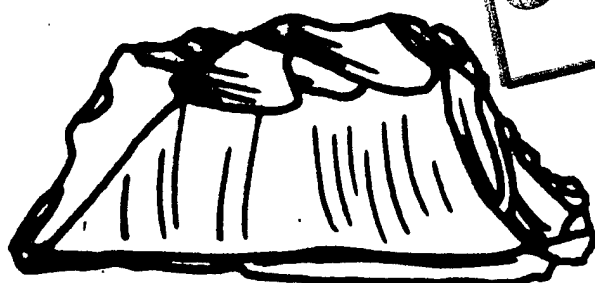
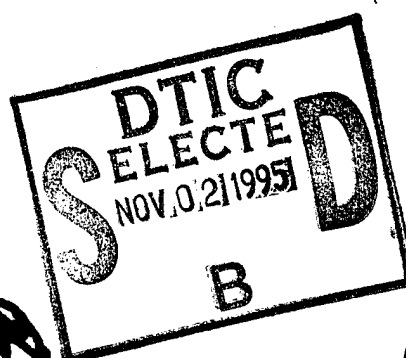




US Army Corps
of Engineers
Omaha District

ARCHEOLOGICAL TESTING OF SITES 32MN228 AND 32MN331, WHITE EARTH BAY AREA OF LAKE SAKAKAWEA, MOUNTRAIL COUNTY, ND

VOLUME 1 MAIN REPORT



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Prepared by:
Augustana College
Sioux Falls, South Dakota

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ARCHEOLOGICAL TESTING OF SITES 32MN228 and 32MN331,
WHITE EARTH BAY AREA OF LAKE SAKAKAWEA,
MOUNTRAIL COUNTY, NORTH DAKOTA

VOLUME 1
MAIN REPORT

by

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JANUARY 1989

Prepared For
U.S. ARMY CORPS OF ENGINEERS, OMAHA DISTRICT
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ARCHEOLOGY LABORATORY OF THE CENTER FOR WESTERN STUDIES
AUGUSTANA COLLEGE, SIOUX FALLS, SOUTH DAKOTA

ARCHEOLOGICAL CONTRACT SERIES NUMBER 42

19. (cont.)

Pollen Samples	Excavation
Soil Cores	Integrity
Stone Circles	Flotation
Screening	Knife River Flint
Upper Component	Lower Component
White Earth Bay	

20. (cont.)

No distinct subsurface features were located, but one test unit at site 32MN331 suggested the presence of two cultural occupations. One stone circle and a possible cairn remain at site 32MN228. However, the controlled subsurface testing, surface survey and cutbank inspection indicate that little additional or significant information would be obtained from continued excavation at these sites. Therefore, they are not considered eligible for nomination to the National Register of Historic Places.

ABSTRACT

Test excavations were conducted at two previously recorded prehistoric archeological sites, 32MN228 and 32MN331, located in the White Earth Bay area of Lake Sakakawea in Mountrail County, North Dakota. The sites were evaluated in terms of their eligibility for nomination to the National Register of Historic Places. The evaluation of these sites documented continuing impact/disturbance by both human (stone removal, planting of shelterbelts) and natural (shoreline erosion) forces.

No distinct subsurface features were located, but one test unit at site 32MN331 suggested the presence of two cultural occupations. One stone circle and a possible cairn remain at site 32MN228. However, the controlled subsurface testing, surface survey and cutbank inspection indicate that little additional or significant information would be obtained from continued excavation at these sites. Therefore, they are not considered eligible for nomination to the National Register of Historic Places.

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Type and Purpose of Investigation

This report details the evaluation of two prehistoric sites, 32MN228 and 32MN331, located in the White Earth Bay area of Lake Sakakawea in Mountrail County, North Dakota. The sites were examined in regard to their eligibility for nomination to the National Register of Historic Places. The purpose of the work requested by the Omaha District, U.S. Army Corps of Engineers (DACW45-88-T-1369, dated February 18, 1988) was to meet the District's obligation to Federal preservation legislation and associated implementing regulations with regard to cultural resource management (see Appendix A).

Specifically, the scope-of-work called for an exhaustive search of all background literature on the White Earth Bay area of Lake Sakakawea and the sites identified for testing; fieldwork to recover information contained in these sites; analysis of sufficient intensity to clearly establish whether or not either site is eligible for inclusion in the National Register of Historic Places; and the preparation of a technical report.

Project Location

The two sites are located near the former confluence of the White Earth River and the Missouri River valleys. Figure 1 reproduces a 1943 (pre-reservoir) map of this area. Today much of the area is inundated by Lake Sakakawea as a result of the construction of Garrison Dam. Site 32MN331 is located on a low terrace, while site 32MN228 is situated on the second terrace above the current water level of Lake Sakakawea. A third, upper terrace is located further inland. An extensive stone circle site, 32MN335, is located on this upper terrace edge and several of the finger ridges which extend towards the second terrace. The latter site is not part of the current evaluation.

Lake Sakakawea is situated in western North Dakota within the Williston Basin and is included in the Great Plains Province (Fenneman 1931). Figure 2 depicts the general location of the project area in relation to this larger region.

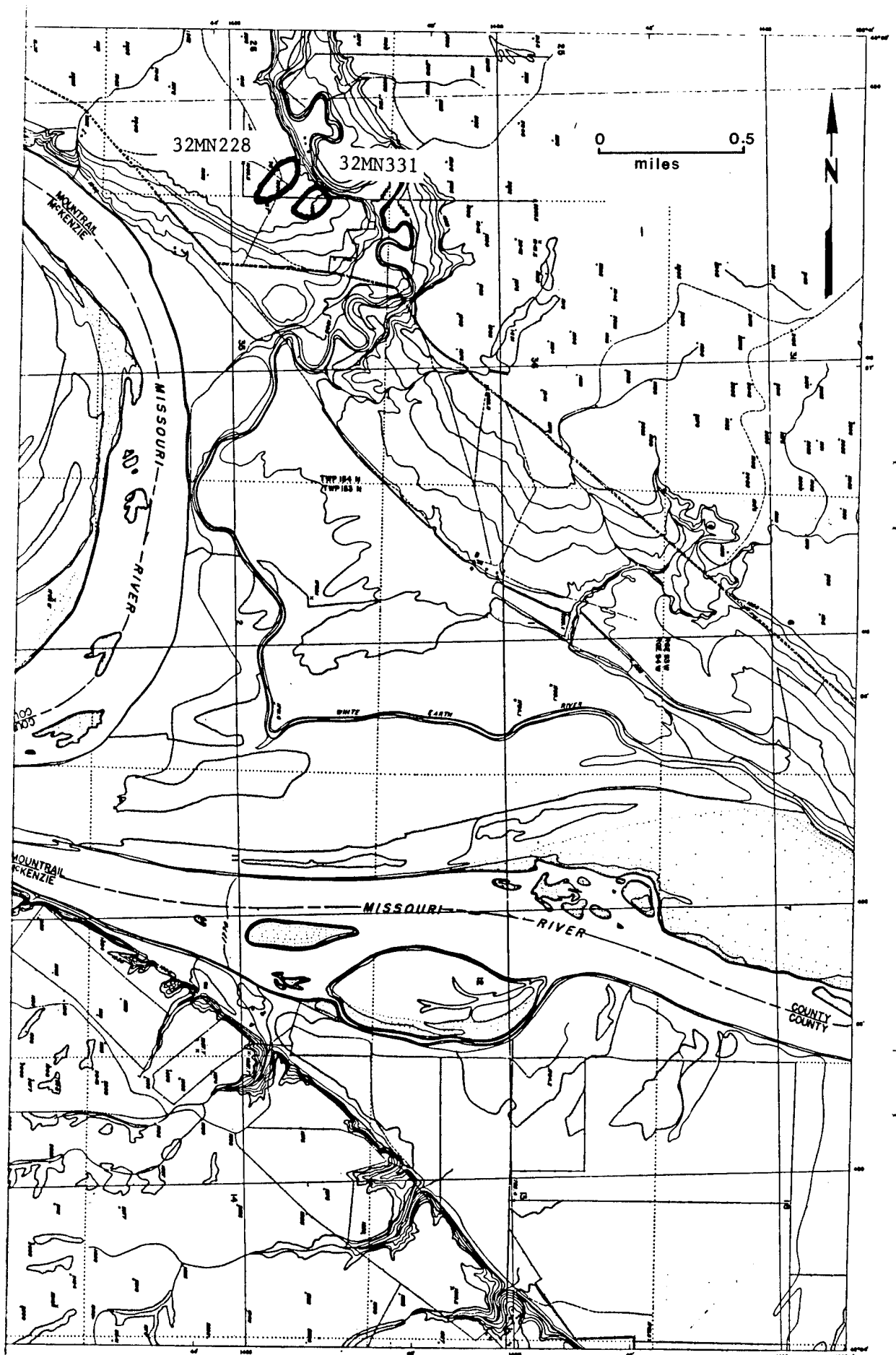


Figure 1. Pre-reservoir (1943) map of the project area.

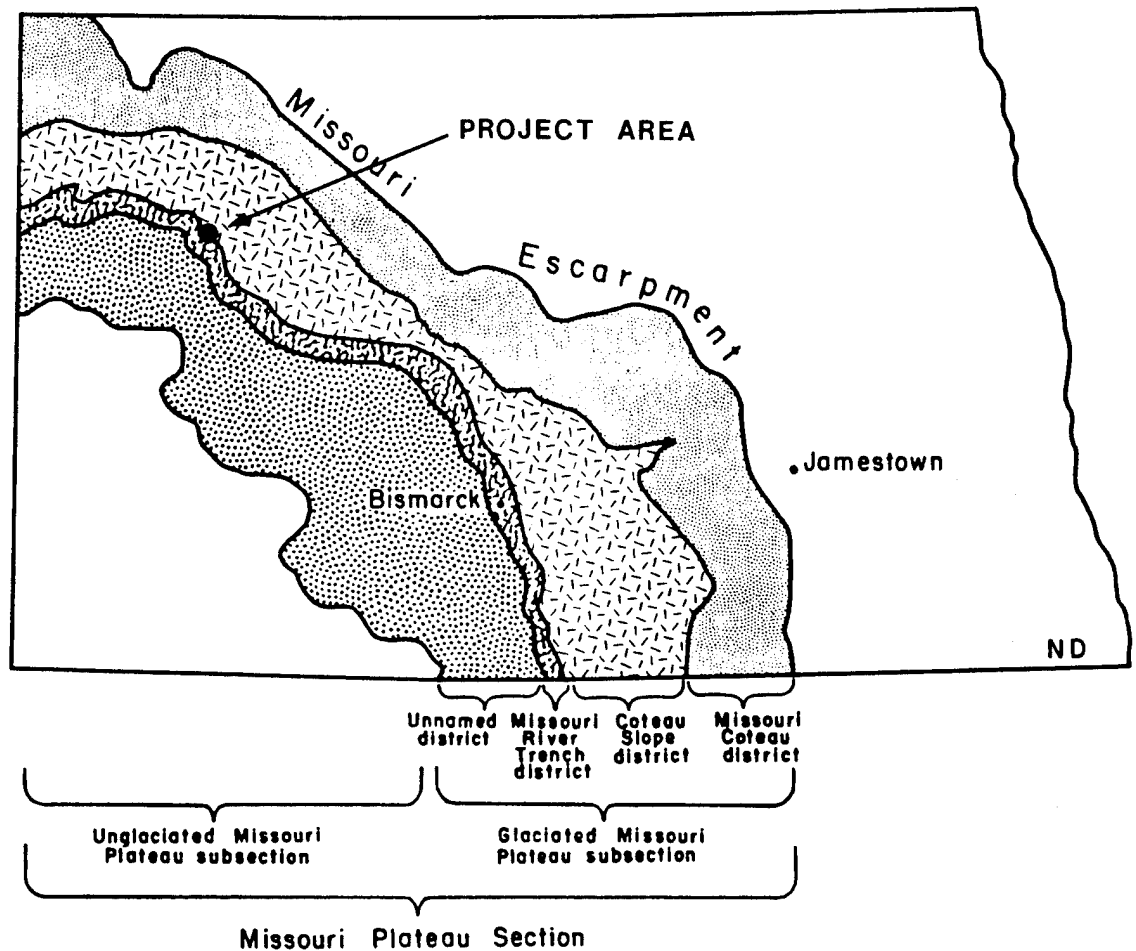


Figure 2. General location of the project area within the Great Plains Physiographic Province (after Wyckoff and Kuehn 1983:Figure 4:11).

Sites 32MN228 and 32MN331 which were evaluated under this scope-of-work are located within Lehmer's Garrison region of the Middle Missouri subarea (Lehmer 1971:Figure 21). In an overview of the prehistory of western and central North Dakota, Mountrail County, along with Burke, Divide and Williams counties, has been placed within the Northwest Study Area (Gregg 1985).

This area has recently been the focus of a large-scale archeological survey (Winham, Lippincott and Lueck 1987). The regional prehistory and history documented by this survey, and earlier surveys, spans more than 10,000 years, extending from the Paleoindian period to the recent Historic period. The specific sites under investigation, 32MN228 and 32MN331, are represented by a stone circle complex and a buried prehistoric component which may or may not relate to the stone circle site. The cultural/temporal affiliation of these sites is not known, but a Late Prehistoric association is likely.

Curation of Artifacts and Site Records

All site records and artifacts are curated with the U.S. Army Corps of Engineers, Omaha District, Omaha, Nebraska.

Report Organization

The report is organized in accordance with the outline presented in the scope-of-work (Appendix A). Background information is provided first and is followed by a discussion of the research orientation and fieldwork methodology. The main body of the report consists of the results of the fieldwork and analysis of the data. In the concluding section, the results are reviewed and discussed and recommendations are made.

Work Schedule

Following receipt of the notice to proceed, the Archeology Laboratory of Augustana College contacted Virginia Gnabasik, formerly U.S. Army Corps of Engineers Archeologist in Riverdale, North Dakota, and obtained updated information on both sites to be examined. Mr. Roy Snyder, Garrison Dam/Lake Sakakawea Project Manager, was also contacted and informed of the proposed project and dates of the fieldwork.

Other professional archeologists familiar with the project area, including Fred Schneider (University of North Dakota [UND]), Tom Haberman (South Dakota Archeological Research Center), the staff of UNDAR-West, and Larry Robson (formerly U.S. Army Corps of Engineers Archeologist, Riverdale), were also questioned about the area.

The field crew, comprised of R. Peter Winham, Edward J. Lueck and Lynette Rossum, arrived at the U.S. Army Corps of Engineers offices in Riverdale on the morning of April 27, 1988. The crew met with Tim Kolke of Real Estate who provided a map of the project area which demarcated the following land divisions: a) Corps lots (unsold); b) privately owned lots; and c) concessionaire leased lands. [Note: This map showed Lot 63 as privately owned, while the map provided in the scope-of-work showed Lot 63 as U.S. Army Corps of Engineers property.] Mr. Kolke also provided the crew with the name of the concessionaire, Bruce Gunderson, and his telephone numbers.

The afternoon of April 27 was spent at the project area inspecting the cutbank at site 32MN331 and flagging observed surface materials. The crew also met with Bruce Gunderson and with one of the lot owners, Mr. R.C. Peyton, a permanent resident.

Subsurface testing was initiated on April 28, 1988, and continued until May 4, 1988. On the one day that fieldwork was terminated early due to rain, the crew visited the Soil Conservation Office in Stanley and began to process recovered artifacts. Upon completion of the fieldwork the crew spent part of a day at the North Dakota Heritage Center undertaking additional research for the project prior to returning to Sioux Falls.

The study region defined for this project encompasses the area around the present mouth of the White Earth River in Mountrail County, North Dakota. Today the confluence of the White Earth and Missouri rivers is inundated by Lake Sakakawea. In the past the meandering of both rivers probably shifted the actual confluence, but in 1943 (Figure 1) the confluence occurred some distance east of the project area.

The White Earth River is one of several south-flowing tributaries of the Missouri River. Within the project area the river valley is broad, approximately half a kilometer in width, and steep-sided, with bluffs extending over 200 feet above the reservoir level.

The geologic map of the project area indicates that it is underlain by the Tongue River Formation - sandstone, shale and lignite (Bluemler 1975). Physiographically the area is located within the Missouri Plateau Section, Glaciated Missouri Plateau Subsection of the Great Plains Physiographic Province (Wyckoff and Kuehn 1983:Figure 4:11). The sites under investigation are situated along the left bank of the Missouri River trench near its confluence with the White Earth River.

The local topography displays a steep drop along the northeastern edge of the area down to the White Earth River. To the northwest lie the slopes transitional to the upland terrace. The slopes descending from the second to the first terrace are fairly steep, but short, while from the first terrace the land slopes gently to Lake Sakakawea.

Vegetation on the second terrace is a mixed grass prairie, while the first terrace is characterized primarily by disturbed ground vegetation crossed by numerous two-tracks. Buckbrush, wild rose and hardwood trees are established in some draws and low areas of the site. Portions of the study region are categorized as a series of distinct ecosystems including the Bottomland Ecosystem, River Breaks Ecosystem, Terrace Ecosystem, and Upland Grassland Ecosystem, as defined in the State Historical Society of North Dakota's Training Manual (Snortland-Coles and Perry 1986:22-24).

The Bottomland Ecosystem includes all land occupied by rivers and streams and their annual floodplains. Flora consists of cottonwoods (Populus deltoides), sandbar willows (Salix interior) and junipers (Juniperus communis), western wheatgrass (Agropyron smithii), green

needlegrass (Stipa viridula), big bluestem (Andropogon gerardi), needle-and-thread grass (Stipa comata) and fringed sagewort (Artemisia frigida). Normally this ecosystem is inundated by Lake Sakakawea.

The Terrace Ecosystem is comprised of former river bottoms and floodplains that are presently situated adjacent to, but higher than, the present Bottomland Ecosystem. Flora includes a predominance of blue grama (Bouteloua gracilis), western wheatgrass (Agropyron smithii), needle-and-thread grass (Stipa comata), and/or prairie sandreed (Calamovilfa longifolia). The major terraces in the project area are along portions of the Missouri River and White Earth River.

The Upland Grassland Ecosystem includes "hilly uplands interspersed by rounded hills with steeper-sided knobs of sandstone, siltstone, silty shales, and clay stone bedrock" (Stewart and Stewart 1973). Soils are loamy, clayey and sandy and support a sparse, but varied, vegetative community. Flora includes a predominance of little bluestem (Andropogon scoparius) with needle-and-thread grass (Stipa comata), prairie sandreed (Calamovilfa longifolia) and, on thicker soils, western wheatgrass (Agropyron smithii), blue grama (Bouteloua gracilis), green needlegrass (Stipa viridula), and big bluestem (Andropogon gerardi).

The River Breaks Ecosystem, located adjacent to major rivers and streams, is comprised of deeply dissected "badlands" often barren of plant life, but occasionally supporting scattered shrubs, grasses and forbs.

Soils

The major soil type in the project area is Wabek gravelly loam (1-35 percent slopes), with areas of Cabba-Badlands complex (9-120 percent slopes) adjoining. Wabek gravelly loam is a deep, nearly level to steep, excessively-drained soil on outwash plains and terraces. Permeability is very rapid; runoff is slow to rapid. The soil is very shallow over sand and gravel. A typical pedon of Wabek gravelly loam is recorded as follows:

A1 0-6 inches; dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish-brown (10YR 3/2) moist...slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots...clear smooth boundary.

C1ca 6-11 inches; light brownish-gray (10YR 6/2) gravelly sandy loam, dark grayish-brown (10YR 4/2) moist...slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; disseminated carbonates throughout...gradual wavy boundary.

IIC2 11-60 inches; yellowish-brown (10YR 5/4) stratified very gravelly loamy sand and coarse sand, dark brown (10YR 4/3) moist; single grain, loose, nonsticky and nonplastic; thin crusts of carbonates on underside of pebbles; about 55 percent pebbles; some strata of loam and sandy loam less than 4 inches thick.

(Wright, Schaar and Tillotson 1982:123)

The Cabba-Badlands complex is comprised of shallow, moderately steep to very steep soils that are well-drained and miscellaneous areas of Badland.

Typically, the Cabba soil has a surface layer of grayish-brown loam about 3 inches thick. The next layer is light brownish-gray silt loam about 5 inches thick. The substratum is grayish-brown silt loam to a depth of 18 inches. Below this is soft bedrock. In some places the soil is fine sandy loam; in other places it is silty clay loam. In a few places it has porcelanite in the substratum.

Areas of Badland consist of exposed, silty and clayey sedimentary bedrock that is highly erodible. Badland typically is on south-facing slopes. It is barren of vegetation [Wright, Schaar and Tillotson 1982:24].

Fauna

Throughout the last 10,000 years a wide variety of wildlife would have been present within the study area. A recent study of faunal use based on the descriptions of selected tribal groups within North Dakota, including this study area (Brown, Hanson and Gregg 1983:102-107), lists the following: large mammals - bison (Bison bison), elk (Cervus elaphus), mule deer (Odocoileus hemionus), white-tailed deer (Odocoileus virginianus), pronghorn antelope (Antilocapra americana), big horn sheep (Ovis canadensis), grizzly bear (Ursus horribilis), mountain lion (Felis concolor), moose (Alces americanus); and small mammals - wolf (Canis lupus), coyote (Canis latrans), fox (Vulpes spp.), kit fox (Vulpes velox), bobcat (Lynx sp.), dog [introduced by man] (Canis familiaris),

otter (Mustela lutra canadensis), badger (Taxidea taxus), porcupine (Erethizon epixanthus), beaver (Castor canadensis), racoon (Procyon loter loter), prairie dog (Cynomys ludovicianus), skunk (Mephitis americana), muskrat (Ondatra zibethicus), weasel, ermine (Mustela sp.), mink (Mustela vison), cottontail (Sylvilagus sp.), jack rabbit (Lepus sp.), red squirrel (Sciurus hudsonicus), and ground squirrel (Citellus sp.).

In addition to the mammals, numerous birds and fish were present and hunted by the Native Americans. These included the eagle (Buteoninae), hawk (Buteo sp.), owl (Tytonidae/Stridaidae), prairie-chicken (Tympanuchus cupido), ducks/geese (Anatidae), northern pike, jack fish, yellowhead (Esox lucius sp.), walleye (Stizistiedion vitreum glaudem) and channel catfish (Ictalurus punctatus).

Climate

The climate of North Dakota is described as a typical "continental climate" (Jensen 1972:1), with weather patterns over a period of time characterized by daily and seasonal extremes in temperature, light to moderate precipitation which tends to be irregular in time and coverage, low relative humidity, plentiful sunshine and nearly continuous air movements. Day lengths vary from less than nine hours in December to more than 16 hours in June.

The annual mean temperature in the survey area is around 40°F, varying from a January mean of 7°F to a July mean of 70°F. Extreme highs of around 110°F and extreme lows reaching -54°F have been recorded. About 200 days a year temperatures fall below freezing. The mean freeze free period is ca. 120 days in length, with the last day of the freeze period occurring ca. May 20, and the first day ca. September 18. Annual mean precipitation for the area is 14-15 inches, with 8-8.5 inches falling between April and July. The average annual snowfall is ca. 30 inches (Jensen 1972).

Extremes of weather are not uncommon in North Dakota. Tornadoes, wind storms, hail storms and blizzards generally occur an average of several times a year.

Field Survey Conditions

As is typically the case during projects conducted in the spring of the year, the field crew experienced a very wide range of weather patterns. The testing program began with hot (80°F) and sunny conditions, but the weather had shifted to very cold, wet and windy conditions by the close of the fieldwork session. Almost a full day was lost to rain during this time.

Human Geography

The effects of human impact on the project area are most obvious. Undoubtedly, the greatest effect on the study area has resulted from the construction of Garrison Dam, begun in 1947, and the subsequent flooding of 383,000 acres, much of it prime farmland, to create what is now Lake Sakakawea.

Presently the project area is being developed for cottage lots and as a recreation area. A number of homes are now occupied year-round. The nearest major centers of population are Stanley and New Town.

3.

PREVIOUS CULTURAL RESOURCE INVESTIGATIONS

Several cultural resource management investigations have been conducted in the general project area. The most recent summary of these investigations is that compiled by Gnabasik (1988). The specific sites under consideration were first positively identified and recorded during a 1974 shoreline survey by the Department of Anthropology and Archaeology, University of North Dakota, Grand Forks (Haberman and Schneider 1975). A locality called the "Overgrown Site" was assigned site number 32MN228 and was described as follows:

This site consists of two groups of tipi rings on a point of land bordered by the west shore of White Earth Bay and the north shore of Lake Sakakawea. One group of three rings is situated at the eastern edge of the site overlooking what was the White Earth valley. The other, a group of four tipi rings, is located at the western edge of the site in a sloping area below the end of a high ridge. Widely scattered flakes were found along recent dirt roads through the area and along the edge of the slope leading to the beach at the east side of the site. This rather extensive area is designated as one site, estimated to cover approximately a quarter of a section. This area was probably intermittently occupied on several different occasions....The rather small lithic sample from the site includes flakes and a possible core fragment of Knife River flint and flakes of gray metamorphosed shale, brown chert, white agate, and gray quartzite....The area has excavation potential but cultural material may be thinly scattered over a wide area [Haberman and Schneider 1975:64-65].

Site 32MN228, as initially described, apparently included sites 32MN331 and 32MN228 as discussed below, as well as site 32MN335 (Gnabasik 1988:4). Later investigations recorded many more stone circles; materials presently associated with 32MN228 and 32MN335 are separated by a distance of about 285 m.

In 1980, Larry Robson recorded 28 stone circle features and one stone cluster in what is here defined as site 32MN228. These features were mapped (Figure 3) and all have been subsequently removed. The stones were placed in piles (Plate 1). The exact relationship of the stone circles recorded in 1974 to those recorded by Robson in 1980 is not readily reconstructable.

NOTE: Feature #1 measured 20' in diameter and Feature #10 measured 10' along the N-S axis and 12' along the E-W axis. Both of these features are mapped accordingly. The remaining features are mapped to represent the average ring diameter of 15'.

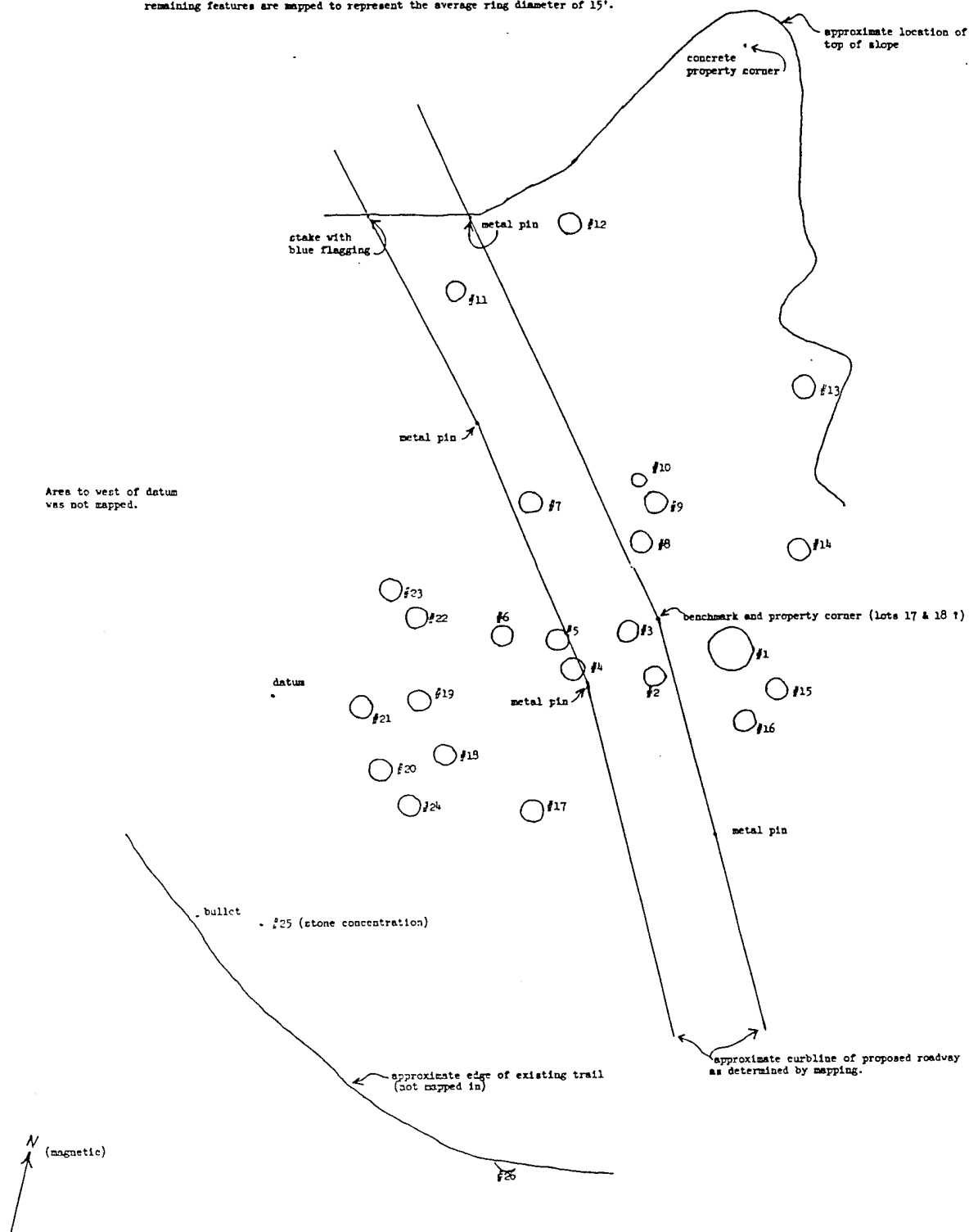


Figure 3. Plane table map of cultural features 1-26.

Figure 3. Map of stone circles recorded at 32MN228 in 1980
(from Robson 1980).

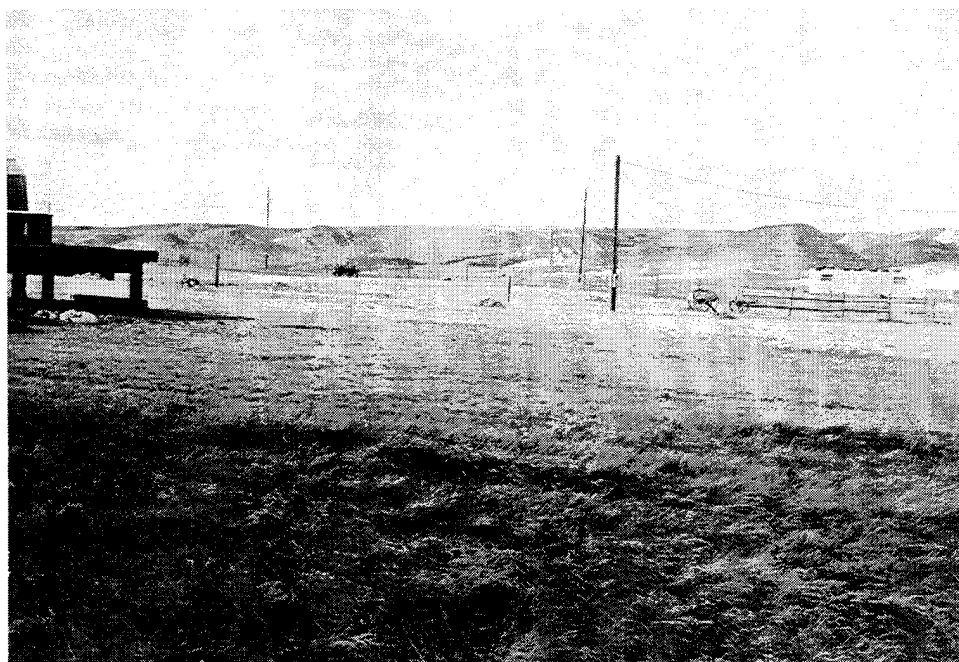


Plate 1. Stone piles (former stone circles) at 32MN228, view facing N.

Robson also inspected the area around the boat ramp which had been upgraded from a steel to a concrete ramp, but observed no cultural resources in that location (Robson 1980:4).

In 1981 Robson (1981) surveyed a 50-foot-wide right-of-way (ROW) that originated on the ridgetop northwest of cottage lots 26 and 27, and ran between a two-track dirt road to the west and a seasonal drainage to the east. No cultural resources were observed in the ROW, but a cairn and a stone circle were noted approximately 80 feet southwest of the ROW in the NE $\frac{1}{4}$, SW $\frac{1}{4}$ of Section 26. These features may relate to site 32MN335 (below).

In 1985, as part of a reconnaissance survey of all U.S. Army Corps of Engineers lands adjoining Lake Sakakawea in Mountrail County, archeologists from the Archeology Laboratory of Augustana College reexamined the area. Two new site numbers (32MN331 and 32MN335) were assigned to this area and 32MN228 was redefined. Site 32MN228 relates to the stone circle site on the second terrace, and site 32MN331 to a cultural material scatter located on the first terrace and around the lakeshore. In 1985, three apparent stone circles were observed at 32MN228, as most of the previously recorded circles had been destroyed. The stone circles observed on the ridge slopes and upper terrace edge were assigned site number 32MN335.

The 1985 site map of 32MN228 (Figure 4) depicts a scatter of lithic material (A) along the northeast edge of the site as well as some isolated flakes (D, F) and a transverse scraper (E) to the southwest. At site 32MN331 a sparse lithic scatter was recorded along the beach area and material was observed eroding from the cutbank.

Previous archeological, historical and ethnohistorical investigations in this vicinity have identified a variety of cultural affiliations with which sites 32MN228 and/or 32MN331 might be related. Human presence ranging from the Paleoindian period to the historic fur trading and homesteading periods is represented nearby. Documentation of a Paleoindian presence comes from a local collector who reported that a Folsom projectile point produced on Knife River flint (KRF) (heavily patinated) was found on the east point of White Earth Bay (John Vachal personal communication 1985) in the vicinity of 32MN219 (Winham, Lippincott and Lueck 1987:50). This site is located to the southeast across the bay from 32MN228 and 32MN331.

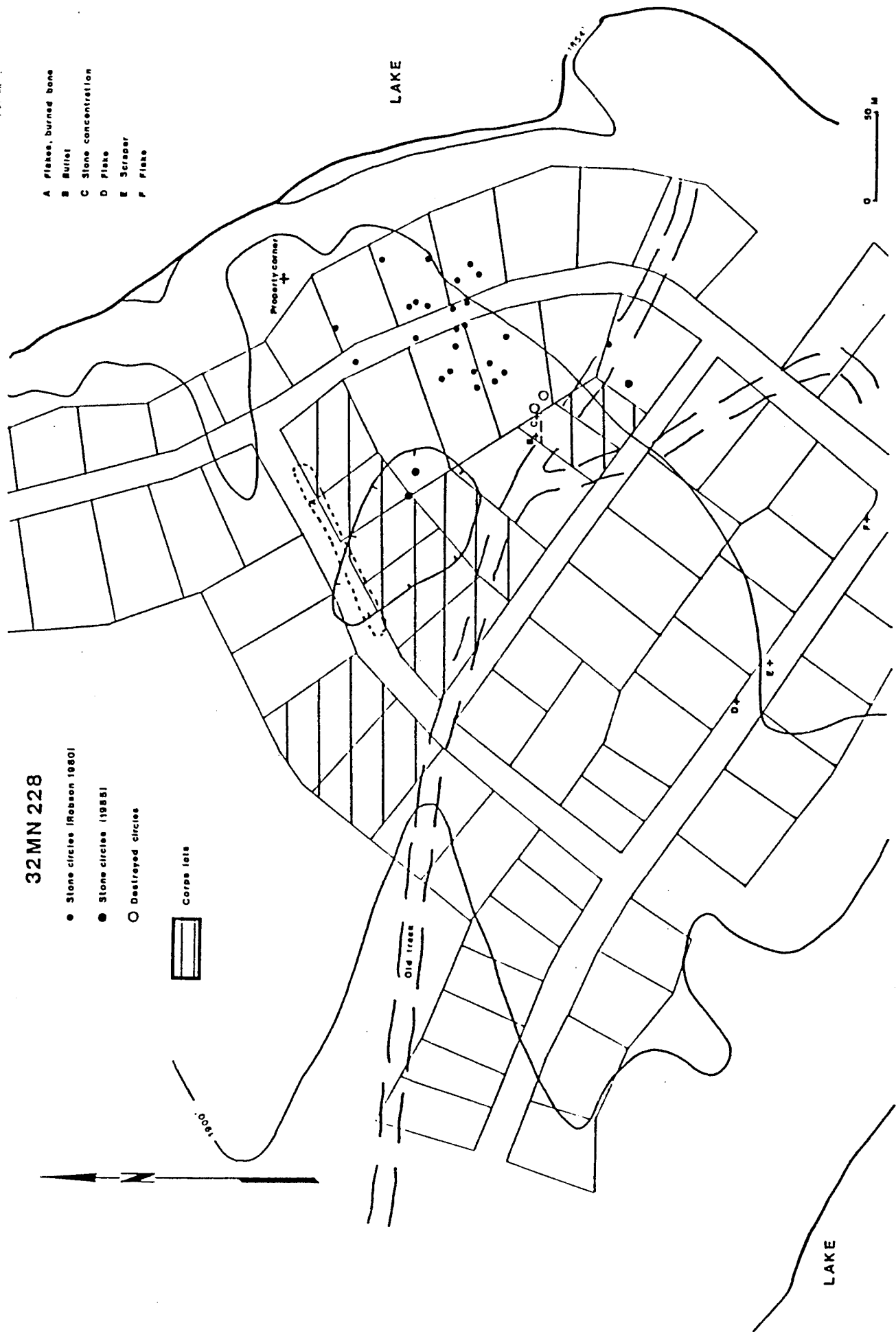


Figure 4. 1985 site map of 32MN228 (from Winham, Lippincott and Lueck 1987). Note: The circles recorded in 1980 had been destroyed by 1985. Only three circles were noted in 1985 and only one was observed in 1988.

Two now-inundated historic sites are also located nearby. Kipp's Post (32MN1) is inundated about 1.6 miles southeast of the project area. Large-scale salvage excavations were undertaken at this site by personnel associated with the Smithsonian Institution River Basin Surveys program (SIRBS) (see Woolworth and Wood 1960). Kipp's Post was the predecessor of the famed Fort Union and the site of a Columbia Fur Company trading post which was built at the mouth of the White Earth River in the fall and winter of 1826-1827, and abandoned in 1829 or 1830 (Woolworth and Wood 1960:247, 255). The post was completely excavated by the SIRBS in 1954.

It appears that Assiniboiné and Mandan groups were also present in the vicinity of Kipp's Post. James Kipp built the post in 1826 and "...remained there during the winter, trading with the Assiniboins" (Woolworth and Wood 1960:253-254, citing Wied-Neuwied 1906, vol. 23:228). "Prince Paul," the Duke of Wurttemberg, visited Mandan Indians at the post in 1830 (Woolworth and Wood 1960:254, citing Bauser 1938, vol. 19:472).

Closer to the project area, but also inundated, is site 32MN21, located about 0.3 miles south of 32MN331. This trading post, known as Hall's Post or Hall's Horse Ranch, was established in 1885 by Edward S. Hall to conduct business with Crow-Flies-High's band of Seceders (Hidatsa). Hall "apparently operated a ranch in the vicinity of the old trading house in 1893" (Mattison 1955:54). In 1891 (Missouri River Commission 1894:map LVII), a stage road is shown passing near Hall's Horse Ranch and up onto the terrace where site 32MN331 is located. From the ranch, the road (or another road) continues on to the northeast.

In addition to the sites described above, there are a striking number of sizeable stone circle sites in the vicinity. Seventeen stone circle sites are located within 2 miles of the project area, and all but one (32MN332 - 0.38 miles from the river) are located within 0.2 miles of the White Earth River. Site 32MN228 is included in this group. These sites contain from 1 to 39 circles, with an average of 11.4 circles. While Hanson (1984:93-113) suggests that models for seasonal migrations of bison in the Northern Plains are untenable, the frequency of these stone circle sites may reflect recurring use prehistorically of a relatively reliable source of bison; the presence of bison can be substantiated to some degree by historical accounts.

The following overview of the prehistory of the project area focuses on the cultural/temporal periods during which the sites under study may have been occupied. For this overview a broad timeframe is reviewed because the sites have not been accurately dated.

The recovery of a ceramic bodysherd from 32MN331 suggests that at least one occupation of the site occurred during the Plains Woodland or Plains Village period. However, stone circle sites have been documented to have an antiquity of greater than 3000 years B.P.

The focus of this overview is the Garrison region of the Middle Missouri subarea of the Northern Plains (Figures 5 and 6). Figure 7 presents a published chronological model for the Northern Plains region (Gregg 1983:Figure 6.4) that is broadly applied in the following discussion of the cultural history of the study area.

Two more regionally-specific chronologies have been developed. The first is for the Little Missouri Grasslands region, located south and west of the present study area, for which four general temporal divisions are outlined: the Early Prehistoric period (10,000-6000 B.C.); the Middle Prehistoric period (6000 B.C.-A.D. 500); the Late Prehistoric period (A.D. 500-1780); and the Historic period (A.D. 1780 to present) (Loendorf 1978). The second chronology has been developed for the Knife-Heart region of the Middle Missouri, located south and east of the study area, and is summarized by Lovick and Ahler (1982). This chronology deals with the Plains Village period.

The earliest occupation/peopling of the Northern Plains is dated around 9500 B.C. with the beginning of the Paleoindian tradition. This tradition is characterized by a variety of hunting and gathering strategies, with the emphasis on big game as the staple of the subsistence strategies. Within this tradition, six complexes are recognized: Clovis, Folsom, Hell Gap-Agate Basin, Cody, Plainview and Parallel Oblique Flaked. These complexes differ in part with regard to projectile point stylistics. A Folsom point was recovered from the east point of White Earth Bay near site 32MN219. The most significant Paleoindian site recorded near the project area is the Moe site (32MN101), located just northwest of New Town.

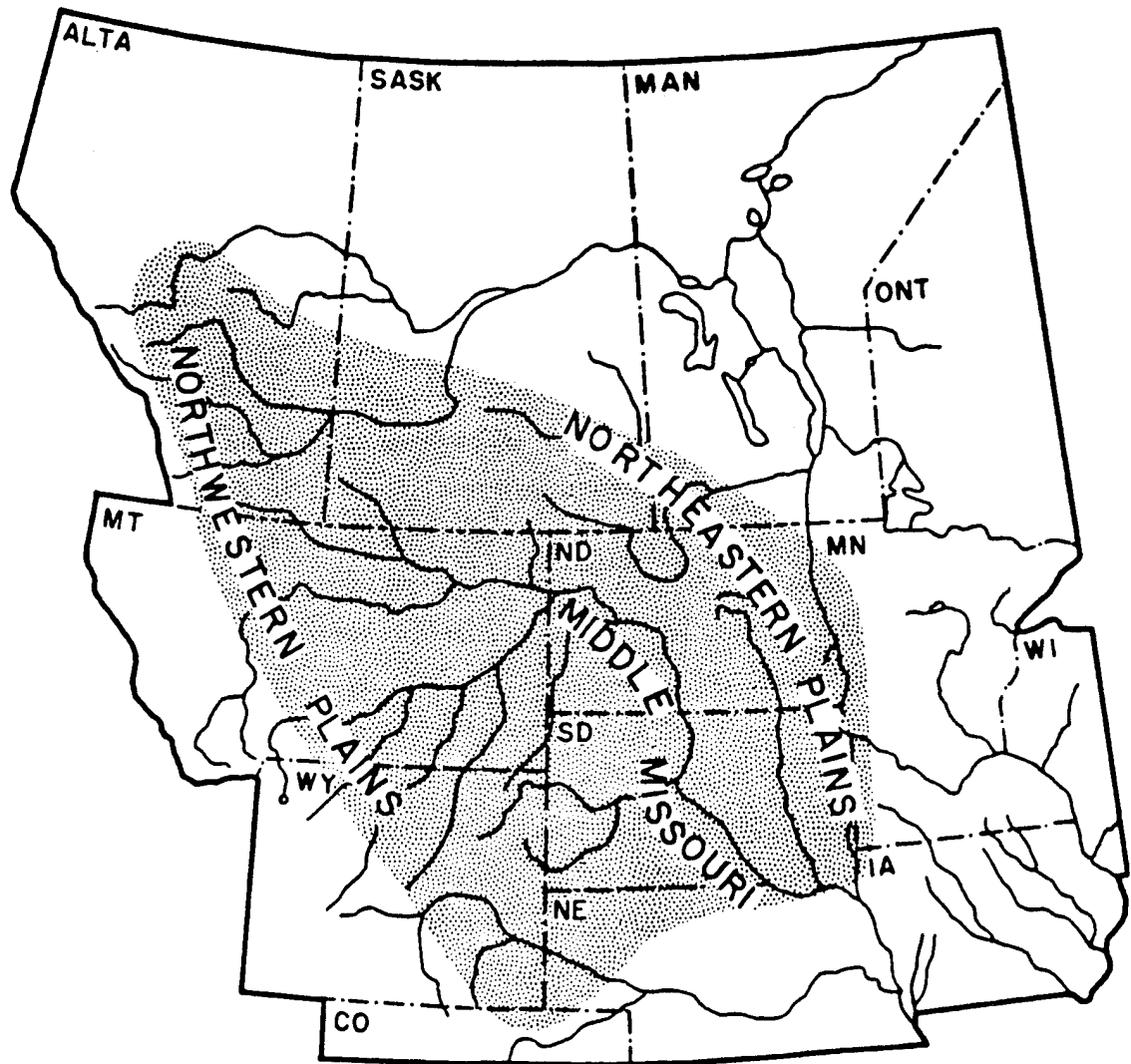


Figure 5. Subareas of the Northern Plains, combining terminology from Griffin (1952), Lehmer (1971:28-29), Lehmer and Caldwell (1966:512), and Wedel (1961:23) [from Gregg 1983:Figure 6.1].

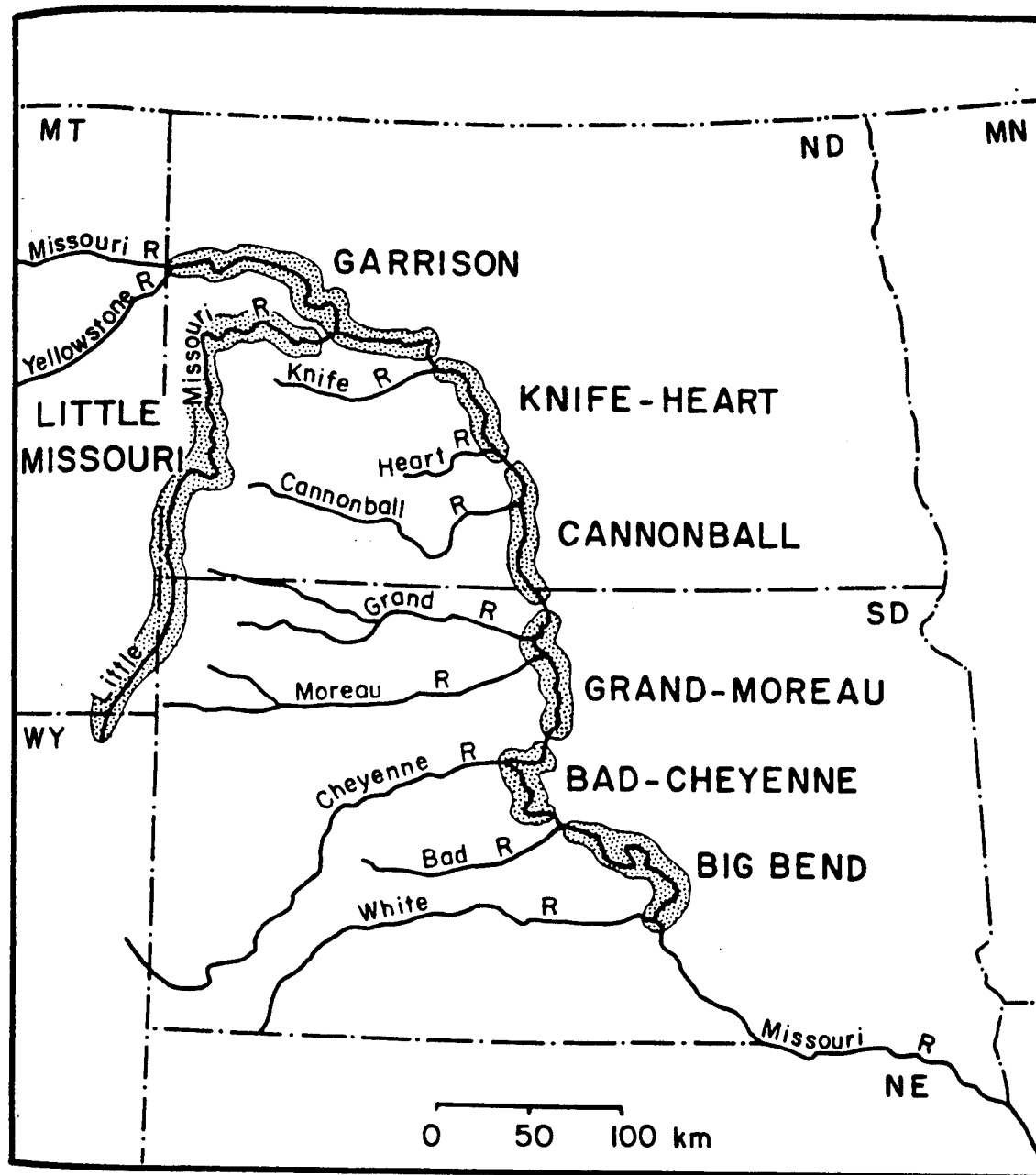


Figure 6. Regions of the Middle Missouri Subarea, from Lehmer (1971: 29), and the Little Missouri Region of the Northwestern Plains Subarea, from Loendorf et al. (1982) [from Gregg 1983:Figure 6.2].

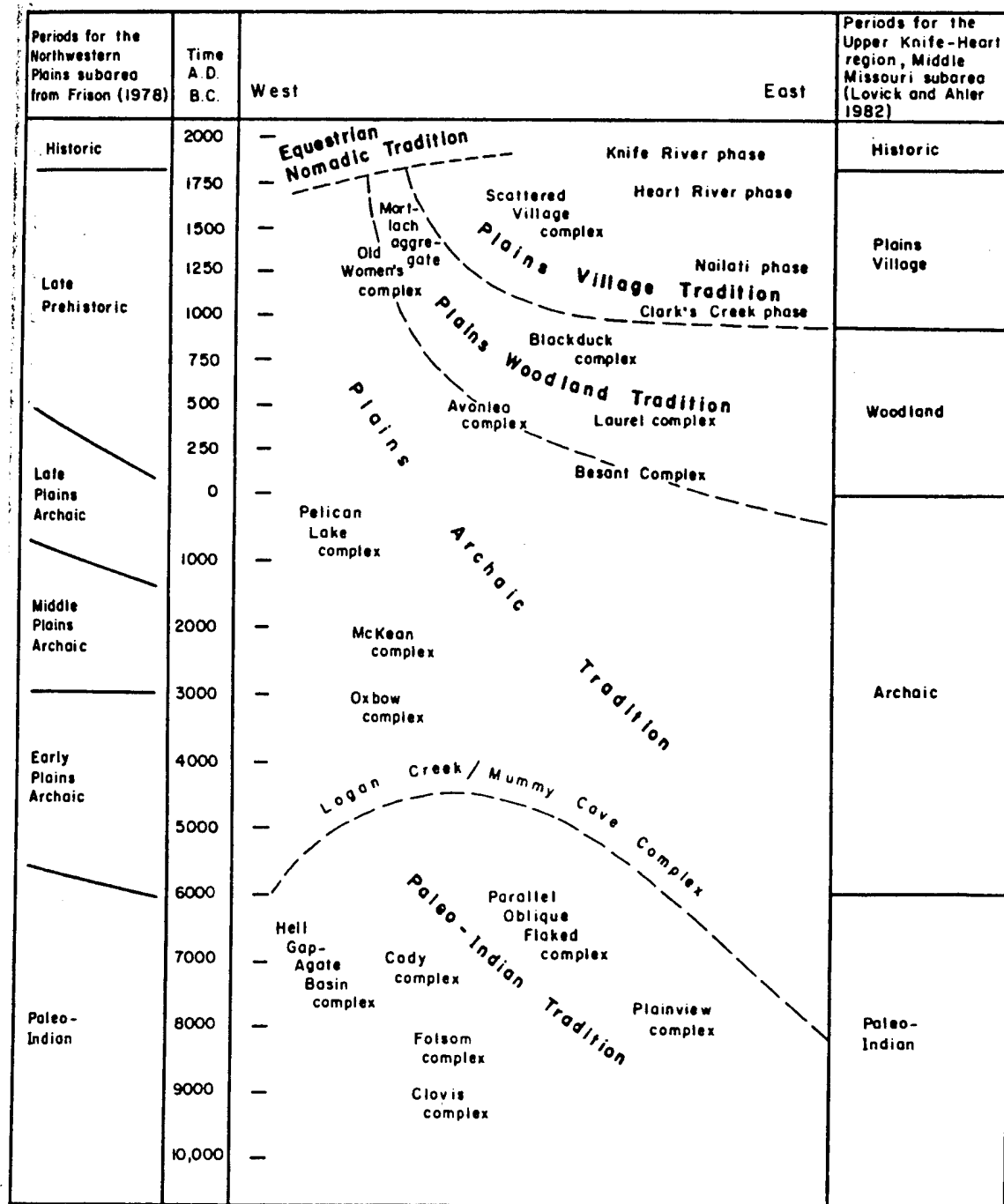


Figure 7. Chronological model for the Northern Plains depicting named archeological units with components known or anticipated in western and central North Dakota (from Gregg 1983:Figure 6.4).

At approximately 5500 B.C., a transition in subsistence economies occurs with a shift from the Paleoindian period emphasis on big game to the Plains Archaic emphasis on a more diversified system of resource exploitation. However, there are regional variations in the extent and emphasis of the changes based on the different potentials of the local environments. In general, it is the adaptation from Pleistocene to essentially modern flora and fauna that marks the change in subsistence strategies. It has been noted that "the majority of the Pleistocene megafauna living in herds...became extinct about 8000 years ago" (Hester 1960:66).

While present evidence from the study region is very limited it suggests that the emphasis was still on big game hunting.

Frison states that human adaptations on the Northwestern Plains during the last 4000 years of prehistory were largely dependent on bison (1971:89)....The termination of the Plains Archaic tradition is also variable. It is likely that some human groups using the study area with this adaptation made a transition to a Woodland adaptation as early as 100 B.C. Other groups, like the Algonkian Blackfeet, developed Equestrian Nomadic tradition adaptations from a Plains Archaic base very late in prehistory [Gregg 1983:256-257].

The named Plains Archaic tradition complexes represented in or close to the study area are the Logan Creek/Mummy Cave and Oxbow complexes (early), McKean complex (middle), and the Pelican Lake complex (late).

The McKean complex includes McKean Lanceolate points, Mallory points, Duncan points, Hanna points, Yonkee points, and associated remains, as well as several unnamed point varieties.

The widespread McKean presence on the Northern Plains has been described as 'explosive' (Wormington and Forbis 1965:190) and 'almost dramatic' (Frison 1978:46). This presence correlates with the beginning of the essentially modern Sub-Boreal climatic episode (cool and moist in comparison with the Atlantic). Faunal and floral resource potentials are believed to have been similar to those of the early Historic period [Gregg 1983:270].

McKean complex materials have been recorded from the Moe site, 32MN101 (Schneider 1975) and from site 32MN234 (Haberman and Schneider 1975), located on an island in Little Knife Bay. A Yonkee-like point was recovered from site 32MN120, located southwest of Pouch Point Bay

(Winham, Lippincott and Lueck 1987). The McKean complex has an extensive distribution and covers a broad time frame, ranging from ca. 3000 B.C. to 510 B.C. The McKean complex may represent the earliest intensive use of the Little Missouri region (Loendorf et al. 1982:51) and the beginnings of a more intensive exploitation of the present study area. Although there has been little detailed evaluation of McKean complex subsistence strategies/adaptations, what evidence there is indicates a heavy reliance on bison hunting. Syms suggests McKean complex groups may have "lived much of the year in small groups and combined into larger groups during the summer for buffalo hunts" (1969:169). In the Little Missouri Grasslands "one pronounced pattern appears to be a concentration of Middle Archaic sites on many of the extensive linear ridge systems which occur throughout the badlands" (Beckes and Keyser 1983:177).

The Pelican Lake complex components follow those of the McKean complex throughout most of the geographic extent of the McKean complex and the adaptive strategies are also similar. "There is considerable taxonomic confusion with the Pelican Lake point type and varieties. Any corner notched or corner removed point dating ca. 1500 B.C. - A.D. 400 is frequently classified as Pelican Lake" (Gregg 1983:273). Points classified as Pelican Lake were recently recovered during a survey from sites 32MN90, 32MN205, 32MN254, 32MN285, 32MN295, and 32MN364 (Winham, Lippincott and Lueck 1987).

Important Pelican Lake components in the nearby Little Missouri Grasslands region include the Sunday Sage site (32BI22) (Simon and Borchert 1981a) and the Ice Box Canyon Ridge site (32MZ38) (Simon and Borchert 1981b).

"Most Northern Plains archeologists agree that Pelican Lake developed out of the McKean complex (cf. Joyes 1970:212; Reeves 1970a:167). In the Little Missouri region...'it appears there was a continuous transition, in terms of exploitation of the region,' from McKean to Pelican Lake (Loendorf et al. 1982:52)" (Gregg 1983:273). However, "the question of whether Pelican Lake cultures represent an in situ development from preceding cultures or a cultural intrusion of Woodland influenced populations" (Beckes and Keyser 1983:185) needs further evaluation.

"Reeves places the 'transition from Hanna to Pelican Lake at ca. 1300 B.C. to 750 B.C.' with regional variations (1970b:330). The temporal range suggested for the Pelican Lake complex in the study area is 1500 B.C. - A.D. 250" (Gregg 1983:273).

A number of unspecified (non-Pelican Lake) Late Plains Archaic points were also recovered from sites 32MN285, 32MN291, 32MN295 and 32MN304 (Winham, Lippincott and Lueck 1987). In addition, records from 32MN22, 32MN101, 32MN212, and 32MN220 indicate the presence of a Late Archaic component. Beckes and Keyser also report that "a class of generalized, as yet untyped, side and corner-notched points of probable Late Archaic affiliation is found on the Grasslands" (1983:193). "This point style diversification may be accounted for by relatively high Late Plains Archaic period human population densities and increased regionalism. Lessened post-Sub-Boreal erosional and depositional landscape modification means increased potential for encountering archeological components from this period" (Gregg 1983:278).

Late Prehistoric/Plains Woodland

"The Woodland period...is characterized by the appearance for the first time of distinctively styled pottery vessels (Johnson and Wood 1980)....populations resident in the Plains during the Woodland period appear to have initially maintained the same basic adaptive strategies characteristic of the earlier Archaic populations" (Lovick and Ahler 1982:53). Another distinguishing feature is mound burial which developed where Woodland groups were able to maintain a relatively high population density; "the resulting social organization permitted the construction of numerous linear and conical burial mounds and possibly a greater emphasis on communal bison hunting (Neuman 1975; Chomko and Wood 1973; Wood and Johnson 1973)" (Lovick and Ahler 1982:53).

The Besant complex is the earliest named archeological unit associated with ceramics within the general study region. Often this complex is placed under the label of the Plains Archaic tradition, and there "may or may not be qualitative differences between Woodland and Plains Archaic lifeways in North Dakota" (Gregg 1983:278). Besant is partially contemporary with late Pelican Lake on the Northwestern Plains, with Laurel to the east and northeast, and with Avonlea.

The Hopewellian Interaction Sphere (Caldwell 1964) was ongoing during a portion of the Besant temporal range....Reeves suggests that KRF entered the...H.I.S. through Besant and that Besant interaction indicates qualitative differences in transportation systems, communication systems, and social organization in comparison with traditional Northwestern Plains hunter-gatherer societies (1970a:172-173) [Gregg 1983:280-282].

Besant projectile points have been recorded at sites 32MN120, 32MN220, 32MN332, 32MN347 and 32MN365 (Winham, Lippincott and Lueck 1987). Reeves suggests a Besant temporal range of A.D. 1 to A.D. 700 or 800 in the Northern Plains (Reeves 1970b).

The Besant complex is one of several complexes within the Plains Woodland tradition and is represented in the vicinity of the present project boundaries. Wood (1956) reports a Plains Woodland tradition site south of the Missouri River in northern McKenzie County (32MZ2). The Midipadi Butte site, which exhibits evidence of Plains Woodland tradition occupation (Good and Hauff 1977; Kuehn et al. 1982), is also located along the southern side of the Missouri River. Additionally, the Moe site (Schneider 1975) contains evidence of Plains Woodland tradition occupation.

In the Knife-Heart region "it now appears that the Woodland period in the area can be divided into at least two subparts, Early/Middle Woodland (ca. A.D. 1-500) which is distinguished by the use of dart or spear points, and Late Woodland (ca. A.D. 500-1000) which is characterized by the occurrence of arrowpoints and by inference the introduction of the bow and arrow" (Lovick and Ahler 1982:53).

The Avonlea complex is considered to have developed in place out of Pelican Lake (Reeves 1970a) with a temporal range in the study area of ca. A.D. 450-1000. Avonlea consists of a distinctive projectile point type as well as a number of components (all late) containing ceramics. A single Avonlea point was recognized at site 32MN269 (Winham, Lippincott and Lueck 1987), but very few other Avonlea components are reported for North Dakota and none are reported from the Little Missouri region (Gregg 1983:294).

Late Prehistoric/Plains Village

Other than Besant and Avonlea components, which have been classified within the Plains Woodland tradition, no distinctive Plains Woodland material is recorded from the study area. Diagnostic prehistoric material recovered on a recent survey, and referred to as either "Late Prehistoric Corner/Side Notched," "Plains/Prairie Side/Corner Notched" or "Late Prehistoric unnotched," included items from the following sites: 32MN101, 32MN120, 32MN205, 32MN206, 32MN219, 32MN220, 32MN351, 32MN354, 32MN362, 32MN363 and 32MN372 (Winham, Lippincott and Lueck 1987). Specific dating of these points is lacking and they may range from the Woodland through the Plains Village periods.

The Plains Village tradition in the general study area, which includes the Garrison subarea of the Missouri River and the Little Missouri region, is not well-documented. Few earthlodge villages are present, and most of the sites of this period are periodic or seasonal occupation sites. In western North Dakota, the Mondrian Tree site (32MZ58), the Dune site (32MZ502), the Flat Top Butte site (32MZ422), the Wilkins site (32SL7) and the Geary Bison Kill (32BI4) are examples of non-earthlodge Plains Village sites. The checked stamped and cord impressed ceramics found at site 32MN350, along Crane Creek, probably represent a transitory Plains Village site (Winham, Lippincott and Lueck 1987). Ceramic material was also previously recorded at sites 32MN8, 32MN9, 32MN211 and 32MN234.

Stone circle sites or tipi ring sites are most often associated with the Late Prehistoric period, but several have been shown to date to the Middle/Late Archaic periods and some are possibly earlier (Winham 1982:23.2). Another site type associated with the Plains Village period in the study area is the eagle trapping pit.

Lehmer's synthesis of the Middle Missouri region (1971) continues to represent the prevailing general framework within which Missouri River archeologists work. He defined three traditions which influenced the development of the Middle Missouri region during the Plains Village period - the Central Plains tradition, the Middle Missouri tradition (including three variants: the Initial, Extended, and Terminal), and the Coalescent tradition (including the Initial, Extended, Post-Contact and Disorganized variants).

"There are no Initial Middle Missouri variant sites presently recognized in North Dakota. However, heavy utilization of KRF at Initial variant villages in the lower Bad-Cheyenne and Big Bend regions (Lehmer 1971:77) indicates interaction with groups in the study area [KRF quarries-Dunn County] on this early time level" (Gregg 1983:306).

The Central Plains tradition is not directly represented by any sites in the Middle Missouri area, but its influences are apparent. In the vicinity of Lake Sakakawea, the earliest village sites are of the Extended Middle Missouri variant, appearing ca. A.D. 1000-1050, with one site - Grandmother's Lodge (32ME59) - located just south and east of Mountrail County. The only other known village sites near the survey area are classified as Disorganized Coalescent, and include Rock Village (32ME15) and Jacobsen/Nightwalker's Butte (32DU1/18).

It is generally understood that the prehistoric village cultures eventually developed into the Mandan, Hidatsa, and Arikara tribes who inhabited the Middle Missouri subarea in historic times. The Arikara have oral traditions of having moved into the Missouri valley from areas to the south, in particular from the Central Plains, and the archeological record supports these traditions to a great degree (Deetz 1965:5-7). Likewise, the Mandan have oral traditions in which various parts of the tribe moved to their eventual homeland in South Dakota and particularly North Dakota from somewhere to the east and southeast (Bowers 1948:19-24; 1950:15-18), and to some extent the archeological record also supports these traditions. The Hidatsa have distinct traditions for three different subparts of the tribe, with the Hidatsa Proper and the Awaxawi claiming to have arrived on the Missouri River from the east, and with the third subtribe of the Hidatsa, the Awatixa, claiming to have always lived on the Missouri River in the Knife-Heart region (Wood 1980; Bowers 1948:17-19) [Lovick and Ahler 1982:56].

Lovick and Ahler's recent reassessment of the Plains Village period in the Knife-Heart region (1982:54-84) shows a much more complex set of interactions and processes of coalescence that can be incorporated into either Lehmer's (1971) or Bowers's (1948) classificatory schemes. Six "phases" in the Plains Village prehistoric and historic periods are recognized in the Knife-Heart region, which following Lovick and Ahler (1982:Table 2) are: Clark's Creek phase, A.D. 1000-1200 [within Lehmer's Middle Missouri tradition and Bowers's Cannonball focus];

Nailati phase, A.D. 1200-1400 [within Lehmer's Middle Missouri tradition and Bowers's Painted Woods focus]; Heart River phase, A.D. 1400-1710 [within Lehmer's Coalescent tradition and Bowers's Heart River focus]; Scattered Village complex(es), A.D. 1400-1700 [within Bowers's Upper Grand focus and Painted Woods focus]; Unnamed phase, Protohistoric, A.D. 1710-1750 [within Lehmer's Coalescent tradition and Bowers's Heart River focus]; and the Knife River phase, A.D. 1750-1861 [within Lehmer's Coalescent tradition and Bowers's Heart River focus].

Euro-American Period

The Historic period in the area is focused on the Missouri River which served as a major transportation route utilized by native tribes, fur traders, travelers, gold seekers, soldiers and settlers. Early exploration of the Lake Sakakawea area by Euro-Americans was directed at a search for new sources of furs for the fur trade and included expeditions by the La Verendrye brothers (1730s-1740s), Jean Baptiste Truteau (1790s), Loisel (1800s), Francois-Antoine Larocque (1805) - who recorded seeing many bears and skunks when they crossed the "lesser Missory" on October 7, 1805 (Wood and Thiessen 1985:198) - and Lewis and Clark (1804/1806).

No historic Euro-American materials were recovered during the present site investigations, although the locations of Hall's Post (32MN21) and of Kipp's Post (32MN1) are nearby. Woolworth and Wood (1960) excavated Kipp's Post, a Columbia Fur Company trading post apparently built at the mouth of the White Earth River in the fall and winter of 1826-1827. Hall's Post is recorded as having been established by E.S. Hall in 1885 for trade with the band of Gros Ventre chief, Crow-Flies-High (Kivett 1947:SIRBS Site Form). Metcalf (1952:SIRBS Survey Form) records that Hall also had a horse ranch here and that there is some evidence the site was abandoned about 1900.

Stone Circle Sites and the White Earth River Region

During a recent survey of U.S. Army Corps of Engineers property alongside Lake Sakakawea (Winham, Lippincott and Lueck 1987), a portion of the lands bordering the White Earth River were surveyed. Seventeen stone circle sites were present in this area. These sites are summarized in Table 1.

Table 1. Summary of Stone Circle Sites on U.S. Army Corps of Engineers Lands in the Vicinity of the White Earth River.

SITE #	# OF CIRCLES	NEAREST WATER	INSIDE CIRCLE DIAMETER RANGE (m)	AVERAGE DIAMETER (m)
32MN228	25+	WER	ca. 3.00 - 6.09	ca. 4.57
32MN173	3	WER	3.80 - 5.75	4.75
32MN174	½ (semi)	WER		
32MN175	10	WER	3.12 - 5.57	4.20
32MN176	17	WER	3.59 - 7.00	4.61
32MN177	1	WER	4.29	4.29
32MN178	15	WER	2.52 - 7.18	4.76
32MN179	8	WER	3.37 - 7.95	4.49
32MN180	1	WER	3.12	3.12
32MN181	11	WER	2.97 - 5.65	3.81
32MN182	2	WER	3.90 - 4.34	4.12
32MN185	4	WER	3.38 - 5.56	4.68
32MN224	23+	WER	3.40 - 10.02	6.10
32MN226	13	WER	3.81 - 7.07	5.03
32MN334	39	WER	2.24 - 6.00	4.63
32MN335	19	WER	2.91 - 5.23	4.10
32MN375	5	WER	2.93 - 5.01	4.00

WER = White Earth River

Site 32MN228 is one of several large stone circle sites in this area at which over 15 circles were recorded. A review of the data recovered from the Northern Border Pipeline survey, a major linear survey crossing Montana, North Dakota, South Dakota and portions of Minnesota and Iowa (Hannus 1985), recorded stone circle sites in Montana which span a thousand year time frame, from 1289 B.P. to 150 B.P. One site, 24PH8, produced C-14 dates of 3500-4500 B.P. from material found between stone circles, and dates from within stone circles ranging from ca. 1300-600 B.P., illustrating the longevity of use (reuse) of some stone circle site localities. A recent compendium of studies of stone circle sites is presented in "From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation" (Davis 1983).

Several stone circle sites in Mountrail County have been tested or excavated in the past, including 32MN140 (Bass 1983); 32MN143, 32MN147 and 32MN150 (Aivazian 1983); 32MN103 and 32MN105 (Dill and Ludwickson 1977); and 32MN106 (Dill 1978). Site 32MN140 consisted of four stone circles and two cairns. Twelve shovel probes were made at this site and the matrix screened through ¼" mesh. No cultural materials were recovered.

Sites 32MN147 and 32MN150 were both single stone circles, while 32MN143 was comprised of five stone circles. Sites 32MN147 and 32MN150 contained lithic materials and possible hearth remains, while 32MN143 contained a single ceramic bodysherd. This bodysherd displayed no surface treatment, was a uniform dark brown color, tempered with crushed granite and was considered typologically to be a Late Plains Woodland Blackduck type (Aivazian 1983:13). Testing to determine National Register eligibility, however, failed to yield additional data to warrant the sites being listed as eligible. The major considerations relating to National Register eligibility at these sites were chronology, subsistence activities, seasonality, lithic technology, activity area and structural information (e.g., placement of entrance).

At 32MN103, a single stone circle, a stone pavement was recorded at ± 10 -12 cm but no cultural specimens were recovered. Site 32MN105 consisted of seven stone circles, six of which were tested. Four of the circles produced no cultural specimens or features, one produced a single KRF tertiary flake and one yielded three KRF flakes and two fragments of the 3rd(?) molar of a deer. At site 32MN106, 24 stone circles were recorded and four were tested. No cultural materials were recovered.

The central aim of this project was the evaluation of sites 32MN228 and 32MN331 with regard to their possible National Register eligibility. Aspects considered critical in accomplishing this evaluation include site integrity and the ability of the sites to yield information important in prehistory or history. While the archeological community continues to debate the question of what specific criteria render an archeological site eligible for the National Register, one overriding consideration is the potential of the site to address important/significant research questions involving culture patterns, culture process or activities important to the history or prehistory of the locality or a wider region.

If a site (or district) is considered potentially eligible for nomination to the National Register, documentation of a number of specific elements is required for the archeological property. First, a detailed record of the spatial parameters, structure, and content of the site must be ascertained which focuses on the aspects of the site that are significant with regard to its nomination. A description of the site's environmental setting, its integrity, current condition and cultural/temporal affiliation must be provided. Additionally, the data base and research potential need to be identified and set into an appropriate framework. Finally, the specific geographical information and illustrations necessary to locate and document the site must be compiled.

The focus of this project's research design was the assessment of the significance of the sites in terms of their likelihood to yield information important in prehistory or history. As Butler (1987:821) has discussed, importance is based on the theoretical and substantive knowledge of the discipline.

In addition to site 32MN228, 16 stone circles sites were recorded in the vicinity of the White Earth River during a recent survey by the Archeology Laboratory of Augustana College (Winham, Lippincott and Lueck 1987). Three of the sites, 32MN224, 32MN226 and 32MN334, are each of a size that would include the combined areas of sites 32MN228 and 32MN331. The fact that these two sites are situated on different landforms does

not preclude the possibility that they are part of a single continuous occupation site.

However, even if the sites can be shown to be linked on the basis of the spatial distribution of artifacts and features, the question of whether the cultural material relates to a single occupation or multiple occupations remains. The evaluation of stone circle sites in this area has been assigned a high priority.

Desperately needed are data from excavated stone ring sites, the dominant yet most poorly understood site/feature type in the study area. Stem family, multifamily, and band encampments (Hanson 1983) affiliated with various named archeological units are surely represented. Deposits of cultural material are typically thin on these sites in comparison with other site types, but detailed chipped stone tool and flaking debris analyses almost invariably result in increased understanding of site function, cultural/temporal affiliation, and lithic technologies [Gregg 1985:165].

The following hypothesis was put forward in the proposal as an example of a research question that might be investigated at these sites:

Sites 32MN228 and 32MN331 reflect a band encampment of one of the Northern Plains nomadic tribes. The primary function of the site(s) was communal procurement of big game. The resources obtained were distributed, processed, exchanged and consumed within the matrix of the band encampment.

To begin to test this hypothesis the following topics must be addressed:

- 1) the contemporaneity of the individual dwellings (stone circles) needs to be established;
- 2) the function of each stone circle should be addressed - whether they relate to nuclear families or to some special activity area;
- 3) the range of activities on the site needs to be documented; and
- 4) the duration of occupation and actual subsistence strategies need to be evaluated independently.

In documenting sites 32MN228 and 32MN331, their potential to address these types of questions is a major factor in determining eligibility for nomination to the National Register of Historic Places.

General research topics considered in the evaluation of these localities included: the cultural-historical framework; site function; horizontal and vertical boundaries of the site; and site integrity. Specific subjects addressed at each site locality are listed below. Comments are provided summarizing the general results of the site evaluations with regard to potential for addressing the research questions.

1. Cultural/Historical Framework - based on radiocarbon dates and diagnostic artifacts.

COMMENT: No clearly uncontaminated (undisturbed) charcoal was recovered during the excavations. A single ceramic bodysherd was the only temporally restricted item recovered. Patination of Knife River flint artifacts varied from unpatinated to heavily patinated, with this variation occurring sometimes within the same context/level. In XU2 (32MN331) nearly all the KRF in the upper 30 cm was unpatinated to slightly patinated, while moderately to heavily patinated flakes dominated the lower (30-60 cm) levels, suggesting an earlier component.

2. Subsistence Strategies - based on recovery of floral/faunal remains and artifact assemblage.

COMMENT: No direct data relating to subsistence strategies were recovered during the excavations. Seeds recovered from flotation samples were derived from various species of weeds, probably recent and intrusive. Some small bone and tooth enamel fragments from deer were recovered but may also be intrusive. Metate fragments suggest that grinding of plant remains took place.

3. Site Function - based on assessment of site size, location and artifact assemblages.

COMMENT: The focus of site 32MN228 was confirmed in the vicinity of a series of stone circles recorded by Robson in 1980. Site 32MN331 consisted of a similar, but more varied, chipped stone lithic assemblage, and also included a metate, a ceramic fragment and more numerous bone fragments.

Both sites appeared to have a widespread, but generally low density, scatter of cultural material. The variability between the two sites is not sufficient to suggest different site functions. Their similar locations and the lack of features indicating a more permanent occupation suggest that both sites were temporary camps. Site 32MN228 was associated with stone circles, while site 32MN331 perhaps was not.

4. Local Environment and Depositional History.

COMMENT: Results of the analysis of two pollen samples submitted to Dr. Eric Grimm, Illinois State Museum, were disappointing. Both samples produced very little pollen and had no interpretive value. All of the pollen was poorly preserved and much of it was highly degraded. The local landform has been relatively stable for thousands of years. Those changes which have occurred are due primarily to the construction of the Garrison Dam and formation of Lake Sakakawea. The terraces around 32MN331 are being eroded and sand and gravels are forming dunes or sand/gravel bars around a portion of the site.

5. Intra-Site Variability - addressed through documentation of spatial variability using shovel tests/probes relating to a grid system imposed over the site area.

COMMENT: At site 32MN228 the positive cores were restricted to the northeast part of the second terrace in locations adjacent to the area of stone circles (now destroyed). It seems likely that activities were restricted to within and around the stone circles in an area some 170 m N-S x 200 m E-W. However, a few lithic items, including a transverse scraper, were recorded in the vicinity of a possible cairn (see Figure 11) in 1985 (see Figure 4). This extended site area is 240 m NW-SE x 450 m NE-SW.

At 32MN331 a similarly widespread scatter was observed with an apparent focus in the northern portion, around XU2. A core area some 170 m N-S x 250 m E-W is suggested, with outlying materials also present in an area 200 m N-S x 320 m E-W. Excavation Units 1, 4 and 5 produced cultural material at depths no greater than 30 cm, while XU2 appeared to have two cultural zones, one from 0-30 cm and

the other extending from 30-60 cm. More heavily patinated KRF artifacts recovered from the surface, from auger testing and the test units appear to be restricted to the northern area of the site.

6. Inter-Site Relationships, specifically focusing on the question of whether 32MN228 and 32MN331 should be considered a single site - addressed through comparative analyses of the artifact assemblages, material density, and diagnostic artifacts.

COMMENT: Some differences were observed between the two sites, perhaps the most significant being the presence of a ceramic sherd, obsidian, Tongue River silica and ground stone at 32MN331. All of these items were absent from site 32MN228. Also, all of the patterned tools such as scrapers, graters and bifaces, came from site 32MN331. The only tools recovered from site 32MN228 were utilized and retouched flakes. It should be noted, however, that during the 1985 survey, a transverse scraper (Type C) and a double pointed graver/awl were recorded in the 32MN228 general site area (Winham, Lippincott and Lueck 1987:236).

The quantities of materials from both sites are relatively small and the overall assemblages are otherwise similar in content. Nevertheless, the evidence does suggest that more varied and complex activities occurred at 32MN331 than at 32MN228. Moderately to heavily patinated KRF material was found at 32MN331, primarily in the lower levels of XU2, and at 32MN228, where it was more generally scattered and occurred in both excavation units.

The field methodology presented in the technical proposal was performed essentially as originally defined. This methodology is detailed below, with comments added to describe the actual field situation encountered.

An initial pedestrian survey of each site was accomplished to relocate datum points and features, as well as to provide an evaluation and comparison of the current site condition with that recorded during previous surveys. One original datum, a 2" iron pipe, was relocated (Plate 2) and used as the permanent datum for both sites. This datum formed the 0,0 point of the grid system established over the site. Several changes had occurred to the sites since 1985, when the last professional survey was conducted. In the area of 32MN228, additional stones that may once have formed stone circles had been removed, leaving only one possible stone circle feature. In the 32MN331 site area, plowing associated with tree-planting (shelterbelt) had exposed additional cultural material. The exposed material recorded in the cutbanks in 1985 was relocated.

The technical proposal indicated that data to address the general topics outlined earlier would be obtained in the following manner.

Cultural-historical Framework: This topic will be addressed through recovery and analysis of diagnostic artifacts, feature types and C-14 dates.

Site Function: This topic will be addressed through site location and site content (artifacts, features).

Horizontal Boundaries: These boundaries are to be assessed by evaluating the physiographic circumstance, surface artifact distribution and results of an intensive subsurface testing/coring program based on a grid composed of 25 m squares imposed on the sites.

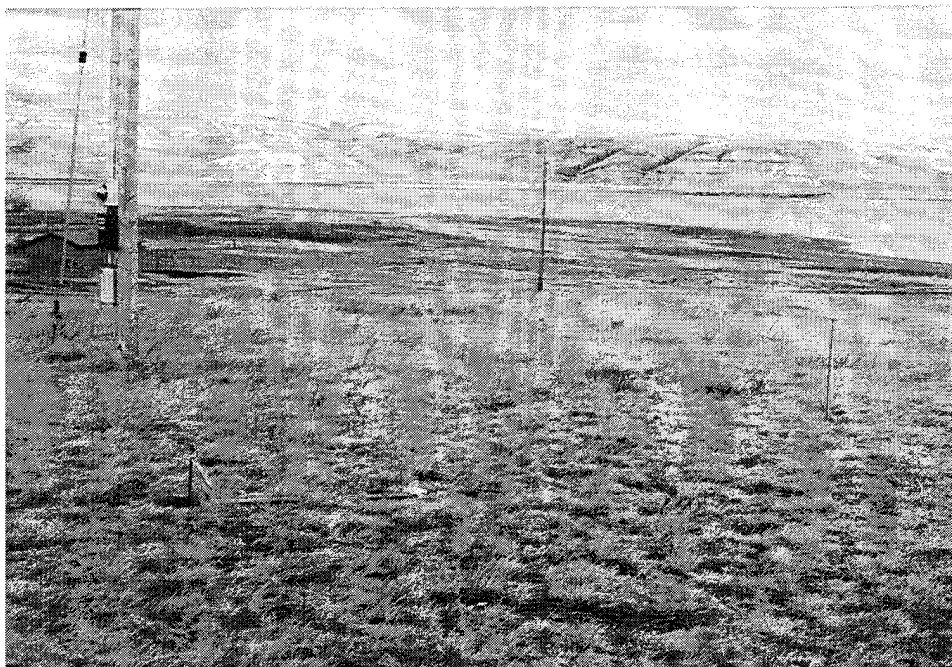


Plate 2. Main site datum, 2" iron pipe (right), facing E.

Vertical Boundaries: This topic will be addressed through the results of the test excavations and interpretations of resulting profiles/ photographs.

Site Integrity: This question will be addressed by evaluating all pertinent data derived from the proposed work and from previous investigations at these sites. This evaluation includes an assessment of the extent and severity of erosion, slumpage, and other natural/human impacts.

A standard set of recording procedures was implemented for this project. A theodolite and San Francisco rod were used to record all spatial data and metric tapes were used for detailed measurements. All data were incorporated onto site maps in the field to assure that the most comprehensive data matrix was utilized to guide the testing programs.

All test units were excavated in levels not exceeding 10 cm in depth with plan views made of each unit at each level. One wall of each unit was profiled and photographed. Each layer was described and soil colors recorded using Munsell Soil Color categories.

A series of standardized recording forms (Appendices B and C) for photographs, profile drawings, unit plans, layer descriptions, feature descriptions and samples, as well as a detailed fieldwork log, were kept for each site tested.

All soil was screened through $\frac{1}{4}$ " hardware cloth, with $\frac{1}{8}$ " hardware cloth used for screening of selected samples (Plate 3). In regard to the selected samples, a minimum 15 x 15 x 10 cm sample was screened from the southwest corner of each layer/level. Note that in some cases this sample was obtained from elsewhere in the unit, if the southwest corner appeared disturbed.

Artifacts located in situ were point-plotted and collected; other artifacts were collected in relation to each level or natural



Plate 3. Screening at XU5, 32MN331, facing S.

stratigraphic layer. Because most of the excavation was accomplished by shovel skimming into a screen, few artifacts were recovered in situ.

Samples for radiocarbon age determination were to be recovered, if present. While some charcoal was encountered, it was most likely intrusive from the many recent surface fire hearths that have occurred across the recreation area.

Flotation samples were to be approximately 2000 cubic centimeters; the actual sample size obtained in the field approximated 2250 cubic centimeters. Pollen samples were collected from a column in one profile of each unit. Each sample approximated 64 cubic centimeters in volume.

The testing program was also designed to address specific issues raised in the scope-of-work and in particular the relationship between sites 32MN228 and 32MN331.

The scope-of-work gave a recommended number and maximum depth for 1 m x 1 m units and shovel tests/cores to be excavated at each site. In our technical proposal these recommendations were adapted to produce a more systematic approach to the site evaluations. Rather than randomly placing 4-6 tests in each Corps lot (as suggested in the scope-of-work) we proposed to impose a 25 meter square grid over both sites, oriented on magnetic north. Essentially, tests would then be accomplished at every grid point that was situated within the project (Corps) lands.

There are several important advantages to this approach specific to the interpretation of the data collected, particularly at 32MN331 where, for instance, the density of artifacts can be readily plotted. At 32MN228 the limited and discontinuous areas of Corps lands restricts spatial analyses to a degree, but the data are readily comparable with that from 32MN331.

To implement this grid it was proposed to establish a baseline east to west across both sites using a theodolite and metric tapes. Stakes or pin flags were to be placed every 25 meters along the baseline. North to south grid lines would then be established as needed using either the theodolite or a Brunton compass and metric tapes.

In practice, the grid was expanded from the site datum to cover both sites using a series of baselines spaced 100 meters apart (Plate 4). Metric tapes were extended between grid points on these baselines and intermediate grid positions so located. Grid points were identified as to their distance north/south and east/west of the main datum.

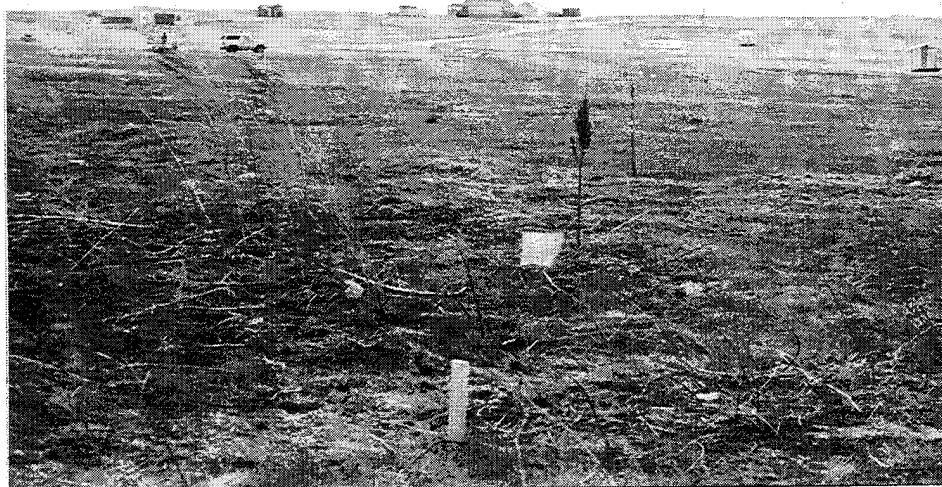


Plate 4. View along one of the grid baselines, staked out across site 32MN331, facing W.

The initial testing phase systematically included all designated U.S. Army Corps of Engineers lands, sampled areas between the two sites (32MN228 and 32MN331), and sampled areas in the immediate vicinity of, and areas between, previously recorded cultural materials (surface). After obtaining landowner permission, some cores were also accomplished on non-Corps lands at site 32MN228.

The second phase of the proposed testing program allowed for the optional placement of additional tests to better define areas with cultural remains and site boundaries. This option was applied in the field at site 32MN331 to better determine where to locate two of the 1 m x 1 m test units (see Figure 9).

At site 32MN228 the grid coring that constituted the baseline testing program was predicted to involve a minimum of 49 cores/probes. The excavation of two to four 1 m x 1 m units would then form the second testing phase. The actual field situation included 67 cores and two test units.

At site 32MN331, it was estimated that the baseline testing program would include a minimum of 187 tests. The placement of any additional tests/soil cores and four to eight 1 m x 1 m units would constitute the second testing phase. The specific locations of planned construction projects (septic tank, sewage vault, fish remains vault and three drainage field lines) were also to be evaluated at this time.

The actual field situation revealed that a larger portion of site 32MN331 than anticipated was subject to inundation and sand/gravel deposition. Cores here produced only sand or were impossible to dig because gravels were encountered. The eroded cutbank exposures provided visual indication of site disturbances in these areas. When coring was extended to the boundaries of the site (cutbank), this baseline testing included 85 cores. An additional 23 cores were placed in the central areas of the site to better define where to locate two excavation units. A further 16 cores were then placed along the approximate lines of proposed field drains and vault locations. Four 1 m x 1 m units were excavated, and additionally two flotation samples were obtained from the cutbank where cultural materials were exposed.

The results of the fieldwork carried out at sites 32MN228 and 32MN331 are documented primarily in the form of maps, plans, profiles and tables. Site plans (Figures 8 and 9) document all of the testing and surface collection undertaken (all of the gridded areas were surface collected). Plans and profiles are provided for each excavation unit (below), and the results of the coring are presented in Appendix D. Artifacts recovered from the site are summarized in Table 3, while Appendix E provides detailed level by level summaries of the artifacts from each test unit. Appendix F is the complete artifact catalog.

Features

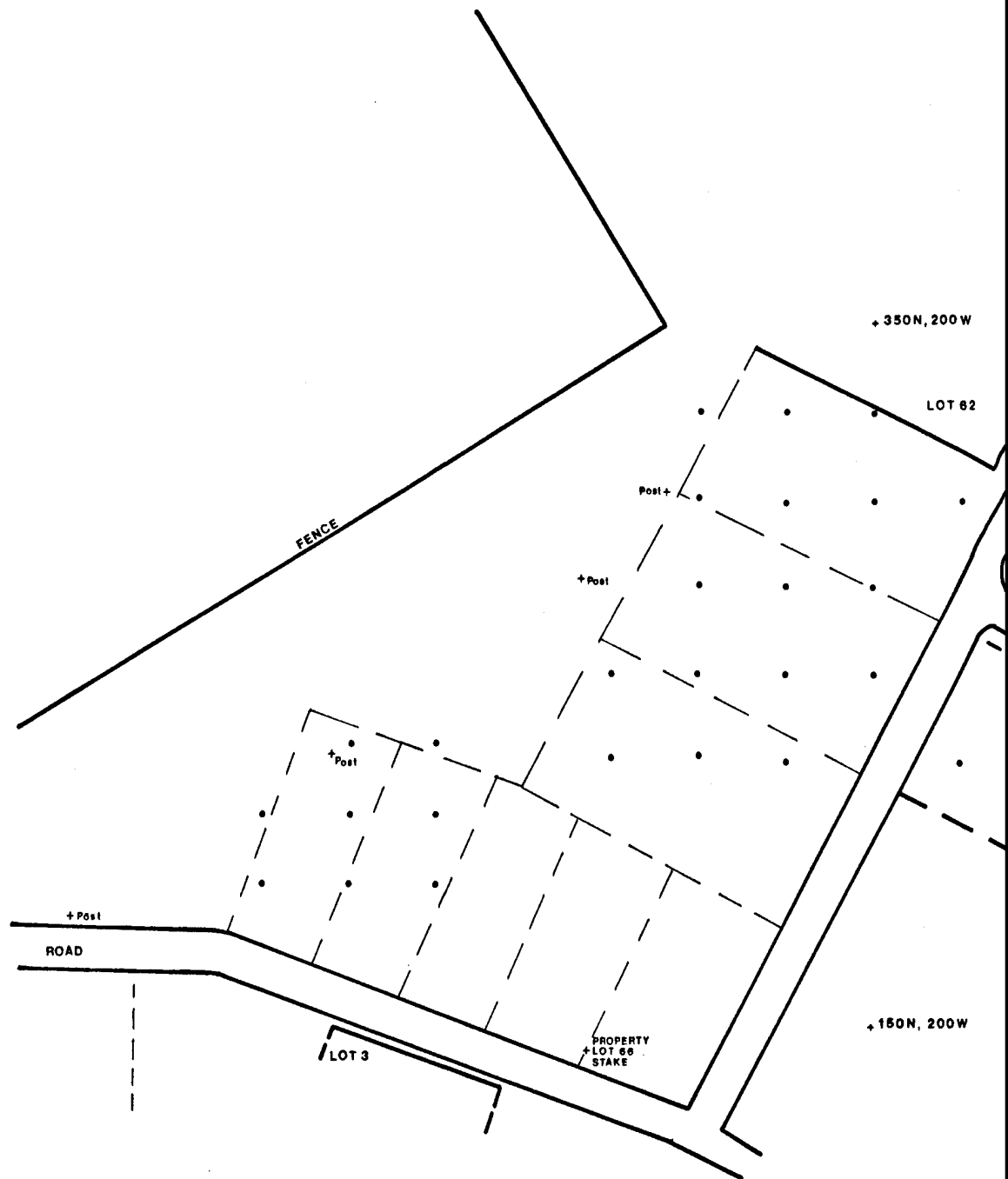
One historic hearth was observed at site 32MN331 in XU2 (Level 1), and is documented below. At site 32MN228 two surface features were recorded, including a partial stone circle (Figure 10; Plate 5) and a possible rock cairn (Figure 11; Plate 6). Excavation Unit 3 was placed near a positive auger test, within the confines of the apparent stone circle. The outline of the stone circle is somewhat ambiguous, with only a few stones remaining. The cairn is considered part of site 32MN228, but was not tested because it is located on private land.

Samples

A standard set of soil samples was obtained from each test unit, including one flotation sample and at least two pollen samples. Details of the samples are given below. In addition, a ca. 15 cm x 15 cm sample was passed through 1/8" mesh screens for each level excavated. Two soil samples were also obtained from the cutbank at 32MN331 where material was observed eroding out of the bank. Table 2 summarizes the samples that were subsequently processed by water-screening and flotation.

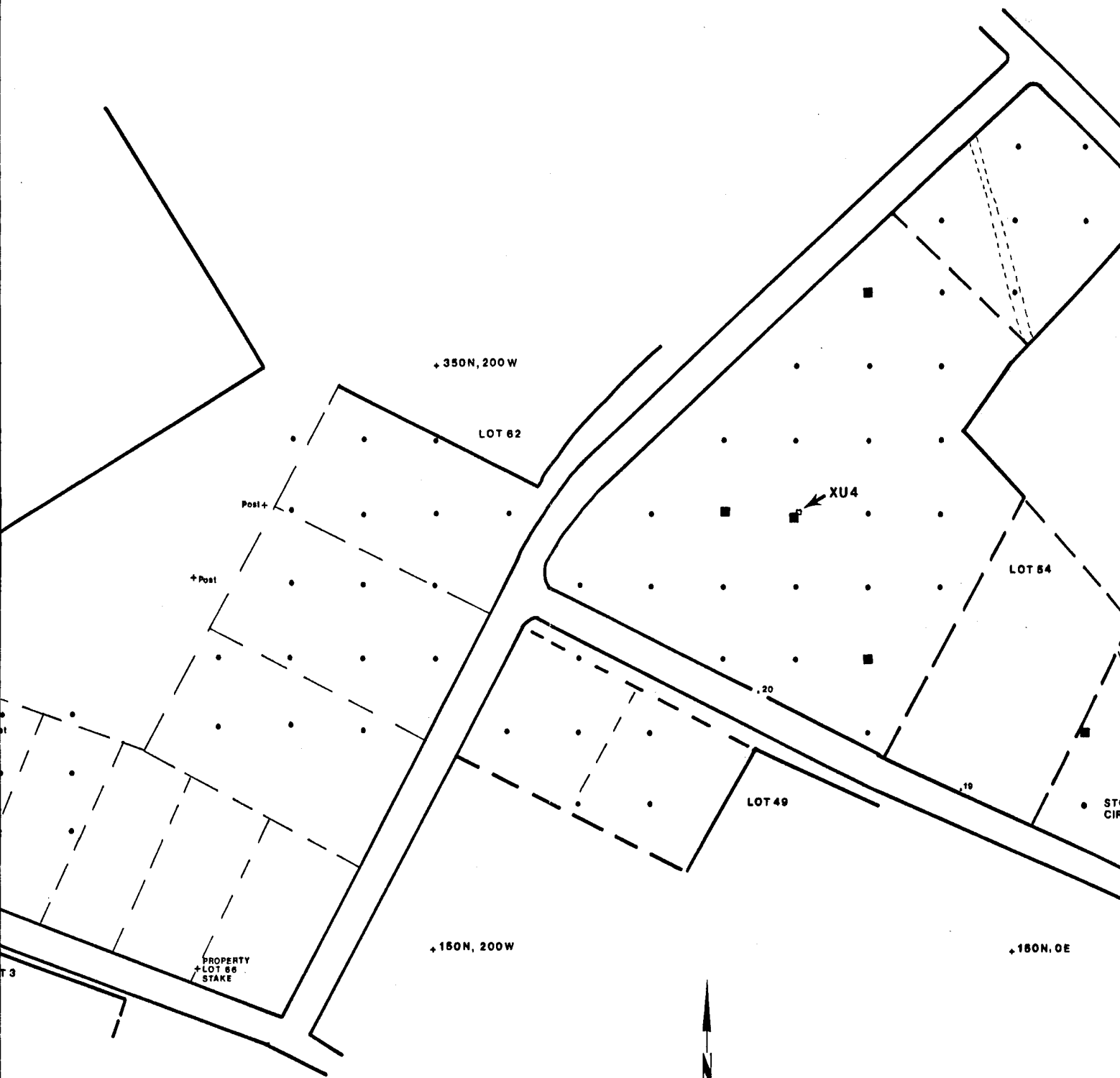
Excavation Units

A total of six 1 m x 1 m excavation units (XUs) were excavated, two units at 32MN228 and four units at 32MN331. These units were numbered sequentially, as excavated. Units 1, 2, 5 and 6 relate to site 32MN331 while Units 3 and 4 relate to site 32MN228. Summaries of the individual units are presented below.

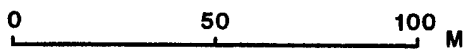


32MN2

0 50 100 M



32MN228



9 CAIRN

DATUM
0,0

F

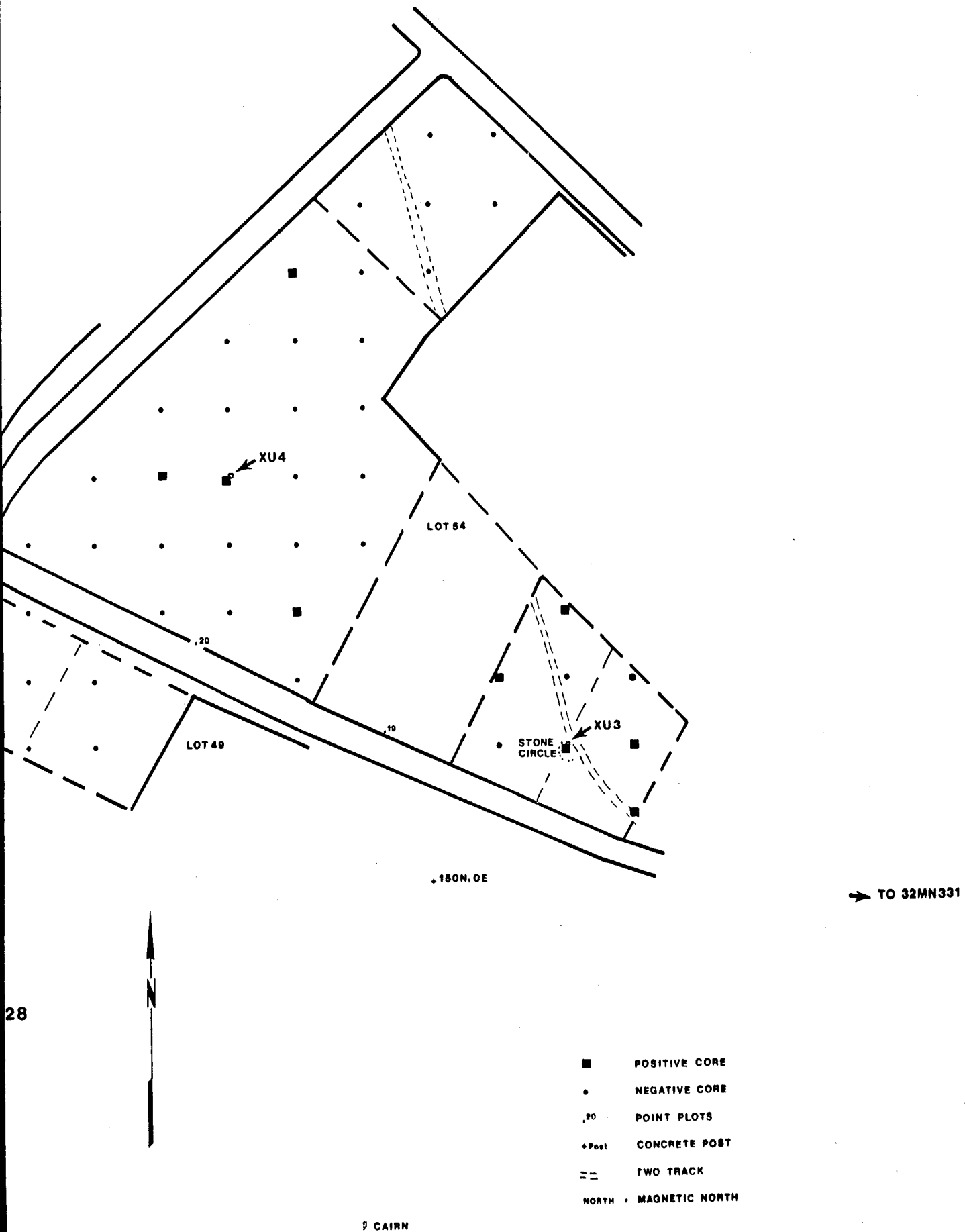


Figure 8. Plan of investigations at site 32MN228.

HATCHERY

32MN228 SITE AREA

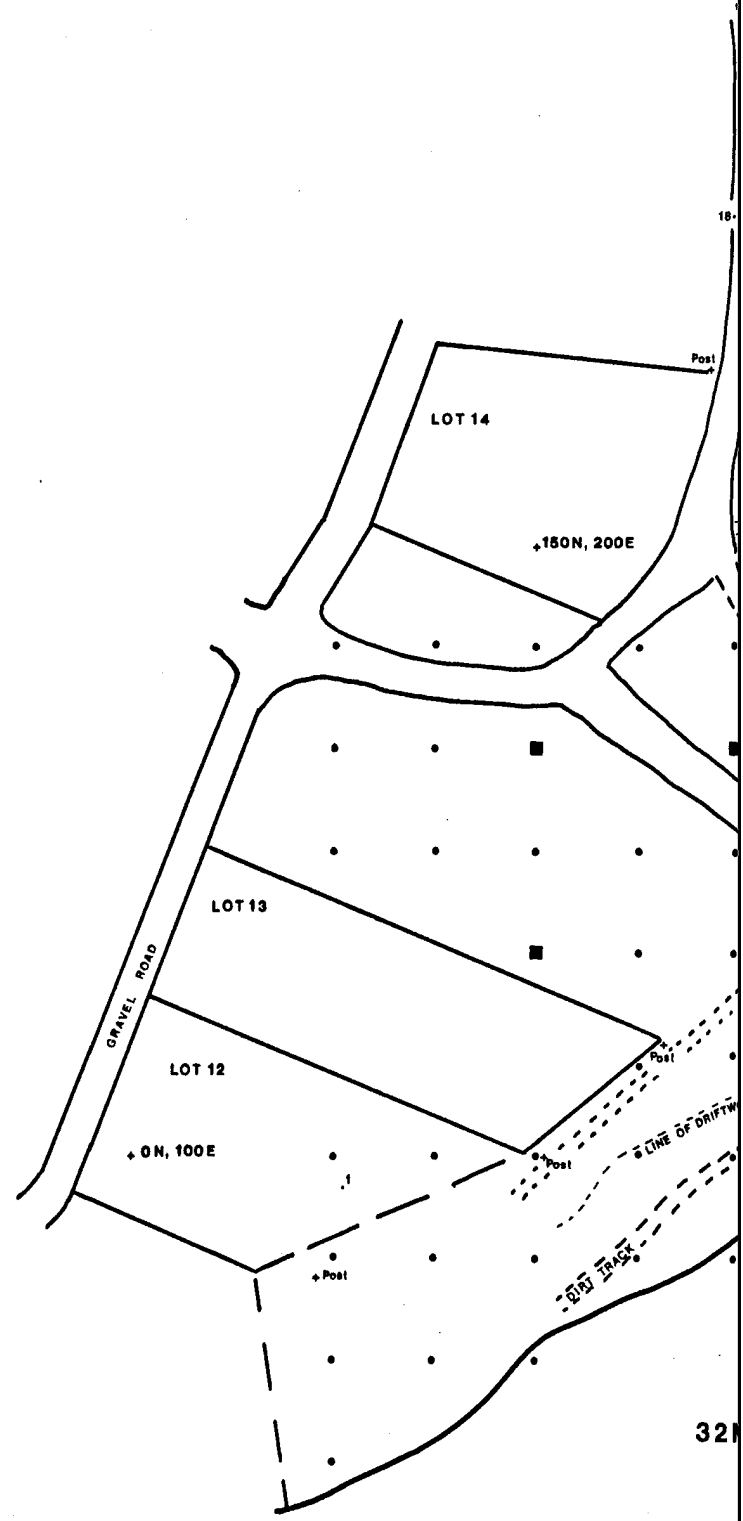
+150N, 0E

PROPERTY
LOT 41
SE CORNER

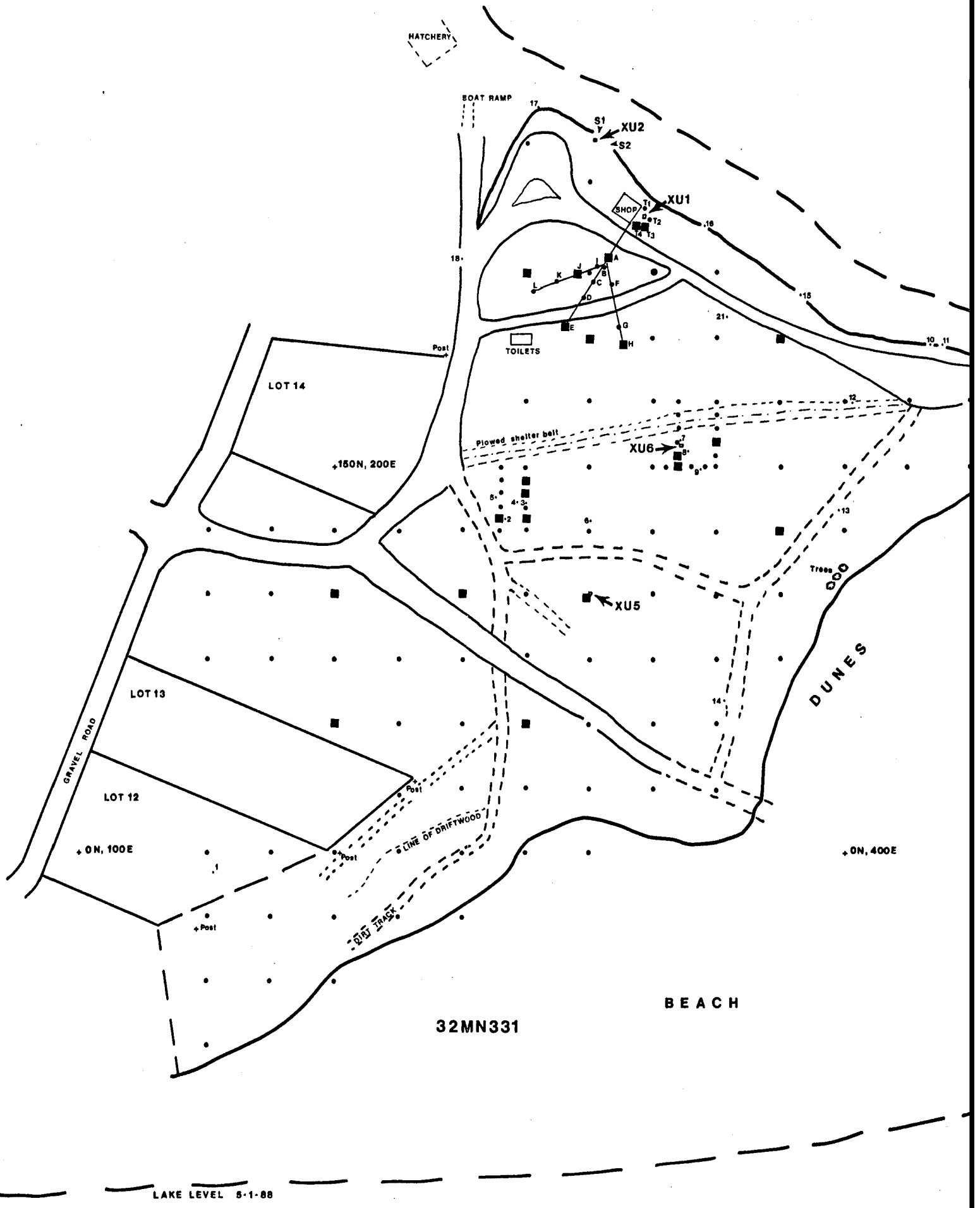
Brass cap.
+ DATUM
0,0

0 50 100 M

- POSITIVE CORE
- NEGATIVE CORE
- POINT PLOTS
- A-L CORES ALONG FIELD DRAINS
- T1-T4 CORES AT VAULT
- S1-S2 CUT BANK SOIL SAMPLES
- + Post CONCRETE POST
- ==== TWO TRACK
- NORTH : MAGNETIC NORTH



32



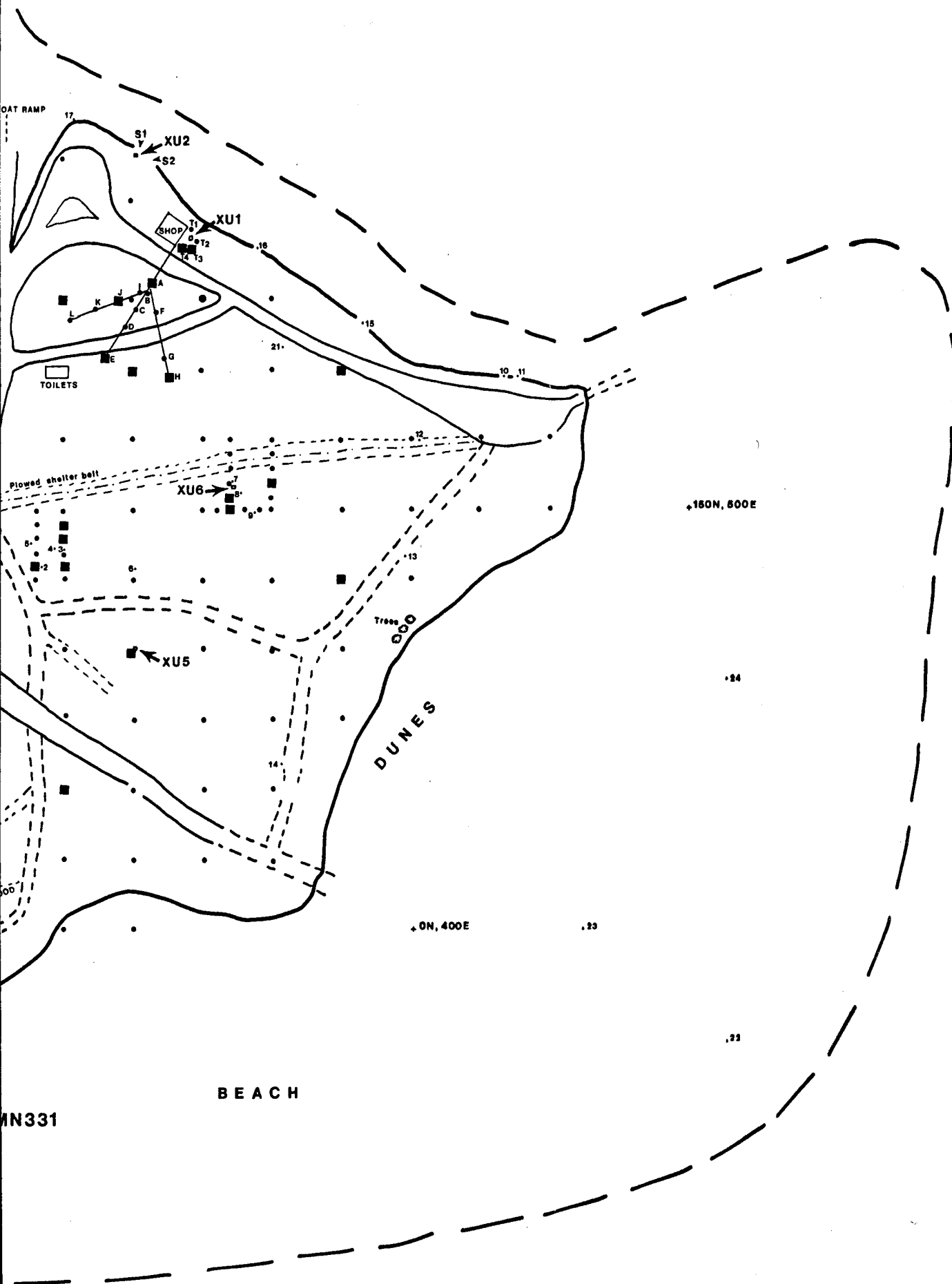


Figure 9. Plan of investigations at site 32MN331.

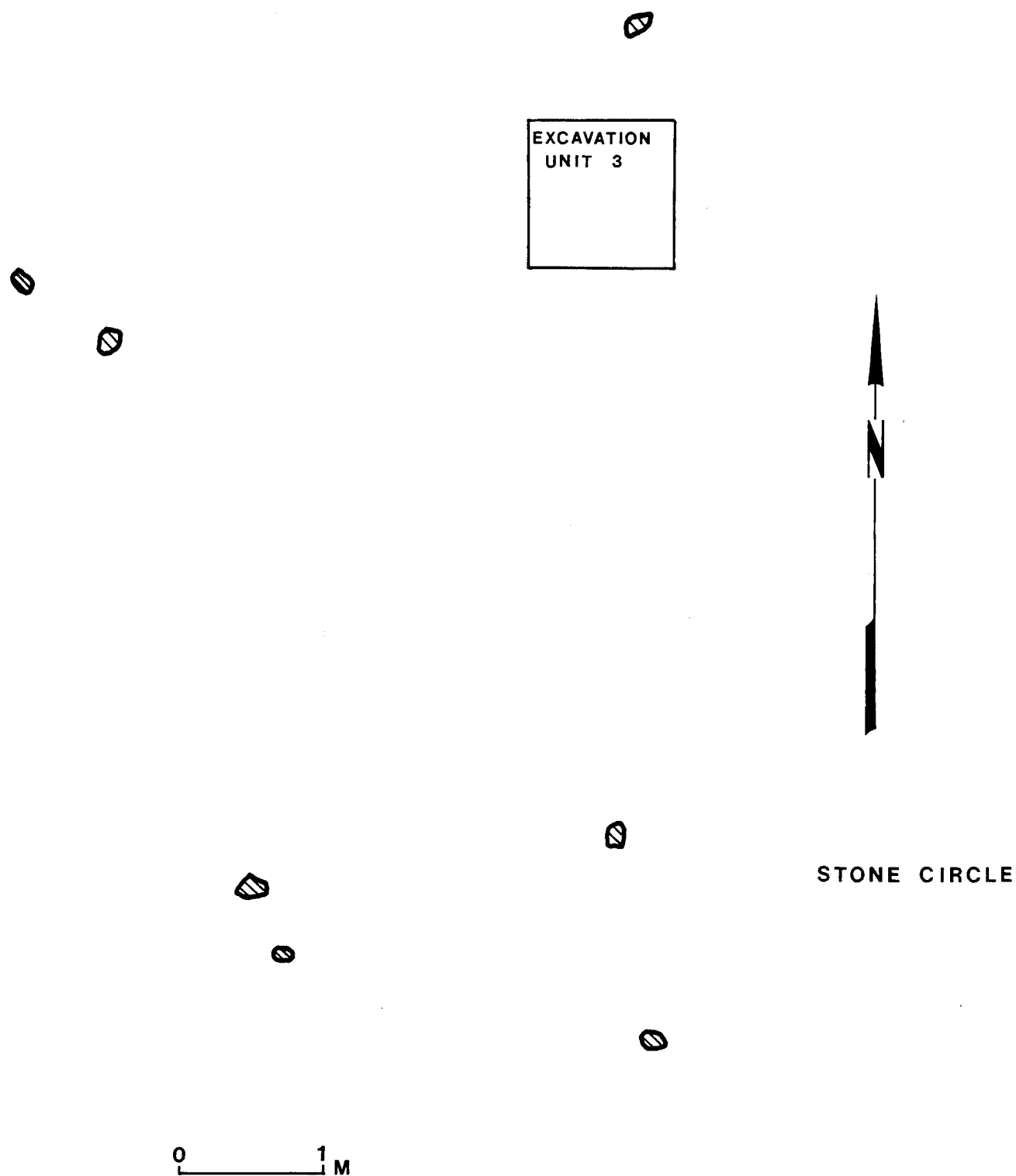


Figure 10. Plan of partial stone circle at site 32MN228.

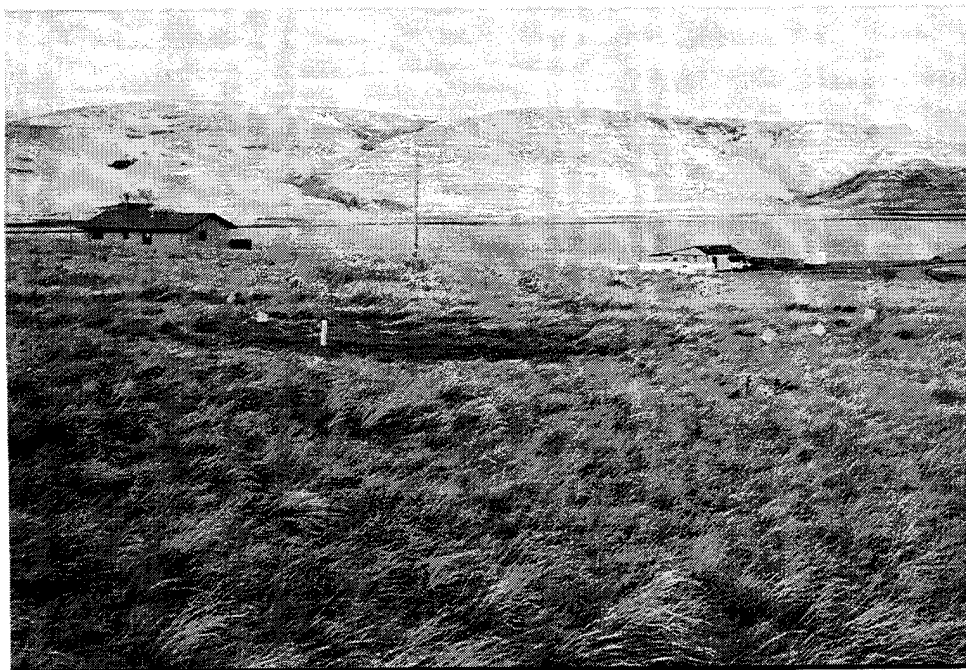


Plate 5. Stones of a partial stone circle?, flagged with wooden stake marking XU3, site 32MN228, facing ENE.

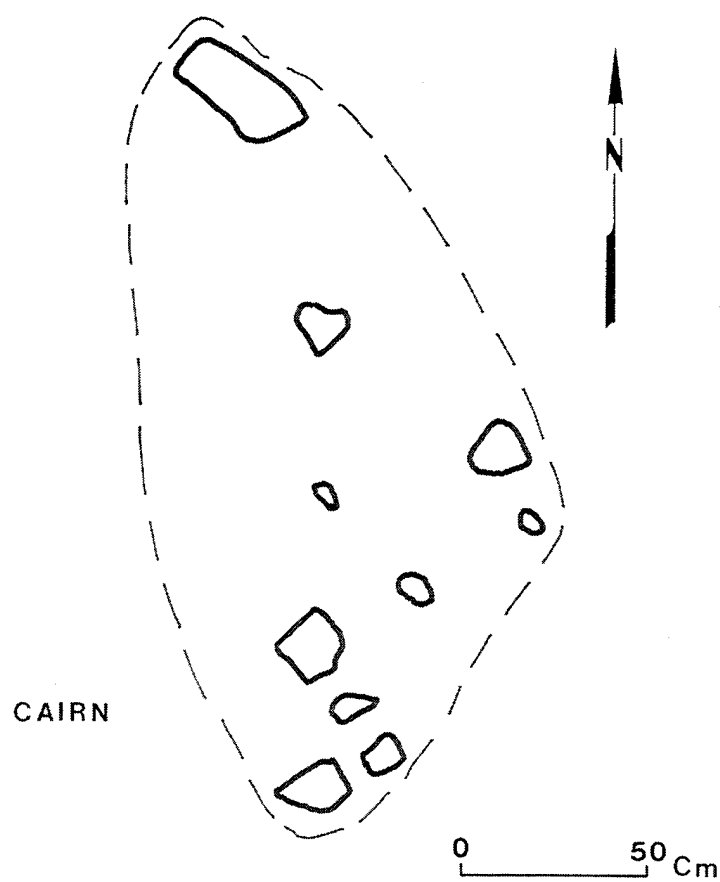


Figure 11. Plan of cairn at site 32MN228.



Plate 6. Stones forming a cairn?, site 32MN228, facing N.

Table 2. Summary of Samples Water-Screened.
[all samples ca. 15 x 15 x 10 cm]

SAMPLE #	LOCATION	WEIGHT		
		Lbs	Oz	Kg
1	32MN331 XU1 10-20 cm	9	5	4.224
5	32MN331 XU2 10-20 cm	8	6	3.799
6	32MN331 XU2 20-30 cm	8	4	3.742
12	32MN228 XU3 10-20 cm	7	6	3.345
15	32MN228 XU4 10-20 cm	7	13	3.544
18	32MN331 XU5 10-20 cm	8	5	3.770
21	32MN331 XU6 10-20 cm	7	0.5	3.189
24	32MN331 Cutbank 1	8	4	3.742
25	32MN331 Cutbank 2	7	5	3.317

Summary of Excavation Units at Site 32MN228

Excavation Unit: 3 (XU3) (Figure 12; Plate 7)

Site: 32MN228

Location: 200N, 50W

Number of 10 cm Levels: 3

Flotation Sample: Northwest corner of Level 2 (10-20 cm below surface (bs))

Pollen Samples: Sample numbers 13 and 14 from a column 25-30 cm south of the northwest corner. Sample No. 13, 4-9 cm bs; Sample No. 14, 12-16 cm bs.

Profile: West wall

Purpose: To evaluate a positive auger probe/possible relationship to stone circle.

Description of Profile: Two zones were recorded. Zone 1: ca. 0-10 cm bs; dark brown (10YR 3/3) sandy silt. Zone 2: ca. 10-30+ cm bs; dark yellowish-brown (10YR 4/4) gravelly silty sand, calcium carbonate common. Zone 1 grades into Zone 2, with an irregular boundary between the two. Gravels/rock were recorded at a depth of ca. 20-30+ cm bs.

Features: No features were observed.

Material Recovered: Level 1: chipped stone (11 items, 1 in the 1/8" screen); fire-cracked rock (FCR) (2 pieces, 1 in the 1/8" screen); yellow ochre (1 piece); gravels ca. 1/8-2 inches in diameter (ca. 1/3 pint). Level 2: chipped stone (35 items, 6 in the 1/8" screen); bone fragments and burned bone fragments (22 pieces, 4 in the 1/8" screen); mineralized wood or bone (5 pieces); gravels ca. 1/8-2 inches in diameter (ca. 1 pint). Level 3: chipped stone (36 items, 2 in the 1/8" screen); FCR (1 piece); bone fragments (2 fragments); mineralized wood or bone (5 pieces, 2 in the 1/8" screen); gravels ca. 1/8-6 inches in diameter (ca. 1½+ pints).

Observations: Materials appear to be primarily associated with Levels 2 and 3.

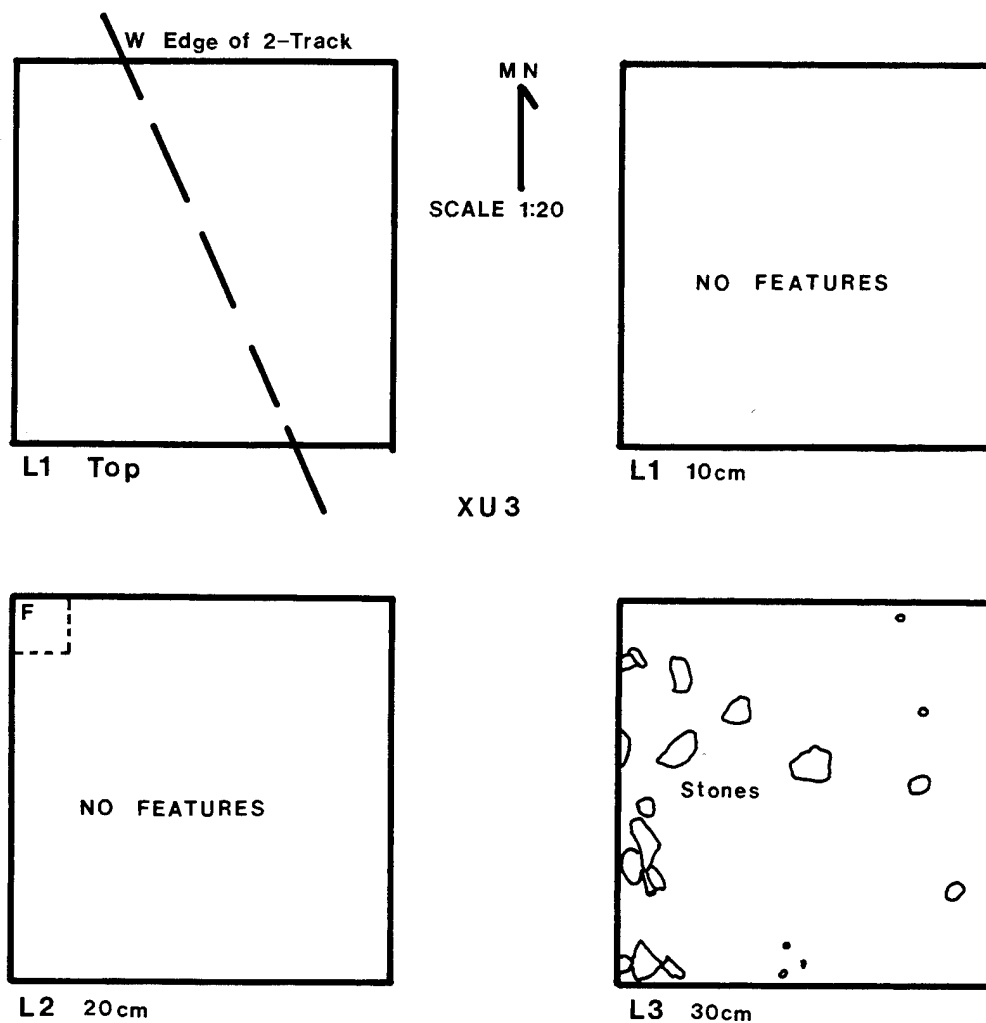


Figure 12. Floorplans and profiles at site 32MN228 - XU3. Profile -
 Layer 1: dark brown (10YR 3/3) sandy silt, roots present;
 Layer 2: dark brown (10YR 3/3), grading to dark
 yellowish-brown (10YR 4/4) silty sand with gravels (calcium
 carbonate on many) and several large stones.
 F = flotation sample; P = pollen sample.



Plate 7. Site 32MN228, XU3, west wall profile.

Excavation Unit: 4 (XU4) (Figure 13; Plate 8)

Site: 32MN228

Location: 300N, 25W

Number of 10 cm Levels: 3

Flotation Sample: Northwest corner of Level 2 (10-20 cm bs)

Pollen Samples: Sample numbers 16 and 17 from a column 10-14 cm south of the northwest corner. Sample No. 16, 5-10 cm bs; Sample No. 17, 15-20 cm bs.

Profile: West wall

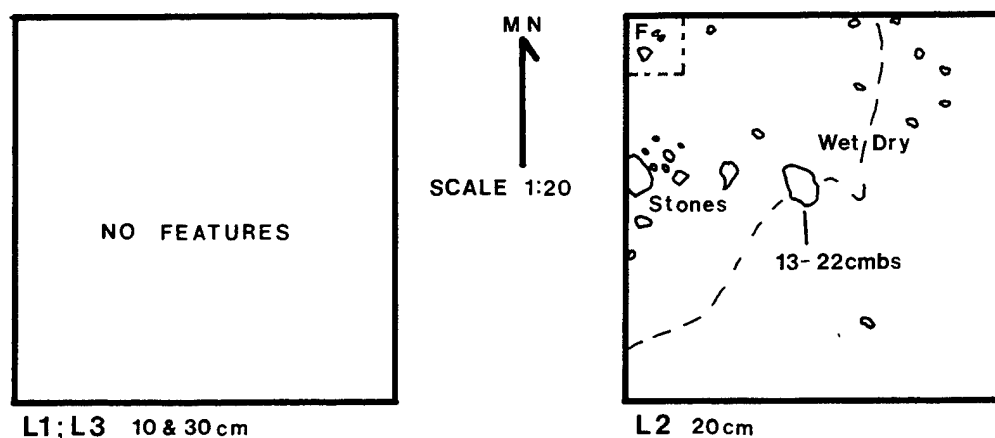
Purpose: To evaluate a positive auger probe.

Description of Profile: Three zones were recorded. Zone 1: ca. 0-4 cm bs; dense sod, very dark grayish-brown (10YR 3/2) sandy silt. Zone 2: ca. 4-20 cm bs; dark brown (10YR 3/3) sandy silt. Zone 3: ca. 20-30+ cm bs; dark brown (10YR 3/3) sandy silt; gravelly/rocky. Calcium carbonate common in soil and gravels/rocks in bottom of Zone 2 and Zone 3.

Features: No features were observed.

Material Recovered: Level 1: chipped stone (3 items); gravels 1/8-2½ inches in diameter (ca. 1 pint). Level 2: chipped stone (21 items, 2 in the 1/8" screen); bone fragments and burned bone fragments (17); mineralized wood or bone (2 pieces); charcoal fragments (1 item); gravels 1/8-2½ inches in diameter (ca. 2 pints), plus rock shown on floor plan. Level 3: chipped stone (10 items, 2 in the 1/8" screen); gravels ca. 1/8-6½ inches in diameter (ca. 1½ gallons).

Observations: Materials appear to be primarily associated with Level 2 (10-20 cm bs).



XU 4

Figure 13. Floorplans and profiles at site 32MN228 - XU4. Profile - Layer 1: very dark grayish-brown (10YR 3/2) sandy silt below dense sod; Layer 2: dark brown (10YR 3/3) sandy silt with gravels (heavy calcium carbonate on many) and some larger stones; Layer 3: dark brown (10YR 3/3) sandy silt with gravels and stones up to 6½" in diameter. F = flotation sample; P = pollen sample.



Plate 8. Site 32MN228, XU4, west wall profile.

Summary of Excavation Units at Site 32MN331

Excavation Unit: 1 (XU1) (Figure 14; Plate 9) Site: 32MN331
Location: ca. 246N, ca. 321E - about 5 m southeast of John's Bait Shop
Number of 10 cm Levels: 4
Flotation Sample: Southeast corner of Level 2 (10-20 cm bs)
Pollen Samples: Sample numbers 2 and 3 from a column in the east wall
48-52 cm north of the southeast corner. Sample No. 2, 5-9 cm bs; Sample
No. 3, 18-22 cm bs.
Profile: East wall
Purpose: To evaluate the proposed location of a vault for holding fish
remains solids.
Description of Profile: Four zones were observed. Zone 1: ca. 0-3 cm
bs; a heavy sod containing much crushed rock associated with a parking
area. Zone 2: 3-16 cm bs; a brown/dark brown (7.5YR 4/2) sandy silt
with gravel. Zone 3: 16-33 cm bs; brown (10YR 5/3) sandy silt with
gravel. Zone 4: 33-40+ cm bs; brown (10YR 5/3) sandy silt with gravel
and calcium carbonate. A piece of FCR was observed in the wall from ca.
21.5-26 cm bs.
Features: No features were observed. A rodent run was mapped on the
floor of Level 4. Old cracks in the floor of Level 2.
Material Recovered: Level 1: bodysherd, split (2 pieces), polished;
chipped stone (8 items); window glass (2 pieces); cigarette filters (2
items); crushed rock (pink shale?) and gravel ca. 1/8-2 inches in
diameter (ca. 2 pints). Level 2: chipped stone (3 KRF tertiary flakes
in the 1/8" screen, 62 items in the flotation sample, 7 items in the 1/4"
screen); bone fragment (plus 184 in the flotation sample); charcoal
flecks (2 flecks, plus 53 in the flotation sample); gravels 1/8-1 1/2
inches in diameter (ca. 3/4 pint, plus 172.6 g in flotation sample); 1
seed. Level 3: chipped stone? (1 item); FCR (3 items, possibly from the
same piece); gravels ca. 1/8-1 1/2 inches in diameter (ca. 1/2 pint). Level
4: bone fragment? (1 item); gravels 1/8-1 inch in diameter (ca. 1/3
pint).
Observations: Artifacts primarily come from 0-20 cm bs.

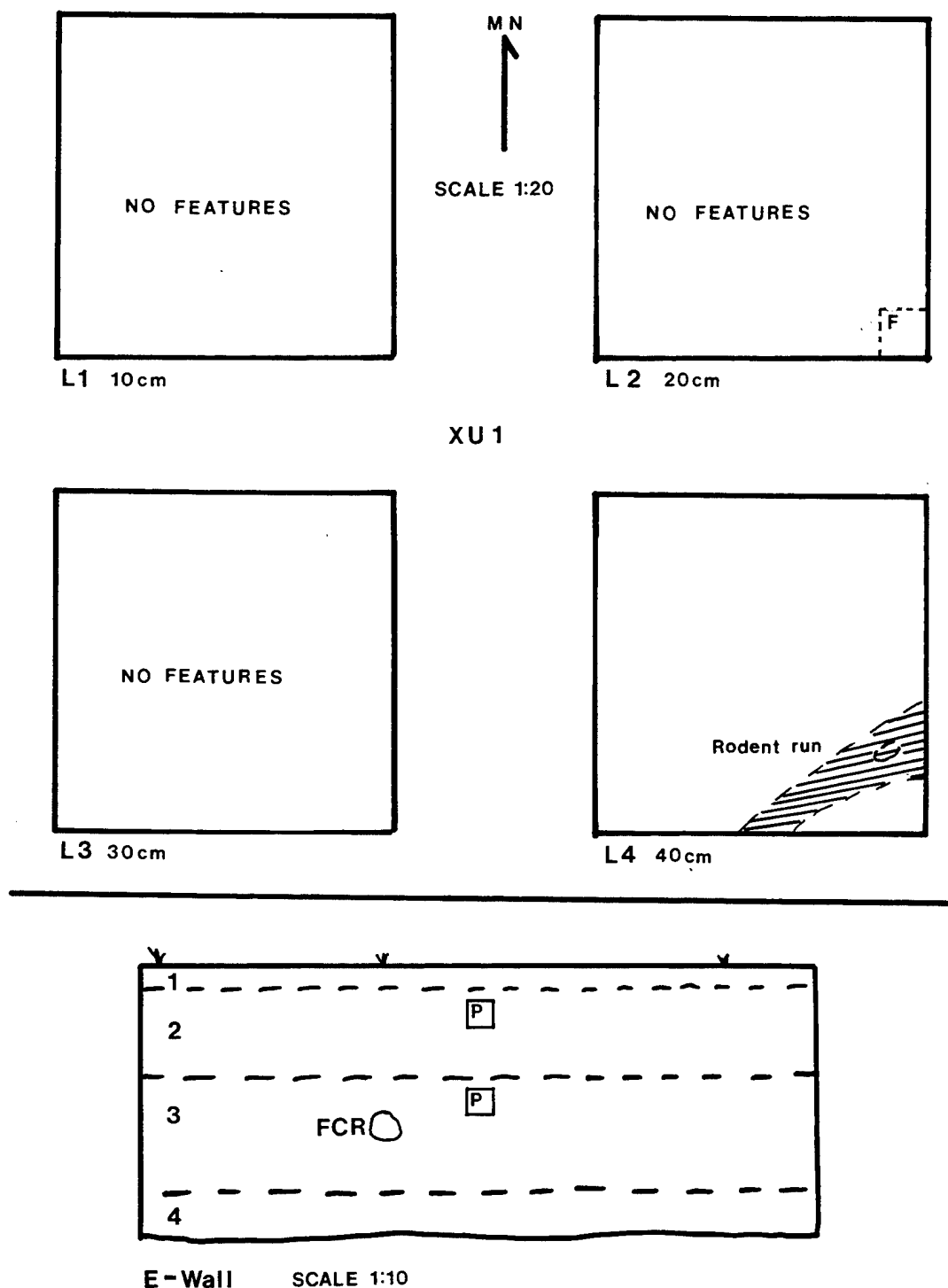


Figure 14. Floorplans and profiles at site 32MN331 - XU1. Profile - Layer 1: heavy sod with some crushed rock; Layer 2: brown/dark brown (7.5YR 4/2) sandy silt with shale and gravels; Layer 3: brown (10YR 5/3) silty sand, calcium carbonate common at base, some gravel present; Layer 4: brown (10YR 5/3) sandy silt with calcium carbonate covering gravel. F = flotation sample; P = pollen sample.

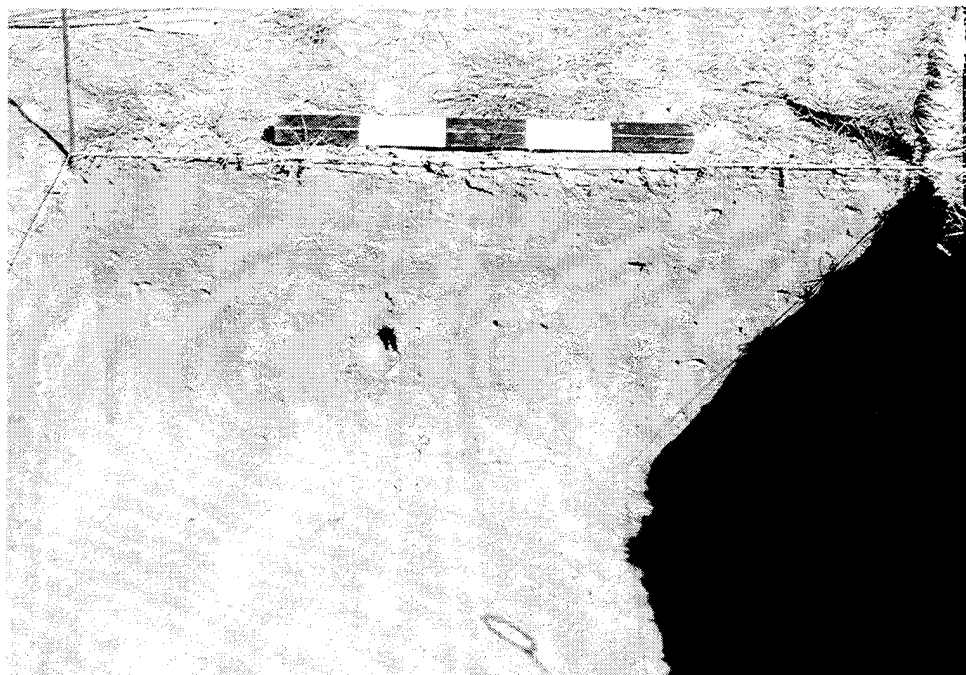


Plate 9. Site 32MN331, XU1, east wall profile.

Excavation Unit: 2 (XU2) (Figures 15 and 16;
Plates 10 and 11)

Site: 32MN331

Location: ca. 276N, ca. 301E in a concentration of lithic material, burned bone and charcoal exposed in the cutbank near (northwest of) John's Bait Shop

Number of 10 cm Levels: 6 (Level 6: South half only excavated)

Flotation Sample: Level 2 (10-20 cm bs), 35-50 cm east of the northwest corner. Southeast portion of the top of Level 3 (20-22 cm bs), consisting of a concentration of cultural materials.

Pollen Samples: Sample numbers 7-11 from a column in the east wall 35-40 cm north of the southeast corner. Sample No. 7, 5-10 cm bs; Sample No. 8, 15-20 cm bs; Sample No. 9, 25-30 cm bs; Sample No. 10, 35-40 cm bs; Sample No. 11, 50-55 cm bs.

Profile: East and south walls

Purpose: To evaluate a concentration of cultural materials exposed in the cutbank.

Description of Profile: Three zones, a historic hearth (Feature 1), a rodent run, a piece of FCR and two rocks were exposed in the east and south wall profiles. Zone 1: ca. 0-23 cm bs; brown/dark brown (7.5YR 4/2) sandy silt. Zone 2: 23-35.5 cm bs; brown (10.5YR 5/3) sandy silt. Zone 3: 35.5-60+ cm bs; brown (10.5YR 5/3) sandy silt which more frequently contains calcium carbonate.

Features: A recent historic hearth, Feature 1, was recorded as partially in the southeast corner of Level 1. Feature 1 extended up to 30 cm north of the southeast corner, and from the surface to a depth of 8.5 cm bs. It contained charcoal and flooring nails; other historic artifacts from Level 1 may have been associated with this feature. A largely vertical rodent run was recorded in the southeast corner of the unit; it was visible from ca. 23-55 cm bs and extended up to 7 cm into the unit's south wall. Although the run underlies Feature 1, and at first glance appears to be associated with it, some 14.5 cm of unassociated soils separate the two. Rodent runs were also recorded on the floors of Levels 1, 2, 3, 4 and 5.

Also plotted, but not designated features, were materials or concentrations of materials on the floor of Levels 2 and 3, and an apparent metate fragment in Level 5 (45.5-48.5 cm bs).

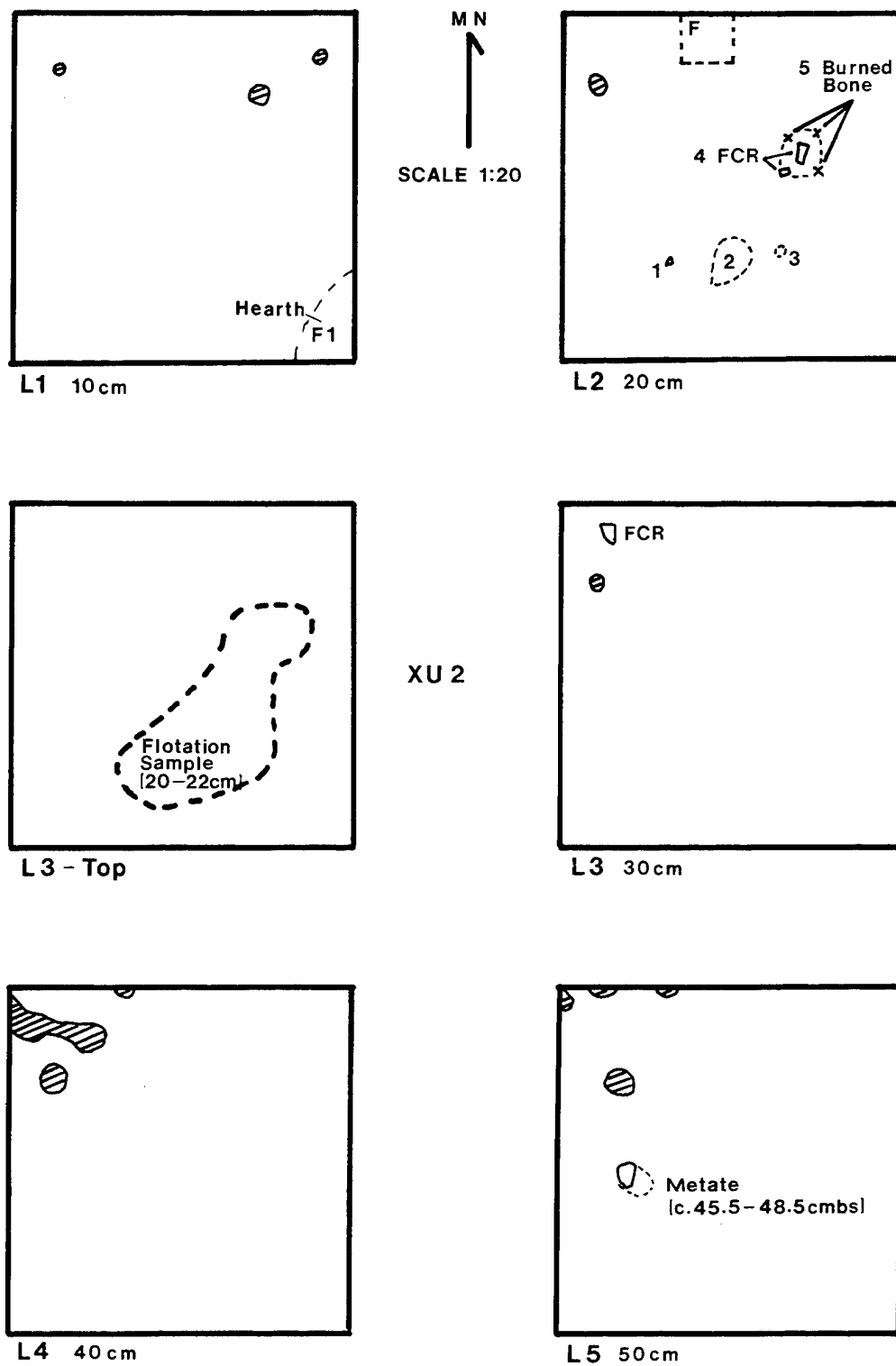
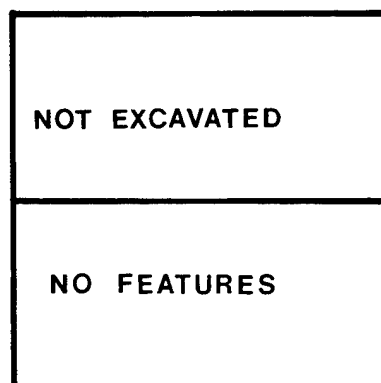


Figure 15. Floorplans, site 32MN331 - XU2.



L6 60cm

KEY TO FLOORPLANS - XU2

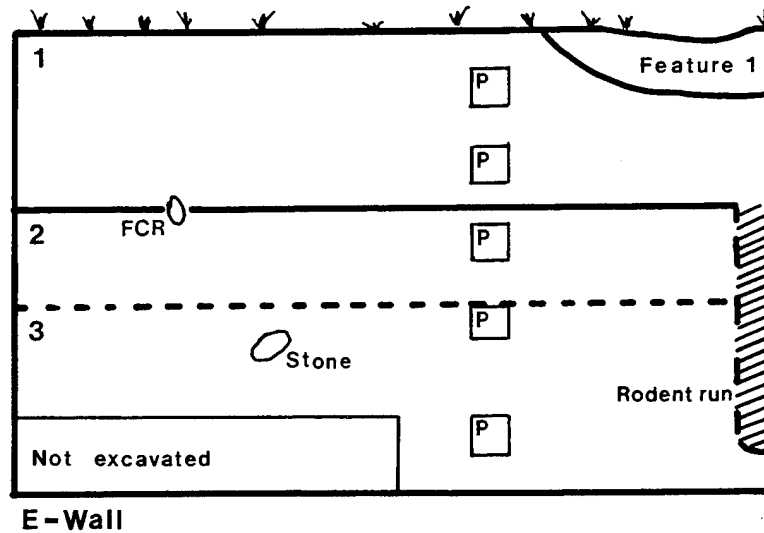


RODENT RUN

1-5 PLOTTED ITEMS

F FLOTATION SAMPLE

Figure 15 (cont.) Floorplans, site 32MN331 - XU2.



XU2

SCALE 1:10

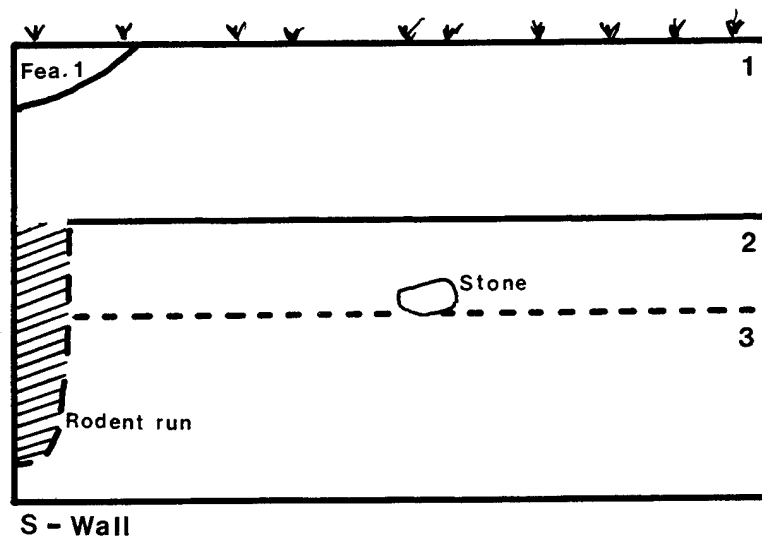


Figure 16. Profiles at site 32MN331 - XU2. Layer 1: brown/dark brown (7.5YR 4/2) sandy silt with gravels; Layer 2: brown (10.5YR 5/3) sandy silt with calcium carbonate covered gravels; Layer 3: brown (10YR 5/3) sandy silt, as Layer 2 but with calcium carbonates becoming more common. Feature 1: historic hearth, 8.5 cm in depth, 30 cm N-S x 13 cm E-W, contained charcoal briquette and nails. P = pollen sample.

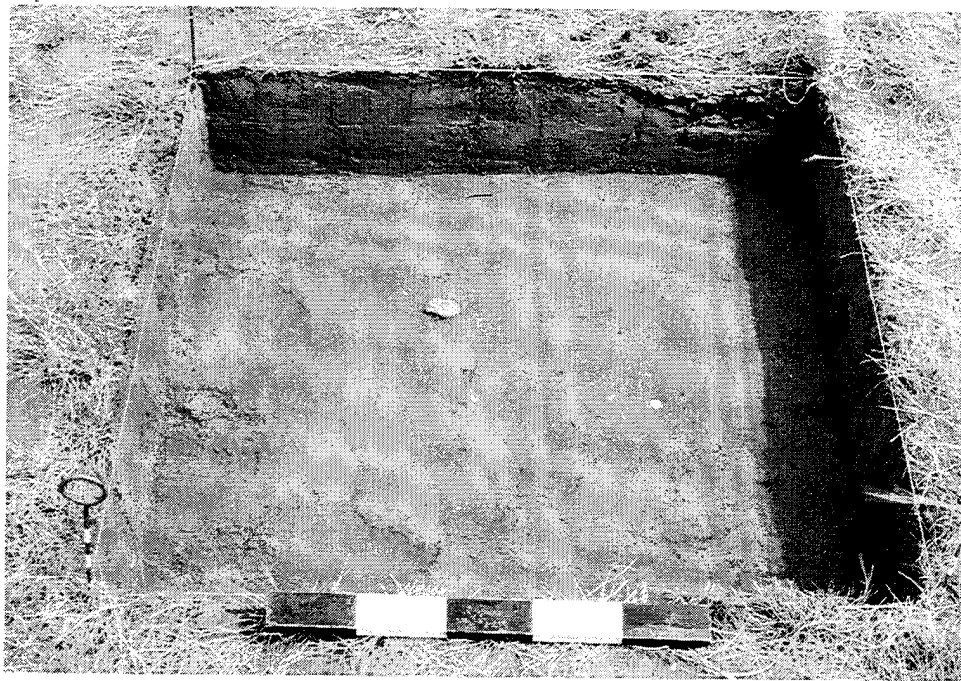


Plate 10. Site 32MN331, XU2, Level 2 floor with Feature 1 visible in profile (top right).

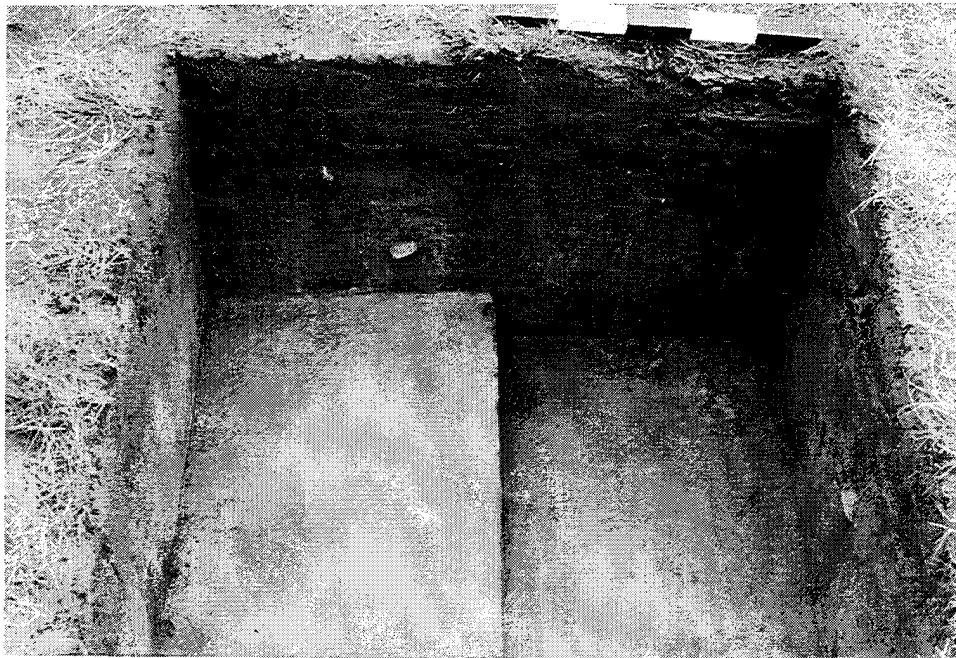


Plate 11. Site 32MN331, XU2, east wall profile.

Material Recovered: Level 1: "charcoal" briquette (1 item); 22 caliber bullet casings (2 items); "flooring" nails (7 items); melted lead glob (1 piece); flattened wire coil, brass (?) (1); aluminum "pop top" tab (2); clear bottle glass (2 fragments); cigarette filters (2); charcoal fragments from Feature 1 (29+); chipped stone (4 items); FCR (2 pieces); bone, burned bone fragments (2); gravels ca. 1/8-1½ inches in diameter (ca. 0.75 pint). Level 2: chipped stone (74 items, 12 in the 1/8" screen); FCR (7 pieces); dentine and enamel fragments (1 in the 1/8" screen); bone fragments and burned bone fragments (35); charcoal fragments (10); seed (1); gravel ca. 1/8-2 inches in diameter (ca. 0.75 pint). Level 3: chipped stone (80 items, 2 in the 1/8" screen); FCR (8 pieces, 1 in the 1/8" screen); charcoal fragments (49); dentine and enamel fragments, bone and burned bone fragments (262); gravel ca. 1/8-1½" in diameter (ca. 0.75 pint). Level 4: chipped stone (48 items, 15 in the 1/8" screen); ground stone (1); FCR (1); dentine and enamel and bone fragments (4 pieces, 1 in the 1/8" screen); gravel ca. 1/8-3½" in diameter (ca. 1 pint). Level 5: chipped stone (62 items, 2 in the 1/8" screen); ground stone (23 pieces); dentine and enamel, bone and burned bone fragments (41 pieces); gravel ca. 1/8-2½" in diameter (ca. ½ pint). Level 6: chipped stone (10 items); bone fragments (2 pieces); gravel ca. 1/8-½" in diameter (ca. 1/10 pint).

Observations: Types and frequencies of certain materials suggest two prehistoric occupations, one primarily associated with Levels 2 and 3 and the other with Levels 4 and 5. KRF, chert, chalcedony and quartzite appear to characterize Levels 2 and 3; KRF, porcelanite and ground stone characterize Levels 4 and 5. There also appears to be some association of bone with each of the two "zones" above. A deer mandible fragment and tooth were recovered from Level 5.

Excavation Unit: 5 (XU5) (Figure 17; Plate 12)

Site: 32MN331

Location: 100N, 300E

Number of 10 cm Levels: 4

Flotation Sample: Southeast corner of Level 2 (10-20 cm bs)

Pollen Samples: Sample numbers 19 and 20 from a column in the north wall 48-52 cm east of the northwest corner. Sample No. 19, 5-10 cm bs; Sample No. 20, 15-20 cm bs.

Profile: North wall

Purpose: To evaluate a positive auger probe.

Description of Profile: Three zones were recorded. Zone 1: ca. 0-17 cm bs; very dark grayish-brown (10YR 3/2) clayey silt. Zone 2: 17-36 cm bs; brown/dark brown (10YR 4/3) clayey silt grading to sandy silt. Zone 3: 36-40+ cm bs; brown (10YR 5/3) sandy silt, more gravels and calcium carbonate than above.

Features: No features were observed. Rodent runs were recorded on the floor of Levels 2, 3 and 4 and in the north wall profile.

Material Recovered: Level 1: chipped stone (20 items); gravels ca. 1/8-1/2" in diameter (ca. 1/20 pint). Level 2: chipped stone (93 items, 15 in the 1/8" screen); bone fragments and burned bone fragments (10); charcoal fragments (2 item); seeds (34.5); gravels ca. 1/8" in diameter (ca. 1/20 pint). Level 3: chipped stone (11 items, 6 in the 1/8" screen); gravels ca. 1/8-1 1/4" in diameter (ca. 1/2 pint). Level 4: chipped stone (1 item from 1/8" screen); gravels, ca. 1/8-2" in diameter (ca. 1 1/4 pints).

Observations: Materials appear to be primarily associated with Level 2.

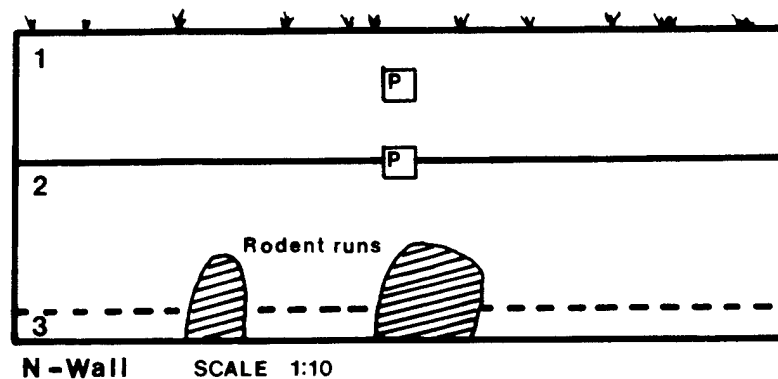
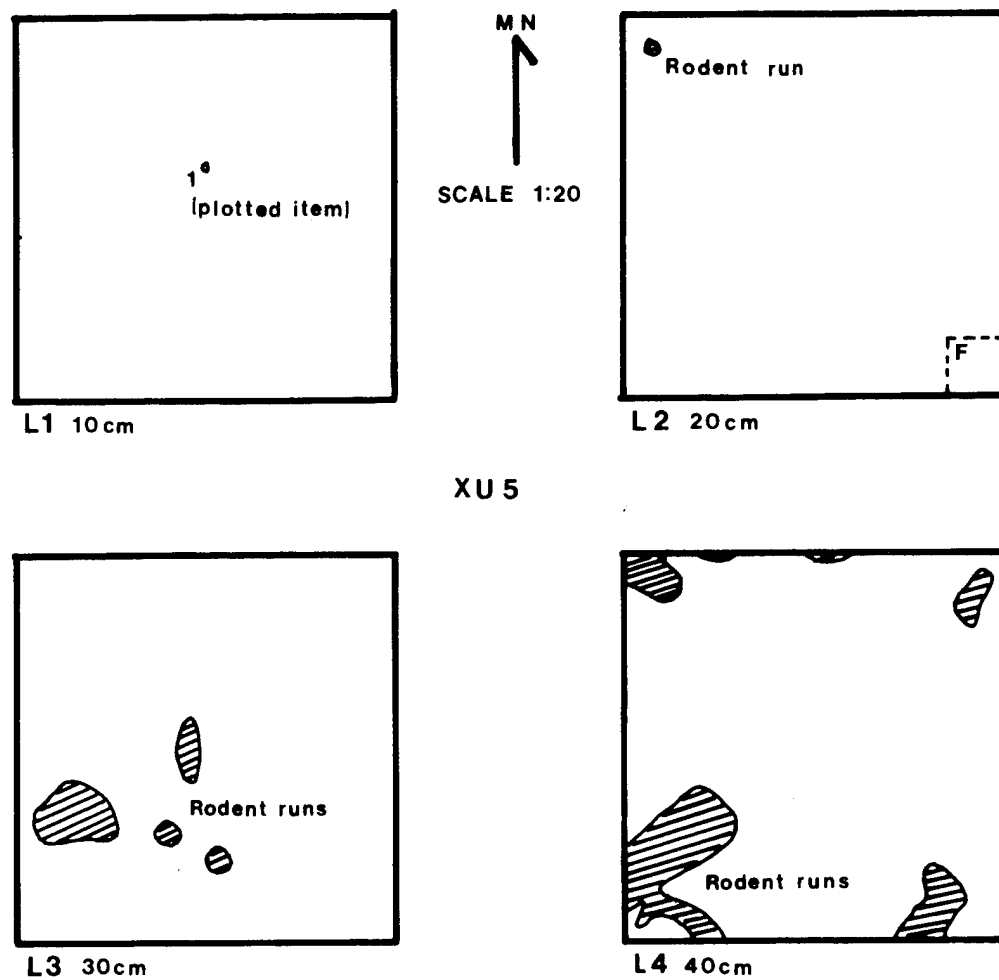


Figure 17. Floorplans and profiles at site 32MN331 - XU5. Profile - Layer 1: very dark grayish-brown (10YR 3/2) clayey silt with few gravels; Layer 2: brown/dark brown (10YR 4/3) sandy silt with few gravels; Layer 3: brown (10YR 5/3) sandy silt with more gravels and calcium carbonate than Layer 2. F = flotation sample; P = pollen sample.



Plate 12. Site 32MN331, XU5, north wall profile.

Excavation Unit: 6 (XU6) (Figure 18; Plate 13)

Site: 32MN331

Location: 159N, 335E

Number of 10 cm Levels: 3

Flotation Sample: Northeast corner of Level 2 (10-20 cm bs)

Pollen Samples: Sample numbers 22 and 23 from a column 60-65 cm north of the southwest corner. Sample No. 22, 5-10 cm bs; Sample No. 23, 15-20 cm bs.

Profile: West wall

Purpose: To evaluate several positive auger probes.

Description of Profile: Three zones were recorded. Zone 1: ca. 0-10 cm bs; very dark grayish-brown (10YR 3/2) silt with some sand and small gravels; moist; rootlets common. Zone 2: 10-16 cm bs; same as Zone 1, but fewer rootlets than Zone 1. Zone 3: 16-30+ cm bs; brown/dark brown (10YR 4/3) sandy silt, fewer gravels than Zones 1 and 2.

Features: No features were observed. Rocks/gravels were recorded on the floor of Levels 1 and 2 and in the west wall profile from ca. 21-26 cm bs.

Material Recovered: Level 1: chipped stone (64 items, 11 from the 1/8" screen); gravels, small and few. Level 2: chipped stone (28 items, 3 in the 1/8" screen); dentine and enamel and bone fragments (2 items, 1 in the 1/8" screen); charcoal fragment (1 item); seeds (467+); gravels, small and few. Level 3: chipped stone (2 items).

Observations: Materials appear to be primarily associated with Levels 1 and 2 (0-20 cm bs).

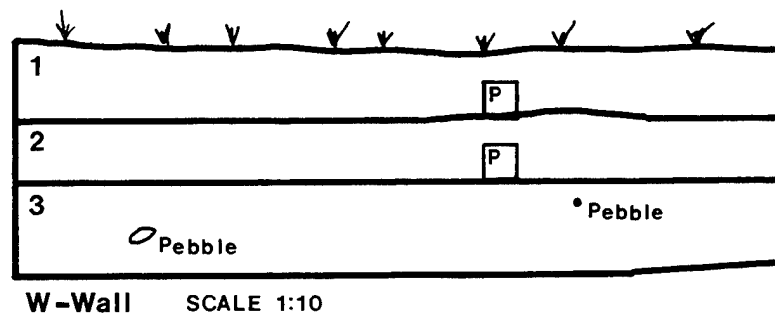
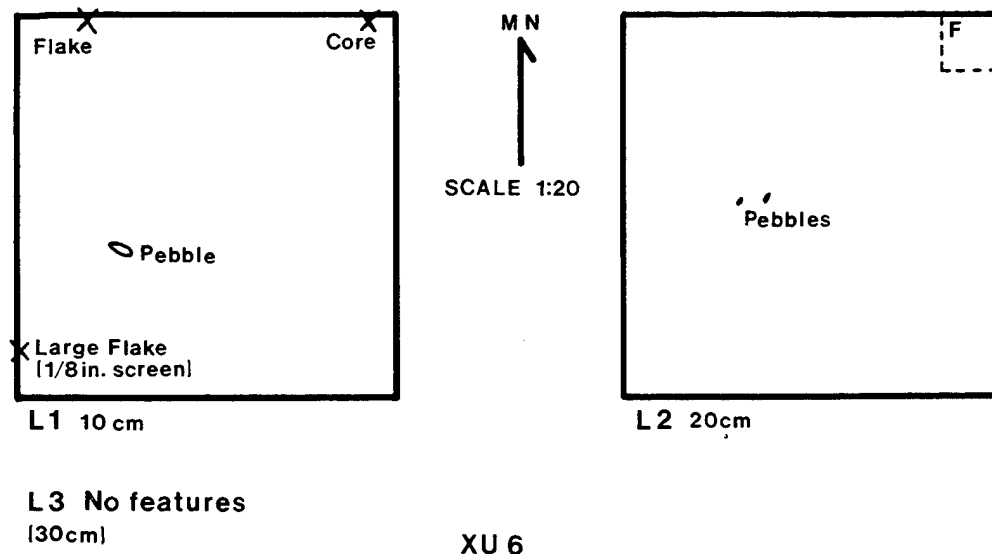


Figure 18. Floorplans and profiles at site 32MN331 - XU6. Profile - Layer 1: very dark grayish-brown (10YR 3/2) sandy silt with rare gravels; Layer 2: brown/dark brown (10YR 4/3) silt with very rare gravels; Layer 3: brown/dark brown (10YR 4/3) sandy silt, extremely hard and compact, very rare gravels. F = flotation sample; P = pollen sample.

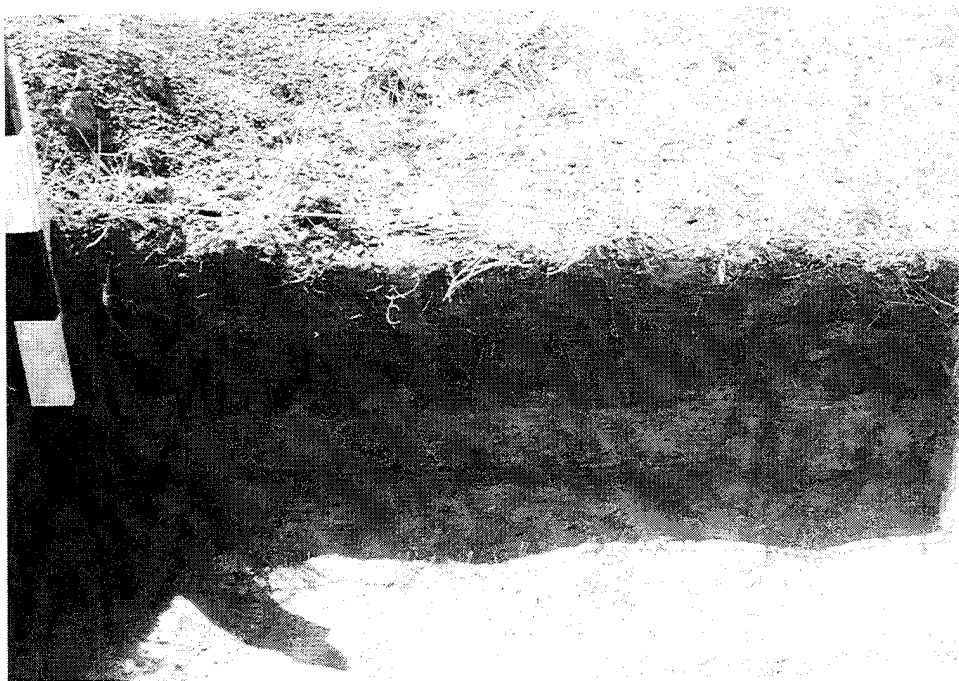


Plate 13. Site 32MN331, XU6, west wall profile.

Surface and Cutbank Survey

The surfaces of both sites (Plates 14-17) were systematically inspected by the field crew walking closely spaced (ca. 10 m) transects. Surface visibility varied from excellent to very poor. The 32MN228 area was mostly in pasture; erosion along the sides of the roads had exposed some cultural material (Plots 19 and 20 - Figure 8). Lot areas 47 and 48 (see Appendix A) were almost bare of vegetation, affording good surface visibility.

Site 32MN331 evidenced many disturbed areas, including a strip of land plowed for tree-planting where some surface materials (Plot 12 - Figure 9) were observed.

All cultural material observed was flagged, point-plotted and collected (Figures 8 and 9). Similarly, the entire cutbank (Plate 14) was inspected for buried cultural materials. The following items were observed in the cutbank (Figure 9):

Plot 15, a burin facted graver, was located on a cut step leading down the cutbank and probably not in situ.

Plot 16, a retouched flake, was located in situ near the cut step at 29.5 cm bs.

Plot 10, a tertiary flake fragment, was in situ at 40 cm bs.

Plot 11, a secondary flake, was in situ at 10 cm bs.

[Plot 17, a tertiary flake, was a surface find].

Most of the cutbank material was observed between the surface and 35 cm bs near XU2. Therefore, two soil samples were taken from the cutbank in this area (S1 and S2 - Figure 9) at locations that included concentrations of lithic materials. S1 was taken from 20-35 cm bs, and S2 from 10-25 cm bs (Plate 18).

Auger Tests

The auger tests were accomplished using an 8 cm diameter solid core hand auger (Plate 19). The matrix removed from the core was screened through 1/8" hardware cloth. Cores were taken to a depth of 50 cm or to the depth at which the auger hit dense gravels or rocks. Appendix D presents a summary of the core locations, depths and the positive or negative results. Detailed descriptions of the cultural materials

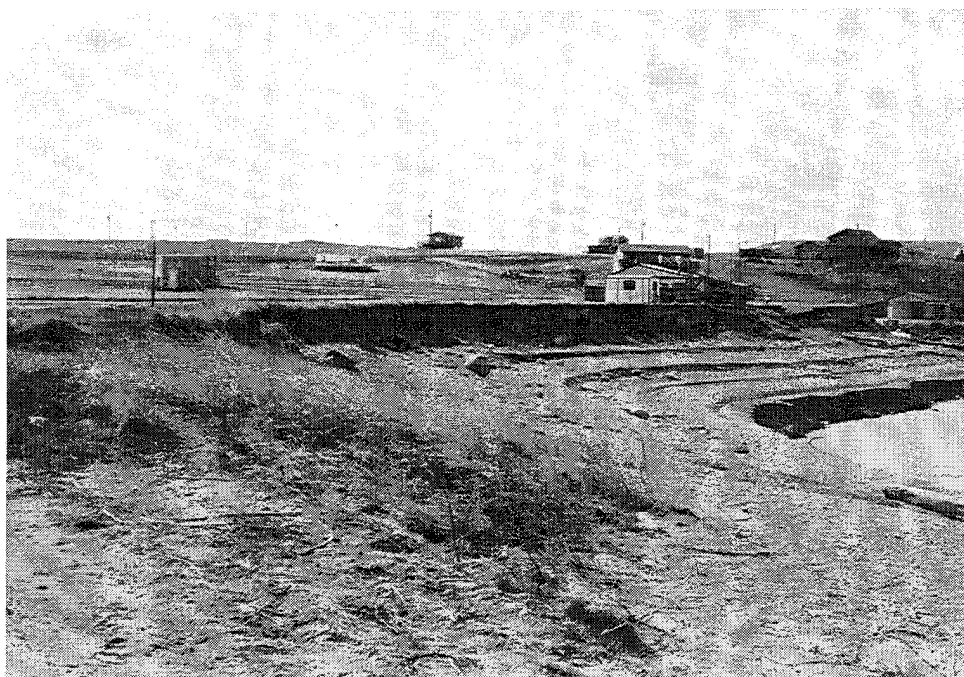


Plate 14. View of cutbank at site 32MN331 (foreground), with the bait shop and boat ramp (left). The houses on the upper terrace are on private lots on site 32MN228.



Plate 15. Overview of the southern portion of site 32MN331, facing SE, taken from site 32MN228, near XU3.

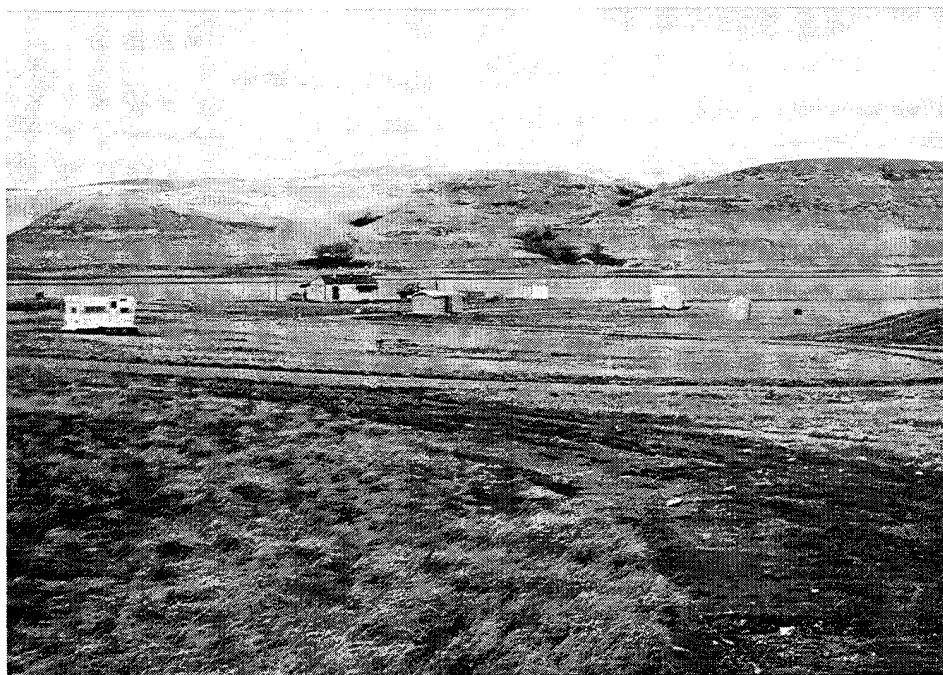


Plate 16. Overview of the northern part of site 32MN331, with the bait shop (left center), facing NE.



Plate 17. View from beach, facing SW towards site 32MN331, showing erosion and sand dune formation. Trees to left shown on Figure 9.



Plate 18. View of cutbank by bait shop showing sample locations
(1) foreground, (2) background, facing SSE.

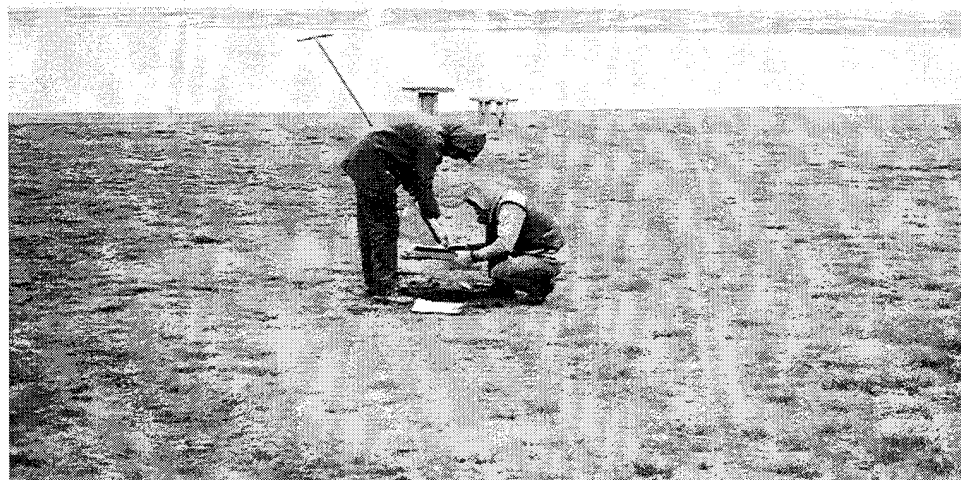


Plate 19. Augering at site 32MN331, facing S.

recovered from the positive cores are presented in the artifact catalog, Appendix F.

Testing Area of Proposed Vaults and Field Drains

The scope-of-work, Appendix A, requested that auger probes be placed at the proposed septic tank, sewage vault, and fish remains vault locations and along the three drainage field lines, if their final locations had been determined. Although the locations of these projects were not finalized at the time of the survey, Bruce Gunderson, the concessionaire, indicated approximately where the vaults and drains would be placed. Based on his information, XU1 and Auger Tests 1-4 (Figure 9) were situated to provide an adequate examination of the proposed vault locations. The locations of the proposed field drains were taped off and flagged and Auger Tests A-L were accomplished to investigate these locations.

Auger Tests 1 and 2 recovered no cultural materials, but Tests 3 and 4 did produce items of KRF from 0-30 cm bs. Test 4 also produced a round wire nail in the upper (0-10 cm) level.

In regard to tests A-L only tests A, E, H and J were positive. Tests A, E and H produced KRF flakes (unpatinated to slightly patinated) from 20-40 cm bs, while Test J produced fragments of a possible elk tooth in the upper level (0-10 cm).

The results of the excavation of XU1 have been detailed above, and based on the auger testing it is expected that similar artifact recovery would be repeated across this area.

Once the material from the field reached the laboratory it was washed, labeled, hand-sorted and rebagged. All soil samples (except pollen) were processed using a system of fine screening and flotation to recover both the flot and artifacts. Subsequent analysis of this material consisted of microscopic evaluation and sorting of artifactual and ecofactual material, followed by identification. The method used for flotation was the standard procedure utilized by the Archeology Laboratory, which involves a combination screening/flotation methodology to maximize the recovery of cultural materials. First, the soil sample is water-screened through a 2 mm screen, with the residue passing through the screen into a large container. The flot from this residue is then passed through a 1 mm screen and collected as the Small Flot. The material collected in the 2 mm screen is then placed in a container of water and agitated; the flot from that process is collected in a 1 mm screen as the Large Flot. The residue remaining in the screens is saved, dried and further sorted.

Once all the material recovered from the testing and excavations had been prepared, the artifact analyses were undertaken in two main phases. First, basic data on all materials recovered were documented in the artifact catalog (Appendix F). These data are summarized in Table 3, below. For this basic documentation weights were determined using balance scales - a Dial-O-Gram scale for most items and an infant scale for a few larger items. When two or more items were grouped, only a maximum weight was determined. A maximum error of 0.02 grams is believed to be associated with the balance scale as a result of variable instrument reading. The weights for certain items, such as small flakes, small quantities of seeds, and fish scale were listed as insignificant if they weighed 0.01 grams or less.

Dimensions were obtained with stainless steel metric dial calipers (Mitutoyo). When two or more items were grouped for size determination, minimum and maximum dimensions for the group (range) were recorded. In a few cases, both the minimum and maximum dimension came from the same item.

Most items, with the exception of seeds, were identified through visual inspection. A 2x and 10x hand lens and 20x microscope were

Table 3. Summary of Artifacts Recovered from Sites 32MN331 and 32MN228.
(See Appendix F for a more detailed breakdown of materials recovered.)

ARTIFACT TYPE	XU1	XU2	XU5	SITE 32MN331			POINT PLOTS	CUTBANK	TOTAL *	XU3	XU4	SITE 32MN228			POINT PLOTS	TOTAL
				XU6	AUGER TESTS							AUGER TESTS				
CERAMICS																
BODYSHERD																
Weight (g)	2.0	-	-	-	-	-	-	-	2.0	-	-	-	-	-	-	-
Number	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
LITHICS - KRF																
PRIMARY FLAKE																
Weight (g)	-	4.2	-	20.8	-	-	-	-	25.0	-	-	-	-	-	-	-
Number	-	4	-	6	-	-	-	-	10	-	-	-	-	-	-	-
SECONDARY FLAKE																
Weight (g)	-	.3	-	6.4	-	5.7	-	-	12.4	0.6	-	-	-	-	-	0.6
Number	-	1	-	6	-	4	-	-	11	1	-	-	-	-	-	1
TERTIARY FLAKE																
Weight (g)	6.9	36.67	24.0	15.5	2.3	15.4	-	-	100.77	19.2	3.9	1.7	2.0	26.8		
Number	8	104	68	49	15	9	-	-	253	48	15	13	7	83		
UTILIZED/																
RETOUCHED FLAKE																
Weight (g)	-	2.28	2.3	.4	-	6.6	-	-	11.58	3.9	-	-	8.3	12.2		
Number	-	2	3	1	-	4	-	-	10	3	-	-	4	7		
SCRAPER																
Weight (g)	-	-	-	3.5	-	-	-	-	3.5	-	-	-	-	-	-	-
Number	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-
DRILL/BORER																
Weight (g)	-	1.45	-	-	-	-	-	-	1.45	-	-	-	-	-	-	-
Number	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
GRAVER																
Weight (g)	-	-	-	-	-	1.3	-	-	1.3	-	-	-	-	-	-	-
Number	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
CORE																
Weight (g)	14.6	-	-	4.2	-	-	-	-	18.8	-	-	-	-	-	-	-
Number	1	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-

Table 3. (cont.)

ARTIFACT TYPE	XU1	XU2	XU5	SITE 32MN331			TOTAL *	CUTBANK	TOTAL *	XU3	XU4	SITE 32MN228		TOTAL
				XU6	AUGER TESTS	POINT PLOTS						AUGER TESTS	POINT PLOTS	
LITHICS - KRF (cont.)														
SHATTER							*							
Weight (g)	.9	35.7	9.0	4.5	4.5	6.3	*	-	60.9	3.1	1.6	INS*	3.6	8.3
Number	2	35	13	5	6	4	*	-	65	4	3	1	3	11
FLAKE FRAGMENT							*							
Weight (g)	1.7	7.8	5.6	1.6	.8	5.4	*	-	22.9	1.8	3.9	.5	2.8	9.0
Number	5	18	21	8	8	6	*	-	66	8	6	7	5	26
LITHICS - CHERT														
TERTIARY FLAKE							*							
Weight (g)	.4	.6	-	-	-	8.3	*	4.7	14.0	-	-	INS	7.6	7.6
Number	1	4	-	-	-	5	*	57	67	-	-	1	4	5
UTILIZED/ RETOUCHED FLAKE							*							
Weight (g)	-	-	-	-	-	1.1	*	-	1.1	-	-	-	-	-
Number	-	-	-	-	-	1	*	-	1	-	-	-	-	-
SCRAPER							*							
Weight (g)	-	-	-	1.8	-	-	*	-	1.8	-	-	-	-	-
Number	-	-	-	1	-	-	*	-	1	-	-	-	-	-
CORE							*							
Weight (g)	-	-	-	-	-	-	*	-	-	-	1.8	-	51.3	53.1
Number	-	-	-	-	-	-	*	-	-	-	1	-	1	2
SHATTER							*							
Weight (g)	-	34.7	.4	.4	-	-	*	10.4	45.9	1.1	-	INS	3.4	4.5
Number	-	13	1	1	-	-	*	23	38	3	-	1	2	6
FLAKE FRAGMENT							*							
Weight (g)	INS	1.0	1.7	INS	-	.3	*	8.6	11.6	INS	-	-	-	INS
Number	2	4	2	1	-	1	*	38	48	1	-	-	-	1

* INS = Insignificant

Table 3. (cont.)

ARTIFACT TYPE	XU1	XU2	XU5	SITE 32MN331		POINT PLOTS	CUTBANK	TOTAL *	XU3	XU4	SITE 32MN228		POINT PLOTS	TOTAL
				AUGER TESTS	XU6						AUGER TESTS	TOTAL *		
LITHICS - CHALCEDONY														
TERTIARY FLAKE														
Weight (g)	-	3.7	.5	INS	-	-	.6	4.8	1.4	.1	-	-	-	1.5
Number	-	44	9	2	-	-	21	76	9	4	-	-	-	13
SHATTER														
Weight (g)	-	INS	INS	INS	-	-	.1	.1	INS	.6	-	-	-	.6
Number	-	2	2	1	-	-	2	7	2	2	-	-	-	4
FLAKE FRAGMENT														
Weight (g)	1.0	.2	.1	-	-	.3	.7	2.3	INS	-	-	-	-	INS
Number	4	11	4	-	-	1	4	24	1	-	-	-	-	1
LITHICS - PORCELANITE														
TERTIARY FLAKE														
Weight (g)	-	8.3	.2	.4	.2	-	-	9.1	.1	.3	.1	-	-	.5
Number	-	19	1	4	3	-	-	27	1	1	3	-	-	5
UTILIZED/														
RETOUCHED FLAKE														
Weight (g)	-	-	-	-	-	-	-	-	-	-	4.3	-	-	4.3
Number	-	-	-	-	-	-	-	-	-	-	1	-	-	1
BIFACE/POINT TIP														
Weight (g)	-	-	-	.3	-	-	-	.3	-	-	-	-	-	-
Number	-	-	-	1	-	-	-	1	-	-	-	-	-	-
SHATTER														
Weight (g)	2.2	1.2	-	-	.1	-	-	3.5	-	-	INS	-	-	INS
Number	1	6	-	-	1	-	-	8	-	-	2	-	-	2
FLAKE FRAGMENT														
Weight (g)	-	-	.2	-	-	-	-	.2	-	-	-	-	-	-
Number	-	-	1	-	-	-	-	1	-	-	-	-	-	-

Table 3. (cont.)

ARTIFACT TYPE	XU1	XU2	XU5	SITE 32MN331			POINT PLOTS	CUTBANK	TOTAL	*	XU3	XU4	SITE 32MN228		POINT PLOTS	TOTAL
				XU6	AUGER TESTS	AUGER TESTS							AUGER TESTS			
LITHICS - QUARTZITE																
TERTIARY FLAKE																
Weight (g)	-	1.6	-	-	-	-	-	-	1.6	*	-	3.2	-	-	-	3.2
Number	-	4	-	-	-	-	-	-	4	*	-	2	-	-	-	2
SHATTER																
Weight (g)	-	.5	-	-	-	-	-	-	.5	*	-	-	-	-	-	-
Number	-	1	-	-	-	-	-	-	1	*	-	-	-	-	-	-
FLAKE FRAGMENT																
Weight (g)	-	.3	-	-	-	-	-	-	.3	*	-	-	-	-	-	-
Number	-	2	-	-	-	-	-	-	2	*	-	-	-	-	-	-
LITHICS - QUARTZ																
SHATTER																
Weight (g)	-	16.4	-	-	-	-	-	-	16.4	*	-	-	-	-	-	-
Number	-	1	-	-	-	-	-	-	1	*	-	-	-	-	-	-
LITHICS - OBSIDIAN																
FLAKE FRAGMENT																
Weight (g)	-	INS	-	-	-	-	-	-	INS	*	-	-	-	-	-	-
Number	-	1	-	-	-	-	-	-	1	*	-	-	-	-	-	-
LITHICS - TONGUE RIVER SILICA																
SECONDARY FLAKE																
Weight (g)	-	-	-	-	-	-	11.2	-	11.2	*	-	-	-	-	-	-
Number	-	-	-	-	-	-	1	-	1	*	-	-	-	-	-	-
TERTIARY FLAKE																
Weight (g)	-	.4	-	-	-	-	-	-	.4	*	-	-	-	-	-	-
Number	-	1	-	-	-	-	-	-	1	*	-	-	-	-	-	-
LITHICS - BASALT-LIKE																
TERTIARY FLAKE																
Weight (g)	-	-	-	-	-	-	-	-	-	*	.5	-	-	-	-	.5
Number	-	-	-	-	-	-	-	-	-	*	1	-	-	-	-	1

Table 3. (cont.)

ARTIFACT TYPE	XU1	XU2	XU5	SITE 32MN331			TOTAL *	CUTBANK	POINT PLOTS	SITE 32MN228			TOTAL
				XU6	AUGER TESTS	XU3				XU4	AUGER TESTS	POINT PLOTS	
GROUND STONE/ SANDSTONE													
Weight (g)	-	434.5	-	-	-	-	434.5	-	-	-	-	-	-
Number	-	24	-	-	-	-	24	-	-	-	-	-	-
FIRE-CRACKED ROCK													
Weight (g)	207.9	727.9	-	-	-	499.7	1435.5	122.3	-	-	-	-	122.3
Number	4	18	-	-	-	1	23	3	-	-	-	-	3
SEEDS													
Weight (g)	INS	INS	INS	INS	-	INS	INS	INS	-	-	-	-	INS
Number	5	1	34.5	467	-	5	512.5	4	-	-	-	-	71
CHARCOAL													
Weight (g)	INS	.1	INS	INS	-	INS	.1	-	-	INS	-	-	INS
Number	FLECKS	59	2	1	-	12	74	-	-	1	-	-	1
BONE													
DENTINE/ENAMEL FRAGS.													
Weight (g)	-	9.7	-	.1	1.7	INS	11.5	-	-	-	.4	-	.4
Number	-	80	-	1	12	1	94	-	-	-	1	-	1
BONE FRAGS.													
Weight (g)	1.8	46.4	1.4	INS	-	1.6	51.2	2.0	-	.4	-	4.7	7.1
Number	7	189	6	2	-	36	240	6	-	4	-	4	14
BURNED BONE FRAGS.													
Weight (g)	-	7.7	.1	-	-	INS	7.8	.8	-	.3	-	-	1.1
Number	-	77	4	-	-	1	82	18	-	13	-	-	31
WOOD OR MINERALIZED													
BONE													
Weight (g)	-	-	-	-	-	-	-	6.8	-	1.5	-	-	8.3
Number	-	-	-	-	-	-	-	12	-	2	-	-	14

Table 3. (cont.)

ARTIFACT TYPE	SITE 32MN331						SITE 32MN228							
	XU1	XU2	XU5	XU6	AUGER TESTS	POINT PLOTS	CUTBANK	TOTAL	*	XU3	XU4	AUGER TESTS	POINT PLOTS	TOTAL
FISH SCALE									*					
Weight (g)	-	-	-	-	-	-	INS	INS	*	-	-	-	-	-
Number	-	-	-	-	-	-	1	1	*	-	-	-	-	-
YELLOW OCHRE									*					
Weight (g)	-	-	-	-	-	-	-	-	*	.3	-	-	-	.3
Number	-	-	-	-	-	-	-	-	*	1	-	-	-	1
BURNED EARTH?									*					
Weight (g)	-	-	-	-	-	-	-	INS	*	-	-	-	-	-
Number	-	-	-	-	-	-	-	1	*	-	-	-	-	-

variously used to observe each item. Some features on microflakes were not able to be identified with certainty (i.e., presence of a lip, crushing, fissures, bulb and/or platform) resulting in the possibility that some items classified as flake fragments may actually be tertiary flakes or shatter or vice versa.

Once the basic data had been recorded and the artifacts cataloged, the second phase of the analysis was the selection of specific items for more detailed study. Such studies were undertaken on all patterned chipped stone artifacts, ceramics, seeds, pollen samples and identifiable bone fragments. The patination of all KRF items is recorded under the comments column of the catalog sheets (Appendix F). This records a general visual impression of each item.

Seeds

Seeds were identified by comparison with photographs and written descriptions in Martin and Barkley (1973); Slife, Buchholtz and Kommedahl (1960); and Delorit (1970). All seeds were examined through a 20x power binocular microscope (Model 40 - American Optical Company). The following seed types were identified:

- ? Mint (Mentha canadensis) (Catalog nos. 221, 393)
- ? Lambsquarters (Chenopodium album) (Catalog nos. 91, 219, 234, 264, 266, 296, 298, 370, 392, 393)
- ? Filaree (Erodium cicutarium) (Catalog nos. 368, 370, 393)
- ? Cornbind (Polygonum convolvulus) (also Wild Buckwheat, Black bindweed) (Catalog nos. 264, 266)
- ? Spurge (Euphorbia maculata) (Catalog no. 297)
Seed pods? (Catalog no. 371)
- ? Pigweed (Amaranthus retroflexus) (Catalog no. 198)
- ? Tarweed (Hemizonia congesta) (Catalog no. 90)
- ? Pigweed (Amaranthus) (Catalog no. 266)

Bone

All fragments were examined by William Soeffing, zoologist, Sioux Falls College, and identified as to element and species, if possible. Most of the bone consisted of minute, unidentifiable fragments.

Pollen

Two pollen samples were submitted to Dr. Eric Grimm at the Illinois State Museum for analysis. Procedures utilized follow Faegri and Iversen (1966) and Heusser and Stock (1984). One 4 cc subsample was taken from each of the samples. These were treated with 10 percent potassium hydroxide (KOH) to remove humics and then strained through a Gooch filtering crucible to remove any stones or larger pieces of organic material. Both samples contained gravel or sand, and the 32MN228 sample also contained many small stones. The samples were then treated with hydrochloric acid (HCl) and hydrofluoric acid (HF). Both samples received extensive HF treatment; one one-hour period in hot HF, followed by three three-hour periods in hot HF. Each of the HF treatments was followed by a wash with hot, concentrated HCl. Samples underwent acetolysis, were washed with water, and 0.5 ml of a microsphere suspension ($88,000 \pm 8200$ microspheres/ml) was added to each sample. Samples were strained through a nytex screen with sodium pyrophosphate to get rid of the clay, then stained with safranin and returned to vials for storage.

Ceramics and Patterned Chipped Stone Tools

These artifacts were examined both macro- and microscopically by Dr. L. Adrien Hannus. Salient attributes and morphological characteristics were described and metric measurements were obtained. Selected examples were illustrated by Rebecca Johnson (see Figure 19).

Pollen

Pollen preservation is extremely poor. Two samples were processed, one from 32MN331 [XU2 25-30 cm] (Plate 20) and one from site 32MN228 [XU3 15-20 cm]. The concentration of pollen is very low; the small amounts present could have been mixed in by minor bioturbation by earthworms or other soil organisms. In the sample from site 32MN228 only 14 grains were encountered, while in the sample from site 32MN331 38.5 grains were encountered. Almost all of the grains were highly degraded. According to Dr. Grimm's report, the low concentration and incomplete preservation of the grains in both samples makes any vegetational interpretation impossible. It should also be noted that differential preservation has undoubtedly caused the pollen sample to be biased. Dr. Grimm's complete pollen report comprises Appendix H.

Flotation

The procedures used for fine water-screening and flotation of soil samples taken from sites 32MN228 and 32MN331 resulted in the recovery of additional lithic and bone material, as well as charcoal flecks, seeds, a fish scale and recent roots and insect remains. Because of the likely mixing of cultural deposits with recent activity on the site, it is almost impossible to ascertain whether the charcoal, fish scale, seeds and bone fragments are associated in any way with the prehistoric site components. All seeds recovered are normally found in this area; none appear to be charred.

Spatial Analyses

The spatial information derived from the evaluations of these sites consists of maps of the surface distribution of artifacts and features and the results of the systematic coring and judgmental testing (Figures 8 and 9).

Features associated with site 32MN228, as originally documented, included at least 28 stone circles and a possible cairn. Today only one partial stone circle (Figure 10) and a possible cairn (Figure 11) remain at 32MN228; the cairn is located on private land. No prehistoric features are associated with site 32MN331.

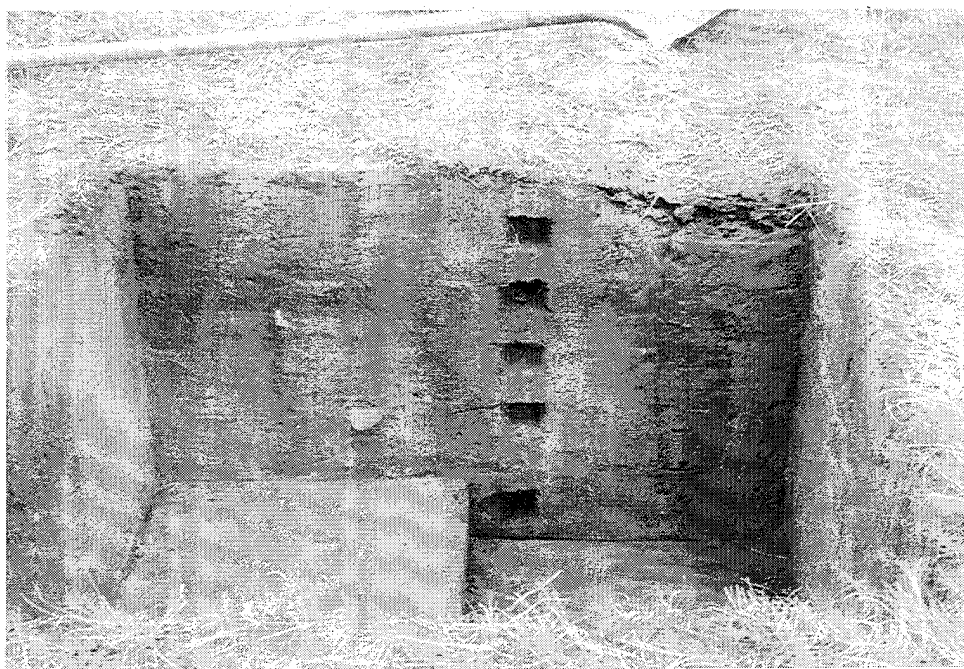


Plate 20. Pollen samples extracted from the east wall, XU2, site 32MN331. The middle of the five samples was processed.

The coring and testing at 32MN228 suggest that the site focus was towards the northeast, along the bluffs above the White Earth River. All of the previously recorded stone circles were once situated in this area and it is towards this section of the site that the positive cores occurred. The possible cairn is the only feature isolated from this core area, perhaps an indication that it is not a cairn or that it is a solitary feature unrelated to 32MN228.

At site 32MN331 the results obtained through the coring and testing procedures, coupled with the surface collection, suggest a focus towards the northeast, paralleling the White Earth River. However, there is evidence for a widespread, sparse scatter extending across the entire terrace area (Figure 9). Based on the available evidence, an estimate of the core area of each site suggests that 32MN228 covered some 300 x 300 meters, while 32MN331 today extends over an area 250 x 250 meters. Estimating the areal extent of site 32MN331 is complicated by the fact that it has been subject to significant impact from shoreline erosion.

Comparisons of Site Assemblages

Table 4 summarizes the artifacts recovered from sites 32MN228 and 32MN331 during the present site evaluation procedures. The chipped stone assemblages show a fairly similar composition. Knife River flint is the dominant material type, with cherts and chalcedonies comprising the other primary types. Porcelanite is similarly represented at both sites, as is quartzite. Small quantities of quartz, obsidian and Tongue River silica were recovered from 32MN331, but were absent at 32MN228, while one basalt-like flake was noted at 32MN228 and none at 32MN331.

Perhaps more significant was the presence of a ceramic sherd and ground stone artifacts at 32MN331. Neither of these artifact types was recovered at 32MN228. Even when allowing for a three-fold increase in material density at 32MN228 to compensate for the more limited area excavated (Table 5), fire-cracked rock and bone fragments are more common at 32MN331 than at 32MN228. However, the disturbed nature of both sites makes it impossible to be certain that all of this material relates solely to the prehistoric components.

Table 6 summarizes and compares the major artifact content of each test unit. Excavation Unit 3 at 32MN228 and XU 2 at 32MN331 clearly have the highest artifact density at the respective sites.

Table 4. Comparison of Assemblages Between Site 32MN228 and 32MN331.

A. CHIPPED STONE					
		32MN331		32MN228	
ASSEMBLAGE COMPONENT		PERCENTAGE BY NUMBER WEIGHT		PERCENTAGE BY NUMBER WEIGHT	
		%	%	%	%
Knife River Flint		57.6	67.8	74.8	42.8
Chert		21.1	18.9	8.2	49.1
Chalcedony		14.7	2.2	10.5	1.6
Porcelanite		5.1	3.3	4.7	3.6
Quartzite		1.0	0.6	1.2	2.4
Quartz		0.1	4.2	-	-
Obsidian		0.1	-	-	-
Tongue River Silica		0.3	2.9	-	-
Basalt-like		-	-	0.6	0.4
		%	%	%	%
Totals	Percentage	100	99.9	100	99.9
	Number	733		171	
	Weight		392.8		132.7
B. NON-CHIPPED STONE					
		32MN331		32MN228	
ASSEMBLAGE COMPONENT		NUMBER	WEIGHT	NUMBER	WEIGHT
Ceramic		1	2.0	-	-
Ground Stone		24	434.5	-	-
Fish Scale		1	-	-	-
Burned Earth		1	-	-	-
Bone: a) dentine		94	11.5	1	0.4
b) fragments		240	51.2	14	7.1
c) burned		82	7.8	31	1.1
Fire-Cracked Rock		23	1435.5	3	122.3
Seeds		512.5	-	71	-
Charcoal		74	0.1	1	-
Mineralized Bone/Wood		-	-	14	8.3
Yellow Ochre		-	-	1	0.3

Table 5. Comparisons of Units and Volumes of Material Excavated at Sites 32MN228 and 32MN331 and Densities of Chipped Stone Material.

	32MN228	32MN331
Number of 1 m x 1 m Units	2	4
Total Depth (cm)	60	175
Volume (m ³)	0.6	1.75
Number of Chipped Stone Items from 1 m x 1 m Units	116	516
# per Unit	58	129
# per m ³	193	294

Table 6. Test Unit Comparisons, A Summary, Sites 32MN228 and 32MN331.

32MN228															
	XU3						XU4								
	1/4"		1/8" Flot				1/4"		1/8" Flot						
Chipped Stone	73	9	-				30	4	-						
Bone	20	4	-				17	-	-						
FCR	2	1	-				-	-	-						
32MN331															
	XU1			XU2				XU5			XU6				
	1/4"		1/8" Flot	1/4"		1/8" Flot		1/4"		1/8" Flot		1/4"		1/8" Flot	
Chipped Stone	16	3	62	247	31	-		103	22	-		80	14	-	
Bone	2	-	184	345	2	-		10	-	-		1	1	-	
FCR	3	-	-	17	1	-		-	-	-		-	-	-	
Ceramic	2 (join)	-	-	-	-	-		-	-	-		-	-	-	
Ground Stone	-	-	-	24	-	-		-	-	-		-	-	-	

Inter-Site Analysis of Test Units and Auger Cores

Detailed descriptions and summaries of the results of the test unit excavations have been presented earlier (pp. 50-70 and Table 6). At site 32MN228, XU3 produced the greatest variety, density and vertical depth of cultural materials. It should be noted that this unit was situated within the confines of an apparent stone circle.

At site 32MN331, Units 1, 4 and 5 exhibited a similar density and depth of cultural materials; Unit 1, however, did contain a ceramic fragment. It is Unit 2 that shows a marked difference when compared to the other units excavated at this site. In Unit 2, two cultural layers are suggested. The upper layer (10-30 cm) consists of Knife River flint (unpatinated to slightly patinated), chert, chalcedony and quartzite, while the lower layer is characterized by Knife River flint (lightly to moderately patinated), porcelanite and fragments of a sandstone metate.

The samples from the cutbank in the vicinity of XU2 produced only chert and chalcedony flake and shatter fragments in terms of chipped stone materials, a large fire-cracked rock, a fish scale, and comparatively numerous (38) bone fragments. Only a single cultural layer exists in the cutbank.

Bone

Of the few identifiable bone fragments, all were either deer or elk (Table 7), and were recovered from site 32MN331.

Table 7. Summary of Identifiable Bone Fragments from Site 32MN331.

CATALOG #	BONE ELEMENT
44	Enamel from cervid, possibly elk (<u>Cervus elaphus</u>)
141	Enamel from cervid
142	Enamel from cervid
179	1st right incisor from cervid
182	Right mandible fragment, from deer/cervid

Ceramic Fragment

The single ceramic specimen recovered (in two pieces) from site 32MN331 (catalog number 68) is a small bodysherd that has been burnished on its exterior surface and has been tempered with crushed granite. Its maximum dimension is 8.63 mm. The exterior surface color is pale brown (10YR 6/3).

Patterned Chipped Stone Tools

All of the patterned chipped stone tools were recovered from site 32MN331. The tools, illustrated in Figure 19, are described below.

CATALOG

- | | |
|-----|---|
| 18 | Burin faceted graver of unpatinated Knife River flint (Figure 19a). |
| 114 | Unifacially retouched piece of very slightly patinated Knife River flint - distal tip of drill/borer (Figure 19b). |
| 202 | Retouched flake of Knife River flint with heavy patination. Slight bi-bevel unifacial retouch on lateral margins (Figure 19c). |
| 277 | Biface fragment/possible distal tip of projectile point, produced on porcelanite (Figure 19d). |
| 278 | Transverse scraper, Type D (Figure 19e).
Chert, light olive brown - 2.5Y 5/4
Length : 20.815 mm
Width : 16.88 mm
Thickness : 4.96 mm
Transverse cord : 15.375 mm
Distal transverse width : 2.335 mm |

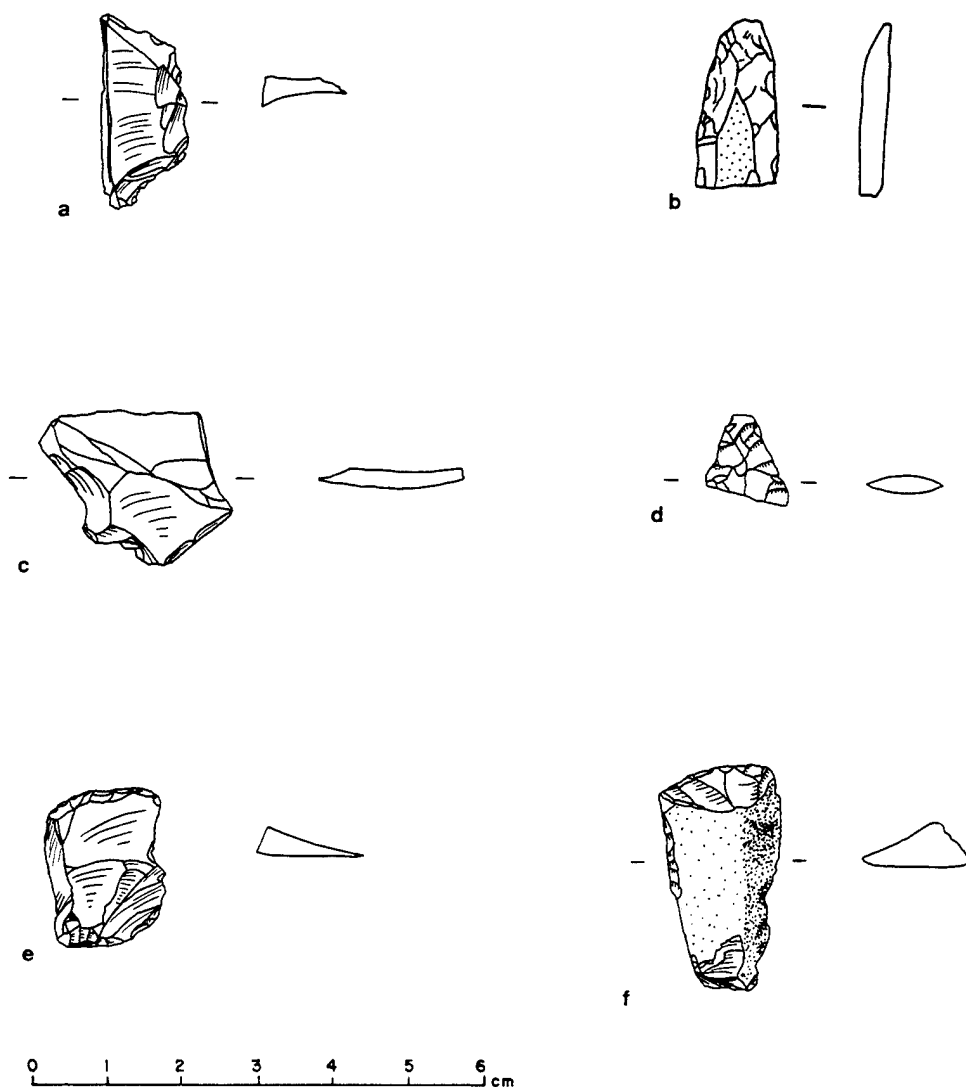


Figure 19. Artifacts from site 32MN331 (catalog number indicated). a: burin faceted graver, KRF (#18); b: unifacially retouched piece/distal tip of drill/borer, KRF (#114); c: flake with slight bi-bevel unifacial retouch on lateral margins, KRF (#202); d: biface fragment, possible distal tip of projectile point, porcelanite (#277); e: Type D transverse scraper, chert (#278); f: Type D transverse scraper, KRF (#282).

282 Transverse scraper, Type D (Figure 19f).
 KRF, dark reddish-brown - 5YR 2.5/2
 Produced on a primary flake.

Length	:	30.325 mm
Width	:	16.32 mm
Thickness	:	7.03 mm
Transverse cord	:	15.785 mm
Distal transverse width	:	1.885 mm

Transverse scrapers are a class of tools that are consistently patterned and bilaterally symmetrical, thus lending themselves to more detailed metric analyses and typology. Following a typology similar to Lee and Lovick (1979) and Nowak (1981), the transverse scrapers recovered from this investigation were measured (Figure 20) and morphologically grouped according to overall shape, dorsal flaking treatment, distal margin shape, and treatment of the lateral margins.

Type D transverse scrapers are made from an expanding decortication flake. Shape is irregularly triangular with both convex and straight distal margins. No flakes are removed from the dorsal side with the exception of the margins, thereby retaining cortex on the entire dorsal surface. Secondary retouch may occur on the lateral margins but often there is no marginal retouch except on the distal edge.

Ground Stone

All of the ground stone fragments were recovered from site 32MN331. These items are described below.

CATALOG

- 168 Sandstone fragment from grinding stone.
 Maximum dimension 56.59 mm; weight 29.4 g.
- 172 Nine sandstone grinding stone fragments, possibly heat-cracked. Maximum dimensions vary from 9.76 mm to 55.71 mm.
 Total weight 81.93 g.

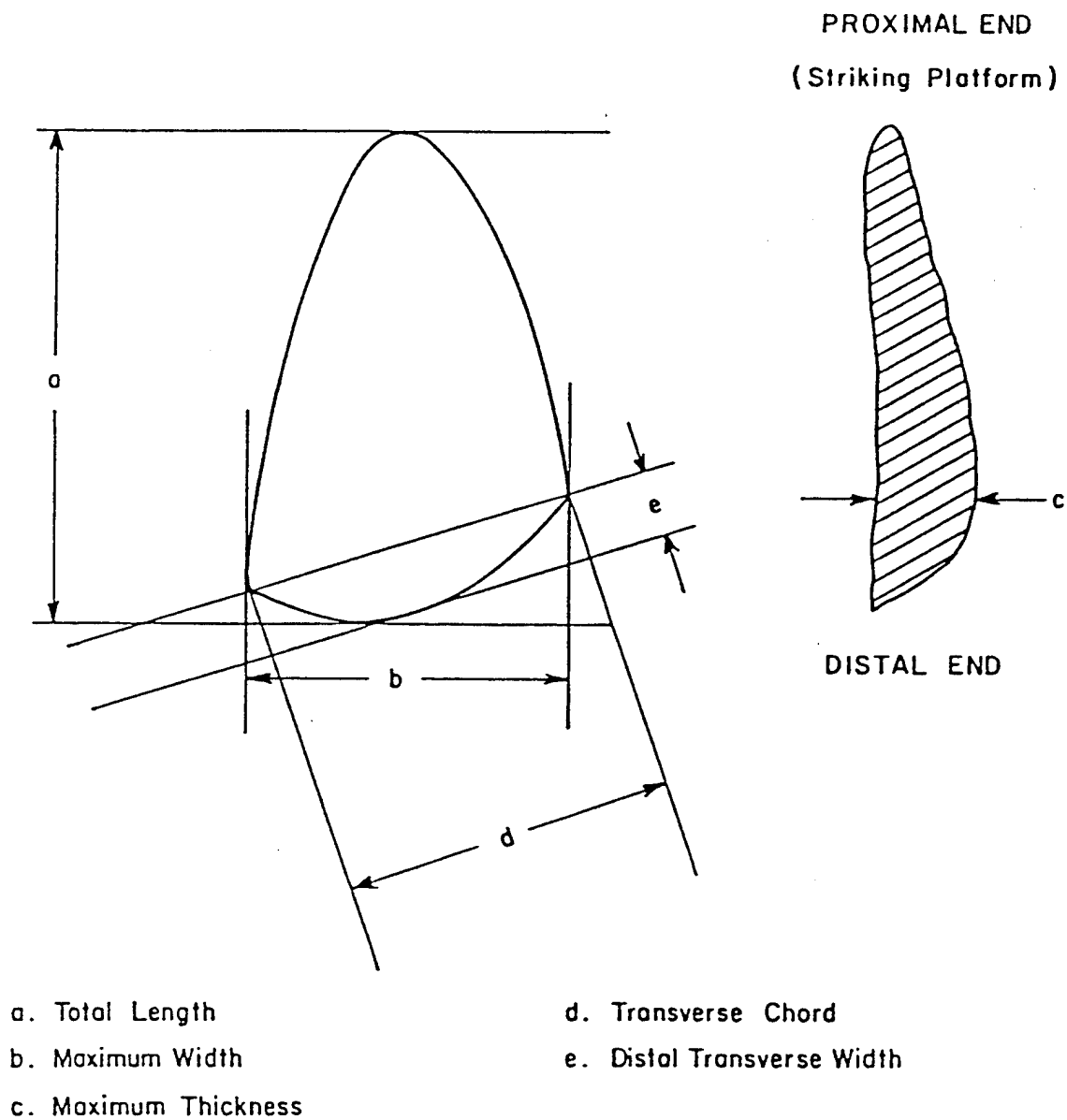


Figure 20. Diagram of a generalized transverse scraper indicating the five measurements taken (adapted from Lee and Lovick 1979).

- 181 Two sandstone fragments, maximum dimensions 10.67 mm and
13.33 mm. Total weight 1.17 g.
- 183 Metate fragments (12) of weathering sandstone (Plate 21).
Refitted maximum dimension 124.35 mm. Total weight 322.03 g.

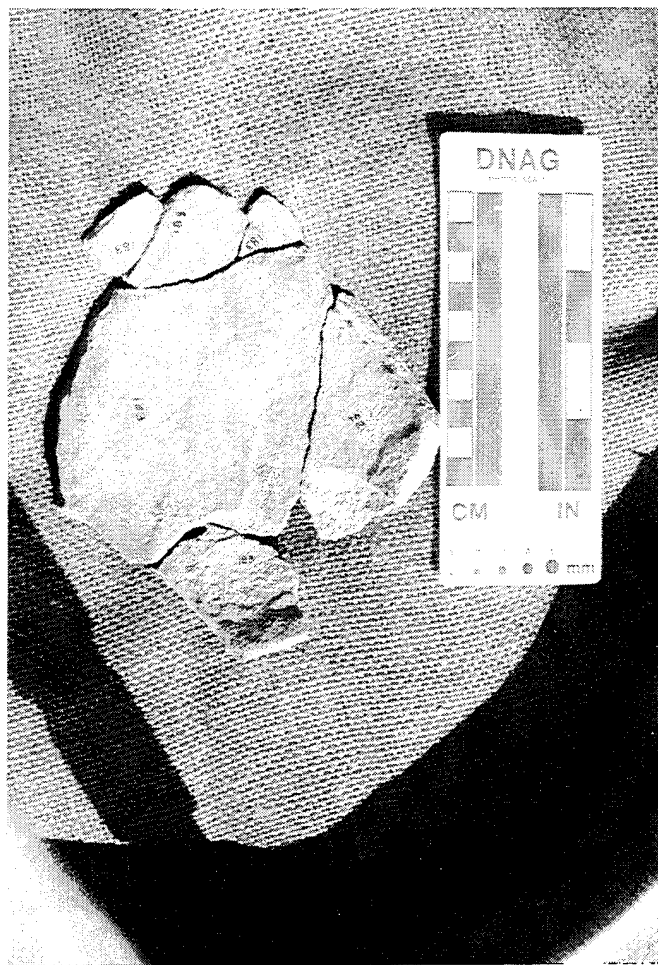


Plate 21. Sandstone metate fragments.

Cultural-Historical Framework

The evaluation of sites 32MN228 and 32MN331 produced very few diagnostic materials. The surficial nature of most of the deposits (0-30 cm) contributes little precise data in terms of their relative age.

Ahler et al. (1981) have suggested a figure of 1500 years as a minimum age for artifacts of KRF which exhibit a moderate to heavy degree of patination, and although this evidence must be used with caution (Van Nest 1985) it can provide an indication of possible age and intrasite variability. Some of the Knife River flint artifacts recovered from these excavations were moderately to heavily patinated, while many were unpatinated or only slightly patinated. The Knife River flint debitage from the lower levels of XU2 (32MN331) is consistently more heavily patinated than items in the upper levels, suggesting a separate component. Similarly, none of the Knife River flint material in XU5 and XU6 and none of the surface finds or finds from auger tests around those units exhibit more than very slight patination.

A single ceramic bodysherd recovered from XU1 at site 32MN331 provides another line of evidence for dating the site. This sherd was located in the upper level (0-10 cm) and suggests that the surface component dates back no more than 1500 years; it very probably dates to within the last 1000 years.

Site Function - Artifact Types, Density

The artifact assemblages from the two sites under investigation, while similar, do suggest certain differences. Site 32MN228 is a stone circle site and the evidence suggests activities were concentrated in close proximity to the stone circle features. Artifact density is comparatively low (Table 5), artifact variability is less than that at site 32MN331 (Table 4), and no patterned tools were recovered from the excavations at 32MN228 - only a few retouched/utilized flakes. It is suggested the site may have been occupied once, or on repeated occasions, but for only a short period at any one time.

Site 32MN331, on the other hand, appears to have had at least two periods of occupation, judging from the excavation of XU2. The earlier,

lower component probably was much more restricted in area, as no other evidence for cultural materials below 50 cm was obtained in other areas of the site, including the cutbanks. The sandstone metate fragments found in this lower component suggest, at least, a seasonal campsite, based on plant exploitation.

The more recent, upper component exhibits greater artifact density across the entire site. The artifact assemblage of the upper component includes two transverse scrapers, a drill and a fragment of obsidian. Artifact density is at least twice that of site 32MN228 and no evidence has been found (Peyton, Robson, Gnabasik, personal communication 1988) to indicate that there were ever stone circles here (although this must remain a possibility).

Lithic Technology

Table 8 summarizes the debitage and cores recovered from sites 32MN228 and 32MN331 categorized by raw material types where over 10 items were recovered. [Note - KRF, brown chalcedony and mineralized wood can appear visually similar and very small fragments of these may be misidentified].

Table 8. Summary of Debitage/Cores from Sites 32MN228 and 32MN331.

RAW MATERIAL	32MN228	32MN331
<u>KRF</u>	#	#
Primary	0	10
Secondary	1	11
Tertiary	83	254
Cores	0	2
Shatter/Frags.	37	131
<u>CHERT</u>		
Tertiary	5	67
Core	2	0
Shatter/Frags.	7	86
<u>CHALCEDONY</u>		
Tertiary	13	75
Shatter/Frags.	5	31
<u>PORCELANITE</u>		
Tertiary	5	27
Shatter/Frags.	2	9

Very few primary and secondary flakes are present at these sites, and of those present, all are of Knife River flint. The majority of the lithic debitage is categorized as small retouch/resharpening/biface thinning flakes and incidental shatter and flake fragments.

A single flake of obsidian and the items of porcelanite indicate minimal use of non-local lithic sources. The Knife River flint materials probably were obtained from the source areas to the south, in Dunn County, and along the Little Missouri River (Winham, Lippincott, Hannus and Lueck 1987), although there may have been local lag deposits containing Knife River flint as well as cherts and chalcedonies.

The quantity/density of materials at these sites is low and would require no major raw material procurement. Simple tool maintenance and replacement activities are postulated.

Subsistence Strategies

The metate from the lower level in XU2 at 32MN331 suggests plant acquisition at that time. Subsistence strategies for the upper component of 32MN331 and for 32MN228 are not directly documented. The occurrence of transverse scrapers, a drill and bifaces/biface blanks at 32MN331 suggests activities relating to hide working and hunting in general.

Seasonality

No direct evidence for season of occupation was obtained. Indirect evidence, comparative studies and ethnographic research would suggest a spring and fall occupation for 32MN228 and summer for 32MN331, but this is highly speculative.

Site Boundaries

At site 32MN228 the auger testing suggests that U.S. Army Corps of Engineers lots 47, 48, 63, 64, 69 and 70 be excluded from the site area. The rock cairn, located on private land, may or may not be part of the site, but a few lithic artifacts were noted in this area in the 1985 survey (Figure 4). The main prehistoric activity focus of 32MN228 was undoubtedly in the area of the stone circles recorded by Robson (1980).

At site 32MN331 the entire lower terrace is considered as part of the site area. However, the focus of activity predominates towards the north in the area adjacent to, but on the terrace below, site 32MN228.

Site Integrity

The integrity of both sites must be considered extremely poor. At site 32MN228, where 28 stone circles were once documented, only a portion of one stone circle remains. The site has been additionally impacted by roads, buildings, and associated construction activities such as buried cables.

Site 32MN331 is located on a terrace that has been cultivated in the past and has been recently (in the last 2-3 years) plowed to establish shelterbelts. It has additionally suffered severe shoreline erosion that has exposed cultural materials and has been the recipient of extensive recreational activity. Numerous contemporary fire hearths are scattered over the site, which makes obtaining charcoal samples for radiometric dating a spurious exercise unless the charcoal is found in a sealed context (i.e., a subsurface feature).

Inter- and Intra-Site Variability

Comparisons between these two sites and within each site have been presented in tabular format and discussed above (Tables 3 to 6, and 8; Figures 8 and 9). Based on the results of these studies we consider these locales to represent two distinct prehistoric localities, although they may have functioned similarly. It is likely that site 32MN331 contains two separate prehistoric components.

The evaluation of these sites did not produce any subsurface cultural features; diagnostic artifacts and samples (charcoal) for dating are absent; preservation of floral and faunal materials associated with an undisturbed subsurface context is lacking; and the sites have both been heavily impacted by a range of natural and cultural forces.

The following recommendations are based on the assumption that the information obtained from these sites, both during previous investigations and currently, is representative of the sites as a whole. It is always possible on sites of this size that isolated features may occur and could provide additional, perhaps significant, information. It is also likely that extensive excavations might provide an expanded data base (i.e., additional lithic materials) with which to further evaluate the results of the test excavations reported here.

One particular area of site 32MN331 which is problematical in terms of its evaluation, is the area of XU2. This unit produced potential evidence for two cultural layers or occupations. The lower of the two components is undisturbed by past cultivation practices, but subject to extensive root and animal disturbances. Inspection of the cutbank in this vicinity failed to reveal a continuation of the buried component, if indeed it was present, nor was it observed in any additional excavation units or cores.

Having evaluated these circumstances, it is our professional judgment that these sites are not eligible for nomination to the National Register of Historic Places at this time. However, should specific construction projects impact the area around XU2 at site 32MN331, monitoring and/or additional testing of the suspected lower component is recommended.

Fire-Cracked Rock (FCR) Rock or rock fragments showing evidence of thermal alteration in the form of splitting, spalling, color changes and crumbling.

Biface An artifact bearing flake scars on both faces (from Crabtree 1972:38).

Bifacially Retouched (piece) A blank form bearing flake scars on part or all of the margin(s) of both faces.

Bi-polar Core A mass of lithic material reflecting placement of one end on an anvil and having been struck on the opposing end with a percussor. This is evidenced by a cone of force on the end struck, a "ridge" somewhere between the two ends reflecting interruption of force, and crushing at one or both ends at or near the contact area.

Core A mass of lithic material bearing a negative flake scar(s).

Flake Fragment A product of controlled chipping of stone which may have cortex on one or more planes (rare), contains one or more ripples (or compression rings) on one plane and/or feather or hinge termination, but lacks platform, contact area, and bulb of force.

Graver A flake or other blank form with marginal or invasive retouch to produce a pronounced, sharp, angular projection on the flake or blank (from Brown et al. 1982:33).

Mano Oblong (and flattened) shaped sandstone piece, the shape of which suggests modification.

Metate Basin-shaped sandstone piece, the shape of which suggests modification resulting from grinding.

Pedon The smallest unit or volume of soil representing all the horizons of the soil profile. Usually 1 m², but can be larger.

Primary or Decortication Flake A product of controlled chipping of stone; the dorsal surface retains cortex.

Retouched Flake A flake exhibiting marginal retouch along a portion or all of one or more edges.

Secondary Flake A product of controlled chipping of stone; the dorsal surface has cortex on one or more planes, and flake scars on one or more planes.

Shatter Presumably a product of controlled chipping of stone. Shatter may have cortex on one or more planes; it lacks an obvious platform, contact area, bulb of force or termination.

Tertiary Flake A product of controlled chipping of stone with no cortex present on any plane; contains platform and contact area (usually evidenced by slight crushing), bulb of force, and/or one or more ripples (or compression rings) on the ventral surface. The latter allowed a directed search for problematical platforms and contact areas.

Transverse Scraper A flake which has been marginally or invasively retouched on one face to produce a regularly shaped straight to convex working edge on one end which is usually transverse to the axis of percussion; lateral margins are sometimes developed as well.

Utilized Flake A flake with crushing or small incidental flake scars along part or all of the margin(s), the result of use.

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