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Knife River National Historic Site

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Knife River Indian Villages Archaeological Program An Overview

F. A. Calabrese

INTRODUCTION

The Knife River Indian Villages are located in North Dakota near the confluence of the Knife and Missouri Rivers, just north of the contemporary town of Stanton, North Dakota. They lie within the area between the Garrison Dam to the north and the Oahe Reservoir to the south, the last remaining unflooded segment of the Missouri River valley in the Dakotas. Within the area are river floodplains, terraces, dissected breaks and upland rolling terrain. Forests occur on the floodplain and lower terraces with a variety of native and exotic grasses found on the breaks and uplands.

A number of relatively undisturbed archaeological sites occur along this stretch of river, an area which historically was the homeland of both the Hidatsa and Mandan Indians. The Knife River Indian Villages are the northernmost cluster of sites. They are the final major village complex representing the pinnacle of Hidatsa and Mandan cultural development in an unbroken occupational sequence spanning at least 500 years. They occur in an area that, even today, is considered only marginally suited for agriculture, yet they represent intensive occupation by semi-sedentary horticulturalists. This strategic location along the river also provided the villagers an opportunity to serve and prosper as key middleman traders between the Euro-Americans to the east and the Indians to the west, expanding upon a tradition which developed from earlier centuries of trading with their nomadic neighbors.

Historically, the villages are rich in associations with prominent figures in the history of the American westward expansion as well as the earlier fur trade era. There is a wealth of historical data pertaining to the Lewis and Clark visits to the villages (1804-1806) and later documentation by the famous artists George Catlin and Karl Bodmer (1832-1834). Throughout this period the Hidatsa and Mandan were affected dramatically by the Euro-American influence resulting in unparalleled change and innovation in both material culture and social organization. It was also this association that led to the decimation of the Hidatsa and Mandan population through the spread of smallpox through a series of outbreaks culminating in a major epidemic (1837) which forever altered these peoples' culture.

ADMINISTRATIVE BACKGROUND

Interest in the Knife River Indian Villages from both an archaeological and historical perspective dates back to the late 1800's, with the establishment of the town of Stanton, North Dakota. The import of the villages was recognized by scholars as well as the settlers and farmers of the area. It was the landowners who preserved what remains today of these sites making them attractive as an historical and scientific resource.

Inclusion of the Knife River Indian Villages into the National Park System was being considered as early as the mid-1960's. By 1968, work was underway on what was then called a "Feasibility Study" (now referred to as a "Master Plan" for Knife River Indian Villages). This study, completed in 1968, was submitted to Washington by early 1970. The legislative package prepared for Congress passed both the House and Senate as Public Law 93-486 (93rd Congress; HR13157) on October 26, 1974 (88 Stat. 1461). The enabling legislation authorized a sum of \$600,000 for land acquisition and \$2,260,000 for development. This legislation created the only unit in the National Park Service designed specifically to commemorate the culture and history of the Plains Indians.

In November of 1974, a news release notifying the public of the establishment of the villages as a National Historic Site met with little fanfare. At this time the National Park Service was suffering cuts in both budget and personnel, and managers were more worried about how they were going to meet current demands for existing parks. Landowners, on the other hand, saw that they were going to lose their land and there was little they could do.

At this time the Midwest Archaeological Center was also undergoing some major changes. The Center developed out of the Smithsonian Institution River Basin Surveys office in Lincoln, Nebraska. This office was originally established through a cooperative agreement between the National Park Service and the Smithsonian Institution to accomplish needed archaeological work in conjunction with the Pick-Sloan reservoir projects in the Missouri River Basin (Lehmer 1971). Funding was provided through the Preservation of Historic Properties appropriation. In 1969, when the Smithsonian Institution River Basin activities were discontinued, the National Park Service continued with its commitment to assisting other federal agencies by administering appropriated funds by contracting for archaeological assistance and directly accomplishing work with Midwest Archaeological Center personnel. The office name was changed from the Smithsonian Institution River Basin Surveys Office to the Midwest Archaeological Center. Most personnel

remained and the National Park Service and Center continued the program of archaeology on the Middle Missouri River.

In 1973, the Directorate of the National Park Service initiated a shift in both the mission and funding of the archaeological centers. Heavy emphasis was placed on contracting to accomplish archaeological objectives, and the Service and Center internal salvage capability was eliminated. Operation of the National Park Service funding was programmed. The following year, in conjunction with the implementation of the 1974 Archaeological and Historic Preservation Act, the external contract archaeological program was centralized into three offices in San Francisco, Denver and Atlanta. Ten positions and people were taken from the Midwest Archaeological Center and moved to Denver. Line item National Park Service funding for the Center began in fiscal year 1975. The Center was left to build what is now called the internal archaeological program, devoted to accomplishing projects within the National Parks. The program then was small, with only five people and limited funds. Our orientation was turning to major programs in the National Parks but the interest in working on the Plains continued at the Center, and the creation of the Knife River Indian Village National Historic Site seemed to offer a way to fulfill that interest, especially given the intent of the legislation creating the Park and the potential for research into a number of questions and problems pertaining to Hidatsa and Mandan culture.

In November of 1974 the Midwest Archaeological Center identified the need for funds to initiate archaeological, ethnohistorical, cartographic and magnetic survey studies at Knife River but very little money was available. We submitted a "10-238", the National Park Service programming document required to secure funds, requesting \$136,000 per year for five years to develop an archaeological program which would be carried out by the Midwest Archaeological Center. Our attempts to secure funds and positions through the normal programming channels met with little success. It was apparent that the Service was not going to provide the staff nor funds to develop a major research program in archaeology at Knife River or for that matter anywhere else within the Service. There were just not enough resources to meet other Service needs.

Shortly after the enabling legislation was passed (July 1975), the Rocky Mountain Region moved to secure an Area Manager for the Knife River Indian Villages Park. In addition it was decided then that the eroded bank at Sakakawea had to be stabilized as soon as possible. The Center outlined an archaeological program to be carried out in conjunction with the stabilization at Sakakawea.

There was \$3,000 available for archaeology and \$30,000 available for the planning of the stabilization. Because of certain restrictions, Rocky Mountain Region National Park Service managers could not expend the money by the end of the fiscal year and elected to transfer these funds to the Center to assist with the archaeological program. This provided our first solid funding for the Knife River Project.

CONTRACTUAL ARRANGEMENTS

The Center (in January and February 1976) still faced the dilemma of accomplishing its goals at Knife River within the constraints of the Center's budget and personnel ceilings. The available \$33,000 was not going to be sufficient. The Chairman of the Anthropology Department, University of North Dakota indicated a willingness to participate in a joint archaeological program at Knife River. It was suggested that the University of North Dakota provide a position and matching funds necessary to support a Principal Investigator for the Knife River project. With the limited available funds it seemed the only feasible way to get the project moving. However, it was a commitment of funds on my part, funds from a budget which was limited and which kept disappearing from the National Park Service (computer) programs. I was a bit nervous about the joint project.

Our proposal for a joint University of North Dakota and National Park Service Program was outlined to the National Park Service Rocky Mountain Region Deputy Regional Director in March 1976 at a Regional Superintendents Conference in Denver. In early April a trip was made to the University of North Dakota to seek agreement with the President and Dean. In late April a memo of agreement between the Service and University was drafted and submitted to the Interior Solicitor. The Solicitor considered a Memo of Agreement insufficient, since the arrangement we anticipated involved the transfer of funds. It was redrafted into a contract (May 5), submitted to the Solicitor (May 5-June 11), submitted to the Rocky Mountain Region (June 15) for review and signature, and to the Midwest Region for signature (June 18) and finally to the University of North Dakota for finalization (June 28).

The objectives of the Contract and Agreement are:

1. Undertake a cooperative (UND-NPS) archaeological research program for the Upper Missouri River Drainage Area designed to provide an understanding of regional prehistory, ethnohistory, and history of American Indian populations within and adjacent to the area.

2. Conduct an integrated interdisciplinary program including (but not restricted to) archaeological, historic, prehistoric and other scientific research needed to understand Hidatsa prehistory and history and relation of the Hidatsa to surrounding prehistoric tribes.

It must be noted that throughout this period funding for the project was at best insecure. It was not until fiscal year 1979 that finances were securely programmed and we could be sure that the program would continue from year to year.

ARCHAEOLOGICAL OBJECTIVES

The Midwest Archaeological Center was previously involved in research within the Dakotas. From our perspective the acquisition of Knife River Indian Villages offered an opportunity to test a series of hypotheses which evolved from ongoing research in the area by a number of researchers affiliated with the Center, University of North Dakota and University of Missouri. The immediate Center objectives were to: 1) develop a viable research design to guide the project; 2) evaluate the state of our knowledge of the area's prehistory, ethnohistory and history; and 3) initiate a comprehensive program for preliminary data acquisition to begin solving area problems.

Dr. Stanley Ahler, then at the Illinois State Museum was recruited for the position at the University of North Dakota. His first task was to bring together in a coherent research plan a number of the general ideas, formulated by the Center Staff and Park Personnel, to guide the Knife River Program. This included the integration of new methods for evaluating resources while assessing and evaluating specific archaeological problems. These ideas are outlined in two important documents: the research plans generated by Ahler (1978a) and Wood (1977) which serve as guides for work at Knife River. The latter work by Wood will be discussed in some detail later.

Ahler systematically provides a brief archaeological overview of the area, delineates the major archaeological problems and develops an overall three phase research design. The primary concerns, to both the Service and researchers alike, outlined by Ahler (1978a) at Knife River include: 1) development of an inter and intra village chronology; 2) attempts to identify village occupants and differentiate the Mandan and Hidatsa regional occupations; 3) an understanding and evaluation of regional cultural subsystems (e.g. trade, technological, ceremonial, etc.) and their evolution; and 4) management and preservation of the resource.

With temporal and spatial variables controlled, the objectives become the resolution of anthropological problems including: 1) delineation of the basic parameters of local subsistence systems including evaluation of strategies and changing patterns; 2) delineating basic parameters of the native technologies including evaluation of strategies and changing patterns; and 3) evaluation of native settlement strategies and changing patterns.

To resolve these problems a three phase research design is proposed to span a twelve-year period. Phase I was already well underway at the time the research proposal was compiled.

Phase I emphasizes collecting basic data, locating, identifying and inventorying all cultural resources at Knife River Indian Villages National Historic Site and developing procedures grounded in the physical sciences to attack major problems outlined in Phase II (Years 1-3).

Phase II emphasizes intensive and extensive testing within and outside of the Village area, solving chronological and ethnic identity problems and the continued collection of basic data (Years 4-7).

Phase III involves the extensive excavation to collect information on architecture, within site activity areas, spatial arrangement of major parts of several villages and to develop data for an interpretive program (Years 8-12).

The ability to meet the objectives of the research outlined in Phases I and II, was dependent upon simultaneous implementation of a number of programs. These include programs in: 1) remote sensing and mapping; 2) magnetic survey; 3) Executive Order 11593 survey; 4) controlled within site surface collection; 5) problem oriented test excavations; 6) reconnaissance and testing in development areas; 7) out-of-park reconnaissance; 8) environmental and paleontological studies; 9) chronometric studies; 10) analysis of existing collections; and 11) rodent control and site preservation. We have been able to implement most of the projects with some success. These accomplishments will be outlined below. Other projects and problems are not progressing as well because of the absence of individuals interested in working with these problems and/or managerial or financial support from offices within the Service under whose province the responsibility for obtaining these data fall.

MAGNETIC SURVEY

While the Midwest Archaeological Center was struggling with various ways to resolve administrative problems with limited personnel and funds, we were also pursuing new approaches to archaeology which fit a conservation model of cultural resource

management which was then evolving (Grady and Lipe 1977; Calabrese 1977). Our mission is the preservation and protection of the resource while obtaining data for both scientific and management needs. To this end we were exploring new methods of data recovery.

Magnetic survey was in use in Europe for a number of years, yet the kind and size of sites where it was employed differed significantly from those in North America. Experimentation in North America was underway in the 1960's and we were fortunate enough to be affiliated with a University with a physicist interested in and capable of carrying out such research in archaeology. John Weymouth began magnetic survey experimentation in the central Plains in 1972 (Weymouth 1976). By 1974 Weymouth's work looked promising for the resolution of certain problems in the Middle Missouri Subarea of the Plains. The Midwest Archaeological Center encouraged a survey of a portion of the Walth Bay site in 1975. The results of the first work in the Middle Missouri were extremely successful (Weymouth 1976) and we saw a potential for magnetic survey at Knife River Indian Villages.

The Knife River Indian Villages offered several opportunities for magnetic survey because: 1) the surface remains of structures were fairly easily identifiable; 2) anticipated archaeological work would allow us to test, using traditional archaeological means, some of the anomalies which could be detected by magnetic survey; and 3) the data from the magnetic survey could be easily related to the data from the remote sensing aerial photo program.

In the summer of 1976 a proton magnetometer survey of portions of Sakakawea Village, Buchfink and Amahami Villages was conducted as a joint effort by the Midwest Archaeological Center and University of Nebraska (Weymouth and Nickel 1977). The results were remarkable. In the area covered, the signature of twelve earth lodges was apparent. When compared to available aerial photo coverage and contour maps, not only did the features match and correlate but additional structures, not apparent in the photos or on the maps, were observable on the magnetic contour maps (Weymouth and Nickel 1977:11).

In sum, in a matter of a few days, a wealth of information was obtained about subsurface features, including the identification of houses visible on the surface as well as those partially obliterated by other features. In addition, the magnetic survey detected fire pits, cache pits and house entryways. All of this was done with no alteration to the archaeological site.

Until this time the Midwest Archaeological Center was using equipment and expertise borrowed from the University of Nebraska.

We were dependent upon magnetometers obtained on loan from University of Nebraska Physics and Geology Departments. The data compiled from the work at Sakakawea were put into a form which could easily be understood by managers and a campaign was launched to secure funds to obtain our own equipment. The Directorate of the Midwest Regional office was quick to grasp the utility of magnetic surveying as a cost efficient means of evaluating subsurface remains--without destroying their integrity.

The Regional office made funds available to obtain two proton magnetometers which were subsequently used during the 1977 field season. With our own equipment the Center continued magnetic survey at Sakakawea, Big Hidatsa, and Lower Hidatsa villages as well as a number of other areas outside of the Park.

Magnetic survey was used to map villages, locate archaeological concentrations in plowed (obliterated) fields and evaluate sites with little other surface evidence present (Buchfink at Knife River). It was also extensively used to evaluate areas which are to be impacted by development within the Park. It is used to guide the placement of test trenches and test units, and subsequent excavations are generally able to evaluate the signature of the anomalies reported by magnetic survey.

THE DATA LOGGER PROJECT

The project and program of magnetic survey progressed in sophistication not only in terms of the apparent utility from an archaeological perspective but also in the development of field and laboratory procedures. The mapping and magnetic survey techniques in use up to the summer of 1977 consisted of survey measurements taken within a 20 m grid, with two magnetometers producing readings simultaneously. A reference magnetometer is used to control for "diurnal variation" in the magnetic field and a moving magnetometer to record differences in the field due to subsurface magnetic variation. Each pair of readings from the magnetometers was hand recorded, and in the early stages the data matrix was carried or mailed back to the university, keypunched and entered into the computer for data manipulation using the SYMAP program (Weymouth 1976) (Weymouth and Nickel 1977). A later innovation (1977) consisted of the use of a remote terminal, where data taken during the day were entered from the field by the keyboard and preliminary analysis provided--with limited data matrix feedback to the field within a day. Evaluation of data in the field allowed manipulation of the instruments if values were extreme and/or resurvey if data were incomplete.

For the first time these data were available for field personnel to utilize to modify the field research as work progressed. Still, however, a major problem was the poor turnaround time for data analysis and only as a value difference matrix--format. If the technique was to be of consistent use to the archaeologist, living with a restricted field season and generally a limited time at any given site, he must have it in map form almost immediately to assist with on-the-spot decision-making and project direction. Recall that in the magnetic survey of a 20 m square over 400 pairs of five digit numbers are recorded and must be analyzed before any interpretation is possible. In effect, a computer is needed in the field--literally to operate on-site; to record and process data on-site. There were no such commercial computers then available on the market for such use. Then too, the purchase of a computer in the federal government is extremely difficult--if not impossible. To meet our needs an electrical engineering student (Ken Burgess) was hired by the Center to design and build a field computer to transfer digital data from the magnetometers directly to the field computer as well as devise the software (programs) to meet the specific needs of the machine and analysis of magnetic survey data in the field.

Burgess worked throughout the winter of 1976 and spring of 1977 and had a unit ready for field testing in May of 1977. This unit was fully operational in August of 1977 (Burgess 1978). The data logger developed by Burgess was capable of obtaining data directly from the pair of magnetometers (reference and moving), record it on tape, and provide digital hard (paper) copy in the field. The computer also had the capability to allow the operator to display and print arithmetic differences between values obtained from the two magnetometers and provide maps of these data. The end result was a system which has totally eliminated manual manipulation of field data, reducing error and increasing efficiency by cutting field time 50% or more. In addition, the computer in the field was capable of acting as a terminal for the transfer of data from the field to a university computer--and it will accept graphic or numeric data in return. The computer hardware, all purchased locally, was known as our "KMART" Special.

Burgess designed and built the interface and modified all other equipment to work as a single function unit and developed the basic programs to run the unit. In January of 1978 the National Park Washington Office found out about our computer and sent a team out to investigate. When finished, they agreed that it was a "special use" computer and allowed us to proceed. Simultaneously, we petitioned Washington for the acquisition of a Hewlett Packard

9845A to process our data. We now have this unit with an XY plotter and digitizer as well as a series of other systems which can process and report data directly in the field.

AERIAL PHOTO PROGRAM

Center staff members were keenly aware of the potential use of aerial photos in archaeological research. Some work was done earlier in the Plains (Stallard and Witty 1966) by the State of Kansas. Don Lehmer and W. R. Wood consistently used aerial photos to check features and sites in the Middle Missouri. But to date there is no single consistent case of applied aerial photography in the plans.

In May of 1975, Tom Lyons spoke to a group of us about the use of remote sensing in their work in the southwest, specifically in Chaco Canyon. The utility of aerial photography applied to problems at Knife River was immediately apparent. Meeting with Lyons in February 1976 we outlined our needs including: 1) mapping of the Knife River sites from aerial photos at 0.5 ft. contour levels; 2) location of ditches, fortifications and delineation of house depressions; and 3) possible location of burial pits. Tom had never worked on the Plains and was unfamiliar with the local topography. He questioned me unbelievably when we requested maps with one-half ft. contours. Nonetheless, he agreed to assist. Doug Scovill and the Washington office were interested in having the techniques of remote sensing applied outside of the southwest and agreed to fund aerial photos and topographic mapping of the village sites. In the summer of 1976 funds were made available, the flights made and photos produced. Map production began that fall and continued through the winter of 1976-1977. By the summer of 1977 we had good topographic maps of Sakakawea and Lower Hidatsa. Ground control problems had to be resolved before completion of the Big Hadatsa maps.

Meanwhile in July 1977 decisions were made to obtain color infrared photos of Knife River Indian Villages. These photos have provided researchers with an additional tool for evaluating surface features. We have a complete set of photos and photo-derived contour maps of each of the three major Knife River Villages at a scale of 1:30. The latter are particularly useful in plotting archaeological data and correlating magnetic and ground survey data (Nickel and Weymouth 1977). In addition, we have not obtained complete stereoscopic coverage of the entire Park area with maps of the entire Park at a scale of 1:1000 and 50 cm contour intervals. These maps are useful in both plotting archaeological data and

providing assistance to planners and designers. Together the black and white and infrared photos offer the opportunity to ground check and evaluate archaeological anomalies. There is yet a wealth of information to be obtained from further study of the photos and integration of the photo data with ground surveillance.

SURFACE RECONNAISSANCE AND EXECUTIVE ORDER SURVEY

The surface reconnaissance program was initiated in 1978 using a modified version of a point-quarter sampling procedure (Ahler 1978b; 4-8, 16-22; Ahler et. al. 1979 16-24). The technique, using random points in a defined survey tract (grid) allows data compilation which can provide an estimate of artifact density per unit of surface area (tract or grid) as well as definition of content. The artifact density values can, in turn, be graphically displayed by computer programs such as SYMAP. Large tracts which were in pasture or have been cultivated, both in the north and south portions of the Park, were covered in 1978. Reports of the work in the Buchfink cultivated tract are now available (Ahler et. al. 1979). The 1978 data were used by planners to select alternative areas where the Visitor Center might be placed and to avoid major archaeological concentrations. The data were also instrumental in determining needs and procedure to be followed in evaluating areas to be impacted by proposed development of the Visitors Center and maintenance area once the areas were selected. Additional point-quarter survey continued through the summer of 1979.

The original Executive Order or Cultural Resource Reconnaissance was conducted between 1976 and 1980 to identify, locate and evaluate all surface archaeological and historical sites. The original master plan had recognized only three major sites in developing the congressional data for the establishment of the Knife River Villages National Historic Site. The final total includes an additional thirteen less prominent villages, burial grounds, trail complexes, a variety of activity areas and a series of farmsteads and other historic sites (Ahler 1982).

PROBLEM ORIENTED TEST EXCAVATIONS

During the summer of 1978 a series of sites were tested. Waterscreen recovery techniques were used at each site. Series I test excavations were designed to evaluate magnetic anomalies discovered by magnetic survey. However, the results were somewhat disappointing. Cultural remains were sparse and more thorough evaluation of the site is pending. At Lower Hidatsa, test

excavations were strategically placed to evaluate magnetic data as well as provide information about general site stratigraphy. Both objectives were successfully met. Over two meters of rich deposits were encountered in Lower Hidatsa. At another site excavations were designed to evaluate remains previously exposed by a mechanically cut trench made by a local farmer. Work here revealed a well defined village component and possible earlier component as well. Excavations were also initiated to mitigate the impact to be caused by a road used as access to the stabilizing protective embankment designed to prevent erosion at Sakakawea Village. Excavations revealed the partial remains of a circular earth lodge and associated features. These excavations were guided by pre-excavation magnetic survey with considerably more success in identifying magnetic anomalies than at the Poly site. In 1979 and subsequent field seasons, testing continued to provide the necessary data to test assumptions about our methods and evaluate the archaeological remains in the Park.

EVALUATION OF POTENTIAL DEVELOPMENT SITES

Evaluation of a potential development site began in the summer of 1978 (Ahler 1978) with preliminary data provided by Ahler from the point-quarter surveys and general on-site inspection. These data were, in turn, used by the planners in preparing their alternative for the Visitor Center location--with some local administrative preferences dictating potential site selection (U.S.D.I. NPS n.d.). There were arguments between the archaeologists, planners and managers. One of the best alternative loci, from a planning point of view, was too close to Lower Hidatsa and would be situated on major archaeological concentrations. In turn, administrators believed the placement of the Visitors Center at the two other loci put the facility too far from the resource. Selection of one of the three alternatives (A, B or C) required additional evaluation. A majority of the 1979 field season was directed toward the seeming resolution of the problem of Visitor Center placement. The 1979 work confirmed Ahler's extrapolations based on the point-quarter surveys of 1978.

GEOMORPHOLOGICAL STUDIES

Until the Knife River project was initiated, studies in the Knife River area were limited. A preliminary assessment of our needs was made in 1976 by Clayton. This was preceded by more

general works by Clayton and others (1976a) which was instrumental in understanding local terrace stratigraphy.

Clayton suggested that an approach to resolving the area Holocene stratigraphy and chronology should be worked out. This was conducted by Jon Reiten of the University of North Dakota. The program was designed to: 1) date terrace deposits; 2) core and evaluate subsurface deposits; and 3) map surface sediments and geomorphic units (Ahler 1979:8, 45; Reiten, 1983).

CONTROLLED WITHIN-SITE SURFACE COLLECTION PROGRAM

This program was initiated in 1977 with intensive surface collections in five meter squares made over approximately 25 percent of the uncultivated portions of Sakakawea Village (Ahler 1978a, 43). However, more pressing problems and needs in other areas resulted in discontinuance of this program.

CHRONOMETRIC STUDIES

Two preliminary evaluatory studies were made to seek alternative methods of obtaining absolute dates for the occupation at Knife River Indian Villages. Estimated dates for occupation of the three late sites at Knife River (Sakakawea, Big Hidatsa and Lower Hidatsa) date from the 17th to late 18th century. Traditional radiocarbon dating procedures are not sensitive enough to allow developing an accurate chronology for the successive occupation in these villages.

Zimmerman (n.d.) evaluated the potential of thermoluminescence dating of sherds from Knife River sites. On the basis of his preliminary tests of several sherds he indicates that the Quartz "High Temperature" and Quartz "Predose" methods will yield acceptable dates with a tolerable 7 to 8% error factor (+1 s.d.). He assessed the possibility of establishing intra and inter site chronologies as good. In April of 1978, twenty sherds were submitted for dating to the Washington University Center for Archaeometry (Sutton 1979). Dates for 18 of the 20 samples were obtained. There are some problems with the dates obtained from the general strata column samples from Lower Hidatsa but in general an occupation spanning A.D. 1400 to 1850 is now represented by over 25 TL dates (Ahler 1892: 68).

Wolfman (1978) provided a preliminary assessment of the utility of archeomagnetic dating at Knife River Indian Villages. He notes that the potential for establishing a useful archaeometric chronology for Knife River between 1675 and 1845 is dependent

upon: 1) our ability to date sites of the same time period independently of the archaeological data; 2) availability of datable material; and 3) ranges of change in geomagnetic field and configuration of the polar curve. There is little published data on local declination and inclination data for the area are simply not available. A polar curve for the Knife River area cannot be determined. There is sufficient declination change (16.5°) between 1750 and 1800 to date samples to allow dating of items within this window with a 95% confidence level. However, one is still left with the problem of dating materials from 1675-1750 and 1800-1845. Wolfman does note that while dates in these latter time periods would not be as accurate as those for the 1750 to 1800 range, he does indicate that they will be considerably better than C¹⁴ dates.

While it was believed radiocarbon dating might not meet all of the needs in determining the chronology for the Knife River program, nevertheless, an extensive program of radiocarbon dating from the Knife River Village and surrounding sites was initiated. Early in 1970 there were few dates from the northern Middle Missouri sites (Calabrese 1972). Today there are well over 85 dates reported and more currently being analyzed. These samples date sites from the Late Archaic through Post Contract occupation of the area (Ahler 1983).

ETHNOHISTORICAL STUDIES

The second major study derived from our initial investigations at Knife River is an assessment of the Historical Resources of the Knife River Indian Villages National Historic Site compiled by W. Raymond Wood (March 1977). The study was commissioned to evaluate: 1) available historical documentation and other resource material available with specific consideration given to the reliability of that material; 2) the location of resource materials and evaluation of factors necessary to obtain the data; 3) the procedures and time necessary to obtain the material outlined; and 4) recommendations as to individuals to carry out this research.

We were not able to support to the degree anticipated the ethnohistorical research and outlined by Wood. Then, too, the ethnohistorical research requires the diligence of one or two individuals pursuing specific leads rather than teams of scientists trying to resolve major problems. We have tried to provide assistance to those individuals evaluating ethnohistorical problems relating to the Knife River Indian Villages. In this way we have obtained considerable information and strengthened our ethnohistorical and historical data base for the Knife River area.

The reports that were prepared by various researchers are very important and considered a major contribution to our understanding the region. Steven Chomko (1978) utilizing ethnohistorical techniques attempted to determine the tribal affiliation of the Greenshield and Ice Glider sites in the Knife Heart region of North Dakota. Of extreme importance is his review of first-hand accounts, utilized to reconstruct Arikara, Mandan and Hidatsa tribal movements and village locations in the periods of AD 1718-1862. Chomko indicates that it is plausible that the Arikara occupied the Greenshield Village and the time span indicated (i.e., 1795-1798). He also offers some alternate hypothesis for sites considered to be winter villages. References suggest that one such site, Ice Glider, may be the remnants of more transient structures left by other nomadic groups of people.

Another by-product of the original ethnohistorical planning document is the analysis of the Sitting Rabbit 1907 map of the Missouri River in North Dakota (Thiessen, Wood, and Jones, 1979). In this document the authors reviewed the authorship of the Sitting Rabbit map prepared between 1906 and 1907 by a Mandan Indian at the request of the then Secretary of the State Historical Society of North Dakota. The Sitting Rabbit map is important because it provides a note and crosscheck of early Euro-American records, provides basic data for future archaeological surveys, provides a background understanding of Hidatsa and Mandan traditions, preserves a number of Hidatsa linguistic forms which aren't otherwise recorded, and provides insights into the ethnographer who compiled this information.

Another major source of information derived from ethnohistoric research is Wood's (1978) notes on the historical cartography of the Upper Knife Heart Region. Wood evaluates Missouri River maps dating from the late 1700's through the early 1900's. Wood's document is laced with information pertinent to the interpretation of the maps and the relevance of these maps to the Upper Knife Heart Region. Wood notes that his study is by no means definitive and is meant only as a guide to existing literature and to more important known cartographic sources for the ethnohistorical and environmental data relevant to Knife River Indian Villages National Historic Site. It offers one of the most complete resources for the beginning researcher to ground himself in the information available in the cartographic record.

Support from the Midwest Archaeological Center was also provided for Trimble's ethnohistorical interpretation of the spread of smallpox in the northern plains utilizing concepts of disease ecology (1979). Trimble successfully argues that the smallpox

epidemic at Fort Clark in 1837, which basically destroyed the Mandan tribe and culturally shattered the Hidatsa and Arikara as well, was probably introduced to the native populations by three Arikara women who disembarked at Fort Clark from the supply steamboat St. Peters. His ecological approach or what he calls "disease ecology" is characterized by comprehensive attention to mutual relationships between organisms and the environment while considering the multiple effects of human actions which alter the relationship between people and their environment. Trimble also offers valuable information which tends to negate the hypothesized dissemination of smallpox to the Upper Missouri Indians through distribution of a blanket.

Jeff Hanson (1983) provides an evaluation of Hidatsa culture change (adaptive adjustment) during the period between 1780 and 1845; the era when the Hidatsa were feeling the greatest effect of Euro-American contact. Beside the smallpox epidemic the Hidatsa were faced with the introduction of the horse and the onset of the fur trade as well as intensified warfare.

In addition to these documents, Wood has provided an all-inclusive account of David Thompson's visits to the Mandan-Hidatsa Villages in 1797-1798. This differs from the original document which was written using field notes but does not include all of the data and observations he recorded. Also on hand now are new verbatim transcriptions of documents important to the understanding of the relationship between the Northwest Company and the Mandan and Hidatsa Indians. These consist of the fur trade documents bearing on the Mandan and Hidatsa trade with Northwest Company posts in central Canada, 1793-1805: five new transcriptions, Wood (1979) and Thiessen (1980). In total the ethnohistorical data compiled with meager financial support have great potential for re-assessing the long-term interaction between Euro-American and the natives of the Knife River area and the resultant changes wrought in native culture.

PROJECT COMPLETION

It was the intent of the Center to develop, maintain and to continue the entire twelve year research program for Knife River National Historic Site as outlined in the research design. There was good support from the Washington Office to continue the program. The University of North Dakota, other consultants and researchers were consistently meeting deadlines and the project was running smoothly.

But from the beginning there was opposition to the project by some, fostered in part by a bias toward southwestern archaeology in the National Park Service. It is hard for some to see the expenditure of funds on Plains sites while there are southwestern sites "eroding away". With the establishment of the Regional archaeologist position in the Rocky Mountain Region the seed of discontent grew and reached full blossom in the winter of 1980. We were told that the Knife River Project was "too costly", geared to research, and not meant to meet "management" needs and that there were other (southwestern of course) priorities which had to be met in the Rocky Mountain region. We were also informed that funding would be terminated in mid-project at the end of fiscal year 1980. A meeting between representatives of the University of North Dakota, Midwest Archaeological Center, National Park Service Washington Office was arranged with representatives of the Rocky Mountain regional office in December, 1980. At this meeting it was noted that it was not in the Service's best interest to discontinue a project without completing reports of excavations and analyses. It was agreed that funding would be provided to bring the project to completion at the end of Phase I as defined in the research design.

In summary, the Knife River archaeological project was born out of an interest in the prehistory of North Dakota by a group of researchers who shared the same interest and objectives. This was occurring at a time when there were major shifts in the orientation of the cultural resources management programs in the National Park Service (then the lead and coordinating agency in federal cultural resource programs) as well as at the Midwest Archaeological Center. It was also a time when the archaeologists began to give serious consideration to differences between preservation and conservation of archaeological resources. This shift in emphasis provided an opportunity to: 1) test some new and exciting conservation and preservation methods of evaluating archaeological resources; 2) employ nondestructive techniques; 3) follow a rigorous research design for evaluating the archaeological resource; 4) provide sound scientific data for understanding the area prehistory; and 5) provide data useful for the interpretation and management of the resource.

The success of the program was dependent upon "holding" it together from a financial and administrative point of view and accomplishing the research objectives in a cost efficient and timely manner. The joint program between the University of North Dakota and the National Park Service and cooperation of researchers at the Universities of Missouri and Nebraska as well as a host of other

specialists was extremely successful and offered a solid method of accomplishing projects. Cooperation between the government and universities is not new. Most of the early Missouri Basin projects were accomplished in a similar cooperative spirit with contributions of personnel and financial assistance coming from both. It is an attractive alternate format for accomplishing both academic and management objectives rather than the more traditional less involved methods of formal contracting for archaeological services. The participants are willing cooperators rather than wary businessmen in procuring or providing archaeological information.

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