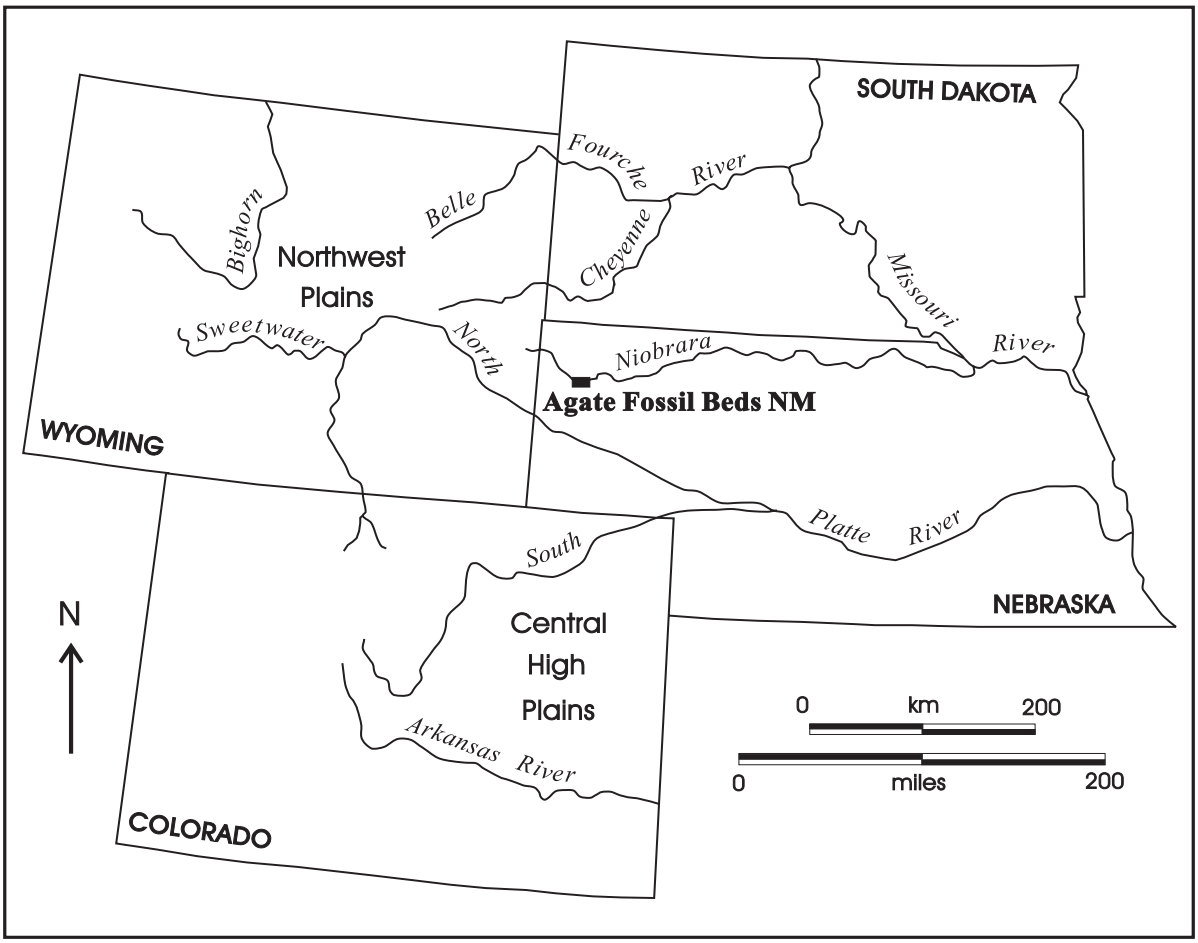
The 1996 Archeological Survey at Agate Fossil Beds National Monument



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The 1996 Archeological Survey at Agate Fossil Beds National Monument

By

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This report has been reviewed against the criteria contained in 43CFR Part 7, Subpart A, Section 7.18 (a) (1) and, upon recommendation of the Midwest Regional Office and the Midwest Archeological Center, has been classified as

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Making the report available meets the criteria of 43CFR Part 7, Subpart A, Section 7.18 (a) (1).

Abstract

During August 1996, the author and a crew of three archeologists from the Midwest Archeological Center conducted an archeological survey of approximately 1,200 acres within the boundaries of Agate Fossil Beds National Monument. The survey focused on fee-owned land north of the Niobrara River. In this area, the crew located five new sites and revisited several previously recorded sites. The crew also recorded 11 isolated stone tools north of the Niobrara River and buried soils containing animal bones at three locations along the river. The southern portion of the 1996 survey area overlapped areas covered by Caven Clark in 1991, and all areas had been reconnoitered by Marvin Kay in 1975. In addition to the area north of the Niobrara River, two locations on the south side of the river were examined. One of these is the present location of the small structure known as the Bone Cabin Complex because of its prior use by crews conducting paleontological research. The second is a small area of fee-owned land adjacent to Nebraska Highway 29 considered to be one of the locations of a camp used by the Lakota chief Red Cloud during visits to the Agate Springs Ranch. Based on surface manifestations, the individual sites located in 1996 are likely to yield only limited information on past human occupation of the monument. However, taken as a group, the sites can be considered as contributing elements to a district if nominated for inclusion on the National Register of Historic Places.

Acknowledgments

The 1996 field crew consisted of Al Smith, Scott Stadler, and William Volf. All three contributed substantially to the success of our survey and to its timely completion. In addition to their regular duties, William Volf contributed insights based on his prior survey and testing work in western Nebraska and Al willingly assumed the responsibility as project photographer. Superintendent Ruthann Knudson, at that time recently arrived at Agate Fossil Beds National Monument, designated Park Ranger Marten Schmitz, the resource management specialist, as our liaison. He was always willing to make time for our frequent reviews and updates of the work as it progressed. Indeed, all staff members were helpful and interested in our work, and we are most grateful to those who provided useful insights into the history and natural history of the area. Douglas Scott of the Midwest Archeological Center provided immeasurable assistance in completing this report.

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Introduction

In August 1996, the author and three other archeologists from the Midwest Archeological Center, Lincoln, Nebraska, conducted a pedestrian archeological survey of portions of Agate Fossil Beds National Monument in Sioux County, Nebraska (Figure 1). The crew consisted of Al Smith, Scott Stadler, and William Volf. The crew focused its efforts on fee-owned land within the monument boundaries and north of the Niobrara River. The survey was the third phase of a multi-year project planned and funded as part of the Systemwide Archeological Inventory Program for units of the National Park Service. The records produced for this project are curated as MWAC Accession 965 and AGFO Accession 66.

Previous Archeological Research

Although archeological artifacts recovered from the region surrounding Agate Fossil Beds National Monument indicate several thousands of years of human use, this specific segment of the Niobrara River valley was not occupied by Euroamericans until 1879 (Meade 1990:4) or 1877 (Cook 1923:273). At that time Elisha B. Graham established a ranch called the 0 4 located near the present Agate Springs Ranch headquarters. According to Harold J. Cook (1968:8), the 0 4 Ranch was located near the point where the Fort Robinson Road crosses the Niobrara River (Figure 2). Meade (1990:5) indicates the 0 4 Ranch was about 13 miles west of another ranch, known as the Lower 33, established by E. B. Bronson about the same time. The Lower 33 Ranch would have been located at about the same point as the southeastern establishment of Bartlett Richard's Ranch, shown right of center in Figure 2. James H. Cook married Graham's daughter Kate in 1886, and the Cooks purchased the 0 4 Ranch from Graham in 1887 (Cook and Driggs 1942:230–231; National Park Service 1980).

Harold J. Cook, James H. Cook's eldest son, grew up on Agate Springs Ranch during the period when many professional paleontologists were beginning to explore the local fossil deposits (Cook 1968). He was inspired to attend the University of Nebraska and then studied geology at several eastern schools (Cook 1968:197–210). Harold Cook participated in the evaluation of a number of early archeological sites as well as paleontological ones (Cook 1926; Meade 1990:20; National Park Service 1980). In the mid-1920s, Harold Cook was involved in an evaluation of the age and geological context of specimens of fossil bison and associated stone tools (Cook 1925, 1927; Howard 1943:Footnote 1). Near Agate Springs Ranch he also recovered a fossil tooth that, for a time, was argued to be human and to date to the early Pliocene, although that interpretation eventually proved untenable (Cook 1926:334–336; Cook and Driggs 1942:240; Meade 1990:32).

Artifacts in what is known as the Cook Collection clearly reveal an interest in stone tools. In his autobiographical writings, James Cook recalls his interest in archeological and paleontological specimens (Cook and Driggs 1942). Dorothy Meade observed that James Cook was interested in fossils but was most active in collecting "Indian artifacts and historical objects" (Meade 1990). Many specimens in the collection are from the vicinity of the present monument and other sites in the region, while other specimens indicate exchanges with other collectors or visits to sites far removed from the Agate Springs area. In describing the Cook family's museum, Dorothy Meade (1994:14) mentions a "large tray filled with flint projectile points picked up at Agate over the years." The National Park Service treats much of the Cook Collection as an organic whole and consequently has preserved the packaging and associated notes, which increases the research potential of this material when used in conjunction with more recent systematic collections (Miller 1992).

In 1966, Jackson W. Moore apparently undertook excavations near the main paleontological quarries to evaluate the remaining fossil-bearing strata and the capacity of the deposit to support a "heavy structure." Presumably the structure in question was to have been a visitor and interpretive center (Moore 1966). Moore's 1966 trip report does not contain a map, and consequently it is not clear from the available records exactly where his test was located. He mentions a visit to an archeological site outside the boundaries of the monument but does not refer to any archeological sites within the boundaries.

In 1973, Adrienne Anderson and Raymond Mundell visited Agate Fossil Beds to assess the new monument's need for a basic resource inventory (Anderson 1973). In the course of their visit they recorded site 25SX152. Anderson's trip report does not mention other sites, and it appears that 25SX152 was observed because it is traversed by the trail between the paleontological quarries and the visitor center.

In 1975, Marvin Kay and Steve Holen of the University of Nebraska undertook the first systematic professional archeological survey of lands within Agate Fossil Beds National Monument (Kay 1975). Kay and Holen revisited 25SX152 and recorded 11 other sites, including several lithic scatters, two sites with prehistoric ceramics, a few small rock cairns, an earth-filled cairn, and a site with stone tipi rings.

In 1976, Danny Olinger (1980) and a Midwest Archeological Center crew evaluated 25SX163. This site, originally identified by Kay and Holen, was threatened by the interim visitor center development. Although 25SX163 was one of the sites from which Kay and Holen had collected prehistoric pottery sherds, no additional pottery was recovered in Olinger's five 1-m-sq excavation units.

In June 1990, William Hunt visited the monument to evaluate the cultural features and artifacts observed by monument personnel in an eroded section of the bank of the Niobrara River (Hunt 1990). In his July 1990 trip report, Hunt described the stratigraphy observed in his ca. 1-m-sq test unit and evaluated the single sherd previously recovered from the riverbank by a member of the monument staff. Hunt noted the similarity of the strata in his test with those recorded by Olinger at the nearby 25SX163, which is located about 200 m (650 ft) away. He designated the area 25SX89 primarily on the basis of materials recovered by the monument staff.

The area defined as 25SX89 was later incorporated into the larger site 25SX163 as a result of fieldword directed by Caven Clark (1993:14). During 1991 and 1992, Clark directed Midwest Archeological Center crews that surveyed along River Road, also known as Marsland Road and the monument entrance road. Clark tested selected sites that were to be impacted by pending construction. Clark revisited many of the sites found by Kay and Holen north of the river and recorded 36 additional site components on the south side of the river. Eleven sites were tested with one or more 1-m-sq excavation units. Much of the excavation effort focused on sites 25SX163, 25SX157, and 25SX486 (Clark 1994).

During 1992, the surface of site 25SX163 was partially disturbed as a result of construction, and the Midwest Archeological Center crew made additional surface collections from the site. These lithic artifacts were analyzed by Todd Butler and reported in an appendix to Clark's 1994 report. In 1994, a survey party covered land south of the Niobrara River. The survey party was jointly directed by LuAnn Wandsnider, Department of Anthropology, University of Nebraska, and Vergil Noble, Midwest Archeological Center, as a cooperative project between the two organizations. The 1994 survey and the subsequent season of test excavations in 1995 formed the first two years of the three-year Systemwide Archeological Inventory Program project and has been reported by Wandsnider and MacDonell (1997).

Environmental Setting

Agate Fossil Beds National Monument includes about 6.4 km (ca. 4 mi) of the Niobrara River valley and adjacent terraces, as well as narrow bands with remnants of the surrounding high tablelands. This high, flat plain, known as the Hartville Table (Hunt 1984:19) or the Box Butte Tableland, dominates the landscape between the North Platte River valley, which lies 60 km (37 mi) to the south, and the Pine Ridge region a short distance to the north. It is bounded on the west by the Hartville Uplift in Wyoming and on the east and southeast by the Nebraska Sandhills. The Niobrara River flows east from the fossil beds for about 90 kilometers (56 mi) before trending northward toward the boundary between Nebraska and South Dakota. Upstream, to the west of the monument, the river's course turns sharply northwest toward its head in eastern Wyoming. The monument varies in width from about 3 km (2 mi) in the east to about half that at its narrowest point in the west. Where remnants of the adjacent tablelands extend into the valley, the change in elevation is fairly precipitous but less than 80 m (260 ft). The riverbed lies slightly below 1340 m (4400 ft) above sea level and the higher ridges range between 1370 m (4490 ft) and 1400 m (4600 ft). The Niobrara channel is only a few meters wide under normal flow conditions and me-

anders considerably in the narrow valley. Springs just west of the monument substantially augment the river's flow, and the Niobrara River is the only significant perennial stream between the North Platte and the White Rivers.

The region is well known for climatic extremes (Kay 1998). Temperatures often range from less than -20°C (ca. 0°F) in the winter to near 40°C (ca. 100°F) in mid and late summer. Rainfall is scant but the majority of the annual precipitation occurs in the early summer growing season (Weaver 1965:117). The Box Butte Tableland is described by Weaver (1965:120) as hardlands that typically have high run-off of rain and are highly subject to erosion. The high runoff also reduces the portion of annual precipitation available to support vegetation. Vegetation is a mixture of short xeric-adapted sod-forming grasses, short grasslike sedges, and medium-height prairie grasses. A great variety of forbs, including cacti and yucca, are present. Shrubby vegetation is notably absent from the higher terraces, hill sides, and ridge tops. The marshy floodplain of the Niobrara River presents a different array of plants than does the more widespread shortgrass prairie. However, the floodplain is estimated to cover only 121 hectares (ca. 300 ac) over the entire length of the monument (Stubbendieck and Willson 1986:24). In her history of Agate Springs Ranch, Dorothy Meade (1990:5, 15) notes the complete lack of trees in the valley at the time James Cook settled there in the late 1880s. According to her account, James Cook transplanted cottonwoods (*Populus deltoides*) and willows (*Salix* sp.) from the valley of the North Platte River.

Cultural-Historical Framework

The culture history of the project area is largely inferred from archeologically better known areas adjacent to northwest Nebraska rather than from within and near the monument itself. The absence of substantial amounts of public land south of the national forests and national grasslands in northwest Nebraska and the lack of commercial developments have contributed to the preservation of archeological sites in the Agate Fossil Beds vicinity for future research. Until more sites are examined in the region immediately around the monument, archeologists must rely on the culture histories of neighboring areas for broad outlines and general trends.

The major framework applied to most of the High Plains is based primarily on a series of stratified sites located to the west, many of them in Wyoming and Colorado (Metcalf 1987; Hoffman and Graham 1998). Projectile points from these sites provide the most important taxonomic tool for most of the prehistoric period. Sites that have contributed to an understanding of Paleoindian and Archaic cultures are located in the vicinity of Agate Fossil Beds National Monument (Frison 1998). Signal Butte (Strong 1935) and Ash Hollow Cave (Champe 1946) each yielded a variety of Archaic point styles in stratified contexts. The Scotts Bluff site yielded Paleoindian points in association with a bison bonebed. The Hudson-Meng site yielded Paleoindian points in proximity to an extensive bison bonebed, although it is not certain that the site represents a traditional kill site (Hoffman 1996). More recent cultural traditions are identified by reference to ceramic assemblages best known from sites south and east of Agate Fossil Beds National Monument, such as Ash Hollow Cave (Champe 1946). Several regional overviews have been published (Strong 1935; Mulloy 1958; Wedel 1961; Frison 1991; Wood 1998).

James Gunnerson (1987) prepared an exhaustive summary of the archeology of the portion of the High Plains lying slightly south of the Niobrara River, and many of his observations are applicable to the area around Agate Fossil Beds National Monument. More recently the Arkansas Archeological Survey has prepared a series of regional overviews for areas adjacent to or including Agate Fossil Beds National Monument (Frison and Mainfort 1996; Hoffman et al. 1989; Hoffman 1996; Owsley and Rose 1997).

In reporting his 1991 and 1992 work at Agate Fossil Beds National Monument, Caven Clark summarizes the regional sequence as listed at right. In any such chronology, the temporal boundaries of elements of the scheme are imprecise, especially with older remains, and some researchers are inclined to divide the sequence into several, perhaps innumerable, subdivisions. In some cases transitions are gradual and/or incomplete, hence some overlap in the dates listed.

Paleoindian	10,000 BC to 6000 BC
Archaic	6000 BC to AD 100
Woodland	100 BC to AD 1000
Plains Village and Horse Nomad	AD 900 to 1890
Historic	After 1750

Background and Field Methods

The Midwest Archeological Center's 1996 archeological survey at Agate Fossil Beds National Monument was designed to complete the systematic search for prehistoric and historic archeological sites. The goal was to provide an inventory of site locations and site types that would meet a broad range of current and future management needs. The preceding two-year survey and testing program was conducted by crews from the University of Nebraska, Lincoln, working under a formal cooperative agreement with the National Park Service (CA 6115-4-8026). The 1994 and 1995 archeological work focused on land owned by the National Park Service and lying south of the Niobrara River. In contrast, the 1996 work was planned to cover the land north of the river. In all three years, work was confined to fee-owned lands and did not include land under scenic easements and other private lands within the authorized boundaries. The initial plan was to include the detached unit known as the Stenomylus Quarry. However, prior to the start of the 1996 work, Superintendent Knudson visited the Stenomylus Quarry and ascertained that Marvin Kay's inventory was adequate, with the only unrecorded features being ones associated with the historic paleontological excavations. Consequently, the Stenomylus Quarry area was dropped from the 1996 work plan. It was assumed that in the process of completing the inventory we would encounter several of the previously recorded sites. We planned to assess the documentation of those sites and record the locations using a global positioning system (GPS) instrument.

The initial work plan for the 1996 survey gave priority to coverage of several areas in which no sites were yet recorded. Marvin Kay and Steve Holen had undertaken a survey of the monument in 1975 and located several previously unrecorded sites. The series of investigations by Olinger and Clark related to the construction of new visitor facilities revealed additional sites, as had the University of Nebraska's work in 1994 and 1995. Specifically Caven Clark's 1991 survey along River Road identified 36 new loci containing some artifacts. In fact, Kay (1975:18) had concluded that "because of the extensive ground cover, sites adjacent to the Niobrara were hard to define and others undoubtedly were missed." Although the number of site loci recorded increased as a result of substantially greater labor — and probably because of the vagaries of rodent burrowing habits — Clark's view was remarkably similar to Kay's. That is, Caven Clark advised this author in June 1996 that "Surveying on the north should be straightforward if it is from the road north. The area between the river and the road is one long continuous lithic scatter, punctuated in areas by higher densities of artifacts." Clark (1993:7) describes the survey procedure used along the River Road corridor, and it is clear from the site locations that his crew was also able to explore some of the monument lands outside the construction area.

The 1996 plan used the same 10-m (33-ft) interval between crew members that Clark used along the road and the University of Nebraska crews used when they surveyed the area south of the river. We applied that process systematically to all of the land between the marshy floodplain and the monument boundaries on the west, north, and east. However, some differences in method were recognized at the outset. Clark's work was directly tied to a known zone of impact for road improvements and visitor center development. Because of the threat of destruction, all artifacts observed were collected during the 1991 and 1992 seasons.

The 1996 project employed a small crew during a field season of about 15 working days. In fact, our crew had about the same amount of time to survey and record sites as did the University of Nebraska group engaged in electronic distance measurement alone. For this reason, the 1996 crew opted to use only a Global Positioning System (GPS) unit and visual comparison of field features with topographic maps. The Midwest Archeological Center had just received a precision lightweight GPS receiver (PLGR) made by Rockwell Avionics. The model available in 1996 contained firmware for Precise Positioning Service (PPS), which eliminates the applied error of up to 100 m (330 ft) often present for GPS signals under a process called Selective Availability. In addition, the unit uses anti-spoofing codes, which lessen the likelihood that it will respond to false GPS signals. The benefit of these features is that the PLGR unit is less prone to measurement error, and a significant improvement in accuracy can be obtained without establishing paired base stations and processing data after completing fieldwork, although these techniques will improve the accuracy of PLGR data, as well as data from GPS units that do not utilize the PPS system.

Several factors, including the geometry of available satellites, influence the accuracy of any individual reading. The PLGR is purported to yield precision in the 10 to 15 m (33 to 50 ft) range under normal conditions. We believed this was sufficient for documenting the location of sites encountered during the 1996 survey and that the economy of not establishing multiple mapping stations across several kilometers of irregular terrain compensated for any small imprecision in establishing Universal Transverse Mercator (UTM) values. Site location details are separately bound in the appendix, which conists of Tables 1–3.

The other major change from previous surveys was that surface collecting was not standard practice. Test excavations indicate that most artifacts lying on the surface are displaced from shallow buried strata, probably by rodent burrowing (Clark 1993:27, 1994:7). The most common raw material types are well known, and all indications are that the majority of materials could be identified in the field. Public entities providing indefinite care for museum objects are increasingly aware of the complexity and cost of curation activities. We believed that the primary goal of completing the inventory of surface-detectable archeological sites could be met without adding unnecessarily to the existing curated artifact inventory. Artifacts thought to significantly increase our understanding of when, how, and by whom the monument had been used and those judged to be threatened were collected.

Initial Orientation and GPS Test

The first field activity involved locating several previously recorded sites. The objective was to acquaint all of the team members with the range of site features that might be encountered and to examine the locally available lithic materials. We also tested the PLGR unit by entering previously recorded UTMs and using the PLGR's navigation function to locate known sites. If the PLGR failed to direct us to a site, we would then determine whether such failure was the result of PLGR inaccuracy, or incorrect UTM values, or both.

25SX153

Using Nebraska site survey forms and base maps to find recorded sites, we began with 25SX153, which consists of several single-course tipi rings (Kay 1975:28). The UTM value as measured by the PLGR within the group of stone rings was a small amount east and north of the value recorded on the state site survey form. However, the previously computed value would be correct for the approximate center of the site if an adjacent lithic scatter were included. The stone rings, although located near a small cutbank, are not being eroded. Because of the lack of grass fires and livestock grazing within the monument for the past 20 years, the stone features were well hidden by current vegetation and thatch, and the superintendent advised the author that she does not see that the rocks form rings. As was the case when Marvin Kay and Caven Clark visited the site, we did not observe any artifacts in proximity to the stone rings. Kay identified a lithic scatter adjacent to the area of the stone rings, but south of River Road. He collected several flakes, a unifacial tool, and a single small body sherd with mica temper. Kay also noted that the association between the stone rings and the lithic scatter was not definitive.

Caven Clark's crew tested the portion of 25SX153 to be affected by River Road improvements. Four 1-m-sq test units were excavated and a few additional flakes were recovered at the site from the surface and test units south of the road (Clark 1993:10–11). No pottery was recovered and no buried stone or earthen features were observed. Clark also noted that an association between the stone rings and the lithic scatter was uncertain. From our initial reconnaissance south of the road, we concluded that lithic material on the surface was sparse, consisting only of a few small non-utilized flakes of Hartville Uplift Chert and Moss Agate and a small crescentic biface of gray Cloverly Quartzite.

25SX27

Following our inspection of 25SX153, we used the PLGR's navigation function to lead us to 25SX27, which is approximately 0.5 km to the northeast of 25SX153. The site, located by Clark in 1991, is situated on and around the top of a small knoll ca. 20 m (65 ft) above the surrounding prairie. The site location as measured by the PLGR was within 20 m (65 ft) east and north of the location previously determined by Clark. We did not observe any flakes on the top of the knoll, but the potential for animal bur-

rowing is minimal and Clark's crew collected artifacts from the site surface in 1991 (Clark 1993:9, 35). High on the east face of the knoll, we observed a large end scraper of Hartville Uplift Chert (6 cm x 3.5 cm) and the triangular distal portion (2.5 cm) of a thin biface made of Cloverly Quartzite. No debitage was observed near the two artifacts.

25SX156

The last site located as part of our orientation was 25SX156. Kay recorded this site in 1975 and escribed it as a low elliptical rock-and-earth filled mound. Once on the site, the PLGR provided a UTM value that was 59 m east and 159 m north of that recorded on the state site survey form. However, the site location as recorded by Clark on the topographic map used in his reports is correct, with the PLGR's UTM falling in the center of the site symbol. The difference between the original UTM value and that recorded with the PLGR can be explained, in part, by the use of a 15-minute topographic map on the earlier survey. Also, the site is not located on a narrow well-defined topographic feature but rather sits in an area without sharp relief. Kay and Holen collected one flake of non-local chert from the surface of the mound and several fragments of black to light gray translucent Moss Agate. Clark's crew visited the site in 1991 and made a collection of raw materials from the vicinity of the mound. The material they collected tends toward white or very light gray and, although it contains dark dendritic inclusions, is markedly more opaque than the material Kay picked up. They did not record any artifacts on or near the mound. We did not observe any artifacts at 25SX156, but raw materials similar to those collected by Kay are common along the top edges and eroded slopes of this bluff or ridge. This is especially true to the west and south, where Clark (1993:24, 25) recorded several lithic workshop sites (25SX491, 492, 493, 494).

Overall the PLGR seemed quite satisfactory for our purposes. We were able to revisit sites using the unit to guide us, and the values matched those previously recorded within the ca. 15-m uncertainty range claimed for the instrument. During the 1996 survey, the PLGR was configured to use the North American 1927 Continental United States model. This was selected for ease of comparison with the draft United States Geological Survey topographic maps that were prepared using this model. After the initial setup the unit normally provided a high-precision (± 15 m [± 50 ft]) measurement within a few minutes of being turned on. On two occasions, values with 100-m (330-ft) uncertainties were produced, and changing the orientation of the antenna did not produce more satisfactory values. These sites were revisited later in the project and more acceptable values were recorded. The few problems were attributed to poor satellite geometry at the times of the readings.

During the last week of the project several points were relocated and again measured with the PLGR and with another, simpler GPS unit. The first four pairs of rows in Table 1 list four locations at which the PLGR was used on August 15th and 16th with repeat measurements taken on August 27th and 28th. The four repeated measurements are all quite close to the original ones with the exception of the reading taken on August 16th, which had a large uncertainty of ± 87 m (± 285 ft).

The last seven pairs of rows in Table 1 are readings taken with the PLGR and a Garmin 45XL GPS unit, with each pair of readings taken at the same location and time. The Garmin unit does not have the PPS firmware or the anti-spoofing feature. Nonetheless, the Garmin values are close to those recorded with the PLGR, with differences less than 40 m (130 ft) and usually about 15 m (49 ft). This suggests that during periods in which the effects of Selective Availability is minimized, an inexpensive unit would be suitable for relocating cultural or natural features within the monument.

Sites and Other Features Located in 1996

Because of uncertainties regarding weather condidtions, ground conditions, and site recording times, the work plan called for survey of selected areas. The areas selected for survey had an absence of recorded sites and poorly recorded intensity of prior surveys. It soon became clear that the sparseness of ground cover and scarcity of new sites would allow us to complete virtually all of the area north of the river. Consequently we did not use our priority plan and instead proceeded to survey from west to east on the north side of the road during the first two weeks and from west to east between the road and the river in the last week. All references to sections in this report are to sections in Township 28 North and Range 55 West.

The first area surveyed was the northwest portion of government-owned land. This unit is bounded on the west by Nebraska Highway 29, on the north and east by the National Park Service fenced boundary, and on the south by sites 25SX496 and 25SX490. This survey unit includes most of the west half of the northeast quarter of Section 6. Although this region has considerable relief, the monument is quite narrow here, and each east-west traverse covered only about 300 m (1000 ft). The shortness of the traverses and the irregular landforms, which provided landmarks, made it possible to maintain systematic coverage. A single large flake of Hartville Uplift Chert (4.5 cm x 2 cm) was observed lying on exposed bedrock within a few of meters of the north boundary fence near its junction with the east boundary fence. The specimen did not have obvious signs of use, and the dorsal surface was largely covered with a light-colored cortex. It is possible that associated materials exist on private property north of the monument, but none could be observed from within the monument. No sites or isolated tools were located in the area north of sites 25SX496 and 25SX490. South of these two previously recorded sites, our traverses were oriented north-south.

25SX291

In Section 6, in addition to the isolated flake mentioned above, we located one previously unrecorded small historic dump (25SX291) and an isolated stone tool. The isolated tool (IT96-1) was a small unifacial scraper made of gray Cloverly Quartzite (2 cm x 2 cm). It was retouched on both sides and across the distal margin. This isolated tool was located near the base of a bluff and approximately 80 m (260 ft) northeast of 25SX482, with which it might be associated. However, no other material was observed between the isolated find and 25SX482. The dump site designated 25SX291 is located in a shallow depression west of the interpretive trail and is near a two-track trail trending northeast from a point near the junction of the monument's entrance road with Highway 29. The same two-track trail can be identified in the vicinity of 25SX497, also a trash dump, recorded by Clark (1993:25). Small fragments of a thin hard whiteware, decorated with small pink and green floral elements, were observed on the surface. No fragments large enough to identify the function of the piece or pattern were seen. Also present were clear and slightly purplish fragments of flat glass and glass fragments that had molded flutes or facets. Fragments of bailing wire, electrical wire, and what appeared to be a 5-gallon (19-liter) can were also present. No evidence of a structure was observed, but the dump is within sight of the Agate Springs Ranch and may well contain early-twentieth-century household and farm discards.

In general, we saw little that would add to Clark's observations previously recorded in Section 6. Sources of Moss Agate (25SX490, 491, 493, 494) are numerous in this area, but these sites seem more likely to have been opportunistic collecting points rather than quarries. The material is highly fractured, and much of what can be found on the surface appears to be natural shatter. Nonetheless, it seems probable that much of the agate found at sites within the monument originated in these exposures. We did not relocate 25SX498, perhaps because it was completely collected in 1991. The small cairns at 25SX495 and 25SX496 were relocated. The UTM location measured by the PLGR for 25SX495 agreed well with the existing value and location shown in Clark's reports. However, the PLGR-derived UTM for 25SX496 would place that site about 80 m east and 160 m north of the presently recorded location. Because of the rather ephemeral nature of these features and variations in the recorded location, we searched the narrow ridge thoroughly above and below the position projected for the site. No other sites or features that could

be confused with 25SX496 were noted, therefore the site location should be corrected on future maps of the area. No cultural material was observed in the portion of Section 6 south of River Road. This area was cursorily examined, but pedestrian survey on this small wedge of land was unproductive largely because of very heavy vegetation near the river. Neither the ground surface nor animal burrows could be seen. Two other small areas in Section 6 were not walked; they consisted of two small depressions, one on either side of the parking lot for the Daemonelix Trail. Both depressions contained water during the entire period our crew was at Agate Fossil Beds, and the vegetation indicates they are often wet.

River Road nearly parallels the southern limit of the Section 5. The north boundary fence also parallels the section line about a quarter mile north. These demarcate a survey unit consisting of the southern quarter of Section 5. Near the west side and in the center of the survey area, high bluffs intrude from the northwest and north. The rest of the unit is low in elevation and lacks significant relief. The team walked north-south traverses and worked from west to east across the area. The crew recorded three new sites. The finds consist of two small cairns, one lithic scatter, and two isolated tools in Section 5.

25SX292

A lithic scatter is situated on a low rise just west of a north-south pasture access road. We observed a large (5 cm x 3 cm), thick (3 cm) end scraper of local Moss Agate. Two small flakes of pink and gray Cloverly Quartzite were also observed within a 20-m (65-ft) radius of the tool. Two isolated tools were recorded at the extreme northern limit of the survey area, one in the west and one in the east. Near the base of a ridge was a portion of a small biface made of gray Cloverly Quartzite (IT96-2). The fragmentary specimen is 2.5 cm wide x 4 cm long, but the original length cannot be confidently estimated. The specimen is about 0.8 cm thick where it was broken. No other material was observed at this location, which is just a few meters from the point at which the northern boundary fence intersects the line between Sections 5 and 6. The other isolated tool was recorded at the extreme northeast corner of the survey unit (IT96-3). This artifact was made of a light tan Cloverly Quartzite and consisted of about 1.5 cm of the blade of a small thin side-notched projectile point. The distal point was missing and the blade was broken from side to side between the notches.

25SX293

One cairn, 25SX293, is well out on the end of a narrow northwest–southeast trending bluff (Figure 3). The feature consists of about a dozen large (30–50 cm [12–20 in]) chunks of the same limestone on which it sits. There are many other smaller fragments that grade into the size range of the numerous fragments occurring naturally on all the bluff tops (Figure 4). The limestone supports an extensive growth of bright orange lichen. No cultural material was observed in proximity to 25SX293.

25SX294

Another cairn overlooks 25SX474, an extensive lithic scatter recorded and tested by Clark (1993:19). Designated 25SX294, it sits on the extreme southeast lobe of the bluff that intrudes into the center of the survey area (Figure 5) and resembles 25SX293. However, there are fewer large limestone rocks. It, too, contains several smaller stones that grade into the background clutter (Figure 6). The larger stones are covered with the ubiquitous orange lichen, and a small amount of soil is trapped between the rocks. No cultural material was observed in proximity to 25SX294.

Throughout most of Section 4, River Road and the northern boundary fence both trend to the northeast, although not on parallel tracks. Clark recorded two sizable lithic scatters, 25SX475 and 25SX476, in the western portion of this unit and another large lithic scatter, 25SX481, extending into Section 3 on the east. Clark (1993:21) considered the latter site to be an extension of 25SX163. In 1996 the crew did not record any new sites in Section 4, but they did observe two isolated tools. The first was a modified flake of the local Moss Agate (IT96-4). The specimen is approximately 3 cm long and 2.5 cm wide near its distal margin. The distal margin had numerous tiny flake scars, perhaps from use. The specimen was located on the east side of the ridge that ends north of 25SX475 and is about 200 m (660 ft) north of the site.

The second isolated tool in this section was an incomplete projectile point (IT96-5). The specimen is 3.5 cm long and 1.7 cm wide. The tip is broken and missing and would have added about 0.5 cm to the length. The specimen resembles some early and middle Archaic side-notched points; however, the base has an unmodified platform, and the lateral indents are uneven and crude giving the impression that the specimen had not been worked to its final form. The artifact was made of a translucent dark brown chert with some lighter brown or tan inclusions. Such material superficially resembles Knife River Flint and may be from one of the secondary deposits north of the Niobrara River (Clark 1993:5). This specimen was found a few hundred meters from the location where Clark's crew found an isolated pebble chert core (25SX483). No other cultural materials were observed in this area by the crew in 1996.

25SX295

In Section 3, the monument's northern boundary continues to trend toward the northeast, while River Road turns sharply north-northeast and subsequently turns toward the northeast on a track parallel to the boundary. The terrain along the westernmost portion of Section 3 is quite rough, although it becomes more level when heading east from a point north of the visitor center. The survey crew again crossed 25SX27 (mentioned above in the discussion of PLGR testing), as well as 25SX30 and 25SX154. Site 25SX154 is another small rock cairn initially located by Kay (1975:31–34). Clark's crew revisited the site in 1991 and observed some minor exposures of the local Moss Agate material listed in his reports as Upper Harrison Formation. Unfortunately, through a typographical error, the report lists these exposures as containing Hartville Uplift Chert, which is otherwise correctly listed as originating in Wyoming (Clark 1993:3, 4, 11). Below the bluff on which site 25SX154 is situated, Clark's crew located a small lithic scatter from which a modified flake of the exotic Hartville Uplift Chert was recovered. In 1996 we reexamined the cairn, but found nothing to add to the existing descriptions. We crossed the location of 25SX30 but did not locate any additional flakes or tools. We did identify one new lithic scatter that is now designated 25SX295. Within a radius of about 20 m (65 ft) we located two large decortication flakes and 10 smaller flakes of Moss Agate. No obvious wear or modification was observed on the flakes. The site is located just to the east of the top of a small ridge north of River Road and between the present visitor center and employee housing areas.

The 1996 crew did not identify any new sites south of River Road in Section 3. In most of this unit, the 4400-foot contour on the 7.5-minute topographic map provides a good visual indication of the southern limit of the survey. Below this level, the floodplain is generally marshy and heavily vegetated making it impossible to see the ground surface. The small draw between the present visitor center and the employee residential area is an exception. This area is far enough removed from the active stream and is well drained enough to permit survey in spite of its relatively low elevation. In addition to 25SX163, Clark's crew identified three sites south of the road. The sites include a historic dump near the road (25SX480), a site with prehistoric lithic tools and debris (25SX469), and a site that had previously yielded a prehistoric ceramic sherd, stone tools, flakes, and a buried concentration of burned limestone (25SX487). We specifically reexamined these areas but only in the vicinity of 25SX480 did we observe additional debris on the surface.

The monument's superintendent asked us to look for evidence of an early location of the structure known as the Bone Cabin. The structure is now located south of the river in Section 9, but recent inspection of historic photographs suggested that the same small building once stood near the present visitor center. No footing stones, depressions, mounds, or concentrations of historic debris had been seen on either side of the road in the area of interest. Our assessment of the historic photographs is that the building was located north of River Road near the present well or pump house; however, we found no archeological evidence that a laboratory or residence once stood in the area. We also paid particular attention to the area immediately north of the visitor center, again with negative results. Also, no historic features or artifacts were recovered during the various episodes of testing and surface collecting on 25SX163, which is located under and around the present visitor center complex. The datable material that Clark's crew collected from the surface of the historic dump (25SX480) did not indicate a particularly early date. How-

ever, the site was not tested by excavation. Subsurface testing might recover older material in association with an earlier residence or laboratory, although this would not help locate the building's former footings.

Survey in Section 8 resulted in the location of four widely scattered stone tools, remnants of an abandoned wagon or farm implement, and a riverbank exposure of buried animal bones. The first isolate (IT96-6) recorded in Section 8 was the base of a large corner-notched point in the small portion of the section north of River Road. The specimen was 3 cm wide at the base and was broken along two planes. One fracture passed through the barb formed above one of the notches, and the other fracture extended into the deepest part of the opposing notch. The fragment was approximately 2 cm long, so one can only speculate about the original length and shape of the missing blade. The specimen was made of a fairly uniform dark red chert. The material might be Hartville Uplift Chert but was darker and more uniform than most of the Hartville Uplift Chert we observed. The base was slightly convex and had been thinned on both surfaces. Unfortunately, the specimen was located about 50 cm (1.5 ft) down the slope leading into the recent road ditch. It is not possible to determine the extent of displacemement. No features were seen in the road cut and no other cultural material was in close proximity. The specimen probably represents one of the many named variants of point types assigned to the early to middle Archaic period.

Near the southeast extent of 25SX157 we located a small core of Hartville Uplift Chert (IT96-7). The specimen contained some black dendritic inclusions and measured about 3 cm x 3.5 cm. The remnant of the striking platform was about 1 cm in diameter. Although we did not locate other material in close proximity, this object should probably be assigned to 25SX157. South and east of the core we observed a band of dark soil containing fragments of bone exposed in the left bank of the Niobrara River. The lens of soil is about 20 m (65 ft) long and varies from 0.5 to 1.5 m (1.5 to 5 ft) below the modern ground surface. The buried soil band contained fragments of the ribs, femur, and vertebrae of a large mammal, presumably bison. No clear cultural features, such as hearths and stone tools, were observed in the exposed portion of the riverbank. A bit of charcoal was observed at the extreme northwest end of the exposure, and a small whiteware sherd (diameter < 1 cm) was located southeast of the buried soil lens. The sherd did not exhibit any decoration, and neither the size nor form of the original object could be ascertained. The sherd was found on eroded soil near the waterline of the river, and its original context is unknown. There was no clear indication that the charcoal had cultural significance. No other historic or prehistoric artifacts were observed near the buried bone. None of the material was collected.

At the extreme southern limit of one of the traverses, about 250 m (820 ft) southeast of 25SX473, we located a small thin biface (IT96-8). Like most artifacts, it was located in backdirt from an animal burrow. The find spot was at the base of the first terrace above the marshy river margin. It was broadly ovate, 4 cm long, and 2 cm wide near the proximal end. Small flakes had been removed from all margins, and a few flakes had been removed from the dorsal surface, significantly thinning the tool. The specimen was made from Hartville Uplift Chert containing several dark gray inclusions. About 150 m (490 ft) southwest of 25SX478 we located the distal portion of a broken unifacial tool (IT96-10). The fragment was 3.2 cm wide, 2.5 cm long, and about 0.5 cm thick at the point of fracture. The distal margin and one lateral margin had been sharpened by the removal of numerous small flakes. The artifact was made of Hartville Uplift Chert. Approximately 300 m (980 ft) southeast of 25SX474 we located the remnants of a piece of farm equipment. Present were iron fittings and portions of the wood framework of an apparently horse-drawn implement. We did not recognize fittings that would clearly indicate the function of the implement. However, the metal parts contained an apparent trademark, probably that of International Harvester, consisting of an 'I' superimposed on an 'H', both enclosed in a raised circle with a diameter about 5 cm (2 in). No portion of the relic was collected.

Our survey of Section 9 between River Road and the marshy floodplain along the left bank of the Niobrara River did not reveal any new sites. The crew once again crossed the lithic-scatter portion of 25SX153. In the western portion of Section 9, Clark located two lithic scatters, 25SX478 and 25SX479. These sites are under and east of the fishing access parking area. To the west and south of 25SX478 we located an isolated tool (IT96-11). This artifact was the distal portion of a large thin flake. The specimen had been fractured along two lines producing a 2 cm x 2.5 cm fragment. The tool was made of an uniden-

tified dark gray chert with white inclusions and it had been continuously retouched along all of the remaining original margin. Clark (1993:20, 21) speculated that 25SX478 and 25SX479 might be parts of a single activity area, but their location away from the construction zone precluded testing. Certainly the isolated tool just described and another isolated tool located nearby in Section 8 confirm the nearly continuous presence (with variable density) of artifacts in proximity to the river.

25SX290

Prior to the arrival of our crew, work had begun on the restoration of the small wood frame structure known as the Bone Cabin. It is the central feature of the Harold J. Cook Homestead Cabin, a property listed on National Register of Historic Places. A small concentration of broken bottle glass was discovered during the removal of a concrete floor in a small kitchen addition on the southeast corner of the main cabin. We were asked to examine the material remaining on the surface after the concrete was removed. The concrete was thought to have been poured in the kitchen around 1942 at the same time as a slab along the east side of the original cabin. During restoration, the concrete had been broken up and removed. Cemented into the bottom side of several of the fragments was a considerable quantity of broken bottle glass and much lesser amount of ferrous material. The concrete was between 10 and 15 cm (4 and 6 in) thick and had been broken into chunks ranging from 30 to 50 cm (12 to 20 in) on a side. The lower portion of the concrete included a coarse aggregate. The restoration crew had not removed a significant amount of loose glass. Little glass remained on or in the floor below where the concrete had been removed. Given the density of glass cemented in the base of the concrete and the relative lack of material embedded in the soil surface, it appears that the debris was deposited just before the concrete was poured. This may have been done to eliminate undesirable trash or, as seems more likely, to take the place of other aggregate material in order to make a limited amount of concrete cover more surface area.

We examined the material adhering to the concrete, looking for elements that would indicate a date or function. One identifiable item in the concrete was the base of a colorless glass bottle with a form identified as Philadelphia Oval (Jones and Sullivan 1985:85) and embossed with / OWENS / and the trademark of the Owens-Illinois Glass Company. The numeric code associated with the trademark indicates that the bottle was fabricated in 1937 (Toulouse 1971:403). Another base lacked the name but carried the Owens-Illinois trademark and a numeric code indicating fabrication in 1934. The partial shoulder, neck, and ring handle of a brown glass jug was observed. The finish is missing from the jug but it seems likely that it was finished for a metal screw top. The base of a fruit jar was embossed with the ‘H’ over ‘A’ trademark used by the Hazel-Atlas Company after 1920 (Toulouse 1971:242). This jar base contained numeric codes 6746 and 42. We could not determine whether either of these might indicate fabrication in the mid-1940s. Also present were the neck and finish of a long-neck brown beer bottle and a body fragment of a colorless pop bottle. The beer bottle finish was designed to be sealed with a crown cap. The pop bottle fragment included portions of white and red painted labels identifying it with “Capitol Beverages.” There was no indication of a flavor or popular trade name. Neither the beer nor pop bottle contained information on the bottle manufacturer.

A metal lug cap for a jar was also found. The cap was bent but was approximately 6 cm in diameter. The rolled wire border on the skirt of the lid formed four broad (0.5 cm) lugs designed to fit a divided-thread screw finish. The exterior of the cap was painted in red, white, and blue. The top of the lid was devoted to advertising a Wednesday evening radio program featuring The Great Gildersleeve (Figure 9). The jar lid did not contain a date or indication of the jar’s original contents. It is possible that additional research will identify one or more products that sponsored the Gildersleeve radio broadcast, thus providing a clue to the contents. The Great Gildersleeve character made the transition from late prewar commercial radio to early commercial television. This suggests the product was contemporary with or slightly older than the ca. 1942 “Murphy Kitchen” addition to the Bone Cabin. This supports the interpretation that the debris was placed with the concrete and was not part of a substantially earlier trash deposit. A small amount of other historic debris was observed resting on the surface under the standing structure.

Two flakes of presumably prehistoric origin were also observed near the cabin. One flake was Moss Agate and unmodified, while the other was a large flake of Hartville Uplift Chert that had been retouched along the distal margin. These two flakes may have been carried to the cabin vicinity by a rancher or paleontologist, but in other contexts it would be considered evidence of aboriginal use of the area in which the cabin is located. As part of the restoration, monument staff brought limestone from outside the monument to rebuild the rock berm seen in early photographs (cf. Cockrell 1986: Figure 2). A small amount of white to very light gray chert was imported with the limestone. In the process of shaping and placing the limestone chunks, some recent flakes of the chert may have been produced. The light chert is similar to some of that which occurs in the Upper Harrison Formation within the monument. The site number 25SX290 was assigned to the archeological component of the Harold J. Cook Homestead Cabin.

25SX285

While in the vicinity of the cabin, we recorded the location of the historic grave of John Franklin Cook. The grave is ca. 60 m (200 ft) north and 200 m (650 ft) east of the cabin. As a result of the 1994 University of Nebraska survey, the grave was assigned the site number 25SX285 (Wandsnider 1997:138).

25SX459

Another survey area on the south side of the river consisted of a small tract of land adjacent to Nebraska Highway 29. Agate Fossil Beds National Monument holds fee title to a strip of land ca. 100 m (330 ft) wide east-west and extending about 500 m (1650 ft) south of the river. The unit is bounded on the south and east by private property, and on the west by the highway and Agate Springs Ranch. The area is one of several possible locations of one or more short-term encampments of Red Cloud's Lakota band. In 1971, Roy Weaver, who was then working at the monument, provided information on the site to the Nebraska State Historical Society, and a trinomial site number was assigned. Because of possible confusion with another site, a new number was assigned and the site is now properly identified as 25SX459. The original location of the site was clearly placed east of Highway 29, south of the Niobrara River and near the Agate Springs Ranch buildings. However, the site was incorrectly listed as being in Range 53 West at an incorrect UTM location. The site is in Range 55 West, and a more accurate UTM was provided to the Nebraska State Historical Society. The range and UTM errors are probably typographical mistakes and might have contributed to earlier confusion between this location and another archeological site.

Given the small area to be surveyed and proximity to the highway, we opted to use a 5-m (16-ft) spacing for this unit's traverses. We began at the south fence and walked the usual parallel north-south lines. We began inside and adjacent to the west fence and eventually ended along the east fence. When finished inside the fenced unit, we walked the area between the west National Park Service boundary fence and the east edge of the highway pavement. Weaver indicated that Harold J. Cook marked the site with a concrete post and a bundle of sickle blades. We found such a feature at the north end of the survey unit. The marker consists of a steel implement shaft driven into the ground and standing about 0.5 m (1.5 ft) above grade. Leaning against this steel shaft is the portion Weaver described as a concrete post. These two central elements are surrounded by four steel mower sickle blades wired together at the top so that the blades form a four-sided pyramid. One of the blades has been bent, perhaps in a collision with a farm vehicle (Figures 7 and 8). The marker is about 100 m (330 ft) from the Agate Springs Ranch headquarters.

No inscription was observed on the concrete post and no dates or trademarks were observed on the sickle blade components. Versions of this type of cutting blade are still in use on ranches today. The basic design for cutting hay dates to as early as 1826 in England, and versions were used as hedge trimmers by 1880 (Partridge 1973:66, 67, 126–128). In 1931 Davidson (1931:216) stated that "At the present time nearly all mowers sold in the United States resemble each other very much in construction and the mower is, therefore, almost a standard machine." He also attributed the design to reapers of the mid-1800s. Culpin (1976) observed that "the cutting mechanism of the finger-bar mower has remained fundamentally the same for over a century." It is unlikely that the blade fragments will ever prove useful in answering questions about the date of construction of the feature or whether it is still in its original location.

A small amount of burned glass and charcoal was exposed in the bank of the river just a few meters north of the sickle blade marker. The material was buried a few centimeters below the modern surface. The cultural material is contained in a small, poorly defined zone of dark soil. No clear cultural features such as pits or hearths were seen. Within about a 30-m (100-ft) radius of the sickle blade marker we observed 7 flakes of Hartville Uplift Chert. No tools or other artifacts were observed. A second moderate concentration of stone debris was located about 200 m (650 ft) south of the sickle blade marker. Again, no tools were observed, but the flakes came from various materials including Hartville Uplift Chert, Cloverly Quartzite, and possibly Knife River Flint. The debitage probably predates Red Cloud's documented use of the site since it is unlikely that his band was making substantial use of stone tools by the time they visited James Cook at the ranch, ca. 1890 and 1908. Although the historic debris observed in the riverbank near the sickle blade marker would not normally be associated with an Indian camp, it might be associated with Red Cloud's encampment given the late date of their visits to the ranch. However, the material could also be household discards from the Cook family's home, which is only about a hundred meters (330 ft) to the west.

25SX283

In conjunction with our other work on the south side of the Niobrara River, we visited a small historic site (25SX283) to augment the record made by the University of Nebraska crew in 1994. In discussion, the crew working on the Bone Cabin offered the speculation that a structure from 25SX283 might have been used to expand the Bone Cabin. The 25SX283 structure site consists of a concrete and limestone foundation and cellar wall. The cellar depression is filled with twentieth-century trash including parts of a tractor, a portion of a windmill, cans, and broken bottles. We prepared a measured sketch map of the foundation, photographed it, and located an associated well. The foundation is ca. 2 m (6.5 ft) square with an irregular east wall and an entrance protruding from the north corner of the east wall. The unpaved base of the entry slopes down into the cellar pit. Walls of the foundation are ca. 15 cm (6 in) thick and were poured in many batches. Surrounding limestone slabs suggest that a building ca. 3 m (10 ft) square or larger might have existed over the cellar. A few small fragments of glass and whiteware were observed scattered down the slope east of the foundation. The pottery was a thin hard ware with a floral design similar to that observed at a dump (25SX291) north of the Niobrara River. The well is located 24 m (78 ft) west-southwest of the southwest corner of the concrete foundation. The well is inconspicuous, marked only by a small-diameter (ca. 20 cm [8 in]) corrugated galvanized pipe, which stands about 15 cm (6 in) above the ground surface. No clear evidence of a well platform or windmill base was observed. A pebble dropped into the pipe takes several seconds to hit water. Wandsnider (1997:138) identifies this site as the Kelly Homestead.

Buried Bone and Paleosols

Because we had located the buried soil with probable bison bones in the north bank in Section 8, we elected to examine similar vertical bank profiles opposite the first spot. We crossed the river at Ranger Residence Road and searched the riverbank from that access road (in Section 9) west to the western boundary fence in Section 8. We observed buried large mammal bones at two locations on the south side of the river and a buried soil layer with charcoal and ash at one location. However, as with the buried bone on the north side of the river, none of the locations revealed clear indications of artifacts, features, or other human associations. Near 25SX269 we located the astragalus and a fragment of an unidentified element from a large mammal such as a bison. The bone was buried about 1 m (3 ft) below the current surface and located at the base of or just below a dark gray soil band. About 90 m (300 ft) to the west we observed an area with many fine soil strata that dipped sharply from the west-northwest toward the southeast. Included in one of these strata were small amounts of charcoal and ash. Near 25SX265 we observed bone on three sides of a broad remnant of a high terrace. The bone was greatly weathered but appeared to be from a large mammal and occurred in the bank and on the eroded slope 1 to 1.5 m (3 to 5 ft) below the surface. These observations support Marvin Kay's (1975) recommendation that paleoenvironmental studies ought to be undertaken at 25SX162 and Caven Clark's (1993:29) recognition that such studies would likely aid in the interpretation of human activities in this portion of the Niobrara River valley.

Conclusions

During a three-week 1996 field season, the Midwest Archeological Center crew surveyed all accessible government-owned land north of the Niobrara River within Agate Fossil Beds National Monument. The area was walked with intervals of 10 m (33 ft) between crew members. Exceptions include the heavily vegetated portions of the Niobrara River floodplain (generally below the 4400-foot contour interval) and small water-filled depressions near the Daemonelix Trail parking lot. Although vegetation is heavy across most of the monument, in these areas it is literally impossible to see the ground surface and animal burrowing is not evident. For consistency, all possible surfaces were walked including the steep talus slopes around the small bluffs or buttes and the bluff tops. Outside the floodplain, vegetation ranges from heavy on the river terraces to moderate on the higher slopes and almost nonexistent on the more exposed portions of the flat-topped limestone bluffs. Just above the marshy zone, vegetation remains fairly dense, but the dirt thrown up by burrowing animals provides uncontrolled samples of the subsurface strata, including some of those which contain artifacts.

Additional pedestrian survey would likely result in the detection of a few additional lithic scatters or modify our present understanding of the boundaries of others. The potential for the discovery of additional sites on the bluff tops is minimal since surface visibility is good, soil development is minimal, and these areas were thoroughly searched during the three years of the SAIP program and were probably covered twice before.

The inventory of sites in the moderately vegetated side valleys and main terraces is much more problematic. The same parameters that caused Kay to predict that some sites had probably not been detected in 1975 still pertain today. Ground visibility in low-lying areas is often poor. The presence of a substantial thatch of dead vegetation greatly limits the ability of surveyors to see the ground surface on all landforms except the highest points and steep slopes. Additional survey is unlikely to be very rewarding unless it can be coordinated with periods when grass fires allow a nearly unobstructed view of the surface. The side valleys are away from the development zone and have had neither the frequency of scrutiny nor the benefit of test excavation. In addition, they are removed from the region's principal resource, the Niobrara River, and would seem to have less potential for sites.

The area adjacent to River Road has been subject to the closest scrutiny and the most testing. The impression is that in the area near the road, prehistoric remains consist of one or a few large lithic scatters, punctuated by areas of higher and lower concentration of surface artifacts. Although this area has been the focus of almost all of the excavation within the monument and within a 60 km (37 mi) radius, the extent of the excavations is still very limited. Features such as pits and hearths are scarce, datable material is even scarcer, and test excavations have revealed that most surface artifacts appear to be displaced from a moderately thick near-surface buried soil which typically lacks internal stratigraphy. Artifact density is moderate to low and direct association between finds has been difficult to establish.

The 1996 survey completed specific elements of Agate Fossil Beds National Monument's resource inventory, but did little to expand upon the existing regional culture history. We observed no artifacts that would suggest Paleoindian use of the area. At least two of the artifacts observed suggest Archaic period use, while other small bifaces observed would be expected in the later Plains Village assemblages. No prehistoric pottery was observed. The stone materials observed in both patterned artifacts and waste debris are consistent with the broad pattern identified by Clark (1993), Butler (1994), and Wandsnider and MacDonell (1997). Hartville Uplift Chert was the most common material observed. Cloverly Quartzite and the local Moss Agate were about equally represented and less common than Hartville Uplift Chert. However, Cloverly Quartzite was commonly seen in whole and fragmentary tools while Moss Agate was most often seen as unmodified flakes. Moss Agate dominated the inventory at only one site (25SX295) and no tools were observed there. Other stone materials were either not identified by source or were in such low frequency as to limit interpretation.

Material remains indicate that people who depended on stone resources from eastern Wyoming made the most widespread and presumably most frequent use of this portion of the Niobrara Valley. Butler (1994:33–34) notes the lack of similarity in raw material types between the Agate Fossil Bed assemblages and assemblages recovered during the Norden project a short distance to the northeast. Given the scant chronometric data and the lack of stratigraphy in the sites tested to date, the assemblages do little to facilitate testing different models of resource acquisition, distribution, and consumption. Site function of the numerous lithic scatters is also highly speculative at this time. The paucity of pottery and residential features (e.g., house pits, tipi rings, prepared hearths and storage pits) and the lack of well-defined stratigraphy give the impression that occupation episodes were brief during all time periods. It is appropriate to repeat that no testing was conducted in 1996 and the sum of all the excavation within Agate Fossil Beds National Monument is only a few dozen square meters.

While the lack of significant excavation or site testing data precludes definitive statements regarding the prehistoric occupation of the monument, research in eastern Wyoming has demonstrated a similar distribution of lithic scatters and opportunistic stone source acquisition sites (Connor 1993, 1998; Butler 1986; Tetra Tech 1987; Reher 1971). Most lithic scatter sites in eastern Wyoming are of the same ephemeral nature, limited numbers of artifacts, shallow deposition, and limited stratigraphic development. Nevertheless those sites and the Agate Fossil Beds sites indicate long and continuous human occupation. The sites appear to represent limited periods of occupation as part of a seasonal round of hunting and gathering similar to that practiced by the later horse nomads of historic Indian groups using the vast expanse of the Great Plains during the nineteenth century. Some sites may have been occupied only once, and others several times over the millennia.

Rock cairns have been more difficult to understand than lithic scatters. Kay (1975:31–33) notes that these small features have been variously interpreted as constructions built for game drives, during vision quests, and as trail markers. He and Holen visited similar sites on private lands and were shown a much larger cairn (ca. 3 m [10 ft] high), which he attributed to historic sheepherders. Kay concluded that the small cairns in Agate Fossil Beds National Monument were of aboriginal construction and are probably late prehistoric or historic in age.

Volf (1997) describes the cairns located south of the Niobrara River during the 1994 season. He, too, summarizes the literature suggesting functions of cairns in the Great Plains. Volf also notes the paucity of artifacts in and near the cairns and speculates that some of the rock piles may be natural products of erosion. He further suggestes that some may have been created during geologic mapping of the valley. Richard Jensen (1973:177, 220–221) reports the investigation of a small rock pile in the Lodgepole Creek valley south of the North Platte River in the Nebraska panhandle. This site, 25CN44, is a small pile of limestone slabs under which was discovered a small irregular pit. Jensen cites a reference by Thomas B. Kehoe to fasting or vision quest sites on the Blackfoot reservation in Montana. However, he notes that existing descriptions of fasting sites do not include pits. Interestingly, the caption for the plate illustrating 25CN44 describes it as an eagle trap site. Although not elaborated on in the text, the reference is probably to features such as those described in Gilbert Wilson's (1928) monograph on Hidatsa eagle trapping. Cairns within Agate Fossil Beds have not been excavated, and Jensen's excavation of 25CN44 is the only one reported from the vicinity of the monument. The interpretion of cairns, as with other aspects of the prehistory of Agate Fossil Beds National Monument, is handicapped by a limited view of a small segment of the Niobrara River valley and virtually none of the extensive adjacent tablelands.

No sites located in 1996 are in particular danger of damage, and no immediate action is required of resource managers. The sites discovered in 1996 are not subject to erosion or regular vehicular traffic and are not in zones with active development. The historic trash deposit at 25SX291 might become the target of antiquarian collectors, but complete or collectible objects were not visible on the surface. The site is not conspicuous, and the vicinity is easily monitored from Highway 29 and from River Road near the Daemonelix Trail parking lot. The other sites located in 1996 are inconspicuous and not apt to receive much visitor impact. They are not particularly close to trails or public use areas.

The five sites recorded in 1996 could be expected to qualify, if nominated individually, for inclusion in the National Register of Historic Places under Criterion D, which concerns the potential to yield information important to history or prehistory. However, given the poorly defined spatial limits that can be assigned to most of the individual Agate Fossil Beds sites, in part due to the absence of site testing, it seems more appropriate to recommend that the sites be considered as contributing resources as part of a larger National Register District. Such a district could be defined from the earlier inventory and site testing work of Clark (1993, 1994) and the inventory work reported by Kay (1975), as well as the identification of non-continuous non-site areas in the monument by Wandsnider et al. (1997).

A National Register District might be predicated on the general concept that the prehistoric occupation of northwestern Nebraska is reflected in the archeological resources of Agate Fossil Beds National Monument. That occupation exhibits a mixture of stability and change through time, although the evidence indicates that past human activities throughout the monument were related to seasonal and transhumant patterns of resource use. The sites that reflect this seasonal round of resource use and exploitation as part of a mobile hunter-gatherer adaptation are extremely important for understanding past human relationships with the environment. An understanding of this interactive relationship is important not only for understanding the past but also for developing a greater appreciation of how the inhabitants of present-day northwestern Nebraska interact and are affected by the environment today.

References Cited

Anderson, A.

1973 Memorandum to the Chief, Midwest Archeological Center, from Archeologist, Midwest Archeological Center, October 30. Subject: Trip report and archaeological assessment, BADL, MORU, DETO, WICA, JECA, AGFO, SCBL, CHRO. On file, National Park Service, Midwest Archeological Center, Lincoln.

Butler, T.

1994 Appendix A: Lithic Analysis of Surface Materials at 25SX163. In *Archeological Investigations on Marsland Road, Agate Fossil Beds National Monument, Sioux County, Nebraska*, by Caven Clark, pp. 29–43. Technical Report No. 31. National Park Service, Midwest Archeological Center, Lincoln.

Butler, W. B.

1986 *Taxonomy in Northeastern Colorado Prehistory*. Ph. D. dissertation, Department of Anthropology, University of Missouri, Columbia.

Champe, J. L.

1946 *Ash Hollow Cave*. University of Nebraska Studies (n.s.) No. 1. Lincoln.

Clark, C. P.

1993 *Archeological Survey and Testing at Agate Fossil Beds National Monument, Sioux County, Nebraska*. Technical Report No. 22. National Park Service, Midwest Archeological Center, Lincoln.

1994 *Archeological Investigations on Marsland Road, Agate Fossil Beds National Monument, Sioux County, Nebraska*. Technical Report No. 31. National Park Service, Midwest Archeological Center, Lincoln.

Cockrell, R.

1986 *Bones of Agate — An Administrative History of Agate Fossil Beds National Monument, Nebraska*. National Park Service, Midwest Regional Office, Omaha, Nebraska.

Connor, M. A.

1993 *1991 Test Excavations at 48LA277: A Plains Woodland Site on Crow Creek, Wyoming*. National Park Service, Midwest Archeolgical Center, Lincoln.

1998 *Investigations in the Mountain-Plains Transition Zone: 1992 Archeological Field Work at Warren Airforce Base, Wyoming*. Technical Report No. 52. National Park Service, Midwest Archeolgical Center, Lincoln.

Cook, H. J.

1925 Definite Evidence of Human Artifacts in the American Pleistocene. *Science* 62(1612):450–460.

1926 The Antiquity of Man in America. *Scientific American* (November):334–336.

1927 New Geological and Paleontological Evidence Bearing on the Antiquity of Mankind in America. *Natural History* 28:240–274.

1968 *Tales of the 0 4 Ranch*. University of Nebraska Press, Linclon.

Cook, J. H.

1923 *Fifty Years on the Old Frontier*. Yale University Press, New Haven.

Cook, J. H., and H. R. Driggs

1942 *Longhorn Cowboy*. G. P. Putnam's Sons, New York.

Culpin, C.

1976 *Farm Machinery*. Granada Publishing, Toronto.

Davidson, J. B.
1931 *Agricultural Machinery*. J. Wiley and Sons, London.

Frison, G. C.
1991 *Prehistoric Hunters of the High Plains*. Second Edition. Academic Press Inc., San Diego.

1998 The Northwestern and Northern Plains Archaic. In *Archaeology on the Great Plains*, edited by W. R. Wood, pp. 140–172. University Press of Kansas, Lawrence.

Frison, G. C., and R. C. Mainfort (editors)
1996 *Archeological and Bioarcheological Resources of the Northern Plains: A Volume in the Central and Northern Plains Archeological Overview*. Research Series No. 47. Arkansas Archeolgical Survey, Fayetteville.

Gunnerson, J. H.
1987 *Archaeology of the High Plains*. Cultural Resource Series No. 19. Bureau of Land Management, Denver.

Hoffman, J. L. (editor)
1996 *Archeology and Paleoecology of the Central Great Plains: A Volume in the Central and Northern Plains Archeological Overview*. Research Series No. 48. Arkansas Archeolgical Survey, Fayetteville.

Hoffman, J. L., R. L. Brooks, J. S. Hays, D. W. Owsley, R. L. Jantz, M. K. Marks, and M. H. Manheim
1989 F*rom Clovis to Comanchero: Archeological Overview of the Southern Great Plains*. Research Series No. 35. Arkansas Archeological Survey, Fayetteville.

Hoffman, J. L., and R. W. Graham
1998 The Paleo-Indian Cultures of the Great Plains. In *Archaeology on the Great Plains*, edited by W. R. Wood, pp. 87–139. University Press of Kansas, Lawrence.

Howard, E. B.
1943 The Finley Site: Discovery of Yuma Points, in Situ, near Eden, Wyoming. *American Antiquity* 7:224–234.

Hunt, R. M., Jr.
1984 The Agate Hills History of Paleontological Excavations, 1904 – 1925. Manuscript prepared for the Midwest Region, National Park Service, Omaha.

Hunt, W.
1990 Memorandum to Regional Archeologist, Midwest Region, from Supervisory Archeologist, Midwest Archeological Center, July 11. Subject: Archeological monitoring of Scotts Bluff parking lot removal; documentation of site at Agate Fossil Beds; comments regarding 25SX163 and future construction of new Visitor Center. On file, National Park Service, Midwest Archeological Center and Scotts Bluff National Monument.

Jensen, R. E.
1973 A Preliminary Report on the Point of Rocks Archeological Survey, 1971. *Publications in Anthropology* 5:159–240. Nebraska State Historical Society, Lincoln.

Jones, O., and C. Sullivan
1985 *The Parks Canada Glass Glossary for the Description of Containers, Tableware, Flat Glass, and Closures*. Parks Canada, National Historic Parks and Sites Branch, Ottawa.

Kay, M.
1975 Archeological Surveys in Scotts Bluff and Agate Fossil Beds National Monuments, Nebraska. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

1998 The Great Plains Setting. In *Archaeology on the Great Plains*, edited by W. R. Wood, pp. 16–47. University Press of Kansas, Lawrence.

Meade, D. C.
1990 *The Story of Agate Springs Ranch*. Business Farmer Printing, Scottsbluff, Nebraska.

1994 *Heart Bags & Hand Shakes: The Story of the Cook Collection*. National Woodlands Publishing Co., Lake Ann, Michigan.

Metcalf, M. D.
1987 Contributions to the Prehistoric Chronology of the Wyoming Basin. In *Perspectives on Archaeological Resource Management in the Great Plains*, edited by Alan J. Osborn and Robert C. Hassler, pp. 233–261. I and O Publishing, Omaha, Nebraska.

Miller, R.
1992 Agate Fossil Beds National Monument and the Cook Collection — An Original High Plains History. *CRM Bulletin* 15(1):8–11.

Moore, J. W.
1966 Excavations at Agate Fossil Beds. Manuscript and trip report on file, National Park Service, Midwest Archeological Center, Lincoln.

Mulloy, W.
1958 *A Preliminary Historical Outline for the Northwestern Plains*. University of Wyoming Publications (22)1.

National Park Service
1980 *Agate Fossil Beds*. Handbook 107. Division of Publications, National Park Service, Washington, D. C.

Olinger, D. E.
1980 *Agate Fossil Beds National Monument: Archeological Investigations at Site 25SX163*. Occasional Studies in Anthropology No. 6. National Park Service, Midwest Archeological Center, Lincoln.

Owsley, D. W., and J. C. Rose (editors)
1997 *Bioarcheology of the North Central United States: A Volume in the Central and Northern Plains Archeological Overview*. Research Series No. 49. Arkansas Archeological Survey, Fayetteville.

Partridge, M.
1973 *Farm Tools Through the Ages*. New York Graphic Society Ltd., Boston.

Reher, C. A.
1971 *A Survey of Ceramic Sites in Southeastern Wyoming*. Master's thesis, Department of Anthropology, University of Wyoming, Laramie.

Strong, W. D.
1935 *An Introduction to Nebraska Archeology*. Smithsonian Miscellaneous Collections (93)10. Smithsonian Institution, Washington, D. C.

Stubbendieck, J., and G. Willson
1986 *An Identification of Prairie in National Park Units in the Great Plains*. National Park Service Occasional Paper No. 7. National Park Service, Washington, D. C.

Tetra Tech, Inc.
1987 *Southeastern Wyoming Prehistory, Volume I*. Peacekeeper Program Cultural Resources Technical Report No. 3. Tetra Tech, Inc., San Bernardino, California.

Toulouse, J. H.
1971 *Bottle Makers and Their Marks*. Thomas Nelson Inc., New York.

Volf, W.
1997 Appendix E: Cairn Description. In *Agate Fossil Beds Prehistoric Archaeological Landscapes, 1994–1995*, edited by L. Wandsnider and G. MacDonnell, pp. 127–137. National Park Service, Midwest Archeological Center, Lincoln

Wandsnider, L.
1997 Appendix F: Historic Site and Artifact Summary. In *Agate Fossil Beds Prehistoric Archaeological Landscapes, 1994–1995*, edited by L. Wandsnider and G. MacDonnell, pp. 138–139. National Park Service, Midwest Archeological Center, Lincoln.

Wandsnider, L., and G. MacDonell (editors)
1997 *Agate Fossil Beds Prehistoric Archaeological Landscapes, 1994–1995*. National Park Service, Midwest Archeological Center, Lincoln.

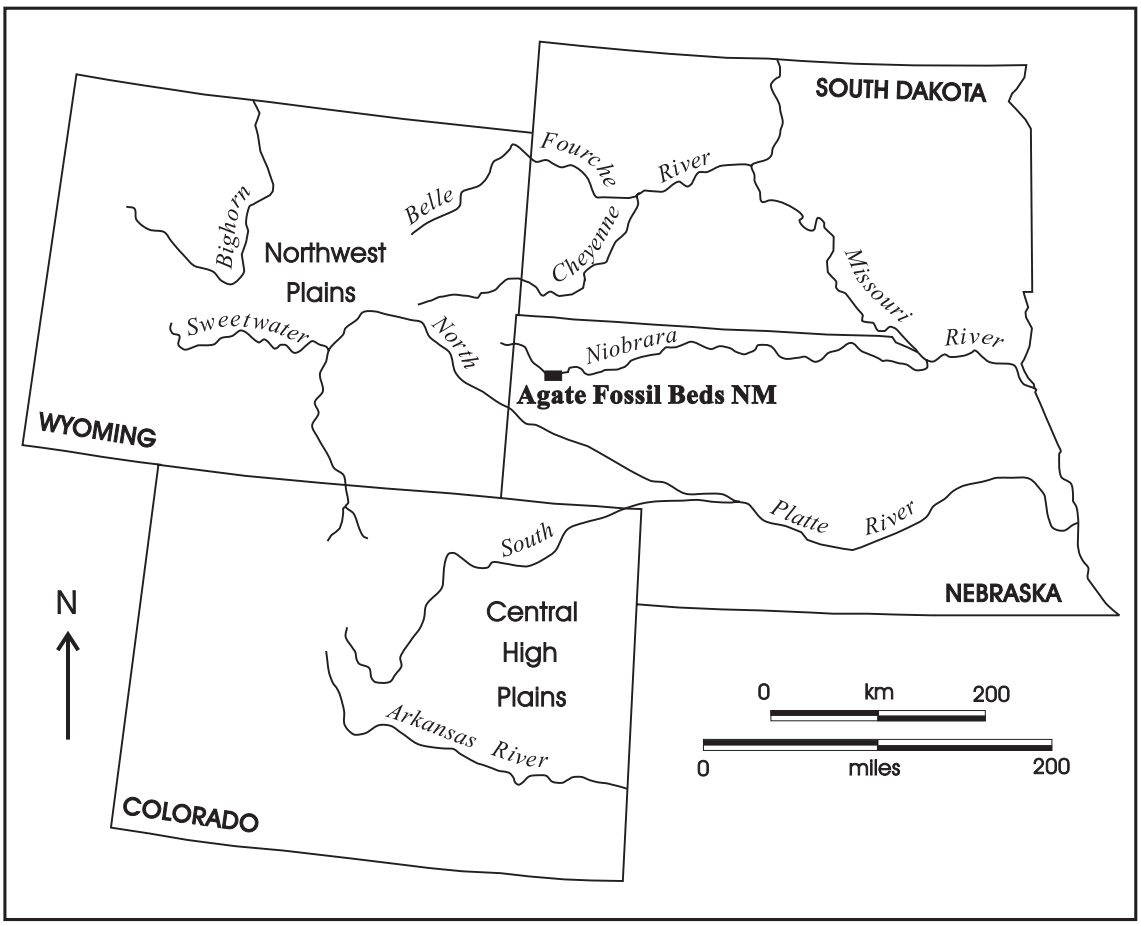
Wandsnider, L., G. MacDonell, and J. Galindo
1997 Field Methods and Results. In *Agate Fossil Beds Prehistoric Archaeological Landscapes, 1994–1995*, edited by L. Wandsnider and G. MacDonnell, pp. 27–58. National Park Service, Midwest Archeological Center, Lincoln

Weaver, J. E.
1965 *Native Vegetation of Nebraska*. University of Nebraska Press, Lincoln.

Wedel, W. R.
1961 *Prehistoric Man on the Great Plains*. University of Oklahoma Press, Norman.

Wilson, G. L.
1928 *Hidatsa Eagle Trapping*. Anthropological Papers 30(4). American Museum of Natural History, New York.

Wood, W. R. (editor)
1998 *Archaeology on the Great Plains*. University Press of Kansas, Lawrence.



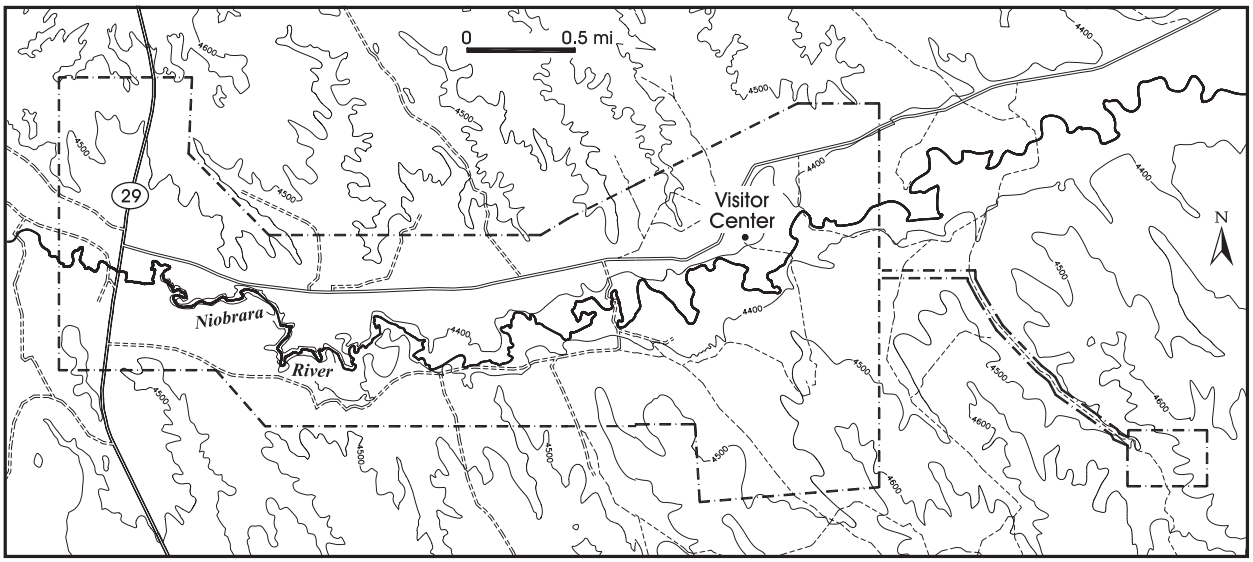


Figure 1. Location and selected features of Agate Fossil Beds National Monument.

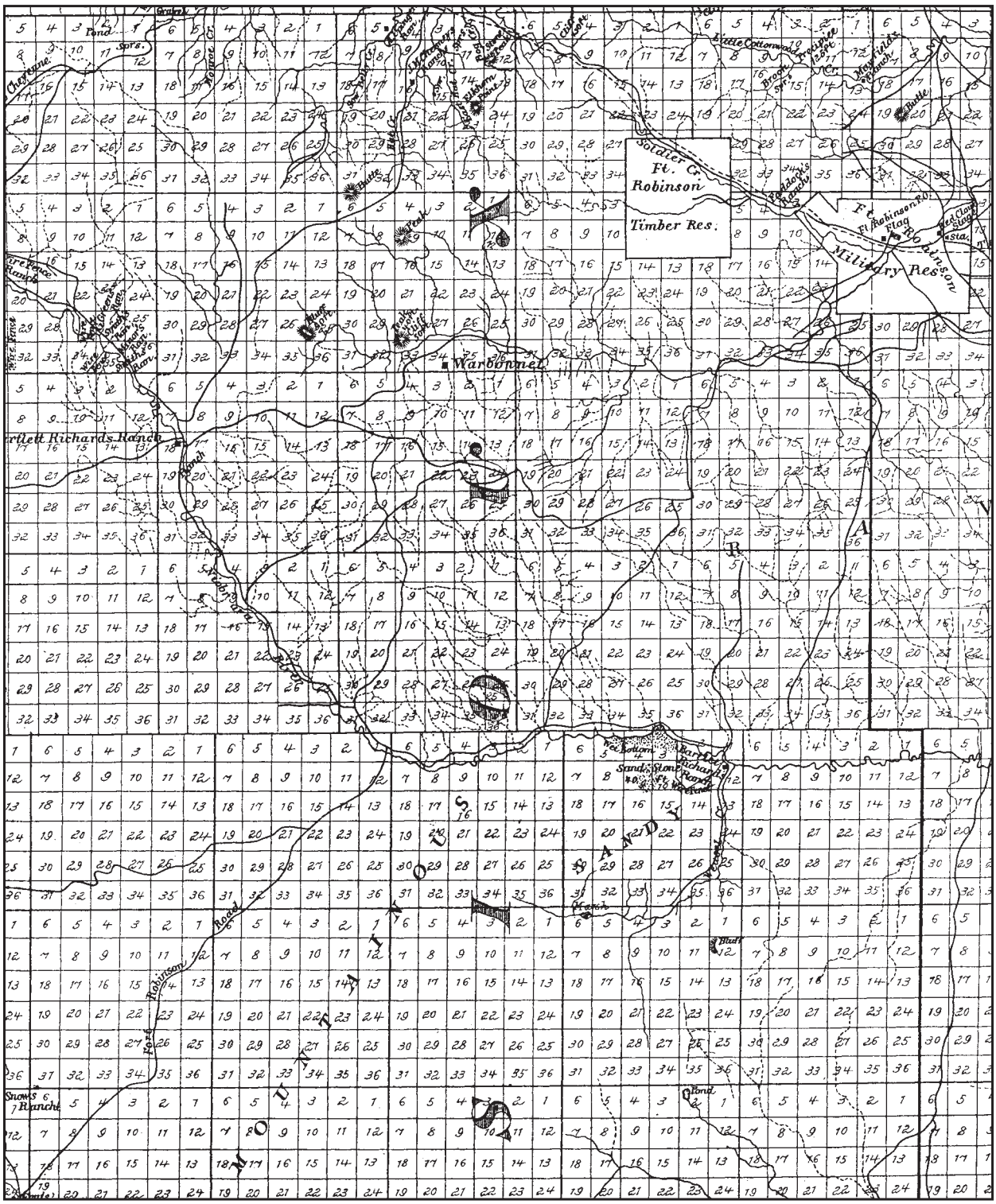


Figure 2. A portion of the 1885 map of Sioux County, Nebraska.

Figure 3. Detailed view of 25SX293, a rock cairn; a 30-cm scale is in the foreground.

Figure 4. General view of 25SX293; a 30-cm scale is in the foreground.

Figure 5. Detailed view of 25SX294 , a rock cairn; a 30-cm scale is in the foreground.

Figure 6. General view of 25SX294.

Figure 7. Overview of marker on 25SX459 with Agate Springs Ranch House in background.

Figure 8. Detailed view of the sickle blade and post marker on 25SX459.

Figure 9. Jar lid recovered from concrete slab at the Bone Cabin, 25SX290, advertising "The Great Gildersleeve" radio program.

UTM Coordinates

Appendix to *The 1996 Archeological Survey at Agate Fossil Beds National Monument*
Midwest Archeological Center Technical Report No. 80, by Robert K. Nickel

Table 1. Comparison of same-location pairs of UTM values.

Date	Instrument	± m	UTM Easting	Change (m)	UTM Northing	Change (m)
Same Instrument, Different Times						
8/15	PLGR	13	603770	—	4696775	—
8/28	PLGR	16	603770	0	4696779	+4
8/15	PLGR	13	603793	—	4696771	—
8/28	PLGR	14	603791	-2	4696779	+8
8/15	PLGR	15	603766	—	4696751	—
8/28	PLGR	12	603762	-4	4696755	+4
8/16	PLGR	87	600806	—	4697489	—
8/27	PLGR	9.5	600798	-8	4697452	-37
Same Time, Different Instruments						
8/26	PLGR	9.6	601744	—	4696665	—
8/26	Garmin	n/a	601768	+24	4696668	+3
8/26	PLGR	16	601685	—	4696694	—
8/26	Garmin	n/a	601675	-10	4696704	+10
8/26	PLGR	14	601319	—	4696380	—
8/26	Garmin	n/a	601318	-1	4696391	+11
8/27	PLGR	9.5	600798	—	4697452	—
8/27	Garmin	n/a	600775	-23	4697472	+20
8/28	PLGR	16	603770	—	4696779	—
8/28	Garmin	n/a	603759	-11	4696741	-38
8/28	PLGR	14	603791	—	4696779	—
8/28	Garmin	n/a	603806	+15	4696757	-22
8/28	PLGR	12	603762	—	4696755	—
8/28	Garmin	n/a	603754	-8	4696762	+7

Table 2. UTM coordinates of archeological sites located in 1996 and assigned site numbers.

Site	Type	UTM Easting	UTM Northing
25SX290	historic trash deposit and lithic scatter	603779	4696756
25SX291	historic trash deposit	599746	4697774
25SX292	lithic scatter	600907	4697249
25SX293	rock cairn	600798	4697452
25SX294	rock cairn	601414	4697450
25SX295	lithic scatter	604176	4698214

Table 3. UTM coordinates of isolated tools (IT) and features located in 1996.

Designation,	Description	Material	UTM Easting	UTM Northing
IT96-1	unifacial scraper	Cloverly Quartzite	600342	4697432
IT96-2	biface fragment	Cloverly Quartzite	600685	4697550
IT96-3	side-notched point fragment	Cloverly Quartzite	602347	4697625
IT96-4	modified flake	Moss Agate	602310	4697520
IT96-5	side-notched point	Knife River Flint	603222	4697501
IT96-6	corner-notched point base	unidentified red chert	601068	4697175
IT96-7	core	Hartville Uplift Chert	600675	4697121
IT96-8	biface	Hartville Uplift Chert	601369	4696921
IT96-10	modified flake	Hartville Uplift Chert	602193	4696904
IT96-11	modified flake	unidentified gray chert	602276	4696865
—	John Franklin Cook Grave, 1941		603993	4696817
—	buried soil with animal bones, whiteware sherd, charcoal		601112	4696747
—	buried soil with animal bones		601744	4696665
—	buried soil with charcoal, ash		601685	4696664
—	buried soil with animal bones		601319	4696380
—	wooden farm implement		601836	4696904
—	sickle-blade monument		599521	4697153