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United States Department of the Interior
National Park Service

National Register of Historic Places
Multiple Property Documentation Form

This form is used for documenting multiple property groups relating to one or several historic contexts. See instructions in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items.

__X_ New Submission ____ Amended Submission

A. Name of Multiple Property Listing

The Woodland Tradition in Minnesota (ca. 1000 B.C. – A.D. 1750)

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

The Brainerd Complex: Early Woodland in Central and Northern Minnesota, 1000 B.C.–A.D. 400
The Southeast Minnesota Early Woodland Complex, 500–200 B.C.
The Havana-Related Complex: Middle Woodland in Central and Eastern Minnesota, 200 B.C.–A.D. 200/300
The Laurel Complex: Middle Woodland in Northern Minnesota, 150 B.C.–A.D. 650
The Fox Lake Complex: Middle Prehistoric in Southwestern Minnesota, 200 B.C.–A.D. 700
The Lake Benton Complex: Late Middle Prehistoric in Southwestern Minnesota, A.D. 700–1200
The Central Minnesota Transitional Woodland Complex: Middle to Late Woodland in Central Minnesota, A.D. 300–1000
The Southeast Minnesota Late Woodland Complex, A.D. 500–1150
The Blackduck-Kathio Complex: Late [Terminal] Woodland in Northern and Central Minnesota, A.D. 600–1100
The Rainy River Late Woodland Complex: Late [Terminal] Woodland in Northern Minnesota, A.D. 1100–1400
The Psinomani Complex: Late [Terminal] Woodland, Protohistoric, and Early Historic in Northern and Central Minnesota, A.D. 1100–1750

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D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. (___ See continuation sheet for additional comments.)

_____

Signature and title of certifying official Barbara Mitchell Howard, Deputy State Historic Preservation Officer Date

Minnesota Historical Society
State or Federal Agency or Tribal government

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

_____ _____

Signature of the Keeper Date of Action

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SECTION E: STATEMENT OF HISTORIC CONTEXTS

The archaeological record of the Woodland tradition in the state of Minnesota spans the time period from 1000 B.C. to A.D.1750 and is presented here as a series of eleven complexes. The Woodland tradition is considered to include components that have pottery but lack intensive maize agriculture, thus distinguishing it from the Archaic tradition that precedes it and the Plains Village, Mississippian, and Oneota complexes that follow or are contemporaneous with the end of the Woodland tradition. Although the geographic boundaries of this Multiple Property Documentation Form (MPDF) correspond to those of the State of Minnesota, the boundaries of individual complexes might either encompass a single region within Minnesota or extend into adjoining regions of Iowa, Wisconsin, North and South Dakota, Manitoba, or Ontario.

Several terms are used here in the sense proposed by Ahler (1993). A *component* is the smallest unit of taxonomic study, and "consists of the remains from a single occupation or series of physically inseparable and stylistically indistinguishable occupations at a single site" (1993:59). The term *complex* (1993:61) refers to:

> *a group of components which lies within a single cultural tradition and which exhibits a common dominant stylistic trait or a common set of recurring, nondominant stylistic traits or other traits, with such traits or trait complexes being sufficiently distinctive to distinguish the complex from all other similarly defined units. By dominant traits is meant a single typological group or stylistic variant or attribute state which constitutes the majority of all such occurrences in a component….The actual temporal and spatial limits of a complex are determined by the range exhibited by member components.*

Ahler (1993:61–62) goes on to say that the complex is a higher-level taxonomic unit than a component or phase defined by only a small series of shared stylistic or typological attributes thought to be especially important for differentiating subunits within a tradition. Multiple culturally and ethnically distinct groups of people can be involved in a complex, but they all share a dominant style or other narrow range of material culture. Since a complex is defined without temporal or spatial characteristics, it is less desirable than other types of integrative units. The complex is considered a temporary, provisional unit linking components with dominant stylistic and typological characteristics. With additional study, the complex will be replaced by other taxonomic units in line with Willey and Phillips' (1958) emphasis on time, space, and content.

The use of the complex as a provisional taxonomic unit for Woodland archaeology in Minnesota is thought to be appropriate given the current state of knowledge. Although most if not all complexes in Minnesota can be identified based almost exclusively on ceramic types, their temporal ranges are very provisional, with few closely associated radiocarbon dates that are accepted by the broader archaeological community. Likewise, the geographic distributions of many complexes are ill-defined, with major gaps in spatial data or past problems with identifying ceramic types. Besides these spatial and temporal problems, the range of material culture that can be unequivocally associated with most of the complexes is largely unknown, due to lack of excavations or mixture of components assigned to different complexes.

1 STATEWIDE OVERVIEW

This MPDF first presents general information about Minnesota's environment and resources, the history of archaeological research in Minnesota, the precontact traditions defined for the state, and research themes applicable to all Woodland complexes. Individual complexes then are considered.

1.1 Environment and Physical Setting

Landscape position and environmental setting are especially important in the interpretation of archaeological sites because they are directly related to factors that affected human occupation, such as available resources (including both plants and animals), availability of water, and communication routes and ease of travel. They also relate to site-formation processes and the potential for buried sites.

ECS Provinces and Archaeological Regions

Minnesota's complex, ever-changing biotic and physiographic communities (Ojakangas and Matsch 1982) have been classified and described through a number of different systems, including those based on parameters of the physical and biotic environment, such as the Ecological Classification System (ECS) prepared for Minnesota by the Minnesota Department of Natural Resources (DNR), U.S. Forest Service, and University of Minnesota. Mn/Model, the archaeological predictive model of the Minnesota Department of Transportation (Mn/DOT) (see section 1.2), adopted the ECS as a regionalization scheme of systematically classified "biotic and environmental factors, including climate, geology, topography, soils, hydrology, and vegetation" for modeling archaeological site potential (Gibbon et al. 2005). In Minnesota the ECS lists four provinces, 10 sections, and 26 subsections (Minnesota DNR–Division of Forestry 1999).

Archaeologists have also implemented environmental classification systems to examine the relationships between site locations and environmental variables (e.g., Gibbon et al. 2005; Johnson 1969b; Minnesota Historical Society 1981; Wilford 1941). The Minnesota State Historic Preservation Office (SHPO) uses a framework of nine archaeological regions, originally defined by Anfinson (1990), that are based on the assumption that the physical environment and the distribution of natural resources affect the distribution of precontact sites. Of prime importance in this system are the distributions of lakes, vegetation communities, and mounds. The nine archaeological regions are (1) Southwest Riverine, (2) Prairie Lake, (3) Southeast Riverine, (4) Central Lakes Deciduous, (5) Central Lakes Coniferous, (6) Red River Valley, (7) Northern Bog, (8) Border Lakes, and (9) Lake Superior Shore. Except for 1 and 8, each region is also divided into subsections (east, west, south, north, or central). The following summarizes the ECS provinces and sections and the corresponding SHPO regions. Figure 1 shows the counties in Minnesota. Figure 2 shows the ECS subsections and SHPO archaeological regions.

Laurentian Mixed Forest Province

This province covers central and northeastern Minnesota and extends into Ontario, Wisconsin, and Michigan, and east to New England. In Minnesota, the province includes conifer forests, mixed hardwood and conifer forests, and conifer bogs and swamps. The landscape in this province was shaped by glacial action and ranges from areas of thin glacial drift with many lakes, to hummocky or undulating areas with deep glacial drift, to large flat areas that are poorly drained and include peatlands. The climate varies from relatively warm and dry in the southwestern part of the province to cooler and moister in the northeast. This province includes five sections and fourteen subsections:

Northern Superior Uplands section. In the northeast, this section coincides with the Canadian Shield, an area where glaciers removed most of the sediments, leaving bedrock covered with thin, patchy areas of coarse loamy till, outwash plains, glacial moraines, many lakes, and occasional bedrock outcrops. The rugged terrain reflects the nature of the underlying bedrock. Vegetation consists of fire-dependent forests that in precontact times included a mixed conifer-hardwood forest of red and white pine with aspen, paper birch, spruce, and balsam fir. Pollen and charcoal records indicate that the importance of fires in maintaining the native vegetation extended well into the past. Peatlands and wet forests were found as patches within the forests. Windthrows are significant sources of disturbance in this region.

This section has five subsections: The *Border Lakes* subsection borders Ontario and includes portions of the Superior National Forest. It has over 300 lakes and portions of several rivers, including the Vermilion and the Sioux. The *Laurentian Uplands* subsection consists of coniferous- and deciduous-forest till plains, outwash plains, and peatlands with rolling topography. These two subsections generally correspond to SHPO region 8 (Border Lakes), distinctive for its numerous lakes in bedrock, as compared to glacial till elsewhere. Two other subsections, the *Nashwauk Uplands* and *Toimi Uplands,* fall within SHPO region 5 (Central Lakes Coniferous), which is characterized by many lakes, often deep, and river systems that include the Mississippi and St. Croix. The final ECS subsection, *North Shore Highlands,* follows a moraine along Lake Superior, with a lake-moderated microclimate that supported sugar-maple forests with white pine, yellow birch, and white cedar; this subsection overlaps SHPO region 9 (Lake Superior) as well as the eastern edge of region 5.

Northern Minnesota and Ontario Peatlands section. This section is flat and poorly drained. About half consists of clayey deposits formed by Glacial Lake Agassiz; other areas have uplands of glacial till eroded by Glacial Lake

Agassiz and shoreline beach ridges that supported mesic and wet-mesic forests, including aspen-birch forests that became dominated by conifers. In the east were forests of white, red, and jack pine, with lowlands occupied by sedge fens, bogs, and swamps, as well as areas of fire-dependent jack pine or red pine forests. This section has two subsections, both of which are generally included within SHPO region 7 (Northern Bog). The *Agassiz Lowlands* subsection contains the peatlands-dominated portion of the Glacial Lake Agassiz plain. This flat, poorly drained plain is the location of the Big Fork and Rainy Rivers as well as three major lakes: Lower Red Lake, Upper Red Lake, and Lake of the Woods. The *Littlefork Vermillion Uplands* subsection is a level to gently rolling lake plain that forms a transitional area between peatlands to the west and bedrock-controlled landscape to the east. There are a number of meandering rivers, including the Littlefork, Vermilion, Ash, Blackduck, and Rainy Rivers, and a few lakes, including Vermilion Lake, Pelican Lake, and Net Lake.

Northern Minnesota Drift and Lake Plains section. This section covers the central part of northern Minnesota and has four subsections. The west half has two large subsections (*Chippewa Plains*, and *Pine Moraines and Outwash Plains*) with deep glacial deposits and vegetation that reflects the patchy distribution of landforms. Precontact vegetation included conifers such as white and red pine with jack pine barrens, and also hardwoods, notably aspen-birch, sugar maple, basswood, northern red oak, and bur oak. The Chippewa Plains subsection, between Leech Lake to the south and Glacial Lake Agassiz to the north, has two major lakes, Leech Lake and Cass Lake, as well as the Mississippi River and a reservoir along the river, Lake Winnibigoshish. This subsection is included in SHPO region 5 (Central Lakes Coniferous). The Pine Moraines and Outwash Plains subsection includes the headwaters of the Mississippi River in Itasca Lake, along with the Pine and Crow Wing Rivers. It is included in SHPO regions 5 (Central Lakes Coniferous) and 4 (Central Lakes Deciduous).

In contrast, the eastern half of the Northern Minnesota Drift and Lake Plains section has deposits from Glacial Lakes Upham and Aitkin, with peatland communities. Sedge meadows, alder, and willow swamps line streams that drain the flat plain and border the Mississippi and Leech Lake Rivers. The two subsections in this area are both included within SHPO region 5 (Central Lakes Coniferous). The *St. Louis Moraines* subsection is an irregular strip with rolling to steep slopes and northern hardwood to mixed hardwood-conifer forest. The Mississippi River crosses this subsection, which also has numerous lakes in a poorly developed drainage network. By contrast, there are few lakes in the *Tamarack Lowlands* subsection, which covers a glacial lake and till plain. The Mississippi, St. Louis, Whiteface, East Swan, Savannah, and Willow Rivers drain this latter landscape.

Western Superior Uplands section. This section has only one subsection, the *Mille Lacs Uplands*, which is included in two SHPO regions: the eastern portion is in SHPO region 5 (Central Lakes Coniferous), and the western half is in region 4 (Central Lakes Deciduous). The major lake is Mille Lacs, though there are more than a hundred other lakes, mostly on end moraines, and the St. Croix, Kettle, Snake, Rum, and Ripple Rivers drain the area in a young drainage network, with sandy terraces along the St. Croix River. Upland hardwood forests and mixed conifer-hardwood forests were common before Euro-American settlement, with areas of peatland.

Southern Superior Uplands section. This section lies along the south shore of Lake Superior, with only a small portion in Minnesota. The surface deposits are level to gently rolling and consist of clayey sediments deposited by Glacial Lake Duluth, and the area is highly dissected by the Nemadji River. Higher flat lands between ravines have poorly drained remnants of the lake bed. This Minnesota portion of the section includes two subsections. The tiny *Glacial Lake Superior Plain* subsection lies in the basin of Glacial Lake Superior. Spruce, white pine, and aspen-birch forests lined the well-developed drainage systems in precontact times, and there are no natural lakes. This subsection forms the southern end of SHPO region 9 (Lake Superior). The *St. Croix Moraine and Outwash Plains* subsection includes steep bluffs and bedrock exposed along the St. Croix River and the well-developed floodplain along the Mississippi River. Prior to Euro-American settlement, vegetation included a mosaic of oak openings, prairie, and Big Woods (sugar maple, basswood, and elm) communities, with conifer bogs and swamps; river-bottom forests were found along the Mississippi. This subsection lies in SHPO region 4 (Central Lakes Deciduous).

Tallgrass Aspen Parklands Province

This province covers northwestern Minnesota and extends into Manitoba, Saskatchewan, and Alberta. In Minnesota, it forms an ecotone between the prairie and mixed conifer-hardwood forests and lies between the Laurentian Mixed

Forest and Prairie Parklands provinces. The Minnesota portion of this province has only one section, the Lake Agassiz, Aspen Parklands, and only one subsection, the *Aspen Parklands*, which is included in SHPO region 6 (Red River Valley). This landform is the Glacial Lake Agassiz basin, consisting of sandy beach ridges, loamy till, sandy deposits from the shallow parts of the lake, and clay and silt deposited in the deeper parts of the lake. Evapotranspiration in this region is greater than precipitation, and the low precipitation and winds from the Great Plains promote spring fires and stress trees and shrubs. In precontact times, differential moisture and fire frequency led to the formation of a mosaic of prairies, brushland, aspen savanna, and forests, with wet prairies, meadows, fens, and wet forests in the wetlands, and mesic hardwood forests and floodplain forest communities only in areas well protected from fire. The Roseau River is the major river in an undeveloped drainage network with meandering streams that flood regularly. Lakes are rare.

Prairie Parkland Province

This province covers the southwestern quarter of Minnesota and extends into Manitoba, North and South Dakota, Iowa, and farther west and south. It represents the eastern edge of the prairies that once dominated the central part of the continent. The climate is drier than in the eastern part of the state, with evapotranspiration in most of this region being greater than precipitation; the low precipitation and dry westerly winds promoted fires in precontact times that encouraged prairie grasses over forests. There are only small areas of marshes, wetland prairie, and wet meadows. The more rugged terrain supports a mosaic of prairie and forests. This area was covered by ice sheets several times, leaving thick mantles of drift. The northern portion has deep-water sediments left by Glacial Lake Agassiz. Glacial river Warren drained through the southern half of the province and cut the valley now occupied by the Minnesota River. The only bedrock outcroppings are in some deep cuts in the Minnesota River, and some resistant quartzite outcroppings in the southwest corner. This province comprises two sections:

North Central Glaciated Plains section. This section lies in the southwest corner of the state and has level to rolling calcareous till bisected by the Minnesota River valley. It has three subsections. The *Minnesota River Prairie* and *Coteau Moraines* subsections fall largely within SHPO archaeological region 2 (Prairie Lakes). The *Inner Coteau* subsection corresponds to SHPO region 1 (Southwest Riverine).

The Minnesota River Prairie, the easternmost subsection, contains the deeply dissected Minnesota River valley and more than 150 lakes, as well as wetlands that have been drained. In precontact times, prairie vegetation was dominant, with patches of wet prairie and forests of silver maple, elm, cottonwood, and willow on floodplains. Postcontact suppression of natural fires has led to the development of woodlands in areas that formerly had oak openings or brush prairies. This area is heavily farmed today.

To the west lies the Coteau Moraines, one of two subsections that are part of the Coteau, a high landform created by thick pre-Wisconsin glacial drift. The Coteau Moraines is in an area of shallow loess over glacial till and moraines, producing a landscape that varies from gently to steeply rolling and hilly. Precontact vegetation was prairie, with some river-bottom forests. The area has few lakes, and a moderately well-developed drainage network. Major rivers include the Lac Qui Parle, Yellow Medicine, and Redwood.

The Inner Coteau subsection, in the far southwest corner of the state, is the highest part of the Coteau complex in Minnesota. The land has a thick layer of glacial till and highly dissected moraines with a thick cap of loess. The bedrock is visible in only a few places, most notably in the Pipestone County outcrops of pipestone and Upper Precambrian quartzite. This subsection drains primarily into the Missouri River system. It has few lakes and a well-formed dendritic drainage network due to the easily eroded loess. Tallgrass prairie once dominated the landscape, with some areas of wet prairie, and limited forests along streams such as the Rock and Redwood Rivers. The area is extensively farmed today.

Red River Valley section. This section has only one subsection, the *Red River Prairie* subsection, which is generally included in SHPO region 6 (Red River Valley). This area is the northern part of the Prairie Parkland province and is dominated by the deep-water basin of Glacial Lake Agassiz. This flat, poorly drained plain has low beach ridges and wave-cut scarps that mark the former shorelines of the lake. The Red River and its tributaries flow in shallow valleys. The area is described as the flattest, driest, most fire-prone region of Minnesota, and in precontact times, it was

covered with tall-grass prairie and wetland prairie systems, with fire-dependent forests, mesic hardwood forests, wet forests, and floodplain forests occurring only in the deepest river valleys and protected areas. Drainage systems are poorly developed and flooding is common, creating the potential for stratified buried sites. The few lakes are shallow and often perched.

Eastern Broadleaf Forest

This province occupies the southeastern corner of the state and extends diagonally to the northwest, up the Mississippi River valley between the Prairie Parkland and Laurentian Mixed Forest provinces into central Minnesota. Outside Minnesota, it extends east and south down to Missouri and Arkansas. It is described as an ecotone between the semiarid prairies and the semihumid mixed conifer-deciduous forests. The western boundary with the prairies is sharply defined, but the eastern boundary is more gradual and diffuse. The land surface of much of the province was shaped by glacial action, with thick Wisconsin-age drift, and glacial lakes that drained to cut the Minnesota, St. Croix, and lower Mississippi Valleys. The southeast corner of the province was not covered by ice during the last glaciation, and this "Driftless Area" shows more rugged topography, with deeply dissected streams, bedrock exposures, and areas of pre-Wisconsin drift. The draining of the glacial lakes provided a source of loess that covered the southeast part of the province. Climatically, precipitation is approximately equal to evapotranspiration. This province has two sections:

Minnesota and Northeast Iowa Morainal section. This is the larger of the two sections and lies as a band of forest and prairie mosaic bordering the Prairie Parkland province. The area consists of moraines, till, sand plains, and drumlins. The five subsections reflect combinations of landform and substrate, and the associated precontact vegetation showed the differential effects of fire, or its absence in protected areas, with a mosaic of maple-basswood forests and oak savanna, tallgrass prairies, and oak forests, with the forests occurring in more fire-protected areas. Major rivers include the Mississippi, Minnesota, and St. Croix, each of which has floodplain and terrace forests, with silver maple on the active floodplains and silver maple, cottonwood, box elder, green ash, and elm on the terraces. There are intermittent wetlands but few peatlands. This section has five subsections. The *Hardwood Hills*, *Anoka Sand Plain*, and *St. Paul–Baldwin Plains and Moraines* subsections generally are included in SHPO archaeological region 4 (Central Lakes Deciduous). The *Big Woods* subsection is included in two SHPO regions: region 4 (Central Lakes Deciduous) and region 2 (Prairie Lakes). The *Oak Savanna* subsection is split between SHPO regions 2 (Prairie Lake) and 3 (Southeast Riverine).

The Hardwood Hills subsection is characterized by rugged topography with steep hills and numerous lakes in glacial end moraines and outwash plains. The Alexandria Moraine is the location of the headwaters of many rivers and streams, including the Chippewa, Long Prairie, Sauk, and Crow Wing Rivers. The continental divide splits the province, with waters to the north flowing to Hudson Bay, and waters to the south flowing into the Mississippi River.

The Anoka Sand Plain subsection includes a flat to gently rolling sandy lake plain and terraces along the Mississippi River. The St. Paul-Baldwin Plains and Moraines subsection includes part of the Twin Cities metropolitan area and consists of an end moraine and outwash plain of the Superior Lobe, with Mississippi River terraces on the west separating it from the Anoka Sand Plain. The Big Woods subsection was a large area of deciduous forests at the time of Euro-American settlement, including northern red oak, sugar maple, basswood, and American elm. The Minnesota River runs through this subsection, as do the Crow River and tributaries. Fire was less common here than in the prairies to the west. The Big Woods expanded about 300 years ago as a result of a decrease in fire frequency, which was in turn probably a product of cooler, moister climatic conditions during the "Little Ice Age." The Oak Savanna subsection is a rolling plain of loess-covered moraine ridges and sandstone and carbonate bedrock. There are a few lakes in the moraines, but otherwise the drainage network is well developed. The gently rolling topography does not block fires, resulting in oak openings with some areas of prairie or maple-basswood forest, depending on fire exposure

Paleozoic Plateau section. This region is part of an old plateau and forms a gently rolling glacial till plain covered by loess in the east and by pre-Wisconsin age till in the central and western portions. As the till thins to the east, the topography becomes controlled by bedrock, with exposures of Ordovician dolomite, limestone, and sandstone, and with Cambrian sandstone, shale, and dolomite along the Mississippi Valley walls. These bedrock outcroppings include sources of chert and orthoquartzite used by Native peoples. The southwestern portion has sinkholes but few

lakes. Major rivers include the headwaters of the Root, Whitewater, Zumbro, and Cannon. Both of this section's two subsections are included in SHPO archaeological region 3 (Southeast Riverine).

The *Rochester Plateau* subsection, which lies in the western, till-covered portion, had precontact vegetation that included fire-dependent communities of tallgrass prairie and bur oak savanna. The *Blufflands* subsection consists of a plateau covered by loess and then eroded by numerous streams to create a highly dissected landscape with high bluffs, deep river valleys, and no lakes. Along the Mississippi River on the eastern margin, the relief is up to 600 feet. Precontact vegetation included bur oak savanna and tallgrass prairie; prairie occurred in areas susceptible to fire as well as on steep slopes with south- or southwest-facing aspects. Forests of red oak, white oak, shagbark hickory, basswood, and black walnut grew in protected valleys.

Available Resources

Mn/Model (see section 1.2) summarized the available animal resources for each of the biotic regimes, which generally correspond to the provinces in the ECS (Gibbon et al. 2005). The Boreal Forest (included in the conifer forests of the Northeastern Laurentian Mixed Forest province) would have had a number of large game animals such as moose and caribou, as well as black bear, wolf, lynx, wolverine, martin, fisher, red fox, porcupine, beaver, and snowshoe hare. Game would have tended to be dispersed and of low density, however, making hunting a challenge. Fish would have been abundant in the rivers and lakes, most prominently sturgeon, bass, pike, walleye, whitefish, lake trout, smelt, perch, bullhead, catfish, sucker, and freshwater drum. Turtles, frogs and freshwater mussels would have been found in some rivers and lakes. The most important time to harvest some resources would have been when they congregated seasonally, such as sturgeon spawning in the spring. The boreal forest would have had few edible plant foods.

The Mixed Hardwood forest biome generally corresponds to the Eastern Broadleaf Forest province and the southern parts of the Laurentian Mixed Forest province with mixed conifer-hardwoods. The same mixture of boreal forest mammals is reported, but caribou would have been less common and moose more common, and white-tailed deer would have been abundant in the deciduous forests. Fish were also abundant. Wild rice appears to have gradually spread north into central and northern Minnesota, and when fully established ultimately became a mainstay of later Woodland and postcontact-era peoples. Other plant foods included a variety of berries and fruits such as blueberries, juneberries, and wintergreen, and nuts such as beaked hazel.

The Deciduous Forest biome (corresponding to the Eastern Broadleaf Forest province) was one of the richest for precontact populations, with abundant plant foods and game animals. Deer were the most important game animal, but elk, bear, raccoon, rabbit, fox, bobcat, wolf, mink, otter, beaver, muskrat, and woodchuck would have been available as well. Bison occasionally were found in open grassland areas. Plant foods included wild rice as well as nuts such as hickory, walnut, hazel, and acorn, and a wide range of fruits and berries including wild grapes, blackberries, raspberries, and cherries. The climate of this biome is amenable to maize cultivation.

The fourth biome, the Prairie, would have been found predominantly in the Prairie Parkland and Tallgrass Aspen provinces, but patches of prairie would have been present further east in areas susceptible to fires. The most important animal resource in this area for both precontact- and contact-era cultures would have been the bison. Elk, badgers, jackrabbits, gophers, and coyotes would have been present as well. Plant food resources were more limited but might have included tubers such as the prairie turnip. Although most of the vegetation was tall grass, trees along the rivers and stream valleys in areas protected from fire were a source of both firewood and wood for tools and structures.

Climatic Change

The climate has not been constant, as indicated in Table 1. Sequences of climatic change have been developed for Minnesota from a series of lake pollen cores, and correlations to continental patterns of vegetation and climatic change (Baerreis et al. 1976; Bryson 1998; Grimm 1981; Kutzbach 1987; Webb and Bryson 1972; Webb et al. 1983; Wendland and Bryson 1974). Of greatest significance to the Woodland tradition is a period of cooler temperatures, the Sub-Boreal, that extended through the Early and Middle Woodland periods and was followed by the warmer Neo-Atlantic and Pacific periods, and then the cooler, moister Little Ice Age from about A.D. 1550 until 1915. During

these broader climatic shifts and more local changes, the most noticeable changes would have been the local expansion or contraction of the prairie-forest ecotone and the prairie bison herds. Changes in local lake levels would have affected settlement patterns adjacent to the lakes, with some lakes drying up completely. Fires would have caused changes in the composition and distribution of forests as well as expansion of shrublands and savannas. Fire frequency would have been affected by local and regional climatic conditions, and possibly also by the human population. Starting about A.D. 1550, the Big Woods expanded at the expense of prairies as a result of changes in fire frequency in the cooler, moister Little Ice Age climate.

1.2 Past Research

Archaeology in Minnesota began in the mid-nineteenth century with investigations into the thousands of earthen mounds found by the early Euro-American settlers. Alfred Hill, a civil engineer, worked with the Minnesota Historical Society (MHS) to record mounds and other earthworks encountered by surveyors who were mapping Minnesota, and also solicited information from the public, as well as conducting some excavations. In 1880 Hill met up with T. H. Lewis, an archaeologist and surveyor, and the Northwestern Archaeological Survey was born. From 1881 to 1895 Hill served as Lewis' patron while Lewis traveled the state, often on foot, recording more than 2,000 mound and village sites and providing detailed, accurate sketch maps and measurements of more than 17,000 individual mounds. Lewis's records often provide the only documentation for mounds that have subsequently been destroyed.

In the late nineteenth century, Jacob Brower also became interested in mound surveys and collected many archaeological books and records, many of which were unfortunately destroyed in a fire, though he published a series of volumes on Minnesota, particularly the Mille Lacs area. Newton Winchell's 1911 *Aborigines of Minnesota* published many of Lewis's and Brower's mound descriptions and maps. The Smithsonian also became involved in mound surveys and excavations, and Cyrus Thomas (1894) examined several mounds in Minnesota.

The next major archaeological research was conducted by Albert Jenks at the University of Minnesota, and his field assistant and successor, Lloyd Wilford, who replaced Jenks in 1938 and remained at the university until his retirement in 1959 (Johnson 1974). Wilford's remarkable career included the excavation of many important Woodland sites and publication of the basic cultural sequences of Minnesota (Wilford 1941, 1944, 1945, 1952a, 1952c, 1955b), in which he tried to apply McKern's (1939) Midwestern Taxonomic System to Minnesota. Wilford took a group of students to the field each summer and attempted to examine sites of different types and from each of Minnesota's diverse environmental regions. Wilford also prepared manuscript site reports describing the fieldwork and laboratory analysis. Though Wilford's recovery techniques were not as rigorous as those of today, he recorded a large number of sites and collected important archaeological materials, as well as providing an essential framework that helped guide Minnesota archaeology.

Elden Johnson followed Wilford at the University of Minnesota. Johnson updated and published a number of Wilford's manuscripts (Wilford 1970; Wilford et al. 1969) and conducted major projects at Spring Lake Park, the Red River, and Mille Lacs (along with Leland Cooper). Johnson retired from the University in 1987 and became Executive Director of the Institute for Minnesota Archaeology, a not-for-profit archaeological research firm.

Joining Johnson at the University of Minnesota was Guy Gibbon. The department produced a number of graduate students with active research projects, particularly in the Mille Lacs sites. Since the 1960s, other institutions have also been conducting archaeology projects in Minnesota. The Minnesota Historical Society established a contract archaeology program whose work included the Statewide Archaeological Survey from 1977 to 1981 (Minnesota Historical Society 1981). Other institutions with archaeologists included Hamline University, the Science Museum of Minnesota, the University of Minnesota/Duluth, Moorhead State University, St. Cloud State University, Bemidji State University, and Mankato State University. In addition, the Leech Lake Heritage Sites Program was formed at the Leech Lake Chippewa Reservation.

A series of precontact and historic contexts were developed in the 1980s and 1990s (Anfinson 1994a, 1994b; Dobbs and Anfinson 1990). The Office of State Archaeologist (OSA) and SHPO today maintain the database of all Minnesota archaeological sites.

During the 1980s, Cultural Resource Management (CRM) firms became more common and since then have conducted much of the archaeology in the state for a variety of clients, including Mn/DOT, the DNR, other federal, state and local agencies, and private firms. In 1994 Mn/DOT initiated Mn/Model, a predictive model of archaeological sites in Minnesota (Hudak et al. 2002) that assembled and digitized Minnesota's site records into GIS and is being used to facilitate planning as well as research. Mn/Model was the source for the geographic mapping and rectified site locations used in this project.

The earlier archaeological research in Minnesota produced a large volume of data, but those data have some limitations. Early field methods were not as systematic as those of today, nor did they focus on as wide a range of information sources, including sediment samples for obtaining pollen, subsistence remains, or phytoliths. Screening, if done at all, was often at ½ inch. Undiagnostic artifacts such as body sherds or lithic debris often were not retained. If excavations were done in levels, the levels were often arbitrary rather than following natural zones, and were often six inches in depth, potentially mixing multiple components by cross-cutting deposits. The nature of Woodland sites was not well understood in earlier research, and small scatters of material often were considered unimportant, though they are crucial to understanding overall settlement patterns. For reasons such as these, many of the older collections from Minnesota's Woodland sites have limitations. For many complexes, however, these older collections are some of the most important sources of information, and reanalysis of the artifacts and information from them is needed. For example, excavations at the multicomponent Wilford site (21ML12) produced many features and artifacts, and flotation produced subsistence remains, but systematic reanalysis of the ceramics in conjunction with the field notes is needed to figure out which features are associated with which complexes. In some cases, such as with the Mille Lacs sites, massive volumes of data produced during several seasons of fieldwork have daunted researchers and precluded systematic reexamination. Reexamination of the collections and preparation of reports from these projects is greatly needed.

The SHPO/OSA archaeological site database has tremendous potential for analysis and GIS studies but also has some limitations. The initial data entry relied on the original site forms, which often lacked specific identified ceramic types or did not match current typologies, and seldom used the modern SHPO archaeological complexes. Thus, the majority of the sites that were excavated prior to the 1980s, and that form the foundation for our understanding of Minnesota Woodland archaeology, are coded incompletely or inaccurately. For example, La Moille Rockshelter, the type site for La Moille ceramics, is not coded for that complex or ceramic type, only for precontact ceramics, with no complex identified. Most of the Mille Lacs sites have the same problem.

Finally, modern CRM projects have produced a wealth of information, but detailed, specialized analyses needed to answer important research questions often are not carried out, such as sourcing copper artifacts or thin-sectioning ceramics to identify trade patterns. With its project-specific emphasis, CRM work also rarely includes the broader reevaluations and syntheses needed to conduct regional comparative studies or rethink fundamental concepts related to cultural complexes or contexts. Time and budgetary limitations are important realities, and such studies go beyond what agencies and businesses typically perceive as compliance with laws and regulations governing the cultural resources process. Yet such studies are also essential for improving the quality, effectiveness, and efficiency of Woodland archaeological research, including for compliance purposes.

1.3 Precontact Archaeological Record

There are five precontact archaeological traditions in Minnesota: Paleoindian, Archaic, Woodland, Plains Village, and Mississippian (Dobbs and Anfinson 1990). The Paleoindian tradition (approximately 9500–6500 B.C.) began with the first people who entered the state as the glaciers retreated. These mobile hunters probably pursued both big game as well as smaller animals and plants, depending on the available resources of each region. This tradition is followed by the Archaic tradition (6000–800 B.C.), during which people implemented diverse hunting and gathering practices as they adapted to the varied and changing postglacial environment.

The Woodland tradition began about 1000 B.C. and is marked by the presence of ceramics, although the basic hunting-gathering strategy continued and was augmented with fishing, wild rice collection, and at least some use of cultivated plants. In some regions, earthen mounds were constructed in large numbers and became prominent parts of

the landscape. The timing of the end of the Woodland tradition varies by region, with areas north of the limits of maize cultivation showing continuation of this tradition until the early postcontact period.

In the south, two later traditions developed and in some areas coexisted with or replaced the Woodland tradition. The Plains Village tradition developed in southern Minnesota and adjoining states with influences from both the Middle Missouri and Mississippian traditions. It was contemporary with some Late Woodland complexes and had more permanent villages, with an emphasis on maize cultivation. The Mississippian and Oneota traditions emerged in southern Minnesota as a result of some form of interaction with Middle Mississippian societies at Cahokia about A.D. 1000. Mississippian peoples also cultivated maize, used shell-tempered pottery, and lived in larger villages than Woodland peoples. Depending on the region, Woodland, Plains Village, or Mississippian/Oneota traditions were present at the time of Euro-American contact.

1.4 Property Types

Five basic site or property types will be considered in this MPDF. They are habitation sites, resource procurement and processing sites, special-use sites, and mortuary sites (subdivided into mound and nonmound sites).

The most common sites in Minnesota are habitation sites, which encompass the full range of types of occupations produced by people during general habitation at a particular location. In contrast with more specialized procurement and processing sites that focused on a single specific resource, habitation sites will tend to have denser, more extensive, and more diverse artifact assemblages that suggest habitation for a shorter or longer period of time, and multiple activities rather than single-resource procurement. Although sufficient evidence does not exist for creating formal subtypes, habitation sites will include both smaller and larger areas reflecting occupations either of longer duration or by larger groups.

Resource procurement and processing sites will tend to be smaller and activity- or function-specific and will lack many of the indicators of a general habitation site (dense, extensive, and diverse artifact assemblage). They will appear to have as their primary focus exploitation of a limited range of resources at one location. Site-catchment analysis would be useful for identifying potential resources. These sites will complement the larger habitation sites in completing our picture of the settlement pattern and the seasonal round. It might be difficult to separate some sites in this class from the “habitation site” category. Types of sites in this category might include quarry sites, bison kill sites, or wild ricing camps, providing a limited range of activities are represented.

Special-use sites could include dated rock-art sites, ceremonial sites, and caches. They are likely to be rare and unusual and reflect non-subsistence or extractive activities.

Mortuary sites include both mounds and nonmound burials. Mounds constructed for burial and other purposes are a distinctive attribute of the Woodland tradition, though they are not found with all complexes. Unexcavated mounds will often lack information sufficient to associate them with a particular complex as required for this MPDF; however, they might be eligible under a separate MPDF for precontact earthworks (Dobbs 1996). Excavated mounds that retain integrity and that can reliably be attributed to a complex through context, burial goods, or radiometric or other dating, are also eligible under this MPDF.

Nonmound mortuary sites will consist of human remains in intentional inhumations in nonmound contexts, such as isolated burials or burials within villages. Generally these burials will be associated with a complex based on either diagnostic burial goods or the context of the burial itself.

1.5 Statewide Woodland Research Themes

Although research themes are presented in Section E for each individual Woodland complex, the themes presented here are broadly applicable to all of the complexes. They are organized into primary and secondary research categories based on the primacy of having particular kinds of information before other research can take place, and on the ability of the Woodland archaeological record at a typical site to answer such questions. For example, a well-established, tight chronology is essential to virtually all other research themes and thus is included as a primary research theme. Chronology is not only essential, it can also reasonably be expected to be answerable from the kinds

of Woodland tradition sites known to exist in Minnesota, if appropriate and sufficient recovery procedures and analyses are undertaken. Other research themes such as social and political organization, while important, are less likely to be answerable from typical Woodland sites, and will often require a larger dataset from multiple sites and excavation of particularly rich sites with a variety of features. Thus, these themes are placed in the secondary research category.

Fundamental to addressing most of the research themes is the need for discrete occupations that can be attributed to a particular Woodland complex, either at single-component sites or at multicomponent sites with horizontal or vertical separation of components. Many of Minnesota's Woodland sites are multicomponent, with little separation between components leading to mixing of multiple occupations. Thus, the full range of material culture and other attributes of many Woodland complexes cannot be distinguished, and complexes have been defined and described based largely on diagnostic artifacts, particularly ceramics.

In addition, there is also a need for archaeological projects to utilize appropriate recovery techniques (including fine-scale recovery), employ adequate expertise to conduct specialized analyses, and have sufficient funding to adequately interpret the archaeological record. Particularly crucial is having sufficient datable materials and funding for multiple radiocarbon or other absolute dates. Phase II evaluation projects need to employ appropriate techniques to be able to assess the potential of a particular site to address research questions, such as whether there are separable components, features, and preservation of datable materials and ecofacts. Also needed are block excavations that can identify patterns of features or activity areas, as well as sufficient depth of excavation to reveal buried components, such as in floodplains and other alluvial settings. Geophysical techniques such as resistivity survey and magnetometry can be used for identifying site features prior to excavation, saving time and effort and leading to a more comprehensive understanding of the sites. Finally, there is a real need to complete full site reports for a number of important sites that have been excavated but never fully analyzed or documented, including the Cooper (21ML9/16) Petaga Point (21ML11), and Wilford (21ML12) sites.

Certain characteristics of Minnesota's Woodland sites, together with the nature of the archaeological research to date, have shaped the quantity, quality, and limitations of the available data and directly affect both the status of current research questions and the strategies and methods of archaeological research needed to address them. Minnesota's Woodland sites range in size from small to large, but individual sites are rarely well circumscribed or defined, so that the actual sizes of most sites or site types are poorly known. The soils in many parts of Minnesota are shallow, with minimal soil buildup and little separation between components. Shallow sites are often disturbed partially or completely by plowing, with only portions of middens or features left intact below the plow zone. This is particularly true in the southern part of the state, where much of the land is under cultivation. Woodland peoples did not often dig deep storage pit features, in contrast to later Oneota and Plains Village peoples; features such as hearths, basin-shaped pits, or post holes from semi-permanent houses are not common and, when present, are often shallow. Wild ricing features rarely have diagnostic artifacts with them and are often on sites that were heavily used by Ojibwe wild ricers, confusing the identification.

Soils in many parts of Minnesota are acidic, creating poor conditions for preservation of animal remains. Plant remains will not preserve in any case unless charred, and therefore require conditions that allow both charring and subsequent preservation, such as might be found in hearths. Charred plant remains found outside of features are rare and usually cannot be reliably attributed to human as compared to natural fires. Limits on organic remains mean limits on datable materials, as well as on data that can be used for interpreting subsistence.

Primary Statewide Research Themes

Chronology

A fundamental need for understanding Minnesota's Woodland complexes is an adequate chronology, including absolute dates for the full span of each complex, but particularly for the beginning and end, as well as charting important changes within the complex. Multiple dates are needed on materials in tight association with the full range of variation seen in diagnostic artifacts to allow development of refined chronologies. Direct dating of significant

features such as structures would also be useful. Ideally, the dated materials would be part of a separable component at a site.

Dating of ceramic residues has become important in recent years but has provided anomalous results. The early residue dates, such as those on Brainerd ceramics, are several hundred years earlier than expected when compared to conventional radiocarbon dates. The residue dates need to be confirmed or reevaluated in conjunction with dates on charcoal or other datable materials. If the dates prove to be too old, can they be calibrated or adjusted in some way? Are there regional or soils-specific factors that might account for anomalous dates? In addition to radiometric dating, other types of dating such as thermoluminescence should be employed where feasible.

Technology and Material Culture

Besides identifying diagnostic artifacts, the full range of material culture for each complex needs to be described. In addition to artifacts typically considered diagnostic, such as rim sherds and projectile points, can other region- or complex-specific cultural items be identified, such as unique pottery designs, bone tools, or patterns of raw material use? In some cases, reexamination of existing collections will help refine ceramic typologies and clarify the contexts of artifacts and features. For example, large collections from Mille Lacs sites are in need of work, to study unanalyzed materials or identify cultural components.

Ceramics. Ceramics provide the most sensitive chronological and regional marker for a complex, but many of the typologies are inadequate or outdated. There is a need for refining and updating existing ceramic typologies, developing a better understanding of spatial distribution and regional and temporal variations for ceramics, and conducting detailed attribute analysis. Changes through time and across regions need to be explored. Comparisons also are needed between ceramic types used in Minnesota and those used in nearby regions (for example, how are Late Woodland corded ceramics in the southern part of the state related to the corded-ware horizon found across the Midwest?).

Variability within many types of ceramics seems to be great but is also poorly understood. Single-component sites or separable components within stratified sites are needed to identify the range of contemporary ceramic types and varieties and how they change through time. Attribute analysis could generate a database of ceramic characteristics that could be analyzed statistically and modeled in GIS. Ceramic manufacturing processes and vessel function are in general also poorly known. More detailed technological study of ceramics (e.g., paste, temper) could improve understanding, as could thin-section analysis, X-ray florescence, and diffraction, which can help to identify mineralogical and elemental composition and differentiate locally made vs. imported pottery. Also, what is the range of variation within one assemblage?

Many of the Woodland ceramic and lithic types currently in use were created years ago and need rethinking. Ceramic types that have geographic distribution as part of their definition have been particularly troublesome. With the recent increase in archaeological research in Minnesota, particularly with CRM projects, many sherds are being found outside the areas originally defined for specific ceramic types. They are typically dealt with in two ways: either they are identified as that ceramic type, with a note that they are outside of the type's typical range; or they are not identified as that ceramic type because they are not within its typical range. In either case, geographic definition is limiting analysis of the actual distribution of ceramic attributes reflected in the types. Ceramic type definitions based on consistent attributes are needed for virtually all of the Woodland types (or even a rethinking of the whole concept of ceramic "type"). Then, reanalysis of the existing collections is needed to document what really has been found, and where it is distributed. Otherwise, preconceived (and sometimes unrecognized) notions dictate what types are identified in what places, masking patterns of similarity and regional differentiation.

One important set of data comes from the series of sites in Mille Lacs State park. Several hundred thousand sherds have been excavated but not yet studied in depth or systematically integrated with the excavation records for specific features and house structures. Separation of components, particularly at the Cooper (21ML9/16), Wilford (21ML12) and Petaga Point (21ML11) sites would be a very important line of future research (Mather 2000).

Lithics. Much more information is needed on the full range of Woodland lithic artifacts, both tools and manufacturing debris, and the raw materials used, both local and exotic. Lithic typologies need to be refined and their associations

with cultural complexes verified. Trait comparison to Archaic, Middle Woodland, and Plains types is essential for distinguishing the points from those of other periods and regions, or for confirming that they are all part of a homogeneous complex. Any temporal changes or specific geographic distributions would be useful.

Lithic tools and debris need to be studied in terms of function, lithic reduction sequences, tool manufacturing, raw material selection, and changes through time in all of these. Can raw material debris profiles be developed to characterize these sites, and possibly to date them even if ceramics are not present? Single-component sites or multicomponent sites with a horizontally or vertically separate component are needed for this research.

More work is needed on the accurate identification of specific lithic sources (Bakken 1996), and on documentation of changes in the use of particular raw materials through time and space, and for different tool types. Existing collections might then need to be reexamined, and implications drawn for understanding trade and interaction with other regions. The most suitable collections would be those that are moderate to large in size and are from single-component sites or distinguishable components at multicomponent sites. Additional data could help to answer questions related to lithic technology and raw-material acquisition and how those might have changed through time. For example, is the Knife River flint at a particular site coming from North Dakota (Clayton et al. 1970), or from glacial drift? How does Knife River flint fit into local exchange patterns? How does its use compare to the use of local and other exotic materials? What is being transported—raw materials or finished artifacts? How does the use of Knife River flint vary through time? Are there spatial differences in the use of Knife River flint, perhaps related to distance from its primary source area in western North Dakota? Examination of both tools and debitage is necessary to obtain maximum information and benefit.

Specialized studies such as use-wear analysis might yield information on activities and tool use. Further analysis is needed to identify any differences in lithic assemblages (tools, raw materials, etc.) between sites associated with mound construction and other habitation sites, between complexes in different areas, and between sites with different activities represented. What was the effect of the bow and arrow on the rest of the technological tool kit and on hunting practices, settlement, etc.? Where and when was bipolar core technology used?

Worked bone, antler, and shell. Very little work has been done to date on these artifacts for Minnesota Woodland complexes. Future research should look at identifying types and verifying distinctive attributes; examining how the various types correlate with site type and function, including subsistence activities; assessing how they vary through time and space; and evaluating how their acquisition is reflected in faunal remains (for example, the selection, transport, and curation of particular elements as tool stock). Use-wear analysis and replication experiments could prove highly informative for this artifact category.

Other artifacts. Additional sourcing of copper would aid in tracing specific trade routes and changes through time. Other artifact classes might include the use of marine shells, ocher, or pipestone. When and how were they used, and for what functions? Where and how were they obtained? In a broader perspective, what type of exchange might be represented, and what might have been traded in return?

Subsistence

More detailed information on subsistence is needed for all Woodland complexes in Minnesota. Additional sites with larger samples of subsistence remains are needed from a variety of habitats. Systematic fine-scale recovery from Woodland sites is needed, including flotation to recover plant and animal remains, fine lithic debris, and other small artifacts. Also needed are specialized analyses of these remains, not just superficial analyses such as sorting fauna by class (e.g., fish vs. mammal). Faunal remains, for example, need to be evaluated to determine not just number of elements, but also the minimum number of individual animals (MNI) of each species represented at the site, the amount of meat (or kilocalories of energy) represented, age at death, size, sex, and season of death. Interpreting the variety of faunal taxa in terms of habitat selection and seasonal availability will be essential to understanding the whole Woodland seasonal round. Extractive strategies must be examined at the site, local area, and regional scales, including changes through time. Patterns will need to be considered with regard to both variable exploitative strategy and taphonomic changes, such as changes in patterns of transport, processing, and/or disposal of animals, and the final deposition of their remains. Floral analyses need to include wood charcoal as a reflection of both the environment and

cultural practices, as well as recovery and identification of macroplant remains such as seeds and nuts, and phytolith and pollen studies. Ceramics can be analyzed for evidence of phytoliths and pollen. Infrared spectrometry and gas chromatography can investigate cooking residues and fatty acids from products cooked in vessels, to identify how the vessels were used and what foods were consumed.

The role of wild rice in precontact cultures is a crucial question. Lofstrom (1987) discusses social organization and population size implications for incorporating wild rice, and many cultural interpretations about social organization, seasonal round, etc. are based on an assumption of wild rice use. Careful excavation and extensive flotation sampling from well-dated contexts, or alternative sources of information such as residues on ceramics, are needed to identify subsistence remains and provide good assemblages for analysis. Specifically, what plant resources were being used? When was wild rice first used, and when did it be come a prominent part of the economy? How did the use of other resources change? Are there special precontact features used to process wild rice? If so, can they be clearly identified, and can they be distinguished from postcontact ricing features?

What cultivated plants were used by Woodland tradition populations in Minnesota? How did the northern limits of corn agriculture change through time? When did corn first appear in various regions?

How did people exploit different resources as part of the broader annual round? In addition to wild rice, where, when, and how were important specialized resources exploited, such as bison or sturgeon? Were sturgeon fisheries occupied for large parts of the year, or only for short periods? What was the nature of bison hunting in various regions, how did it relate to overall way of life, and how did it change through time (including in relation to environmental changes)? Were groups making use of seasonal bison hunts? Which groups, and at what times? Did some groups travel from one region to another as part of a large-scale seasonal round? Was there exchange of bison meat and products, and if so, with whom and in return for what?

Geographic Distribution

The boundaries and geographic distribution of individual complexes are poorly known, and the bases on which they were defined are often not explicit. How can the geographic distributions be usefully and explicitly defined? Depending on how complexes or contexts are defined, are distributions defined primarily on the basis of ceramics? Or on a combination of ceramics, other artifact types, and subsistence/settlement information? To what degree are geographic distributions affected by fundamental lack of archaeological data (i.e., areas in which little research has been done) vs. outdated or imprecise information in the database used to plot the distributions (e.g., older site collections that lack updated typological information, or database coding that does not incorporate newer types or varieties)?

Is there a central area for each complex in which the complex is present as part of a complete assemblage of distinctive material culture and other practices, with only isolated sherds or limited numbers of artifacts found outside this area? If so, how are these central and outlying areas related? Are the areas with only a few sherds indicative of trade, exchange of marriage partners, seasonal movement, migration? Are different kinds of sites or activities reflected in different areas? Do seasonal rounds cross environmental boundaries, or are there relatively distinguishable cultural subsets within each environmental province? How do sites change as one goes west and northwest along the prairie/forest border and onto the prairies of west-central Minnesota? How do sites in different ecological settings compare? In looking at distributions of archaeological assemblages, what aspects result from movement of people in migrations or seasonal movements, as compared to movement of artifacts in trade and exchange? How can these different factors be distinguished?

GIS analysis of environmental and geographic variables together with the distribution of different complexes can examine patterns of utilization of different resource zones and consider factors characterizing site selection. Topographic and hydrologic modeling of site locations can be used to evaluate environmental variables affecting site location, and to identify factors for predicting locations of additional sites. For example, examining the distribution of water and other natural firebreaks can help to evaluate whether sites were located in the lee of firebreaks. Sun exposure, funneling of wind, cold traps, and other microenvironmental attributes of site location can be examined with the aid of GIS modeling that considers valley shape, orientation, slope, etc.

Modeling (i.e., Mn/Model) could identify locations along rivers (such as trade routes) that share the characteristics of a complex, to target future field investigations. GIS can be used for site catchment analysis to suggest what resources might have been exploited at individual sites, and how this compares between sites across regions. Site function within the complex's settlement system can be suggested, and multiple alternative explanations for site location and site function proposed and evaluated.

How were ecotones exploited? In particular, what were the effects of the prairie/forest ecotone (and possible changes in this ecotone) on subsistence and settlement systems and movement of peoples across the ecotone? Did some areas, such as ecotonal areas, serve as central points, or trading or culture hubs? Were there regions that were transitional between a number of distinct complexes, and that would have made exposure to or intermarriage with other cultural groups more likely? For example, ecologically, many Kathio sites are concentrated in ecotonal (transitional) biomes between deciduous/coniferous forests and forest/prairie. Is this transitional location reflected in cultural patterns such as trade between regions, or raw materials and resources acquired from multiple environmental zones? Were these places where peoples of adjacent cultures interacted? Evidence of distribution of ceramics or raw materials between different groups might document such patterns of interaction.

What effects did human subsistence and settlement systems have on the environment, including the prairie/forest ecotone? Were people using fires to maintain ecotonal and prairie habitats? Is there evidence of extensive areas of burning (such as in cores obtained from lakes or rivers)? Or evidence of natural resources that are dependent on fire, such as varieties of wood, plants, or animals?

Regional Interaction

Research is needed into the full range of interregional interactions within and between peoples of contemporary cultures or complexes, as well as the relationships that helped to shape changes in cultures through time. Trade and interaction, including the exchange of lithic raw materials such as Knife River flint or obsidian and other exotic artifacts, need to be better documented, with studies of both source and destination areas, and what the exchange patterns reflect in terms of regional interaction. Further research is needed to document specific items being traded, their sources, and the roles of different peoples in the acquisition and movement of exotic materials within larger regional trade networks. This information might allow testing of models of population movement between habitats.

On a broader level, the nature of any trade is also unclear—for example, face-to-face, down-the-line, or some combination. Interregional communication of all sorts should be investigated through the patterns of distribution of exotic or non-local raw materials, and ceramic styles. Communication methods might have included travel, and exchange of people (men and women), ideas, finished objects, raw materials, subsistence goods, and "luxury" or non-essential items. Investigation of ceramic tempers and clays at individual sites, and how they differ between sites, has implications for settlement systems, trade, travel, and marriage practices and sociocultural integration. Can patterns of marriage-partner exchange and residence between communities be identified (matrilocality, patrilocality)? Can territorial boundaries between different groups be identified by differential distribution of artifact classes or attributes such as pottery design or distinctive usage patterns in lithic raw materials?

Defining the Complexes

Finally, after evaluation of the research themes, the definition of each complex needs to be refined. Additional dating and understanding of the regional distribution and changes through time, as well as the relationships to other complexes and other regional populations, will facilitate development of meaningful archaeological phases.

Secondary Statewide Research Themes

These next themes are no less important than those presented above, but are often more difficult to address from individual sites, given their complexity and abstractness, particularly at individual sites. Often, a robust archaeological assemblage, extensive excavation, and more specialized analyzes are required. As with the primary research themes, single-component sites or separable components at multicomponent sites are especially useful.

Settlement Patterns

A variety of sites in different habitats and representing different seasons need to be examined, including both short- and long-term occupations, to identify both extractive sites and processing at base camps. What role do each of the known kinds of sites (such as fisheries) play in the complete seasonal round? How does this seasonal round differ from one region/environment to another, and how does it change through time? Specific attributes linking sites within a single, relatively contemporaneous settlement system would be useful (e.g., tracking manufacture and use of different kinds of tools, or connection of sites via lithic source distributions). Even one site and one component can display considerable horizontal variation, perhaps indicating different activity areas—or the vagaries of deposition. Thus sampling should include *all* areas of a site to identify such variability.

Mortuary Practices and Ideology

One of the main challenges for analyzing mortuary remains is attributing the remains to a specific complex, because often no diagnostic artifacts are found associated with the remains. Although some studies have been done on biological relationships of Woodland populations (e.g. Myster 2001), they have proved difficult to interpret, and the analyzed human remains are often impossible to connect to specific Woodland complexes. Additional research into the cultural context of previously analyzed human remains would do much to make this data more usable. But even on the broader scale of the Woodland tradition, information on demography, health, disease status, and nutrition is needed. Research is needed on the kinds of mortuary features and artifacts that might be expected to reflect ceremonial or religious beliefs, including bear ceremonialism and the use of tobacco. Do special places such as portages play a role in the cultural landscape that can be identified archaeologically? Other possible sources of information on ideology and iconography might be petroglyphs, pictographs, and portable rock art.

Analysis of human remains is governed under statute 307.08, providing guidelines for recovery and analysis of human remains. Even if the human remains and mortuary artifacts are not commonly available for many studies, additional analyses might be possible with mortuary information collected earlier. Further research, including genetic and biological research, on the movement of peoples is needed. What is the most likely sequence of cultural shifts and population movements to connect precontact with protohistoric and postcontact populations?

Demography

Almost nothing is known about Woodland demographics in Minnesota. Some osteological data was collected on excavated human remains prior to their reburial (Myster and O'Connell 1997), although most of the Woodland period remains were fragmentary and provided only limited information on mortality and disease. Studies such as Ossenberg (1974) and Myster (2001) considered population relationships for Woodland groups and others in the Midwest. The cultural contexts for many of the archaeological assemblages that were used by the older studies such as Ossenberg have been redefined, making the initial conclusions inaccurate. However, the original data might be amenable to reanalysis. Substantial additional data to clarify population density through time is needed. Refinement of the ceramic chronology should allow a better determination of which sites are really contemporaneous, to provide a better base for population estimates and for interpretation of the existing biological data. Better data from single-component sites and more radiocarbon dates would be useful for estimating population, evaluating processes of aggregation and dispersal throughout the year, and understanding overall population density. How did regional density and population levels change through time and by region, and what were some contributing factors, such as changes in the resource base? Other researchers in adjoining regions have argued for increasing population throughout the Woodland tradition. Is this increase reflected in Minnesota?

Houses and Site Patterning

Research needs include the confirmation and full excavation of possible houses already reported, the identification of other possible houses, and evaluation of size and shape, methods of construction, and related internal and external features. Careful excavation of an entire house at a single-component Minnesota site is essential. Single-component sites or sites with good separation between different occupations could also provide information on spatial patterning, to help identify different activities as well as "tool kits" based on simultaneous use of artifacts rather than archaeologically imposed typology. Even if actual structures cannot be identified, feature distribution, contents, and

fill sequences could reveal a great deal about activities and patterning at individual sites and could suggest whether some sites might reflect more permanent base camps. Geophysical techniques should be utilized to identify possible features, including house structures, to target areas for excavation, and to provide information on site structure and size.

Environmental Change

How did the climate change through time in Minnesota, and how did ecological biomes respond, especially in ways that would affect human populations (e.g., movement of vegetation communities and associated animals, changing lake levels, prairie expansion or contraction, availability of wild rice, limits of corn agriculture)? How did human cultures in different regions and at different times respond to these changes? Why were certain types of sites located where they were? At individual sites, data such as pollen, charred seeds, and gastropods and other microfauna can provide information on local vegetational communities, climate, microhabitats, and environmental degradation. Information from multiple sites can be used to track regional patterns and changes through time.

Past environments differ from those of today, and understanding site-specific local environments is a critical part of interpreting site locations and functions. Environmental changes are particularly important where vegetation communities and ecotones have changed location, occupations have been buried along river floodplains, or lakes have changed size, producing a series of beaches. For example, at the Mooney site (21NR29), Michlovic (1987) documented paleosols through analyses of the course of river channels and deep sediments (including analysis of particle size and organic, carbonate, and phosphate content), and argued for local climatic changes that were not visible in regional pollen diagrams.

Social, Economic, and Political Organization

The nature of Woodland cultural systems in Minnesota is poorly understood, as are social, economic, and political organization (e.g., egalitarian or stratified social structure), although long-distance trade and group activities such as mound construction or bison hunts should have placed organizational demands on the society. Any aspects of these facets of culture are an important area for future research, although much of the data will need to come from multiple sites throughout a region. At individual sites, is there internal patterning of activity areas or other features? What can this tell us about the nature of activities conducted at the site, or internal social organization? At a more abstract level, what are the relationships between ceramics and people—to what extent do ceramic wares reflect cultural entities or groups?

2 THE BRAINERD COMPLEX: Early Woodland in Central and Northern Minnesota, 1000 B.C.–A.D. 400

2.1 Introduction and Overview

The Brainerd complex is identified by Brainerd ceramics that have two distinct types of surface treatment, net impressions or horizontal cord marking, and might represent the earliest pottery in central and northern Minnesota. The temporal placement of Brainerd ware is controversial, with a series of radiometric dates on ceramic residues giving distinctly older dates than previously expected. Associated projectile points include stemmed and side-notched points that are similar to Oxbow, McKean complex, and Pelican Lake styles and show similarities to preceding Archaic points and to northern Plains Woodland types. Raw materials reflect use of both local and western sources, and additional distinctive lithics include scrapers and rectangular chisels or wedges.

Other aspects of the complex are poorly known. Little subsistence information exists, except for phytoliths recovered from residues on sherds, and faunal and floral remains from a few sites with separable components. These materials reflect hunting of medium-sized and large mammals and collection of a wide range of plant foods, including starchy seeds, fruits, and nuts. The underlying adaptation has been proposed to be basically Archaic, with the addition of pottery. Burials occur either in mounds or as nonmound burials. Hohman-Caine and Goltz (1995) have proposed the name Elk Lake for the complex associated with the makers of Brainerd ceramics.

2.2 Environmental Setting and Geographic Distribution

Net-impressed pottery has a wide distribution extending from north-central Minnesota west into the Plains, and north and west to Lake Winnipeg and Montana (Hohman-Caine and Goltz 1995:109). There were 169 Brainerd sites identified in the SHPO/OSA database in 2008 (Figure 3). In terms of their distribution within the Ecological Classification System (Mn DNR–Division of Forestry 1999), most of the sites are in the Laurentian Mixed Forest province (138 sites, 82%), with most of those (119 sites, 75%) in the Northern Minnesota Drift and Lake Plains section, and the rest in the Western Superior Uplands (13 sites), Northern Superior Uplands (3 sites), and Northern. Minnesota and Ontario Peatlands (3 sites) sections. The Eastern Broadleaf Forest province, Minnesota and Northeast Iowa Morainal section, has 25 sites (15%); the Prairie Parkland province has 4 sites, with 2 in the North Central Glaciated Plains section and 2 in the Red River Valley section; and the Tallgrass Aspen Parklands province, Lake Agassiz section, has 2 sites.

In terms of SHPO archaeological regions (Anfinson 1990), over half of the sites (96 sites, 57%) are in the Central Lakes Coniferous region, with all but one of those in the Central subregion. Most of the rest of the sites are in the Central Lakes Deciduous region (63 sites, 37%), with more than half in the West subregion. The remaining regions, at less than 2% each, include Northern Bog West (4 sites), and Prairie Lake North, Border Lakes, and Red River Valley North (2 sites each).

Vegetation during the Brainerd occupation would have been different from that of today, with mixed oak and pine forests intermingled with oak savannas, providing habitat for elk and bison (MnDNR–MIS Bureau 1994). Wild rice also might have been moving from southern and central Minnesota into the northern Minnesota lakes by about 1000 B.C. (Hohman-Caine and Goltz 1995:127; Yourd 1988).

2.3 Past Research

The history of research on Brainerd is connected to the interpretation of the concept of “Early Woodland” in Minnesota. Prior to a recent series of AMS dates on residues found on Brainerd ware, researchers (e.g., Gibbon 1986:89) argued that Minnesota had no Early Woodland period corresponding to that cultural period in adjacent states. The earliest pottery otherwise reported in Minnesota was LaMoille Thick, similar to early pottery south and east of Minnesota but found only rarely in Minnesota itself, and only in the southeastern part of the state. Otherwise, in central and northern Minnesota, the “Initial” Woodland with the first ceramics seemed to occur contemporaneously with what is called Middle Woodland elsewhere. Ceramics such as Malmo in central Minnesota or Laurel in northern

Minnesota were interpreted as the first pottery in those regions. Since the 1990s new radiometric dates, mostly AMS dates from residues on Brainerd pottery, have suggested that Brainerd ceramics fit within the Early Woodland period and have led to a major reevaluation of the complex. The dates, if confirmed, make Brainerd ceramics even earlier than other Early Woodland complexes, and would make the Brainerd complex unique in the Midwest.

The history of research includes identification of net-impressed ceramics at a number of sites, and initial interpretations about relative chronological position. The type Brainerd Net Impressed was first identified as a transitional Late Woodland type by Johnson (1971a, 1978; Johnson et al. 1977). Gull Lake Dam (21CA37) was considered the type site, and the definition incorporated a series of other sites in the Headwaters Lakes and to the north whose ceramics were at the University of Minnesota Archaeology Lab: Mitchell Dam (21BK1), Shocker (21BL1), Waskish (21BL2), Scott (21CA1), Mud Lake (21CA2), Hill Point (21CE2), White Oak Point (21IC1), Osufsen (21IC2), Round Lake (21IC15), and McKinstry (21KC2). Lugenbeal (1978a), working with Blackduck and undifferentiated Woodland ceramics from northern Minnesota, added horizontal cordmarking to net impressions as a Brainerd trait and suggested a Middle Woodland context, contemporaneous at least in part with Laurel. Neumann (1978) reported a combination parallel-grooved and net-impressed vessel from Gull Lake and proposed Gull Lake Net Impressed, though this has not been generally accepted as a separate type. Birk (1979a:46–50) summarized the understanding of Brainerd as a Middle Woodland type.

Hohman-Caine and Goltz (1995) undertook a major reexamination of Brainerd ware and the question of Early Woodland in Minnesota, summarizing what was known of the material culture, subsistence remains, spatial and environmental distribution of sites with Brainerd pottery, and radiometric evidence for early dates. They concluded that the early dates for Brainerd ware indicate an Early Woodland complex and reflect the first use of pottery in Minnesota and the entire Midwest. Additional residue dates since their study have also been early, and subsequent researchers have continued to debate the interpretations of the temporal position of Brainerd.

Hohman-Caine and Goltz (1995) also suggested using the term “Elk Lake culture” for the peoples that used Brainerd ceramics. Subsequently (1999:40) they proposed that given its apparent longevity, changing climatic conditions, and varying procurement patterns, Elk Lake should be considered a complex rather than a culture.

Reported recent site excavations of substantial Brainerd components include Pimusche Boat Access (21BL88; Goltz 1993), Kitchie Bay (21BL273; Hohman-Caine and Goltz 1995), Shingobee Island (21CA28; Hohman-Caine and Goltz 1999), South Pike Bay (21CA38; Harrison 1988), Roosevelt Lake Narrows (21CA184; Justin 1995; Thompson 1995), Kelnhofer (21CA226; Hohman-Caine and Goltz 1995), Lake Carlos State Park (21DL2; Gonsior et al. 1999), LaSalle Creek (21HB26; Kluth and Kluth 1994), Third River Borrow Pit (21IC176; Mulholland et al. 1997), North Twin Lake (21MH5; Michlovic and Sather 2000; Navarre et al. 1994), and Blueberry Lake (21WD6; Johnson et al. 1995).

2.4 Chronology

Information on the temporal placement of Brainerd comes from a series of radiometric dates, most of them obtained from residues on ceramics, and some limited stratigraphic evidence. Earlier discussions of Brainerd temporal placement, prior to the AMS dates, generally considered the complex to be Middle Woodland, after Malmo and more or less contemporaneous with Laurel in northern Minnesota at approximately A.D. 600–800 (e.g., Birk 1979a, 1991:6; Johnson 1971a). In the Mississippi Headwaters, Brainerd was understood to predate Sandy Lake and possibly Blackduck ceramics and extend back into the early Middle Woodland period (Birk 1979a:50; Lugenbeal 1978b; MacNeish 1958:71).

Since the 1990s, the AMS residue dates and some dates on wood charcoal have pushed back the dating of Brainerd ceramics to the Early Woodland period, making this the oldest dated pottery in Minnesota. Figure 4 shows the existing dates. Except for some outlier dates at both ends, the calibrated dates form a sequence from about 1300 B.C. to about A.D. 500, representing a possible span of 1,800 years for the use of Brainerd ceramics.

The two earliest dates (4090 and 4400 B.P.) were obtained on charcoal from woody stem fragments found in a house feature at Shingobee Island (21CA28) associated with the lower of two separable Brainerd components at the site.

Hohman-Caine and Goltz (1999:37) argue that although the two dates appear old, they are also consistent, even though they do not quite overlap, and that there are no other older occupations at the site to account for the material. However, it is also possible that the charcoal could have derived from a natural fire and been incorporated into the feature by rodents. The authors conclude that additional lines of evidence, particularly a date on the fauna from the feature, are needed to support or refute these early dates (1999:38).

The three latest dates for Brainerd also are problematic. At Lower Rice Lake (21CE5), Bakken (1994) obtained an AMS date of 710 ± 60 B.P. on wood from Feature 15, which had only Brainerd ceramics, but he rejected it, arguing that the sample might have been contaminated at the site or in the years since it was collected, although he had no evidence in either direction. Two dates from Mikinako-Sag (21BL71) also seem anomalously late.

For the Third River Borrow site (21IC176), both wood charcoal and residue dates are available, and the wood charcoal dates are significantly later than the residue dates. Mulholland et al. (1997) reported a classic pit feature with charcoal and three Brainerd horizontally corded sherds, including one with organic residue. Three charcoal dates and one residue date were obtained. The charcoal dates gave a 2-sigma calibrated range of A.D. 53–584, while the residue date was 390 B.C, calibrated at two sigmas to 720–203 B.C. The authors considered possible sources of contamination and misinterpretation but ultimately could not explain the discrepancy. The dates for the charcoal would be appropriate for the Laurel occupation of the site. If the wood charcoal dates are eliminated, along with three other dates that also appear to be anomalously late, then the terminal date for Brainerd is about A.D. 400.

At several sites, multiple residue dates were run on the same vessel and came out very close to each other. Dates were obtained on a split sample from Blueberry Lake (21WD6; Johnson et al. 1995), and on two sherds from the same vessel at La Salle Creek (21HB26) and also at Cass Lake I (21CA352) (Hohman-Caine and Goltz 1995:Table 7). Not all the old dates are from residue. There is also a date on wood charcoal from Kitchie Bay (21BL273) of 2480 ± 90 B.P. (Hohman-Caine and Goltz 1995:124).

Only limited stratigraphic evidence exists for the placement of Brainerd ceramics. Early reports of stratigraphic evidence came from Osufsen Mound (21IC2), where Brainerd ware was found below Blackduck; White Oak Point Village (21IC1), where it was found below Blackduck and Sandy Lake; and McKinstry Mound (21KC2), where both Brainerd and Laurel were found below Blackduck (Thompson 1995:9.19; Lugenbeal 1978b). Brainerd ware was also associated with Laurel based on vertical distribution at the Third River Borrow site (21IC176), though it is unclear whether the two forms were contemporary or just lacked stratigraphic separation (Mulholland et al. 1997).

Some contradictory information exists on possible trends through time within Brainerd. At the Third River Borrow site (21IC176), some differences might exist in the distribution of the horizontally corded and net-impressed ceramics, with the horizontally corded perhaps being somewhat earlier than the net-impressed, and with Laurel occurring contemporaneously with both and also at the interface between the two Brainerd varieties (Mulholland et al. 1997:64). However, for LaSalle Creek (21HB26), Hohman-Caine and Goltz (1995:127) cite the possibility that horizontally banded types originated later than the net-impressed types. Given the contradictory conclusions about the chronology of the two Brainerd varieties, further research is needed into any potential changes through time within Brainerd.

Other indications of relative age for Brainerd sites come from the observation that some of the sites are on older beach ridges associated with higher lake levels that occurred around 2000–3000 B.P. (Hohman-Caine and Goltz 1995).

2.5 Technology and Material Culture

Ceramics

Hohman-Caine and Goltz (1995) have presented the most complete recent description of Brainerd ware ceramics, reaffirming the two main types initially defined for Brainerd ware (Birk 1979a). They drew on information from at least 350 vessels, including direct examination of 59 vessels from various sites. Among their findings, Hohman-Caine and Goltz (1995:115) noted:

> *A distinctive feature of Brainerd ceramics is the nature of the clay body. It can be described as somewhat porous and frequently sandy in appearance. Examination of the surfaces of sherds under low power (15–30X)*

magnification often reveals a highly weathered appearance with particles of non-plastic inclusions often projecting in high relief from the weathered ceramic paste. This appearance probably results both from long exposure to physical and chemical weathering within the soil environment and the often apparent lack of processing of the original clay body. This contrasts noticeably with most later ceramics. Experimental studies by one of the authors (Goltz) have demonstrated that the clay body of much Brainerd Ware can be best replicated using unprocessed and untempered clays from argillic soil horizons of glacial till derived soils within the Itasca moraine (Goltz, ceramic replication experiments).

Because of relatively uniform clay sources, the colors tend to be fairly homogenous. The paste tends to have a fine, sandy texture with coarser temper inclusions of naturally occurring medium sand and occasionally small pebbles up to 5 mm in diameter. When temper is deliberately added, it usually consists of medium to coarse mineral grains from burned, crushed granite or similar rock (Hohman-Caine and Goltz 1995:115). Thickness varies even within individual vessels. Rims are typically 5–7 mm thick but range from 3.5 to 8 mm. Bodies are typically 6–8 mm thick, ranging from 4 to 9 mm. Vessel bases are usually thickened and range from 8 mm to well over 10 mm thick.

Two types of surface treatment are present and are mutually exclusive on individual vessels: net impressed, and horizontally corded. Hohman-Caine and Goltz suggest that "When observed over large vessel surface areas, the net pattern suggests application by an entire net rather than paddling or rolling by objects covered with smaller pieces of netting" (1995:117).

On the horizontally corded vessels, the cord impressions appear on the exterior surface and occasionally the lip surface. Orientation is nearly horizontal and linear. Cord orientation on the lower part of the vessel tends to be more horizontal. A few examples have vertically oriented cord markings on a least a portion of the vessel. Smoothing is less common than with the net-impressed vessels. Hohman-Caine and Goltz (1995:118) suggest that the impressions were made by rolling a cordwrapped object, possibly flexible, over a smoothed vessel surface and that they are distinctly different from the cordwrapped paddle impressions on later vessels.

Both the net-impressed and the horizontally corded vessels show coil breaks, indicating that coiling methods of manufacture were used initially. Hohman-Caine and Goltz (1995:118) suggest that net-impressed ceramics were supported within a net bag while they were shaped and thinned.

Brainerd vessel forms are conoidal to subconoidal. Rim profiles are slightly in-sloping or vertical. Lips are flat to convex and sometimes have a folded-over edge. One horizontally corded vessel from the Kelnhofer site (21CA226) has a flattened bottom; other vessel bases show some rounding and are classified as subconoidal, while still other vessels are more pointed.

Two different vessel proportions characterize the net-impressed and horizontally corded vessels. The net-impressed vessels have a greater maximum diameter relative to the vessel height. Goltz's experimental work suggests that this is a function of thinning in the net bag (Hohman-Caine and Goltz 1995:119). Hohman-Caine and Goltz also note at least one vessel with more of a cup/bowl shape.

Vessel sizes are estimated from 15 complete or partially restored vessels. Except for two small vessels that are only 8–15 cm across at the rim and 5–16.5 cm tall, the other vessels range from 21.5 to 32.5 cm in rim diameter, with a maximum diameter of 36.5 cm. Vessel heights range from 22.5 to 36.6 cm, and diameter-to-height ratios vary from 0.86 to 1.11. Total volumes are estimated at around 19 liters for the larger vessels, with the smaller ones about 9.5 liters; the smallest vessel from Gull Lake Dam has a volume of 1.4 liters (Hohman-Caine and Goltz 1995:119).

Five ceramic varieties are defined (Hohman-Caine and Goltz 1995:120):

Plain Variety. No exterior decoration is present. Occasional net or cord-marking may be present on the lip. This variety occurs in both net-impressed and horizontally corded types. Both the present study and data from Roosevelt Lake Narrows suggest that this variety is more common on net-impressed than on horizontally corded types, although Lugenbeal's data shows similar percentages for both.

Cord-Wrapped Object (CWO) Stamped Variety. Cordwrapped object stamping is present on the vessel exterior in the form of oblique, horizontal, or vertical stamps or some combination. Similar stamping may also be present

on the vessel interior or, more rarely, the vessel lip. All three sets of data demonstrate that this variety is more common on Horizontally Corded Types, but to varying degrees of magnitude. This may relate to the fact that the same tool could have been used for the CWO stamps as well as for the cord marks.

Angled Stamp Variety. Typically, one horizontal row of vertically oriented angled stamps (sometimes referred to as punctates) is present on the vessel exterior. These are frequently made with a square object, but may be made with a round object. Angled stamps made with a cord-wrapped object are considered a part of the cord-wrapped object stamped variety. Interior or lip decorations, including incised lines, may be present in this variety. No definite trend between Net-Impressed and Horizontally Corded types is clear.

Incised Variety. Incised lines, typically oblique or vertical, are present on the vessel exterior. Data from Roosevelt Lake Narrows and Lugenbeal's study suggest that this variety may be more common on the Net-Impressed type.

Reed Stamped Variety. Circular stamps, made with a hollow circular object, such as a reed, are present on the vessel exterior. These may be arranged in any combination of horizontal, vertical, or oblique rows. This is a minor but consistent variety that seems to be confined to the Horizontally Corded type.

A number of other decorative treatments occur with low frequencies. These include circular punctates and linear or oval stamps. At the present time, no separate varieties are proposed for these.

A third type, Gull Lake Net Impressed, proposed by Neumann (1978) on the basis of sherds from one site (21CA58), was essentially incorporated into Birk's descriptions and later into Hohman-Caine and Goltz's work.

Hohman-Caine and Goltz (1995:117–118) also speculate on the original purpose of the netting, if not for ceramic production, and point out just how labor intensive making such fine netting would be, and how much finer the mesh is than would typically be needed for a fish net: "Obviously there was some function other than fish procurement for the manufacturing of this net. Impressions on restored Brainerd Ware vessels suggest that bag-shaped nets of similar size as the vessels were used. These may have been primarily carrying or storage bags with netting used essentially as a fabric type."

For Lake Carlos (21DL2), Gonsior et al. (1999:6.37) note that two vessels have an S cord twist, different from the more typical Z-twist. They also describe a rare parallel-grooved vessel that might be Avonlea-related and was dated at 1880 ± 50 B.P. (Gonsior et al. 1999:10.1).

Lithics

Brainerd-related projectile point types do not appear to be well defined. In general, the points have corner notches or expanding stems and show similarities to previous Late Archaic or possibly Early Woodland types, subsequent Middle Woodland types such as Snyders, and perhaps Plains types. The points appear by size and style to be dart rather than bow-and-arrow tips. Hohman-Caine and Goltz (1995:122) examined 30 points from a series of sites, finding a range of lengths from 27 to 45 mm. They describe points that are corner-notched/expanding stemmed, straight stemmed, broadly notched, or with shallow side notches.

Exotic lithic materials such as Knife River flint and Burlington chert are often reported at Brainerd sites. Hohman-Caine and Goltz (1995) also describe small to medium-sized scrapers in addition to square to rectangular wedges or woodworking tools.

For two sites, the complete lithic assemblage has been characterized. Shingobee Island (21CA28; Hohman-Caine and Goltz 1995:121–122) had two stratigraphically separated components, both with Brainerd ceramics. The lower component produced three Oxbow projectile points, two of siltstone and one of Knife River flint, plus a heavily reworked side-notched point of Knife River flint. Also found were several scrapers and several rectangular to square chisel/wedge tools. The upper component produced points made of Swan River chert that were similar to Duncan/Hanna points, as well as points made of Tongue River silica that were classified as Pelican Lake. The raw materials at Shingobee Island (Hohman-Caine and Goltz 1999) were predominantly local, with substantial use of lower-quality materials such as friable quartz cobbles and some coarser grades of siltstone. The presence of 18 cores plus hammerstones and abundant lithic debris indicates early stage lithic reduction. Utilized flakes, early and late-

stage bifaces, and two large chopping tools also were found. Later stages of lithic reduction, including tool sharpening and rejuvenation, reflect use of both local and nonlocal or exotic raw materials.

Seven wedge/biface tools from the site were described by Hohman-Caine and Goltz (1999:19):

> *Patterned, bifacially flaked tools having one or two sets of opposing edges exhibiting crushing/use wear and a roughly square or rectangular shape were placed in this category. While these kinds of artifacts are sometimes referred to as bipolar cores, the items placed into this category from the Shingobee Island site have a consistently narrow range of size and shape that contrasts with the few larger more irregular pieces previously categorized as bipolar cores.*
>
> *Similar tools have been noted at the LaSalle Creek site (Caine and Goltz [1995]) the Portage Creek Bridge site (Caine and Goltz 1998), and the Blueberry Lake Village site [Johnson et al. 1995] Several factors beyond the consistent size and shape lend additional support for considering these as finished tools rather than cores.*
>
> *First, they have been flaked well past the size where useable flakes could have been removed from them, thus negating their use as a core for flake production. Second, they are all potentially reducible into another patterned tool type, such as a small projectile point. The fact that they were not suggests that their present form was the intended product of knapping. All are of good quality material with no observable flaws. Several such tools are of Knife River Flint that does not require bipolar reduction. The edge wear suggests light repeated blows that produced wear, rather than removal of flakes.*
>
> *We suggest that these are most likely wood working tools used for splitting small diameter pieces of wood. These artifacts have been assigned to the Early Elk Lake Complex component.*

Almost 2,000 pounds (860 kg) of fire-cracked rock were recovered at Shingobee Island from only 13 m^2 of excavation, from a layer that was mostly less than 30 cm thick (Hohman-Caine and Goltz 1999:21). This fire-cracked rock was later used to define structures at the site.

At the LaSalle Creek site (21HB26; Hohman-Caine and Goltz 1995:122), in addition to four of the distinctive wedge-like tools of Knife River flint described above for Shingobee Island, there were also large end and side scrapers with a smooth, heavy polish that might be from hide fleshing.

Worked Bone, Antler, and Shell

None are identified in the literature.

Other Artifacts

Seven small pieces of worked copper were recovered from Shingobee Island (21CA28). One was a needle or pin-shaped object 9.3 mm long and 1.1 mm in diameter, pointed at both ends. The others were flattened fragments ranging from 4 to 26 mm in size, some folded several times. Most or all were attributed to the Early Elk Lake component at the site (Hohman-Caine and Goltz 1999:25).

2.6 Subsistence

Only two sites appear to have produced faunal remains found in context with Brainerd ceramics and identifiable to that component. At the LaSalle Creek site (21HB26; Hohman-Caine and Goltz 1995:112), remains including those of elk, deer, and dog were interpreted as representing a late summer through early winter occupation. At Shingobee Island (21CA28), Hohman-Caine and Goltz (1995:115, 1999) estimated that there were over 70,000 fragments of bone, well preserved though incompletely analyzed at time of the report. In the lower component, the remains represented at least five elk, three bison, and possibly one caribou and one turtle (Hohman-Caine and Goltz 1999:36). Remains from the upper component included deer, beaver, and otter. Many bones were described as complete, particularly carpals and tarsals, but long bones were fractured. There were articulated foot bones of elk and bison, some in pit features within the probable structure (Hohman-Caine and Goltz 1999:30–31).

Remains of fish and medium-sized mammals such as deer and beaver were reported from Blueberry Lake (21WD6), but they were not separated by component, so there is no way to distinguish what remains were associated with the Brainerd or the Sandy Lake occupation (Johnson et al. 1995:36).

With respect to plant resources, there is very little evidence regarding Brainerd-associated plant foods. One site has produced macrofloral remains, and several others have produced evidence of phytoliths from ceramic residues. The macrofloral evidence comes from Roosevelt Lake (21CA184), where flotation samples were processed from the living floor and elsewhere. Most of the seeds from the site were uncharred, and therefore were not attributable to the precontact occupation. Samples from the house floor, however, did contain charred plant remains, including seeds from some weedy plant species such as chenopods, which are possible sources of edible seeds; seeds from a number of edible fruits such as raspberry and strawberry; and shell from several types of nuts, including acorns and hazelnuts (Thompson et al. 1995:Figure 5.1).

Residues on Brainerd pottery from the same site produced evidence of starch grains, possibly from processing some kind of seeds; chenopod and amaranth were proposed as possible candidates (Thompson et al. 1995:5.14). Grass, possibly wild rice, was also indicated as a possible source for some phytoliths, though the phytoliths were not sufficient to support statistical analysis, and no macrofloral remains of wild rice were found (Thompson et al. 1995:5.14–5.15). Other observations on the nature of the residue include the suggestion that nut-oil processing was also taking place in some vessels. Thompson et al. (1995:5.16) suggest that based on phytolith evidence, the early Brainerd vessels were used for starchy nongrass seeds such as chenopods and amaranth, or possibly for nut-oil processing, but with some grass seeds being used. Justin suggests that by the end of the Brainerd occupation, wild rice had been introduced. The carbon isotope ratios of the residues increased steadily over the 1,000 years spanned by the residue dates at the site, and this could suggest increasing use of plants, particularly grass seeds, through time, though there was no stylistic change in Brainerd ware during this sequence (Thompson et al. 1995:5.6).

Phytoliths have been reported from residues on Brainerd sherds at a number of sites (Hohman-Caine and Goltz 1995; Thompson et al. 1994), with some researchers reporting wild rice and associated AMS dates. At Ogema-Geshik (21IC12), a Brainerd vessel produced wild rice phytoliths (Justin and Thompson 1995:12.2–12.3) and an AMS date of A.D. 60. At Palmer Pines (21HB19), wild rice phytoliths occurred in residues from net-impressed pottery (Justin and Thompson 1995:12.2–12.3). Gonsior et al. (1999:9.2) report numerous wild rice phytoliths from one sample from a Brainerd parallel-grooved vessel at Lake Carlos (21DL2). The sample was radiocarbon dated to A.D. 100. At the Cass Lake I site (21CA352), residues with wild rice on Brainerd Horizontally Corded ceramics were dated to between 700 and 800 B.C. (Hohman-Caine and Goltz 1995:127). Justin and Thompson (1995:12.3) argue that the earliest Brainerd manifestations precede the use of wild rice, which they say starts no earlier than A.D. 0—roughly when pollen evidence suggests an increase in wild rice in the region (though not necessarily an increase in its use). However, it appears that some of the residue dates with wild rice are older than A.D. 0.

Justin and Thompson (1995) contrast the use of wild rice at some sites with the evidence from North Twin Lake (21MH5) and La Salle Creek (21HB26), where there is little evidence of grasses, though there are starch grains that might reflect use of seeds such as chenopods, amaranth, and knotweed, or nuts that do not produce phytoliths. Some charred seeds of the above genera were found at Roosevelt Lake.

2.7 Mortuary Practices and Ideology

Brainerd ware has been found with both mound and nonmound burials in Minnesota, but the contexts and associations often are unclear. Brainerd Net Impressed pottery has been reported as a mortuary artifact from only one mound and one nonmound burial (Arzigian and Stevenson 2003). A Brainerd vessel was found in linear Mound 2c at Gull Lake Dam (21CA37; Johnson 1971a) and dated to 2160 B.P. (Johannessen 1998). The pot was in a subsoil pit with charred bone fragments resulting from either a deliberate cremation or accidental charring. Other features in the mound included secondary burials in subsoil pits or on the original ground surface. At the Carr Lake Burial site (21BL172), net-impressed Brainerd sherds accompanied a single nonmound burial, possibly a bundle burial, in a pit.

Brainerd ceramics also have been found in mound-related contexts outside of burial features. Wilford found a crushed, net-impressed bowl at King Mound (21CW2), although its original context is unclear (Arzigian and Stevenson 2003:366). It was beneath an elongated mound, about 14 feet east of the reported location of a mound burial exposed by construction. The vessel was probably on or near the original ground surface, but there were no associated features or human remains. Brainerd sherds also have been found in mound fill at other sites such as Gull Lake Dam (21CA37), Slininger (21NR1), and McKinstry (21KC2). These mound-fill ceramics might date underlying occupations that served as sources of mound fill, rather than the mounds or the burials themselves.

2.8 Social, Economic, and Political Organization

Although it is difficult to document specific Brainerd components at sites and therefore difficult to see evidence of trade or interregional communications, there is evidence for the use of Knife River flint at sites such as Horseshoe Bay (21CA201), La Salle Creek (21HB26), and Blueberry Lake (21WD6). Furthermore, the projectile point types, though not well defined, suggest some similarities to Plains types such as Hanna.

2.9 Cultural Relationships

Brainerd's relationship to Laurel remains subject to debate. Although the two manifestations occur together at some sites such as Third River Borrow Pit (21IC176; Mulholland et al. 1997), it is unclear whether one precedes the other or they overlap significantly, as the dates suggest. The same uncertainty also applies to Malmo and other Middle Woodland ceramics in Minnesota, LaMoille and other Early Woodland ceramics in Minnesota, Black Sand ceramics in Illinois and Prairie ware in Wisconsin, and ceramics of other Early and Middle Woodland cultures in the region.

There is a need to examine the relationship between Brainerd and Avonlea, a northern Plains ceramic type that begins about 1550 B.P. with early Avonlea, although the dates fall near the end of those for Brainerd.

Bakken (1994:108) points out that throughout the region, conoidal, wide-mouthed ceramic wares with horizontal cordmarking tend to be fairly early:

> *For example, roughly comparable wares discussed by Benn (1990)… include Crawford (ca. 2424 to 2021 BP, corrected dates), Valley (ca. 2021 to 1684 BP, first date corrected), and "middle" Fox Lake (within the period of ca. 2150 to 1450 BP). Comparable wares discussed by Gregg and Picha (1989) for the Naze site (32SN246) in southeastern North Dakota include unnamed Early Plains Woodland (2780 ± 80 to 2388 ± 44 BP) and Middle Plains Woodland (2035 ± 70 to 1760 ± 200 BP) ceramics. In southwestern Minnesota, comparable Fox Lake ceramics were dated to 2050 ± 80 BP (100 BC) (Anfinson 1979b; Hudak 1976).*

2.10 Demography and Settlement

Little is known about these aspects of the Brainerd complex. Some sites seem to have just a few Brainerd sherds at sites with other Woodland components, such as occurs at many of the Mille Lacs sites; other sites have substantial Brainerd components. This variation suggests that there might be multiple kinds of sites within the Brainerd settlement pattern, or that not all sites associated with Brainerd have abundant diagnostic ceramics.

Hohman-Caine and Goltz (1995:127) argue that Brainerd was highly adapted to the prairie-forest ecotone, and as that environment collapsed with late Holocene environmental changes and the entry of forests into the area, the complex also declined in that area, although it is unclear why the people did not simply move with the ecotone.

Only a few sites have any data on seasonality. For Shingobee Island (21CA28), Hohman-Caine and Goltz (1995:115, 1999) suggest that the site might represent a winter occupation, with the fire-cracked rock used for heating. Fauna from the lower occupation also have been interpreted as late fall/early winter, possibly representing the entire winter season. Data from the upper occupation suggest a shorter, late winter/spring occupation with deer, beaver, and otter (Hohman-Caine and Goltz 1999:32). At Roosevelt Lake (21CA184), the presence of berries and chenopods, purslane, and other weedy seeds suggests a warm-season, late-summer occupation, and the presence of nuts suggests a fall occupation. The faunal remains also imply warm-season occupation.

For Roosevelt Lake (21CA184), Justin and Thompson (1995:12.1) suggests the presence of a "living floor, possibly of a house or a lodge. The floor was composed of a layer of hard-packed sand, strewn with fire-cracked rock....The matrix of the sand contained many small flakes, burned bone fragments, and crushed fragments of pottery. In contrast to the houses described for Manitoba, this floor appeared to represent an area repeatedly re-used in multiple occupations." He also documented a midden adjacent to the hard-packed sand and described it as a "matrix of very dark, greasy soil which contained abundant cultural material. Pottery and bone were located more densely within this area than any other part of the site" (1995:12.2). It is difficult to envision a house floor repeatedly occupied for the span of several hundred years suggested by the Brainerd dates at the site, but perhaps it reflects a living surface used during one early occupation, with later materials added. Detailed fine-screen sampling was conducted on the floor, and one area contained a concentration of opal phytoliths of grasses, possibly *Phragmites* (giant reedgrass), sometimes used for matting material (1995:12.1), as well as phytoliths of a variety of deciduous, coniferous, and herbaceous plants. Interestingly, analysis of the sediments within the house floor area documented "extremely heavy use of silica-rich plants by the occupants of the floor feature. Sediments above and below the cultural horizon are virtually devoid of phytoliths" (Mulholland 1995:21). This pattern would tend to support the interpretation of this feature as a living surface.

At Shingobee Island (21CA28; Hohman-Caine and Goltz 1995:115, 1999), shallow pit features with large pieces of fire-cracked rock were identified as a possible house structure. Hohman-Caine and Goltz (1999:39) say that a "highly patterned discard of ceramics, lithics, FCR, faunal remains, and a complex of pit features was identified. This is interpreted as a house structure that was heated by hot rocks, rather than an internal hearth." They designated two features found in the eastern two-thirds of the lower levels and assigned to the Early Elk Lake occupation (1999:35–36). Feature A was

> *a complex series of overlapping pits and pit-like structures… marked most notably by a darker soil matrix and an extremely dense concentration of FCR. In form it resembles an irregular "trench" of varying width and depth. The southeastern end is difficult to precisely delineate due to merging with an area of continued extremely dense concentrations of FCR that do not appear to be in pitlike structures….*
>
> *This feature is interpreted as the outer perimeter of a structure with the exterior to the southwest and the interior to the northeast. The complex of pit-like structures appears to have served a variety of functions ranging from storage, disposal, and probably most significantly, receptacles for hot rocks, which were apparently used for heating the structure. Because of this function, they were continually re-dug and shaped, filled and emptied. This is evidenced by at least seven individual sub-pits that could be identified.*
>
> *The narrow section of the feature…, which lacks the pit-like character of the remainder of the feature, is interpreted as the probable location of a doorway opening. The discard patterns of several artifact types, most notably broken ceramics and small, fractured pieces of FCR as well as faunal remains support this interpretation.*

Feature B was another pit complex, with a central pit containing abundant FCR, faunal remains, and Brainerd sherds, with the pit presumably used to heat the structure.

2.11 Principal Sites and Property Types

Principal Sites

The following are principal sites reported for the Brainerd complex. They were compiled from the SHPO site database and from the Hohman-Caine and Goltz (1995) list of sites with Brainerd ceramics. Information on the multicomponent nature of each site is indicated where known.

21BK1	Mitchell Dam (Brainerd, Blackduck/Kathio)
21BL1	Schocker (Brainerd, Blackduck)
21BL2	Waskish (a few Brainerd sherds, also Laurel, Blackduck, Psinomani)
21BL88	Pimushe Boat Access site (Brainerd and Sandy Lake spatially separated)
21BL273	Kitchie Bay (single component, small occupation)

21CA1	Scott (Brainerd, Blackduck, Psinomani)
21CA2	Mud Lake (Brainerd, Blackduck/Kathio Psinomani)
21CA28	Shingobee Island (Late Woodland, but predominantly Brainerd, with two stratigraphically separated Brainerd components)
21CA38	South Pike Bay (Late Archaic through Late Woodland, but with a substantial Brainerd component, possibly horizontally separated components)
21CA58	Langer (Brainerd through Psinomani)
21CA184	Roosevelt Lake Narrows (Archaic through Sandy Lake, predominantly Brainerd but no stratigraphy)
21CA188	Felknor (Woodland with at least one horizontally separate Brainerd occupation)
21CA201	Horseshoe Bay (Paleoindian through historic Ojibwe with significant Brainerd component)
21CA226	Kelnhofer (single-component Brainerd)
21CE2	Hill Point [NRHP] (Brainerd, Middle Woodland, Blackduck)
21DL2	Carlos State Park (Early through Late Woodland)
21HB26	LaSalle Creek (single component, short-term occupation)
21IC1	White Oak Point [NRHP] (Brainerd through Psinomani)
21IC2	Osufsen (Brainerd, Blackduck)
21IC16	Inger (Brainerd, Blackduck)
21IC176	Third River Borrow Pit (Brainerd, Laurel)
21KC1	Nett Lake (Brainerd, Laurel, Blackduck)
21KC2	McKinstry [NRHP] (Brainerd, Laurel, Blackduck, Psinomani; habitation, mounds)
21MH5	North Twin Lake (Brainerd through Psinomani)
21NR29	Mooney (Archaic, two Late Woodland settlements, with some Brainerd sherds)
21OT51	Dead River (Brainerd, Blackduck)
21WD6	Blueberry Lake (Brainerd, Laurel, Psinomani)

Property Types

Based on the existing literature, these property types should exist for the Brainerd complex.

Habitation sites: Shingobee Island (site 21CA28) might be a fall/winter habitation with evidence of large-mammal remains and possible structures.

Resource procurement and processing sites (e.g., quarry site, fishing camp): With the limited excavation data available, no such sites can be identified reliably at present, but they should exist.

Special-use sites: These sites could encompass a range of special activities but have not yet been defined for Brainerd.

Mortuary sites–mounds: A number of these have been documented and excavated, such as Gull Lake Dam (21CA37).

Mortuary sites–nonmound: The Carr Lake Burial (21BL172) was a nonmound burial in a pit with Brainerd ceramics.

2.12 Major Research Questions for the Brainerd Complex

In addition to the statewide research themes identified above, the following are some important directions for future research for the Brainerd complex:

Chronology. The primary question to be resolved with Brainerd is dating—Is Brainerd really as old as the dates on ceramic residues suggest? If so, it becomes one of the earliest Woodland manifestations in the Midwest and takes on critical importance for our understanding of the transition between the Archaic and Woodland traditions. However, the

existing dates are problematic. The earliest are significantly older than those associated with other Early Woodland ceramics, but the latest dates extend into the Middle Woodland period, producing a range of over 1,500 years for a ceramic type that shows only minimal changes during this period. Careful evaluation of the residue dates should be undertaken, as has been done recently for some residue dates from New York, Pennsylvania, Michigan, Wisconsin, and Kentucky (Hart and Lovis 2007). The "reservoir effect" should be specifically evaluated to see whether residues have been affected either by local groundwater or by fish from those waters that have incorporated old carbon. Both possibilities have been suggested by Mulholland et al. (1997:61), Gonsior et al. (1999:6.37), and others, although Hart and Lovis found no effect in their samples. Are residue dates affected by the geographic source of the residue? Areas such as northeastern Minnesota with granites, igneous rocks, and non-calcareous till might be less likely to generate groundwater with old carbon than areas with limestone bedrock or calcareous till. Plotting the geographic distribution of the dates to see how they cluster might reveal patterns associated with bedrock or parent material. Alternatively, was there contamination from the ceramic paste in the pot if residues were removed with some paste adhering to or incorporated into residues in the cooking process?

Multiple additional dates are needed from single-component sites (or from confirmed Brainerd features) from both residue and non-residue samples, to confirm dating, to confirm the very long time frame reported for the complex, and to further test the hypothesis that there is a significant difference between residue and standard charcoal dates. The range of dates from an apparently single-component site should be examined to test the reliability of dates. Finally, any evidence of stratigraphy needs to be carefully examined in light of the new dates to see if more refined interpretations can be generated.

The Brainerd complex beyond ceramics. Most Brainerd pottery seems to occur at sites that also have other ceramic wares, making it difficult to determine the nature of the Brainerd complex beyond its ceramics. Are there changes in lithic tools, raw material usage, or lithic debris profiles during this period? What subsistence strategies are operating? How do they differ from Archaic sites? Single-component sites or spatially separable components at multicomponent sites are needed to evaluate the rest of the complex.

Ceramics. If Brainerd is actually as early as the dates indicate, then some differences in technology should be apparent between the Brainerd sherds and others at a site, beyond differences in decorative technique and surface treatment. Even if the same local clay sources were used, some manufacturing differences should exist, particularly if Brainerd is the earliest pottery and people were just learning what to do with the clay. Hohman-Caine and Goltz (1995) emphasize Brainerd's distinctiveness in their description of paste and manufacturing techniques, which they see as different from those of later ceramics. Thin-section analysis, spectrographic analysis of temper and paste characteristics, and study of other unique signatures of ceramics (clay source, temper types, firing temperatures, etc.) might be useful for comparing Brainerd with other sherds from the same sites, as well as comparing Brainerd sherds from multiple sites. If a widespread, consistent manufacturing pattern existed, there should be greater similarity within the Brainerd sherds, and greater differences between Brainerd and those of later non-Brainerd occupations. If Brainerd and later sherds within one site are more similar, this would suggest more contemporaneity of Brainerd with other later pottery types.

3 THE SOUTHEAST MINNESOTA EARLY WOODLAND COMPLEX, 500–200 B.C.

3.1 Introduction and Overview

The Southeast Minnesota Early Woodland complex is characterized by La Moille Thick ceramics that are similar to other Early Woodland ceramics such as Marion Thick in Wisconsin and Illinois. There are only five sites in Minnesota with ceramics that connect them to this complex, and little is known about the rest of the complex. Sites are currently known only from riverine settings in the southeastern and south-central part of the state, along the Mississippi River and its tributaries, such as the Minnesota and Blue Earth. It is unclear whether mounds are associated with the complex. The absence of a substantial or well-defined Early Woodland complex in southeastern Minnesota might reflect the gradual nature of the transition between Archaic and Woodland in this region, and the probable persistence of Archaic lifeways with the addition of ceramics that reflect intermittent contacts with other regional cultures.

3.2 Environmental Setting and Geographic Distribution

All five reported sites for the Southeast Minnesota Early Woodland complex are within the Mississippi River basin (Figure 5). Three of the sites are in the Mississippi River valley, and the other two are in the Blue Earth watershed, tributary to the Minnesota River, which joins the Mississippi River above the Schilling Archaeological District. The known sites show a strong riverine orientation, with three found on islands, one on an isthmus, and one in a rockshelter in the bluffs along the Mississippi Valley. Based on maps of presettlement vegetation (MnDNR–MIS Bureau 1994), there is also a strong riverine or wetland focus to the surrounding vegetation: Kunz (21WW8) is adjacent to Big Woods, prairie, and wet prairie overlooking a river bottom; Enno Schaeffer (21FA104) is adjacent to wet prairies and marshes; and the other three sites are within or near river-bottom forests.

With regard to the Ecological Classification System (MnDNR–Division of Forestry 1999), three of the five sites are within the Eastern Broadleaf Forest province, along the Mississippi River valley. Two of the sites are in the Paleozoic Plateau section, Blufflands subsection (La Moille Rockshelter, 21WN1; NSPII, 21GD59), in the Southeast Riverine East SHPO archaeological region. A third site (Schilling, 21WA1) is just to the north in the Minnesota and Northeast Iowa Morainal section, St. Paul–Baldwin Plains subsection, or the Central Lakes Deciduous East SHPO archaeological region. The remaining two sites (Kunz and Enno Schaeffer) are in the Prairie Parkland province, North Central Glaciated Plains section, Minnesota River Prairie subsection, which is in the Prairie Lake South archaeological region. Kunz is on the Watonwan River, and Enno Schaeffer is on the Blue Earth River; both rivers are in the watershed of the Blue Earth River, which joins the Minnesota River at Mankato.

Other sites in Minnesota are reported to have an Early Woodland component, but in most cases the diagnostic sherds are Brainerd. However, it is possible that additional La Moille Thick sherds are present but unidentified in extant collections.

3.3 Past Research

The major excavated component for the Southeast Minnesota Early Woodland complex comes from the La Moille Rockshelter (21WN1), located in bluffs lining the Mississippi River valley, in a rockshelter exposed during construction of Highway 61 and excavated by Wilford in 1939. By that time, large portions of archaeological deposits might have been removed or disturbed, and a local resident had excavated a trench through some of the deposits. Wilford documented 15 feet of a stratified sequence of occupation that included a Late Archaic assemblage at the bottom and an early Woodland deposit on the top, marked by a reconstructable pot found in the upper levels (Wilford 1954c, 1955b). Excavation was by hand in 1-foot levels, with all material screened. Leland Cooper located additional sherds of the vessel in a private collection and reconstructed it (Hudak and Johnson 1975:1). Hudak and Johnson (1975) first defined the La Moille Thick ceramic type based on this vessel. The rockshelter analysis does not tabulate the abundant faunal remains and lithics by specific levels, and Wilford (1954c:20) notes that there were few artifacts, and that no distinctive changes through time could be identified. Several hearths were identified in the deposit.

Other sites have reported La Moille Thick sherds, as documented in Anfinson (1979f), but there have been no extensive excavations of single-component sites with Early Woodland La Moille Thick ceramics.

Though there are few sites in Minnesota, regional expressions of Early Woodland have shaped our inferences about the complex. Dobbs and Anfinson (1990:116) report:

> *In 1946, James B. Griffin proposed the classic Early-Middle-Late Woodland sequence for the archaeological cultures of the eastern deciduous forest region (Griffin 1946). Griffin described several characteristics of the Early Woodland portion of this sequence. One of the most distinctive aspects of Early Woodland was the first appearance of pottery, specifically the "thick" sequence of ceramics wares, including Fayette and Marion Thick. In addition, Griffin (1946:43–59) included tubular pipes, bar gorgets, stemmed and notched points, birdstones, boatstones, three-quarter grooved axes and celts, and burial mounds in the complex. It is often assumed that corn horticulture and (perhaps) the transition toward a more sedentary form of life is apparent in Early Woodland complexes.*

Other interpretations about the complex are derived from complexes in adjoining states that share similar thick ceramics, such as Marion Thick in Wisconsin and Indiana (Griffin 1952:97–98; Helmen 1951:4–5). The Indian Isle phase (Stoltman 1990) defined for southwestern Wisconsin might be an appropriate phase for developments in southeast Minnesota along the Mississippi River based on its proximity to Minnesota and its similar ceramics with thick crushed-rock temper and interior and exterior cord-roughening. Indian Isle marks the earliest appearance of pottery in that region, with Marion Thick vessels occurring about 500 B.C. Limited radiocarbon dates and stratigraphy suggest that the Indian Isle phase precedes the Early Woodland Prairie phase, which has Prairie ware ceramics similar to Black Sand and related types. An uncalibrated date associated with ceramics from a site in Prairie du Chien (Clam Shell Point, 47CR187) that appear to be Marion related is 10 ± 80 B.C. (WIS1291) (Stoltman 1990:244), predating the Prairie phase. Straight-stemmed Kramer points appear to be earlier than the contracting-stemmed Waubesa points found with the Prairie phase ceramics. At the Fisher Mound (47VE825) site complex in Stoddard, Wisconsin, which lies within the floodplain of the Mississippi River across from Houston County, Minnesota, Indian Isle ceramics were found on the edge of a terrace that once would have been part of a complex terrace and backwater system in the Mississippi River floodplain (Arzigian 2008).

In 1986 Gibbon reviewed the status of the concept of Early Woodland in Minnesota and argued that "it is probably meaningless to talk of an Early Woodland period for Minnesota" because of the limited number of thick sherds and the apparent absence of a coherent complex associated with the pottery (1986:89). Dobbs and Anfinson (1990:117) suggest that Gibbon's conclusion might be premature but acknowledge that "It reinforces, however, the need to differentiate between the content of archaeological complexes and the chronology of these complexes."

3.4 Chronology

There are no radiocarbon dates on La Moille ceramics from Minnesota. Instead, interpretations have been extrapolated from dates obtained from sites in other states, but the connection and appropriateness of these dates for Minnesota are unverified. Anfinson (1979f) suggests Early Woodland dates of 500–300 B.C., with the earlier date based on dating of similar ceramics elsewhere in the Midwest, and the end date based on the stratigraphic position of La Moille ceramics at La Moille Rockshelter (21WN1). Gibbon (1986) argues that the dates are likely to be more recent, at 200 B.C.

In Wisconsin, three dates from hearths or fire pits beneath mounds at the Hilgen Spring Park Mound Group (47OZ7) are 460 ± 55 B.C., 525 ± 65 B.C., and 840 ± 65 B.C. (Kehoe 1975:346); however, the artifacts came from mound fill, so the association of the dates with specific ceramics is unclear. Hudak and Johnson (1975:2) provide dates from other Midwestern states that might be comparable: Leimbach in Ohio (520 ± 310 B.C., M-1524); the Sheets and Larson sites in Illinois (560 ± 100 B.C.); and the Schultz II site in Michigan (530 ± 150 B.C.). The Jean Rita site in Illinois has a date of A.D. 34 on bone that Hudak and Johnson (1975:2) suggest reflects contamination. In Wisconsin, limited radiocarbon dates and stratigraphy suggest that the Indian Isle phase with its thick ceramics precedes the Prairie phase. An uncalibrated date from Clam Shell Point (47CR187), associated with ceramics that appear to be Marion related, is 10 ± 80 B.C. (WIS1291) (Stoltman 1990:244), predating the Prairie phase.

3.5 Technology and Material Culture

Except for limited numbers of sherds and a reconstructed La Moille Thick vessel, the material culture of the Southeast Minnesota Early Woodland complex is poorly known.

Ceramics

La Moille Thick is related to Marion Thick from Illinois and Wisconsin and other regional types. Wilford (1954c) and Hudak and Johnson (1975) describe the reconstructed vessel from La Moille Rockshelter. It has coarse grit temper and as reconstructed is 32 cm high and 27.4 cm wide at the mouth, tapering from mouth to base, with a small, slightly convex base. It has a flattened lip, a straight rim and body, and a vessel capacity of about 8 liters. The vessel walls are 10 mm thick, and there are three pairs of drilled holes that appear to be mend holes. The exterior has distinct vertical to oblique cordmarking, and the interior has horizontal to oblique cordmarking. The exterior might be a rolled cordwrapped stick impression (Hudak and Johnson 1975). The reconstructed vessel also has a series of 16 fingernail impressions perpendicular to the lip, placed 5 cm below the lip on the exterior, and eight groups of five punctations 5–13 mm apart on the lip, with the groups 38–80 mm apart (Anfinson 1979f:115).

In Wisconsin, the type Marion Thick, comparable to La Moille Thick, precedes the Black Sand–related Prairie wares in southwestern Wisconsin. At the Fisher Mound (47Ve825) complex in Stoddard, Indian Isle ceramics show similarities to Marion Thick, in terms of their cord-roughened exterior and interior their and coarse crushed-rock temper; however, some vessels also suggest some blending with later traditions, such as those with similar exterior and interior decoration and surface treatment, but also sand temper more typical of the later Prairie Phase (Arzigian 2008). This type of crossover suggests that other components or variants of La Moille ceramics might exist in Minnesota and might be related to this earliest Woodland complex but might not always be immediately recognized, or could be attributed to other complexes.

Lithics

Specific lithic assemblages have not been identified for this complex. Anfinson (1979f:115) notes that all the points at the La Moille Rockshelter were recovered from levels below the La Moille Thick sherds, with the only straight-stemmed point coming from one of the lower levels, and side-notched points coming from middle levels. In Wisconsin, Kramer stemmed points are often found with Indian Isle and Marion Thick ceramics.

Worked Bone, Antler, and Shell

Although Wilford (1954c) describes worked bones from La Moille Rockshelter, his published report does not provide their provenience, so that they cannot be attributed to either the Archaic or the Woodland occupation.

Other Artifacts

To date, there is little information on other artifact types for the Southeast Minnesota Early Woodland complex.

3.6 Subsistence

Except for faunal remains at La Moille Rockshelter, there is little information on subsistence for the Southeast Minnesota Early Woodland complex. Even at La Moille, the Early Woodland component was not separated from the other Archaic and Woodland deposits, leaving little that can be specifically attributed to this component.

La Moille Rockshelter had abundant faunal remains, and charcoal from hearths that probably would have had floral remains in addition to wood charcoal, but the site was excavated prior to the advent of flotation. Wilford (1954c:23) and Hudak and Johnson (1975:1) describe the La Moille Rockshelter as a fishing camp, and Wilford reports numerous fish and mammal bones, clamshells, turtle bones, and charcoal, with fish more common than mammal bones, particularly in the deeper deposits (Wilford 1954c:20).

No specific information on floral remains or plant use is available for this complex.

3.7 Mortuary Practices and Ideology

No mortuary sites are known to be specifically associated with the Southeast Minnesota Early Woodland complex, though mounds are present at some of the sites that have produced La Moille ceramics, such as the Schilling site (21WA1) and NSP II (21GD59).

3.8 Social, Economic, and Political Organization

The few La Moille Thick sherds found in isolated contexts or within multicomponent sites provide little information on social, economic, or political organization. However, it is likely that the seasonally mobile hunter-gatherer bands that characterized the Archaic continued. The nature of any social changes with the incorporation of pottery is an area for future research.

3.9 Cultural Relationships

Current perspectives on regional interaction come from observations of similar ceramics elsewhere in the Midwest, predominantly east of the Mississippi River (as reported by Hudak and Johnson 1975:1), associated with the Indian Isle phase in southwestern Wisconsin and the Ryan phase in northeastern Iowa (Benn 1979). These similar ceramics include Marion Thick in Wisconsin (Mason 1964; Stoltman 1990), Iowa (Logan 1976), Indiana (Helmen 1951), and Illinois (Griffin 1952); Fayette Thick ceramics in Kentucky and southern Ohio (Griffin 1943:667–672); Schultz Thick in Michigan (Fitting 1972:142–147); and Leimbach Thick in north-central Ohio (Shane 1967:106–109). Similar pottery is also reported from the Sheets and Larson (Munson 1966) and Jean Rita (Linder 1974) sites in Illinois. Vinette I in New York (Ritchie and MacNeish 1949:100, 119) might also be related. Later ceramics such as Fox Lake Trailed in southwestern Minnesota might have been derived from La Moille ceramics (e.g., Anfinson (1987:115). Information is not yet sufficient to evaluate the nature of the cultural relationships reflected by these ceramic similarities.

3.10 Demography and Settlement

Little information is available on these topics for the Southeast Minnesota Early Woodland complex. Early Woodland ceramics so far have been found in a rockshelter and along the main Mississippi River valley, as well as in the interior, in tributary streams and rivers. There is insufficient information to speculate further about settlement patterns, although it is likely that people moved seasonally to exploit available resources, as documented elsewhere for Archaic and Early Woodland populations (for example, Theler and Boszhardt 2003).

3.11 Principal Sites and Property Types

Principal Sites

The following are the only sites with La Moille ceramics specifically identified (compiled from Anfinson 1979f). Other sites are identified as Early Woodland in the OSA database, but they generally report Brainerd pottery if they list any specific ceramics.

21FA104	Enno Schaeffer (single component)
21GD59	NSP II (Early Woodland, Late Woodland)
21WA1	Schilling [NRHP, part of the Schilling Archaeological District] (Early through Late Woodland, Oneota; habitation and mounds)
21WN1	La Moille Rockshelter (multicomponent stratified Archaic and Woodland)
21WW8	Kunz (La Moille ceramics from surface collection; also Fox Lake, Lake Benton, Plains Village)

Property Types

As with other complexes, it is likely that both mortuary and nonmortuary sites exist, though subdividing the sites is particularly difficult with this complex. Property types that are likely to exist include:

Habitation sites: These are likely to be the most common sites identified, but none have been sufficiently excavated to describe what might be expected. At least one site is in a rockshelter (La Moille Rockshelter, 21WN1). The Schilling site (21WA1) is a habitation site near mounds, but the extent of any Early Woodland occupation is unclear.

Resource procurement and processing sites: None are known. The La Moille Rockshelter (21WN1) was described by Wilford as a fishing camp but seems to have an artifact assemblage more typical of a habitation site than a specialized fishing site.

Special-use sites: None have been identified.

Mortuary sites: No nonmound burials have been reported. Two sites, Schilling (21WA1) and NSP II (21GD59), have mounds, but their cultural contexts or association with La Moille ceramics or an Early Woodland occupation is unknown. Perhaps future information might make attribution to this complex possible.

3.12 Major Research Questions for the Southeast Minnesota Early Woodland Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Southeast Minnesota Early Woodland complex:

Dating. There are no La Moille Thick dates from Minnesota, but tight association of dates with La Moille ceramics is essential to understanding chronology and how La Moille relates to other possible early ceramics such as Brainerd and to Fox Lake Incised ceramics.

Material culture. Virtually every aspect of this complex remains poorly known. Any single-component or separable occupation that could be identified for this complex would facilitate at least a basic understanding of the material culture and other aspects of the complex. Complete analysis of the artifacts and subsistence remains from La Moille Rockshelter would permit some basic separation of the Early Woodland component from the Archaic occupations, and would provide information on subsistence and lithic technology. Since all but three sherds from the rockshelter were from the La Moille vessel (Wilford 1954c:22), the distribution of sherds could be used to separate out this component for more detailed analysis.

Nature of the "Early Woodland" transition. Gibbon (1986:89) argued that how archaeologists define the concept of Early Woodland will affect our understanding of this complex. Is Early Woodland "the incidental addition of ceramics and a few new lithic types to an essentially stable Archaic lifeway"? Is it an Archaic florescence? A new technological stage marked by ceramic manufacture? Or an indicator of the emergence of "a new Woodland lifeway based on marked shifts in settlement-subsistence practices and burial ceremonialism"? Substantial separable components at stratified Archaic and Woodland sites would be important in documenting how cultures changed with the introduction of pottery.

4 THE HAVANA-RELATED COMPLEX: Middle Woodland in Central and Eastern Minnesota, 200 B.C.–A.D. 200/300

4.1 Introduction and Overview

The Havana-related complex fits within the more broadly defined Lake Forest Middle Woodland tradition (Fitting 1970:129–142), which in Minnesota also includes Laurel. Within the Havana-related complex there may be temporal, spatial, and cultural variation as well as variations in how different peoples interacted with people outside Minnesota. This complex incorporates the currently defined Havana-related Howard Lake, Sorg, and Malmo contexts in central and eastern Minnesota. Howard Lake is the northernmost regional variant of Havana Hopewell from the Central Illinois River valley and the "Hopewell Interaction Sphere," with Havana connections or influence evident in ceramic, lithic, burial, and subsistence-settlement traits (Gibbon et al.1993:5.2), and with sites concentrated in the Anoka Sand Plain. The Sorg phase was originally defined from sites along Spring Lake, a Mississippi River floodplain lake in Dakota County, that had Havana-like ceramics and lithics (Anfinson 1979g). Malmo was originally defined as a local Middle Woodland ceramic phase in Mille Lacs that displayed some ceramic similarities to Havana pottery.

It is likely that the relationship of Minnesota sites to the broader Havana culture is variable, with one extreme being Howard Lake sites along the Mississippi River Valley—for example, the Indian Mounds Park site (21RA10) in St. Paul, which contained burials with limestone crypts and exotic artifacts that included a perforated bear canine and hammered copper, although there were no associated ceramics. At the other extreme would be Malmo complex sites with just a few ceramics that show general similarities to Havana. According to Gibbon and Hohman-Caine (1980:60),

> *Cultural similarities among "Lake Forest Middle Woodland: complexes in eastern Minnesota seem the result of a shared, diffuse hunter-gatherer adaptation to a common northwoods environment and the adoption of some widespread Middle Woodland horizon markers, rather than the result of participation within a tightly integrated intraregional exchange system.*

Gibbon et al. (1993:5.2) argue that "The preferable term when discussing broad-based regional developments in our region,…is Havana, for the term directs attention to the entire life way of 'Havana' people rather than to one spectacular aspect (the 'Hopewellian') of this life way."

The Havana-related lifeway is poorly understood in Minnesota but seems to involve manufacture of grit-tempered ceramics that have flat or rounded, sometimes beveled lips and are decorated with punctates, bosses, incised lines, slashes, cordwrapped-stick impressions, and dentate stamping. Within Havana-related ceramics, distinct differences are apparent between Howard Lake, Malmo, and Sorg, but it is unclear how to interpret this variation in terms of the associated cultures. Lithics include small notched and stemmed points, such as some Snyders-like and Manker points. Lithic raw materials are predominantly local but sometimes include exotic raw materials such as obsidian, Hixton silicified sandstone, and Knife River flint.

Burials are often in mounds, though nonmound burials are also known. Some mounds are large and include secondary or primary burials and cremations, sometimes with log or stone tombs or coverings, and often with no grave goods. Exotic or special burial artifacts are rare but can include galena, copper, and perforated bear canines. Subsistence and settlement practices are poorly known, but comparison to other Havana-related complexes suggests a pattern of seasonal mobility, with larger summer villages and dispersed winter camps. Unlike the riverine adaptation seen in Havana cultures in Illinois, the Minnesota sites are located in more mixed habitats, including areas of wet prairies and oak openings, often bordered by mixed deciduous forest.

Gibbon argues that the complex may have changed through time, though we do not yet have sufficient information to properly evaluate it (Gibbon et al. 1993:5.18–5.19):

> *It is possible that the majority of Havana-related material in the deciduous forest zones of this southeastern area, and particularly those materials in the expanded deciduous forest zones in the north of this zone, may represent the archaeological manifestations of a single society whose lifeway gradually changed over time. Havana-related materials may span the entire 200 B.C.–A.D. 200/300 period traditionally given for the Havana*

tradition in Illinois. A recent radiocarbon date of 110 B.C. for a Havana-related pottery vessel from the Sandon site south of Mankato along the Blue Earth River, for example, documents an early presence of Havanoid material in the state, and Sorg phase materials may document a late transitional phase to early Late Woodland phases. In this interpretation, the Howard Lake and Sorg phases mark temporally distinct segments of a developmental sequence. It does not matter here whether this interpretation is correct or not. The point is that Howard Lake phase materials and Havana in Minnesota in general are too poorly known at the present time to assess the reliability of Howard Lake as a taxonomic unit.

4.2 Environmental Setting and Geographic Distribution

The different ceramics within the Havana-related complex have somewhat different geographic distributions, related at least in part to their degree of association with Havana cultures to the south. Havana-related ceramics are reported at 73 sites from the Twin Cities southward along the Mississippi River through Dakota, Washington, and Goodhue Counties (Dobbs and Anfinson 1990) (Figure 6). Anfinson's (1979d) map shows the widespread distribution of Havanoid ceramics throughout the Midwest, overlapping with southeastern Minnesota, and extending up the Mississippi River valley. Hopewell influence is strongest at sites such as Indian Mounds Park (21RA10; Johnson 1957). Less pronounced connections to Hopewell are apparent for sites such as Sorg (21DK1), which is downriver from Indian Mounds Park, but the chronological and cultural relations between Sorg and Howard Lake are unknown. Farther downriver, the Trempealeau area in Wisconsin has strong Havana connections (McKern 1931), suggesting possible routes for travel or trade from Illinois along the Mississippi River. However, there are at least some Havana-related influences further to the west. Anfinson (1997:58–59) describes some Havana-related sites in the Prairie Plains province, including Heymans Creek in Nicollet County, but notes that other Hopewell influences in the area are rare, with only one sherd from the Johnson site (21JK1) in the U of M collections from southwestern Minnesota. That sherd has cordwrapped-stick impressions on the upper rim and curvilinear trailed lines on the lower rim. Johnson (1994:3.46–3.48) documented the Havana-related ceramics in Sherburne, Stearns, Meeker, and Kandiyohi Counties.

The principal concentration of Howard Lake ceramics and sites is in southern east-central Minnesota, particularly on the southern edge of the Anoka Sand Plain and along Rice Creek . It includes the Howard Lake Archaeological District surrounding Howard Lake in southeastern Anoka County (Anfinson 1979d; Dobbs and Anfinson 1990; Flaskerd 1943, 1944; Gibbon and Hohman-Caine 1980:59; Wilford 1937a, 1955a). Sites include A. H. Anderson (21AN8) and Howard Lake (21AN1; Harrison et al. 1977), the type sites for the phase, as well as the Long Lake site (21HE100) in Hennepin County.

Sorg ceramics are more common in the northern portion of southeast Minnesota (Johnson 1959). Most of these ceramics come from a cluster of sites along the shores of Spring Lake south of St. Paul, including Hamm (21DK3), Bremer (21DK6), Sorg (21DK1), and a rockshelter, Lee Mill Cave (21DK2). The Harvey rockshelter (21WA22) also has Sorg materials and is located on the lower St. Croix River. Other sites with Sorg ceramics are found on beach ridges or terraces above the Mississippi floodplain (Anfinson 1979g:197). St. Paul, overlooking the Mississippi River, includes the only excavated Hopewell burial mound in Minnesota, at Indian Mounds Park (21RA10; Gibbon et al. 1993:5.16).

Malmo ceramics are more widely distributed, occurring around Mille Lacs Lake and over much of central and eastern Minnesota, from Mille Lacs west across the Gull Lake area to the lakes in Ottertail County and into the prairies. Surface collections from this area, as reported by Gibbon and Hohman-Caine (1980:59) and Gibbon et al. (1993:5.16), suggest that the Anoka Sand Plain was an important population center at this time and also document additional Havana-related sites along the major rivers such as the St. Croix (up to Stillwater), the Blue Earth, the Minnesota (to Mankato), and the Mississippi (to St. Cloud). Havana-related ceramics and Snyders corner-notched points are reported on the surface or mixed with other components in subsurface deposits (Gibbon et al. 1993:5.16), and with some ceramics reported at the Humphrey site (21FA1) in Faribault County. Further, "The recent discovery of a Howard Lake–like vessel in northwestern Wisconsin also suggests that the distribution of these complexes may be far more widespread than has been assumed" (Dobbs and Anfinson 1990). Gibbon et al. (1993:5.17–5.18) point out that Havana-related pottery and points are found at many other sites besides the Howard Lake and Sorg type sites in Anoka and Dakota Counties, but these additional sites were not included when the Howard Lake and Sorg phases

were originally defined, thus leading to underestimation of the distribution of Havana-related occupations in Minnesota. The statewide database of archaeological sites lists many "Middle Woodland" sites that might fall within this complex if large enough samples of their ceramics were reexamined.

In terms of their environmental settings, Havana-related sites generally are found in the southern hardwood forests, oak savannas, and true prairies in southeastern Minnesota (Gibbon and Hohman-Caine 1980:58). Gibbon and Hohman-Caine also point out that "The locations of these [Havana-related] components suggest that they represent cultural adaptations to major riverine environments or to complex niches composed of wet prairies, marshes, sloughs, oak openings and barrens, and aspen-oak woods in the Anoka Sand Plain" (1980:59). Within the Ecological Classification System (Mn DNR–Division of Forestry 1999), 40 of the 73 sites (55%) are in the Eastern Broadleaf Forest province, mostly in the Minnesota and Northeast Iowa Morainal section (33 sites, 45%). The Laurentian Mixed Forest province has 30 sites (41%), split between the Western Superior Uplands (17 sites), the Northern Minnesota Drift and Lake Plains (12 sites), and the Northern Superior Uplands (1 site). Three sites (4%) are in the Prairie Parkland province. In terms of the SHPO archaeological regions (Anfinson 1990), the same focus on deciduous-forest environments is seen, with 46 sites (63%) in the Central Lakes Deciduous region, mostly in the East subregion. The Central Lakes Coniferous region and the Southeast Riverine region each have 11 sites (15%), and the Prairie Lake region has 4 sites (5%).

Gibbon et al. (1993:5.9) and Hruby (1977) focus on the Anoka Sand Plain as the center of Howard Lake and argue that the Howard Lake phase is unlike other Havana-related complexes in that it is an adaptation not to a riverine floodplain habitat but to wet prairies, lakes, and oak openings bordered by mixed deciduous forest and aspen-oak openings. Looking specifically at Howard Lake sites, 16 of the 18 sites (89%) are in the Eastern Broadleaf Forest province, with most of them in the Central Lakes Deciduous East archaeological region (15 sites), and one site in the Southeast Riverine West archaeological region. The other two sites are in the Laurentian Mixed Forest province and the Central Lakes Deciduous South archaeological region (11%).

Malmo is found within the transition zone between the Eastern Broadleaf Forest and Laurentian Mixed Forest provinces, with 36 of the 38 sites split between the Central Lakes Deciduous (24 sites) and Central Lakes Coniferous (12 sites) archaeological regions, and the remaining two sites in the Southeast Riverine archaeological region. Sites with Malmo ceramics, including some large burial mounds, are also found to the north in Isanti County and expand the settings of the larger Havana-related complex to include riverine settings and oak openings.

4.3 Past Research

The Havana-related complex encompasses a number of ceramic types, most of them poorly defined; cultural adaptations, defined primarily in terms of their relation to Hopewell and Havana cultures; and mortuary practices, often poorly dated. Specific research has focused on limited excavation at some key sites and tabulation of the presence of ceramic types in surface and limited excavation contexts, but few major excavations have been undertaken, and none at sites with good organic preservation. Thus, our knowledge of these cultures is very limited. Further, the individual elements integrated here into "Havana-related" reflect an uneven mixture of ceramic types and cultures.

Excavations at Indian Mounds Park (21RA10) have provided the strongest indications of Hopewellian influence in Minnesota. This group of 18 mounds (15 circular, two biconical, and one oval) were on a bluff overlooking the Mississippi River in St. Paul, in an area affected by development even by the mid-1800s. Sixteen of the mounds were excavated in the 1800s: local antiquarians explored four (Mounds 3, 5, 8, and 9) in the 1850s and 1860s; and T. H. Lewis later excavated one of those same mounds (Mound 3) plus 12 others (1, 4, 6, 7, and 10–17). All of the excavated mounds contained human remains (Arzigian and Stevenson 2003:472–477). Although the site probably spans several centuries or even millennia, burial treatment and exotic artifacts recorded for several mounds, including limestone crypts, galena, hammered copper, and a perforated bear canine, suggest that at least some of the mounds reflect Hopewellian influence, although there is no information on any diagnostic ceramics.

The Howard Lake phase exhibits less direct Havana-related connections, revealed primarily in Havana-like ceramics. Gibbon et al. (1993) have synthesized current understanding of Howard Lake, particularly as found in the Anoka Sand Plain, with reference to comparisons with contemporary or related cultures in Wisconsin (especially the Trempealeau phase).

Wilford (1937a, 1941) first described the Howard Lake focus on the basis of work at the A. H. Anderson (21AN8) and Malmo (21AK1) sites, but after working at Howard Lake (21AN1) in 1950, he reassigned the focus to a Hopewellian phase based on the ceramics (Gibbon et al. 1993:5.7–5.8; Wilford 1955b). Howard Lake ceramics have been found at the type sites and others in Anoka County, as well as in southern Pine County at the Pokegama Outlet site (21PN10; Anfinson 1979d:95). Excavations at one of the type sites, the A. H. Anderson (21AN8) habitation site, were conducted by Wilford in 1934, and by MHS in 1976 in response to highway construction, and revealed buried early, middle, and late precontact occupations, including a few shell-tempered sherds. The site is on an extensive sand ridge at the southern end of Howard Lake near the Rice Creek outlet. Some subsistence remains were recovered, including remains of fish, bison, deer, beaver, turtle, and waterfowl, although these were not attributed to specific occupations (Anfinson 1979d). Wilford (1937a, 1955b) described the Anderson site as having a homogeneous Woodland occupation, but Anfinson (1979d:95) has argued that it includes at least two Woodland occupations, Middle and Late Woodland, marked by plain thin sherds and cordmarked thin sherds. The mound incorporated village debris from an earlier occupation.

The Howard Lake Mounds site (21AN1) is northeast of the Anderson site, on the eastern edge of the lake. It has one large mound (125 × 90 × 19 feet) and five smaller mounds. Excavation of one smaller mound in 1950 found sherds and lithics in the mound fill and a subsurface pit with multiple secondary burials but no grave goods. Specific dating of the excavated mound was difficult, but Anfinson (1979d:95) suggests that at least the large mound at the site was probably Middle Woodland based on its size.

Sorg ceramics have been reported from only a few sites, most of them clustered around Spring Lake in the Mississippi river floodplain. Johnson (1959) conducted excavations at the type site, Sorg (21DK1), finding a stratified occupation with Havana-related Sorg ceramics beneath a Late Woodland occupation.

Wilford originally defined the Malmo focus of the Mille Lacs Aspect based on ceramics with smooth surface treatment, and he assigned sites on the basis of burial mode. He saw Malmo ceramics as intermediate between Howard Lake and Laurel (Wilford 1955b:135). He also noted difficulty with the definition of the focus because of its great variability and said, “It is set up largely on the basis of historical knowledge of the Sioux Indians” (Wilford 1955b:134). Since then, the concept of Malmo as either a ceramic phase or a culture has been heavily debated (Gibbon and Hohman-Caine 1980).

Malmo sites include various mound sites as well as the type site, the Malmo mound and village site (21AK1). At that site, Brower excavated three mounds in 1899, Bushnell excavated two in 1900, and G. Ekholm of the University of Minnesota excavated 13 in 1936. Ekholm’s work on these 13 mounds was never published, but G. Hume (1962) prepared a draft report. Ekholm found single or multiple bundle burials in nine of the mounds. In terms of links to Havana, Mound 12 was significant in that it contained a burned log crib over the remains of several individuals.

Wilford conducted “salvage” excavations at the Anderson mound in 1933 and Vanderbloom mound in 1952; both areas are now included in the Brower site (21ML1; Wilford et al. 1969). Wilford excavated the Brower habitation site in 1949, and Gibbon returned there in 1972 (Gibbon 1975a). Brower appears to be a single-component habitation site with significant lithic and ceramic assemblages, although organic preservation was reportedly very poor. The habitation area also has a nonmound Malmo burial.

Four other mound sites excavated by Wilford have been attributed to the Malmo phase (Arzigian and Stevenson 2003:85–88): Peterson (21OT1), excavated in 1937 (Wilford 1942; Wilford et al. 1969); Morrison (21OT2), excavated by Jenks and Wilford in 1937 (Wilford et al. 1969); Graham Lake (21OT5), excavated in 1949 (Wilford 1954b, Wilford et al. 1969); and High Island Mound (21SB1), excavated by Wilford in 1955 (Johnson 1964). Additional habitation sites or components have been identified through work along TH169 and other recent projects at Mille Lacs (e.g., Mather with contributors 2000); Trocki and Hudak 2005).

Gibbon (1975a:10–11) and Gibbon et al. (1993) noted that understanding Malmo sites was difficult because only the Brower site was single component; the rest were multicomponent in shallow, sandy soils, so that artifacts were mixed. Gibbon also questioned the reliability of representing Malmo as an integral unit because of the small number of sites, including some excavations that remain unreported, the small sample size, and the fact that work had been conducted predominantly in burial mounds with few or no diagnostics, leaving Brower as the only single-component habitation site.

The Havana-related complex in Minnesota is undoubtedly closely related to developments elsewhere in the Midwest, both in the Havana heartland of the central Illinois River Valley and in the Trempealeau area along the Mississippi river in southwestern Wisconsin. Gibbon et al. (1993) provides a history of research in those areas and compares the Trempealeau phase in southwestern Wisconsin with Minnesota's Howard Lake phase, finding significant parallels as well as differences, with Trempealeau being a simpler version of Havana, and Howard Lake being even more distantly related.

More recent research in southwestern Wisconsin has modified some earlier interpretations. In southwestern Wisconsin, Stoltman's 1995 work on islands in the Mississippi Valley near Prairie du Chien (Stoltman 2003, 2004) included excavation of the well-stratified Tillmont site (47CR460). This work has led Stoltman to propose a redefinition of Middle Woodland chronology, including combining two sequential phases (the Havana-related Trempealeau phase, associated with mound building but with no identified habitation sites, and the Millville phase, originally defined as post-Havana habitation) into a new Trempealeau-Millville phase (Stoltman 2003:149). Excavations, particularly at Tillmont, revealed Millville ceramics clearly associated with a mortuary crypt feature reflecting Trempealeau mortuary practices and artifacts (such as obsidian). This tight contextual association of Havana-related mortuary practices and Millville-type ceramics suggested to Stoltman that these two "phases" were contemporaneous rather than sequential, with Millville Middle Woodland occupations representing the village sites of "Trempealeau phase" Havana-related mound builders. Further research on this entire subject is needed.

4.4 Chronology

Few radiometric dates currently exist for Minnesota's Havana-related complex. Three dates come from mounds, and additional dates come from residue on Malmo or transitional Malmo/St. Croix pottery (Figure 7), although these dates extend later than generally expected for Middle Woodland. Most interpretations of dates for the complex come from perceived relationships to the Havana culture in Illinois. Anfinson (1979d) suggests a range of 200 B.C.–A.D. 200/300. Some recent dates have come in significantly later, however, as discussed below.

Of the three radiometric dates from mounds (Johnson 1964), the Vanderbloom (21ML1) date of 1800 B.P., or A.D. 150, seems reasonable. The reliability of two other early dates from mounds has been called into question. Anderson (21AN8) has produced a date of 2150 B.P., or 200 B.C., and Aufderheide et al. (1994) note that it was obtained from charred wood that had been stored open in a drawer and might have been contaminated. The date from the mound at Morrison (21OT2) is 2640 B.P., or 690 B.C. Anfinson (comment in Hohman-Caine 1979) notes that this might be too early for Malmo. Gibbon et al. (1993:5.19) report that "A recent radiocarbon date of 110 B.C. for a Havana-related pottery vessel from the Sandon site south of Mankato along the Blue Earth River…documents an early presence of Havanoid material in the state."

Other dates are now available, though some are significantly later than expected. Trocki and Hudak (2005:iii) note that "At site 21ML102, the AMS dates for residue on sherds interpreted to fall at the transition from Malmo ware to St. Croix ware are A.D. 240–440 (calibrated, Beta-190204) and A.D. 260–290 and A.D. 320–450 (calibrated, Beta-190205)." The residues were taken from a rim sherd and a body sherd thought to be from the same vessel. The rim is described as "smoothed with decoration on the lip. Incised lines, oriented diagonally to the right, occur on the interior and exterior of the vessel. The incised lines extend approximately 23 mm below the lip and are spaced 9 mm apart" (Trocki and Hudak 2005:292). The interpretation as transitional is derived from the dating, apparently not from the typology of the sherd.

Two dates obtained from residues on Malmo vessels from the Malmo site (21AK1) span the range from A.D. 350 to 605 (calibrated) (Mather with contributors 2000). This seems late for Malmo ceramics, although there are so few dates that it is hard to reject them out of hand.

Comparison with chronology of other regions also provides some information. Anfinson (1979d:96) gives dates of 200 B.C. to approximately A.D. 300 for Howard Lake based on dates for Havana in Illinois, noting that Howard Lake ceramics might encompass or overlap both early and late Havana from Illinois. Anfinson dates Sorg based on similarities to early Havana Hopewell ceramics, particularly in the use of crosshatching (Anfinson 1979g). However, dating remains problematic, and there is no reason to assume that the complex in Minnesota ended at the same time that it disappeared elsewhere in the Midwest.

4.5 Technology and Material Culture

Ceramics

Different ceramic types have been defined for Minnesota's Havana-related complexes; however, their utility, reliability, and consistency have been questioned, and redefinition of the types is needed. The following presents what appear to be current definitions.

Thomas (2000:14.4) describes the history of the definition of Malmo. Wilford initially associated certain pottery forms with his Malmo focus based on similarities to Havanoid wares from the Howard Lake area (Wilford 1937a, 1941, 1944, 1955b). Wilford never described a formal Malmo ware, but a general understanding grew of a ceramic type in the Mille Lacs area. Gary Hume first used the term in his 1962 report on the Malmo mounds, applying it to the smooth-surfaced, coarse grit-tempered pottery he found in his excavations. Malmo pottery was used as a type marker for Johnson's Middle Prehistoric Rum River phase. Hohman-Caine attempted a definition in 1979, noting that Malmo/Kern was a poorly defined and highly variable ceramic type: "It appears to have been general practice to simply group smooth body sherds and rims from central Minnesota under this label" (Hohman-Caine 1979:138). This tendency might explain the broad distribution of "Malmo" ceramics in the site database.

Hohman-Caine (1979:138) recorded over 200 rim sherds and many body sherds classified as Malmo on the basis of their smooth surface treatment and grit temper. Finely crushed quartz was reported to be common. Lips were described as generally flattened or rounded, and occasionally having an interior bevel. One restored vessel from Graham Lake (21OT5) was conical with a pointed base and no neck constriction. Decorative motifs were variable and included slashes, punctates, bosses, and incised lines. Much of the pottery was undecorated. One Malmo vessel from the type site (21AK1) had limestone temper (cited by Rothaus et al. 2005:59).

Howard Lake ceramics (Anfinson 1979d) have as their type sites Howard Lake (21AN1) and Anderson (21AN8). Anfinson notes that 40–50 vessels were present in the University of Minnesota collections at the time of the 1979 synthesis. Temper was grit, and the thickness was 8–10 mm. Surface treatment was smooth, or occasionally cordmarked, or cordmarked and then smoothed. Method of manufacture has not been determined. Anfinson (1979d:96) describes two relatively complete Howard Lake vessels recovered by Hohman-Caine from 21AN19 and 21AN60: "The vessels are smooth surfaced, thick-walled, wide-mouthed jars with beveled lips, straight to slightly outflaring rims, slightly constricted necks and conoidal bottoms."

Wilford (1937a:123, 1955a:131) argued that the interior-beveled lip should be considered a distinctive hallmark of Howard Lake. Anfinson (1979d:96) agreed, and described Howard Lake decoration as follows, incorporating Wilford's (1937a) and newer work:

> *The decoration on HOWARD LAKE vessels is primarily on the exterior rim and shoulder but occasional decoration appears on the interior rim, the lip and even the mid-body area. The most common decorative modes are straight dentate stamps, ovoid stamps, trailed lines and bosses impressed in a smooth surface. The dentate stamps are usually used in alternating oblique and horizontal bands on the rim or in panels on the lower rim or shoulder. Trailed lines are used primarily to delineate either horizontal or vertical zoning. The use of fairly large, smooth areas on some sherds…emphasizes "panel-zoning." The use of external cordwrapped stick impressions is rare and when it appears it is in a herringbone pattern on the rim.... A cordmarked surface in the*

> *area of decoration… is also rare. Lip and interior decoration is usually applied with a dentate stamp or a cordwrapped stick. Trailed lines appear occasionally on the lip.*

Sorg phase ceramics are reported from only a few sites. Anfinson (1979g:197–198) noted that two Sorg types had been defined at that time (Johnson 1959), but sample sizes were small, and he suggested a new classification of Sorg ceramics into two somewhat different types: a proposed type called Sorg Banded, with two varieties (Sorg Banded Dentate and a provisional new variety, Sorg Banded Trailed); and Sorg Zoned Dentate.

According to Anfinson, Sorg pottery overall was grit tempered, with a thickness of 6–12 mm, and a cordmarked body with smoothing of the rim before decoration. The vessels were "thick-walled, wide-mouthed jars with flat lips, straight rims, slightly constricted necks, rounded shoulders and conoidal bottoms" (Anfinson 1979g:197). Method of manufacture was unknown.

For his proposed Sorg Banded type, Anfinson (1979g:197) said that decoration on the Sorg Banded Dentate variety (Johnson 1959) is:

> *confined chiefly to the rim, upper shoulder, and lip and consists of alternating bands of dentate stamp impressions and punctates. The bands are separated by double trailed lines. On the reconstructed Sorg vessel from the type site a single row of bosses surrounds the upper rim in a dentate band. Punctates can be either square or round. The dentate stamp impressions are usually vertical or horizontal. Horizontal dentate stamp impressions were evident on thick, cordmarked sherds from the Lee Mill Cave site (21 DK 2) (Johnson & Taylor 1956). The lip of the Sorg vessel had a crosshatched dentate pattern. Sherds of this variety have been found at 21 DK 1, 21 DK 2, and on the surface on Point Douglas.*

For his provisional Sorg Banded Trailed variety, Anfinson (1979g:198) said:

> *Decoration appears to be confined to the rim area and usually consists of alternating bands of cross-hatched trailed lines and plain bands. The trailed-line bands on the SORG sherds from the Bremer Site (21 DK 6) (Jenson 1959) are simply oblique with no crosshatching. The bands of this variety, as in Sorg Banded Dentate, are separated by trailed lines except they are single lines rather than double lines. A line of square punctates or square punctates alternating with bosses fills the second band below the lip. The lips of Banded Trailed do not appear to have any decoration. Sherds belonging to this variety have been found at 21 DK 6, 21WA 22, at the junction of the Cannon and Mississippi Rivers near Red Wing (Winchell 1911:452), and a site recently discovered by Douglas Birk of the Minnesota Historical Society on Sand Point in Goodhue County. The sherds from the Sand Point Site and Harvey Rock Shelter (2l WA 22) are almost identical.*

Anfinson (1979g:198) said that the second type, Sorg Zoned Dentate (Johnson 1959):

> *combines both banding and zoned decoration. On the sherd from the Sorg Site, a single row of oblique dentate stamp impressions start below the lip followed by a row of alternating square bosses and punctates very similar to the Harvey Rock shelter sherd illustrated in Brown (1944). There is then a band of oblique dentate stamps framed by trailed lines. The lower rim has alternating panels of smooth zones and oblique dentate stamp zones. The panels are also outlined by trailed lines.*

Some decorative techniques are similar among all Havana-related ceramics, including lip forms (round or inslanting), relatively thick walls, punctates or bosses below the lip, and trailed or incised lines on the exterior and lip. However, Malmo ceramics tend not to have the dentate stamping that is more common in Howard Lake and Sorg assemblages (Gibbon 1975a:9–10; Johnson 1971a:54–55; Johnson 1994:3.44).

Body sherds, particularly those from near the rim, seem to be the same on many of these types. They are characterized by a smooth surface, which also occurs on other Middle Woodland and transitional Middle/Late Woodland ceramics such as Onamia. Hohman-Caine (1983:66, 132) reported that she could reliably separate Howard Lake from St. Croix or Onamia body sherds, but also noted (1983:138–139) that Laurel and Malmo share many traits, thus leading to the "geographical solution," with interpretations heavily influenced by the locations of finds. She reported (1983:138–140) that her type analysis showed eight shared modes and differences in only three: Laurel's in-slanting rim is not found with Malmo; Malmo's loosely wound and widely spaced impressions are not characteristic of Laurel; and the

short oblique motif might be characteristic of Malmo. The shared modes were a conoidal body, a flat lip, a high rim, a smooth body, an unthickened rim-lip, the use of cordwrapped stick and dentate impressions, and straight rims.

Lithics

The few excavations of Havana-related components have provided only limited information on lithics. Havana-related lithic assemblages have been described as having two distinct traits: medium to large, corner-notched projectile points such as Snyders, Norton, and Manker points; and blades and blade cores and "ribbon flakes," or small blades (e.g., Gibbon et al. 1993:5.3). However, both the blades and true Snyders and other typed points appear to be rare in excavated contexts in Minnesota, or at least are rarely identified as these types, though more generic side-notched and corner-notched points are reported.

Gibbon et al. (1993:5.13–5.14) note that in general, Howard Lake assemblages seem to differ from more southern Havana assemblages, but little work has been done to study these differences. They suggest that Howard Lake reflects a continuation of local technologies dating back to at least the Late Archaic. They also note some northeastern Plains influences that are distinctly different from sites to the south. These Plains influences are suggested by points that resemble Pelican Lake (widespread in the northern Plains; Morrow 1984), and Samantha (associated with the Middle Plains Woodland Sonota complex in eastern North Dakota; Gregg and Picha 1989).

Anfinson (1979g:198) argued that the lithics associated with Sorg ceramics are more similar to Havana than those found with Howard Lake ceramics. Johnson (1959:24) said that at the stratified Sorg site (21DK1), lithics from the levels with Sorg ceramics included

> *thick, side notched projectile points; stemmed points; unstemmed blades; and probably the corner notched points, although these were surface finds at this site. Scraper types include small thumb scrapers; triangular, unifacially flaked end scrapers; elongate, backed end scrapers; and the single, very large tabular scraper. The only definitely fashioned knives from this zone are the three sided, symmetric, bifacially flaked knives with a sinuous cutting edge. Utilized flakes with marginal retouch were probably also used as knives. Chisel pointed gravers are found in this lower zone, but the gravers with a flaked point are both from level three and their association with this assemblage is not certain.*

Pecked and ground stone was noticeably absent at the Sorg site, with only a fragment of a partially grooved hammerstone and a quartz cobble hammerstone reported. Johnson (1959:17) also reported two irregular pieces of chert with some polished surfaces that were probably not natural. Flakes modified into knives came from all levels of the site. Johnson reported a core with long parallel-sided flakes removed from one surface, though no core-blades were found at the site. Core-blades were, however, found at the Lee Mill Cave (Johnson 1959:16). Johnson did not mention the raw material of the core. The three-sided knives had two long, parallel edges and tapered from a wide end to a more pointed base (Johnson 1959:15).

At the single-component Brower site, which had Malmo ceramics (Gibbon 1975a), debitage was predominantly quartz with some chalcedony, chert, jasper, basalt, and other raw materials. Tools were made of Knife River flint, quartz, chert, jasper, and obsidian. Gibbon noted the difficulty of using quartz flakes, and his statistics indicate that only 2.3% of the 1,807 quartz flakes showed signs of use, in contrast to 23% of the 310 chalcedony flakes. Most of the flaking at the site suggested irregular battering, but some Knife River flint flakes were described as "blade-like" and having retouch on lateral margins (Gibbon 1975a:5). Gibbon described two flakes as gravers and 10 as perforators, and also reported a variety of unifacially and bifacially retouched flakes, a wedge, and a crude quartz flake chopper. There were 26 projectile points; those unbroken and available for Gibbon to study included 10 side-notched, four corner-notched, two contracting stemmed, two expanding stemmed, and two straight stemmed. There were also 16 end scrapers and one side scraper. Twelve knives had sinuous, double-beveled working edges and one or two retouched faces. There were also four hammerstones, one anvil, one net-weight with light notches, and one igneous stone hoe with a subtriangular outline and two sets of worn notches (natural or manufactured grooves).

Clark (1984) has addressed the use of Knife River flint in Minnesota and Wisconsin, suggesting multiple patterns of acquisition. Non-Hopewell habitation sites in Minnesota show extensive use of Knife River flint for utilitarian objects and suggest "Down the Line Exchange" as described by Renfrew (1972). By contrast, in southwestern Wisconsin

Hopewellian contexts, Knife River flint occurs predominantly as large bifaces in burial mounds, suggesting a pattern of "Prestige Chain Exchange," with Minnesota Middle Woodland cultures possibly serving as intermediary sources.

Hruby's Master's thesis project (1977, as summarized by Gibbon et al. 1993:5.13) examined the lithics from the Anderson site (21AN8), a multicomponent PaleoIndian, Archaic, and Woodland site at which Howard Lake materials represented the main occupation. Hruby's conclusions suggested that lithic technologies for both Archaic and Woodland groups were similar because of the reliance on local glacial cobbles. He documented a wide range of extractive technologies, with relatively small tools with multiple working edges suggesting a mobile population. Most of the raw materials were local, except for some Knife River flint and Hixton orthoquartzite. Finally, formal tools tended to be from better-quality raw materials, compared to the expedient tools. He did not see evidence of blade technology, and found the Snyders and Manker projectile points underrepresented.

Bakken (2000) has defined a variety of lithic exploitation patterns that have been applied to Woodland assemblages. The Rum River phase associated with Malmo ceramics at Mille Lacs shows a variant of the Q pattern (heavy use of quartz) with more exotics (Rothaus et al. 2005:68). Obsidian, for example, was found at the Black Brook site (21ML40). Two small obsidian cores also were found at the Indian School site (21ML6); one of them was a flake with scars from removal of three small blades (Rothaus et al 2005:73). (Judging from the photos, however, these are not classic Hopewell blade cores.)

Some surface finds of exotic lithics might also be pertinent here. Gibbon et al. (1993:5.13) report that a few flakes of obsidian were found at 21AN19 and 21AN49 near Centerville and at 21IA26 on the Rum River in central Isanti County. They suggest that these finds might be related to the Howard Lake phase occupation of the region. Obsidian has often been attributed to the Hopewell Interaction Sphere, though there is now good evidence from Wisconsin (Stoltman 2003:163–167) for its presence significantly earlier, either with Red Ocher burials at Riverside Cemetery (Pleger 1998, 2000, as discussed in Stoltman 2003:166) or with Red Ocher/Marion Early Woodland at the Tillmont site in Prairie du Chien, Wisconsin, with dates of about 500 B.C.

Worked Bone, Antler, and Shell

Perforated bear canines are characteristic of Havana. T. H. Lewis reported finding a perforated bear canine in the stone "cists" he uncovered in Mound 12 at Indian Mounds Park (21RA10; Arzigian and Stevenson 2003:477). The Sorg site (21DK1) produced some worked bone and shell from the levels containing Sorg ceramics. Johnson (1959:24) says, "The bone flaker, the chisel pointed bone tool, and the fragment of a bone harpoon are included in this assemblage, and it is probable that the perforated shell hoe belongs here also." The "flaker" is a mammal rib bone that is pointed at one end, and the "chisel" is a split mammal long bone with one broken end and a chisel-like point at the other end. The harpoon is a small piece of split long bone with one edge that has a semicircular notch with a slight barb. Johnson says the perforated shell hoe is typical of Middle Woodland shell hoes, but it was a surface find at this multicomponent site.

A possible Malmo sherd was found with a cache of several bear skulls and about 150 bear teeth at the Christensen Mound, 21SH16 (Arzigian and Stevenson 2003:499; Mather and McFarlane 1999:17). This cache also had a clay pipe, flakes, and a triangular point, so the dating and association of the bear cache with the Malmo sherd is unclear.

Other Artifacts

Exotic artifacts from Indian Mounds Park (21RA10) included a small piece of galena and hammered copper, but unfortunately, these artifacts have disappeared (Forsberg 2003:44). Gibbon et al. (1993:5.13) note that some pieces of copper from collections in the Isanti and Anoka County region might be related to the Howard Lake phase occupation, though there is no contextual evidence to support this.

Rothaus et al. (2005:66) describe a piece of galena found at the Indian School site (21ML6) as "a rough cube with concretions on one surface.... The galena was found in a shovel test …, so little can be said about its context or associated artifacts. It is presumed to be related to a Middle Woodland component due to the documented role of this material in the Hopewellian trade network,… The piece is covered with a weathered patina on all sides, indicating that

it is not of recent origin." This site is multicomponent, with Malmo and Brainerd pottery as well as transitional and Late Woodland types, so association of the galena with the Havana-related complex is unconfirmed, though likely.

4.6 Subsistence

Few subsistence remains have been recovered from excavated contexts with Havana-related components. Based largely on analogy with cultures in other regions and times, researchers have suggested a diffuse hunting-gathering adaptation. Gibbon et al. (1993:5.4) describe the Havana adaptation as follows:

> *The Havana culture is usually considered a florescence of the hunting-gathering-gardening economy of the Late Archaic and Early Woodland periods in the area (Hall 1980). A distinctive characteristic of this economy was the harvesting of a variety of wild plants (especially nuts) and animals (deer, fish, waterfowl), and the cultivation of native Midwestern oily (sumpweed and sunflower) and starchy (goosefoot, knotweed, and maygrass) seeds. Although cucurbit rind (mostly squash with some gourd) is present in nearly all flotation samples from Middle Woodland sites of the area, other domesticates, such as maize and beans, were either absent (beans) or only of minimal importance (maize).*

Two Havana-related sites in Minnesota have produced some faunal remains. At the Brower site, Gibbon (1975a:10) obtained a few calcined bones: a white-tailed deer tooth, a duck femur, another bird bone, and a fragment of mussel shell, as well as fragments of mammal bone. There were also non-calcined fragments of mammal bone, a fish bone, turtle bone, and bird bone. However, this is a very limited sample from a site with poor preservation.

Calcined bone from the Indian School site (21ML6) included some from the deer family and others possibly from a five-toed mammal (bear, beaver or wolf/dog). Non-calcined bones also were present but were predominantly historic, and all the remains are difficult to attribute to the precontact component (Rothaus et al. 2005:83).

Evidence of use of plants is very limited from Minnesota Havana-related sites. Phytoliths from residues on two Malmo vessels from the Malmo site (21AK1) were examined (Thompson 2000:19.9). One vessel reportedly had a phytolith assemblage that was a good match for wild rice, and another had an assemblage similar to that found with varieties of northern flint corn, typically corncob chaff. Although very interesting, these results are not sufficient to argue for the extensive use of either wild rice or corn. Corn was present, though in very small quantities, in some Illinois sites during the Middle Woodland period and might have been brought to Minnesota in trade. There is no evidence for corn horticulture at this time in Minnesota. There might have been some use of native weedy seeds such as knotweed or chenopodium, or native cultigens such as sunflower or squash, but the evidence has not been found, largely due to the lack of extensive flotation or palynological or phytolith studies at archaeological sites. At comparable Middle Woodland Millville phase sites in the Mississippi River floodplain in Wisconsin, sumpweed, sunflower, squash, goosefoot, knotweed, wild rice, fruits, and berries are known to have been used (Arzigian 1987, 2000).

4.7 Mortuary Practices and Ideology

Mortuary patterns for the Havana-related complex include a range of burial practices that show varying degrees of affinity to Havana or Hopewellian cultures. The closest ties are seen in the Indian Mounds Park burials (21RA10), which have some burial features and artifacts, such as a perforated bear canine and possibly a panpipe, that are distinctly Hopewellian. Other sites show more limited sharing of Havana-like mortuary behavior.

Gibbon et al. (1993:5.3–5.4) summarize Illinois Havana burial practices:

> *The typical Havana burial area is a group of 2 or 3 to 15 earthen burial mounds that are conical in shape, although as many as 81 mounds are present in the Albany site in Whiteside County, Illinois (Herold 1971:8–11). Mounds vary widely in diameter and height, with the largest known Havana mound north of the American Bottoms (Mound 10 at the Albany site) measuring 220' in diameter and 32' in height. Larger mounds in a group (those over 5' in height) nearly always contain diagnostic Hopewell Interaction Sphere items, such as copper earspools, pan pipes, celts, perforated bear canines, platform pipes, pearl beads, and elongate, often stemmed, non-utilitarian bifaces (Farquharson 1876; McKern 1931; Herold 1971). The presence in these mounds of*

exotic materials from distant areas illustrates the importance in the Hopewell Interaction Sphere of long distance trade or exchange. These materials, which are rarely found in other cultural contexts in the core area, include obsidian, mica, copper, silver, and Knife River chalcedony. The distinctive Hopewell Interaction Sphere items mentioned above and these exotic materials are also found in larger habitation sites in the core Havana area in Illinois. Primary extended burial is the most common burial mode in larger mounds, although cremation and secondary bundle burials also occur and may be more common in smaller mounds (e.g., Herold 1971; McKem 1931). Burials were usually placed in rectangular, subfloor tombs that were often lined or covered with logs or bark.

At Indian Mounds Park (21RA10), on a bluff overlooking the Mississippi River, early development in the city of St. Paul led to the excavation of 16 of the site's 18 mounds in the 1800s. The excavators included local antiquarians as well as T. H. Lewis (Arzigian and Stevenson 2003:472–477). The mounds appear to have been constructed over a long time, but some mounds showed the strongest evidence of Hopewellian influence documented in Minnesota mounds: exotic artifacts such as red ocher, galena, hammered sheet copper over a possible panpipe, a clay death mask, and a drilled bear canine; and mortuary features such as log tombs and stone crypts.

Mound 12 had the most distinctively Hopewellian contents (Arzigian and Stevenson 2003:475–477). This large conical mound (51 feet in diameter and 8.5 feet high), excavated by Lewis in 1882, contained two features. The first was a complex of eight small stone "cists" or compartments, about 7 inches deep, made from upright slabs of limestone. Each compartment contained secondary human remains (there were no suggestions of any complete skeleton) and mortuary items. Mussel shells were found with almost every burial, and other mortuary items included a perforated bear tooth, a piece of lead ore (galena), and a hammered copper ornament described by Lewis as "oval in outline, flat on one side and convex on the other, with a small hole on each end for inserting a string. It is made of a thin sheet of hammered copper, the edges of which were notched in order to fit around a wooden pattern of oval shape" (Lewis 1896:318). This item has been variously suggested to be the cover of a panpipe or a chest ornament. The stone compartments extended more than 3 feet below the original ground surface and were overlain by a layer of flat limestone slabs and a pile of boulders and slabs. The second feature in the mound was a 7-foot-long ridge of sandy clay at the level of the cist covers and to their east.

In Mound 3, De Montreville found a clay mask with a cranium of a child. He also found three clusters of 11 crania total, a cremation, and fragmentary human remains with large boulders, all in the mound fill. The clay mask has been suggested to be a Hopewellian trait (Johnson 1957).

Stone or log tombs are also Hopewellian traits. Lewis and William Gross found remnants of a log tomb in Mound 7, as well as pottery that might be Havana (so described by Woolworth 1981). In Mound 17, a feature covered with limestone slabs might also be a variant of a stone tomb.

Other mounds at Indian Mounds Park had a wide range of burial treatments but lacked any distinctively Havana or Hopewellian artifacts; some shell-tempered sherds were found in the fill of some of the other mounds. Elden Johnson (1957) has argued that the site as a whole reflects use over a long period of time, from Havana-related to late precontact.

Howard Lake ceramics have been found in only one mound: in the fill of Mound 3 at the Howard Lake site (21AN1) (Arzigian and Stevenson 2003:333–334; Wilford 1955a). Beneath the mound Wilford found a large, rectangular pit with a mass of poorly preserved human bones representing at least 19 overlapping bundle burials and one cremation (although not cremated in situ) that Wilford suggested had all been placed at one time. The pit burials had no pottery or other temporally diagnostic artifacts, but six burials had red ocher and one had a possible clay/ocher mask. Such masks are often considered a distinctive Hopewell trait (Johnson 1957), but Johnson and Ready (1992) note that masks have been found in a variety of contexts, including with Blackduck burials at McKinstry. Because of the absence of diagnostic ceramics or any other distinctive Hopewell artifacts with the burial feature itself, the attribution to Howard Lake or the Havana-related complex is tenuous.

Gibbon et al. (1993:5.15) note that bundle burials are typical of the smaller mounds in a Hopewell group, and that Hopewell grave goods are typically found only with a small number of high-status individuals, so that the absence of

grave goods in many mounds might not be unexpected. However, they also point out that no Hopewell Interaction Sphere items have been found at either Howard Lake (21AN1) or the Anderson site (21AN8), making the connection to Havana or Hopewell much more tenuous. One Hopewellian trait, stone or log tombs, is found at least in modified form with Malmo ceramics at the Malmo site (21AK1) and the Brower/Nick Vanderbloom Mound/Kern site (21ML1), and in undated stone vaults at Jefferson (21HU5).

Statewide, six sites with 33 features have been attributed to the Malmo phase (Arzigian and Stevenson 2003:84–88), although only two sites, Graham Lake (21OT5) and the village at Brower (21ML1), have burials with associated diagnostic ceramics. Mounds at other sites, including Malmo (21AK1), Brower (21ML1), Peterson (21OT1), Morrison (21OT2), and High Island Mound (21SB1), have been attributed to Malmo based on radiometric dating, ceramics in mound fill, and burial treatments considered "typical."

Two burials, one in a mound and one in a village setting, have had associated Malmo mortuary vessels. The mound burial was at Graham Lake (21OT5), where a child's burial on the original ground surface was accompanied by flakes of Knife River flint, red ocher, and a conoidal pottery vessel with interior rim punctates. Johnson (Wilford et al. 1969:51) said that the vessel was probably Early Woodland, but Dobbs (Benchley et al. 1997:125) included it with Malmo. Village excavations at the Brower site (21ML1) also uncovered a pit with a secondary bundle burial and a Malmo vessel (Gibbon 1975a:3). This latter discovery suggests that not all burials were placed in mounds during this time.

The Brower site (21ML1; Arzigian and Stevenson 2003:86, 434–436) consists of a series of habitation sites and 100 mounds, including the Anderson and Vanderbloom mounds, where the University of Minnesota conducted "salvage" excavations in the 1930s and 1950s. Both mounds had features considered typical of the Malmo phase (Aufderheide et al. 1994; Myster and O'Connell 1997:283; Wilford et al. 1969), including in-situ cremation of secondary and primary burials, interment in burial pits capped by logs that were then burned, and an absence of grave goods, including any diagnostic ceramics. The Anderson mound contained a burial complex with a cremated bundle burial and an ocherous clay lens with charred logs; above this complex was a later bundle burial. The Vanderbloom mound had a burial complex with a grid of charred logs over charred and calcined human bones representing secondary burials placed on birch bark, with remains from about 17 individuals. Both features have been radiometrically dated, Anderson to 200 B.C. and Vanderbloom to A.D. 150. The cremated human remains were fragmentary and little osteological analysis was possible, severe osteoarthritis was reported from one 40 year old female, and two individuals each had a single dental abscess or carious lesion (Aufderheide et al. 1994:265-271; Myster and O'Connell 1997:219–220).

At Morrison (21OT2), of four mounds tested, two (Mounds 2 and 13) had shallow burial pits with multiple secondary burials that had been covered by logs and burned. The other two mounds had simpler features. Mound 1 contained a single, primary flexed burial in a pit. Mound 12 had three pits, one with three secondary burials, one with primary and secondary burials, and one with red ocher but no human remains. A radiocarbon sample from a charred log overlying the central burial pit in Mound 13 gave a date of 2640 ± 200 B.P., or approximately 690 B.C. (Johnson 1964). As discussed earlier, many researchers have reservations about this date.

At the base of the High Island Mound (21SB1; Arzigian and Stevenson 2003:502–503), Wilford found a large, rectangular central pit that extended about 1.5 feet into the subsoil, contained at least 16 secondary bundle burials, and showed indications of decayed wood from a log crypt. Associated with these submound burials were a stemmed or side-notched point, a chalcedony scraper, and traces of red ocher. A radiocarbon sample from the uncharred logs provided a date of A.D. 450 ± 150 (Johnson 1964). Since the mound produced no diagnostic artifacts and a relatively late radiocarbon date, the primary basis for calling it Malmo (e.g., Myster and O'Connell 1997) seems to have been the log crypt structure; however, this structure was not burned as it was in the other mounds attributed to Malmo.

Examination of the different burial traits at other sites attributed to Malmo suggests either that the sites represent a wider range of phases than just Malmo, or that Malmo burial practices are somewhat more varied than the trait lists suggest. At the Malmo site (21AK1), 18 mounds were excavated between 1899 and 1936. In two, the remains were too decayed to determine burial form, and no human remains were found in six others. Ten mounds had single or multiple bundle burials, four of them with some evidence of charring. Mound 12 was unusual in that it contained a

burned log crib over the remains of a subadult and probable additional individuals. Two of the burials found during the University of Minnesota excavations were near the ground surface, while the rest were in pits below the original ground surface. Burial goods, though limited, included projectile points with four burials, and worked lithics, ocherous earth, and pottery clay. Skeletal pathologies included two individuals with slight degenerative joint disease, and two with diffuse periostitis. There were no dental caries or abscesses, but three individuals had moderate or severe periodontitis (Aufderheide et al. 1994:366; Myster and O'Connell 1997:219).

Malmo-type sherds were recovered from the fill of many of the mounds at the Malmo site, including in the fill between the logs over the Mound 12 burial. No burial, however, had diagnostic pottery associated as a mortuary item, so it is difficult to date the period(s) of actual burial within the mounds. Aufderheide et al. (1994:28) argue that "the presence of Malmo sherds in the mound fill suggests that the mound construction postdates the Malmo habitation of the site." Based on the available evidence, construction of the mounds need not have been much later than the habitation site; the mounds might be Malmo in age or significantly later.

Wilford (1942) had difficulty assigning a phase to the Peterson mound group (21OT1) because only general burial traits were evident. He tested two mounds, and in Mound 2 found a submound pit with primary flexed burials. Mound 3 had a fireplace covered by the mound, but no human remains, and Wilford suggested that the mound might have been an embankment constructed over a ritual fire, rather than a burial mound. No artifacts were found, either in the mound fill or as mortuary items. He later identified the site, along with Morrison and Graham Lake, as Malmo (Wilford et al. 1969).

Traits uniquely associated with Malmo burials are difficult to identify (Arzigian and Stevenson 2003:85–88), and it is likely that the larger sites have mounds from multiple time periods. The burials with log constructions (at Malmo and High Island Mound, in the Anderson and Vanderbloom mounds at Brower, and in two mounds at Morrison) either have Malmo sherds in the mound fill, making the mounds Malmo or later in time, or have no associated diagnostic artifacts. The sites with log-construction burial complexes in one or two mounds also have other mounds with simpler burials, most of them secondary but some of them primary; burials also occur in submound pits as well as on the original ground surface. Of all the proposed Malmo phase burials discussed here, Mound 1 at Graham Lake (21OT5) had the only mound burial directly dated by association with diagnostic artifacts. Those human remains were too deteriorated to determine burial form, and no log construction was apparent. The other burial with a Malmo vessel was a secondary burial in the village area at Brower (21ML1).

Although absence of mortuary goods has been cited as a distinguishing attribute of the Malmo phase, at least some burials at Malmo, Graham Lake, and High Island Mound did have mortuary artifacts, including the Malmo vessel found at Graham Lake. Given the general lack of associated artifacts and dates, there seems to be no way to determine whether the burials are all contemporaneous. So, even if the more elaborate log crypt burials can be considered diagnostic of Malmo as a cultural complex, they do not necessarily date the rest of the burials at those sites, and the remaining burials display a fairly generalized burial form of mostly secondary burials with few or no burial goods,

The Trempealeau phase described for Wisconsin might have some Minnesota connection. Recent research from Wisconsin, however, adds to the complexity of perceived Havana-related mortuary practices. Stoltman reports a Trempealeau phase burial crypt at the Tillmont site where about 30 individuals had been interred in the crypt over an extended period of time, as evidenced by multiple examples of displaced or missing bones (2003:196–197). Stoltman notes (2003:xiv) that these nonmound burials occur within sight of Hopewell-related mounds, such as at Effigy Mounds National Monument, and that Tillmont has a series of three mortuary episodes, two of them with mortuary remains. It is unclear whether these nonmound burials represent a separate kind of mortuary practice from the mounds, different parts of the community, or some other aspect of cultural behavior.

For sites with Sorg ceramics, no mortuary sites are confirmed, though some mounds are near Sorg habitation sites. The Bremer mounds (21DK5) are located by the Bremer habitation site (21DK6), though the connection to specific Woodland complexes is unclear (Jenson 1959).

4.8 Social, Economic, and Political Organization

Little information exists on social, economic, or political organization for the Havana-related complex. Researchers have addressed these broader sociocultural issues by comparison to Havana and to Hopewell as well as to general interpretations of how populations are organized. Gibbon et al. (1993:5.17–5.19) maintain that better understanding of the overall Hopewell Interaction Sphere is key to understanding the Minnesota Havana/Hopewell-related manifestations (Gibbon et al. 1993:5.17–5.19). They note that most assessments of the Hopewell Interaction Sphere have focused on "exchange" and "adaptation," implying economic and political (peaceful relationships through gift exchange) functions. Instead, they suggest (Gibbon et al. 1993:517) that the Hopewell Interaction Sphere was

> *a conceptual system for ordering the world rather than an economy. According to this interpretation, the "Interaction Sphere" is the material manifestation of a vision quest/power/prestige ideological system in which any member of a society could attain "vision" through personal effort (Braun 1979).... [I]t can be argued that it was this conceptual system that entered Minnesota during the A.D. 100 to 200/300 time period. At least some aspects of this system spread still further northward and became integral, generative components of the Lake Woods Malmo and Laurel cultures (Gibbon and Caine 1980). Extensions into and interactions with other regions of the state are demonstrated by the discovery of an occasional Havana-related artifact in a site deposit…. Very large burial mounds in Isanti County just north of the Howard Lake phase core area may also represent some form of interaction with or transition into Malmo phase societies…. Howard Lake phase mortuary practices, ceramics, and projectile points, settlement and subsistence, and depositional practices become more understandable within this context as do the regional sequences of change that occurred in Minnesota during the Middle Woodland and early Late Woodland periods*.

Gibbon et al. (1993:5.18) cite Havana-related ceramics as an example, pointing out the potential significance of decorated vessels being

> *almost exclusively the only Havana-related ceramics found in the state. According to the perspective adopted here, they were intimately involved in intragroup social relationships during this period, with some groups within each society adopting this "charged" southern pottery to gain hegemony over the rare and exotic as channels of supernatural and social power.*

4.9 Cultural Relationships

The major external cultural relationship concerns the Havana culture and the Hopewell Interaction Sphere. Two core areas are described for the Hopewell Interaction Sphere: Havana, centered along the Illinois River Valley south of Peoria; and the southern Ohio region. The Hopewell Interaction Sphere (Seeman 1979; Struever 1964) includes elements of mortuary, exchange, and prestige systems. Gibbon (Gibbon et al. 1993:5.2) describes how cultures from southern Illinois to southeastern Wisconsin share a distinctive set of traits that identify them as Havana and as participants in the Hopewell Interaction Sphere (citing also Stoltman 1983:223–224). These include ceramics, lithics, burials, and settlement-subsistence aspects.

Dobbs and Anfinson (1990) note that the principal importance of these sites lies in their connections to the Havana variant of Hopewell, as reflected in ceramic similarities, and also note links between the Laurel, Howard Lake, Havana-related and Malmo study units. They suggest that Howard Lake/Havana relationships can be explained by Howard Lake involvement in a logistics network that supplied northern raw materials (such as copper from Isle Royale and pipestone from Barron County, Wisconsin) to southern Hopewellian cultures. Stylistic concepts, reflected in ceramic decorations, moved northward through this same network, resulting in the incorporation of Havana decorations in Howard Lake pottery.

Howard Lake ceramics are related to a broad series of Havana ceramics. Havana ceramics were first defined along the Illinois River in west-central Illinois (Anfinson 1979d:96; Cole and Deuel 1937; Fowler 1955). Similar pottery also comes from parts of Indiana, Michigan (Quimby 1941), Wisconsin (Salzer 1973), Missouri, Oklahoma, Iowa, and Minnesota, over an area that corresponds roughly to the prairie peninsula. The northern assemblages tend to be simpler and are considered "Havana-related" or Havanoid. They have been grouped into local phases such as the Trempealeau phase in southwestern Wisconsin (Stoltman 1979, 1990:246–247, although this classification has been

revised in Stoltman 2003, 2004, 2006), the McGregor phase in northeast Iowa (Logan 1976:157), and the Nickerson phase in southeast Iowa and northwest Illinois (Bennett 1945:121).

Johnson (1959:26) compares Sorg with Hopewell and Havana in terms of ceramics as well as how elaborate the burial complexes are, and suggests that Sorg is best considered a peripheral manifestation. He compares decorative similarities between Sorg ceramics and Early Woodland pottery of central Illinois, especially with regard to horizontal bands of dentate stamps in Neteler Stamped pottery and the prevalence of incising in Fettie Incised. Johnson (1959:25) says, "Both of these types are Early Hopewell in the central Illinois valley and both have the decoration applied to a smoothed rim area. The Sorg Banded Dentate appears to combine the techniques of each of these pottery types in its prevalent use of incised lines and horizontal rows of dentate stamp placed over a smoothed rim area."

For Minnesota, Indian Mounds Park (21RA10; Arzigian and Stevenson 2003:472–477) has the strongest evidence of Hopewellian traits, with its stone-lined cist burials, log tombs, bear canine, galena, red ocher, clay mask, and hammered sheet copper that might have covered a panpipe.

For Howard Lake, though it shows the closest ceramic ties to Havana complexes to the south and east, Anfinson (1979d:96) argues that it is only peripherally related and lacks some typical Havana materials such as lithics (Snyders points, Dickson knives), as well as Hopewell-type artifacts such as platform pipes and figurines. He notes that Howard Lake also shows a lacustrine orientation, while Havana and Hopewell show more of a riverine adaptation, which would be appropriate considering their connections to the south along the river systems.

Gibbon and Hohman-Caine (1980: 60) also see Howard Lake and Sorg as peripheral:

> *Cultural similarities among "Lake Forest Middle Woodland" complexes in eastern Minnesota seem the result of a shared, diffuse hunter-gatherer adaptation to a common northwoods environment and the adoption of some widespread Middle Woodland horizon markers, rather than the result of participation within a tightly integrated intraregional exchange system.*

In addition to connections to cultures outside of Minnesota, Malmo ceramics show similarities to other Middle Woodland types such as Laurel, as well as to Snake River Incised, Vach Trailed, and Pokegama Smooth types to the east (Hohman-Caine 1979:138). Gibbon (1975a) sees Laurel influence in push-pull decorative techniques, and Havana traits such as "beveled lips, cross-hatched incised rims, cordwrapped-stick stamping, incised zoning, alternating bosses and punctates, dentate and incised lines in alternate area patterns, and limestone tempering" (1975a:18). Hohman-Caine (1983) considers how Malmo and Laurel relate to later complexes and suggests some connections to later St. Croix and Onamia pottery modes.

Syms (1977:82) suggests that Malmo was the transmission route between Laurel and Hopewell. Rajnovich (2003:71–72) also discusses but rejects the possibility that Malmo might be ancestral to Laurel. Instead, Rajnovich sees Laurel influencing Malmo:

> *the possibility that Laurel emanated from Malmo seems remote for a number of reasons. 1) The high frequencies of pseudo-scallop shell stamping in Laurel is not observed in Malmo; the Brower Site has none. 2) The shared traits of dentate stamping, punctates, bosses, and cord-wrapped stick are characteristic of late Laurel. 3) The small number of Malmo vessels compared to Laurel with perhaps more than 1200 vessels suggests an influence to Malmo from Laurel. 4) The diffuse nature of Malmo, if it exists as an entity at all, in a restricted locality is in contrast to the strong cultural homogeneity and extent of Laurel.*

4.10 Demography and Settlement

Little is known about demographics of the Havana-related complex. In the Havana heartland, the settlement pattern has been fairly well documented: "Stable subsistence territories consisting of evenly spaced floodplain village–burial mound complexes associated with this economy along the lower Illinois River Valley and adjacent floodplains of the Upper Mississippi River Valley (Asch et al. 1979; Gibbon 1992)" (Gibbon et al. 1993:5.4).

Earlier, Gibbon (1975a:13–14) pointed out that we lack sufficient information to identify a settlement pattern for Havana-related complexes in Minnesota. If settlement patterns for the complexes followed that proposed for the Lake

Forest Middle Woodland, there should be both large summer villages and smaller winter villages. Summer villages might show evidence of fishing, winter villages of hunting. In addition to these two types of sites, there are also burial mounds and probably small, special-activity components. However, the only single-component site Gibbon knew of, Brower, did not fit his predictions for either the summer or the winter site type. It had a number of artifacts directly related to food procurement and domestic activities, suggesting something more than a hunting camp, yet the lack of features and the small number of artifacts suggested that it was not a settled village with a full range of domestic activities. Instead, Gibbon suggested that Brower was a small, periodically revisited campsite associated with mound building and mortuary activities. It is possible that at least some of the sites along rivers or lakes have been buried or eroded, though mounds on the blufftops have remained.

Gibbon et al. (1993:5.10–5.11) summarize what little is known of Howard Lake phase settlement patterns, noting that Christina Harrison's 1977 survey of Anoka and Isanti Counties (Harrison 1978) found Howard Lake phase sites on low ridges overlooking lakeshores, often near stream mouths, and usually associated with one or several conical burial mounds. These sites were situated near lake and wetland resources, with deer in the forest edge.

Settlement patterns for the Trempealeau phase in southwestern Wisconsin have been described as seasonally sedentary, with fall-winter movement into the interior and uplands where large mammals, particularly white-tailed deer, were taken. In the spring through the fall, occupation was on the floodplain and terraces, where people harvested riverine resources such as mussels and fish, and also practiced some incipient horticulture, including growing sumpweed and squash (Arzigian 2000; Stoltman 1990; Theler 1987).

Features found at the sites are limited. The Brower site had midden areas and a few hearths as the only non-burial features (Gibbon 1975a). The Sorg site (21DK1; Johnson 1959:24) had small ash and charcoal deposits, small groups of limestone cobbles that might have been associated with fires, and five stains thought to be postholes, although they did not appear to be associated with any of the other features and formed no consistent pattern (1959:24).

4.11 Principal Sites and Property Types

Principal Sites

Dobbs and Anfinson (1990:132) stress the importance of preserving the Howard Lake Archaeological District, which includes the major mound and habitation sites of the Havana Hopewell complex in Minnesota. The following sites are compiled from Dobbs and Anfinson (1990) and other reports, with the specific identified ceramics indicated for each site:

21AK1	Malmo Mounds [NRHP] (Malmo and Kathio ceramics; type site for Malmo ceramics)
21AN1,	Howard Lake (type site for Howard Lake; also Kathio ceramics
21AN2	Centerville (Howard Lake; also Paleo)
21AN8	Anderson (type site for Howard Lake; also Sorg, Paleo, Late Woodland)
21AN19	Harrison (Howard Lake; also Late Woodland)
21AN60	Peltier Island (Howard Lake)
21CA37	Gull Lake Mounds [NRHP] (Malmo; multicomponent Brainerd, Middle and Late Woodland; no stratigraphy; mound excavations)
21CA58	Langer (Malmo complex; also Brainerd, Kathio, Sandy Lake, St. Croix ceramics)
21CW96	Black Bear (Malmo context; also Brainerd, Blackduck ceramics)
21DK1	Sorg (type site for Sorg ceramics; multicomponent stratified—Havana-related and Late Woodland)
21DK2	Lee Mill Cave (Havana-related; Sorg ceramics, also Late Woodland and Blue Earth ceramics)
21DK3	Hamm (Havana-related; Sorg and Late Woodland ceramics)
21DK6	Bremer (Havana-related; Sorg and Late Woodland ceramics)
21FA1	Humphrey (Havana-related; also Blue Earth ceramics)
21FL3	Tudahl Rockshelter (Havana-related and Late Woodland)

21HE100	Long Lake (Howard Lake)
21IC1	White Oak Point [NRHP] (Malmo; also Blackduck, Sandy Lake, Brainerd, Fox Lake ceramics)
21JK1	Johnson (one Hopewellian sherd found in U of M collections; also Fox Lake, Lake Benton complexes)
21KA22, 24, 26	Knife River Prehistoric District [NRHP] (Malmo; also Kathio ceramics)
21ML1	Brower [NRHP] (Malmo context; single-component Malmo habitation site, and the Vanderbloom and Anderson mounds)
21ML6	Indian School [NRHP] (Malmo; also Kathio ceramics)
21ML18	Bromley Griffin [NRHP] (Malmo; also St. Croix ceramics)
21ML102	(no name) (AMS dates on transitional Malmo–St. Croix sherds)
21OT1	Peterson (Malmo context; Hohman-Caine 1979 notes that mound has been attributed to Malmo but has no Malmo ceramics)
21OT2	Morrison Mounds (principal site, Malmo context; Hohman-Caine 1979 notes that Morrison Mound has been attributed to Malmo but has no Malmo ceramics)
21OT5	Graham Lake (Malmo context; mound)
21PN10	Pokegama Outlet (Howard Lake; also St. Croix/Onamia ceramics)
21RA10	Indian Mounds Park (Havana-related; also Late Woodland)
21SB1	High Island (Malmo context; Hohman-Caine 1979 notes that mound has been attributed to Malmo but has no Malmo ceramics)
21SH16	Christensen Mound (possible Malmo sherd with cache of bear remains)
21WA1	Schilling site [NRHP] (Howard Lake, Havana-related, and La Moille ceramics)
21WA22	Harvey Rock Shelter (Havana-related; Sorg ceramics, Late Woodland)

Property Types

Based on the existing literature, these property types should exist for the Havana-related complex:

Habitation sites: Anderson (21AN8), Bremer (21DK6), and Brower (21ML1) are examples of substantial habitation sites. The Sorg site (21DK1) might have been a temporary campsite, or perhaps a remnant of a larger, more permanent or semipermanent village. It is possible that occupations in various rockshelters (such as Tudahl, 21FL3, and Lee Mill Cave, 21DK2) might reflect winter encampments.

Resource procurement and processing sites: With the limited excavation data available, no such sites can be reliably identified at present, but they should exist.

Special-use sites: None have yet been identified.

Mortuary–mounds: A number of these have been documented and excavated, such as Malmo (21AK1), Howard Lake (21AN1), Brower (21ML1), and Indian Mounds Park (21RA10).

Mortuary–nonmound: Nonmound burials have been reported from Brower (21ML1).

4.12 Major Research Questions for the Havana-Related Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Havana-related complex:

Relationship to Havana and Hopewell. Developing a better understanding of the external cultural relationships of Minnesota's Havana-related cultures is a high priority. This includes exploring the degree and nature of connections with Havana/Hopewell core areas as well as other peripheral manifestations. What is the nature of this complex? Does it represent a distinct culture and group of people or does it encompass a series of sites with specific artifacts? What place or role did these people have in the movement of material goods, ideas, and stylistic influences through the Hopewellian network, and why did these Hopewellian-influenced cultures develop where they did, rather than closer to Isle Royale and Barron County, the sources of important trade items in the network? It is possible that other trade

materials such as Knife River flint also played an important role, which tended to concentrate sites in this area and spread them out to the western border of Minnesota with key nodes at certain sites like Lake Koronis (21ME1) in Meeker County (see Johnson 1994:3.32, 3.42–3.48, Figures 3.11–3.14). The Minnesota sites can also be studied as an example of cultural development along a margin or frontier. GIS modeling can be used to identify locations along rivers (trade routes) that share the characteristics of known Havana sites, to target future field investigations for more data, and to evaluate site-catchment data to suggest what resources might have been exploited.

Ceramics. Ceramics are central to evaluating Minnesota's Havana/Hopewell connections, and the relationships need to be defined between the many different Havana-related ceramic types. Better distributional data are needed to better reflect the different ceramics and complexes. Larger ceramic assemblages are needed to begin to define the variation in pottery within localities and across larger spatial units. Because many sites in the database are now coded simply as Middle Woodland, more detailed analysis of regional distribution patterns is difficult. What are the geographic boundaries of Havana-related complexes? Do these change through time? Are there meaningful differences in the distributions of various ceramic types correlated with the different manifestations?

Lithics and other exotics. More analyses are needed from sites where the lithics can be reliably attributed to a Havana-related occupation. Specific attention should be paid to the presence of exotics, and to the production of other distinctively Hopewellian kinds of artifacts such as blade cores or other kinds of exotic artifacts. Such objects might also be identified from surface collections, including those of local avocational archaeologists, that are from specific site locations. Though the contexts would be lacking, the presence of these artifacts could be plotted regionally and might provide a better indication of the distribution of Hopewellian influences in the region.

5 THE LAUREL COMPLEX: Middle Woodland in Northern Minnesota, 150 B.C.–A.D. 650

5.1 Introduction and Overview

The Laurel complex represents Middle Woodland in northern Minnesota, dated to roughly 150 B.C.–A.D. 650. Laurel sites are found across the northern third of the state, with the best known concentrations occurring in the Rainy River, Rainy Lake, and Vermilion River drainages and the Mississippi River headwaters. Laurel is characterized by an adaptation to northern forests and a hunting-gathering lifestyle focused on seasonally abundant fish, moose, and beaver but with diverse use of other small and large game in the lake/forest region and bison on the prairie margin. Artifacts characteristic of Laurel include grit-tempered ceramics with smoothed surfaces decorated with a variety of dentate stamps, often in a push-pull or stab-and-drag manner. Lithics include stemmed and notched projectile points and end scrapers. Worked bone and antler tools include socketed and perforated antler harpoons that are perhaps unique to Laurel, as well as cut beaver incisors. Some small copper awls, flakers, and beads, and red and yellow ocher are also reported. Mounds, some quite large and with elaborate burials, and a variety of habitation and special-purpose sites, including fishing camps and bison-hunting camps, are known. Some type of broad-scale regional interaction with other Middle Woodland cultures is suggested by the distribution of exotic raw materials and ceramic attributes and other cultural traits. In May 2007 there were 158 sites recorded in the SHPO/OSA site database as having a Laurel context.

5.2 Environmental Setting and Geographic Distribution

Laurel sites are found across the northern third of the state, with two clusters in the Superior National Forest and Voyagers National Park resulting from extensive survey on these federal lands. In terms of the Ecological Classification System (MnDNR–Division of Forestry 1999), 94% (149) of the 159 sites recorded as Laurel are in the Laurentian Mixed Forest province, with most of them (102) in the Border Lakes subsection of the Northern Superior Uplands section, another 20 in the Northern Minnesota Drift and Lake Plains section, and five or fewer in the other sections of the Laurentian Mixed Forest province. There are nine sites in other provinces, including four in the Red River Valley section of the Prairie Parkland province, and five in the Aspen Parklands section within the Tallgrass Aspen Parklands province.

By landscape setting as reported in the archaeological sites database, 130 of the 159 sites in the SHPO/OSA database in 2008 are in some type of lacustrine setting, chiefly on lakeshores, islands, and peninsulas; 20 are in riverine settings, including terraces; 4 are in uplands; and 4 have no report. Based on presettlement maps of vegetation (MnDNR–MIS Bureau 1994), 49% (78 sites) are listed as being adjacent to bodies of water, and 12% (19 sites) are recorded as aspen-birch, 13% (21 sites) as white and Norway pine, 6% (10 sites) as conifer bogs and swamps, and 5.6% (9 sites) as jack pine barrens and openings. The remainder are listed as river-bottom forests, wet prairie, mixed hardwood and pine, oak openings and barrens, prairie, and Big Woods.

Laurel sites are found across a large area of the upper Midwest. In Minnesota (Figure 8), the 159 Laurel-coded sites are found predominantly in two SHPO archaeological regions (Anfinson 1990): Border Lakes (100 sites, 63%), and Central Lakes Coniferous Central (30 sites, 19%). The remaining 18% are distributed between Northern Bog (10 sites), Red River Valley North (seven sites), Central Lakes Deciduous (two), Lake Superior North (two), Prairie Lake (one) and unknown (seven). Rajnovich (2003:7) points out that Laurel burial mounds are present only in the Boundary Waters area of Ontario and Minnesota, and at Drummond Island near Sault Ste. Marie, Michigan.

5.3 Past Research

Wilford first defined the Rainy River Focus in 1937 (Wilford 1937a) and revised it in 1941 as the Laurel Focus of the Rainy River Aspect of the Woodland Pattern (Wilford 1941). Previously, some archaeological work and a great deal of looting had already taken place at several of the major Laurel sites in the Rainy River drainage in Koochiching County, particularly at Grand Mound, which had been looted since the late 1800s (some of the results of which are reported in Winchell 1911). The name Laurel comes from a former small town in the area, with the name applied to the site that included Grand Mound (21KC3), also called the Smith site. The Koochiching County sites are positioned

along the Rainy River, with the Grand Mound/Smith Mounds site at the mouth of the Big Fork River, and McKinstry (21KC2) at the mouth of the Little Fork River. Pike Bay Mound (21SL1) is near the origin of the Little Fork River on Lake Vermillion, about 100 miles southeast of the Koochiching County sites. In the Rainy River area, Wilford excavated Smith Mound 4 in 1933 (Wilford 1937a, n.d.c), Mounds 1 and 2 at McKinstry in 1939 (Wilford n.d.a), Pike Bay Mound in 1940, (Wilford 1952b) and finally Smith Mound 3 in 1956 (Wilford n.d.b, 1950b, 1952a, 1952c). In 1961, Elden Johnson led excavations at the Pearson site (21SL3) on Lake Vermillion, the only Laurel habitation site excavated to that point (Stoltman 1973:1). Stoltman conducted excavations at McKinstry Mound 1 in 1970. These five mounds and single habitation site formed the basis for Stoltman's (1973) monograph *The Laurel Culture in Minnesota* and his subsequent article (1974) on within-Laurel variability.

Significant work with Laurel occupations has also been done in Canada and Michigan. The Royal Ontario Museum conducted surveys of mound sites, including Armstrong Mound (Kenyon 1970). James V. Wright (1967b) surveyed the north shore of Lake Superior and excavated the Heron Bay site, a single-component Laurel occupation. The University of Michigan also conducted excavations at two Laurel village sites at Naomikong Point (Janzen 1968) and Summer Island (Brose 1970a, 1970b). Arthurs (1982, 1986) excavated in 1975 at the Long Sault site (DdKml), which is on two terraces at Long Sault Rapids, on the Canadian side of the Rainy River about 2 km downstream from the Smith Mounds. His excavations identified deep, stratified cultural deposits, including Archaic, Laurel, and Blackduck components.

In 1970 Stoltman conducted brief excavations in the Smith (21KC3) village area, recovering Laurel ceramics that came from beneath a Blackduck occupation and were analyzed by Lugenbeal (1976). Lugenbeal returned in 1972 to excavate three 3 × 3 m units (Lugenbeal 1976). In his dissertation, Lugenbeal studied the ceramics from a series of 10 Laurel sites, many with Blackduck components, refining Stoltman's ceramic types and adding several of his own. Minnesota sites that Lugenbeal used were Smith Village (21KC3) and Nett Lake (21KC1); the other sites were in Canada. Major excavations of Laurel components or sites in the Rainy River area in more recent years have included further work at the McKinstry habitation area, including work done through the Minnesota Trunk Highway Archaeology Reconnaissance Survey (Peterson 1983), and Mn/DOT Phase III excavations for a bridge replacement (Thomas and Mather with contributors 1996).

Significant work also has been done on sites in Voyagers National Park (for example, Clyde Creek, 21SL35; Lynott 1984); in the Superior National Forest, in the area of Cass, Itasca, and Beltrami Counties (for example, work at different portions of 21BL5; Kluth and Kluth 1996); and at Lake Winnibigoshish Dam (e.g., 21IC4; Schaaf 1978). Decorative techniques and thermoluminescence dating on ceramics from Clyde Creek (Lynott 1984) provided three dates that suggested that this was a single-component Laurel occupation dating to the Smith phase, between A.D. 500 and 750.

Michlovic's excavation of Lake Bronson (21KT1) in 1976 (Anfinson et al. 1978) showed a significant presence of Laurel in the prairie area, with a focus on bison hunting. The site is on a glacial lake beach ridge in a virgin prairie, providing the opportunity for assessing ecological relationships in the region (Anfinson 1975).

Rajnovich (2003) has completed a dissertation on Laurel ceramics and regional patterning. The dissertation takes a broader and more regional perspective regarding ceramic styles and their implications for culture change in the Upper Great Lakes. Finally, Thomas and Mather (1996b:5.1) have discussed updating of the Laurel-related terminology and taxonomy, as adapted from Syms' (1977) Co-Influence Sphere Model.

5.4 Chronology

Considerable controversy exists regarding the beginning and ending dates for the Laurel complex. Much of the early work on Laurel in Minnesota consisted of mound excavations, with cultural chronologies derived from mound fill. Subsequent village excavations have produced some evidence of stratification, but most of the sites appear to be multicomponent, co-occurring with later Blackduck occupations, making separation of components tricky.

There seems to be general agreement on Laurel existing between 0 and A.D. 500, with a possible maximum span of 200 B.C.–A.D. 800 (Dobbs and Anfinson 1990:139). Some dates in Ontario and Manitoba might be as late as A.D.

1100–1250 (Rapp et al. 1995:8). Calibrated, the Minnesota dates are concentrated between 150 B.C. and A.D. 650 (Figure 9).

Stoltman (1973:114–118, 1974) defined three phases for Laurel, based on ceramic attribute analysis and seriation of assemblages from mound fill in six mounds. Lugenbeal proposed a fourth phase, Hungry Hall, that he identified only at two mounds along the Rainy River in Canada (Lugenbeal 1976:578–580). Some possible ranges for the phases represented in Minnesota are as follows (adapted from Dobbs and Anfinson 1990:139; Rapp et al. 1995:8; Stoltman 1974; Thomas and Mather 1996a:18.3–18.4):

- Pike Bay phase, ca. 100 B.C.–A.D. 300, although possibly as early as 200 B.C.
- McKinstry phase, ca. A.D. 300–500
- Smith phase, ca. A.D. 500–800, possibly ending by A.D. 600

5.5 Technology and Material Culture

Ceramics

Ceramics are the most thoroughly studied of the Laurel artifact categories, and they have been the primary line of evidence for identifying Laurel components and phases. A general description of the ceramics (Anderson 1979; Budak 1985, 1998; Lugenbeal 1976; Stoltman 1973; Thomas 1996a:10.27–10.29; Wilford 1941) includes the following characteristics: grit temper, often with crushed granite; a smooth exterior surface; and a generally conoidal form with a typical thickness of 3–8 mm. The lip is flat to slightly rounded and undecorated. Decoration usually involves use of some sort of stamping tool on the exterior rim, the neck, and occasionally the upper shoulder.

Thomas (1996a:10.27–10.29) integrated Stoltman's type definitions as modified by Lugenbeal for a description of Laurel ware types:

> *Laurel vessels are almost always grit-tempered and smooth-surfaced. They are generally conoidal in form, with a flat to slightly rounded, undecorated lip, and exterior decoration on the rim/neck and occasionally upper shoulder. Decoration was usually accomplished with some kind of stamping tool. Vessels appear to have been made by the coil method…*
>
> *Stoltman (1973) identified five main types of Laurel ware and two residual categories for a total of seven types. Lugenbeal expanded this typology by dividing one of Stoltman's types into two, based upon the execution of the decorative tool. He also added an additional category that remains questionable today due to its late, transitional nature. The types as defined by Stoltman and modified by Lugenbeal are described below.*
>
> Laurel Pseudo-Scallop Shell. *Pseudo-scallop shell stamps are essentially a form of linear stamping, which limits the variations in decoration a potter can present with this tool…. The impressions appear as a wavy lines in vertical, oblique and/or horizontal patterns. Occasionally secondary decorative elements such as punctates or bosses occur but these are infrequent. Pseudoscallop shell stamping is thought to be an earlier decorative element in the Laurel sequence, most common during the McKinstry Phase or Complex. Pseudo-scallop shell stamps can be dragged and impressed rather than impressed and lifted, resulting in a stamp-and-drag or push-pull motif. When this motif occurs it is included in the Laurel Oblique category.*
>
> Laurel Dentate. *The Laurel Dentate motif was executed by impressing a notched or toothed stamp into the wet clay in vertical, oblique or horizontal rows…. Often, as in similar motif categories such as the Laurel Pseudo-Scallop Shell, this element may also include secondary decorative elements such as punctates or bosses. Laurel Dentate stamping is thought to occur late in the Laurel sequence and is a common element of Smith Complex vessels.*
>
> Laurel Incised. *This type of Laurel ware exhibits short or long incised lines in a vertical, oblique or horizontal pattern…. Combinations with bosses and punctates are not uncommon. Incised lines are generally widely spaced and straight, not curvilinear. Incised motifs are very rare but not unheard of (Reid and Rajnovich 1991). Laurel Incised appears to occur in fairly low frequencies in most sites, rendering the recognition of temporal placement difficult.*

Laurel Bossed. *The use of bosses by Laurel potters is strongly linked to the combined use of punctates…. Laurel Bossed exhibits only exterior bosses with the interior punctates that formed them. These bosses are usually in a single, evenly-spaced row around the exterior rim. Bossing seems to be a trait most common in the middle of the Laurel sequence, although bossing is found on some later transitional vessels.*

Laurel Punctate. *Like Laurel Bossed, this type exhibits only exterior punctates with the resulting interior bosses (although these are sometimes smoothed). As noted above, punctates commonly occur with bosses but form a rare category when they occur without bosses. Like Laurel Incised, Laurel Punctate occurs in such low frequencies that it is difficult to recognize any temporal patterning.*

Laurel Boss and Punctate. *Bosses and punctates are combined in an alternating interior/exterior pattern on this ware type, resulting in both bosses and punctates on the interior and exterior rim…. This type is most abundant in the middle part of the Laurel sequence.*

Laurel Oblique. *Stoltman originally defined one category of Laurel Oblique, with a number of subvarieties distinguished by dragging or undragging as well as the type of tool used.... As Lugenbeal (1976:460) notes, "Stoltman's Laurel Oblique type shifts the emphasis in classification from the technique of stamping (linear stamped versus dragged stamp) to the decorative motif (short oblique motif). The advantage of this shift is its creation of a type that can be easily and reliably identified." Stoltman's method apparently failed to gain wide acceptance, and instead Lugenbeal separated the Oblique type into two main categories, Laurel Oblique Dragged Stamped and Laurel Oblique-Undragged. For the purposes of this study, and to facilitate comparison, the original inclusive definition of Oblique has been used. Laurel Oblique here consists of one or more rows of oblique or vertical stamping or incising around the rim without the horizontal motif. This motif appears to occur earlier in the Laurel sequence and is associated with the Pike Bay Phase/Complex.*

Laurel Plain. *As the name implies, Laurel Plain lacks any exterior decoration....The Laurel Plain type is found in almost all Laurel assemblages, but there is some debate as to whether the trend is toward greater occurrence early, middle or late in the sequence (Reid and Rajnovich 1991:217).*

Laurel Cord-Wrapped Stick. *Lugenbeal added this type to the Laurel ware group, arguing that it is not a Blackduck variant as everything except the decorative element is Laurel-like. As might be expected, this is a very late Laurel type that is commonly found in Manitoba sites. Laurel Cord-Wrapped Stick indicates the Hungry Hall Phase/Complex.*

Some researchers have used different terms for some of the decorative elements found on Laurel pottery. For example, Laurel Oblique, according to Stoltman's definition, includes dragged and undragged elements. Dragged elements are often referred to as push-pull. Because the term oblique does not specify push-pull or simple linear stamping as the element in the Oblique type, different terms appear in the literature. Reid and Rajnovich (1991) have used the terms dragged dentate stamp, and dragged linear stamp in their work. As a result, without being able to examine other collections firsthand, it is often impossible to determine what exactly is meant by the terms oblique, linear stamp or dragged elements.

There are differences in the literature in how specific ceramic attributes have been described, posing some problems for standardized typology. Chronological phase designations within Laurel are based largely on seriations derived from mound-fill ceramics and reflect changes in the relative abundance of different types, rather than actual additions or losses of specific types (Lugenbeal 1976; Stoltman 1973). Some types occur throughout the sequence; other types are more typical of one phase than others. For example, according to Stoltman (1973), the Pike Bay phase has more Laurel Oblique ceramics, the McKinstry phase has more Laurel Pseudo-Scallop Shell and Laurel Bossed, the Smith phase has more Laurel Dentate ceramics, and the Hungry Hall phase has Laurel Cord-Wrapped Stick.

Lithics

Laurel lithics typically are described as including end scrapers, large side-notched points, large corner-notched points, small side-notched points, and small-eared points, along with a wide range of other kinds of scrapers, knives, and other chipped-stone tools. Webster (1967, 1973) suggested that while large side-notched points might be typical of Laurel, other artifacts such as small-eared points and end scrapers have a wider spatial and temporal distribution.

In their discussion of the McKinstry (21KC2) site excavations, Hoppin and Mather (1996) describe apparent changes in lithic technology at the site from Laurel through Late Terminal Woodland. One change was in the use of hard-hammer percussion, which decreased through time overall, although the pattern depended on the kinds of raw materials. Changes also were observed in platform preparation, the use of blades, the incidence of heat treatment, the use of raw materials, and the occurrence of debitage types. Hoppin and Mather suggested that the lithic raw-material distribution supports traditional ideas of trade networks, including Knife River flint and jasper taconite that were traded as preforms or tools. Shen (1996) conducted a use-wear analysis on lithics from McKinstry, including seven artifacts from the Laurel component, and was able to make some suggestions about tool usage. Although the small sample size limits general interpretations, it suggests a potential line of future research.

Worked Bone, Antler, and Shell

The Laurel bone/antler tool industry includes cut beaver incisors and socketed and perforated antler harpoons that might be some of the few artifacts uniquely diagnostic of Laurel (Webster 1973:105–106; Wilford 1952a). Additional types of modified bone include awls, bird-bone tools, and ornaments of animal teeth and bone (Morey et al. 1996:15.39-15.40; Webster 1973:111). McKinstry Mound 1 had large numbers of cut shell disk beads and marine shell beads, both associated and unassociated with human remains.

Other Artifacts

Other artifacts found at Laurel sites include copper and red and yellow ocher. Copper tools reported from Laurel sites tend to be small and consist primarily of awls, pressure flakers, and beads (Rapp et al. 1990). Laurel sites do not have the large copper tools characteristic of the Archaic (Stoltman 1973). Rapp et al. (1990) conducted a trace-element analysis of copper sources and reported that Laurel artifacts from the River Point site south of Ely, Minnesota, had a source area in Minong, Wisconsin.

Hematite and red and yellow ocher are often found at many northern Minnesota sites, including in association with human remains at Laurel sites, but red ocher is also found in habitation sites—sometimes ubiquitously, as at McKinstry (21KC2; see Arzigian et al. 1994; Thomas 1996c:14.4)—and the connection to specific or ceremonial activities is unclear. Sometimes it is even unclear whether small flecks of red ocher are cultural or natural in origin, as this material also occurs in nonarchaeological contexts in northern Minnesota (Thomas 1996c:14.4).

5.6 Subsistence

Laurel subsistence has been described as a mixed hunting-gathering economy with a seasonal round that exploited seasonally and locally abundant fish, large and small game, and plant foods. The seasonal round likely included periods during which large groups gathered, as well as times of more dispersed settlement.

Major faunal resources included sturgeon, pike, suckers, and other fish as well as moose, beaver, and a wide range of other mammalian taxa in the northern forest, rivers, and lakes, and bison on the prairie margin. However, there are few detailed reports of substantial, well-collected, and thoroughly analyzed assemblages of faunal remains from Laurel sites, and those that do exist (for example, Morey et al. 1996) appear to present somewhat contradictory trends in specific details, at least as currently interpreted. It is likely that most sites reflect only a small part of the seasonal round, and that multicomponent sites or sites in the same habitat need not have been occupied during the same season, accounting for at least some of the variation observed.

Few analyses have derived from habitation sites (for example, Anfinson et al. 1978; Arthurs 1986; Lugenbeal 1976) as compared to mounds (e.g., Lukens 1973). Few have had fine-screen recovery or been analyzed beyond number of specimens (e.g., Morey et al. 1996). Biases in the archaeological record as a result of taphonomic processes are a particular problem for Laurel sites because of the importance of sturgeon and the ease of identifying sturgeon-bone fragments compared to remains of other fish, which have relatively few elements diagnostic to taxon. Differences in procurement, butchering, and transport of different taxa, as well as the use of faunal materials (particularly beaver incisors) for tool stock, might be biasing analyses based just on number of specimens. Thus, numerous methodological issues remain, including how to compare species such as sturgeon, moose, and bison that have radically different anatomical and taphonomic characteristics.

At the McKinstry site (21KC2) on the Rainy River, Phase III excavations (Morey et al. 1996:15.16) generated some conclusions and some cautions about the nature of faunal data, particularly with regard to the sturgeon bones common at Laurel sites (1996:15.31–15.33). The authors identified a general decrease in the representation of sturgeon, with beaver and sucker specimens increasing in number from Laurel to Terminal Woodland. Other species such as turtle, pike, walleye, and beaver remained consistent but were present in lower numbers. However, these results are biased by differential recovery, with sturgeon and moose coming from the larger-screened samples, and other species such as sucker coming only from finer-screened samples. Changes observed in the fish taxa represented might also have resulted from changes in capture methods, with the gill nets proposed for the later Terminal Woodland peoples (Morey et al. 1996:15.52), making fall fisheries more readily available than they were to Laurel peoples.

The Lake Bronson site (21KT1), which lies on an open beach ridge in the Red River Valley, provides evidence of a different aspect of Laurel subsistence and hunting practices—bison hunting (Anfinson et al. 1978:39). The bones are associated with a Laurel-component hearth dated to A.D. 205 ± 85. The hunting strategy involved stalking of individual animals, based on ethnographic information, butchering practices, and the lithic assemblage as well as the practices otherwise interpreted for Laurel. How bison hunting fit into the whole Laurel seasonal round is another area of study.

Relatively little information is available on macrofloral remains from Laurel sites, due to limitations in both excavation methods and flotation, and perhaps due to the nature of the Laurel sites themselves. Currently there is no evidence for any native North American cultigens or other domesticated plants in the Laurel area, although at least some resources such as goosefoot are possible. Wild plant resources undoubtedly were used, but almost nothing is known about this aspect of the subsistence system. Even the northernmost Laurel sites would have had access to fruits and berries, aquatic tubers, and other usable plants, and more southerly sites would have had access to additional plant resources. Some plants (e.g., tubers) can be difficult to detect archaeologically, but seeds and pits should preserve if charred.

Wild rice grains are present at McKinstry (21KC2), though in limited quantities (Valppu 1996:16.2–16.3), and a possible wild-rice processing feature might be present at the Big Rice site (21SL163) north of Virginia, Minnesota (Rapp et al. 1990:235; Valppu and Rapp 2000), where wild rice grains from three pits with only Laurel ceramics were AMS dated to Laurel. Though the site had later ceramics, the AMS dates directly on wild rice grains support the attribution to Laurel. The dates attributed to Laurel (calibrated 1-sigma range) are from 35 B.C. to A.D. 229. Two dates from a fourth feature appear to relate to the Terminal Woodland occupation. Other sites have lacked adequate contexts or adequate excavation methods for recovering wild rice, if it was present. Despite these problems with the data, it seems clear that the occurrence of wild rice in Laurel contexts is radically different from the occurrences seen at later sites. The transition to a complex focusing on wild rice has social, cultural, and settlement implications well beyond the choice of which plants to harvest. Wild rice processing involves preparation of specialized facilities, often at repeatedly revisited sites. Furthermore, because of the multiyear variability of the harvest, it might well require a band to rely on multiple wild rice harvesting beds in divergent areas to ensure at least one good crop in any given year. Much more information is needed on the role of wild rice in overall subsistence and settlement strategies, when and where its use originated, and the role of increased wild rice exploitation in changes in other aspects of culture.

Phytolith analysis has gained more prominence in interpretations of both environment and subsistence, particularly when sherd residues can be examined directly. Thompson (1996a:17.6) examined residues from four sherds from McKinstry and found some grass phytoliths present, suggesting at least partial reliance on starchy seeds for food, but he found no evidence of phytoliths comparable to corn or wild rice.

5.7 Mortuary Practices and Ideology

Much of what we know about Laurel complex comes from five excavated mounds at three sites within or on the margin of the Little Fork/Vermillion uplands: Pike Bay Mound (21SL1), McKinstry (21KC2), and Grand Mound /Smith Mounds (21KC3). Mounds interpreted as Laurel are found predominantly in the Rainy River drainage and to the north and east. Several of the mounds have been badly looted, but multiple construction episodes and burial

sequences are well documented through radiocarbon dates, mound soil stratigraphy, and ceramic sequences. No nonmound burials are known for Laurel, although there are some possible sites (Arzigian and Stevenson 2003:88–90).

Burials from all three Minnesota Laurel phases have been identified from these mounds. The Pike Bay and McKinstry phases are represented by construction episodes at several mounds, but only disturbed burials. However, many artifacts are reported, particularly from McKinstry Mound 1, which contained a fragmentary burial with a necklace of 2,200 cut shell disk beads, and another collection of 800 cut marine-shell beads that were not associated with human remains. The Mound 1 fill contained abundant ceramics and lithics that Stoltman used to define Laurel ceramic types, as well as projectile points, knives, scrapers, and artifacts made from antler, bone, and teeth (including awls, perforated phalanges, bird-bone tubes, bone ornaments, socketed and perforated antler points or conical harpoons, and beaver incisors). Copper artifacts included awls, a bracelet, and sheet copper. McKinstry Mound 2 was predominantly Blackduck but contained one "formal burial arrangement" thought to be Laurel, consisting of a red ocher floor with three rocks, clam shells, three scrapers, and a few fragmentary human bones (Stoltman 1973:25).

The Smith phase of Laurel is represented by two mounds at the Grand Mound/Smith Mounds site that had many burials but relatively few artifacts. A variety of secondary burials were present, as well as torso burials and cremations. Individuals interred in Smith Mounds 3 and 4 exhibited few pathologies other than those associated with age or occupation such as degenerative joint disease or periostitis, as well as Harris lines indicating episodes of growth disruption and recovery from ages one to 14 (Myster and O'Connell 1997:220; Torbenson et al. 1994). Distinctive mortuary practices are evident from Smith Mound 4, including red ocher treatment, removal of the occipital bone, long-bone perforation, and cut marks consistent with dismemberment (Arzigian and Stevenson 2003; Stoltman 1973; Torbenson et al. 1992, 1994, 1996; Wilford 1950a). Speculation on the bone puncturing has ranged from brain and marrow extraction (Wilford 1950a) to spirit release (Torbenson et al. 1992:513). Postmortem long-bone puncturing is best represented at Grand Mound/Smith Mounds but is not unique to Laurel, with other examples found in the Red River Valley and the southern margins of the Great Lakes (Torbenson et al. 1992:513). The cultural context and functions of the practice might have varied across this region.

No nonmound burials have been confirmed for Laurel, although there are some possible candidates. A burned feature at Hannaford (21KC25) has a human phalanx and a radiocarbon date of A.D. 690 (uncalibrated), though there are no diagnostic artifacts and the feature is attributed only to Woodland (Arzigian and Stevenson 2003:427-428). Another site, Bulldozer Boy (21LA237), has an unconfirmed precontact burial, and the database lists only Laurel ceramics from the site (Arzigian and Stevenson 2003:88–90).

5.8 Social, Economic, and Political Organization

Existing data include evidence for interregional communication and contact, although there is only speculation on the form that it took—probably some combination of trade, intermarriage, and travel. The evidence includes lithics (e.g., Knife River flint, obsidian) and ceramics that appear to have been part of larger regional patterns. However, the exotic lithics so characteristic of Hopewell are not necessarily unique to Laurel. Knife River flint in particular was also used by Terminal Woodland groups, and "considering its persistence long after the Hopewellian decline, and the popularity of the material in Manitoba throughout prehistory, it may also reflect more localized systems of exchange" (Arthurs 1986:139).

5.9 Cultural Relationships

Laurel is often called Initial Woodland and has been argued to represent the first appearance of ceramics in northern Minnesota; however, recent dates on Brainerd pottery suggest that it precedes Laurel. The Laurel complex includes the first appearance of burial mounds, and in temporal and formal or stylistic terms, it is comparable to Middle Woodland manifestations to the south and east. The relationships of Laurel to preceding and subsequent cultures are a subject of debate.

Many aspects of hunter-gatherer life continued from Archaic traditions in the area; however, the specific culture(s) and external influences leading to the development of Laurel are still unclear. Researchers have suggested origins in

the Shield Archaic, the Lake Forest Archaic, or possibly multiple local Archaic populations adapted to the mixed hardwood-pine forest areas. Much of this discussion depends on identifying the earliest sites with Laurel cultural traits, and examining the evolution of ceramics within this broad region (e.g., Rajnovich 2003).

With regard to contemporary complexes, Anderson (1979:122) says that "Laurel appears to be stylistically related to North Bay in Wisconsin (Mason 1967 and 1969), Saugeen in southern Ontario and Point Peninsula to the east (Wright 1967[a] and Stoltman 1973). Hopewell influence on Laurel ceramics is also evidenced by decorative attributes such as dentate stamping, linear stamping and bossing (Lugenbeal 1976)." Ossenberg (1974:36-37) found little biological relationship between Laurel and Illinois Hopewell. Other traits, including mortuary behavior and the presence of exotic raw materials such as obsidian and Knife River flint, suggest some type of connection with Hopewell. Laurel is generally considered to have been part of some larger pattern of regional interaction that marked the Middle Woodland period of eastern North America (Brose 1970a; Lugenbeal 1976:636–637; Mason 1991; Stoltman 1973; Thomas and Mather 1996b:5.10). However, the exact nature of those connections is unclear, and Laurel peoples appear to have retained their autonomy (Myster and O'Connell 1997:284).

The dating and nature of the end of Laurel are also debated. In northern Minnesota, Blackduck ceramics appear about A.D. 600–800 (Rapp et al. 1995:9), but it is unclear whether their appearance represents in-situ evolution of Laurel into Blackduck, diffusion of populations or ideas (Thomas and Mather 1996b:5.13–5.14), or replacement of Laurel by a separate group of Blackduck people (Stoltman 1973). Blackduck and Laurel share much of their geographic distribution and adaptation to the mixed conifer-hardwood forests. Depending on how dates and contexts are interpreted, Laurel components might be contemporaneous with Blackduck for several hundred years. Virtually no stratified sites with well-documented "transitional" components have been excavated (Schaaf 1978:55–56), often because of limited excavations in habitation areas, small samples of ceramics, shallow deposits, or confusion of possible transitional components by disturbances from later groups.

It is likely that the nature of the transition from Laurel to later complexes will vary over the broad range of Laurel distribution. The evidence that does exist suggests that there were distinct changes in ceramics and lithics, mortuary behavior, subsistence, and social organization between Laurel and Blackduck, and that this change occurred somewhere around A.D. 600–800, paralleling changes in the rest of eastern North America about this time. Blackduck components are found overlying Laurel components at a number of sites, and Blackduck burials are intrusive into Laurel mounds (Stoltman 1973). Transitional ceramic types have been suggested, but they are rare (Anderson 1979:122); St. Croix Stamped and Onamia are possibilities (Hohman-Caine 1983; Thomas and Mather 1996b:5.13–5.14). Lugenbeal's ceramic analysis defined a Laurel cordwrapped stick type, while cordwrapped stick decoration is characteristic of Blackduck (Lugenbeal 1976), and both Wilford and Stoltman interpreted some of the mortuary vessels from McKinstry Mound 2 as having some "apparent combination of Laurel and Blackduck ceramic traits" (Thomas 1996b:8.6).

5.10 Demography and Settlement

Little information is available regarding Laurel demography such as site density, and population estimates. Speculation suggests that groups of extended families gathered regularly during the warm months, including at mound centers, and split into smaller groups in the winter. Ethnographic analogy with groups such as the historic Ojibwe suggests egalitarian bands with work divided along gender and age lines (e.g., Thomas and Mather 1996b:5.10–5.11).

The remains from Smith Mound 4 represent the largest Laurel population available for study of age and sex distribution (Myster and O'Connell 1997:220; Torbenson et al. 1994), with 193 individuals (111 adult, 82 subadult). Of the adults, 41 were female, 65 were male, and 5 unidentifiable as to sex. Both females and individuals less than 3 years of age were thought to be underrepresented, precluding reliable demographic studies. A preliminary estimate of life expectancy at birth was given as approximately 20 years, on the low end of such figures as derived from other Midwestern sites (Myster and O'Connell 1997:220).

Some types of features or structures should be associated with the various Laurel settlement types, but evidence is scanty so far. Reid and Rajnovich (1985) have suggested that some Laurel sites have house structures, although the

River Point site (21LA10) is the only one in Minnesota. Proposed house patterns consisted of fragmentary sets of postholes, along with dark staining, artifact concentrations, and more compact soil. The best evidence comes from the Ballynacree site (DkKp-8) in Ontario, where three structures and associated features were excavated (Reid and Rajnovich 1991). Possible structures at other sites were not fully excavated and were at multicomponent sites where separation of components was difficult. The Laurel structures are described as oval, 6–8 m long and 3–5 m wide, with internal hearths and storage pits, and possibly housing about 10 people (Rapp et al. 1998:12; Reid and Rajnovich 1985). However, the identification of some of the structures seems problematical, particularly at sites that were only partially excavated. For example, the few postholes mapped do not always form clear patterns, and many of the defined stain or compaction areas do not have the configurations of regular structures.

5.11 Principal Sites and Property Types

Principal Sites

The following sites are compiled from Dobbs and Anfinson (1990):

21IC4	Winnibigoshish Dam (Laurel, Blackduck; habitation and mounds)
21KC1	Nett Lake (Brainerd, Laurel, Blackduck; habitation)
21KC2	McKinstry Mounds and Village [NRHP] (Laurel, Blackduck, Psinomani; habitation and mounds)
21KC3	Laurel Mounds, also called Grand Mound/Smith Mounds [NHL] (type site; Laurel, Blackduck, Psinomani; habitation and mounds)
21KC6	Houska (Laurel, Blackduck; habitation)
21KC25	Hannaford (Laurel, Blackduck; mortuary–nonmound)
21KT1	Lake Bronson [NRHP] (Laurel, Central Minnesota Transitional, Blackduck; mounds, kill/butchering site)
21SL1	Pike Bay Mound (Laurel; mound)
21SL3	Pearson (Laurel, Blackduck; habitation)
21SL35	Clyde Creek [NRHP] (Laurel; habitation)
21SL82	King Williams Narrows No. 2 [NRHP] (Laurel, Blackduck, Psinomani; habitation)
21SL141	Sweetnose Island [NRHP] (Laurel, Late Woodland; habitation)

Property Types

Based on the existing literature, these property types should exist for the Laurel complex:

Habitation sites: Habitation sites are likely to include larger base camps representing seasonal gatherings for fishing and possibly mound construction, as at McKinstry (21KC2) or Clyde Creek (21SL35; Lynott 1984:7), as well as smaller campsites, including possible winter camps for smaller groups of people.

Resource procurement and processing sites: Although a variety of activities are taking place at the site, Lake Bronson (21KT1) might be an example of a bison butchering site. Specialized fishing camps can also be expected.

Special-use sites: No documented special-use sites have been identified for Laurel.

Mortuary–mounds: Mound sites such as McKinstry (21KC2), Grand Mound/Smith Mounds (21KC3), and Pike Bay Mound (21SL1) are well documented for Laurel.

Mortuary–nonmound: There are no confirmed nonmound burial sites associated with Laurel, although they probably exist.

5.12 Major Research Questions for the Laurel Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research for the Laurel complex:

Chronology. Although there might be some stratigraphic confirmation of the ceramic seriation that is the basis for specific phase designations, work in this direction has been limited, often because of the contexts of the ceramic assemblages themselves. Acquiring additional dates in tight association with habitations that have clear separation of components, along with careful reexamination and calibration of existing dates and contexts, may help in determining the overall time span of Laurel, how Laurel relates to other Middle Woodland complexes, whether Laurel occurs in different regions at different times, and whether the Laurel phases developed by ceramic seriation are supported by stratigraphic and radiocarbon evidence. Thermoluminescence dates (Lynott and Perry 1981) from Laurel sherds provide an additional possible line of evidence.

Ceramics. Further work is needed to establish standard descriptions of ceramic attributes, to verify that the ceramic types and their changes in relative frequency are useful diagnostic criteria, or to determine whether other types or specific attributes would provide better chronological and spatial markers. Suspected chronological changes in pottery need to be supported by additional radiocarbon dates with solid contextual associations. A robust artifact assemblage from a single-component site or separable components at a multicomponent site is needed. The relationship between Laurel and other smooth-surfaced ceramics in central Minnesota, as well as the relationship with later Blackduck ceramics, also must be explored.

Internal site structure, features, and houses. Research needs include the confirmation and full excavation of possible houses already reported, the identification of other possible houses, evaluation of internal and external features related to the structures, size and shape, and methods of construction. Careful excavation of an entire house at a single-component Minnesota site is essential and would help to reduce problems with post-Laurel disturbances. It would also provide a basis for comparison with the Canada sites. Single-component sites or sites with good separation between different occupations could also provide information on spatial patterning, to help identify different kinds of activities as well as “tool kits” based on simultaneous use of artifacts rather than archaeologically imposed typology. Even if actual structures cannot be identified, feature distribution, contents, and fill sequences could reveal a great deal about activities and patterning at the site, and could suggest whether some sites might reflect more permanent base camps.

6 THE FOX LAKE COMPLEX: Middle Prehistoric in Southwestern Minnesota, 200 B.C.–A.D. 700

6.1 Introduction and Overview

The Fox Lake complex represents the first appearance of ceramics in the Prairie Lake region of southwestern Minnesota. It is thought to date from about 200 B.C. to A.D. 700, though there are few radiocarbon dates from Minnesota. The 52 reported sites with Fox Lake components are concentrated in the Prairie Lake region, a natural region defined on the co-occurrence of shallow lakes and tall-grass prairie vegetation in southwestern Minnesota, eastern South Dakota, and north-central Iowa (Anfinson 1997). The sites occur typically along lake margins but also along streams and rivers. Fox Lake represents the first use of pottery in the region, but it is contemporary with Middle Woodland cultures to the south and east. The pottery might be related to Black Sand and other incised-over-cordmarked ceramics from elsewhere in the Midwest; however, there are no signs of participation in broader Woodland interaction networks such as Hopewell. The complex shows a Plains type of adaptation, with bison utilization balanced with exploitation of lacustrine and riverine resources. Plant foods were probably used, though the evidence is minimal due to a combination of poor preservation and limited fine-scale recovery. The cultural adaptation appears to have been a very stable one, showing continuity with the preceding Archaic populations and few changes with the following Lake Benton complex except in ceramic styles and the beginning the mound construction (Anfinson 1997:47–75). There are no mound sites known for the Fox Lake complex, and no ceramics from this complex have been found with burials or in mound fills—an important difference between the Prairie Lake region and the rest of Minnesota, where mound burials were common during this period (Anfinson 1997:71).

6.2 Environmental Setting and Geographic Distribution

Anfinson (1994a:3) notes that Fox Lake habitation sites are strongly associated with water, for reasons other than just access to fresh water. Some 75% are located on lakes, usually in settings with water on at least two sides, such as islands, peninsulas, and isthmuses. The remainder are located along rivers or streams, at river/stream junctions or on terraces by ravines. Such village locations reflect an emphasis on protection, probably from prairie fires. Additional benefits would have been the availability of trees that were also protected from fire, and protection from other, hostile groups.

Major Fox Lake sites on islands include the type site, Fox Lake (21MR2), as well as Pedersen (21LN2) and Mountain Lake (21CO1). Other sites such as Arthur (13DK27) and Tuttle Lake (21MR1) are on lakeshores and peninsulas. In the archaeological site database only 7 (13%) of the 52 sites are listed as having a landscape position that does not include some type of lakeshore or riverine setting.

Within the Ecological Classification System (MnDNR–MIS Bureau 1999), of the 52 reported Fox Lake sites in the SHPO/OSA database in 2008, 45 (87%) are in the Prairie Parkland province in the North Central Glaciated Plains section, including 30 sites (58%) in the Minnesota River Prairie subsection and 15 (29%) in the Coteau Moraines subsection. Seven sites (13%) are in the Eastern Broadleaf Forest province in the Minnesota and Northeast Iowa Morainal section, with sites in the following subsections: Oak Savanna (three sites), Big Woods (two sites), Anoka Sand Plain (one), and Hardwood Hills (one).

The geographic distribution of Fox Lake sites is closely tied to the Prairie Lake archaeological region (Anfinson 1990), with sites concentrated south of the Minnesota River and west of the Blue Earth River (Figure 10), though there are a few sites north of this range. Fox Lake sites are also recorded in eastern South Dakota and north-central Iowa. In Figure 10, only two sites are located well outside the Prairie Parkland province in the Eastern Broadleaf Forest province, and these are outlier sites with only a few sherds; otherwise, all of the Fox Lake sites are within the Prairie Parkland province or very close to the margin.

Based on maps of presettlement vegetation (MnDNR–MIS Bureau 1994), 22 (42%) of the 52 sites were in areas of prairie. Wooded areas account for another 20%: 6 sites (12%) in Big Woods and 4 sites (8%) in oak openings and

barrens. Vegetation associated with lakes or rivers accounts for the remainder, with river-bottom forests at 6 sites (12%); wet prairies, marshes, and sloughs at 4 sites (8%); and water at 10 (19%).

6.3 Past Research

Anfinson's 1987 dissertation and 1997 publication summarized existing research on the archaeology of southwestern Minnesota, and much of the information for the Fox Lake complex is drawn from those works, supplemented by more recent excavations. Anfinson describes how Wilford initially recognized a distinct Woodland complex for the Southern Minnesota Aspect that combined a number of what we now consider to be different cultures. Though southeastern phases were soon split from southwestern manifestations, it was a while before separate phases were proposed in southwestern Minnesota, due to such factors as long-term stability in the region and extensive soil disturbances that did not provide readily observable changes through time. Anfinson notes further that the culture history does not fit the familiar Early/Middle/Late periods because of lack of changes in ceramics and lithics, the absence of significant Hopewell influences, the lack of horticulture, and the late appearance of horticulture and burial mounds. Therefore, the area is divided into two complexes: Fox Lake and Lake Benton. The Fox Lake analysis as presented in Anfinson (1997) is based primarily on work at three sites: Fox Lake (21MR2), Pedersen (21LN2), and Arthur, in Iowa (13DK27).

The Fox Lake site is the type site for the Fox Lake complex, the initial Woodland complex of the Prairie Lake region. The site is on an island in Fox Lake just north of Sherburn, Minnesota. It was the first habitation site in southwestern Minnesota to be excavated by professional archaeologists. There were four seasons of excavation at the site. Jenks and Wilford conducted a surface collection and small-scale excavation in 1935 (Wilford 1937a), and in 1941, Wilford excavated four units (Wilford 1961a). In 1981 and 1982, Anfinson excavated a series of units for his dissertation, focusing on identifying cultural change and recovering subsistence remains and charcoal through flotation and waterscreening. Concentrations of fire-cracked rock, as well as animal bones and artifacts, were recovered. A large artifact assemblage allowed Anfinson to refine the ceramic typology and define local ceramic variations. A series of four radiocarbon dates were obtained. Anfinson (1987:Appendix 1) reported on the fieldwork and analysis at Fox Lake. Lukens (1963) included some of Wilford's animal bones in his faunal analysis. Bonney (1962, 1965, 1970) considered the pottery from the site and drew parallels to other regional Early Woodland ceramic types, including Dane Incised and Black Sand Incised.

The Pedersen site is also on an island in Lake Benton; at low lake levels it is connected to the shore by a narrow causeway. This site was first excavated by Wilford, who dug four units in 1956 (Wilford 1961b). Wilford identified Woodland, Cambria, and Oneota components and documented rock layers in two of the squares. In 1973 and 1974, G. Joseph Hudak of the Science Museum of Minnesota opened 11 smaller units and two large block excavations and identified rock features similar to those found by Wilford. Five radiocarbon dates were obtained (Hudak 1976; Lass 1980). The faunal remains have been published by Shane (1978), and the ceramics by Hudak (1976). The site is discussed further by Anfinson (1987, 1997).

The third site Anfinson used for detailed reconstruction of the complex was the Arthur site, located on the east side of Lake Okoboji East, on a relic beach above the lake (Tiffany 1982). Unit excavations in 1980 identified rock cluster features and a few pits. Late Paleoindian, Archaic, Woodland, and Late Prehistoric cultural horizons were reported; all were in the A horizon, and there was considerable mixing of horizons.

Additional work that contributed to Anfinson's 1997 synthesis was conducted at sites such as Big Slough (21MU1) in 1949 (Wilford 1954a) and 1971 (Anfinson 1977a, 1977b, 1982); Tuttle Lake (21MR1), Synsteby (21BW1), and Johnson (21JK1). The Hildahl site complex in Minnesota (21YM33-35) was tested as part of the Trunk Highway 23 project and was found to contain Early Prehistoric, Woodland, and Cambria occupations (Anfinson 1997:23; Dobbs 1979; Hudak 1978). Fox Lake sites in South Dakota include Oakwood Lakes (39BK7), Winter (39DE5), Waubay Lakes (39DA7), and Christiansen's Point (39LK18). A second Fox Lake site in Iowa, in addition to the Arthur site, is the Crim site (13ET403).

More recent CRM excavations have included work at two sites. The Duck Lake 1 site (21JK12) is located on three terraces on the east side of Duck Lake. Phase III excavations conducted for Mn/DOT in 2001 (Schoen 2002) consisted of shovel testing, mechanical trenching, and excavation of a 2 × 2 m unit. An in-situ Fox Lake component was identified, along with Lake Benton and Oneota occupations in the plow zone.

Another site, Washington Creek (21ME14), illustrates problems encountered at some Fox Lake sites. The site has what appears to be intact deposits from Middle and Late Woodland occupations, but no features were identified in the excavation, and diagnostics were not found in discrete, segregated activity areas, "leaving the temporal separation of the nondiagnostic artifacts undefined" (Olmanson and Mather 1994:118). The site appears to have been a series of short occupations from which the material remains have become "blurred and generally difficult to separate" (1994:118).

Ceramic analysis has only recently led to the definition of formal ceramic types. Bonney (1965) looked at Wilford's ceramics from a wide area of Minnesota and created a cumbersome series of 18 categories that was not capable of distinguishing between time differences or separate regions. Hudak's (1976) Pedersen site analysis did not define formal types but did identify ceramic series of co-occurring attributes; he split early ceramics from late based on thickness, with a cutoff point of 8 mm. Benn (1982a, 1982b) presented expanded definitions of Fox Lake ceramics based on his analysis of the Arthur site (13DK27) in Iowa. Anfinson (1979b) defined three types for Fox Lake and later added two more, integrating some of Benn's types, based on an examination of the Pedersen, Mountain Lake, and Fox Lake sites. Anfinson (1997:55–66) also discusses the problems and limitations of the early definitions of ceramic types and presents descriptions of the types and varieties.

6.4 Chronology

The Fox Lake complex appears to date from about 200 B.C. to A.D. 700. This time frame represents the middle of the Middle Prehistoric period in the Prairie Lake region (Anfinson 1997). The dating of Fox Lake and Lake Benton occupations is made more confusing by the occurrence of both components at most sites and the lack of clear, distinctive elements to separate the two, so that unless sherds are directly associated with dated charcoal, interpretations of exactly what is being dated are difficult. Figure 11 shows the Fox Lake and Lake Benton dates together; many have been labeled in the archaeological literature simply as "Woodland" (for example. Anfinson 1997:Table 1) because of the difficulty of separating the two components. Examination of the clusters suggests that there might be two sets of dates that approximate the two complexes. Dates in the first set seem to cluster between 200 B.C. and A.D. 70, dating the Fox Lake complex. The second set spans the time from about A.D. 750 to 1300 and should date the Lake Benton complex. However, detailed analysis of the specific contexts of the dates, particularly for the dates in the mid-range, might indicate a transitional complex between the two.

There are 27 radiocarbon dates from the Prairie Lake region that seem to relate to either Fox Lake or Lake Benton (Figure 11). Many of the dates are from outside Minnesota or might not have ideal contexts or associations, particularly at Fox Lake (21MR2) and Oakwood Lakes (39BK7). Eleven of the 27 dates are from the latter site, and only two dates are clearly associated with the Fox Lake complex. The earliest dates are from the Oakwood Lakes site in South Dakota and are associated with an Initial Woodland component that represented the most intensive use of the site (Hannus 1981:312). However, Anfinson (1994a:4) notes that the site had extensive soil disturbance and few diagnostic artifacts, and all of the dates are from bone. The earliest date is 280 ± 245 B.C. (1-sigma calibrated range of 734 B.C.– A.D. 19); however, this date might be anomalous, and has a particularly large range of error. The oldest Minnesota date is 2050 B.P. or 100 B.C. (1-sigma calibrated range of 170 B.C.–A.D. 46), from the Pedersen site (21LN2; Lass 1980:36). A cluster of dates from both South Dakota and Minnesota fall between about A.D. 200 and 700, considering their 1-sigma ranges. At Fox Lake (21MR2), stratigraphy was more confused than at Pedersen (21LN2), and the available dates are not associated with specific diagnostic ceramics, making them difficult to sort into Fox Lake or Lake Benton. The Winter site (39DE5) in South Dakota has two radiocarbon dates from features directly associated with an initial Woodland occupation, with one that falls within the Fox Lake expected time span (1950 ±70 RCYBP; A.D. 50), and the other Lake Benton (1180 ±70 RCYBP; A.D. 860) (Haug 1983).

The end of Fox Lake and transition to Lake Benton is difficult to identify, since so many sites have both components. One date that might mark the transition period is from Pedersen (21LN2) and is associated with a large rim sherd that shows characteristics of both Fox Lake and Lake Benton ceramics (Anfinson 1994a:4). The date of 1135 ± 90 B.P. has a 1-sigma calibrated range of A.D. 780–988.

There is only one radiocarbon date for a mortuary site from this time period in the Prairie Lake region, and it did not have any typical Fox Lake materials associated with it. Human bone from a flexed primary burial at the De Speigler site (39RO23) was associated with a small dentate-stamped vessel and yielded a date of 1350 ± 110 RCYBP, or A.D. 660 (Johnson 1964:41–42). This date is not included in Figure 11 because of the questionable nature of its association with Fox Lake.

6.5 Technology and Material Culture

Ceramics

Ceramics are the main diagnostic artifact for Fox Lake sites. The types are based on work by Hudak (1976, 1978), who defined ceramic series that were formalized into types and expanded by Anfinson (1979b, 1987, 1997).

Anfinson (1997:53–54) notes that in the Prairie Lake region the earliest ceramics are similar to LaMoille Thick, defined in southeastern Minnesota, but these early ceramics are not common. The vessels are thick and usually have well-defined vertical cordmarking on the exterior, with decoration limited to a single horizontal row of fingernail impressions. The interiors are smooth, unlike the cordmarked interiors of LaMoille ceramics. Anfinson (1997:53–54) also reports that thick, fingernail-impressed sherds have been found at the Fox Lake, Mountain Lake, and Kunz sites in Minnesota, as well as at a series of sites in northeastern Iowa, west-central Illinois, and southern Wisconsin. He argues that the "Fox Lake ceramic tradition is in part an outgrowth of such ceramics" (Anfinson 1997:54), and also notes (1994a:1–2) that

> *Fox Lake phase ceramics are characterized by the following attributes: moderate to small-sized conoidal to sub-conoidal vessels with bold exterior cordmarking that is usually vertically oriented, but occasionally oblique or horizontally oriented; the horizontally cordmarked vessels are often partially smoothed and a few Fox Lake rims feature complete smoothing. Vessel walls are relatively thick (6–12 mm) and the paste is sand-tempered. Lips can be round or flat and the rims can be slightly inverted to slightly everted. About two-thirds of the vessels feature some exterior rim decoration, notably trailing, bossing, punctating, and dentate or cordwrapped stick stamping (in order of importance). These decorative attributes can appear alone or in combination. Occasional interior decoration features short, vertically oriented tool or cordwrapped stick impressions in a single band immediately below the lip. Occasional lip decoration with tool or cordwrapped stick impressions can give the lip a notched appearance.*

There are now five defined ceramic types (taken from Anfinson 1994a, 1997:59–66):

Fox Lake Trailed: Thick-walled, conoidal vessels with cordmarked bodies decorated with trailed lines on the rim, often accompanied by bosses and interior cordwrapped stick impressions. Anfinson defines two varieties, Wide Line and Narrow Line. The Wide Line variety has trailed lines ≥2 mm wide, usually in horizontal bands with tool-impressed lips. Bosses are common, punctates occur occasionally, and interior decoration is rare. Lips can be either round or flat. The Narrow Line variety has lines that are <2 mm wide, usually arranged in complex motifs with horizontal, vertical, and oblique orientations. This variety has few punctates and bosses; only occasional interior decoration, usually consisting of cordwrapped stick impressions; and no lip decoration, except for occasional cordmarking. Lips are almost always flat.

Anfinson (1997:59–60) also discusses Benn's (1982b) three varieties of Fox Lake Trailed: Early, Middle, and Late. Early has wide trailed lines (2.9 mm average) or bold gashes on the rims or shoulders, with some bosses and lip notching. The Middle variety has narrower lines (1.7 mm average) arranged in parallel horizontal and oblique patterns such as criss-cross or filled-in triangles, with some use of bosses, punctates, lip notching and interior cordwrapped stick impressions. The Late variety has even narrower lines, averaging 1.5 mm, arranged in complex patterns such as filled-in triangles, and with some use of punctates. There is a proposed general trend from Early to Late for thinner

walls, less bold cordmarking, partially smoothed exteriors, finer paste, and a more curved rim profile, however, there is little stratigraphic or radiocarbon support.

Fox Lake Vertical Cordmarked: Thick-walled, conoidal vessels with vertically cordmarked bodies occasionally decorated below the lip with exterior bosses, punctates, and/or interior cordwrapped stick impressions.

Fox Lake Horizontal Cordmarked: Thick-walled, conoidal vessels with horizontal cordmarked bodies, occasionally partially smoothed and often undecorated; they might have exterior punctates and/or cordwrapped stick impressions but are rarely trailed. This type has similarities to Benn's (1982b) Arthur Cord Roughened; however, Anfinson (1997:60–61) discusses this type and concludes that the Arthur ware classification might not be useful. At the Pedersen site, horizontal cordmarking appears to be stratigraphically late in the Fox Lake complex. At the Mountain Lake site, it is associated with exterior cordwrapped stick impressions, another late Fox Lake attribute (Anfinson 1997:61).

Anfinson (1987, 1997) has added two types, integrating some of Benn's proposed types:

Fox Lake Smooth: Completely smooth rim and upper shoulder. Rim decoration is common and includes bosses, punctates, and occasional cordwrapped stick or dentate stamping.

Fox Lake Cordwrapped Stick: Horizontal cordmarking, with exterior horizontal rows of cordwrapped stick impressions and angular punctates. Anfinson (1997:62) notes the need for an expanded definition that should include some vertical cordmarked surfaces, smoothing, and more decorative variation.

In his Fox Lake context, Anfinson (1994a:1–2) discusses geographic trends in Fox Lake pottery. He says that in the Prairie Lake region, Fox Lake Trailed pottery gets less common from east to west and from south to north. It accounts for at least half the Fox Lake pottery at Fox Lake and Arthur, but only some 20% at Big Slough and Pedersen, and less than 10% at eastern South Dakota sites. Although common at Mountain Lake and Synsteby (25–40%), it is not as common as at Fox Lake and Arthur. Anfinson (1994a:1–2) also notes the predominance of Fox Lake Vertical Cordmarked in the western part of the Prairie Lake region and Fox Lake Horizontal Cordmarked in the central part. Fox Lake Cordwrapped Stick Impressed is always a minor type (≤ 10%) and seems to decrease from east to west, while Fox Lake Smooth, also a minor type, is more common in the west.

Anfinson (1997:65) argues that Fox Lake represents a "relatively stable ceramic manufacturing tradition lasting perhaps a thousand years," although some changes are evident through time. Vessel walls, although always fairly thick, gradually get thinner with time. Exterior smoothing appears later on, but bold, unsmoothed cordmarking remains common. Horizontal cordmarking also appears late, but vertical cordmarking remains. Simple designs of wide trailed lines are more common early, and complex designs of narrow trailed lines are more common later. Earlier in the complex, bosses are more common than punctates; later, the reverse is true. Cordwrapped stick impressions occur only on lips and interiors early, but later, they appear on exteriors.

These changes parallel changes in other Midwestern ceramic wares. Ceramic antecedents lie in the other Early Woodland trailed over cordmarked types. Anfinson (1997:57) notes parallels between the trailed over cordmarked Fox Lake ceramics and other Early Woodland ceramic types, particularly Black Sand, which consists of "small conoidal jars with rounded lips, fine grit temper, walls averaging 6 mm in thickness and vertically cordmarked exterior surfaces. Exterior rim and upper shoulder decorations consist of horizontal, oblique, and vertical trailed lines. Often, these are in combination with a single row of bosses on the upper rim (Griffin 1952:98; Munson 1982:7–8; Struever 1968:149)." Anfinson cites Struever (1968:142) for five dates on Black Sand ceramics from the Peisker site in Illinois that range from 625 to 230 B.C., with a mean between 400 and 300 B.C. (uncalibrated). Other trailed over cordmarked ceramics in the Midwest include Spring Hollow Incised in northeast Iowa (Logan 1976), Brock Lake Incised in southwestern Wisconsin (Keslin 1958:203–205), Nokomis Trailed in north-central Wisconsin (Salzer 1974:47), and Crawford Trailed and Valley Embossed/Trailed in western Iowa and eastern Nebraska (Benn 1990). Though poorly dated, these appear to be Early Woodland or early Middle Woodland components (Anfinson 1997:57). Anfinson notes that isolated trailed-over-cordmarked ceramics have been found at a number of sites in east-central Minnesota and in the Snake River Valley (Hohman-Caine 1969), and also in north-central Minnesota and eastern North Dakota. There

are also similarities between Fox Lake Horizontal corded with no decoration, and Brainerd Horizontal corded, and between Fox Lake smooth with bosses and Laurel smooth with bosses.

Anfinson (1997:58) argues that Havana influences led to some shifts away from such Early Woodland attributes as thick walls, cordmarked exteriors, trailing, and bossing. Havana influences are suggested by cordwrapped stick and dentate impressions, but there is little evidence of more formal Havana traits such as zoning, ovoid or crescent stamps, and beveled lips.

Lithics

Anfinson (1994a:2, 1997:66–68) notes that Fox Lake–associated projectile points show considerable geographic variation within the Prairie Lake region, but in general, earlier points show more affinity to eastern types, and later points show more affinity to western types. Stemmed, side-notched, corner-notched, and unnotched triangular points are associated with the complex, and within each of these styles, sizes and outlines vary. Anfinson cites Hudak's (1974) data from the Pedersen site as indicating that stemmed and corner-notched points are early and, especially in the case of expanding-stemmed points, carry over from the Late Archaic Mountain Lake phase. The corner-notched points at Pederson are more uniform in size than the stemmed points. Unnotched points with isosceles triangular forms predominate in the upper levels. The site's five side-notched points vary in form. Anfinson (1997:68) also notes the presence of many side-notched points with deeply concave bases in the Fox Lake component at the Mountain Lake site, suggesting that the variety of Fox Lake point styles might reflect the adoption of the bow and arrow at some time during the complex. Michlovic (personal communication, 2007) also notes that points were used for different purposes, such as knives, thrusting spears, casting spears, and dart points, and thus a site might have a variety of point types in simultaneous use, just as a ceramic assemblage could have multiple types of vessels.

Other chipped stone tools associated with the Fox Lake complex appear to be common Midwestern and Plains forms of scrapers, knives, drills, flake tools, and choppers. Anfinson (1994a, 1997) describes the general nature of the chipped stone assemblages but identifies no unique tools exclusive to the complex. The assemblages reflect an emphasis on animal hunting and processing (cutting meat and scraping hides). Ground stone tools are uncommon, with each site producing only a few; they include full-grooved mauls, grooved and ungrooved celts/axes, hammerstones, grinding stones, nutting stones, and abrading/sharpening stones. Anfinson suggests that the overall tool assemblage indicates a hunting economy, with the grinding stones suggesting some plant processing (1994a:2, 1997:68–69).

Local raw materials, mostly cherts from till, dominate Fox Lake assemblages. Knife River flint is present in modest quantities at most sites, with percentages increasing east to west. Anfinson (1997:69) suggests that some Knife River flint can be found in till, but a detailed study of the flint might be needed to identify the smaller pieces and cortex indicative of pebbles or cobbles from till; otherwise at least some of the Knife River flint should be considered exotic. High-quality raw materials were usually reserved for unifacial tools (i.e., scrapers) or projectile points, often in preference to poorer-quality local materials. Obsidian (two points and a flake) was present at three sites, but Anfinson could not confirm that it was associated with the Fox Lake components (Anfinson 1994a:2, 1997:68–69).

Worked Bone, Antler, and Shell

According to Anfinson (1994a:2, 1997:69), multicomponent Woodland sites in the Prairie Lake region have produced few bone tools, and stratigraphic mixing makes it difficult to associate the tools with particular components. Anfinson also says that major habitation sites of the initial Woodland in this region have not produced any shell artifacts; however, if the Alton Anderson site (21WW4) is a Fox Lake site, there are some shell pendants from the burial context there.

Anfinson (1997:69–70) lists some bone tools that have been found at sites in the region, though they cannot be definitely attributed to the Fox Lake component. At Fox Lake, a later analysis of Wilford's material (Lukens 1963:169–170) found four carnivore jaw elements that had been trimmed or lightly engraved. At Pedersen, Wilford (1961b:32) found a bone awl and a triangular bone pendant, but there is no stratigraphic information on them. Hudak (1974:Appendix 1) depicted bone artifacts found at Pedersen associated with hearths containing Fox Lake ceramics. Anfinson (1997:69) tabulates them as three mammal-bone awls, three worked teeth (two beaver incisors and one

canine), a bird-bone bead, and several apparent bone pendants. At the Big Slough site (21MU1), Wilford's 1949 excavations (Wilford 1954a) produced a bone awl, while the 1971 excavations (Anfinson 1977a:54) recovered two more awls, a bird-bone bead, and a polished hawk humerus that were from levels associated with Fox Lake ceramics. For the Mountain Lake site, Wilford (1962b:22–23) reported a bird-bone bead and a split mammal long-bone tool with one squared end and one convex end. At Synsteby, Wilford (1962a:49) found a bone chisel and two worked mammal long bones. At Johnson, Wilford (1962b) found two bone beads from lower levels. The Arthur site produced no bone tools (Tiffany 1982:192).

Other Artifacts

There is no information on other kinds of artifacts for the Fox Lake complex.

6.6 Subsistence

Bison are important at all Fox Lake sites, although Anfinson (1982; 1994a; 1997:70–71) notes that their overall importance to the diet might be overemphasized by assumptions that all edible meat was always used. Most of the recovered bison bone is shattered, indicating marrow and/or bone grease extraction. Small numbers of cranial, vertebral, and rib elements were found at all sites except Arthur (Anfinson 1997:70), indicating that kill sites were some distance from habitation sites.

Besides bison, remains of other animal resources have been found, including muskrats at many sites, as well as fish, though the species vary. Deer and elk are present but in lower numbers. Waterfowl and turtles are present, though less common, and mussels are uncommon (Anfinson 1997:71).

Anfinson (1997:70) provides a detailed summary of the fauna from different sites, noting that since recovery techniques varied at each site, direct comparisons are risky. At Fox Lake, fine-scale recovery methods and good preservation provided evidence of subsistence practices, including use of bison, deer, muskrat, turtle, and fish, as would be expected in an adaptation focused on the prairie-lake environment. The initial Woodland levels of the 1980s excavations contained the following elements: bison (11 elements), deer (6), dog/wolf (3), muskrat (29), badger (2), raccoon (4), beaver (11), fox (3), skunk (9), mink (1), gopher (2), northern pike (18), bullhead (4), Canada goose (1), duck (1), and painted turtle (14). The assemblage is similar to that of the earlier Archaic levels except for the dog/wolf and deer. Bison dominated the potential edible meat, but fish and muskrat dominated the MNI (Anfinson 1997:70).

At Pedersen, ½-inch screens probably missed many small remains, particularly fish. The Fox Lake levels had 12 species of mammals, 6 species of fish, 4 species of birds, and 2 species of turtle. Bison accounted for 108 elements from at least 6 individuals; there were also 54 muskrat elements (MNI = 5); 209 bullhead elements (MNI = 34), and 104 perch elements (MNI = 18) (Anfinson 1997:70; Shane 1982).

The 1976 excavations at Mountain Lake also used ½-inch screening, and the assemblage recovered was similar to that from Pedersen (Anfinson 1997:70; Shane 1978, 1982); it was still dominated by bison, but with fewer muskrat and fish. At Big Slough, the Fox Lake levels contained bison (139 elements), muskrat (56), dog/wolf (11), turtle (17), and bullhead (39), with smaller numbers of deer, beaver, badger, raccoon, skunk, gopher, duck, goose, crane, owl, northern pike, and mussels (Anfinson 1982, 1997:70). At two other sites, Arthur and Oakwood Lakes, the Fox Lake components could not be reliably separated, but the assemblages were similar, with bison dominant.

At Duck Lake 1 (21JK12), bison also were dominant; other remains were bird, reptile, amphibian, and six pieces of mussel shell. Schoen (2002:56) characterizes the bison as having been processed at the site, based on the butchering evidence and the distribution of bison parts, suggesting that secondary carcass reduction occurred at the site, reducing the mandibles and legs into smaller units, removing the meat and organs, and crushing the bones for bone grease. Primary butchering took place elsewhere, based on the absence of crania, sacra, vertebrae, innominates, and phalanges (Pipes 2002:B6). Schoen (2002:56) argues that some faunal species are available only seasonally. The analysis considered the faunal assemblage as a whole for interpretations of site function (Pipes 2002:B5), so separating the Fox Lake component was difficult.

It is likely that plant foods were an important part of the diet, but few floral remains are known, probably due to a combination of poor preservation, particularly of some potential resources such as tubers, and limited fine-scale recovery techniques.

At the Oakwood Lakes site in South Dakota (39BK7), some carbonized fragments of chenopods, a wild rose seed, a hawthorn seed, an *Ambrosia* seed, and a marsh elder seed were recovered (Haberman 1981, as cited in Anfinson 1997:70).

6.7 Mortuary Practices and Ideology

No Fox Lake mound sites are known, and the two burial sites interpreted as possible Fox Lake are an isolated burial and a cemetery, both tied to this complex through projectile point styles. Anfinson (1997:71) says that the apparent absence of widespread burial mound use during at least the early part of the Fox Lake complex is a major factor differentiating the Prairie Lake region from adjacent regions, noting that "no Fox Lake ceramics have been found in direct association with mound burials and such ceramics have not even been reported from mound fill."

Two nonmound mortuary sites might be Fox Lake, based on their projectile points, but the cultural contexts of the two sites are still being debated (Anfinson 1997; Arzigian and Stevenson 2003). They are the Runck Burial site (21BW7) and the Alton Anderson Burial site (21WW4). Both sites had primary burials accompanied by projectile points, and the later site (Alton Anderson) had other artifacts as well. Anfinson (1997:74) has suggested that the Runck burial, possibly an Archaic primary pit burial with Parkdale Eared projectile points, could also be early Fox Lake, again based on the points.

According to Anfinson (1997:74), Alton Anderson might be late Fox Lake complex, showing more evidence of contacts outside the Prairie Lake region than Runck, and also might "be the forerunner to mound burial in the Prairie Lake Region." At Alton Anderson, remains of at least 69 individuals were recovered from 16 shallow pits during gravel pit operations on two ridges on a glacial esker. Excavations in 1970 and 1971 by MHS personnel uncovered 16 burials of single and multiple individuals in shallow subsurface pits, with a total MNI of 32–36 calculated by Lothson (1983). Subsequent osteological analysis of the remains, many of them fragments from surface collections, confirmed the presence of at least 69 individuals representing adults and children of both sexes. Most were primary flexed or semi-flexed burials, many found with projectile points or worked shell ornaments, a few bone tools, elk teeth, and red ocher. Other burials were highly disturbed by plowing or gravel operations; only one was a bundle burial of four individuals. Lothson suggests that possible slight rises associated with each of the burial complexes might represent plowed-down mounds. Lothson has attributed the whole site to the Besant-Avonlea phase based on burial form and diagnostic projectile points. Anfinson (1997:73–74) suggests it belongs to the Fox Lake complex based on projectile point styles, with the secondary burials possibly related to a historic component at the site.

6.8 Social, Economic, and Political Organization

Very little is known about these facets of Fox Lake culture. Populations were presumably small enough to move seasonally to exploit bison and other resources, but it is unknown how people were organized. It does appear that Fox Lake peoples did not participate in other regional trade networks such as Hopewell. Anfinson (1997:87) notes that the Prairie Lake region showed no signs of participation in the Hopewell Interaction Sphere and thus has few exotics such as obsidian, copper, or marine shells; it also lacks signs of elaborate mortuary ceremonialism or Hopewell ceramic and lithic influences.

6.9 Cultural Relationships

Anfinson describes the Fox Lake and succeeding Lake Benton complexes as Plains adaptations. He notes (1997:121) that the Prairie Lake region, with its grassland vegetation and bison as the dominant upland mammal, is not just peripheral Plains but should be considered a Plains region both environmentally and culturally: "Archaeologically it evidences little participation in Midwestern Archaic, Woodland, and Middle Mississippian influence spheres, exhibits a strong orientation toward bison procurement for thousands of years, and contained Plains Village cultures closely

related to the Middle Missouri Tradition. Ethnographically, it was dominated by western and middle Dakota groups." However, there are at least some connections to external regions, particularly if the sources of Knife River flint can be demonstrated to be from the Dakotas and not from local till sources.

According to Anfinson (1979b:80), Fox Lake shows similarities to some Early Woodland ceramics, but really represents independent growth and development of a broad-based adaptation to the Prairie Lake region that

> *probably first effervesced in the Archaic period. This economic orientation utilized both the grassland resources (e.g., bison) and the shallow lake resources (e.g., fish, muskrat). The success of this economy may have slowed the rate of cultural change in the region relative to other areas of Minnesota. This is evident in the lack of a we1l-defined Early Woodland period in the region, the gradual and somewhat incomplete transition to Late Woodland ceramics, and the resistance to horticulture during the period of Mississippian expansion. FOX LAKE appears to represent a stable cultural tradition that existed for about 1,000 years, continuing an economic orientation that had been established in Archaic times.*

The ceramics might have been influenced by Early Woodland traditions to the east and south, such as Black Sand Incised and Marion Thick. La Moille Thick is the closest geographically and might be a link with the other early ceramic traditions. But there are virtually no Havana or Hopewell influences reported from the area, even though many occupations were contemporaneous with other Middle Woodland complexes (Anfinson 1979b:80). Once adopted in the region, the ceramic tradition remained relatively stable in terms of both manufacturing and style, with the succeeding Lake Benton complex an outgrowth of Fox Lake but with some ceramic influence from the northeast (Onamia) (Anfinson 1979b:80). Anfinson (1979b:80) points out that

> *In regions adjacent to the Prairie Lake Region…there are archaeological similarities in the Early and Late Prehistoric periods, but most Middle Prehistoric cultural orientations of the Prairie Lake Region are unique to that region. These cultures developed soon after the stabilization of the topography, hydrology, vegetation, and fauna equivalent to that known in early historic accounts. Their way of life underwent relatively little change for thousands of years, even though there were widespread changes in the regions around them.*

6.10 Demography and Settlement

Demographic information is lacking for the Fox Lake complex. Regarding settlement patterns, Anfinson (1997:71) tabulates the distribution of known Fox Lake sites and indicates that of the 35 sites known at the time, 26 are on lakes, including islands, peninsulas and isthmuses, prominent hills, and a bench bisected by a ravine, with the remaining 9 sites on rivers or streams, either at river/stream junctions or high or low terraces adjacent to ravines. Water is often found on at least two sides of the site location. Anfinson suggests that these locations indicate a desire for protection, probably from prairie fires, although there would also have been protection from other humans. Not only would the water protect the village from prairie fires, but it would protect trees that could then be used for fuel and construction.

The distribution of sites was discussed earlier with the environmental parameters. Major villages and campsites are found on islands and peninsulas of the region's many shallow lakes. Anfinson (1979b) also mentions several sites on terraces above the Minnesota River (21RW11, 21YM3, 21YM35). He says villages were never large and probably consisted of a few households of extended families.

Anfinson (1994a:3) also says that

> *The seasonality of the habitation sites is open to some debate. While the fish, waterfowl, and turtle remains may indicate warm season use of these sites, there is little to suggest they were not occupied in the winter as well. Some of the sites would have been exposed in the winter, as the leafless trees and frozen lakes would have done little to stop the fiercely cold winter winds. The major river valleys would offer more protection from the elements for humans as well as game animals; the presence of some Fox Lake sites in these locations may suggest a winter riverine-oriented settlement pattern.*

Winter site locations might have been in more sheltered areas of the Minnesota River valley or in wooded areas around larger lakes such as Lake Shetek (Anfinson 1979b:79); however, few riverine sites have been excavated, and riverine areas have not been surveyed extensively. For at least one site, Hildahl (21YM35), situated on a lower terrace

of the Minnesota River Valley, fish, turtle, and muskrat remains (Dobbs 1979) suggest that river-valley sites were not just winter habitations (Anfinson 1997:71).

In distinguishing activities at different sites, Anfinson (1997:68) suggests that relative percentages of different lithic tools based on inferred function might give some indications of site functions and possibly even seasonality. Two sites (Fox Lake and Oakwood Lakes) have low percentages of points (<15%); five other sites (Pedersen, Arthur, Big Slough, Synsteby, and Mountain Lake) have higher percentages, with Pedersen at 50%. Scrapers are the most common tool type at all the Prairie Lake Woodland habitation sites except Petersen (Anfinson 1997:68) and usually account for about half of the chipped stone tools. Knives constitute about 20%. There are few formal drills or punches, though modified flakes might have served this function too. Anfinson (1997:68) suggests that the lithic tools suggest "an emphasis on animal dispatching and processing (cutting meat and scraping hides)"; however, he also notes that all the sites are multicomponent, so individual components might not have these same percentages, though they "seem to have relatively consistent tool percentages stratigraphically."

The only structure reported from a Fox Lake component comes from eastern North Dakota, at the Naze site (32SN246; Gregg 1990 as summarized by Anfinson 1997:71). A reconstruction suggests that it was a conical structure with multiple central support posts set in footing trenches packed with daub. Perimeter support poles could be leaned against the central supports, and the exterior covered with bark or hides, similar to a tipi.

6.11 Principal Sites and Property Types

Principal Sites

The following come from Anfinson (1994a:5), with additions. Most are habitation sites, except where noted.

21BW1	Synsteby [NRHP] (Paleo, Fox Lake, Lake Benton, Plains Village)
21BW7	Runck (possibly Late Archaic or early Fox Lake; mortuary–nonmound)
21CO1	Mountain Lake [NRHP] (multicomponent but only limited stratigraphy; Fox Lake occupation dominant; also Archaic, Terminal Woodland and Oneota)
21FA6	Walnut Lake (Fox Lake, Lake Benton)
21JK1	Johnson (Fox Lake, Lake Benton, Havana-related)
21JK12	Duck Lake I (stratified Fox Lake, Lake Benton, Oneota)
21JK16	Robertson Park [NRHP] (Fox Lake, Lake Benton, Middle Woodland)
21LN2	Pedersen (stratified multicomponent Paleo, Archaic, Fox Lake, Lake Benton, Plains Village, Oneota)
21MR1	Tuttle Lake (Fox Lake, Lake Benton)
21MR2	Fox Lake [NRHP] (type site; Woodland, Plains Village, and Oneota)
21MU1	Big Slough (Paleo, Archaic, Fox Lake, Lake Benton, Plains Village)
21NL30	Eleanor (Fox Lake, Lake Benton, Middle Woodland)
21RW11	Lower Sioux (Fox Lake, Lake Benton, Laurel)
21SB14	Titloe Lake (Fox Lake, Lake Benton)
21WW4	Alton Anderson (based on projectile point types; Fox Lake, Lake Benton; habitation, mortuary–nonmound)
21WW8	Kunz (Fox Lake, Lake Benton, Plains Village)
21YM2	Hoff (Fox Lake, Lake Benton)
21YM3	Gillingham (Fox Lake, Plains Village)
21YM35	Hildahl (Fox Lake, Lake Benton, Plains Village)

Property Types

Based on the existing literature, these property types should exist for the Fox Lake complex:

Habitation sites: Most of the known Fox Lake sites are habitation sites, including the type site Fox Lake (21MR2).

Resource procurement and processing sites: With the limited excavation data available, no such sites can be reliably identified at present, but they should exist. For example, many sites have bison elements, but none has been identified as a kill site; rather, they appear to be secondary processing sites. If kill sites are present, they may follow the pattern out in the Plains of the Dakotas, where such sites are relatively small and are found in small draws or coulees where the animals were trapped. These locations also provided a chance for reburial from slopewash.

Special-use sites: These site might include petroglyphs or boulder outlines in southwestern Minnesota, though both types of sites are difficult to date.

Mortuary–mounds: So far no mounds have been attributed to Fox Lake, though it is possible that such attributions might be possible in the future.

Mortuary–nonmound: Based on associated projectile points, nonmound mortuary sites might include Runck (21BW7) and Alton Anderson (21WW4).

6.12 Major Research Questions for the Fox Lake Complex

In addition to the statewide research themes identified in Section 1.5, the following are important directions for future research on the Fox Lake complex:

Chronology. New dates in good association with Fox Lake artifacts and features are needed. The specific contexts and associations for the available radiocarbon dates should also be systematically evaluated and compared with those of the Lake Benton occupations, to see how to split the two complexes and what dates can reliably be attributed to one complex or the other. Only a few dates can be unequivocally associated with the Fox Lake complex. When does Fox Lake begin and end? How do the Fox Lake occupations compare to those of Lake Benton? Is there significant overlap between the complexes, or a period of transition between the two?

Lithics. Anfinson (1997:67) suggests that a detailed examination of the nearly 200 points from the Pedersen site would be useful for examining changes through time, as the site spans at least Archaic, Initial and Terminal Woodland, Plains Village, and Oneota, with the landowner's surface collection also suggesting an Early Prehistoric component. Such a study should also include a reanalysis of points and other lithic artifacts from controlled excavations, similar to that undertaken by Anfinson (1997:Table 5), with more attention focused on point types associated with time periods and raw materials. One question is, Was Fox Lake linked to the use of Knife River flint (i.e., trade in this material), as was the case with the Havana-related context?

Regional interaction. What was the nature of interaction with adjacent regions? Was this area really as isolated as it appears, or were there other influences? Detailed study of lithic sources, particularly to identify exotic materials, might help here. If Fox Lake participated in a Plains lifestyle, then uses of lithic raw materials such as Knife River flint originating from the quarry rather than till sources should be expected, particularly since this material was extensively used in similarly dated Besant and Sonota complex sites in the Dakotas and saw widespread distribution throughout Minnesota at this time. Use of Knife River flint might also link this complex to Hopewell or Havana-related complexes.

Archaic-Woodland transition. What was the nature of the shift from Archaic to Woodland? Was Fox Lake a direct outgrowth of a late Archaic phase (Mountain Lake)? What impact did pottery have on this society? When did mound building really begin in the area? When, if ever, did horticulture begin? This area is one for which the "Woodland triad" appears to be especially inappropriate, and where research into the transition to Woodland can be examined for a new perspective on how some societies evolved. A stratified site with separable Archaic and Fox Lake components would be important. Was there a major population increase beginning with Fox Lake, compared to Archaic sites, as is seen with Woodland societies elsewhere? Or was this change more gradual? At the other end, what marked the transformation into the terminal Woodland Lake Benton complex?

Site distribution. The distribution of sites should be confirmed with additional survey north of the Minnesota River and an examination of private collections. Deeply buried sites along rivers and lakes might be underrepresented, and a

concerted effort to explore these areas needs to be initiated. To demonstrate fire protection, regional pollen sequences might provide evidence of repeated fires in non-site areas, and less charcoal might be found at or near site locations. GIS modeling of topographic/hydrologic variables also would be useful

7 THE LAKE BENTON COMPLEX: Late Middle Prehistoric in Southwestern Minnesota, A.D. 700–1200

7.1 Introduction and Overview

Lake Benton sites are found in the Prairie Lake region of southwestern Minnesota, with components occurring at many of the same sites as Fox Lake occupations. The complex is believed to date to A.D. 700–1200. There is clear continuity from the earlier Fox Lake complex to the Lake Benton complex in most cultural aspects; some changes are evident in ceramic manufacturing techniques and styles, projectile point styles, and the beginning of the construction of mounds for burial, though mounds had been built elsewhere in the Midwest for hundreds of years. The type site for the complex is the Pedersen site (21LN2), and a total of 43 sites have been reported to have Lake Benton components. Sites are concentrated along lakes, perhaps for protection from fires.

Elsewhere across the Midwest, the emergence of local Late Woodland complexes coincides with changes in settlement, subsistence, mortuary practices, and material culture, including the shift from the dart to the bow and arrow in the northern Plains. In the Prairie Lake region there is some evidence for interaction with Plains Village groups, including procurement of maize (Anfinson 1997:75). Other aspects of the Lake Benton life-way, including the use of bison, smaller mammals, and fish, apparently remain stable from the Fox Lake complex, though there is little specific archaeological evidence available.

7.2 Environmental Setting and Geographic Distribution

Most Lake Benton components are at sites that also have Fox Lake occupations (Figure 12). Thus, as with Fox Lake, the sites are on lakes (usually on peninsulas, islands, or isthmuses) or along rivers. In the archaeological site database only 7 (16%) of the 43 sites are listed as having a landscape position that does not include some type of lakeshore or riverine setting.

Within the Ecological Classification System (MnDNR–Division of Forestry 1999), sites are concentrated in areas of prairies. Of the 43 reported Lake Benton sites in the SHPO/OSA database in 2008, 36 (84%) are in the Prairie Parkland province, in the North Central Glaciated Plains section; of these, 23 (53%) are in the Minnesota River Prairie subsection, and 13 (30%) are in the Coteau Moraines subsection. The remaining 7 sites (13%) are in the Eastern Broadleaf Forest province, Minnesota and Northeast Iowa Morainal section, with three of these sites in the Oak Savanna subsection, and four in the Hardwood Hills subsection. All but one are in the Prairie Lake SHPO archaeological region (Anfinson 1990), predominantly in the South subregion. Only one site is in the Central Lakes Deciduous region.

Based on maps of presettlement vegetation (MnDNR–MIS Bureau 1994), 16 (37%) of the 43 sites are in areas of prairie. Wooded areas account for another 13 sites (21%), 6 (14%) of them in Big Woods and 3 (7%) in oak openings and barrens. Vegetation associated with lakes or rivers accounts for the remainder, with river-bottom forests at 4 sites (9%); wet prairies, marshes, and sloughs at 5 (12%); and adjacent to water at 9 (21%).

Lake Benton sites are found throughout much of the Prairie Lakes archaeological region; they are concentrated south of the Minnesota River and west of the Blue Earth River, though some sites are found north of this area. Lake Benton sites have also been reported from eastern South Dakota and north-central Iowa.

Bias in archaeological analyses might be affecting our understanding of the distribution of Lake Benton. Anfinson (1994b:1) notes,

> *As with Fox Lake phase sites, Lake Benton phase sites are notably scarce in the west central Minnesota and Iowa areas of the Prairie Lake Region. While much of this is due to a lack of concentrated archaeological work in these areas, Lake Benton is also more difficult to recognize than Fox Lake. Lake Benton ceramics are closely related to other wares, especially the St. Croix-Onamia series in central Minnesota. Until extensive excavations and detailed ceramic analyses are completed at Woodland sites in west central Minnesota, the distribution of Lake Benton sites north of the Minnesota River will not be completely understood.*

Most of the recorded Lake Benton components are at sites that also have Fox Lake components. Exceptions are sites such as Gautefald (21YM2) and Hartford Beach (39RO5), which have major Plains Village components and Lake Benton components, but no Fox Lake (Anfinson 1997:83–84). Also, sites studied in the Lake Oscar region have major Lake Benton and Cambria occupations but no Fox Lake, unless some of the undiagnostic "late prehistoric" occupations relate to Fox Lake. In total, 13 known sites have a Lake Benton component with no Fox Lake, with the Lake Oscar sites (Sellars 1992a) being some of the few excavated sites. Only three sites are single-component Lake Benton; the others are multicomponent with a wide range of other cultural complexes. This number does not include sites that might have had a component that was horizontally or stratigraphically separable; these were not identifiable from the database though they would tend to be important sites. The reported sites are confined to the Prairie Parkland province (MnDNR–Division of Forestry 1999) or its margins.

7.3 Past Research

Anfinson's 1987 dissertation and 1997 publication summarized existing research on the archaeology of southwestern Minnesota, and much of the information for the Lake Benton complex is drawn from those works, supplemented by more recent excavations. Research at some major Lake Benton sites, such as the type site, Pedersen (21LN2), as well as Fox Lake (21MR2) and the Arthur site in Iowa, and other sites in the Prairie Lake region, was discussed with the Fox Lake complex. Hudak (1976) defined several Lake Benton ceramic types, as did Bonney (1965); these were integrated and revised by Anfinson (1979e, 1997).

More recently, Mn/DOT work in the Lake Oscar region of Douglas County by Bear Creek Archaeology (Sellars 1992a) tested a series of sites. They included Dahlstrom (21DL79), a single-component Lake Benton occupation, and Johnsrud (21DL76), where Area B was a single-component Lake Benton occupation and Area A was a single-component Cambria occupation. Another single-component Lake Benton occupation in the project area, the Hammitt site (21DL78), was avoided through road redesign and preserved in place.

7.4 Chronology

The Lake Benton complex appears to date from about A.D. 700 to 1200. This period represents the last portion of the Middle Prehistoric period in the Prairie Lake region (Anfinson 1997), contemporary with Late Woodland complexes in eastern and central Minnesota. As discussed with Fox Lake, there are 27 radiocarbon dates that might apply, but separating Fox Lake and Lake Benton components is difficult, and assigning dates to specific occupations is only rarely based on direct association with diagnostic ceramics (Figure 11). There are only two dates that can be associated with Lake Benton. One date that might relate to an early Lake Benton episode is from the Pedersen site (21LN2), where a date of 1135 ± 90 B.P. with a 1-sigma calibrated range of A.D. 780–988 is associated with a large rim sherd with characteristics of both Fox Lake and Lake Benton ceramics (Anfinson 1994b:4). Otherwise, the 1-sigma calibrated dates cluster between about A.D. 750 and 1300. This cluster includes two dates from Pedersen site animal bones associated with Lake Benton ceramics, as well as dates from the Winter site (39BK7) and Fox Lake (21MR2) that have more confused stratigraphy and contexts that are not specifically associated with diagnostic Lake Benton ceramics (Anfinson 1997:85). From the Lake Oscar region (Sellars and Benn 1992:78), four dates were all modern or less than 260 years old [not shown on chart] and were interpreted as being too recent; their recovery from a chemically treated lawn was thought to be a possible factor.

Two dates might be associated with Lake Benton mortuary sites. Round Mound (21TR1) produced a date of 1025 ± 110 B.P. from decayed wood near a central burial pit (Johnson 1964:43–44). Sisseton Mound (39RO26) had five cordmarked body sherds and produced a date of 830 ± 85 B.P. (Anfinson 1997:84; Sigstad and Sigstad 1973).

7.5 Technology and Material Culture

Ceramics

Changes in ceramic technology and style are one of the characteristic attributes separating Fox Lake from Lake Benton, with Lake Benton marked by the widespread use of exterior cordwrapped stick impressions and the absence

of trailed lines and bosses. While styles changed gradually, manufacturing techniques changed more abruptly, shifting to the use of crushed rock rather than sand temper, more extensive use of surface smoothing, and thinner vessel walls. Anfinson (1997:76–77) says:

> *Lake Benton ceramics are characterized by the following attributes: moderate sized, sub-conoidal vessels with moderately thick walls (6–7 mm) and crushed rock temper. Rim orientation is slightly inflaring to slightly outflaring, and rims are usually slightly curved in profile. Lips can be round or flat. Some wall thickening can occur in the shoulder. Exterior surfaces of the mid-body usually feature well defined vertical cordmarking, probably produced by a cord-rolling rather than cord-paddling technique. Rims and upper shoulders of decorated vessels usually are smoothed and a small percent of body sherds also can be smooth. Interior surfaces are usually smooth but, occasionally, vertically cordmarked. Vessel exteriors can be undecorated or feature cordwrapped stick impressions, dentate impressions, and/or punctates on the rim and upper shoulder; bosses are known but rare. There is occasional interior cordwrapped stick decoration. Up to one-half of the lips have cordmarking, with some lips having cordwrapped stick impressions*.

Hudak (1976) initially proposed two ceramic types based on work at the Pedersen site (21LN2); Benn (1982b) added two types based on Arthur site (13DK27) materials. Anfinson (1987) confirmed the usefulness of these four types. The following descriptions are derived from Anfinson (1997:76–80).

Lake Benton Cordwrapped Stick Impressed: These vessels have bands of oblique, horizontal, and/or vertical cordwrapped stick impressions on smoothed rims and upper shoulders. There are occasional single horizontal rows of punctates on the lower rim. This type differs from Fox Lake Cordwrapped Stick in having crushed rock instead of sand, larger stick diameter, shallower impressions, thinner walls, and more curved and less vertical rim form.

Lake Benton Vertical Cordmarked: This ceramic type is a direct carryover from Fox Lake Vertical Cordmarked. There are basic ware differences between the two types in temper, thickness, and vessel form. In addition, Lake Benton Vertical Cordmarked lacks exterior decoration, unlike the Fox Lake variety, and only occasionally has cordwrapped stick impressions on the lip. It also has cordmarking on the lip, which is rare in the Fox Lake type.

Lake Benton Dentate: This type was initially defined from the Arthur site on the basis of only seven sherds (Benn 1982b:59), but Anfinson argues for its value and has identified additional sherds from the Fox Lake site. The type sherds have fine-toothed dentate impressions in patterns similar to those of Lake Benton Cordwrapped Stick Impressed, arranged in horizontal and oblique bands. One sherd has cordwrapped stick impressions on the lip, while two others have single rows of punctates on the rim.

Lake Benton Plain: Benn (1982b:61) initially defined this type based on 10 sherds from the Arthur site. These rims lack decoration of any kind. Half are smooth surfaced; the other half are cordmarked-smoothed. Rims tend to be thinner and straighter than on other Lake Benton types. Hudak tentatively identified a similar type at Pedersen (Anfinson 1997:77).

Anfinson (1979e, 1997) notes the close relationship and similarities of Lake Benton ceramics to other series, particularly Onamia, including the use of oblique and horizontal bands of cordwrapped stick or dentate-stamped impressions, subconoidal vessel form, and crushed rock temper. Differences include more variation in Lake Benton rim orientation, finer cordwrapped stick stamps, punctates with angular or circular tools, distinct vertical cordmarking on the vessel body, and possibly also differences in motifs and lip treatment (Johnson 1991a). Lake Benton might also persist later in time.

The geographical trends of different Lake Benton ceramic types are less distinct than seen with Fox Lake, but Anfinson (1997:78) argues that the Cordwrapped Stick Impressed type is found at almost every site, but decreases in relative abundance moving south to north and east to west in the Prairie Lake region. Dentate Impressed sherds also decrease in abundance from east to west, but never account for more than 5% of the Lake Benton sample at any site. More Dentate type sherds appear to be present in west-central Minnesota north of the Minnesota River and in Iowa than in southwestern Minnesota and South Dakota. Vertical Cordmarked and Plain types increase in relative abundance moving east to west.

Anfinson (1997:78) notes the difficulty of documenting any temporal trends in Lake Benton ceramics, even with the stratified Pedersen site, but says that "In general, through time Lake Benton vessels become thinner walled, more globular, and had less decorative variety on the exterior and more decoration on the lip. The *Vertical Cordmarked*, *Dentate*, and *Cordwrapped Stick* types may be early types, while the *Plain* type may be late."

Anfinson (1997:79–80) also mentions that single-twisted cord impressed ceramics are found, although rare (<5% of the assemblage), in the upper levels of Prairie Lake sites, apparently contemporary with Lake Benton types, though they do not belong in this ware. This low frequency of cord-impressed sherds is a major distinguishing attribute between this region and neighboring areas to the west, south, and east, where Benn (1982b:83) says that the appearance of single-twisted cord impressed ceramics marks the late Late Woodland period in the western Prairie Peninsula. Single-twist cord impressions are common with such types as Maple Mills/Canton ware from Illinois (Fowler 1955:219), Madison Cord Impressed from Wisconsin (Hurley 1975:225), Lane Farm Cord Impressed from northeastern Iowa (Logan 1976:134), and Loseke ware from the east-central Plains (Benn 1990). Such sherds are also associated with early Plains Village ceramics, including Initial and Extended Middle Missouri variants in the central Dakotas (Lehmer 1971:73), Mill Creek in northwestern Iowa (Ives 1962), and Cambria in southwestern Minnesota (Knudson 1967). Anfinson observes that single-twisted cord impressed sherds are found at most habitation sites in the Prairie Lake region but rarely account for more than 5% of the rims or near-rims. Researchers have identified them as several different types, but the specific typologies have been controversial. Anfinson (1997:80) argues that the sherds at the Fox Lake site appear to have closer affinities to western than eastern ceramics and are possibly related to Loseke ware, with other sherds possibly related to Plains Village rather than Woodland types.

Lithics

A typical lithic assemblage is difficult to identify for a number of reasons. With respect to projectile points, Anfinson (1997:81) says:

> *It is difficult to determine precisely Lake Benton point associations at most sites because Fox Lake and Lake Benton levels are somewhat mixed and most sites have a Plains Village and/or Oneota component that may be contemporaneous with the Lake Benton component. Many of the equilateral triangular points and some of the side-notched points from these sites are no doubt of Plains Village and/or Oneota association. The strongest Lake Benton projectile point associations appear to be with small side-notched points with straight to slightly concave bases commonly referred to as Plains Side-Notched (Kehoe 1966) and typified by the Avonlea type. Some corner-notched points and perhaps side-notched points with deep concave bases may continue to be used also.*

Of the 27 projectile points from the Pedersen site (21LN2) levels most closely associated with Lake Benton ceramics, 12 were side-notched, six were corner-notched, one was stemmed, seven were equilateral triangles, and one was a isosceles triangle. Some point styles such as the side-notched points might be a continuation of this form from Fox Lake.

Anfinson (1997:81) also notes that

> *As with the Fox Lake phase, the Lake Benton phase appears to have no non-projectile point chipped stone tools exclusively associated with it. Lake Benton has the general hunting oriented tool kit with end scrapers, side scrapers, regular and irregular shaped knives, a few specialized drilling and engraving tools, and a wide variety of flake tools. One difference between the Fox Lake phase and Lake Benton may be the relative abundance of projectile points. At the Pedersen site, there are apparently equal percentages (36 percent) of projectile points and scrapers in the Fox Lake levels. In the Lake Benton levels, there are 55 percent projectile points and only 17 percent scrapers. This could reflect the change-over to the bow and arrow (where more loss of points occurred during hunting so more are needed). On the other hand, it might indicate some intensification of projectile hunting rather than trapping, netting, or gathering.*

Lithic raw materials continued to be from local till sources, including predominantly chert, but also chalcedony and quartzite. Some of the chalcedony is Knife River flint, though that might also be found in the local till (Anfinson 1997:81–82).

From the Dahlstrom site (21DL79), a single-component Lake Benton site (Sellars and Stanley 1992), lithics included abundant, mostly granitic fire-cracked rock. The authors note that the choice of granite appears to have been deliberate, as many other possible rocks were available in the area, and that the preference for granite is seen elsewhere (1992:115) and might be due to its superior heat retention (1992:117). The site also produced 29 pieces of lithic debris, three modified flake tools, two cores, and one chunk of galena that was probably obtained locally and probably worked. Sellars and Stanley interpreted the whole assemblage as suggesting expedient and brief usage, with raw materials obtained locally.

Area B at the Johnsrud site (21DL76), also a single-occupation Lake Benton site, produced abundant fire-cracked rock, 67 pieces of lithic debris, and 13 tools. The raw materials were all local, with three cores or core fragments represented. Of the 13 tools, nine were retouched flakes, one was a small side-notched point, two were scrapers, and one was a perforator (Sellars and Stanley 1992:149–156). The lithic reduction strategy seems to have involved the production of wide flake blanks from single-platform cores. Sellars and Stanley found the assemblage comparable to that from Pedersen, except that Johnsrud had all local materials, unlike the Knife River flint at Pedersen. Pedersen had a wider range of tools from a larger lithic sample.

Worked Bone, Antler, and Shell

No information is available.

Other Artifacts

No information is available.

7.6 Subsistence

No stratigraphically or horizontally separated Lake Benton component with good context and fine-scale recovery has been analyzed for faunal or floral remains, thus our knowledge is limited. Based on what little evidence is available, there appear to be no major changes from the Fox Lake complex (Anfinson 1994b:3) except for the addition of maize (probably traded) at one site.

For the Pedersen site, only the faunal remains from the Fox Lake component have been analyzed (Shane 1982). The Arthur (13DK27) and Big Slough (21MU1) sites both have major Lake Benton components, although the stratigraphy is confused and there is no discrete separation of occupations; nevertheless, the evidence suggests use of a variety of mammals, mostly bison and muskrat, as well as fish (Anfinson 1997:83). Anfinson (1997:83) also says,

> *In general, Lake Benton people had the same faunal exploitation patterns as those in the preceding Fox Lake phase. Namely, they relied on no particular species, but utilized large mammals, small mammals, and fish. Bison always dominated the potential edible meat totals, but all of the meat may not have been used, especially when kill sites were distant from campsites. Bison were probably the most important species in a varied inventory.*

Martin and Richmond (1992) examined faunal remains from two sites by Lake Oscar, both of which had fine-screen recovery and flotation, but the contexts were somewhat problematic and might not adequately reflect the complete exploitation pattern (1992:175). Johnsrud (21DL76) Area B had three mammals and two fish species represented (Sellars 1992b:179), including elements from one muskrat, eastern cottontail or snowshoe hare, and bowfin; only one unidentified bone came from a large mammal. Dahlstrom (21DL79) produced remains of two northern pike or muskellunge and at least three suckers, as well as one bone from a yellow perch (Martin and Richmond 1992:173). Also recovered were remains from muskrat, Franklin's ground squirrels, and one turtle.

Evidence for Lake Benton use of plants is very limited due to both preservation issues and the lack of fine-scale recovery techniques. Possibly important plant food resources such as tubers from the lakes might be underrepresented because they do not preserve well. One site has archaeological evidence of plant food use, including possible trade in cultigens (Hunter 1992; Sellars 1992a). Johnsrud Area B (21DL76) produced seven charred fragments of hazelnut, suggesting a dry oak/hickory forest during the time of occupation, and a June–August period of availability (Hunter 1992:168). There were also seven cupules (cob fragments) of maize, one from each of two features, and five from two levels of one unit, meaning that corn was present in almost one-quarter of all samples taken at the site. One seed of

frost or winter grape, which is available in October and November, was recovered from Feature 1. Thus, the plant remains suggest summer to fall occupation and agricultural activities (Hunter 1992:169). This is the first and only evidence so far for cultigens in the Lake Benton complex, though it might also be one of the few undisturbed sites at which flotation was conducted (Sellars 1992b:179–180). Maize might be rare at Lake Benton sites, or its absence might be a result of limited flotation. Sellars notes that the density of cultural material at Johnsrud does not suggest a long enough occupation for planting through harvesting corn. The corn might have been planted in the spring, with people returning to the site in the fall to harvest it, but that does not seem likely given the site's appearance of a single occupational episode. Also, no tools for harvesting or plant processing were found. Sellars (1992b:181) therefore suggests that the corn was imported, though more evidence is needed. It should be noted that the other portion of the Johnsrud site (Area A) was a Cambria occupation that also had corn. Sellars (1992b:183) argues that the Cambria occupation still does not have sufficient intensity to represent a full growing season, and that the site's Cambria occupants also brought in harvested corn from elsewhere.

The analysis of wood from the Johnsrud site (Hunter 1992) suggests a somewhat different forest community than is currently present. For Johnsrud Area B (21DL76), Hunter reports oak (red oak group) as the most common wood charcoal, with silver maple, basswood, and American elm also present, creating a somewhat different picture from the current maple/basswood forest.

7.7 Mortuary Practices and Ideology

The most prominent difference between Fox Lake and Lake Benton mortuary practices is the appearance of mounds. Though mounds had been common in the rest of Minnesota for over 500 years, they seem to appear only late in the Prairie Lake region: "The Prairie Lake Region is clearly a transition zone between the high-density mound area of central/eastern Minnesota–northeastern Iowa and the low-density mound areas of the Missouri Coteau in the central Dakotas" (Anfinson 1997:72). The mounds that are present in the Prairie Lakes region are concentrated on the upper terraces of the Minnesota River valley. They tend to be circular with relatively large diameters (12–18 m) and low heights (0.3–1.5 m) and are found alone or in small groups of two to five. Linear mounds are present but not common, and there are no effigy mounds (Anfinson 1984, 1997:71–72).

Anfinson discusses Poehler (21NL1), Ralph Saienga I (21CP2), and Fire Mound (21TR4) as being Woodland mounds that date to this same period, even if they are not necessarily confirmed as Lake Benton in affiliation (Anfinson 1997:84–85). The mound at Ralph Saienga I (21CP2), which is in Chippewa County along the Minnesota River, contained, in addition to three intrusive, postcontact burials in the mound fill, scattered human remains from what was presumably the original burial, located in a submound pit with a nearby cairn, red ocher, and bison femur fragments. Bison and other animal bones were common throughout the mound fill, however, so the bison fragments might have been accidental inclusions in the pit. Associated with the cairn were a copper awl, a greenstone axe, an end scraper, a knife, and a broken dentate-impressed vessel. Pottery in the mound fill included a partial vessel with dentate stamps in horizontal and oblique bands on a smooth rim and upper shoulder with tool impressions on the lip. Other sherds in the mound fill included small cordwrapped stick and single-twisted cord impressed sherds (Anfinson 1997:84).

At the Poehler site (21NL1), on the south side of Swan Lake east of New Ulm, ceramics from the mound fill had horizontal rows of dentate stamps on a smooth rim and upper shoulder, with interior cordwrapped stick impressions, crushed rock temper, and vertical cordmarking on the body (Anfinson 1997:84). At Fire Mound (21TR4), on a high bluff above the east side of Lake Traverse, a single rim found in the mound fill had vertical, oblique, and horizontal cordwrapped stick impressions on the rim exterior and interior (Anfinson 1997:84). Anfinson also lists other Prairie Lake region mounds with Woodland ceramics in the fill, but notes that ceramics from many of the mounds are dentate stamped, which is rare at the local Lake Benton habitation sites: "This may be a result of mortuary specialization or mound construction by non-Lake Benton people" (1997:85).

Anfinson (1997:85) also points out that Lake Benton mortuary practices do not appear to include the bison ceremonialism found in Sonota burials (Neumann 1975:94) or at sites on the northern edge of the Prairie Lake region such as Fingerson Mound (21PO2) or Round Mound (21TR1; Wilford 1970:1–6; Wilford et al. 1969:41).

In sum, burials from the Lake Benton complex are poorly known. Human remains from the only excavated mound that can be definitively associated with this complex were fragmentary, their burial form indeterminate. Features in the mound included a submound pit and a cairn; red ocher and bison elements also were found. The only diagnostic artifact was a dentate-impressed vessel not directly associated with a burial. It is probable that at least some of the other mounds in the Prairie Lake region are also associated with the Lake Benton complex, though the absence of diagnostic artifacts makes the attribution difficult (Arzigian and Stevenson 2003).

7.8 Social, Economic and Political Organization

Very little is known of Lake Benton social, economic, or political organization. Anfinson (1997:123) argues for long-term stability of the system:

> *The stability of the Middle Prehistoric culture of the Prairie Lake Region probably is best explained by a combination of factors. The most important are: lack of need for outside resources; difficulty of cross-country travel throughout much of the region; and environmental contrast to adjacent areas which made it less attractive to neighboring groups who had successfully adapted on their own. Other elements in the cultural stability of the Prairie Lake Region include the maintenance of stable population levels and the development of a subsistence economy that could adapt to short-term environmental changes equivalent to those caused by a 1930s-like drought.*

Anfinson suggests that people exploited the full subsistence resources of the region only rarely because they had sufficient supplies of preferred resources. Bison would have been hunted when available, and villages moved where necessary, but he argues that the people were not dependent on bison and would have exploited other resources such as aquatic tubers and muskrats when seasonally available, and then the population might have remained in the same place for months. Winters would have posed a challenge, particularly when bison were not available; other resources would have been available, though difficult to obtain, such as muskrat, fish through the ice, and deer. The major river valleys would have provided firewood and shelter, particularly critical during the winter. The absence of storage pits suggested to Anfinson (1997:123) not that people were unfamiliar with such technology but rather, did not need it. He rejected the "feast or famine" model presented by Woolworth and Woolworth (1980) for the historic Dakota tribes, because the historic situation had changed in many ways (Anfinson 1997:123), including the decimation of the bison herds and increasing dependence on traders and the government for food.

7.9 Cultural Relationships

Lake Benton is contemporary with other Woodland cultures and shows some similarities in ceramics to Onamia types of the Central Minnesota Transitional Woodland. Lake Benton is also contemporary, at least at the end, with other groups within the Prairie Lake region, including the early Plains Village complexes such as Great Oasis and Cambria, as well as with Blue Earth Oneota. Some sites have components representing all three—Woodland, Plains Village and Oneota—suggesting that Mississippian and Plains Village incursions into the Prairie Lake region did not end the Woodland tradition. Instead, Anfinson says, "It is likely that the hunter-gatherer way of life in the prairie-lake zone of Minnesota represented a more adaptable and even preferable way of life than that of early maize agriculture" (1979e:110).

With reference to all the groups (Lake Benton, Great Oasis, Cambria, Oneota) occupying the Prairie Lake area just prior to A.D. 1200, Anfinson (1997:125-126) suggests that

> *Hickerson's (1970) study of the historic Ojibwe-Dakota conflict suggests that northern west-central Minnesota was virtually unoccupied in the last years of the Late Prehistoric because of intertribal resource competition. This may be a useful model to help explain the cultural situation in the Prairie Lake Region in Late Prehistoric and early contact times. With the increasing interest in bison hunting and maize cultivation, perhaps brought on by widespread population pressure, improved varieties of maize, and/or increased availability of bison in the eastern Plains, numerous groups expanded into the Prairie Lake Region, There, bison herds roamed and ideal maize growing areas existed. Initially, this expansion was relatively peaceful, but as resource competition and population pressure increased, so did hostility. Finally, around A.D. 1200, conflict was so intense that much of the Prairie Lake Region was abandoned for year-around settlement.*

7.10 Demography and Settlement

No demographic information is available for the Lake Benton complex. Since most Lake Benton occupations are at sites that also have Fox Lake occupations, it is no surprise that the settlement patterns are similar, with sites located on lakes, especially peninsulas, islands, or isthmuses, for protection from fires and possibly from other humans, or also to harvest trees that were also protected from fires (Anfinson 1997: 84).

Benn (1992:95) and Sellars (1992b:185–186), in their discussion of the Lake Oscar sites, suggest application of the Syms Co-influence Sphere to explain the utilization of the same ecotone and site locations by multiple groups over many centuries. Sellars (1992b:184) notes that all of the sites in the Lake Oscar vicinity appear to be short-term occupations rather than large village sites. This is supported by the evidence of multiple cultures occupying the area at the same time, such as Cambria and Lake Benton at Johnsrud, a Sandy Lake presence at the nearby Basswood Shores site (Justin and Schuster 1994), a possible Oneota presence in the region, and Cambria represented at Johnsrud Area A. Sellars (1992b:185–186) says,

> *It is possible that the abundance and diversity of resources available in the Lake Oscar vicinity attracted more than one ethnic group to the area to exploit its resources in late prehistoric times. Additionally, numerous groups may have traversed through the region as a result of expeditions to exploit the resources of other areas (i.e. eastern groups traveling west to hunt bison on the Plains); this would account for the abundance of small, short term occupations. The presence of several different ethnic groups utilizing the region may actually have dissuaded any one group from establishing a permanent, sedentary settlement in the area, so as to reduce the chance of conflict with different ethnic groups utilizing the same area. This would certainly account for the apparent absence of large, sedentary occupations in the Lake Oscar vicinity.*

There is virtually no information on houses or site patterning. Few Lake Benton features have been reported, but they include shallow basins 10–25 cm deep with village refuse at the Johnsrud site (21DL76; Sellars and Benn 1992:73). Although these basins each had a fragment of a corn cupule, there was no sign of substantial storage pits for maize, possibly suggesting short-term use of the site.

7.11 Principal Sites and Property Types

Principal Sites

The following sites are from (Anfinson 1994b:5), with additions:

21BS23	Artichoke Island (Lake Benton, Central Minnesota Transitional Woodland, Plains Village; large local private collection)
21BW1	Synsteby [NRHP] (Paleo, Fox Lake, Lake Benton, Plains Village)
21CO1	Mountain Lake [NRHP] (multicomponent but only limited stratigraphy; Fox Lake occupation dominant; also Archaic, Terminal Woodland, Oneota)
21DL76	Johnsrud (horizontally separated occupations: Area B is single-component Lake Benton; Area A is Cambria)
21DL78	Hammitt (single-component Lake Benton, preserved in place with limited excavations)
21DL79	Dahlstrom (single-component Lake Benton)
21FA6	Walnut Lake (Fox Lake, Lake Benton)
21JK1	Johnson (Fox Lake, Lake Benton, Havana-related)
21JK16	Robertson Park [NRHP] (Fox Lake, Lake Benton, Middle Woodland)
21LN2	Pedersen (stratified multicomponent Paleo, Archaic, Fox Lake, Lake Benton, Plains Village, Oneota)
21LN10	Boy Scout Hill
21MR1	Tuttle Lake (Fox Lake, Lake Benton)
21MR2	Fox Lake [NRHP] (type site; Woodland, Plains Village, and Oneota)
21MU1	Big Slough (Paleo, Archaic, Fox Lake, Lake Benton, Plains Village)
21MU2	Great Oasis (Lake Benton, Great Oasis)
21NL30	Eleanor (Fox Lake, Lake Benton, Middle Woodland)

21RW11 Lower Sioux (Fox Lake, Lake Benton, Laurel)
21SB14 Titloe Lake (Fox Lake, Lake Benton)
21WW4 Alton Anderson (based on projectile point types; Fox Lake, Lake Benton)
21WW8 Kunz (Fox Lake, Lake Benton, Plains Village)
21YM1 Gautefald (Lake Benton, Cambria)
21YM2 Hoff (Fox Lake, Lake Benton)
21YM35 Hildahl (Fox Lake, Lake Benton, Plains Village)

Property Types

Based on the existing literature, these property types should exist for the Lake Benton complex:

Habitation sites: The majority of Lake Benton sites will be habitation sites, such as Johnsrud (21DL76).

Resource procurement and processing sites: No site can yet be identified as having a focus on a specific resource, though the single-occupation Dahlstrom site (21DL79; Sellars 1992a) might qualify as a short-term occupation over several days to process and consume local resources, with a narrow range of tasks and tools.

Special-use sites: These sites could encompass a range of special activities, most of which have not yet been defined. There might be petroglyphs or boulder-outline sites, though these are difficult to date.

Mortuary-mound: Only a few mounds are known from the Prairie Lake region, but they appear to have been constructed during the Lake Benton complex or later. At least one (Ralph Saienga I, 21CP2) had a Lake Benton burial.

Mortuary-nonmound: No nonmound burials are known.

7.12 Major Research Questions for the Lake Benton Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Lake Benton complex:

Chronology. Only two radiocarbon dates can be firmly attributed to Lake Benton. A better radiocarbon chronology is needed, focusing on datable material in good contexts, such as hearths or pits and in tight association with diagnostic artifacts. When did mound burials become widespread? When did the Woodland period end? When did the Late Prehistoric period begin, so we can understand how the village horticultural way of life emerged?

Tighter dates with specific varieties of ceramics will also be key in any attempt to assign various parts of a multicomponent site to their respective contexts. In the case of stratified sites such as Pedersen (21LN2), Anfinson (1997:Table 3) has made some progress in defining Fox Lake and Lake Benton components. Additional work could be initiated, including analyses of temper (sand vs. grit) for both rim and body sherds, and thicknesses of body sherds by level.

Regional patterning and ceramics. Anfinson (1997:126) points out that some areas are unknown—especially west-central Minnesota, where more excavations are needed, and in particular excavations with fine-scale recovery and dating. Also needed are surveys in the Minnesota River valley, with deep testing to locate buried sites. Systematic examinations of private collections (e.g., the Levine site, 21KH93) would be useful for documenting the full range of ceramic variability and providing useful information on geographic distributions.

Artifact attribute studies using existing collections also are needed (Anfinson 1997:126), including detailed comparison of the many ceramics with trailed over cordmarked designs, to understand the relationship between Fox Lake, Lake Benton, Black Sand, and other regional complexes. Comparison of Lake Benton and St. Croix and Onamia ceramics would also help with understanding the relationship between the Prairie Lake and central Minnesota regions. Are there good diagnostic criteria for consistently distinguishing the wares, or is there a chance of misidentification or “geographic” bias depending on the source of the sherds? Systematic reanalysis needs to be

undertaken of these related ceramics in professional and private collections from southern and central Minnesota to determine whether any spatial differences exist, and if they do, what attributes are spatially sensitive. What is the significance of the distribution of single-cord impressed sherds in this region? Does it represent episodes of trade, or movement of limited numbers of potters (women) into the region, or is it a horizon marker present over a large area of the upper Midwest (Benn and Green 2000)? If some of these sherds represent trade vessels, then petrographic analysis might be useful in tracking the sources of the sherds. More detailed attribute analysis might also be useful in connecting these sherds to their closest relatives in adjacent regions, thereby illuminating patterns and directions of trade and interaction.

Subsistence and cultigens. In terms of subsistence, in addition to wild plants and animals, what was the role of any cultigens? Were Lake Benton peoples growing them or just trading for them?

Regional interaction. How did the complex change, and how was it affected by its contemporaries, including any Plains Village groups moving into the area? What was the real settlement pattern (if survey bias can be eliminated)? What were the relationships of Lake Benton to other contemporary groups? Demonstrated association of Lake Benton materials in primary context with Plains Village materials would be very important to understanding if and how the two groups were interacting. So far, Plains Village materials have been found at Lake Benton sites with mixed components or confused stratigraphy (such as Big Slough 21MU1). The time between A.D. 1000 and 1200 is critical to understand. Is there evidence of Mississippian influence? What happened to the peoples of the Lake Benton complex? By about A.D. 1200 they all appear to have been gone, at the same time that Great Oasis and Cambria manifestations also ended in the region.

8 THE CENTRAL MINNESOTA TRANSITIONAL WOODLAND COMPLEX: Middle to Late Woodland in Central Minnesota, A.D. 300–1000

8.1 Introduction and Overview

The Central Minnesota Transitional Woodland marks the transition between Middle Woodland and Late Woodland cultures (ca. A.D. 200–1000), presumably associated with significant shifts in technology, interregional interaction, mortuary practices, subsistence, and settlement, although there is insufficient excavation information at this time to properly document either the complex itself or these probable changes. Clusters of excavated sites in Mille Lacs and along the Snake River are suggested to have reflected a hunting-gathering way of life, possibly associated with some use of wild rice by the end, although the evidence for subsistence patterns is limited. Settlements probably reflect seasonal use of sites. Ceramics include first St. Croix and then Onamia. The complex shows some connections to the Blackduck-Kathio complex that follows it in central Minnesota, as well as to contemporaneous cultures in southwestern Minnesota, such as Lake Benton. Some burials identified as Arvilla are linked to this complex through the presence of St. Croix or Onamia pottery; these include mounds with both primary and secondary burials.

8.2 Environmental Setting and Geographic Distribution

The Central Minnesota Transitional Woodland complex is defined (Anfinson 2006) as coming from Central Minnesota (SHPO archaeological regions 4, 5, 6), though closely related ceramics and lifeways are found in adjacent areas. St. Croix Stamped ceramics come predominantly from northwestern Wisconsin, central and northeastern Minnesota, northwestern South Dakota, and eastern North Dakota. Onamia-like ceramics come from central and southwestern Minnesota (Figure 13). Western-margin sites include DeSpeigler (39RO23) on the Red River. There are concentrations of reported sites at Mille Lacs and along the Snake River drainage, but sites are distributed more widely. Based on materials from surface and private collections, St. Croix pottery has been found commonly and Onamia pottery is described as “ubiquitous” in the south-central Deciduous Lakes archaeological subregion (Johnson 1994:3.51–3.52).

A total of 101 sites are identified as belonging to the Transitional Woodland complex in the SHPO/OSA database in 2008. Of this total, 53 (52%) are in the Laurentian Mixed Forest province (Mn DNR–Division of Forestry 1999), including 32 in the Mille Lacs area and 13 in the Pine Moraines and Outwash Plains; 34 (34%) are in the Eastern Broadleaf Forest province, predominantly in the Anoka Sand Plain; 11 (11%) are in the Prairie Parklands province; and 3 (3%) are in the Tallgrass Aspen Parklands province of the Ecological Classification System (MnDNR–Division of Forestry 1999). In terms of SHPO archaeological regions (Anfinson 1990), most of the sites are in the Central Lakes Deciduous region (69 sites, 68%), with most of those in the East subregion. Twelve sites are in the Central Lakes Coniferous region, 11 in the Prairie Lake region, predominantly the North subregion, 5 in the Red River Valley, and 4 in the Southeast Riverine region.

Gibbon and Hohman-Caine (1980:61) discuss the distribution of St. Croix sites and how they cross-cut environmental zones, with most occurring in the transition zone between deciduous and mixed conifer/hardwood forests, but some burial sites lying in the prairie zone of the Red River Valley. They report that burial sites were on streams near lake outlets in the forested areas, with a few on points extending into small lakes with streams that flow through them, and some on the north shores of lakes. The Red River burial sites are on streams tributary to the Red or Minnesota Rivers.

8.3 Past Research

Archaeological research on the Central Minnesota Transitional Woodland has been conducted predominantly in the Mille Lacs and Snake River regions. Although sites with St. Croix and Onamia pottery are more widely distributed, as discussed above, few other areas have had significant excavations at sites of this complex. For Mille Lacs, Johnson (1984) defined phases that distinguished between components with St. Croix and Onamia pottery. He defined the Isle phase (A.D. 500–800) as having St. Croix pottery, and the Vineland phase (A.D. 800–1000) as having Onamia pottery. He also defined subsistence and other cultural trends that he thought were associated with each phase. Most of

the Mille Lacs sites are multicomponent, however, with little separation of occupations, making archaeological verification of his ideas difficult.

Hohman-Caine (1974) discussed sites in the Snake River region, including Pokegama and Cross Lakes. This information derived from collections of local residents and excavations at six sites by various people, including Cooper and Johnson. The Vach sites were determined to be disturbed and are known from their surface collections; the other three sites that provided information were Neubauer (21PN7; Hohman-Caine 1966), Stumne Mounds (21PN5; Cooper 1967; Johnson 1973:63), and Winter (21PN17; Hohman-Caine cites personal communication from Elden Johnson).

There has been some general discussion on the nature of the transition from Hopewell-related and other Middle Woodland complexes to Late Woodland. In 1980, Gibbon and Hohman-Caine summarized what was known at the time about the St. Croix phase, treating it as transitional between Middle and Late Woodland, and proposed a general model of development from Middle Woodland complexes through the St. Croix transitional phase to Late Woodland Kathio (now the Blackduck-Kathio complex). This transition, however, seems to depend on an intensified use of wild rice with Late Woodland that is not yet supported by good data.

The ceramics with this transitional complex have been discussed in Hohman-Caine's 1969 thesis and 1966 article on the Neubauer site, as well as her 1983 dissertation. The dissertation explored the transition from St. Croix to Onamia in the Mille Lacs series of sites and in the Snake River areas (Stumne Village site, 21PN4), evaluating normative typological and systemic/stylistic approaches to viewing ceramics and culture change. Additional research has included Bakken's 1994 thesis on the Lower Rice Lake site (21CE5; Bakken 2006), Helmen's 1964 article on the Berscheid site (21TO1), E. Johnson's work (1971a) at Gull Lake Dam (21CA37) and 1973 report on the Arvilla complex, which includes a number of burial sites related to this transitional complex. In addition, extensive research has been conducted on the Mille Lacs sites (e.g., Johnson 1984 and Streiff 1987, as documented elsewhere). More recent contract work has documented sites with St. Croix or Onamia pottery (e.g., Forsberg and Dobbs 1997; C. Johnson 1995), but excavations have not yet yielded substantial associated subsistence remains or features.

8.4 Chronology

The Central Minnesota Transitional Woodland complex is considered to be transitional between Malmo and Blackduck-Kathio. It has been assigned to a variety of temporal periods (Johnson 1994:3.50–3.51). Dating is based on some stratigraphic information and on similarities to other transitional Woodland sherds, such as Onamia-like ceramics from southwestern Wisconsin. Gibbon and Hohman-Caine (1980) assigned the St. Croix phase to Early Terminal Woodland and dated it to A.D. 300–800. Anfinson and Wright (1990), George (1979b), and Birk (1991) have dated it to A.D. 500/600–800. C. Johnson (1994:3.50–3.51) says:

> *Birk includes the St. Croix phase within the Middle Woodland period and assigns sites with Onamia series pottery to the Middle–Late Woodland transition in Central Minnesota (A.D. 750–900). Anfinson and Wright also imply a temporal association between Onamia and St. Croix ceramics. Ready (Ready and Anfinson 1979[c]) dates Onamia pottery somewhat later at A.D. 800–1000, and indicates that it is related to both Kathio/Clam River and St. Croix Stamped ceramics*.

Stratigraphically, St. Croix pottery is reported as occurring below Late Woodland ceramics. Clam River (part of the Blackduck-Kathio complex) ceramics were found above St. Croix at the Neubauer site (Hohman-Caine 1966). Onamia ceramics are considered transitional between St. Croix Stamped and Blackduck-Kathio.

George (1979b) gives a range of A.D. 500–800 for St. Croix pottery. He notes that related ceramics from northwestern Wisconsin (the Altern site) date to A.D. 340 (uncalibrated; originally published in Cooper 1964:23) and A.D. 600 from the De Speigler site in northeastern South Dakota. For Onamia pottery, Ready and Anfinson (1979c) suggest an age of A.D. 800–1000.

The radiocarbon dates available for St. Croix pottery show a range of A.D. 0–700 (Figure 14) but also with some unusually early dates. AMS residue dates given by Forsberg and Dobbs (1997) are very early, from 200 B.C. to A.D.

75, and then A.D. 200–500 (uncalibrated), with a range of 355 B.C.–A.D. 465, calibrated to two sigmas. Two samples of residue were dated from each of three sherds. The duplicate samples match each other well for two of the sherds and also fit well with one sample from the third sherd, but the second sample from the third sherd dated 90 years older than the first sample from the same sherd. The sherds with the residue dates are not assigned to a specific type, but the only diagnostic ceramics reported from the site are St. Croix and Onamia.

8.5 Technology and Material Culture

Ceramics

The type site for Onamia ceramics is Petaga Point (21ML11), with a sample of 90 rim sherds, while that for St. Croix is Neubauer (21PN7; Hohman-Caine 1966). Elden Johnson's original type definitions were given in Helmen (1964) and Bleed (1969), as well as in Johnson (1971a). St. Croix Stamped series pottery was described by George (1979b), after Elden Johnson and Leland Cooper in Hohman-Caine (1966), and by Hohman-Caine (1966, 1969, 1983). George listed complete vessels from Stumne Mounds (21PN5), Berscheid (21TO3), and DeSpeigler (39RO23, in South Dakota), as well as a vessel found by a diver in Lake Phalen, in St. Paul. Additional ceramics came from the Altern site (Burnett County, Wisconsin), Vineland Bay (21ML7), Petaga Point, a series of Snake River sites (21PN4, 7, 8, 9, 10, 14, 15) and Gull Lake Dam (21CA37). Hohman-Caine conducted a detailed attribute/mode analysis of St. Croix and Onamia ceramics and suggested that St. Croix and Onamia be defined as types within a single ware (1983:214–215).

St. Croix pottery is tempered with grit (often crushed granite) and has a medium- to fine-textured paste, often somewhat laminated, though both coarser and sandy-textured pastes occur (Hohman-Caine 1983:91). George (1979b) describes the thickness as averaging about 4–5 mm. Hohman-Caine (1983:93) found that lip thicknesses range between 3.5 and 9.5 mm, averaging about 6.5 mm; neck thickness also averages 6.5 mm. George (1979b) describes the surface treatment as tightly spaced cordwrapped paddle impressions, with the rim usually smoothed before decoration. Vessels are subconoidal to rounded, with a slight neck constriction, a high vertical rim, and rounded shoulders, and they range in size from small bowls to large vessels. Hohman-Caine (1983:105) gives orifice diameters of 8–40 cm, with more than half being over 26 cm. Lips vary between the two defined varieties. Dentate Stamped vessels have an unthickened and flattened lip, or occasionally a rounded lip. Some rims have a slight exterior bevel. The lips often have a wavy or crimped appearance from interior and exterior stamping. The lips in the Comb Stamped variety are generally flattened and occasionally rounded (George 1979b; Hohman-Caine 1983). Hohman-Caine (1983:94) describes interior treatment consisting of horizontal striations, perhaps made by running the dentate-stamp tool around the interior neck to thin or smooth it.

Decoration defines two varieties of St. Croix Stamped (George 1979b:169–170):

> *Dentate Stamp Variety (Caine 1969): Simple geometric decorations made with a carved stamp forming rows of parallel horizontal lines or rows of oblique or vertical lines encircling the vessel. Occasional rectangular or "stab" punctates border the lower edge of the decoration. The stamp leaves a square or rectangular impression.*
>
> *Comb Stamped Variety (Caine 1969): Simple geometric decorations made with a carved stamp forming rows of parallel horizontal, vertical, or oblique stampings in various combinations. Occasional shallow punctates made with the end of a stamping tool border the lower edge of decoration. The stamp leaves V-shaped comb impressions.*
>
> *An additional, minor (cord stamped?) variety might be characterized by impressions made by a stick finely wrapped with cord (Gibbon and Caine 1976:7).*

Type definitions for Onamia ceramics as given by Ready and Anfinson (1979c:149) are:

> *<u>Onamia Cordwrapped Stick Impressed:</u> Loosely wound, widely spaced cordwrapped stick impressions in an oblique row around the rim exterior and often in the rim interior. A horizontal band of cordwrapped stick impressions often appears below the oblique band, and a horizontal band of impressions can occasionally appear alone on the rim. A few examples have the cordwrapped stick impressions on the interior only.*

> *Onamia Dentate:* Oblique or horizontal bands of large-toothed, dentate-stamped impressions on the rim and neck with occasional dentate stamping on the lip. This variety is less common than the cordwrapped stick impressed variety.

Anfinson, in George (1979b:170) distinguishes St. Croix from Onamia ceramics:

> *St. Croix ceramics are closely related to Onamia ceramics both in vessel form and some decorative techniques (i.e., dentate stamping in oblique and horizontal bands). In Onamia, however, a "heavy" cordwrapped stick impression is the dominant decorative mode. Dentate stamps, when they appear in Onamia, could also be described as "heavy" as they are made with a stamp that has large, widely spaced teeth.*

Ready and Anfinson (1979c) distinguish Onamia from other related pottery:

> *Onamia Dentate can be distinguished from St. Croix on the basis of the "heavy" dentate stamps on the Onamia rims as opposed to the fine dentate and comb stamps on St. Croix (Caine 1974:61). St. Croix and Onamia have very similar vessel forms and it is occasionally difficult to distinguish the two types. A vessel recovered from the Berscheid Site (21 TO 3) was initially classified as Onamia Dentate (Helmen 1964) but was later reclassified as St. Croix (Johnson 1973:64). Kathio series (Clam River) vessels, on the other hand, have a relatively short, everted rim with fine cordwrapped stick impressions in oblique and horizontal bands.*

Hohman-Caine (1966:89) has suggested that St. Croix pottery was probably made with coils and shaped with a paddle and anvil, though she also acknowledges (1983:94) that there is no good evidence in support of any particular manufacturing technique. She notes (1983:192) that there are distinct size differences between the smaller mortuary vessels from Stumne and DeSpeigler and the much larger vessels from Cooper Mounds and Poulak/Hay Lake (21CW7/14).

In comparison to Lake Benton ceramics, Ready and Anfinson (1979c:150) indicate some differences and similarities:

> *Hudak (1976:3) states that his Series A ceramics (Lake Benton Cordwrapped Stick Impressed) from the Pedersen Site (21 LN 2) are "very similar in all respects to the Onamia series." Although there are definite similarities between Onamia and the Late Woodland cordwrapped stick impressed ceramics in southwestern Minnesota, there are also a number of differences. The southwestern Minnesota Onamia-like (LAKE BENTON) vessels usually have a shorter and more everted rim than central Minnesota Onamia and the cordmarking on the body of the LAKE BENTON phase ceramics is more distinct. Additionally, dentate stamping is rare in southwestern Minnesota and the cordwrapped stick impressed ceramics seem to date somewhat later there.*

Lithics

Projectile points found with Onamia ceramics are described as predominantly side notched, with some unnotched triangular points (Ready and Anfinson 1979c). George (1979b) describes points found with St. Croix Stamped ceramics as being finely made isosceles triangular points and small side-notched points, sometimes described as similar to Prairie Side-Notched (Gibbon and Caine 1980:61, citing Johnson 1973 and Hohman-Caine 1974). Presumably these triangular points are associated with the transition to the use of the bow and arrow. Unfortunately, no lithics were recovered from the stratigraphically separable St. Croix component at the Neubauer site (Hohman-Caine 1966).

For 21AN106, one of the few sites with a distinguishable transitional component, Forsberg and Dobbs (1997) have described the lithic assemblage. Abundant fire-cracked basalt and granite was found, and the authors suggest that it was a result of stone boiling, noting similarities to Wendt's (1988) experimental results on stone boiling. Other lithics were predominantly made of local raw materials, but Burlington chert, Hixton silicified sandstone, Knife River flint, and obsidian also were recovered; exotic materials, particularly Hixton, accounted for 13% by count of the total chipping assemblage (Forsberg and Dobbs 1997:32). Only two cores were recovered, both of local materials. The tool assemblage was limited and included two biface fragments, two retouched blades, two scrapers, one point, and three utilized flakes (1997:38).

Worked Bone, Antler, and Shell

Some Arvilla modified bone and antler might be relevant here, though the connection between Arvilla burial sites and the Central Minnesota Transitional Woodland needs to be clarified before they can be comfortably included. At Stumne Mound (21PN5; Hohman-Caine 1974), burials were reported to be found with shell beads, two antler tips with beaver teeth, and carnivore teeth encased in a mass of red ocher.

Other Artifacts

At 21AN106, a conical copper spear point was recovered (Forsberg and Dobbs 1997:26–27). It was classified within Wittry's (1951) Type 1-0, made by rolling a flat piece of copper into a cone. The site has only St. Croix and Onamia ceramics.

8.6 Subsistence

In general terms, this transitional complex is described as having a hunting-gathering economy. However, little in the way of faunal or floral remains have been recovered, and virtually all are from mixed contexts or were not tabulated by component. Researchers have suggested that wild rice was becoming important, particularly in the Vineland phase, but archaeological evidence in the form of charred wild rice grains is not yet available. Despite the limited data, a model of subsistence strategy changes has been proposed. Gibbon (1994:142, citing Gibbon and Hohman-Caine 1980:4 and Hohman-Caine 1983:255) suggests that there was increasing dependence on wild rice and a few large or abundant animals, with this change perhaps resulting from the increasing availability of wild rice, adjustments to climatic changes (though the significance and impact of climatic change as only one of many cultural factors is argued by Anfinson and Wright 1990), and an increase in population size that put pressure on traditional food resources. Each of these factors still needs to be documented from the archaeological record. Gibbon and Hohman-Caine (1980) suggest a shift from a more diffuse hunting-gathering economy to a more focal subsistence strategy with later Woodland populations such as Blackduck.

The only faunal data identified in this review came from multicomponent sites where the fauna were not sorted by component. Thus, only the most generic interpretations of a hunting-gathering-fishing way of life are feasible. For example, Nowak (1969) discusses the fauna from Vineland Bay (21ML7) as a whole, but the site has St. Croix, Onamia, Kathio, Sandy Lake, Ogechie, Malmo, Blackduck, and possibly Brainerd ceramics, as well as French artifacts. There might be some stratigraphy at Vineland Bay (Nowak 1969:52–54, based on Dickinson's work [1968] at the site), and Nowak documents the continued importance of deer throughout the assemblage, along with beaver, bear, bison, other small mammals, terrapin, and fish—although fish appear to be only a small component of the diet based on either minimum number of individuals or pounds of edible meat.

This review located no reports of charred floral remains found in context at St. Croix or Onamia occupations. Thompson analyzed phytoliths from ceramic residue found on a site with only St. Croix and Onamia pottery (21AN106, Thompson 1996b). Forsberg and Dobbs (1997:39) summarize his findings of wild rice chaff phytoliths on four sherds, corn phytoliths on one sherd, and an unidentified grass on two sherds. Phytoliths of a possible squash or gourd also were found on one sherd. These sherd residues were AMS dated, as reported above. The dates and context for corn are significantly earlier than reported elsewhere, and the fact that the only indications of corn are phytoliths from one sherd, rather than charred corn fragments, suggests that these results should be interpreted cautiously. Late Woodland populations elsewhere did have corn, and it could have been traded to this group, but the residue dates are unusually early even for this.

8.7 Mortuary Practices and Ideology

Information on burial practices for the Central Minnesota Transitional Woodland complex comes from burials found with St. Croix or Onamia pottery, at least two of which were initially placed within the Arvilla complex. Hohman-Caine (1983:218) reexamined the ceramics from Arvilla sites and documented a number of burials that are probably related to the Central Minnesota Transitional Woodland based on the ceramics. For Stumne Mound 6 (21PN5), a linear mound, Hohman-Caine (1974, 1983:195) reports a dentate-stamped vessel associated with a primary flexed burial in a submound pit. Additional burial features were present in the mound but cannot be directly tied to this

complex. A burial pit in the mound contained another flexed primary burial with numerous mortuary artifacts, including a clay elbow pipe, a small mass of whitish clay, six greenstone artifacts, two shell beads, a possible harpoon, and a 6-inch by 1-foot mass of red ocher encasing carnivore teeth, and two antler tips with beaver teeth. Another pit in the mound contained a mass secondary burial of multiple individuals, but no diagnostic artifacts. Mound 14 contained a submound pit with dentate-stamped pottery but no bones; the bones themselves were thought to have been destroyed by acidic soils and animal burrowing (Arzigian and Stevenson 2003:459).

At Berscheid (21TO3), Vern Helmen and the Science Museum in 1963 excavated secondary burials of at least six individuals from a pit in a sand ridge, associated with a St. Croix Dentate vessel that Johnson had reclassified from Onamia Dentate (Helmen 1964; Hohman-Caine 1983:206; Johnson 1973:64). This site was described by Johnson (1973:64) as Arvilla, extending the range of that burial complex to the east. An osteological analysis of the fragmentary remains indicated few pathologies, with one individual having degenerative arthritis, one with temporomandibular joint syndrome, one with sharp-force trauma on the skull, one with a carious lesion, one with enamel hypoplasia, and three with periodontal disease (Myster and O'Connell 1997:224).

A third site had pottery but no human remains in what initially appeared to be a burial mound. At Cooper Mounds (21ML16), Jan Streiff's 1969 testing demonstrated that "mound" 3 was in fact a natural feature of glacially deposited sand/gravel (Streiff 1994). A humus-filled pit at the bottom contained two partial St. Croix Stamped vessels overlying a group of six stones. There were no human remains or other indications of burial features.

8.8 Social, Economic and Political Organization

There is little information on these subjects for the Central Minnesota Transitional Woodland complex. Hohman-Caine (1983:227) poses two hypotheses that emerged from her systemic analysis:

> *1. Rapid stylistic change from A.D. 500 to 800, as seen in the development of St. Croix ceramics, is related to increasing population density and a concomitant shift from diffuse to focal subsistence patterns.*
>
> *2. Arvilla is the religious-ideological manifestation of an interaction sphere that unites populations experiencing increasing socia1 segmentation due to population increases. St. Croix pottery serves as a distinctive informational signal associated with the spread of this complex, probably operating in both the religious and social systems.*

8.9 Cultural Relationships

Temporal, spatial and cultural relationships with earlier, later, and contemporary cultures all need to be resolved. Hohman-Caine (1983) uses her own work and that of Lugenbeal (1976) to discuss the close relationship between St. Croix and early Blackduck bossed ceramics, particularly in the Headwaters Lakes and Red River valley. She argues that some styles of St. Croix pottery are contemporaneous with Early Blackduck, and also argues for overlap with late Laurel dentate-stamped ceramics. To the west, Hohman-Caine (1983), Hudak (1976), and Ready and Anfinson (1979c) all note the similarities between Onamia and Lake Benton ceramics, although at the Pedersen site (Hudak 1976), the Onamia-like Lake Benton ceramics are dated to A.D. 1245, later than other dates for Onamia pottery.

8.10 Demography and Settlement

As discussed in Section 8.6, population densities are suggested to have been changing during this time, at least partially as a result of intensified exploitation of wild rice and a few large mammals (Gibbon 1994); however, the absence of solid subsistence information leaves this assumption untested. Johnson (1984:18) suggests a pattern of small winter habitation sites with scattered summer occupations and possibly small-group hunting camps. Gibbon and Hohman-Caine (1980:61) describe known habitation sites as extensive (from 0.8 to 4.0 hectares) but having low artifact densities. The sites have rarely been found near burial sites, so connections to burial sites have been made on the basis of St. Croix pottery. George (1979b) describes habitation sites with St. Croix Stamped series ceramics as occurring predominantly along streams near lake outlets.

Little information is available on structures or within-site patterning. At Fort Poulak (21CW7/14; Hohman-Caine 1983:196–204), a local collector who found St. Croix pottery during the 1930s reported that it was associated with a house feature. After evaluating the information, Hohman-Caine suggests that the find might indeed indicate a habitation context (although a mound context is also possible), but that the description of a house basin is probably fanciful.

8.11 Principal Sites and Property Types

Principal Sites

The following sites are taken from Anfinson (1994b):

21AN8	Anderson (Havana-related, Late Woodland)
21AN106	(no name) (only St. Croix and Onamia ceramics)
21CA37	Gull Lake Dam (Havana-related, Brainerd, Blackduck-Kathio, Central Minnesota Transitional Woodland)
21IC4	Lake Winnibigoshish Dam (Laurel and Blackduck contexts; also Brainerd, Sandy Lake, and St Croix/Onamia ceramics)
21KT1	Lake Bronson mounds and habitation (Arvilla complex; multicomponent with Laurel, St. Croix, Blackduck ceramics; no stratigraphic separation, though there might be horizontal separation)
21ML2	Aquipaguetin Island (multicomponent with no real stratigraphy; ceramics include St. Croix, Kathio, Clam River, Sandy Lake, Ogechie)
21ML3	Crace (bear mandibles with Clam River ceramics; ceramics include Clam River, St. Croix, Brainerd; partial horizontal separation)
21ML6	Indian School (includes Robbins Mounds; Malmo, Brainerd, Onamia, Kathio ceramics most common, also some Ogechie ceramics) (N.B.: Though the existing excavation data cannot be separated by component, Rothaus et al. 2005:102 argue that intact undisturbed deposits with potential stratigraphic differentiation might still exist at the site, and they recommend it as highest priority for preservation or intensive excavation.)
21ML7	Vineland Bay (ceramics include St. Croix, Onamia, Kathio, Sandy Lake, Ogechie, Malmo, Blackduck, possibly Brainerd; also French artifacts)
21ML9/16	Cooper habitation site and mounds [NRHP] (Dakota and French materials in association; also precontact with St. Croix, Kathio, Ogechie, and Sandy Lake ceramics, and historic Ojibwe)
21ML11	Petaga Point Site [NRHP] (Archaic, Kathio, St. Croix, Sandy Lake ceramics; Psinomani including early historic artifacts; some separation between Archaic and Woodland occupations, but no separation within Woodland components; never fully analyzed)
21ML12	Lloyd A. Wilford Site [NRHP] (Mdewakanton Dakota and French materials in association; also prehistoric, predominantly Sandy Lake ceramics, but formal analysis not done and earlier ceramics are present; needs ceramic and feature analyses to provide context for floral data reported in Bailey 1997)
21ML20	Old Shakopee Bridge (badly mixed, with Kathio, St. Croix, Sandy Lake pottery)
21NL1	Poehler (Middle and Late Woodland and Central Minnesota Transitional Woodland)
21PN5	Stumne Mounds (St. Croix ceramics)
21PN7	Neubauer (stratified with Clam River and St. Croix ceramics)
21PN8	Vach (Central Minnesota Transitional Woodland, Psinomani)
21PN9	Mission (multicomponent, but the only Woodland component is Central Minnesota Transitional]
21PN10	Pokegama Outlet (Blackduck, St Croix, Onamia ceramics)
21PN14/PN15	Pokegama Estates (single component; only St. Croix and Onamia ceramics)
21PO14	Noyes (single component; only St. Croix and Onamia ceramics)
21RL1	Red Lake River (multicomponent with Central Minnesota Transitional and general Late Woodland)
21TO3	Berscheid (single component; burials with St. Croix pottery)

Property Types

Based on the existing literature, these property types should exist for Central Minnesota Transitional Woodland:

Habitation sites: Most of the known sites probably fall into this category, particularly the series of habitation sites at Mille Lacs, such as the Indian School (21ML6), Petaga Point (21ML11), and Wilford (21ML12) sites.

Resource procurement and processing sites: None can be identified at this time.

Special-use sites: These sites could encompass a range of special activities, most of which have not yet been defined for Central Minnesota Transitional Woodland.

Mortuary–mounds: Stumne (21PN5) Mound 6 is connected to this complex through ceramics found with a burial. Other mounds are likely associated but lack diagnostic artifacts.

Mortuary–nonmound: Burials at Berscheid (21TO3) were found with St. Croix Dentate ceramics.

8.12 Major Research Questions for the Central Minnesota Transitional Woodland Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Central Minnesota Transitional Woodland complex:

Subsistence. Better subsistence information, both floral and faunal, is needed to understand the basic subsistence pattern and how it might have changed, before interpretations about changing demography and social structure can be made. In particular, the roles of both wild rice and large mammals need to be clarified with fine-scale recovery and analysis from single-component sites or separable components.

Cultural transitions. What was the nature of the transition from Middle Woodland and Hopewell-related cultures to the Late Woodland complexes such as Blackduck-Kathio? Comparison of material culture, settlement systems, and mortuary practices might provide indications. In some scenarios this complex ended with the entry of Mississippian influences. Did Mississippianization play a role in the cultural transformations seen in central Minnesota? What was the nature of any connection to Arvilla mounds? If this complex represented a transition to the bow and arrow, how is this change visible in the archaeological record?

Regional connections. Cultural relationships, both contemporaneous and through time, are poorly known. Specific lithic raw materials, ceramics, or other cultural traits might be found across the region during this period; tracing these would allow identification of regions of interaction. Examining the distribution of similar ceramic traits such as dentate stamping might be one route of investigation. Such a study would also document any differences in ceramic style found in this ubiquitous and widespread complex. Documenting ceramics from other complexes including Plains Village that are found in Central Minnesota Transitional Woodland sites would be useful for tracing patterns of interaction.

9 THE SOUTHEAST MINNESOTA LATE WOODLAND COMPLEX, A.D. 500–1150

9.1 Introduction and Overview

The Southeast Minnesota Late Woodland complex spans a time from approximately A.D. 500 to 1150. As originally defined (Dobbs and Anfinson 1990:162), this context included Late Woodland sites that came after Havana-related complexes and before Oneota. It was based in the deciduous forests of southeastern Minnesota and included effigy and other mounds and the related cultures marked by cord impressed Madison ware-like ceramics. However, the distribution of cord-impressed ceramics stretches across the southern part of the state, often as a small part of the ceramic assemblage, suggesting a need to clarify the nature of the context and the role of ceramics in its definition.

There has been little recent research in Minnesota to expand our understanding of this context, though work in Wisconsin, Iowa, and Illinois suggests that it represents Late Woodland populations of hunters, gatherers, fishers, and, at least by the end, horticulturalists growing corn and squash as well as native cultigens such as sunflower, goosefoot, and knotweed. These Late Woodland peoples buried their dead in mounds, some of them effigy mounds. Their ceramics are part of a broad horizon of cord-impressed ceramics grouped within Madison ware, and their lithics include the first triangular bow-and-arrow projectile points. Their population levels were probably increasing, and, at least in some places such as southwestern Wisconsin, might have reached high population densities.

9.2 Environmental Setting and Geographic Distribution

The majority of the sites in this context, particularly those associated with effigy mounds, are concentrated in east-central and southeast Minnesota and are similar to cultures in southwestern Wisconsin, northeastern Iowa, and northwestern Illinois. They are found along the Mississippi River and its tributaries, and extend west to the Blue Earth River valley (Figure 15). Considering the distribution of cord-impressed ceramics as drawn from a review of some major site reports (C. Johnson, personal communication, 2008), the distribution of this complex is larger than the range documented in the SHPO database, but is still largely restricted to the southeast part of the state. Elsewhere, cord-impressed ceramics occur only in small quantities along with other Late Woodland complexes.

Within the Ecological Classification System (MnDNR–Division of Forestry 1999), of the 51 sites reported for this context in the SHPO/OSA database in 2008 (excluding the sites connected only through cord-impressed ceramics), 49 (96%) are within the Eastern Broadleaf Forest province. Most of these (36 of the 49 sites, or 74%) are found in the Blufflands of the Paleozoic Plateau. One site is in the Rochester Plateau within the Paleozoic Plateau. Twelve sites are within the Minnesota and Northeast Iowa Morainal section, including the St. Paul-Baldwin Plains (7 sites), Big Woods (3 sites) and Oak Savanna (2 sites) subsections. Two sites are just over the boundary in the Prairie Parkland province, North Central Glaciated Plains/Minnesota River Prairie section. However, this distribution pattern may be biased; archaeologists may have identified this context only in southeastern Minnesota due to the geographic limitations suggested in the name and definition of the context. The Southeast Riverine SHPO archaeological region (Anfinson 1990) has most of the sites (44 sites, 86%), with 7 sites in the Central Lakes Deciduous region, and 4 in the Prairie Lake region.

The sites are located along rivers on terraces and bluffs, and include at least five rockshelters. Only one mound site, Prior Lake (21SC16), an effigy mound site, is in an upland setting.

9.3 Past Research

Southeast Minnesota's Late Woodland sites and the cultures they represent have not been studied extensively and, consequently, are not well understood. Instead, interpretations of them are derived largely from information obtained in adjacent regions, particularly in Wisconsin and Iowa, where research on Late Woodland cultures has been more extensive.

Ceramics related to Effigy Mound–associated Madison ware and Angelo Punctated extend into Minnesota, but the typologies and distribution of these Minnesota ceramics, and the sites on which they are found, have received little systematic study to date. For example, early work by the University of Minnesota included Lloyd Wilford's 1935

excavation at Tudahl Rockshelter (21FL3) in Fillmore County (Wilford 1937a), which revealed this site to be multicomponent. A quick examination of the extant collection in 2001 (R. Boszhardt and K. Stevenson, personal communication, 2008) revealed the presence of Angelo Punctated as well as Madison Cord Impressed pottery. Similarly, in the Science Museum's excavation at Lee Mill Cave (21DK2) along Spring Lake of the Mississippi River in Dakota County (Johnson and Taylor 1956), a pottery type identified as "grit-tempered type A" appears to be Angelo Punctated–related. These are examples of older collections with important materials that have not been reevaluated or fully incorporated into current studies of Late Woodland regional sites and cultures.

For habitation sites, the Sorg site (21DK6) is the type site for Nininger Cordwrapped Stick Impressed ceramics. Sorg is located at the eastern end of Spring Lake in the Mississippi Valley, between the Bremer Camp site (21DK6) and Lee Mill Cave (21DK2). Johnson excavated there in 1953, 1954, and 1956 (Johnson 1959) and identified a stratified series of Middle and Late Woodland deposits, despite erosion from fluctuating lake levels and disturbances from construction. An initial test pit found a hearth that yielded a C-14 date of 800 ± 200 B.P. along with undecorated, cord roughened body sherds. Late Woodland ceramics included Madison Plain and Nininger Cordwrapped Stick Impressed. Some stratigraphic separation of deposits was apparent, with Middle Woodland Sorg ceramics concentrated in the lower four levels, and none higher than level 3; above this, and concentrated in the upper two levels, were Nininger Cordwrapped Stick Impressed, Madison Punctate, and Madison Plain. Levels 1 and 2 had Late Woodland materials that matched the 800 B.P. date from the hearth. Johnson (1959) called this the Nininger focus and argued that it showed more similarities to Wisconsin Effigy Mound than other Late Woodland complexes in Minnesota. Again, the nature and meaning of this material has not been fully evaluated in terms of the larger Late Woodland context.

Other habitation sites with some excavated artifacts include Bremer (21DK6; Jensen 1959), and King Coulee (21WB56; Perkl 1998). Recently, survey at the Falls habitation site (21NL140) west of Mankato produced Madison Cord Impressed and Madison Plain ceramics from a site on a terrace overlooking the Minnesota River valley at Minnemishinona Falls (Arzigian 2007). This and 21BE24 just to the south of the Minnesota River are the westernmost sites reported specifically for this context, although sites further west have cord-impressed ceramics, as discussed above.

The distribution of effigy and other mounds in Minnesota was plotted by Anfinson (1984), who noted that effigy mounds were found exclusively in the southeastern corner of the state. A number of researchers have discussed the role and significance of effigy and other mounds themselves, though these are not considered at length here because the mounds are covered under a separate Multiple Property Documentation Form (Dobbs 1996).

In Wisconsin, researchers from the University of Wisconsin–Madison and University of Wisconsin–La Crosse have been building on earlier research and conducting studies of Late Woodland Effigy Mound cultures in the Driftless Area of southwestern Wisconsin and portions of adjacent states (e.g., Arzigian 2008; Boszhardt 1996; Boszhardt and Goetz 2000; Moffat and Arzigian 2000; Theler and Boszhardt 2000, 2006), including the area of Prairie du Chien, Wisconsin, along the Mississippi River (Arzigian 1993; Stoltman 1990, 2006; Stoltman and Christensen 2000; Theler 1987).

In those regions, two Effigy Mound phases have been identified (e.g., Boszhardt and Goetz 2000; Stoltman 1990:252; Theler and Boszhardt 2006). The Eastman phase, extending from the northwest corner of Illinois up to the Coon Creek valley on the east side of the Mississippi, and to roughly the Minnesota/Iowa border on the west side, dates to ca. A.D. 750–1050 and is distinguished by Madison ware ceramics, short- or no-tailed quadruped mounds, and side-notched or unnotched triangular arrow tips made from local cherts. The Lewis phase extends geographically from north of the Coon Creek valley to north of the Chippewa and Cannon Rivers. It is less well dated but is characterized by the presence of Angelo Punctated pottery, long-tailed quadruped mounds, and triangular arrow points usually made from Hixton silicified sandstone. Excavations have been conducted at a large number of Effigy Mound sites of various types in Wisconsin, from floodplain villages to mound sites to rockshelters.

In Iowa, the Keyes phase is identified as associated with Madison ware ceramics and effigy mounds. Benn and Green (2000) summarized Late Woodland cultures and discussed the Corded Horizon (which includes Madison ware

ceramics), summarizing regional work. Further to the west, they discuss the distribution of Loseke ware, another Corded Horizon ware that is present in the northwestern quarter of Iowa. The distribution of both Madison and Loseke wares is widespread and goes up to the northern border of Iowa, implying that they are present well into Minnesota (Benn and Green 2000: Figure 18.20). Cord-impressed pottery from southwest Minnesota seems to be present in small quantities at scattered small sites (most from amateur collections), making it difficult to determine if it is indeed a complex or just a horizon marker found in association with other regionally defined Late Woodland complexes.

9.4 Chronology

Dobbs and Anfinson (1990:165) note that "The temporal range for Late Woodland remains essentially unknown. Presumably it postdates the Havana-related cultures and continues until ca. 800 years ago (A.D. 1150). Late Woodland groups appear to be, in part, contemporary with early Oneota." A radiocarbon date from the Sorg site (A.D. 1150) is the only direct date from Minnesota, and late in the sequence." The Sorg site date is calibrated at a 1-sigma range to A.D. 1024–1389.

In southwestern Wisconsin, three phases have been defined that probably correspond to the Late Woodland context, at least in southeastern Minnesota. The Mill phase is transitional from Middle to Late Woodland, and the Eastman and Lewis phases are contemporary but, as described above, represent two geographically separate regions and different cultural expressions.

The beginning dates for the period depend on the definition of the complex. If considered strictly as post-Havana-related, then the dating might be fairly early. The Mill phase (ca. A.D. 500–750) was defined by Stoltman (1990:250–252) to encompass the transition from Middle to Late Woodland in southwestern Wisconsin. The phase is marked by Lane Farm Cord Impressed ceramics that have cord-impressed decoration on the rim with rocker stamping covering much of the body. Excavations in Prairie du Chien generally support the stratigraphic position of Lane Farm Cord Impressed above Millville phase ceramics and below Madison Cord Impressed ceramics (Stoltman 1990:250–252; Stoltman and Christensen 2000:501). Two dates of A.D. 770 ± 70 and A.D. 750 ± 70 [1-sigma calibrated range for the pooled mean of the two dates is A.D. 772–935] for the Lane Farm component from the upper shell midden at Mill Coulee (47CR100) probably represent the end of the Mill phase, most likely at about A.D. 770, the lower end of the 1-sigma calibration of these dates (Stoltman 1990:250–252; Stoltman and Christensen 2000:501).

The Eastman phase was defined by Stoltman (1990:252), and the Lewis phase defined by Boszhardt and Goetz (2000), as the two manifestations of the Effigy Mound culture in Wisconsin. Stoltman and Christensen (2000:507) reviewed the over 119 available radiocarbon dates from mounds and habitation sites in Wisconsin and surrounding states, calibrated them, and came up with an estimated time span for effigy mound construction of A.D. 700–1030, with the primary period of effigy-mound construction estimated to extend to A.D. 1000. Following this was a period marked by the manufacture of collared ceramics. Dates available on collared wares prior to the evidence of Mississippian influences come in at A.D. 900–1200 (at a 2-sigma calibrated confidence interval) (Stoltman and Christensen 2000:507).

Using the post-Havana to terminal effigy-mound construction periods and the date from Sorg gives an approximate period of A.D. 500–1150 that might be appropriate for Minnesota.

9.5 Technology and Material Culture

Dobbs and Anfinson (1990:164) argue that, although artifact assemblages for Late Woodland in southeastern Minnesota are poorly defined, they should be similar to assemblages in Wisconsin and Iowa. Baerreis (1953:19) first linked effigy mounds and Madison ware ceramics at the Blackhawk Village site (47DA5) near Madison, Wisconsin. Regional perspectives on the distribution of cord-impressed ceramics find this to be a broad horizon in Iowa, Illinois, Wisconsin, and southern Minnesota.

Ceramics

Ceramics found in Minnesota that are associated with this complex include several types defined for Minnesota, as well as related ceramic types from adjoining regions.

The ceramic type sites for Effigy Mound ceramics in Minnesota are Sorg (21DK1) and Bremer (21DK6). Anfinson (1979a:74) listed three ceramic types associated with the Effigy Mound culture: Nininger Cordwrapped Stick Impressed, Bremer Triangular Punctated, and Madison Plain. All are grit tempered and thin walled (4–6 mm), with exterior cordmarked body surface treatment. The vessels are wide-mouthed jars that are conoidal to subconoidal in form, with the necks slightly constricted and the rims straight to slightly outflaring. Anfinson's (1979a:74) descriptions are as follows:

> *Nininger Cordwrapped Stick Impressed (Johnson 1959:22) - This type features cordwrapped stick impressions on the smoothed exterior of the upper rim and could be considered to be a variant of Madison Cord Impressed (Baerreis 1953). Only a few sherds of this type were evident at the Sorg Site (21 DK 1) where the type was first recognized. The cordwrapped stick impressions were vertical on these sherds. Punctates also are common.*
>
> *Bremer Triangular Punctated (Jenson 1959:29) - This type was first recognized at the Bremer Village Site (21 DK 6). It features triangular punctates on the upper body and rim usually in horizontal rows, although vertical or oblique rows of punctates appear occasionally. The sherds from the Bremer site had cordmarked surfaces while test excavations by Douglas Birk of the Minnesota Historical Society on Sand Point in Wabasha County yielded triangular punctated sherds with smooth surfaced rims. This type could be considered to be a variant of Madison Punctated (Hurley 1975:102).*
>
> *Madison Plain (Keslin 1958:224–227) - Johnson (1959:21) recognized this type at the Sorg site (21 DK1) shortly after it had been defined in Wisconsin. It features a lack of decoration on the vessel exterior with simply a vertically cordmarked surface. The lip and interior rim, however, often have cordwrapped stick impressions.*

In Wisconsin, the Late Woodland period is broken down into several phases. The Mill phase, a transitional phase between Middle and Late Woodland, is characterized by Lane Farm Cord Impressed ceramics that are thought to form a bridge to Late Woodland Madison cord-impressed types. The Lewis and Eastman phases, characterized by effigy mound construction, are represented by Madison ware and Angelo Punctated. Madison ware includes a number of types (Baerreis 1953; Hurley 1975:94–103; Keslin 1958:218–227). Ceramics continue to get thinner, with fine crushed rock temper. Various kinds of single and woven cord impressions become the dominant decorative form.

Lane Farm Cord Impressed has single cord impressions over a smooth surface on the rim exterior, though not the interior, with rocker stamping (either plain or dentate) on all or most of the body. The vessel are jars, walls are relatively thin and hard, and the temper is fine grit, similar to that of the Linn series (Logan 1976:99–100; Stoltman 2003:17; Stoltman and Christensen 2000:499). Lane Farm sherds have a smoothed surface under cord impressions, in contrast to Madison ware types, which have a cord-roughened surface.

Madison Cord Impressed was first defined as a type by Baerreis (1953). Vessels are thin walled and uncollared, with cord-impressed decoration over a cord-roughened surface, and fine crushed-grit temper. The vessels are globular, with marked shoulders and rounded bases. Decoration occurs in a band around the upper rim exterior. The interior rim and lip might have vertical or diagonal impressions. There may also be short vertical, horizontal, or diagonal imprints, perhaps formed by the paddle edge.

Madison Plain is similar to Madison Cord Impressed but without decoration on the exterior; the rim interior and lip might have cord impressions or punctates. The rim also might have a smooth zone over a cord-roughened body or might be cord roughened over the whole exterior.

Madison Punctated is similar to Madison Cord Impressed but also has small exterior punctates; there might also be cordwrapped stick and cord impressions. The punctates might be in horizontal rows or vertical columns.

Madison Fabric Impressed is also similar to Madison Cord Impressed, but the decorative panels on the rim are produced by fabric rather than individual cords (Hurley 1975:230–244).

Angelo Punctated ceramics (Boszhardt 1996) show some similarities to Great Oasis, which dates between A.D. 900 and 1100 (Tiffany 1982). Angelo sherds are identified by punctates and fine incised lines, sometimes in complex patterns, over a cord-roughened surface, and a fine grit temper.

Lithics

Dobbs and Anfinson (1990:165–165) point out that

> *The lithic assemblages of Late Woodland remain poorly known, but appear to contain a number of scrapers and a variety of small projectile points, including both notched and unnotched triangular points. These last forms are presumably associated with the introduction of the bow and arrow during the later portions of Late Woodland.*

At Sorg (Johnson 1959), other lithic tools from the upper two levels that appear to relate to this context include spatula-shaped end scrapers, thumb scrapers, symmetrical and asymmetrical bifacial knives, flake knives, a spokeshave, and utilized flakes; lithic raw materials were from local sources. There were no ground stone tools associated with this component at Sorg.

Stoltman and Christensen (2000:511) note the difficulty in identifying the nonceramic aspects of the Effigy Mound culture, because few single-component habitation sites have been excavated, and the mound fill has so little habitation debris. They note that triangular points, true bow-and-arrow points, are closely associated with the Effigy Mound culture. Though stemmed and notched points are reported, they form a minority in the assemblages (despite, for example, Rowe's [1956:52] assertion and apparently highly selective illustrations of points from mounds). However, Stoltman and Christensen (2000:511) also note the presence of an expanding-stem point in the pelvis of a male at Kratz Creek Mound 1 (Barrett and Hawkes 1919:138–139), indicating that a wider range of points than just triangular are associated with this culture, although perhaps early in the chronology.

Worked Bone, Antler, and Shell

Stoltman and Christensen (2000:511) identified barbed harpoon points of bone (McKern 1928; Rowe 1956) from Late Woodland mound burials. Overall, almost nothing is known of Late Woodland bone and antler tool types in Minnesota.

Other Artifacts

Stoltman and Christensen (2000:511) have assembled a list of items sometimes found in Late Woodland mound burials that include technologies for working bone and antler, copper, and ground stone. Specific artifacts reported include fishing gear, such as barbed harpoon points made of bone; notched stone net sinkers; woodworking tools, including copper wedges/celts, ground stone adzes, and celts; hide-working tools such as deer bone beamers and bone and copper awls; personal ornaments of shell, copper, and clay; and clay elbow pipes. The authors note that there is no evidence for grinding stones, hoes, or other tools associated with intensive plant cultivation. For Minnesota, little information is available on these other artifact types.

9.6 Subsistence

Dobbs and Anfinson (1990:163) note that "The subsistence base of Late Woodland appears to be a relatively straightforward mix of hunting and gathering, which represents a stable and effective adaptation to the deciduous woodland and riverine environments of the southeastern portion of Minnesota." Subsequent research has added evidence of horticultural practices, though not full-scale agriculture. Evidence for cultigens includes squash from King Coulee (21WB56, Perkl 1998), and other domesticates as evidenced from Wisconsin (Arzigian 1993; Moffat and Arzigian 2000; Stevenson et al. 1997), where corn and Madison ware ceramics are found together.

Dobbs and Anfinson (1990:162) note that southwestern Wisconsin and northeastern Iowa provide a working model for Late Woodland subsistence practices. They quote Theler (1987:121–122), who states that:

> *The model of Woodland stage subsistence presented here is a bipartite system having fall-winter-early spring and summer components to the seasonal round. The seasonal cycle is propelled by scheduling the optimal periods for harvest of a few select animal taxa. A pattern of upland, fall-winter site occupation is identified in the Driftless Area of southwestern Wisconsin and northeastern Iowa. The subsistence activities at these sites focused on the procurement and processing of large mammals. This pattern was well developed by the Late Archaic and shows no appreciable change during the Woodland tradition. It is suggested that this represents an*

effective adaptation to a specific, seasonally desirable resource, the white-tailed deer. The Early Woodland period and the Havana-related Middle Woodland are poorly represented at upland winter sites. This absence of data may be related to a low-density human population finding it unnecessary to venture very far into interior valleys of the dissected upland to supply winter subsistence needs, with winter habitation areas located in close proximity to the Mississippi valley. While this study focused on Woodland groups moving seasonally from summer occupations on the main stem Mississippi (or Wisconsin) River into the uplands for a fall-winter deer harvest, it is likely that there were some interior stream valleys which were occupied by resident Woodland groups year round. . . . A number of sites located on the floodplain of the Mississippi River in southwestern Wisconsin are attributed to summer occupations during the Woodland tradition.

The analysis of subsistence remains from these sites indicates a focus on seasonally available resources, particularly freshwater mussels and fish. An evaluation of the mussels' resource potential suggests that, in certain situations, they provide a high return on expended energy. The prehistoric utilization of large numbers of mussels resulted in sizable shell deposits, occurring in two contexts. During the Early, Middle, and Late Woodland periods, mussels were processed at residential areas, and the resulting shell deposits contain vertebrate remains and artifactual material. A second type of utilization involved extensive, nonresidential mussel-processing stations, having middens containing little or no artifactual (or vertebrate) material. These extractive sites appear to have been positioned adjacent to highly productive mussel beds, where meats were removed and shells discarded. This large-scale off-site processing is first identified in southwestern Wisconsin during the Late Woodland period. Based on circumstantial evidence, it is possible that large-scale processing during the Late Woodland may have been initiated to procure quantities of mussel meat to be dried as a winter food resource.

Since that time, Theler has modified and updated his view of Late Woodland subsistence in southwestern Wisconsin to include population increase, gradual "packing" of the landscape, and collapse of two crucial resources (deer and firewood), leading to a previously unexplained abandonment of the interior of the Driftless Area. According to Theler and Boszhardt (2006:460),

as hunter-gatherer population densities increase in a give area, residential mobility becomes constrained and former resource niches are no longer accessible through the traditional seasonal round. At this "packing-threshold," first-line, large land-mammal resources become scarce…, and other subsistence options will be exercised. These options often include a shift to aquatic resources and/or horticulture to increase niche breadth…. A common response is an economic shift to intensified floodplain resource extraction, agriculture, and a transition from hamlets to villages.

The Late Woodland Effigy Mound phenomenon developed out of a several-century period of low population density for which there is little indication of a packing threshold being approached. After A.D. 800, effigy mounds were constructed throughout the southern half of Wisconsin. Differences in the distribution of certain mound forms between glaciated eastern and unglaciated western Wisconsin, and between northern and southern portions of the Driftless Area…suggest the development of social territories within the Effigy Mound culture area. The last effigy mounds were visible responses by groups having reached a packing threshold. Effigy-only groups were placed across the Driftless Area landscape, marking discrete social territories occupied year-round. By A.D. 950, a number of changes had been incorporated into Late Woodland lifeways, including widespread adoption of the bow and arrow, corn horticulture, and intensified harvest of floodplain resources, with a particular emphasis on freshwater mussels.

Initial Late Woodland settlements followed a seasonal round of macroband congregation along major rivers during the warm season and microband dispersal into interior valleys during the winter, where rockshelters were sought as convenient winter camps with a focus on deer hunting. When the landscape became packed by ca. A.D. 950, this seasonal round became untenable…. Along the Mississippi River, these year-round settlements were focused on freshwater mussel harvest and other aquatic resources, and corn supplemented the economy for the first time in the region. But winter deer hunting also occurred at the floodplain camps, as groups in the major valleys no longer had access to interior drainages already occupied by other groups. Interior valleys…were also occupied year-round, and subsistence strategies also involved increased use of local wetland resources and the incorporation of corn.

Theler and Boszhardt believe that continued population increase would have resulted in stress on two key resources, with significant consequences: "The archaeological record indicates near abandonment of the Driftless Area by indigenous Woodland peoples at about A.D. 1050–1100, which we interpret to be concomitant with the depletion of deer and firewood, both essential for surviving Wisconsin winters" (2006:463).

No faunal remains were identified from sites attributed to the Southeast Minnesota Late Woodland complex. Stoltman and Christensen (2000:513) summarize faunal exploitation for the Eastman phase of Wisconsin:

> *Faunal analyses from a number of sites reveal that Effigy Mound peoples exploited a wide range of mammal, bird, fish, turtle, and shellfish resources, depending upon regional and seasonal contexts…. White-tailed deer remains, however, dominate virtually all Effigy Mound faunal assemblages, indicating the clear primacy that this animal had attained within the Effigy Mound subsistence economy. Notable exceptions are some shell midden sites within the Mississippi alluvial valley, which are clearly warm-weather, special resource procurement sites (Theler 1987).*

As discussed above**,** Theler and Boszhardt (2006) also stress the economic dominance of white-tailed deer, although they also argue for the increasing use of less desirable animal resources as human populations grew.

Evidence of cultigens is present at several sites attributed to this context. Domesticated squash comes from the King Coulee site (21WB56; Perkl 1998) along the Mississippi River, and has been directly dated to 1170 ± 40 B.P., or A.D. 780 [1-sigma range A.D. 779–936]. Corn was found at the Nelson Site (21BE24) with Madison Cord Impressed ceramics (Scullin 1992). The corn kernels and two cob fragments were found in shallow pits filled with sand and charcoal that were suggested to be green-corn roasting pits. Scullin suggested Nelson was a garden site for growing and consuming green (sweet) corn. Analysis of the corn by Leonard Blake identified 12-rowed maize. Scullin notes that the maize and ceramics argue for contact with maize-producing cultures to the east and south.

These cultigens appear to be added to a basic hunter-gatherer-fisher subsistence strategy, probably indicative of small gardens rather than full-blown agriculture. There are no large storage features indicated at sites with maize; there are no reports of large agricultural fields.

In Prairie du Chien, Wisconsin, where there has been extensive flotation of sites from the entire Woodland time range, the Eastman phase is the first Woodland culture to produce evidence of maize kernels and cupules, as well as other cultigens such as sunflowers and knotweed from sites along the Mississippi River (Arzigian 1987:229–231, 1993) and elsewhere in Late Woodland contexts in Wisconsin. In addition, bone-chemistry data indicate increased reliance on corn (Bender et al. 1981; Stevenson et al. 1997:173), though not to the extent seen in later Oneota peoples. Two radiocarbon dates are available from the Mill Pond site component with corn, near Prairie du Chien. One feature with Madison Cord Impressed ceramics was dated to A.D. 920 ± 80 (1-sigma calibrated range of A.D. 896–1149), while a feature with Minott's Cord Impressed was dated to A.D. 1090 ± 80 (1-sigma calibrated range of A.D. 1049–1257) (Theler and Boszhardt 2003:133). Carbon isotopes of human bone from Millville (no corn), Aztalan (corn consumers), and Late Woodland burials indicate that some, although not all, Late Woodland people associated with Effigy Mound sites were consuming corn (Stoltman and Christensen 2000:512). Whether this reflects a temporal difference, with the corn consumers being most recent, or differences in the society is unclear. Thus, at least after about A.D. 900, Eastman phase Effigy Mound peoples were consuming and presumably growing at least some corn, though this was not the intensive farming seen later with the Middle and Upper Mississippian populations. They were also consuming other cultigens such as sunflowers, and a wide range of wild plants and animals, heavily exploiting the full range of resources available.

Benn (1980) excavated Hadfield Cave in Iowa, including Keyes phase levels dated to A.D. 650–800. Flotation recovered maize from a number of levels reported to be pre–A.D. 800, though others have expressed doubt about the association of maize with such early deposits and prefer to see the material as intrusive from a later Late Woodland occupation, though there is only one pseudo-collared sherd at the site that might relate to a later date.

9.7 Mortuary Practices and Ideology

Mortuary practices for the Southeast Minnesota Late Woodland complex are known only from mound sites. Most mounds are undated, but it is thought that Late Woodland peoples in southeastern Minnesota constructed both conical and effigy mounds. In Minnesota, the only effigy mound that has been examined to determine the presence of human remains was at Prior Lake (21SC16), where "salvage" excavations in a location where Lewis had mapped a bird effigy found a sterile pit (Arzigian and Stevenson 2003:487; Evans 1961c).

As part of its Spring Lake research along the Mississippi River, the Science Museum of Minnesota excavated in two mounds (one linear and one ovoid) at the Bremer mounds site (21DK5), and a habitation site (21DK6) thought to be associated (Jenson 1959). The village site had both Middle and Late Woodland components, and though there were Late Woodland sherds in the fill of mound 1, the dating of the mounds and burials remains uncertain. Jenson says both mounds had a "prepared" clay floor, but this refers not to a constructed clay layer but rather to possible removal of the original topsoil and exposure of the underlying clay subsoil prior to mound construction. Mound 1 had at least three features: a secondary burial perhaps on or near the original surface; another burial (perhaps primary) in a pit extending 2 feet into the subsoil, with associated limestone rocks; and a cremation of at least eight individuals evidently placed on the top of the subsoil. Field notes suggest that three other features might have been found: another submound burial pit, a thin charcoal lens, and a sterile pit. Mound 2 contained a central submound pit that held a partial human skull and might have extended 1.4 feet into the subsoil. No artifacts were found in Mound 2.

Theler and Boszhardt (2000:291-292) have summarized the research on effigy mounds:

> *Effigy mounds are most abundant in southern Wisconsin. Many also occur along the Mississippi River into northeastern Iowa, with relatively few in adjacent Minnesota and Illinois. They often occur in groups that contain an assortment of shapes, including conical, linear, and a variety of animal effigies…. While the effigy forms were clearly intended to represent some kind of animal or spirit, the precise species is often in doubt, even when a mound is exceptionally well preserved…. Perhaps the most distinctive forms seem to portray birds and mammals. The age of effigy mounds and associated forms has been determined by consistent association with Madison ware pottery; particularly characteristic is the type Madison Cord-Impressed (Stoltman 1990)….*
>
> *Excavation of effigy mounds across southern Wisconsin has shown that these mounds often cover remains of the dead. Human burials were typically positioned in the heart-lung area or head of the effigy. Some mound burials were secondary bundles, but primary flexed interments are more common…. These were placed on a prepared mound floor or in a shallow pit. Associated artifacts are unimpressive and rare. Most mounds contain one to four individuals in one or two interment episodes. Many mounds also contain one or more stone or earth "altars" that often exhibit evidence of burning. Usually these were positioned a few inches above the mound floor, apparently after a layer of soil was deposited (Rowe 1956).*
>
> *Upon completion, an effigy probably held additional importance to the builders, the shape presumably reinforcing family or clan affiliations…. Mound group cemeteries probably were used by societies for decades if not centuries… and may have served as a method to mark territories or signal control over resource zones….*

Effigy mounds in groups with linear and conical mounds are recorded in Wisconsin and the nearby corners of Iowa, Minnesota, and Illinois. These mounds were mapped early in the Euroamerican settlement of the region by the Smithsonian (Squier and Davis 1848) and Increase Lapham in Wisconsin (1855), with excavations conducted chiefly by the Milwaukee Public Museum from 1917 to 1932 (Barrett and Hawkes 1919; McKern 1928, 1930; Rowe 1956), and discussed in depth by Rowe (1956) and Mallam (1976). Stoltman and Christensen (2000:501–504) reviewed some of the evidence from the excavations. They tabulated results that indicated no human remains were found in 40% of the 186 mound excavations done by Barrett and McKern, though previous looting and decomposition probably accounted for their absence in at least some of the mounds. Of 112 mounds with human burials, 82 (73%) had a single grave, though sometimes with more than one individual. The remaining 30 mounds (27%) had more than one grave, again with one or more individuals, though almost always fewer than five individuals per grave. There were three mass graves: Mound 1 at Kratz Creek, with a mass bundle burial of 45 individuals (Barrett and Hawkes 1919:35–45); Mound 66 at Raisbeck, with a mass bundle burial of 35 individuals (Rowe 1956:41–42); and Mound 28 at McClaughry I, with two superimposed graves, one with 11 bundle burials overlain by a grave with four bundle and

three primary flexed interments (McKern 1928:345–349). Stoltman and Christensen summarized the results of the mound excavation studies: secondary bundle burial was preferred (197 of 305 individuals, or 64%); primary flexed burials accounted for 63 of 305 individuals, or 21%; and the remaining 45 burials (15%) were indeterminate in form due to decomposition or disturbance. Large beds of ash found at Kratz Creek suggested that cremation might have been common there (Barrett and Hawkes 1919:24).

Stoltman and Christensen (2000:503) also summarized the placement of burials within the mounds, observing that burials were distributed about equally among three options: on surfaces within accretional mounds (therefore in mound fill); on mound floors; and in pits beneath the mounds. Stoltman and Christensen (2000:503) also note that

> *Topsoil stripping beneath the mound, excavation of subfloor pits, and covering the interments with earth were usually the most labor-intensive activities associated with mound construction. No elaborately constructed tombs were noted, although earthen and stone hearths (the latter usually referred to as "altars") and clay-and-stone-lined cists were common features on mound floors as well as on within-mound surfaces. The preparation of ritual or sacrificial fires, usually denoted by the presence of burned animal bone, was clearly an integral part of effigy mound burial ceremonies associated with the construction of the mounds.*

At Kratz Creek, Barrett and Hawkes (1919) documented a more complex sequence of mound construction starting with an intaglio of the prospective mound, then filling with layers of different-colored soils.

Grave goods with burials were reported to be uncommon and were usually mundane items rather than special burial goods (Stoltman and Christensen 2000:503). Stoltman and Christensen (2000:504) also note that artifacts were generally scarce in the mound fill, suggesting that the habitation sites were not close by. One exception was at the Sanders I site, where Hurley (1975:189–202) excavated a series of pits, house floors, post molds, and other residential features near an effigy mound site. But otherwise, "most mound groups, it would seem, were situated on 'sacred ground' reserved primarily for mortuary activities" (Stoltman and Christensen 2000:504).

Effigy mounds have been interpreted as clan symbols (Stoltman and Christensen 2000:504), most recently by Hall (1993), who found matches with Ho-Chunk clans and effigy shapes, particularly when panther mounds and long-tailed effigies are grouped as the Underground Water Panther or Water Spirit of the "lower world," with the birds belonging to the "upper world." Clark Mallam (1976) discussed mounds as more than burial places—as "integrative mechanisms" for dispersed hunter-gatherer communities that congregated periodically at the effigy mound sites. In 1982 he broadened this interpretation to see them as "metaphorical expressions that stress the idealized state between nature and culture-harmony and balance" (Mallam 1982:60). Hall (1993:51) says, "Effigy mounds were monumental expressions of the cosmology of their builders."

In their original draft context, Dobbs and Anfinson (1990:165) note: "Oneota groups also buried their dead in effigy mounds (Maxwell 1950) and there is not a straightforward correlation between the presence of effigy mounds and Late Woodland groups." This statement from the original context is probably a result of the Oneota pottery found in an effigy mound at the Diamond Bluff site (47PI2) in the Red Wing area (Rodell 1997). This does not appear to be a typical practice, and the Red Wing area might be one of the places where we are seeing a transition between cultures and traditions.

9.8 Social, Economic, and Political Organization

It is likely that at least some groups within this context were band-level societies that during the Late Woodland period increased in cultural complexity and developed into Oneota cultures. According to Theler and Boszhardt (2000:289),

> *Research in the Bad Axe River drainage of southwestern Wisconsin's Driftless Area has produced new data on settlement and subsistence patterns at the end of the Late Woodland "Effigy Mound culture." The inferred changes include a move to year-round occupation of small, interior valleys, corresponding to a regional population increase. Smaller valleys such as the Bad Axe are notable for their effigy-only mound groups that seem to characterize the end of the Effigy Mound culture. It is suggested that, with regional population increases, there were shifts in technology, particularly the adoption of the bow and arrow; an investment in*

> *maize horticulture; a transition from bands to tribes; and interaction with the Mississippian culture area to the south. Many small, interior valleys of southwestern Wisconsin, capable of supporting residential groups, were filled and defended. The flexible annual subsistence round of earlier centuries was broken, and within decades, incipient tribes would abandon the Driftless Area and nucleate at agricultural centers at Red Wing and Apple River as the Oneota.*

Based on the shared similarities in ceramics and effigy mounds, Minnesota peoples were in contact with people in Wisconsin and Iowa, though this area of interaction might not have extended too far west, and appears to have been concentrated along river systems, presumably the travel and trade routes.

Because it is otherwise difficult to tie effigy mounds to specific habitation sites and cultural complexes, Stoltman (e.g., Stoltman and Christensen 2000:505) has argued for a generally accepted connection between Madison Cord Impressed ceramics and effigy mound construction, with Madison ware ceramics being sufficient to make an Eastman phase attribution..

Boszhardt and Goetz (2000), in defining the Lewis phase as distinct from the Eastman phase, document significant environmental and Late Woodland attributes that differ on either side of the "no man's land" or buffer zone of the Coon Creek valley. The Mississippi River trench narrows between La Crosse and Prairie du Chien as the bedrock changes from softer sandstone to more erosion-resistant dolomite. The narrower river is the ideal habitat for large mussel beds that Woodland peoples exploited heavily in the Prairie du Chien area. In contrast, there are no precontact mussel shell middens north of Coon Creek. Besides geographic differences, Boszhardt and Goetz argue that there is a cultural boundary based on mound shapes and material culture. Effigy mounds south of the river are typically birds, some with split tails, and quadrupeds with either short or no tails; to the north, they are predominantly quadrupeds with long-tails, and single-tailed birds. Ceramics south of the river include only Madison ware, while north of the river they include both Madison ware and Angelo Punctated. Triangular points south of the Bad Axe River are chert triangular and small side-notched forms. North of the Bad Axe, the points are mostly unnotched, many of them serrated and made of orthoquartzite.

9.9 Cultural Relationships

Regional interaction during the Late Woodland is suggested by the widespread distribution of similar cord impressed ceramics, the introduction of maize, and construction of mounds. In Iowa, the Keyes phase is marked by manufacture of Madison ware ceramics and association with the Effigy Mound culture (Benn and Green 2000). In Wisconsin, the comparable manifestation are the Eastman and Lewis phases, as described above (Boszhardt and Goetz 2000; Stoltman and Christensen 2000).

However, there are reasons to expect that Minnesota's Late Woodland might be different from Late Woodland manifestations in other states such as Wisconsin. This time period is quite visible archaeologically in other regions, with Madison ware ceramics and small triangular points widely distributed along with effigy and other burial mounds. As mentioned in the section on subsistence, Theler and Boszhardt (2006) have interpreted this distribution as representing "packing" of the landscape, with all available areas of the landscape populated. In Minnesota, however, these ceramics and lithics do not seem as abundant, and presumably the population density they represent was not as high. Thus, Minnesota Late Woodland peoples might not have experienced the "collapse" that Theler and Boszhardt postulate for southwestern Wisconsin populations. Instead there may have been some alternative processes, including those marking the transition to Oneota.

There is only limited evidence of interregional exchange of material objects, though there might be movement of ideas and people. Copper, galena, and Hixton silicified sandstone are the most common imported materials at Effigy Mound sites in Wisconsin, but none of these material are common, and galena and Hixton are both available in the Driftless Area and were probably "circulated via such intracultural exchange mechanisms as gift-giving, bride price, and barter" (Stoltman and Christensen 2000:512).

9.10 Demography and Settlement

Dobbs and Anfinson (1990:163) note that the distribution of southeast Minnesota Late Woodland sites is poorly known, and also that sites within floodplains might be buried and not readily detectable. Thus, little is known in Minnesota of settlement patterns or demography. There may be parallels from adjoining regions, but there are also likely to be significant differences because southern Minnesota spans multiple environmental regions.

In the Eastman phase of Wisconsin, for example, there is evidence of increased population; however, it is unclear whether this is directly comparable to Minnesota. In Wisconsin, evidence of the Eastman phase, or at least Madison Cord Impressed pottery, is found at more sites than evidence of previous phases, and for the first time there is evidence of occupation on ridge tops, not just floodplains, terraces, and interior valleys and coulees. The distribution of sites throughout multiple landscape settings suggests a continued pattern of seasonal movement of people, but with increased population density leading to occupation of some areas year-round (Theler and Boszhardt 2003:138, 2006). Some differences with the previous cultures are apparent. One deals with the pattern of mussel exploitation, with Eastman phase people harvesting large quantities of mussels on the floodplain, but apparently bringing the meat (dried?) back to their base camps (although none of these base camps has yet been identified). The riverine shell middens are extensive but have few artifacts other than fire-cracked rock and charcoal, suggesting that people were not staying there long, even though they were intensively exploiting the riverine resources (Stoltman and Christensen 2000).

Little is known so far about structures at the Late Woodland sites. The Nelson site (21BE24) has postholes in a partial oval shape suggesting wigwam-like structures (Scullin 1992). The Statz site (47DA642) in southeastern Wisconsin (Meinholz and Kolb 1997) has six semisubterranean keyhole structures, along with 87 pits. The Statz site appears to incorporate two separate communities, based on the presence of Aztalan collared ceramics and maize in one cluster of houses but not in the other. Both clusters have uncollared ceramics, including Madison wares, and radiocarbon dates from A.D. 700 to 1000; the cluster with collared ceramics might have been the only area occupied after A.D. 1000 (Stoltman and Christensen 2000:514).

9.11 Principal Sites and Property Types

Principal Sites

The following Minnesota sites are from Anfinson (1979a), Dobbs and Anfinson (1990:165–166), and other sources. Many of the mound sites are poorly dated, and their attribution to a specific complex should be considered preliminary.

21BE24	Nelson (Late Woodland with corn)
21DK1	Sorg (multicomponent stratified; Havana-related and Late Woodland)
21DK2	Lee Mill Cave (Havana-related, Late Woodland, and Blue Earth ceramics)
21DK3	Hamm (Havana-related and Late Woodland ceramics)
21DK6	Bremer (type site; Havana-related and Late Woodland ceramics; habitation site, possibly associated with 21DK5 Bremer Mound)
21DK16	Silk (mounds)
21DK19	Bluff Mounds (mounds)
21FL3	Tudahl (Havana-related and Late Woodland)
21FL48	Theobald (habitation; Madison ware ceramics)
21GD16	A. P. Anderson Park Mounds (mounds)
21GD17	Silvernale Mound Group/Industrial Park Mounds (overlaps W/21GD3; mounds)
21GD38	Serpentine Mounds II (mounds)
21GD59	NSP #2 (Early and Late Woodland; habitation and mounds)
21HU11	Hokah (mounds)
21HU13	La Crescent (mounds)

21HU15	Hein Mounds (mounds)
21NL140	Minnemishinona Falls (single-component Late Woodland; habitation)
21SB23	Clear Lake (habitation)
21SC1	Huber (mounds)
21SC16	Prior Lake (mounds)
21WA3	Sheffield Habitation (part of 21WA13; habitation)
21WA4	McKee (habitation)
21WA5	Leslie Cave (habitation)
21WA22	Harvey Rock Shelter (Havana-related and Late Woodland)
21WB15	Kellogg (mounds)
21WB21	Robinson Lake (mounds)
21WB23	Cook Valley (mounds)
21WB56	King Coulee (Late Archaic, Havana-related, Late Woodland, Oneota)
21WN2	Volkart (mounds)
21WN5	(no name) (mounds)
21WN7	(no name) (mounds)
21WN10	(no name) (mounds)

Property Types

Based on the existing literature, the following property types should exist for the Southeast Minnesota Late Woodland complex:

Habitation sites: These will be the most common sites. It is likely that larger sites were associated with periods of group gatherings and mound building, and smaller sites were occupied during the rest of the year. However there is insufficient information at this time to make these distinctions. Habitation sites include rockshelters (such as Leslie Cave, 21WA5, and Harvey Rockshelter, 21WA22) as well as open-air sites (such as Minnemishinona Falls, 21NL140).

Resource procurement and processing sites: With the limited excavation data available, no such sites can be reliably identified at present in Minnesota, but they should exist. Based on work in adjacent states, these might include shell middens at mussel-processing sites.

Special-use sites: These sites could encompass a range of special activities, most of which have not yet been defined, including rock art.

Mortuary–mounds: Effigy and other mound burials are a characteristic feature of this context; an example is Prior Lake (21SC16), which had the only excavated effigy mound in Minnesota.

Mortuary–nonmound: No nonmound burials have been definitely associated with this complex.

9.12 Major Research Questions for the Southeast Minnesota Late Woodland Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Southeast Minnesota Late Woodland complex:

Defining the complex. Major research questions center on defining the context as something coherent, rather than as the time between two other cultures (Havana and Oneota). The relationship between effigy mounds and cord-impressed ceramics also needs to be clarified. Understanding this period and context is critical for understanding the transition to agricultural systems in the region. But what do these cultures look like in Minnesota? Is there a tight association between Madison ware ceramics and effigy mounds? How widely are these ceramics distributed, and are they part of components associated with other artifacts and ecofacts, or are they added as minor elements of components that can be assigned to other complexes?

Chronology. Dates on materials in tight association with both diagnostic ceramics and individual mounds are necessary to evaluate the development of the culture and the period of mound construction, particularly effigy mounds. Direct dating of corn from the Nelson site (21BE24) would provide information on the period of introduction of cultigens.

Regional distribution of ceramics. Ceramics with single cords used as decoration over a cord-roughened surface are found across central and southern Minnesota, but the ceramics are not coded as such in the SHPO database and cannot be readily separated except by examination of the ceramics themselves. Detailed ceramic studies are needed for Late Woodland sites in Minnesota. The full range of ceramic types in southern Minnesota Late Woodland sites should be evaluated, along with a consideration of how they compare to series defined elsewhere in the Midwest. Because of the presence of a geographic reference in the complex name, archaeologists are likely to have identified this complex for the SHPO/OSA database only for sites in southeastern Minnesota, although the ceramics and other aspects of the complex might be found further west and north. Dobbs and Anfinson (1990:164) argue that, based on typical assemblages in Wisconsin and Iowa, "There are a number of ceramic 'types' that should be present in Minnesota. These include the Lane Farm, Madison, and Minott Cord Impressed series (see Baerreis 1953; Hurley 1975; Logan 1976; Benn 1978, 1979, 1980)." Are these types present? How do they fit within the total ceramic assemblage? Can these types be distinguished from other defined types? This is especially true in the case of Nininger Cordwrapped Stick Impressed and Madison Plain. Besides refining the definitions of existing types, older collections need to be reexamined to update typological information and interpretations. What kinds of regional interaction are evident beyond the broad similarities in ceramics?

Settlement and subsistence models. The draft context (Dobbs and Anfinson 1990:166–167) notes:

> *So little is known about Late Woodland in Minnesota that even the most basic information is crucial at this time. However, since there are models in place for Late Woodland in Wisconsin and Iowa, one fruitful approach will be to take these models and test them in Minnesota. Thus, rather than simply looking for Late Woodland sites, it might be useful to take Theler's (1987) model of subsistence and settlement, and structure surveys to test this model. Similarly, it would be helpful to conduct detailed quantitative analyses of existing collections of Late Woodland ceramics to see how these fit within the broader sequences developed by workers in other states.*

Theler and Boszhardt's (2006) more recent interpretations of Late Woodland subsistence and settlement, population increase, and resource and population collapse offer particularly useful insights for evaluating Late Woodland in nearby regions.

10 THE BLACKDUCK-KATHIO COMPLEX (Late [Terminal] Woodland in Northern and Central Minnesota, A.D. 600–1100) AND THE RAINY RIVER LATE WOODLAND COMPLEX (Late [Terminal] Woodland in Northern Minnesota, A.D. 1100–1400)

10.1 Introduction and Overview

Blackduck ceramics mark the most commonly reported component in northern Minnesota, particularly in the Rainy River area, with at least 326 sites in the SHPO/OSA database coded as having a Blackduck component. Variations in ceramics within Blackduck, including cord-marked or fabric-impressed body treatment, and differences in manufacturing technique and decorative motifs are associated with major variations in temporal and spatial distribution and resource utilization. These differences within sites with "Blackduck" ceramics have been used as the basis for splitting Blackduck into two cultural complexes:

- **Blackduck-Kathio (BDK)** (Anfinson 2006): includes Blackduck, Kathio, and Clam River ceramics; encompasses Early Blackduck (Lugenbeal 1976) and Blackduck Configuration (Thomas and Mather 1996b:5.17)
- **Rainy River Late Woodland (RRLW)** (Anfinson 2006): includes Late Blackduck, Selkirk, and Duck Bay ceramics; approximates Late Blackduck (Lugenbeal 1976) and Rainy River Composite (Lenius and Olinyk 1990)

Despite the abundance of sites with Blackduck sherds, there are surprisingly few single-component sites or sites with extensive excavation, and thus information on many facets of these contexts is somewhat limited. In the archaeological literature it is often difficult to separate BDK and RRLW without reexamination of the pottery; in the SHPO database, separating them is impossible. Thus, both are discussed together here, with sites attributed to the appropriate complex where possible.

Although these two complexes should be separated when additional information is available, they share a number of traits, including distribution of numerous sites in northern Minnesota and Manitoba, with the site size and density suggesting a population increase over earlier complexes. Both mounds and habitation sites are known. Ceramics include a range of Blackduck, Kathio, and related types, with no clear typologies established. Lithics include both notched and unnotched triangular points, presumably for the bow and arrow, as well as bone harpoons and points, awls, flakers, and ornaments. Copper fishhooks, gorges, awls, and beads are also reported. Subsistence is not well known but includes sites showing exploitation of resources such as sturgeon, as well as a diverse array of fish, large and small mammals, and some birds. Sites on the western edge of the distribution on the Plains margins show use of bison, with evidence for both communal and smaller group hunts. Although wild rice has been assumed to be important, there is very little direct evidence of its use by BDK or RRLW peoples in the form of either wild rice grains or specialized ricing features. This lack might be due in part to the limited amount of fine-scale recovery undertaken at any of the sites and the difficulty of separating precontact from historic wild ricing features. There is even some evidence for limited use of maize, though perhaps obtained as a trade item. Mounds are known but might have been constructed early in the development of the complexes, with the later burials intrusive into older mounds or placed in cemeteries. A settlement pattern is suggested, reflecting seasonal movement for subsistence and possibly ceremonial mortuary activities associated with mounds. Later sites with Blackduck ceramics have been tentatively linked to historic tribes, though specific attributions remain controversial.

10.2 Environmental Setting and Geographic Distribution

The preponderance of Blackduck and Kathio sites are found in the mixed conifer-hardwood forests, though they also extend south into the deciduous forests and west onto the prairies and Plains margins. The SHPO/OSA database identifies 326 sites with Blackduck ceramics but does not distinguish between Early and Late Blackduck; thus, the BDK and RRLW complexes are lumped (Figure 16). The BDK complex also includes sites with Kathio and Clam River ceramics, and the RRLW incorporates Selkirk ceramics along with Blackduck.

Sites with Blackduck ceramics are found predominantly in the Laurentian Mixed Forest province of the Ecological Classification System (MnDNR–Division of Forestry 1999) (91% or 295 of 326 total identified sites). Within this province, 31% (101 sites) are in the Border Lakes and 35% (115 sites) are in the Chippewa Plains, and 10% (33 sites) are in the Pine Moraines and Outwash Plains, with the other sites scattered throughout the province. Three other provinces are represented: 3.7% of the sites (12 sites) are in the Eastern Broadleaf Forest province, in both the Anoka Sand Plain and Hardwood Hills subsections, 4.3% (14 sites) are in the Prairie Parkland province (predominantly in the Red River Valley subsection), and 1.5% (5 sites) are in the Aspen Parklands. It appears that these sites are more strongly associated with lakes than with rivers. This is especially true in the north, but also in the south. The only place there seems to be a strong association with rivers is the Red River Valley, where there are no lakes.

Minnesota Blackduck sites are found in the same SHPO archaeological regions (Anfinson 1990) as Laurel complex sites–Central Lakes Coniferous (51%, 167 sites) and Border Lakes (31%, 99 sites), but they also are found more abundantly in the Central Lakes Deciduous region (7%, 23 sites); they also occur in the Red River Valley (5%, 16 sites), Northern Bog (3.4%, 11 sites), and Lake Superior (1 site) regions.

Graham (2005) and Lugenbeal (1976:78) describe the distribution of Blackduck ceramics in predominantly RRLW occupations in Canada, where sites occur in three different biomes: the aspen parkland of the lower Red River, Pembina, and Assiniboine river valleys; the grasslands of southwestern Manitoba; and the boreal forest of central Manitoba and northwestern Ontario, with outlier sites in the boreal forest of northeast Saskatchewan.

Blackduck ceramics show two concentrations of sites in Minnesota: in the Rainy River/Rainy Lake drainage, with sites such as Smith (21KC1), McKinstry (21KC2), and Hannaford (21KC25); and in the Mississippi River Headwaters south of the Northern Bogs, with sites such as Schocker (21BL1) and White Oak Point (21IC1). Beyond Minnesota, BDK and RRLW sites extend from northern Minnesota to southern Manitoba and southwestern Ontario, and east to northern Michigan, as at the Juntunen site on an island in the Straits of Mackinac. In Wisconsin, Blackduck is related to complexes such as Heins Creek and Clam River.

Sites with Kathio ceramics are concentrated in east central Minnesota and are generally identified south of the Blackduck sites. Kathio is best known from the Mille Lacs region. Of the 81 sites with a Kathio context recorded in the SHPO database, 58% (47 sites) are found in the Laurentian Mixed Forest province, primarily in the Mille Lacs Uplands subsection (42%, or 34 of the 47 sites in this province). Of the remaining Kathio sites, 30% (24) are in the Eastern Broadleaf Forest province (in the Chippewa Plains, Pine Moraines and Outwash Plains, St. Louis Moraines and St. Croix Moraine), and 12% (10 sites) are in the Prairie Parkland province (both Minnesota and Red River Prairies). These sites clearly have a more southerly distribution than the Blackduck sites and also seem to reflect a higher proportion of sites on rivers.

The Kathio distribution, as recorded in the SHPO database, is largely confined to the Central Lakes Coniferous and Central Lakes Deciduous archaeological regions, with two sites each in the Prairie Lake North and Red River South regions. One site in Prairie Lake South (21BW1, Synsteby Village and Mounds) might best be considered an outlier with only a possible Kathio component. Only 10 sites are recorded in the SHPO database as having Clam River ceramics, and they are all in the Central Lakes Deciduous East region, split between the Western Superior Uplands of the Laurentian Mixed Forest province, and the Minnesota and Northeast Iowa Morainal subsection of the Eastern Broadleaf Forest province.

There are only seven sites with Selkirk ceramics listed in the SHPO database, five of them in the Border Lakes archaeological region, and two in the Central Lakes Coniferous region. These are within the Laurentian Mixed Forest province, with six sites in the Northern Superior Uplands section, and one site in the Northern Minnesota Drift and Lake Plain section.

10.3 Past Research

Wilford (1937a, 1941) initially defined the Blackduck focus as part of the Headwaters Lake aspect based on University of Minnesota excavations at two sites in the Rainy River drainage that are considered type sites for Blackduck ware. One was Schocker (21BL1), which was a habitation site on Blackduck Lake and was the first

Blackduck site professionally excavated, in 1932 (Wilford 1937b). The second was Osufsen (21IC2), a burial mound site that was excavated in 1938 and is the type site for Blackduck burial practices (Wilford 1941, 1943b; 1945, 1955b). Between Wilford's 1945 first publication on the Blackduck focus and his 1955 *American Antiquity* article, four Blackduck habitation sites were excavated. Three were in the Mississippi Headwaters: White Oak Point Village (21IC1; Wilford 1959), Mitchell Dam (21BK1; Wilford 1954d), and the Scott site (21CA1; Cooper and Johnson 1964; Johnson 1964). The fourth was Nett Lake (21KC1), in the Rainy River region (Wilford 1953). Other sites with multicomponent occupations Wilford investigated included intrusive Blackduck burials into Smith Mound 4 (21KC3; Wilford 1937a, n.d.c), and the Mud Lake Mounds (21CA2; Wilford 1943a). McKinstry Mound 2 (21KC2; Wilford 1952a) provided information on Blackduck burials, with 95 skeletons.

Mound fill and stratigraphy suggested to Wilford a relatively late date for Blackduck, younger than the Laurel ceramics found in the Rainy River Aspect and as part of a regional distribution of late precontact cultures. Lugenbeal (1976) reanalyzed several large assemblages of ceramics, including from Schocker (over 9,000 sherds) and Osufsen mound, extracting some stratigraphic information not apparent during Wilford's analysis. Mitchell Dam (Wilford 1954d) and Scott (Cooper and Johnson 1964) had only limited excavations but provided information for Wilford and Lugenbeal on the relationship between Blackduck and later shell-tempered pottery such as Sandy Lake.

Lugenbeal (1976:68–89) notes that Wilford, as well as MacNeish (1958) and Vickers (1945), attributed many sites to Blackduck based strictly on burial mode; Blackduck pottery was rarely found directly with the burials, although it was present at the sites. In the 1950s and 1960s, Kenyon (1960, 1961, 1970) identified a number of sites in the Rainy River area of Canada, including five burial mounds and two habitation sites. J. V. Wright (1967b) surveyed and tested relatively pure Blackduck components at a series of sites extending east to the north shore of Lake Superior. Wright (1971) also found sites in northern Manitoba in association with Selkirk pottery (thus relating it to Rainy River Late Woodland). Dawson (1974) surveyed Blackduck sites in the Lakehead and Lake Nipigon regions north of Lake Superior (Lugenbeal 1976:77), including the McCluskey and Martin Bird sites. Vickers (1945) identified a related Manitoba focus in Manitoba and Saskatchewan, based on mounds with burials in a sitting position and mortuary vessels similar to Wilford's (Lugenbeal 1976:76). In Michigan, McPherron (1967) reported Blackduck pottery from the Juntunen site in the Mackinac Straits. In Wisconsin, closely related Clam River pottery has been identified (McKern 1963).

More recently, major excavations have been conducted at village sites in the Rainy River drainage. At the Hannaford site (21KC25), Phase II and III excavations in 1992 in a Blackduck habitation site identified a series of stratified Blackduck occupations (Hohman-Caine and Goltz 1994b; Rapp et al. 1995), including both BDK and RRLW complexes. The nearby Smith village site (21KC3), which has both Laurel and Blackduck ceramics, has been excavated and analyzed by a number of archaeologists, including Jenks (1935), Wilford (1950b, 1952c), Lugenbeal (1976), and Stoltman (1973, 1974). The Long Sault site (DdKm1), located in Canada, in the Rainy River drainage several kilometers from McKinstry (Arthurs 1986), had a Blackduck occupation along with Archaic, Laurel, late precontact (RRLW), and historic components.

The McKinstry site mounds and village (21KC2) have been excavated a number of times, including at least five excavations prior to 1939 (described in Thomas 1996b:8.1–8.4), Wilford's excavation of Mounds 1 and 2 in 1939 (Stoltman 1973; Wilford 1950b, 1952a), Stoltman's excavations in 1970 (Stoltman 1973, 1974), MTHARS work in 1983–1985 (Peterson 1983; Peterson and Yourd 1984; Yourd 1985), DNR excavations at a Public Water Access point in 1986 (Emerson 1986), Mississippi Valley Archaeology Center coring in 1994 (Arzigian et al. 1994), and Loucks and Associates' major Phase III excavations in 1994 as part of a bridge replacement project (Thomas and Mather with contributors 1996). The site has Initial through Terminal Woodland occupations, including Laurel, Blackduck, and Rainy River Late Woodland components (Thomas and Mather 1996a). Specialized human osteology reports on human remains excavated by Wilford were presented by Torbenson, Aufderheide, and Johnson (1992), and Torbenson, Langsjoen, and Aufderheide (1996). Johnson and Ready (1992) reconstructed and examined clay funerary masks on Blackduck burials.

In addition to the Late Blackduck sites now attributed to the RRLW complex, additional sites with Selkirk (Meyer and Russell 1987), Duck Bay, and related ceramics have been reported, predominantly from the Rainy River drainage and

Manitoba. Lenius and Olinyk (1990) presented the arguments for splitting Early Blackduck from Late Blackduck and defining the Rainy River Composite. Hanna (1982, 1992) examined Duck Bay ceramics from Aschkibokahn (FbMb-1) in west-central Manitoba and hypothesized about trade and marriage networks. Finally, Graham (2005) at the University of Manitoba Natural Resources Institute prepared a thesis on Blackduck settlement patterns in southwestern Manitoba.

Outside of the Rainy River drainage, single-component BDK sites with extensive excavations include the Ponderosa III site (21CY39), which was excavated during several seasons from 1985 through 2002 (Michlovic 2005), providing a glimpse into adaptations to the prairie and bison hunting. The Stott site (D1MA-1) in southwestern Manitoba is a bison-hunting site (Badertscher et al. 1987). The Dead River site (21OT51; Michlovic 1979), excavated in 1976, is predominantly a BDK occupation but with Laurel, Brainerd, and possibly Middle Missouri components, with some horizontal separation.

Moving to central Minnesota, the Kathio designation as treated here refers to a ceramic series, not directly to the Kathio phase, which has been interpreted to include Onamia pottery (Ready and Anfinson 1979a) and therefore might extend somewhat earlier. The type site of the phase is Petaga Point (21ML11; Wilford 1955b:135–136). Kathio was initially designated by Wilford as a focus in the Mille Lacs Aspect (Wilford 1944). Most research into sites with Kathio ceramics has been done in the Mille Lacs area. Mather (2000) details the extensive history of research in that area. The University of Minnesota conducted extensive fieldwork at a series of sites in the Mille Lacs area, starting with Jenks and Wilford in 1933, through Leland Cooper, Guy Gibbon, and Elden Johnson in the 1960s and 1970s (e.g., Cooper 1965, 1967; Johnson 1984; Wilford 1937a). At least some reports have been prepared for the type site of Petaga Point (21ML11; Bleed 1969), Vineland Bay (21ML7; Dickenson 1968), and Old Shakopee Bridge (21ML20; Gibbon 1976). Whelan (1990) synthesized faunal and seasonality data from the Mille Lacs area. However, many of the sites have not been analyzed in detail, and information remains as field and lab notes and preliminary reports. Features and components are rarely identified by diagnostic artifacts, making interpretation of the rest of the assemblage difficult. More recent excavations have been conducted for Mn/DOT (Mather and contributors 2000) as part of the Lake Onamia–TH 169 Data Recovery Project.

10.4 Chronology

Calibrated radiocarbon dates that can be attributed to the BDK complex begin about A.D. 600 in both the Mississippi River Headwaters locality and the Rainy River/Rainy Lakes locality, and end at approximately A.D. 1000–1100 (Figure 17). The beginning date of A.D. 600 matches that cited by Goltz (1998) and is earlier than other estimates of A.D. 700 (Thomas and Mather 1996a; Lenius and Olinyk 1990:82–83;) or A.D. 800 (Benchley et al. 1997:135; Buchner et al. 1983; Dobbs and Anfinson 1990; Graham 2005:5; Lugenbeal 1979; Meyer and Hamilton 1994).

RRLW sites show radiocarbon dates that concentrate between A.D. 1100 and 1400 (Figure 17) but extend up to A.D. 1600 with calibrated 2-sigma ranges. This matches Lenius and Olinyk's argument that Rainy River Coalescent (including Blackduck, Duck Bay, and Bird Lake ceramics) continued until A.D. 1350, then collapsed back to the core areas in Winnipeg River and the Rainy River Drainage, where it might have persisted until A.D. 1650.

Kathio has been estimated to date to between A.D. 900 and 1300 based largely on the relative position of Kathio ceramics in the Mille Lacs sequence, and on comparative dating with other Late Woodland complexes such as Blackduck (Dobbs and Anfinson 1990:230). Only one Kathio radiocarbon date has been identified, a very late (A.D. 1560) date from Triangle Island (21KA29; Hendrickson 1984), associated with a Kathio–Clam River vessel.

10.5 Technology and Material Culture

Ceramics

There are no generally accepted ceramic typological schemes for Blackduck ceramics. The type sites for Blackduck ware are two sites excavated by Wilford in the 1930s, the Schocker habitation site (21BL1) and the Osufsen burial mound site (21IC2) (Lugenbeal 1979:23). The geographic and temporal variation evident in assemblages from Minnesota and Manitoba has led archaeologists to split them into Early and Late Blackduck. Anfinson (2006) has

proposed that the Blackduck-Kathio complex (as used in this MPDF) should include Early Blackduck ceramics along with Kathio and Clam River ceramics. Anfinson includes Late Blackduck ceramics within the Rainy River Late Woodland, along with Selkirk and Duck Bay ceramic types. Other researchers also have argued for a split in ceramics between Early and Late Blackduck (for example, Hohman-Caine and Goltz 1994a; Lenius and Olinyk 1990; Lugenbeal 1976, 1978a, 1979; Rapp et al. 1995; Thomas and Mather 1996b:5.17).

Blackduck ceramics are stylistically complex, exhibiting variation in time and space. The definition of Blackduck ware has been modified by many researchers, including Arthurs (1986) Carmichael (1977), Dawson (1974), Evans (1961a, 1961b, 1961d), Hlady (1970), Hohman-Caine and Goltz (1994a), Lenius and Olinyk (1990), Lugenbeal (1976, 1978a), MacNeish (1958), McPherron (1967), Meyer and Russell (1987), Syms (1977), Thomas (1996a), and Wright (1965). Unfortunately, there seems to have been little cross-referencing between researchers, and little consensus on typology. Lugenbeal and Arthurs both had some stratigraphic evidence, Lugenbeal's (1976, 1978a) from the Smith site, and Arthurs' (1986) from Long Sault, but otherwise most of these schemes are seriations or typologies based on differences in decorative motifs and techniques observed in mound-fill assemblages, assemblages from multiple sites over large regions, or mixed deposits, rather than well-stratified contexts.

Although specific types differ, there seems to be some agreement on the main attributes in a Blackduck assemblage. Thomas and Mather (1996b:5.17–5.18) define the Blackduck Configuration, which corresponds with the Blackduck part of the BDK complex:

> *What the Blackduck Configuration does consist of, as taken from the writings of Lenius and Olinyk (1990), is what has previously been identified as Early Blackduck (Evans 1961d; Lugenbeal 1976,1978a, 1979). Blackduck Configuration ceramics, following a modified version of Lenius and Olinyk, are characterized by the "classic" form of Blackduck. This form is a globular vessel with a constricted neck, rounded shoulders, an everted or flared rim, and a thickened or wedge-shaped lip. Surface treatment is usually cord-marking with decoration on the interior rim, lip, and exterior rim and neck, but not the exterior body. This decoration usually consists of cord-wrapped object impressions (CWOI) and deep, circular punctates. These elements are generally found arranged in a band of vertical to oblique CWOI around the upper rim just below the neck. Below this band are a series of horizontal rows of CWOI. Usually a row of superimposed, circular punctates forming interior bosses are found between the first and second rows of horizontal impressions. Below the horizontal rows is often a band of vertical to oblique linear punctates, often executed with the end of a cord-wrapped stick. The oblique-over-horizontal motif may be executed on a smooth surface or a brushed/combed surface. Sometimes the tool used in making the horizontal CWOI was dragged between impressions, also resulting in a brushed or combed surface appearance. The lips almost always are flat and decorated by oblique CWOI. The interior may have oblique to vertical CWOI around the rim below the lip, or horizontal brushing/combing placed over the bosses formed from the exterior punctates. Vessels are fairly thin-walled and appear to have been constructed by the slab method in which overlapping pieces of clay were pieced together, resulting in the common, lamina1 splitting of sherds*.

Lenius and Olinyk (1990:79) note that vertical brushing or combing, although "definitive of Blackduck," does not occur separate from one of their primary design elements such as oblique, horizontal, punctate, or stamp. Manufacturing techniques probably included a paddle and anvil or fabric mold, producing a cord-roughened body surface (Lenius and Olinyk 1990:79). Rapp et al. (1995) at Hannaford distinguished several different phases within both Early and Late Blackduck based on stylistic grounds, but such variations need to be further evaluated and refined in terms of stratigraphic relationships.

RRLW includes sherds with typical Late Blackduck traits such as "oblique and horizontal CWOI design elements, globular vessel form, and cord-marked or textile impressed bodies" (Lenius and Olinyk 1990:83). Few vessels have interior rim decoration or bosses, though some had punctations; banding and brushing were rare. Vessels tended to be more squat, with beveled-in lips (Lugenbeal 1979:28). In addition to Late Blackduck ceramics, RRLW includes Duck Bay and Selkirk ceramics, as well as other types known primarily from Manitoba. Lugenbeal (1978a:48-49) notes that fabric-marked surfaces are not found south of the Rainy River.

Stoltman, using information from the Hannaford site (Rapp et al. 1995), proposed a new seriation of changes within Blackduck ceramics based on Lugenbeal's trends and observed stratigraphic positions of different motifs and

elements. Thomas (1996a:10.45–10.48) summarizes Stoltman's proposed sequence as follows [complex attributions added]:

Early Blackduck (Transitional) ***[Blackduck-Kathio complex]***

- oblique-over-horizontal motif executed either in CWOI *[cordwrapped object impression]* or dentate stamping
- circular punctates with interior bosses
- interior oblique motif executed in CWOI or dentate stamping
- may or may not have flared lip
- corded surface treatment
- no exterior or interior combing
- high rim
- occasional exterior bossing
- no smoothed, undecorated neck bands

Middle Blackduck ***[Blackduck-Kathio complex]***

- exterior or interior combing
- oblique-over-horizontal motif executed in CWOI
- circular punctates with interior bosses
- flared lip
- various interior decoration on which the following subgroups are based

Middle Blackduck Subgroup A

> interior CWOI around rim

Middle Blackduck Subgroup B

> interior combing but no interior CWOI

Middle Blackduck Subgroup C

> no interior decoration

Early Late Blackduck ***[Rainy River Late Woodland complex]***

- oblique CWOI above circular punctates with interior bosses but no horizontal CWOI
- combed band below circular punctates
- linear stamp (fingernail-like) in columns on combed band and at base of band
- flared lip
- no interior decoration
- corded surface treatment

Late Late Blackduck ***[Rainy River Late Woodland complex]***

- oblique CWOI motif only
- smoothed band below oblique CWOI motif
- slash or knot linear stamping
- corded or fabric-impressed surface treatment
- flared lip
- no interior decoration
- low rim height
- possible combing

Lugenbeal (1979:26), after Evans (1961d), describes three categories of Blackduck vessels: large storage vessels with a conoidal or subconoidal base, more globular medium-sized cooking vessels, and small mortuary vessels; however, Lugenbeal also notes that the Smith site assemblage showed no decisive multimodality in orifice diameters, and gives a range of 5 cm to over 30 cm orifice diameter (1976:244). Temper is grit, often crushed granite (Lugenbeal 1979:26). Budak (1995) reports the reproduction of a Blackduck pot using a woven bag as support, suggesting one method of manufacture.

The addition of Kathio to the Early Blackduck assemblage to create this Blackduck-Kathio complex is based on similarities in ceramics. Ready and Anfinson (1979a:103–104) note:

> *Although there may indeed be certain ceramic differences between Kathio and Blackduck and even Kathio and Clam River (e.g. the lack of combing and the lack of a wedge lip in Kathio), the striking similarities argue against continuing to have three different ceramic series to describe short rim, fine-cordwrapped stick decorated Late Woodland ceramics in central Minnesota.... The relationship between this consolidated [Kathio and Clam River] ceramic series and early phase Blackduck is an intriguing problem for the future. It may be that all of these ceramics had their origins in an Onamia ancestor which spread throughout a number of different cultural complexes through intermarriage or other forms of social interchange.*

Kathio ceramics are "grit tempered cord marked globular vessels with expanding rims. There are no handles or lugs. Decoration is limited to the constricted neck and lip surface, the decorative mode is cordwrapped dowel, and the motifs are horizontal bands encircling the vessel and/or oblique impressions on the lip surface" (Dobbs and Anfinson 1990:230). Ready and Anfinson (1979a:103) note that there is no good definition of Kathio ceramics, and that some Kathio site attributions might have been applied by default at sites that had a general Late Woodland burial or other cultural attribute and were outside of the geographic areas where other cultures such as Blackduck or Lake Benton were considered to exist (Ready and Anfinson 1979a:103).

The Blackduck-Kathio complex ceramics show connections to other Late Woodland ceramic types. Lugenbeal (1979:24) notes connections between Blackduck pottery and other Late Woodland types, including Mackinac ware (northern Michigan), Heins Creek Cordwrapped Stick (the Door Peninsula, eastern Wisconsin), some types of Madison ware, and in Minnesota, the Kathio series and Clam River. Lugenbeal (1979:24) notes that early Blackduck wares show affinities with St. Croix Stamped and Onamia ceramics. He argues that Blackduck is not related to Sandy Lake and was probably replaced by Sandy Lake in the Headwaters Lakes region "at a fairly early date." Kathio and related ceramic series have a distribution from south-central Wisconsin west and northwest to southern Manitoba (Dobbs and Anfinson 1990:230).

Anfinson (2006) also includes Clam River ceramics within his definition of the Blackduck-Kathio complex, based on the similarity of vessel form and decorative techniques and stratigraphic position. George (1979a:67–68), citing McKern (1963) and Hohman-Caine (1969), describes Clam River pottery, with two type sites from Wisconsin: Clam Lake Mound (47BT1) and Spencer Lake Mound (47BT2), both excavated by McKern. Five nearly complete vessels have medium to fine grit, cordwrapped paddled exteriors, globular bodies with rounded shoulders, constricted necks, high and outcurving neck-rims, and unthickened to slightly thickened lips, sometimes rolled but more typically flattened or slightly rounded. Three varieties of decoration are described: plain-combed, cord-stamped, and twisted cord.

Selkirk ceramics are described by Anfinson (1979h: 231–234), who noted the close relationship with late phase Blackduck (Rainy River Late Woodland) and Sandy Lake ceramics but observed that there were no known sites in Minnesota. He cites MacNeish (1958) and Hlady (1970) for ceramics definitions and describes a number of ceramic types that are grit tempered, fabric impressed, globular to elongated vessels with flat lips and vertical to slightly outflaring rims, slightly constricted necks, rounded bodies, and round to conoidal bases. The types were defined by MacNeish (1958) based on his work in southeast Manitoba. Sturgeon Falls Fabric Impressed has lip or upper rim decoration with crisscrossed or oblique cordwrapped-stick impressions; sometimes there are elongated punctates on the neck. Alexander Fabric Impressed is characterized by lack of decoration and might be a late type. Sturgeon Punctate has punctates in one to three rows around the rim. Clearwater Lake Punctate, defined by Hlady (1970), has a

single line of punctates on the exterior rim that produce bosses on the interior, and is found commonly north of Lake Winnipeg.

Lithics

Projectile points include unnotched and notched triangular points (e.g., Evans 1961d; Hamilton et al. 1981:132; Lugenbeal 1979), and Prairie Side-Notched and Plains Side-Notched points (e.g., 21CY39; Michlovic 2005). At least the triangular points are probably for the bow and arrow. However, these stone tools are not necessarily diagnostic of Blackduck-Kathio, but are shared with other Late Woodland cultures. Besides points, Lugenbeal (1979:24) and Evans (1961d) list some other artifacts presumably associated with Blackduck pottery (from multicomponent sites): end scrapers, oval and lunate knives, side scrapers, trapezoidal end scrapers, oval end scrapers or thumbnail scrapers, tubular-shaped drills, and steatite and clay pipes (Lugenbeal 1979:24). George (1979a:67) adds sandstone shaft abraders associated with Clam River ceramics.

Hoppin and Mather (1996) examined changes in lithic technology through time at the McKinstry site (21KC2), spanning Laurel through RRLW complexes. They noted a decreasing use of hard-hammer percussion, slightly increasing use of platform preparation, and use of heat treatment, peaking with the Late Terminal Woodland (RRLW complex), and with none in the Early Terminal Woodland (Blackduck-Kathio complex). They noted (1996:12.19) that "Although the Early Terminal Woodland does not appear to share many of the technological attributes that are seen in the Initial Woodland, there are significant similarities in the percentages of flake debitage types and the raw materials utilized. In many respects the Early Terminal Woodland suggests commonality with both the Initial Woodland and the Middle to Late Terminal Woodland." They further note an increased reliance on local lithic raw materials from Middle and Late Terminal Woodland, contrasting this with the use of a wider range of exotic materials such as Knife River flint in the Initial Woodland. However, Late Terminal Woodland [RRLW] had the only Swan River chert and Red River chert tools (coming from west of McKinstry) (Hoppin and Mather 1996).

Hoppin and Mather also noted that the McKinstry lithic assemblage was dominated by modified flakes (making up 65% of the total tools from the site), with projectile points, scrapers, and bifaces being the main tools. Shen (1996) conducted a use-wear analysis of tools, and reported that cutting tools were particularly common in the Blackduck component, making up 53% of the 32 flakes in the Blackduck component; wood and bone-working activities were suggested for Blackduck (the different subdivisions within Blackduck were not tabulated separately).

Most Blackduck sites are multicomponent, making identification and analysis of non-diagnostic artifacts difficult, since they need to be definitively associated with a specific component. The single-component Blackduck site (21CY39) excavated by Michlovic (2005) provides some insight into lithic technology. Unlike at some other sites such as McKinstry, cores and core-reduction flakes and shatter at 21CY39 suggested that lithic procurement and tool manufacture were both conducted at the site, and the collection of tools suggests a curated assemblage rather than predominantly expedient tools. Both local and exotic raw materials were used, including Knife River flint and Grand Meadows chert. Tools reflect bison-hunting and -processing activities and include nine projectile points and fragments, described as Prairie Side-Notched and Plains Side-Notched; seven bifaces and fragments; eight scrapers and fragments; one spokeshave; two gravers; one awl; and one utilized flake. The points from 21CY39 show closer connections to the Prairie and Plains Side-Notched points found on the northern Plains, rather than to tools from the Smith site or White Oak Point, and might suggest connections of some sort to the northern Plains (Michlovic 2005:80).

Worked Bone, Antler, and Shell

Lugenbeal (1979:24) cites Evans's (1961d) list of artifacts associated with Blackduck ceramics, although as noted above with lithic artifacts, these materials come from multicomponent sites, so their connection with Blackduck is not certain. Worked bone artifacts include bone awls or needles, unilaterally barbed harpoons made of mammal bones, flakers, bone spatulas, cut beaver incisors, and bear canine ornaments. The unilaterally barbed harpoons might be considered diagnostic nonceramic artifacts, based on stratigraphy at the Smith site (21KC3; Lugenbeal 1979:26). Dobbs and Anfinson (1990:230) list deer ulna awls with Kathio. Rapp et al. (1995:263) note that at the Hannaford site, bone harpoons and points are the most common bone tools.

McKinstry (21KC2; Morey et al. 1996) had a barbless harpoon head and an antler flaking tool from the Early Terminal Woodland component, and a pointed bone tool, bone tubes, two modified turtle shells, and an incised bone from the Middle Terminal Woodland component. Morey et al. (1996:15.41) note that unilaterally barbed harpoons "appear to be primarily associated with Terminal Woodland occupations in the general project area" and list specimens from McKinstry Mound 2, Pike Bay Mound (21SL1; Webster 1973:106), Hannaford (21KC25; Rapp et al. 1995:229), and Long Sault (DlMa-1; Arthurs 1986:219). Morey et al. (1996:15.44) also mention that the Phase III collection from McKinstry does not appear to suggest local manufacture of bone tools at this site. Use-wear analysis on stone tools suggestive of bone working were attributed to butchering activities.

Other Artifacts

Lugenbeal (1979:24) and Evans (1961d) include clay or steatite pipes, awls and copper fishhooks, native copper gorges, and beads as part of Blackduck assemblages. George (1979a:67) lists "birch bark containers composed of three pieces of bark" as well as red ocher in graves for components with Kathio ceramics. A copper awl was reported from Hannaford (Rapp et al. 1995:265).

10.6 Subsistence

Mulholland (2000:5) summarizes the current state of knowledge regarding BDK subsistence:

> *Blackduck subsistence is not well defined, partly a result of few habitation excavations and/or poor recovery techniques. Seasonal exploitation of flora and fauna is assumed as part of a continuing collecting strategy of a diffuse economy (Johnson et al 1977; Johnson 1979). The Dead River site in Otter Tail County is interpreted as a generalized hunting camp at which fishing was significant (Michlovic 1979). Wild rice is also thought to form an important part of the subsistence base, based primarily on site location (Johnson 1969[a]; Johnson 1979). However, poor or mixed stratigraphy between Sandy Lake and Blackduck occupations obscure the degree to which Blackduck use of wild rice can be seen (Lugenbeal 1979:28). Increased populations are proposed for the transition to and during the early part of the Terminal Woodland, A.D. 500-1050 (Gibbon and [Hohman-]Caine 1980). However, the timing of population increase and wild rice use is not sufficiently known.*

Only a few records exist for BDK or RRLW subsistence remains that came from excavations of unmixed habitation deposits, reflect adequate recovery techniques, and were analyzed completely. The Phase III excavations at McKinstry (Morey et al. 1996) and Hannaford (Rapp et al. 1995) are examples, and these reports both acknowledge unresolved issues with taxonomy and taphonomy (particularly in the case of sturgeon), sample sizes, and mixing of deposits that makes broader interpretations difficult. A variety of animal resources are suggested to have been exploited, perhaps at camps occupied seasonally for a portion of the annual round, focused on specific resources available at those times and places. A repeatedly revisited site location, however, might have been occupied during different seasons, or to exploit different resources. The resulting archaeological record would show variation in subsistence patterns reflecting either broader changes through time or changes in the seasons in which particular occupation deposits were formed.

Faunal Resources

There is evidence at Blackduck sites for a variety of fishing and hunting activities: spring spearing of sturgeon; later summer fishing for suckers and other species; exploitation of riverine small mammals such as beaver; and hunting of large mammals such as deer, elk, moose, and bison. Hannaford (Rapp et al. 1995) is suggested to have been a seasonal fishing and hunting camp throughout its Blackduck sequence. The Early Blackduck component at Hannaford showed a May and June occupation dominated by spawning sturgeon that could have been speared with the barbed bone harpoons found in the deposits (Rapp et al. 1995:197). Northern pike, bullheads, walleye, and suckers also were found. The Middle/Late Blackduck component had primarily suckers, which might have been taken with gill nets. In both deposits, the mammals were predominantly riverine species, including beaver, muskrat, otter, and mink. Deer were present but in lower quantities, as were moose and elk. There were a few ducks. Most elements were present, suggesting use of entire animals rather than specific portions (Rapp et al. 1995:195). Much of the bone in several zones was burned; however, the burned bone was not tabulated to class, introducing some bias to the data.

Morey et al. (1996:15.3) examined the McKinstry materials and other site faunal analyses for comparison and discussed many taxonomic, taphonomic, and other considerations, particularly with respect to the analysis of sturgeon.

They regrouped and presented Lugenbeal's (1976) analysis of the Smith site fauna, showing variations in the relative proportions of fish versus mammal bones. Lugenbeal argued that fishing was important, but that the site cannot be considered exclusively a spring sturgeon encampment (1976:369–376). Morey et al. (1996:15.6) noted that some apparent trends in the data might reflect methods of recovery and analysis, particularly the absence of screening. Sturgeon bones are the most readily identifiable and might bias the results of analyses in which all specimens were not systematically identified. At McKinstry (Morey et al. 1996), the early Terminal Woodland component (BDK) had only 63 elements and was excluded from their discussion of overall trends (1996:15.31). Sturgeon was most common in the Initial Woodland component. Suckers were the most common fish in the Middle Terminal component, and beaver increased to become the most abundant species in the Late Terminal component, although suckers were still present. However, Morey et al. point out that such comparisons must be made with caution, given the taphonomic and taxonomic problems.

Even outside the Rainy River drainage and the Mississippi Headwaters, fishing was important. Michlovic (1979:34) reports fish and turtle bones and probable deer found directly associated with Blackduck ceramics from the Dead River site (21OT51). This site lies near the western edge of Blackduck distribution, in the Central Lakes Deciduous West archaeological region.

At sites near the prairie and Great Plains margin, there is evidence for the exploitation of bison. The Stott site (D1MA-1) in Manitoba is a bison-hunting site representing a large-scale bison hunt with a driveline and mass kill (Badertscher 1987:315; Hamilton et al. 1981; Michlovic 2005:63). A single-component Blackduck site (21CY39; Michlovic 2005) on a beach ridge of Glacial Lake Agassiz was a bison-processing camp. Michlovic (2005:79) describes it as an extensive scatter reflecting repeated limited-duration visits by Blackduck peoples to process bison, including marrow extraction. However, the elements indicate selective transport of elements. The lack of skull, vertebral, and pelvic bones argues against this being a kill site. At least four bison are represented, and fetal bones suggest a late winter/early spring hunt. Warm-season or summer indicators include turtle and mussel shells. The only feature found was a concentration of bison-bone debris. Michlovic draws a sharp contrast between 21CY39 and Stott, arguing for use by small groups rather than larger communal hunting groups.

Michlovic (2005:81–82) also discusses bison hunting and Blackduck, suggesting that there might have been variability in the practice:

> *Meyer and Hamilton (1994:122) suggest that Blackduck groups penetrated more deeply onto the Plains than their Laurel predecessors. Reeves (1989:173) argues that one of the important features of the successful use of the northern Plains was the communal hunt. If these two claims are correct, it may be that the social organization of Blackduck peoples allowed their success on the prairie, where they had the organizational skills to make full use of the bison herds. Furthermore, the enormous forage production of the northeastern Plains would have encouraged larger, more stable bison herds (Bamforth 1988:185; Gordon 1979:43). This dependable resource would have been a major attraction for properly equipped and organized hunters able to take advantage of a highly desirable resource such as bison. However, it is not necessary to assume bison use was everywhere the same. Communal hunts were clearly used in some areas. In others, perhaps smaller groups may have culled herds for a few animals at a time. 21CY39 may be one of those locations. The behavioral variability reflected in the lithic and ceramic collection, the maize phytoliths, and even the presence of a small storage facility (feature 2) indicate that there was more to the activities of Blackduck peoples at these logistical camps than bison processing.*

In the Mille Lacs area, the Crace site (21ML3; Gibbon 1975b) produced hundreds of black bear mandible fragments in a midden deposit with Clam River ceramics. These might represent food or a part of ceremonialism associated with black bears, as discussed in Section 10.7.

Floral Resources

There is very little direct evidence for BDK or RRLW use of plant foods in the form of preserved non-wood floral remains found in tight archaeological context with diagnostic artifacts. Two sites provide some evidence for the use of wild rice. At the Big Rice Site (21SL163; Valppu and Rapp 2000), two wild rice grains were AMS dated to AD 894–1410 (maximum range with 1-sigma intercept), suggesting that they belong to the Terminal Woodland occupation of

the site, although the feature contained both Blackduck and Laurel pottery. AMS dates on wild rice grains from three other features associated with the Laurel component at the site range (calibrated 1 intercept) from B.C. 35 to A.D. 229. At McKinstry (21KC2), several wild rice grains were found in Middle Terminal and Late Terminal Woodland strata (Valppu 1996), though not in features or directly associated with diagnostic artifacts. Wild rice grains also have been reported from a predominantly Kathio/Clam River site (Triangle Island, 21KA29; Hendrickson 1984); however, the one radiocarbon date is very late (A.D. 1560).

For 21CY39, Michlovic (2005:62) reports that Thompson identified maize phytoliths from residues on the interiors of two ceramic vessels. The phytoliths most closely resemble the type described today as Mandan corn. Michlovic did not think the site inhabitants had grown the maize, and suggested it might have been obtained in trade with farming communities, perhaps near one of the lithic sources represented, such as Knife River flint or Grand Meadow chert.

In addition to the few wild rice grains and maize phytoliths, a firepit within a Clam River house at the Winter site (21PN17) had acorns (Johnson 1993:56). Otherwise, almost no subsistence plant resources have been documented from well-dated components. This does not mean that Blackduck people ate no plants. It means that either contexts with those remains have not yet been discovered, or recovery methods (particularly flotation sampling) have not been sufficient to recover and identify the remains.

Archaeologists (e.g., Dobbs and Anfinson 1990:230) have frequently written of the "intensifying" use of wild rice as if this conclusion were well established. Instead, it is largely hypothetical and circumstantial, apparently based on site locations in likely ricing areas, the presumed availability of wild rice, and the assumption that if wild rice was available, it would have been consumed. Yet, there must have been a significant period of time when people camped near wild rice beds before discovering the food value or developing the harvesting/processing/cooking techniques needed to fully exploit it. Typical discussions of the cultural history of the region include such statements as the following (Gonsior et al. 1999:3.8):

> *The understanding of Blackduck subsistence is substantially greater than most of the other cultural contexts in Minnesota due to a plethora of data from recent studies.* ***A reliance on wild rice mixed with a fish and ungulate (bison and deer) diet is well established.*** *Residue from a transitional Hannaford ware vessel recovered at Lake Bemidji State Park contained evidence of maize (Thompson 1997). Seasonal procurement camps occur at wild rice and fish spawning locations.* ***Ricing jigs are common at Blackduck sites in lacustrine setting*** [emphasis added].

Blackduck components interpreted as ricing sites are often in the same areas as historic ricing features that are probably being misidentified as precontact features. For example, in his discussion of Nett Lake (21KC1), Johnson (1969c:33) says that "the wild rice harvesting processing area has only a Blackduck component," yet Evans (1961d:128) clearly indicates that the wild ricing features—specifically the jig pots at Nett Lake—were historic Ojibwe in origin.

Johnson (1969a, 1969c) argues for the use of wild rice at late precontact sites, particularly at Scott (21CA1) and Nett Lake (21KC1), but no actual wild rice grains have been recovered from these sites. The problem with Nett Lake was described above. For the Scott site, Johnson himself noted the inability to stratigraphically separate Blackduck and Sandy Lake pottery at the site. Lugenbeal (1976:87) notes:

> *The conclusion that wild rice was utilized as early as A.D. 800 is based on one C-14 date from the Scott site, which contains a mixture of Blackduck and Sandy Lake pottery. The date was obtained from birch bark found in a pit emanating from the third arbitrary six-inch level. The pit was presumably related to the Blackduck occupation of the site (Johnson 1964:48; 1969[c]:34). I think a legitimate question could be raised concerning the conclusive nature of the association of the evidence for wild rice use and the Blackduck component. It makes sense to assume that the Blackduck people occupied the site in order to gather wild rice – perhaps as early as A.D. 800. But it is possible that wild rice was only used during the Sandy Lake component at a later date. Continued study of the prehistoric use of wild rice should go far towards a clarification of this question.*

Rajnovich (1984) and Moffat and Arzigian (2000) have reviewed other evidence of wild rice actually found in archaeological sites. Petaga Point (21ML11) had possible storage and jigging pits but no wild rice grains; the artifacts

associated with the ricing features consisted of undiagnostic cord-marked body sherds (Bleed 1969; Johnson 1969a). At Old Shakopee Bridge (21ML20), one unconfirmed grain was found in a refuse pit, but Middle and Late Woodland contexts at the site were mixed, and the researchers could not identify the cultural context of the grain (Gibbon 1976:22–26). Elsewhere, there are records of intermittent use of wild rice, perhaps when stands were locally available. In Michigan, Ford and Brose (1975:11) report wild rice with a Late Archaic–Early Woodland burial from 400 B.C. Arzigian (2000) found wild rice grains in five features at four Middle Woodland sites along the Mississippi River at Prairie du Chien, Wisconsin, though it has not been found in Late Woodland contexts in the same area.

Rajnovich (1984) reviews surveys of Lake of the Woods, noting that there are many components represented from Paleo and Archaic to Middle Woodland (Laurel) and Late Woodland (Blackduck and Selkirk), and that "None have contained direct evidence of wild rice usage prehistorically, but this may be due to the archaeological record rather than a real reflection of non-use of wild rice." She notes that there was no flotation done for most sites, and those where flotation was done have not yet yielded evidence of wild rice. She also reviews the palynological record and argues that wild rice should have been present in the area by the time of the Laurel occupations at Lake of the Woods. The earliest recorded wild rice pollen she documented was from Rice Lake, 100 km south of Lake of the Woods (citing McAndrews 1969:1678); it appeared about 2450 ± 100 B.P., calibrated to 1935 B.P. There are uncertainties regarding the identification of the wild rice pollen, since it is based on comparison of size frequencies between fossil and modern wild rice pollen, as Rajnovich (1984:204) noted.

Rajnovich (1984:212) also examines Laurel and Blackduck site distributions and settlement patterns and compares them to projected locations of precontact rice stands, and concludes that

> *A settlement pattern study of Middle and Late Woodland sites on Lake of the Woods shows a trend for both Middle and Late Woodland sites to cluster around wild rice stands, however, a causal relationship between the two has not been substantiated. The strong tendency for site-stand clustering leads to a tentative hypothesis that people of both the Middle and Late Woodland periods were aware of and gathered wild rice*.

None of the reported early contexts for wild rice (with or without wild rice grains) show diagnostic Blackduck or Kathio ceramics in context with the types of specialized wild rice processing features (clay linings, jig pots, etc.) described for the historic era. A Leech Lake Heritage Sites Program (LLHSP) report discussing wild rice *features* argues that they are a very late invention, "possibly originating with the more southerly Dakota groups around the Mille Lacs region or even arriving with the historic Ojibwe during the mid 1700's" (LLHSP 2002:130). The authors argue that excavated ricing pits are historic as well, like those at Petaga Point (Bleed 1969:8). They report that "recently identified prehistoric ricing features from the Mille Lacs region are nothing more than large burned areas on the ground which contained a few rice grains" (LLHSP 2002:130). Likewise, Oneota sites in La Crosse, Wisconsin, that have produced extensive evidence for the use of wild rice in the form of abundant and ubiquitous charred wild rice grains (e.g., Arzigian 1989) and maize have not yielded special features for processing wild rice.

10.7 Mortuary Practices and Ideology

The presence of mortuary vessels simplifies identification of at least some Blackduck-related burials, although the complexity of mound construction, use, and reuse makes it difficult to assign specific burial features to either the BDK or the RRLW complex. Burial form is fairly consistent, consisting of primary, usually flexed burials in a variety of relative positions within the mound. Secondary burials and cremations also occur. Burials are found in separate Blackduck mounds and mounds with multiple construction episodes, as well as intrusive into earlier mounds. Primary burials intrusive into mounds, even without burial goods, often have been attributed to Blackduck. Associated artifacts are common with Blackduck burials and include pottery, points, red ocher, bone tools, and birch bark (Arzigian and Stevenson 2003). A Blackduck mortuary vessel associated with primary burials in a submound pit was found at Lake Bronson (21KT1), a series of linear mounds on a beach ridge that Wilford attributed to the Arvilla complex (Anfinson et al. 1978; Johnson 1973:20–23).

At McKinstry, some burials had clay masks (Johnson and Ready 1992) cranial perforations, and cut marks (Torbenson et al 1996; Wilford 1952a). Thomas (1996b:8.12) argues that the punctured human long bones from Smith Mound 4 should be attributed not to the Laurel culture but to a Terminal Woodland component, based on a careful reading of

Stoltman (1973:11–13) and Lugenbeal (1976). Other Blackduck sites with evidence for postmortem long bone tapping include Schocker (21BL1), White Oak Point (21IC1), and Osufsen (21IC2). Study of the remains from these three sites indicates that there is no significant difference in the frequency of bone perforation between males and females, though at Osufsen more adult bones were tapped than juvenile. Possible explanations for the purpose of such treatment include either marrow extraction or spirit release (Myster and O'Connell 1997:226).

McKinstry Mound 2 had six episodes of interments of multiple individuals that were intrusive into a Laurel complex mound. Torbenson et al. (1996) discuss the health status of populations from the Blackduck burials in this mound, noting few diseases other than those associated with age and occupation, including four individuals with periostitis, five with degenerative joint disease, and seventeen with caries; however, the total number of individuals studied was not reported (Myster and O'Connell 1997:225).

Thomas and Mather (1996a:18.10) further suggest that, based on the radiocarbon dates, no Terminal Woodland mound building occurred in the Rainy River area after A.D. 1200, and subsequent mound burials, including those with Late Blackduck ceramics, are intrusive into older mounds.

Blackduck-related interments are also found in habitation areas and as apparently isolated burials. There are a few proposed Blackduck village and cemetery burial sites, but most are attributed to Blackduck without diagnostic artifacts (Arzigian and Stevenson 2003). An intact Blackduck mortuary vessel was found with an eroding primary burial at Lake of the Woods (Budak 1981). Schocker (21BL1), the type site for the Blackduck phase, contains a habitation area with burials attributed to Blackduck based on the burials' context within a village. The landowner reported the site in 1929 after human bones, a copper spearhead, and pottery were uncovered by plowing. Jenks excavated the site in 1932 and uncovered four additional burials on a long, natural ridge in a separate area of the site, including three fragmentary or dismembered burials and one fully flexed primary pit burial. The only mortuary items were a piece of red ocher near one fragmentary burial and possibly a "sea-shell" with the flexed primary. No other diagnostic artifacts were associated. Though these burials were not in a mound, Wilford (1937b) speculated that the natural ridge might have served a similar purpose.

Because of the general absence of burial goods, mortuary sites and features attributed to Kathio seem particularly difficult to place in time. Most Kathio mound designations have been based simply on general burial treatment—secondary burials on the ground surface or in shallow pits, some cremations, and few or no mortuary goods. This pattern is not universal, however, nor is it unique to this phase. Several sites, most notably Round Mound, have both primary and secondary burials. Only occasionally is there supporting, although still debatable, evidence such as artifacts in the mound fill. No diagnostic mortuary artifacts have been identified. Site interpretations are debated and changing, and researchers have reclassified many of the mounds as simply Woodland or Late Woodland (Arzigian and Stevenson 2003).

Ceremonialism associated with bears might also be present, as evidenced by a assemblage of fragmented and burned mandibles from at least 32 black bears found at the Crace site (21ML3; Gibbon 1975b), along with triangular points, Clam River ceramics, and lithic cores, tools, and debris. Such bear ceremonialism is seen later with the Psinomani complex.

10.8 Social, Economic, and Political Organization

Interpretations about social, economic, and political organization derive from interpretations of the observed and inferred subsistence and settlement patterns. Mound building and communal bison hunting would probably involve larger groups of people coming together at certain seasons of the year. Fishing throughout the warm season, and possibly wild rice gathering in fall, would bring people to campsites along rivers and lakes. Existing data include evidence for interregional communication and contact, although there is only speculation on the form that it took—probably some combination of trade, intermarriage, and travel. The evidence includes lithics (e.g., Knife River flint, Grand Meadow chert) and ceramics that appear to have been part of larger regional patterns. Maize might also have been traded, at least to a limited extent by some groups, based on phytoliths on Blackduck pottery. However, the exotic artifacts are not unique to this complex. Knife River flint in particular was also used by Laurel groups, and

"considering its persistence long after the Hopewellian decline, and the popularity of the material in Manitoba throughout prehistory, it may also reflect more localized systems of exchange" (Arthurs 1986:139). "The hypothesis put forth by Syms (1977:106) suggesting regional resource utilization patterns as an adaptive strategy for linguistically related but autonomous groups may be further refined" (Clouse 1983:8).

Michlovic discusses possible interpretations of the nature of the interactions between Plains and Woodland cultures, particularly as reflected in sites on the western margin of Blackduck (1979:36). He wonders if the diversity and wide distribution of Blackduck and related assemblages suggest more than a single ethnic unit. Although trade, widespread population movement, and similarities in function have been argued to explain the widespread similarity in artifact types, Michlovic notes at least some problems with each explanation.

Support for the idea of multiple Blackduck populations comes from Ossenberg's (1974) bioarchaeological study that found significant differences between northern and southern Blackduck groups, with some similarities between both Blackduck groups and the Mille Lacs Kathio population, but with no close affinities to sites in Manitoba. Laurel sites show closer affinity to the southern Blackduck group, although the sample size is small (Myster and O'Connell 1997:229).

Hanna (1982, 1984) used the chemical characterization of ceramic pastes to trace movement of pots and women (the presumed potters), focusing on Duck Bay ceramics from two sites in the boreal forest, including Aschkibokahn. Her results suggest both endogamous and exogamous marriage practices in the society.

10.9 Cultural Relationships

The relative stratigraphic placement of Blackduck ceramics with respect to both earlier ceramics such as Laurel and later ceramics such as Sandy Lake is well established (Lugenbeal 1976:594–598, 1979:24). Blackduck components are located in all areas occupied by Laurel, as well as extending further south, where, instead of Laurel, the Brainerd complex precedes Blackduck (Lugenbeal 1979:592–593). Lugenbeal (1979:24) sees a close relationship between Laurel and Blackduck, though Anfinson (in Lugenbeal 1979:24) argues for a closer relationship between Blackduck and Onamia–St. Croix. At the other end, Lugenbeal argues for closest affinity between Late Blackduck and the Selkirk ceramics of Ontario and Manitoba.

The origins of Blackduck, whether through in-situ development out of Laurel or population replacement, were previously discussed with the Laurel complex. Researchers (e.g., Graham 2005) have argued that Laurel and Blackduck pottery-producing peoples were contemporaneous (Anderson 1979; Dawson 1983; Lenius and Olinyk 1990), suggesting that Blackduck people moved into the area from the south (Dawson 1983). Alternatively, Blackduck pottery might have originated in the Princess Point culture from the western end of Lake Ontario (Buchner et al. 1983). Lenius and Olinyk (1990) argue that their versions of Blackduck and Laurel coexisted with limited interaction for several hundred years, until A.D. 1000, and then merged or coalesced in some fashion to produce the Rainy River Composite that is part of the RRLW.

Rapp et al. (1995:10) and Mulholland (2000:3) discuss how ceramic differences between Laurel and Blackduck might contribute to debate about the Laurel/Blackduck transition, and whether it can be attributed to population movement or in-situ development. Rapp et al. (1995:10–11) say:

> *The differences in burial practices, including intrusive Blackduck burials in Laurel mounds, would seem to argue for population replacement. The differences in pottery from Laurel conoidal, smooth-surfaced pots to Blackduck globular, corded surfaces are also evident. Laurel vessels were constructed by the coil method, as shown by coil breaks (Budak 1985; Arthurs 1986). Paddle and anvil (cord-or fabric-wrapped) has been assumed to be the technology for Blackduck and other Late Woodland ceramics. However, continuous fabric impressions on large restored vessels indicate formation within a fabric mold was also used (Syms 1977; Saylor 1978; Benn 1976; Goltz [1991]).*
>
> *Southern Blackduck sites are considered the earliest with the Headwaters as the early "home" of Blackduck (Lugenbeal 1978a). Sandy Lake replaces Blackduck fairly early there (A.D. 1100). In addition, late phase Blackduck is absent from much of the southern range of Blackduck and displays a northern orientation rather*

> *than southern. Osteological examination of Blackduck burials appears to support these data (Ossenberg 1974). Based on these comparisons, Lugenbeal hypothesizes "competition between two distinct populations within a single floristically and faunally relatively homogeneous geographic area. Consequently, the case for population replacement seems plausible" (Lugenbeal 1978a).*

Researchers have attempted to link the Blackduck archaeological culture to historic tribes. Thomas and Mather (1996b:5.16) note:

> *Many scholars have felt that the Assiniboine were represented by Blackduck ceramics (Bishop and Smith 1975; Hlady 1952; MacNeish 1958; Vickers 1948; Wilford 1945, 1955b). More recently, scholars have argued that the Siouan-speaking Assiniboine could not have been the descendants of Blackduck, and that, instead, Blackduck was ancestral to Algonkian speakers, specifically the Ojibwe (Dawson 1976; Evans 1961b, Johnson 1969[b]); Steinbring 1980). More recent researchers seem to feel that the prehistoric inhabitants of this region were in all likelihood Algonkian-speaking peoples but, as pointed out in a study by Greenberg and Morrison (1982) the ethnic divisions we see today, such as Cree and Ojibwe in Ontario and Manitoba, are, in fact, historical assignments that carry little validity in prehistory. Greenberg and Morrison (1982:91) argue that the Ojibwe "emergence" was not a result of population explosion and migration of Ojibwe into areas abandoned by the Cree north of Lake Superior, but rather that the term Ojibwe or Sauteux spread into the region. The "Crees" and other northern residents did not move--they became "Ojibwe."*

The human osteological studies provide insights into both origins and descendants of Blackduck peoples. According to Thomas and Mather (1996b:5.17),

> *Osteological studies by Ossenberg (1974) have suggested a different model of ethnic origins for Terminal Woodland groups in northern Minnesota. Ossenberg found a great deal of variability among Blackduck populations from northern Minnesota, Manitoba, and the Rainy River. Her study found so much variability that northern Blackduck (McKinstry Mound 2 and Hungry Hall Mound 2) populations were found most similar to Ossenberg's historical Cheyenne sample, and southern Blackduck populations (Osufsen and Schocker mounds) were found most similar to her historical Dakota sample, two groups from entirely different language stocks and with a history of conflict (Syms 1982).*

Myster (2001) conducted a multivariate discriminant function analysis on a sample of crania from a series of sites in Minnesota and the surrounding area, including Paleoindian, Archaic, Woodland, Oneota and Plains Village complexes. Her results suggested that Late Woodland Blackduck populations exhibited significant biological heterogeneity, possibly due to their mobile lifeway, and could not be connected to any specific historic tribe.

10.10 Demography and Settlement

Increases in site size and density, suggesting a population increase, have been proposed for the Terminal Woodland (e.g., Clark 1999:6; Mason 1981). Thomas and Mather (1996b:5.14), citing Dawson (1983:77–78), note that Terminal Woodland sites are larger and more numerous, suggesting greater population size. Many sites are in the same locations as Laurel sites, and "all of the Laurel mound sites on the Rainy River contain smaller Terminal Woodland mounds, usually in far greater numbers" (Thomas and Mather 1996b:5.14).

Limited demographic information is available, with the largest population coming from McKinstry Mound 2. Of 114 individuals, 53 were adults, 61 subadult. Within the adult category, 29 individuals (55%) were male, 17 (32%) as female, and 7 (13%) unidentifiable as to sex. The age distribution was similar to that seen at other Midwestern sites, though there is an underrepresentation of females. Life expectancy at birth was estimated to be 16.8 years, on the low end of the life expectancy range of other Midwestern populations (Myster and O'Connell 1997:225).

Sites from only a few aspects of the seasonal round appear to be represented in the archaeological record—or at least we lack seasonal data to define how most sites would fit into the seasonal round. A pattern of settlement similar to that of earlier peoples has been proposed (Thomas and Mather 1996b:5.15):

> *Terminal Woodland peoples also followed a seasonal mobility pattern, dispersing in the fall and amalgamating in the warm months, possibly returning to the same summer villages year after year. Ceremonial and subsistence*

related activities probably brought larger groups together repeatedly at certain sites. Fall activities such as wild rice gathering would have brought large groups together as would fishing at spring spawning grounds. All of the major mound sites along the Rainy River are either located at points where major tributaries enter the river or where rapids or cataracts break up the river's flow. These areas would have been important spawning grounds for fish such as sturgeon. Between spring and fall and possibly spring and summer, groups would have broken up into smaller hunting and fishing camps.

Similar to Reid and Rajnovich's (1991) hypothesized social organization for Laurel peoples, the Terminal Woodland Pattern has been interpreted as one of mobile bands of extended families that dispersed and recombined seasonally. Mobility may have become increasingly limited as a result of increased population density, greater site permanence, and the greater abundance of storable resources such as wild rice. Band social boundaries may have been fairly open with a constantly changing group membership. The limitations or abundancies of the local environment pressured groups to move elsewhere or to invite other groups to join them.

Graham (2005:ii) argues that Blackduck in southwestern Manitoba moved seasonally between the Plains of southwestern Manitoba in summer and the uplands in winter, "It is also proposed that separate groups of Blackduck people occupied the prairies and boreal forest areas. These groups interacted with one another along the aspen parkland/boreal forest fringe, where social networks were maintained and ideas and trade items were exchanged." Graham and others see change with increased use of Plains resources and bison hunting.

Michlovic (2005:80), in his report on site 21CY39, discusses the problem of site type designations that suggest a single purpose: "there is some variability in behavior that is masked by labels such as logistical camp or bison processing station. Not only is a range of activities represented in the artifact collection, but also the sample of animal bone from the site suggests use in more than one season. Blackduck use of the prairie may have been multi-seasonal, and not restricted to a single foray, and these forays may have involved a range of domestic activities beyond bison procurement." For example, Michlovic (1979:36) says that the Dead River site evidence "does not suggest a specialized single resource oriented hunting camp."

Several possible houses have been reported for Blackduck-Kathio. Johnson reports on a house at Petaga Point (21ML11) that was first identified by Bleed (1969) and then further excavated by Johnson the following year. Johnson (1971b:17–19) describes it as rectangular, 6 x 11 m in size, with a 2 m entrance passage and a floor depressed 50 cm below the original ground surface, marked with peripheral postholes and an interior fire pit. The structure had been burned and had masses of charcoal and partially burned wood over the floor, along with Kathio ceramics and Eastern triangular points beneath the charred material on the original floor surface. Johnson noted surface indications of at least five structures at the site. Overall size and configuration were similar to those seen in houses of the Middle Missouri tradition (e.g., the Brandon site; Over and Meleen 1941; Lehmer 1954:140) except for the absence of interior storage pits. Spruce Point (a Selkirk Composite site) has a reported domestic structure (Rajnovich 1983; Thomas and Mather 1996b:5.14).

Johnson identified seven Clam River pit-house depressions along the Snake River at the Winter site (21Pn17; Johnson 1971b:19; Johnson 1993). Three of the depressions were excavated with trenches and one large block excavation. Houses were identified by two rings of postholes. The outer ring had larger posts set in a shallow trench and angled toward the center of the living area, with a charred log found by one postmold, and with the outer ring slightly mounded up with soil on the outside. Within was a ring of smaller vertical postmolds and dark stained sand identified as the edge of a circular living floor about 3 m in diameter. Clam River cord-marked sherds and small side-notched points were found in a refuse pit inside one house. A fire pit within another house contained charred acorns. The structures are small, about 3 m in diameter, suggesting occupation by a nuclear family.

Dawson (1983:77) notes that features are uncommon at Blackduck sites but include hearths, refuse and cache pits, and some postmolds. Michlovic (2005:62–63) describes a bison-processing site, 21CY39, with a single pit filled with bison bones, interpreted as a storage pit reused for refuse. Because pit disposal is not typical of short-term hunters' camps, the site was interpreted as not strictly an extractive site. Emerson (1996:54–55) suggests that a large FCR deposit at East Lydick Creek (21CA198) with RRLW ceramics was a sweat lodge.

10.11 Principal Sites and Property Types

Principal Sites

The following Minnesota sites are compiled from Dobbs and Anfinson (1990) and Lenius and Oliynk (1990). Most of them are multicomponent. Without further review of the ceramic assemblages, it is difficult to separate most sites with Blackduck ceramics into either BDK or RRLW. [Sites that cannot be attributed to either BDK or RRLW are identified only as Blackduck in the following list.]

21BK1 Mitchell Dam (Blackduck, Brainerd, Kathio)
21BL1 Schocker (Blackduck, also Brainerd; habitation, mortuary–nonmound)
21BL2 Washkish (Blackduck; also Brainerd, Laurel, Psinomani)
21CA1 Scott (Blackduck; also Brainerd, Psinomani)
21CA2 Mud Lake (Blackduck; also Brainerd, Kathio, Psinomani)
21CE2 Hill Point [NRHP] (Blackduck, Brainerd, Middle Woodland)
21CE4 Upper Rice Lake [NRHP] (Blackduck, Psinomani)
21CW14 Upper Hay Lake Mounds/Fort Poulak [NRHP] (Blackduck; St. Croix ceramics)
21CY32 (no name) (Blackduck)
21CY39 Ponderosa III (single-component Blackduck)
21IC1 White Oak Point [NRHP] (Blackduck; also Havana-related, Psinomani, Brainerd)
21IC2 Osufsen (type site; Blackduck, also Brainerd; mortuary–mound)
21IC3 Stangland (Blackduck)
21IC15 Round Lake
21IC16 Inger (Blackduck, Brainerd)
21IC46 Third River (Blackduck, also Psinomani)
21KC1 Nett Lake (Ball Park excavation unit Blackduck; Sawmill excavation unit Rainy River Late Woodland and Blackduck, also Laurel, Brainerd])
21KC2 McKinstry [NRHP] (Blackduck and Rainy River Late Woodland, also Laurel and Psinomani)
21KC3 Smith/Grand Mound/Laurel (Blackduck and Rainy River Late Woodland, also Laurel, Brainerd, Psinomani)
21KC25 Hannaford (Blackduck and Laurel)
21KT1 Lake Bronson site (Laurel, Central Minnesota Transitional Woodland, Blackduck; mounds, kill/butcher site)
21MA8 Skurdahl (Blackduck)
21OT51 Dead River (Blackduck, also Brainerd)
21RO4 Roseau River (Blackduck)
21SL3 Pearson (Laurel, Blackduck)
21SL55 (no name) [NRHP] (Blackduck)
21SL82 (no name) [NRHP] (Laurel, Blackduck, Psinomani)
21SL141 Sweetnose Island [NRHP] (Laurel, Late Woodland)

Principal sites with Kathio ceramics:

21AN8 Anderson (Havana-related, Late Woodland)
21CA27 Gull Lake Dam (Brainerd, Blackduck, Psinomani)
21KA21 [Knife River Indian Villages National Register District] (Kathio and Havana-related)
21KH93 Levine (Central Minnesota Transitional Woodland, Kathio)
21ML2 Aquipaquetin Island [NRHP]
21ML3 Crace [NRHP] (Central Minnesota Transitional Woodland, Clam River with bear mandibles feature, Brainerd; partial horizontal separation of components)
21ML6 Indian School [NRHP] (Havana-related, Kathio)

21ML7	Vineland Bay [NRHP] (Central Minnesota Transitional Woodland, Kathio)
21ML9	Cooper (Central Minnesota Transitional Woodland, Kathio, Psinomani)
21ML11	Petaga Point [NRHP] (type site; multicomponent Kathio through Psinomani)
21ML12	Wilford (Middle Woodland, Central Minnesota Transitional Woodland, Late Woodland)
21ML20	Old Shakopee Bridge [NRHP] (Central Minnesota Transitional Woodland, Kathio, Psinomani)
21NL2	Poehler (Central Minnesota Transitional Woodland, Late Woodland)
21PO1	Bartke (Kathio)
21SH1/16	Christensen (Kathio)

Property Types

For the Blackduck-Kathio and Rainy River Late Woodland complexes, the following site types seem likely:

Habitation sites: Habitations will be the most common site type, but few habitation sites have been carefully studied using modern recovery and analytical methods such as flotation or water-screening with fine mesh. Single-component Blackduck sites are especially poorly known, and the lack of information makes it difficult to evaluate the full range of activities that might be present at a site. Examples of habitation sites include Hannaford (21KC25) and LaSalle Creek (21HB26).

Resource procurement and processing sites: Without subsistence remains and more extensive excavation, it is difficult to evaluate how many sites might qualify as more specialized resource-extraction sites rather than general habitation sites. Sites such as 21CY39 might qualify as bison-processing sites, though a number of activities took place at that particular site.

Special-use sites: Although no documented special-use sites have been identified for BDK or RRLW, they might exist.

Mortuary sites–mounds: Blackduck mounds are probably smaller than Laurel mounds, but mounds often occur on sites with both components, making it difficult to attribute any to a specific component without excavation. Previous excavations have revealed repeated instances of Blackduck peoples making use of earlier Laurel mounds, through either incremental additions to the mounds or intrusive placement of burials in the mounds. Possible examples of Blackduck or Rainy River mounds are McKinstry (21KC2) and Smith (21KC3).

Mortuary sites–nonmound: Schocker (21BL1) is an example of a nonmound mortuary site.

10.12 Major Research Questions for the Blackduck-Kathio and Rainy River Late Woodland Complexes

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Blackduck-Kathio and Rainy River Late Woodland complexes:

Subsistence: wild rice, cultigens, fauna. The role of wild rice in precontact cultures is a crucial question. Lofstrom (1987) discusses social organization and population-size implications for incorporating wild rice, and many cultural interpretations about social organization, seasonal round, etc. are based on an assumption of wild rice use. Careful excavation and extensive flotation sampling from well-dated contexts is needed to identify subsistence remains and provide good assemblages for analysis. Especially if features are scarce or absent, analysis of food residues on diagnostic vessel fragments can provide important information on plant foods and processing activities directly attributable to the complex. Specifically, is there evidence that wild rice was used intensively by BDK or RRLW groups? How was wild rice first introduced and used, and how did it change other resource use and settlement pattern practices? Were special features used to process the wild rice? If so, can they be distinguished from later historic features?

The presence of maize phytoliths from 21CY39 is intriguing. Is there any direct evidence for corn, such as macrofossil remains? What was the role of corn in BDK or RRLW culture? Were some populations growing their own corn, or

were they trading with horticultural or farming communities such as Plains Village groups or other Late Woodland groups? How did the role of corn relate to possible wild rice use, when did it start, and how did it affect demography, the seasonal round, etc.?

Additional sites with larger samples of faunal remains are needed from a variety of habitats. Interpreting the variety of faunal taxa in terms of habitat selection and seasonal availability will be essential to understanding the whole Blackduck-Kathio seasonal round. Specific questions include, What was the nature of Blackduck exploitation of fisheries? Rapp et al. (1995:208) suggest that changes occurred in the season and manner of fishing, from spring spearing of sturgeon in Early Blackduck, to taking of bottom-feeding suckers in Middle and Late Blackduck, possibly with the use of gill nets. Did this represent a broad shift in fishing strategies or fishing techniques, with the decline of harpoon use and the addition of gill nets? Were there changes in seasonal movement, or in the seasons during which sites were occupied by different groups? Changes also were observed in the amount of burned bone at Hannaford. Can broader trends be interpreted? Can specific activity areas be designated? Do the changes in the proportion of burned bone reflect changes in fish processing? Do different proportions of burned bone reflect different processing activities? How do these change through time and space? Where were the harpoons manufactured? Rapp et al. (1995:287) suggest that they were not made at the Hannaford site, although there were several finished tools. Finding the sources of manufacture of these tools might allow a better understanding of the whole settlement pattern and seasonal round. Given the apparent importance of sturgeon in the Rainy River area, how do other regions compare? Morey et al (1996:15.6) pose a series of research questions, including changes in taxa through time. Was there really a change in emphasis on different taxa, or is this merely a result of recovery and analytical methods? Do the documented patterns reflect subsistence, taphonomic changes, disposal patterns, or depositional patterns? How do the patterns vary across the region?

Researchers have suggested (e.g., Rapp et al. 1995:288) that sturgeon were dried, possibly boiled to remove oil that could be used to produce a pemmican-like food, or possibly rendered for isinglass (a form of collagen). Is there archaeological evidence to support any of these ideas? If fish were being processed in cooking pots, this might account for anomalously old dates from sherd residues (Rapp et al. 1995:288). Fractionation of sturgeon and other fishes, as well as different products such as sturgeon flesh, sturgeon oil, and isinglass, should also be evaluated (Rapp et al. 1995:288).

Additional faunal analyses appear in the literature—for example, Whelan's (1990) report on Late Woodland sites in the Mille Lacs area. However, Whelan's analysis did not attribute specific faunal specimens to specific cultural components, greatly limiting the report's utility. Analysis or reanalysis of diagnostic artifacts and components at these multicomponent sites, and a breakdown of subsistence remains by such components, will allow analysis not only of specific complexes' subsistence and settlement systems, but also changes through time.

Chronology. More radiocarbon dates are needed, particularly from sites in east-central Minnesota that have Kathio ceramics. Do Kathio ceramics date to the same time as Early Blackduck ceramics, and thus belong together in one complex? The beginning and end dates for this sequence also need to be addressed in conjunction with refined definition of specific cultural markers for the complex. How do chronologies vary in different regions? The problem of early dates from ceramic residues will need to be addressed as well. Available "Blackduck" dates need to be correlated with a revised ceramic chronology to allow attribution to a specific complex and refinement of the chronology. Can the earliest site dates stratified by latitude show a migration pattern?

Is the chronology correct for the break between "Early" and "Late" Blackduck, and thus the split between BDK and RRLW? Using only dates that clearly fall within one or the other complex means that any possible transitional occupations are obscured. Some research, such as at Hannaford (Rapp et al. 1995:292), suggests a "middle," transitional phase. Did BDK and RRLW coexist for a period, with chronological overlap? How did they relate to the Laurel and Psinomani complexes? How do the Kathio and Clam River sequences compare to Blackduck? Did they extend later in time in central Minnesota than seen in the Blackduck core area? Do Stoltman's ceramic distinctions between the various periods of Kathio-Blackduck hold up under a more thorough and detailed analysis?

Regional distribution patterns. There appear to be more sites with Blackduck and Kathio pottery than earlier complexes, so does that mean more people overall, or more dispersed populations? Information on site size and density for these and earlier sites would be useful. Is the site distribution fully known, or biased by surveyed areas? Do seasonal rounds cross environmental boundaries or ecotones, or are there relatively distinguishable cultural subsets within each environmental province? Are there various regional expressions of Blackduck and Kathio that can be identified and distinguished from one another? Can sites in different environmental zones or regions be linked through distinctive ceramic or lithic traits, specific raw materials, or other distinctive attributes? How do sites change as one goes west and northwest along the prairie/forest border and onto the west-central Minnesota prairies? Ecologically, Kathio is concentrated in ecotonal (transitional) biomes between the deciduous and coniferous forests and between forest and prairie. Could this region have been a trading or cultural hub, or a transitional region between a number of distinct cultures, that would have made exposure to or intermarriage with other cultural groups more likely? Is there evidence at some sites of distinctive ceramics or lithics that could connect one site to interactions with multiple complexes? The distribution of specific lithic raw materials and ceramics would be useful here, including analysis of clay and temper sources and detailed stylistic attributes.

What are the relationships between different contemporaneous complexes? For example, did changes in Late Blackduck ceramic technologies result from technological innovations centered north and northwest of the core Blackduck area (Hohman-Caine and Goltz 1994a)? What are the relationships between Central Minnesota Transitional Woodland, Blackduck, Rainy River Late Woodland, and Psinomani? Were these distinct complexes, or were they merely stylistic variants that reflect temporal or spatial differences? Examination of existing collections, particularly those with large assemblages and at the periphery of regional distribution, is needed to clarify how each site fits within these complexes and to better evaluate spatial distribution.

Ceramics. Detailed study of Blackduck ceramics is essential—either detailed typological analysis, or alternative, more useful approaches to analyzing Blackduck ceramics, perhaps based on detailed attribute analysis. Variability in Blackduck ceramics seems to be great, but is also poorly understood. Stratified sites in multiple regions would facilitate finer chronological separation. Sites in the areas where Blackduck ceramics are most common are needed for study, as well as sites in more peripheral areas. How did Blackduck ceramics change within each region, and how do they vary spatially? Are there cultural or ethnographic analogs that might explain the range of variation? Michlovic (2005) notes that the 13 ceramic vessels at 21CY39 were all stylistically different; he draws a parallel to historic Ojibwe pottery, found at a cemetery (Densmore 1979:162–163), that was highly variable and centered on family traditions rather than ethnic affiliation.

Mound construction. What was the nature of the mound-building activities for BDK or RRLW as compared to Laurel? Were there changes in demographic, sociopolitical, or economic organization that might have caused construction of smaller mounds or use of previous mounds? Were there changes within this long time span? How did mortuary practices vary through the region? Are the small pots really only found in mortuary contexts? Information is also lacking for assigning most nonmound burials to a cultural complex. Further information is needed on how mound-building practices fit into the broader context of Blackduck-Kathio settlement and social systems, and how BDK or RRLW burial practices relate to those of earlier Laurel and later Psinomani complexes. Finally, research is needed on the kinds of nonmortuary features and artifacts that might be expected to reflect ceremonial or religious beliefs.

11 THE PSINOMANI COMPLEX: Late [Terminal] Woodland, Protohistoric, and Early Historic in Northern and Central Minnesota, A.D. 1100–1750

11.1 Introduction and Overview

The Psinomani complex represents Late [Terminal] Woodland, Protohistoric, and Early Historic in northern and central Minnesota, A.D. 1100–1750. It is the most recent precontact archaeological complex in central and northern Minnesota, following the Central Minnesota Transitional Woodland and Blackduck-Kathio complexes. Peoples associated with the Psinomani complex entered into the protohistoric and early historic era as Siouan-speaking cultures. "Psinomani" is an archaeological complex, not a ceramic series, and it is not coterminous with its most characteristic ceramic ware, Sandy Lake. Although most components assigned to this complex contain Sandy Lake ware, there are some that lack this pottery. Located north of the limits of successful corn agriculture, the Psinomani complex is named for the Dakota word for "wild rice gatherers." At Mille Lacs, one of the major concentrations of Psinomani sites, the complex has been linked to the historic Mdewakanton Dakota.

Psinomani material culture is marked by small triangular points, Sandy Lake grit- and shell-tempered ceramics and, in some areas, Ogechie ceramics, a locally made variant of Orr phase Oneota pottery. The Psinomani complex shows interaction (movement of people, goods, ideas, or a combination of these and other processes) with neighboring cultures, including Oneota farming communities to the south and east and Plains Village peoples to the west, crossing the prairie-forest ecotone. Psinomani peoples gathered wild rice, hunted bison and other mammals, and utilized fish and other resources from lakes and rivers. The Psinomani subsistence/settlement system might have made use of large areas of forest, ecotone, and prairie, with trade or other connections to the west for seasonal bison hunts and into North Dakota for Knife River flint and other resources. Sites along lakes such as Mille Lacs were seasonally occupied for the wild rice harvest and might have been occupied full time by at least some of the population. Although Psinomani peoples might have traded for corn at some sites, there is no evidence that they grew corn or stored it in the deep storage pits typical of Oneota or Plains Village sites. Psinomani peoples buried their dead in nonmound contexts and also in mounds, including as intrusive burials, as late as the seventeenth century; both primary flexed and primary disarticulated burials are present.

11.2 Environmental Setting and Geographic Distribution

Psinomani is found in central and northern Minnesota (Figure 18), west to the Red River Valley and eastern North Dakota, east to the St. Croix River in Wisconsin, and north to the Rainy River and into Manitoba and Ontario. In Minnesota, concentrations of sites are found at Mille Lacs, the Mississippi River Headwaters area, and the Red River and Rainy Lake drainages. Arthurs (1978:59) notes that Psinomani sites are typically near major waterways, particularly those with access to the Mississippi Headwaters area, including sites along the Rainy River–Rainy Lake and Boundary Waters systems, eastward to sites with access to Lake Superior.

The Lake Superior Basin Workshop in 1988 (Participants 1988) mapped 72 sites with Sandy Lake pottery in Minnesota, Wisconsin, North Dakota, Manitoba, and Ontario. Lofstrom (1988) used the results of the Statewide Archaeological Survey (SAS) to describe a southern limit for Sandy Lake ware (using only the shell-tempered variety) as an east-west line through central Minnesota, from Douglas to Kanabec Counties. An outlying site on the St. Croix River was noted as being along a north-south route. Recent research has identified Sandy Lake ware from a number of sites even further south, in Sherburne and Wright Counties (Johnson 1994:Figures 3.15C, 3.18A, 3.18C, 3.18H, 3–55). Though the distribution of Sandy Lake pottery is larger than that of the Psinomani complex, the southern boundary proposed in 1988 still seems reasonable for the Psinomani complex in Minnesota.

Psinomani sites occur in several different environmental and resource areas, particularly along ecotones. For example, the Mille Lacs locality is near the forest-grassland ecotone on the western edge of the mixed conifer-hardwood forest. Sites with Sandy Lake or Ogechie ceramics are found predominantly in the Laurentian Mixed Forest province of the Ecological Classification System (MnDNR–Division of Forestry 1999); this association accounts for 211 (77%) of the 275 reported sites. The remaining sites are found in the Prairie Parkland (43 sites, or 16%), Eastern Broadleaf Forest (19 sites, or 7%) and Tallgrass Aspen Parklands (2 sites, or 0.73%). In terms of SHPO archaeological regions

(Anfinson 1990), Psinomani sites occur predominantly in the Central Lakes Coniferous region (149 sites, 54%) and also in the Central Lakes Deciduous (49 sites, 18%), Red River Valley (34 sites, 12%), Border Lakes (19 sites, 7%), and Northern Bog (12 sites, 4%) regions. Scattered outliers are found in the Prairie Lake (2 sites) and Lake Superior (1 site) regions, with 9 sites unattributed to archaeological region.

Peterson (1986) notes that the Psinomani sites in the Mississippi Headwaters area were in locations known for their abundance of wild rice, typically along lakes and rivers that could support wild rice. Conversely, Psinomani sites along the Red River and in the Plains appear to have focused primarily on animal resources, especially bison. However, Peterson (1986:25) notes that some Red River tributaries are known to have had wild rice, and it currently extends north into Manitoba and Ontario.

Ogechie ceramics are found around Mille Lacs, and in a long trail down to Oneota sites to the south and east, such as early Oneota sites at Red Wing. All reported Ogechie sites are within the Mississippi River drainage except for 21SL163, which has only a possible Psinomani component. Elsewhere, Michlovic (1987:54) reports ceramics from the Mooney site (21NR29) in the Red River valley that might represent local variations on Plains Village materials, instead of the Oneota-like local variants found to the east.

11.3 Past Research

The Psinomani complex was defined relatively late in the history of Minnesota research. Its characteristic ceramic ware, Sandy Lake, was defined by Leland Cooper and Elden Johnson in 1964 and was named after Big Sandy Lake in Aitken County (Cooper and Johnson 1964). The term “Wanikan” was proposed in 1977 (Birk 1977a) for the culture making those ceramics, and Gibbon proposed changing the name to Psinomani around 1991 (Gibbon 1994).

Cooper and Johnson’s (1964) initial definition of Sandy Lake ware was based on collections from two habitation sites—the Scott site (21CA1), excavated by Wilford in 1954, and the Fickle site (47BT25), excavated by Cooper in 1935—and two mortuary vessels from Osufsen Mound (21IC2). At both habitation sites, Sandy Lake ware was found stratigraphically above Blackduck pottery. The relationship of Sandy Lake to Clam River pottery was more confusing, and the two wares could not be clearly separated at the Fickle site. Johnson (1969a) later argued that an undefined focus characterized by Sandy Lake pottery succeeded Blackduck and continued until the historic period. Birk described Sandy Lake ware from Norway Lake (21CA22) and proposed the concept of the Wanikan culture “to denote the collective phenomena observed as Sandy Lake potteries and their associated cultural expressions” (Birk 1977a:31). “Wanikan” is an Ojibwe word for a pit or hole in the ground; Birk connected it to the wild ricing pits thought to be associated with Sandy Lake wares. He proposed a separate name for the culture, distinct from that of the ceramics, to emphasize other aspects of the culture. Gibbon (1994) proposed renaming it “Psinomani,” after the Dakota word for “wild rice gatherer,” to reflect the suggested historic Dakota connection. He stressed the relationship of the Psinomani complex to contemporary Oneota and Plains Village cultures; the latter were corn agriculturalists, while Psinomani was north of the line for successful agriculture and focused on wild rice.

Subsequent researchers who worked to plot the regional distribution of Sandy Lake pottery included Arthurs (1978) for northwestern Ontario, and the participants at the 1988 Lake Superior Basin Workshop, who mapped 72 sites. Lofstrom (1988) used the results of the Statewide Archaeological Survey (SAS) to plot the southern extent of sites with shell-tempered Sandy Lake ware.

Major excavations of Psinomani sites have taken place in several localities, including Mille Lacs, the Red River Valley, and the Headwaters Lakes region. In the Mille Lacs area, research by University of Minnesota archaeologists included Wilford’s excavations at a number of sites in the 1930s and 1940s (e.g., Wilford 1944), and work by Leland Cooper and Elden Johnson in the 1960s and 1970s. Researchers developed a local sequence (Hohman-Caine 1983; Johnson 1984; Streiff 1987), and additional site excavations were documented briefly in a series of reports (e.g., Cooper 1965; Gibbon 1976; Johnson 1969a, 1969b, 1971a, 1984, 1985; Streiff 1987, 1994). Subsequent write-ups of information from these sites include Bailey’s (1997) and Schaaf’s (1981) work on floral remains from the Wilford site (21ML12), John Anfinson’s (1980) discussion of the historic component, and student reports (Johnson 1975) with preliminary descriptions or analyses of some of the other artifacts. Lothson’s (1972) thesis on Cooper Mound

(21ML16) documented a seventeenth-century Dakota burial with an Ogechie pot and historic artifacts. Lucking (1973) prepared a thesis on the subsistence ecology of the Cooper site; and Butcher-Younghans (1980) discussed historic artifacts from the Cooper village site. Dickinson (1968) prepared a thesis on the Vineland Bay site (21ML7). Whelan (1990) summarized faunal remains and subsistence systems from Mille Lacs Lake sites. Birk and Johnson (1992) argued for a connection between the Bradbury phase and Mdewakanton Dakota at Mille Lacs. Aufderheide et al. (1994) documented the analysis of human remains from a series of Mille Lacs sites. Finally, Gibbon (2003) prepared a history of the Dakota and Lakota Sioux Nations and included a discussion of their prehistory and the historic record

A Red River survey in 1980–81 in Norman County was an outgrowth of the Statewide Archaeological Survey and focused on the Red River levees. The survey found 39 sites, with shell-tempered Sandy Lake ceramics most common, although Ogechie vessels also were found (Michlovic 1983). The ceramics demonstrated "overlapping ranges for Plains and Woodland artifact types on the northeastern Plains" (Michlovic 1983:25), also providing a route for movement of Knife River flint to the east. Earlier work by Wilford in the Red River area identified the Arvilla complex and suggested that most sites were on beach ridges and were commonly mounds (Johnson 1973). The 1980–81 survey clarified the subsistence pattern as focused on the river and also identified habitation areas, at least one of them deeply buried, suggesting the possibility of site preservation through sedimentation. Excavations at the Mooney site (21NR29) were reported by Michlovic (1987) and C. Johnson (1995). Near the Plains the Canning site (21NR9) was briefly written up by Michlovic (1986). Work at the Shea site (32CS101), a fortified village on the Plains (Michlovic and Schneider 1993), showed interaction between Sandy Lake and Northeastern Plains Village complex peoples.

Elsewhere, work has been done at several clusters of Psinomani sites, including Headwaters Lakes sites such as Norway Lake (21CA22; Birk 1977a, 1977b), Portage Creek (21CA52; Hohman-Caine and Goltz 1997), Nushka Lake (21CA169; Murray 1993); White Oak Point (21IC1; Cooper and Johnson 1964; Wilford 1959) Osufsen (21IC2; Cooper and Johnson 1964; Wilford 1943b), Third River Bridge (21IC46; Hohman-Caine and Goltz 1998), Roosevelt Lake Narrows 21CA184; Justin 1995) and Lower Rice Lake (21CE5; Bakken 1994, 2006). Work has also been done at Aiken County sites such as Battle Island (21AK9; Gibbon 1987) and along the southern edge of Psinomani distribution at Douglas County site 21DL90 (Justin and Schuster 1992, 1994).

Recent Phase I and II excavations have been conducted at a number of sites as part of reconstruction along TH169 through the Mille Lacs National Historic Landmark, with reports including Mather (1991, 2000), Mather with contributors (2000) and Trocki and Hudak (2005).

11.4 Chronology

Psinomani falls within the Late Woodland or Terminal Woodland period, following Blackduck-Kathio in the Mississippi headwaters and Central Minnesota Transitional Woodland in the Mille Lacs region, and at least somewhat contemporary with Rainy River Late Woodland in the Rainy River area and Ontario. It is also contemporary with Plains Village and Oneota cultures, based on radiocarbon chronologies.

There are 26 radiocarbon dates for Psinomani. Figure 19 shows the calibrated one-sigma ranges (solid bar) and two-sigma ranges (open bar). The one-sigma calibrated dates begin predominantly about A.D. 1100, from sites on Leech Lake and Lake Winnibigoshish, and extend to post–A.D. 1800 at the Portage Creek site, also in the Mississippi Headwaters. The earliest date in the chart is from the Roosevelt Lake site (21CA184) and has a one-sigma calibrated range of approximately A.D. 1000–1150 (Thompson 1995:9.20). It is an AMS date on residue from an undecorated, vertically cord-marked body sherd the excavators identified as Sandy Lake. However, the site also had Kathio, Blackduck, and St. Croix pottery, so it is possible that this sherd relates to an earlier component. The earliest dates overlap with those on Blackduck pottery in the Mississippi Headwaters area (see BDK/RRLW complex).

Along the Red River, thermoluminescence dates of A.D. 1140 (shell-tempered sherd), A.D. 780 (shell-tempered sherd), and A.D. 1110 (grit-tempered sherd) have been obtained from the Mooney site (21NR29; Michlovic 1987:45), yielding an average date of A.D. 1010 ± 100. Additional thermoluminescence dates of A.D. 1200–1470 and A.D.

1175–1430 come from the Femco site (21WL1; Michlovic 1985:36). These are not shown on the radiocarbon graph in Figure 19 because they are not calibrated, but they fit within the same time frame as the radiometric dates.

The end date of A.D. 1750 for Psinomani is based on radiocarbon dates and on finding Sandy Lake and Ogechie pottery with Early Historic French artifacts at Mille Lacs, as discussed below. Although some radiocarbon date calibrations extend the terminal date beyond 1750, such as those from Portage Creek Bridge (21CA52; Hohman-Caine and Goltz 1997), investigators tend to attribute the complex to the earlier range of calibrated dates, probably because of the absence of later historic artifacts with the assemblages.

Researchers have developed a local chronology for the Mille Lacs locality, with separate phases. The Shakopee phase is listed (e.g., Streiff 1987:11) as lasting from A.D. 1300 to 1680. The Bradbury phase (Johnson 1984; Streiff 1987) is described as Early Historic/Late Prehistoric, extending from A.D. 1680 to 1750, with both Sandy Lake and Ogechie ceramics (Birk and Johnson 1992:209; Johnson 1984). The Bradbury phase in the Mille Lacs locality has a number of sites at which French artifacts have been found in direct association with Mdewakanton Dakota occupation (tabulated by Birk and Johnson 1992; Johnson 1985). They include the multicomponent habitation sites of Vineland Bay (21ML7), Cooper (21ML9; see Butcher-Younghans 1980 for a discussion of the historic artifacts), and Wilford (21ML12; see Anfinson 1980 for a discussion of the historic component), and also at Cooper Mound (21ML16; Lothson 1972). In the Mille Lacs area, the end date for Psinomani seems to be based on the historic record for the displacement of Dakota peoples by Ojibwe peoples at 1750. Johnson (1985:155) notes that in all cases the French goods predate the mid-eighteenth-century entry of the Ojibwe into the Mille Lacs area.

Early historic dates are also found outside the Mille Lacs area, though not always with historic artifacts. At the Basswood Shores site (21DK90) in Douglas County, Justin and Schuster (1994) identified a single-component, short-term Psinomani habitation site with a radiocarbon date on burned bone of 200 ± 90 B.P., or roughly A.D. 1750, uncalibrated. In the Rainy River area, Arthurs (1978:59) notes that "On the Long Sault Site…Sandy Lake pottery was recovered in association with Selkirk ceramics and historic trade goods in two excavation areas." The Blackduck (Rainy River Late Woodland) stratum underlying it reportedly had a date of A.D. 1750 ± 100.

Changes through time within Psinomani are not well documented. Ogechie ceramics appear to come from later components, such as at the early historic Cooper Mound (21ML16). However, the two Ogechie radiometric dates are both on pot residues, and both are fairly early in the sequence, including the two-sigma calibrated range of A.D. 992–1156 from 21ML91 (Trocki and Hudak 2005:243–244), and A.D.1294–1441 from 21ML16 (Mather and contributors 2000:Appendix E). The oldest date for Ogechie would barely overlap with the beginning of most Oneota cultures in Minnesota. The date might be problematic because it was derived from residue.

Participants in the 1988 Lake Superior Basin Workshop proposed that early dates were found in the south and later dates were found in the north. This pattern should be examined further. Portage Creek Bridge (21CA52; Hohman-Caine and Goltz 1997) has some of the earliest dates as well as some of the latest dates (Figure 19). Most of the Ontario dates (e.g., Ballynacree) approach the protohistoric into the historic era. At this time, it is unclear whether the absence of earlier dates at Ontario sites is a function of sampling.

There is some stratigraphic evidence for the placement of Sandy Lake pottery after Blackduck in northern Minnesota, and after St. Croix and Onamia in the Mille Lacs area, although it is not clear whether the ceramics are contemporary at these sites or the overlap results from mixed components. At the Scott site (21CA1; Cooper and Johnson 1964), Sandy Lake follows Blackduck, although there is one level of overlap. At the Fickle site (47BT25) in Wisconsin, Cooper and Johnson (1964) documented Sandy Lake in the highest level of the site but also recovered Clam River sherds and could not find a clear stratigraphic separation. At the Creech site (21CA14; Johnson 1991b), the upper levels of a midden had Sandy Lake and Ogechie ceramics, above levels with Sandy Lake and Blackduck sherds, over a pure Blackduck level. Peterson (1986) argues that Sandy Lake sherds generally do not appear in the same component as Blackduck. Cooper and Johnson (1964) describe Sandy Lake sherds as associated with Blackduck sherds at Mitchell Dam (21BK1), although the nature of this association is not made clear.

11.5 Technology and Material Culture

Ceramics

Since Cooper and Johnson's (1964) initial definition of Sandy Lake ware, the description and geographic range have been expanded in Minnesota by Birk (1977a, 1977b, 1979b), Rhodes (1973), Michlovic (1987), and Peterson (1986). Gibbon (1976:44) published an attribute list Elden Johnson prepared for Sandy Lake ware. Arthurs (1978) defined some variations unique to Ontario.

Birk (1979b:175) describes rim and vessel shapes:

> *Rims are generally straight, incurved or out-flaring, with flat or rounded cross-sections. Rim body junctures rarely form an abrupt angle or shoulder on the exterior, though the interior junction is often marked by a pronounced thickening. Both mortuary and utilitarian vessels are globular, and somewhat squat (vessel orifices are proportionately wide when compared to body width).*

Cooper and Johnson describe "what may best be termed an incipient S-curvature" in rims from the Scott (21CA1) and Fickle (47BT25) sites (Cooper and Johnson 1964:475–476). Other examples come from the Mooney site (21NR29; Michlovic 1987:50) and Lower Rice Lake (21CE5; Bakken 2006:55).

Birk (1977b) has estimated capacities of different vessels, with mortuary bowls from Osufsen and Norway Lake having capacities below 2 liters, utilitarian vessels from the Fickle site having capacities of about 7–10 liters; and one vessel from Onigum Point having an estimated capacity of 14–15 liters.

Bakken (1994:68–71) has tabulated complete Sandy Lake vessels, include vessels from

- Cooper Village (21ML9; Lothson 1972:167–169, Figures 66, 67, Plates 127, 129, 131; described by Bakken 1994:68)
- Crosier (21ML33; Mather 1991:34), including evidence of drill holes marking conjoined sherds and charcoal providing an uncorrected date of A.D. 1430 ± 110
- Basswood Shores (21DL90; Justin and Schuster 1994:80–82), with two partially reconstructed shell-tempered vessels, one with sharply angled shoulders and the other with more gradual shoulders
- Onigum Marina (21CA138; Birk 1977b)
- Norway Lake (21CA22; Birk 1977a), with two vessels from a mound, including a bowl with three unmodified mussel shells associated with a primary flexed burial

With respect to surface treatment, Birk (1979b:175) describes both vertical cordmarked (Sandy Lake Corded) and plain or smoothed-over cordmarked (Sandy Lake Smooth) surface treatments. Other provisional surface treatments include simple- and check-stamped exteriors. He says that smooth surfaces have not been identified in Ontario.

Both grit and shell temper were used in Sandy Lake ware, with Ontario ceramics tending to be grit tempered and southern Minnesota ceramics both shell and grit tempered. Cooper and Johnson (1964) note that the shell temper at the Scott site is different from that seen in Oneota vessels. The Sandy Lake shell temper is finely ground, with fragments smaller than 1 mm. Oneota is described as having larger (2–5 mm) fragments. The paste is compact but tends to be laminated and to split. Thicknesses range from 3 to 7 mm (at Scott). Cooper and Johnson found no differences in thickness, paste, or color between shell and grit-tempered sherds and concluded that tempering appeared to be "a completely independent variable and not diagnostic of typological variation within the ware." Rhodes (1973:59) reached the same conclusion after looking at the Sandy Lake pottery from Upper Rice Lake (21CE4). Experimental work by Budak (1991) showed that there were functional differences with the two temper types, and shell-tempered pottery would have been more durable and watertight and would have transferred heat with more efficiency than grit-tempered pottery.

Peterson (1986:170–171) argues that temper is more important than others had thought, and that it should form the primary division for the pottery, which could then be subdivided by surface treatment. She did not find variation between Norman County Red River and lake-forest ceramics.

There is debate about the methods of manufacture, and how the corded surface treatment was formed. Bakken (1994:44) cites a conference paper by Grant Goltz (1991) for alternative ideas:

> *Although it is often assumed that ceramic vessels in the region were created by shaping the vessel with a cordwrapped paddle…some experimental research (Goltz 1991) indicates that local clays cannot be successfully manipulated in this manner. Goltz suggests instead that vessels were formed in woven fabric bags, which leave the characteristic "cordmarking" or "fabric impressions" on the exterior surface of the vessel.*

Mineralogical, X-ray fluorescence, and X-ray diffraction studies were undertaken on seven sherds from the Mooney site (21NR29; Michlovic 1987:52), including both grit- and shell-tempered sherds. Besides characterizing the sherds at the site, the research suggested a firing temperature below 900º Celsius.

Birk (1979b) says that decoration on Sandy Lake ware is relatively rare and usually consists of lip notching, interior punctates, or interior lip notching. Notching can vary from saw-tooth treatment to clustered or evenly spaced impressions created by a variety of tools. Birk (1979b:178) suggests that check stamping might be more common moving west from the central Mississippi Headwaters towards sites such as Upper Rice Lake. He notes that Evans (1960) finds check- and simple-stamped potteries in the Middle Missouri subregion—perhaps another indication of connections between the Plains and lake-forest regions. Bleed (1969:27) reported three check-stamped vessels at Petaga Point. Peterson (1986:172) suggested that decoration occurs in more locations than are typically considered for Sandy Lake. She identifies vessels with neck decoration, exterior decoration, and interior rim decoration, in addition to the more typical lip-only and interior-only decoration.

Only a few studies have been able to address temporal changes within Sandy Lake ceramics, either through stratigraphy and direct radiometric dating or stylistic analysis. Hohman-Caine and Goltz (1997:23) note that based on radiocarbon dates and relative preservation conditions for early and late Sandy Lake vessels from the Portage Creek site (21CA52), early Sandy Lake ceramics seem to be grit tempered, while later ones are shell tempered. More specifically, they identified the following trends. First, early Sandy Lake sherds are grit tempered, with three radiometric dates averaging A.D. 1068–1277 (two-sigma calibrated; Hohman-Caine and Goltz 1997:34). Middle Sandy Lake ceramics are shell tempered but still have typical Sandy Lake vessel shapes, with near vertical rims, little or no neck constriction, and only slightly rounded shoulders. No radiometric dates are available from the Portage Creek site for the middle Sandy Lake ceramics, but Hohman-Caine and Goltz suggest an age of A.D. 1300 or later. Late Sandy Lake ceramics are also shell tempered and are distinguished by their shape, surface treatment, and decorative-element application. The vessels have straight, slightly flared rims 3–4 cm high, and the juncture with the shoulder is sharp on the exterior and rounded or sharply angled on the interior. The vessel shoulders are broadly rounded, with overall shape more squat-globular than in earlier forms. There are occasional ovoid rim outlines, similar to those of Oneota-related vessels from central and southeastern Minnesota. The surface treatment is coarse but well-woven fabric, as opposed to the wider range of fabric impressions on earlier vessels. The decoration consists of boldly applied stamping on the lip surface or interior, usually deforming the lip. The two-sigma radiometric range is A.D. 1713–1954, although Hohman-Caine and Goltz argue that the A.D. 1677–1776 two-sigma date range is most plausible. A Fur Trade Era strike-a-light was also found in the last occupation of the site.

Peterson (1986:174–178), based on statistical analysis of predominantly surface-collected ceramics, as well as pottery from some sites with possible spatial separation, suggested possible temporal changes in attributes, including interior neck form, interior decoration techniques, cut-notched lip forms, and lip surface treatments. However, these changes have not yet been demonstrated with evidence from stratified sites.

Arthurs (1978:59) documented regional variation in Sandy Lake ceramics, describing lip-notching tools that he said had not been mentioned previously for Minnesota ceramics, including a “blunt cylindrical object, a smooth curved-end object, a ribbed curved-end object, or a sharp edged object.” He further noted (1978:62) that many Ontario vessels have exterior punctates, while Minnesota ceramics have punctates only rarely, and then on the interior, forming bosses

on the rim exterior just below the lip. No smoothed-surfaced or shell-tempered vessels were identified in his Ontario sample, and he suggested that the absence of shell tempering might reflect decreased Mississippian influence. The Ontario rims also have excurvate rather than incurvate rim profiles.

Peterson's (1986:173) study of interregional variation found similarities between ceramics from the Red River and the Mississippi Headwaters, with more variation occurring within individual sites than between the different regions. She argues that this supports an interpretation of a homogeneous population exploiting multiple habitats as part of their seasonal round. Peterson suggests that temper choice is influenced more by geographic location than temporal placement, with more northern assemblages such as those from Beltrami County or Ontario showing a preference for grit temper. Although Arthurs (1978) had suggested reduced Oneota influence for the Ontario sites, Peterson (1986:176) argues that such an interpretation would not account for the Beltrami County sites. Instead, she suggests that the preference for shell reflected at those sites might result from the type of clay being used. Montmorillonite clay, though difficult to work, is greatly improved by using burned shell.

The Ogechie series was defined from the type site Petaga Point (21ML11) (Elden Johnson, personal communication, as cited in Bleed 1969; Ready and Anfinson 1979b). It is described as a Mississippian-Woodland blend with similarities to both Oneota pottery and Sandy Lake (Ready and Anfinson 1979b) or as a locally made variant of Oneota ceramics (Birk and Johnson 1992:209). The temper is usually shell, though fine granite also is reported. Vessels are globular with flattened lips, straight or everted rims, constricted necks, round shoulders, and a round bottom. Paired loop handles are occasionally found, and lip notching is common. Ready and Anfinson describe two decorative styles: Allamakee Trailed, which has broad trailed lines on the shoulder in vertical or oblique slashes or chevrons, often with linear punctates; and Ogechie Plain, which has no decoration except for occasional lip notching.

Ogechie pottery is reported in association with Sandy Lake at several sites (e.g., Birk 1977a:28; Ready and Anfinson 1979b:143). Ogechie sherds are reported from the Petaga Point (21ML11), Cooper (21ML9/ML16), and Wilford (21ML12) sites (Gibbon 1995). Birk and Johnson (1992:209) describe the Bradbury phase ceramics at Mille Lacs as including both Sandy Lake and Ogechie ceramics, and in two cases Oneota ceramics.

Michlovic (1982:63) reports Ogechie pottery from the Red River area, as well as Sandy Lake sherds related to Oneota pottery. Citing a 1981 personal communication from Christy Hohman-Caine, he describes a vessel from northwest Minnesota: "…this find consists of about 20% of a vessel including portions of the rim, shoulder, and globular body. The pot fragment is typical Sandy Lake, but the shoulder area contains Oneota-like trailing and sub-incumbent punctates." Michlovic notes that trailing occurs on cord-marked, shell-tempered sherds in the Red River area, showing the interrelationships between Sandy Lake and Oneota. He argues that "On the basis of shared ceramic traits, use of a common environment, chronological overlap, and a likely relationship to historically known Siouan speakers, a close link between Sandy Lake and at least one variant of Oneota may be postulated" (Michlovic 1983:25).

"Sandyota" is a term applied to ceramics that show a crossover between Sandy Lake and Oneota. This "type" is not well defined and is probably underreported, with assemblages being identified as Oneota rather than the local variant, Ogechie. LeVasseur and Yourd (2006:83) describe a Sandyota sherd of Sandy Lake form with an Oneota trailed decorative motif from the Sucker Lakes site (21CA50) in the Chippewa National Forest. Anfinson (personal communication, 2008) lists additional sites with Sandyota sherds: Steamboat Lake (21CA27) and the Thunder Lake Burial (21CA506).

Sandy Lake ceramics show similarities to sherds from the Plains and Manitoba (Michlovic 1987:53), including the James River Valley (Schneider 1982); Jamestown, North Dakota; Devils Lake, North Dakota, in association with Plains Village pottery (Michlovic 1983); and Snyder Dam in southwestern Manitoba (Syms 1979), where the pots were made by pressing clay into oven containers (something that might also apply to at least some Sandy Lake wares). He describes rolled-lip pottery with tool impressions and smooth surfaces, and plain grit-tempered pottery that are both similar to James River valley pottery (Schneider 1982) that has smoothed-over body surfaces and rolled lips similar to those of Plains pottery. Ash Rapid Corded, defined by Reid and Rajnovich (1980:79) for northwestern Ontario, is also similar to Sandy Lake except for somewhat higher rims. Selkirk ceramics from Manitoba and Ontario are similar to Sandy Lake except for the degree of rim excurvation and the manufacturing process (Rajnovich and Reid 1978:46).

Cooper and Johnson (1964: 479) mention similarities in vessel form and interior lip notching between Sandy Lake pottery and Raymond focus pottery of Illinois (Griffin 1952:Figure 100).

Michlovic (1987:55) has described a blending of Plains and Sandy Lake pottery that displays tool impressions or surface treatments similar to those found on Northeastern Plains Village wares, although overall the Sandy Lake and Northeastern Plains Village wares could be distinguished. Michlovic (1987:54) indicates that trailing is common in eastern Plains ceramics such as Cambria and also characterizes Sandy Lake on the northeastern Plains. He defines a type of Sandy Lake ware that is plain-surfaced, cordwrapped-stick impressed pottery with lips flattened and surfaces smoothed, traits characteristic of non-Woodland ceramics on the eastern Plains. There are also examples of stick- or tool-impressed Sandy Lake sherds, similar to Lisbon ware from eastern North Dakota (Wheeler 1963).

Some Psinomani sites have sherds of other wares besides Sandy Lake and Ogechie. Michlovic (1987:54) notes that some sherds from the Mooney site (21NR29) have trailing, placing them with Northeastern Plains Village ware. He describes (1987:55) Northeastern Plains Village ware as "variable" and including several types: "It is smoothed surfaced, tool or stick impressed (not cordwrapped stick impressed) and sometimes has complicated lips (e.g. rolled). Red River pottery body sherds may be decorated with trailing, although this feature is not unknown on Sandy Lake ceramics (Michlovic 1983)." He indicates similarities between the Northeastern Plains Village wares and Middle Missouri tradition North Dakota wares such as Riggs Plain Rim, and pottery from the Stutsman focus of the James River valley.

Lithics

Few discrete Psinomani components have been found, making description of a typical Psinomani lithic assemblage difficult. Projectile points appear to be small triangular points, as would be expected with other Late or Terminal Woodland and Oneota occupations. Some sites seem to have been predominantly for tool use and reworking, such as the Portage Creek site (21CA52; Hohman-Caine and Goltz 1997), which, although it also has Brainerd, Malmo, and Blackduck components, has a Psinomani component. Of a total 3,890 artifacts, Hohman-Caine and Goltz (1997:6) tabulate 20 projectile points; 23 scrapers, including end and side scrapers; 4 small bifaces; 5 early-stage bifaces; 7 wedges or bipolar tools; 2 bipolar cores; 5 freehand cores; 50 utilized flakes; 1 hafted hammer; 1 hammerstone; 2 small bipolar anvil stones; and 3,770 pieces of lithic debris. Other sites reflect more of the full range of lithic manufacturing (e.g., some of the Mille Lacs sites described in Bakken 2000), although these could not be separated into specific Woodland components.

Birk and Johnson (1992:209) describe the lithics assemblage from Bradbury phase sites in Mille Lacs as indistinguishable from that associated with northern Oneota sites. "Small triangular points, trapezoidal end scrapers, double-pointed and bifacially flaked knives, sandstone arrow shaft abraders, milling stones, celts, pipestone elbow pipes, and the ubiquitous utilized flakes are all characteristic." It is unclear, however, which sites this information is derived from, since the Mille Lacs sites are largely multicomponent and mixed.

Gibbon (2003:27) notes that there are changes in lithics from previous assemblages in the Mille Lacs area, including the addition of ground-stone artifacts such as grinding slabs and shaft straighteners/abraders and a single scapula hoe. Gibbon does not provide specific information on the sites and contexts in which these artifacts were found, so their association with Psinomani has not been fully verified.

Bakken (2000) identifies three different lithic use patterns in the Mille Lacs area, although not exclusively with Psinomani. The "Q-pattern" focuses on quartz as the most readily available lithic material; it is common at Woodland sites in central to northern Minnesota, ending south of Mille Lacs, when Prairie du Chien chert becomes more accessible. Bakken indicates that studying the relative proportions of Knife Lake siltstone, Tongue River silica, and quartz could be beneficial (2000:15.16). The Mille Lacs sites lacked the stratigraphy and contexts for distinguishing possible changes within Woodland, or for attributing particular assemblages to the Psinomani complex. Bakken (2000:15.15) suggested that the pattern of exotics—specifically, Burlington chert, Hixton orthoquartzite, and Knife River flint—might be indicative of regional connections. Although Hixton orthoquartzite sources are closer than Knife River flint sources to the Mille Lacs sites, the orthoquartzite is much less common, perhaps reflecting either the very

different characteristics of the stone itself, or stronger connections to the west. Knife River flint is frequently mentioned as one of the more common exotics (e.g., 21NR11; Michlovic 1982:67).

For the Basswood Shores site (21DL90) in Douglas County, Justin and Schuster (1994) describe a single stone-tool production episode using Maynes Creek Speckled chert, which has a source in central Iowa and must have been carried or traded in. A projectile point tip and a crude "drill" were found, along with lithic debris from later stages of tool production (Justin and Schuster 1994:80).

In the Red River valley, the Mooney site (21MR2; Michlovic 1987) has a Woodland component (although it might be mixed), that appears to be Sandy Lake with Plains connections. Lithic resources include local materials as well as exotics, including Knife River flint and one piece of obsidian. Tools include three points (two poorly made, broken triangular items whose use as points is unclear, and an eared, side-notched, Oxbow-like point of Knife River flint); five bifaces, eight scrapers, eight utilized flakes, and lithic debris. Mass analysis of the debris suggested that the local and exotic materials underwent different processes.

Worked Bone, Antler, and Shell

A variety of different bone and antler tools might exist, but most assemblages are too mixed to separate out the Psinomani component. One of the tightest associations with a dated Psinomani context comes from Cooper Mound 1. Mather et al. (2000:17.3) reexamined bone tools from Cooper Mound 1 before repatriation and suggested that the bone needles were not from birds or other small animals as initially reported by Lothson (1972:97), but instead were made from the costal cartilage (sternal ribs) of a medium- to large-sized mammal. A bone whistle was likely made from the ulna or humerus of a goose. A unilaterally barbed harpoon and an arrowshaft straightener were from large mammal bones, too heavily modified to identify further. Three shell spoons of *Lampsilis cardium*, the plain pocketbook mussel, were also present with the Cooper burials.

Birk and Johnson (1992:209) describe the bone tool assemblage from Bradbury phase sites in Mille Lacs, though they do not specify which sites were used for this summary: "Bone artifacts are present but in small numbers. Deer ulna awls are common, bird bone whistles or flutes are present, unifacially-barbed points occur, and a variety of small round-in-cross-section awls are present. Missing from the assemblage of bone artifacts, except for one specimen, is the bison scapula hoe so common on Minnesota Oneota sites."

Other Artifacts

Because there are so few single-component or separable components of Psinomani sites, little is known about other artifacts in the assemblage.

11.6 Subsistence

There is a consistent problem with subsistence data at sites that have produced Psinomani artifacts. Subsistence remains have not been analyzed in conjunction with diagnostic artifacts to permit the attribution of particular remains to particular components. For a multicomponent site, it is problematic to discuss fauna and flora, and often lithics, as a single entity rather than by component. Sometimes the components cannot be separated, but more careful analysis of proveniences, particularly with respect to features, might provide better information. This is particularly important at Mille Lacs sites, such as Wilford and Cooper, which have abundant remains that seemingly cannot or have not been attributed to particular components (e.g., Bailey 1997; Lucking 1973; Schaaf 1981; Whelan 1990).

Despite these difficulties, some interpretations of Psinomani subsistence are possible. As will be discussed with settlement patterns, it is unclear whether the different subsistence strategies seen at sites in the prairie region along the Red River valley and at Mille Lacs in the forest-lakes habitat represent two adaptations or parts of the same seasonal round. For the Mille Lacs area, Johnson (1985:161) describes the subsistence pattern as including

> *a dependence upon large mammals of forest, ecotone, and prairie; a dependence upon the wild plant foods of local upland and aquatic habitats; and a significant utilization of fish, waterfowl, and molluscan fauna available locally. The subsistence pattern that emerges suggests a reasonably continuous intensive extraction of food*

resources from the locality, and intermittent seasonal incursions into the forest-prairie mosaic zone and into the more westerly grasslands to procure bison, elk and deer.

Faunal Resources

Our view of faunal exploitation for the Psinomani complex is biased by poor preservation, mixed components, little use of fine-screen recovery, and incomplete analyses of existing samples. Yet a fairly diverse assemblage of fauna is evident in faunal reports from Mille Lacs, the Red River valley, and the Headwaters Lakes region. Johnson (1985:158–159) discusses fauna from "the Wilford site's latest prehistoric component" that included bison, deer, elk, black bear, beaver, muskrat, weasel, and minor amounts of hare, cottontail, woodchuck, porcupine, timber wolf, raccoon, fisher, mink, otter, and skunk. Johnson says that the Cooper site had an identical list, with the addition of dog (citing Lucking 1973:25).

Johnson (1985) notes that bison would have been available on the prairies immediately west of Mille Lacs, and in the winter, in the prairie-forest mosaic vegetation zone, which also would have supported elk and deer (citing Shay 1985). He argues that bison are probably underrepresented archaeologically because populations in historic times reportedly went on both small-group winter hunts and larger, cooperative summer bison hunts some distance west and southwest of the Mille Lacs villages. Based on Hennepin's (1938:114–115) account of such a large-scale hunt, butchering and preserving of meat took place at or near the kill site, so that only some segments or none of the bison skeleton were returned to the habitation site. Johnson reports that except for horn cores, probably taken for the horn, bison elements at the habitation sites are limited to long bones of the legs. Johnson (1985), using estimates of available meat from mammals present at Cooper and Wilford in the Bradbury phase, suggests a breakdown of 30% deer, 30% bison, 15% elk, 9% black bear, and 7% beaver. Other classes of animals present include fish, waterfowl, turtle, and mollusks. Johnson says that fish provided 33% of the faunal contribution to the diet, but the relationship to the mammal contribution is not clear from the information he provides (citing Lucking 1973, Nowak 1969, and site analysis data on file).

Mather et al. (2000) agree that the Cooper, Wilford, and Vineland Bay sites at Mille Lacs were probably permanently occupied, as initially reported by Whelan (1990). The sites have similarities in faunal species present (though specific components have not been separated). Species from Cooper and Wilford include deer, painted turtle, beaver, muskrat, catfish/bullhead, and northern pike/muskellunge. Vineland Bay has deer, beaver, muskrat and painted turtle.

In the Red River area near the Plains, bison are more common. For the Mooney site (21NR29), Michlovic (1987:59) describes a faunal assemblage with 70% (by count) mammal, predominantly bison, 23% fish, and a few bird, amphibian, and reptile bones. He describes the adaptation as a "quasi-diffuse subsistence economy with a heavy reliance on bison and a secondary dependence on a variety of smaller mammals, and to a lesser degree on fish and reptiles." The site is in a prairie/gallery forest ecotone with resources coming from both environments.

For the Third River Bridge site (21IC46) in the Headwaters Lakes region, Mather (1998:27, 2005:163, 175; also Hohman-Caine and Goltz 1998) describes several features with excellent preservation at what appears to be a specialized fishing camp. Feature A, which produced Sandy Lake ceramics and an uncalibrated radiocarbon date of A.D. 1420, had 4,150 bone fragments, of which 99% were fish, with a Minimum Number of Individuals (MNI) of 23 white/longnose suckers and 6 walleye/sauger, plus other elements. The feature also yielded two bird and six mammal bone fragments. Feature D was also tentatively assigned to the Sandy Lake component and generated a radiocarbon date of A.D. 1225 (uncalibrated). It contained 5,756 bone fragments; again, 99% were fish, evenly split between white/longnose suckers (MNI = 16) and walleye/sauger (MNI = 17). In these two features, vertebrae made up only 11% of the fish elements, which Mather (2005:179) suggests reflects removal of the bodies for drying or smoking the meat and disposal of the fish heads. Exploitation of spring spawning was suggested by the suckers and walleye/saugers. The fish were probably taken by netting, spearing, or clubbing, or by hand (Mather 2005:179–181). Earlier Blackduck occupations with a similar focus on fishing suggest repeated visits to the site over a long period of time.

Floral Resources

Although it seems likely that Psinomani peoples harvested wild rice along with a full range of wild nuts, fruits, and berries, the archaeological evidence is frustratingly limited. Historic records describe Dakota peoples harvesting wild rice during the period that would mark the end of Psinomani. Some sites, such as the Wilford site (21ML12), have many charred seeds recovered from features through flotation (Bailey 1997), but the diagnostic ceramics that would confirm the temporal association of these remains have not been systematically studied to date the features. Other sites, particularly in the Mille Lacs area, are multicomponent, lack horizontal and vertical separation of components, and have evidence of more recent Ojibwe wild rice harvesting that is difficult to distinguish from precontact or protohistoric Dakota activities. The TH169 project through the Mille Lacs area tested a number of Late Woodland sites and conducted flotation, but the only floral remains recovered were wild rice grains from historic Ojibwe ricing pits, or uncharred seeds that must be presumed to be modern (Mather et al. 2000; Valppu 2000). Many sites that should have provided key information were excavated before flotation was common—for example, Lower Rice Lake (21CE5; Bakken 2006), which also lacks stratification or any other means of separating multiple components. Thus, there is still an overall lack of wild rice grains or other remains of economically important floral resources found in good context with diagnostic Psinomani artifacts; also lacking are well-dated features attributable to wild rice processing. Birk (1977a) mentions that wild rice grains are sometimes evident in the paste of some Sandy Lake ceramics, but no references to specific vessels and sites have been found.

Bailey (1997) reports many floral remains from the Wilford site (21ML12) but cannot attribute them to a particular component (1997:33), as described above. The ceramics, however, are predominantly Sandy Lake, so most of these specimens probably relate to the Psinomani occupation. Bailey's main focus is on the uses and distribution of tobacco, represented by 308 seeds. One tobacco seed from a feature within house structure 2 reportedly was associated with Ogechie pottery (1997:37–38), although at least some disturbance was evident within the structure. Other features outside the structure that might be associated with the Sandy Lake occupation also had tobacco. In addition, almost 11,000 wild rice seeds or fragments were recovered from the site; they were found in nearly every feature. Other carbonized flora include a range of weedy seeds; nuts such as butternut; fruits and berries such as hawthorn, bayberry, pin cherry, raspberry, elderberry, sumac, nightshade, blueberry, and grape; and grasses and sedges. Two fragments of corn might reflect local horticulture or, more likely, trade with other agricultural groups.

Schaaf (1981) floated a subsample of Feature 62 from the same site and also found hundreds of wild rice grains, along with tobacco, walnut, goosefoot, and weed seeds (although it is difficult to determine which seeds were charred rather than modern.) A student paper on the site (unidentified author, in Johnson 1975:26) notes an Onamia sherd and posthole from what appeared to be an earlier feature, and possibly that Onamia sherd and two Sandy Lake sherds in Feature 62 (Sue Richards, in Johnson 1975:42), making the feature's likely association Psinomani. However, these attributions have not been confirmed.

The large number of seeds Bailey and Schaaf report for the Wilford site suggest that, when wild rice is utilized intensively and archaeological plant remains are properly recovered and analyzed, the evidence for wild rice utilization will be unmistakable. Thus, the few isolated grains recovered from pre–Sandy Lake components suggest either that recovery was inadequate from all earlier occupations or that use of wild rice was significantly less intense than seen with Psinomani. However, as indicated earlier, since Sandy Lake components in good context are lacking, any such conclusions must remain tentative.

Nevertheless, wild rice exploitation is likely to have been central to Psinomani culture. Besides the plant remains, identification of specialized features similar to those described by Jenks (1900) should provide evidence for the role of wild rice in the complex. Gibbon (1994:145) suggests that Psinomani might have had the first "fully developed wild rice parching and storage technology," although the archaeological evidence for wild rice processing features is poorly dated, and it is unclear whether Psinomani sites have storage pits, so the nature of wild rice storage remains unclear. A report by the Leech Lake Heritage Sites Program (2002:130) argues that most or all "ricing pits" might be historic. Although no citations are given, the report notes, "Recently identified prehistoric ricing features from the Mille Lacs region are nothing more than large burned areas on the ground which contained a few rice grains. They were not pits, jigs, or basins, as commonly believed. Rice could easily be dried and parched over an average-sized campfire." Rice

parching features such as these burned areas were described by Mather and Nicholas (2000:7.13–7.15) from the Crosier site (21ML33).

For 21CE5, Bakken (2006) examined features with Sandy Lake pottery that are described as wild rice processing features. Feature 4 (2006:29) is described as a ricing jig pit lined with 6 cm of clay and associated with a smooth-surfaced Sandy Lake vessel with interior rim notching. Feature 13, also called a ricing jig pit, had a Sandy Lake Smooth rim sherd (2006:31). Feature 14 was a fire pit, possible lined with clay and having a Sandy Lake Stamped vessel as well as bird, mammal, and fish bone fragments. Bakken, however, says that "there are no clear associations between the ricing jigs and temporally or culturally diagnostic artifacts" (2006:68). It is unclear whether he thinks the features with Sandy Lake sherds actually date to that complex. The site evidently has a historic component as well, but there is little information beyond a mention that it is still used as a wild rice access point. The possibility of historic ricing features at the site is not addressed. No flotation has been undertaken for the site.

Squash seeds have been reported from a burial vessel in Cooper mound (Johnson 1985:160; Lucking 1973:51). Birk and Johnson (1992:227) describe an Ogechie vessel that contained wild rice and pigweed seeds. Based on Lucking (1973), Johnson (1985) reports a wide range of flora from the Cooper site, but the multicomponent nature of the site makes attribution to the Psinomani component difficult. Johnson mentions the presence of morning glory seeds, suggesting that they were significant because they are hallucinogens (Johnson 1985:160; Lucking 1973:50).

Phytolith analysis provides another avenue for understanding plant resource utilization. Thompson (2000:19.9) reports a phytolith assemblage comparable to wild rice from the residue of an Ogechie vessel at 21ML16.

The distribution of Psinomani complex sites is generally north of the line for successful corn agriculture, but Bailey (1997) recovered several fragments of corn from the Wilford site. There are other indications that at least some Psinomani groups might have been acquiring corn, probably through trade with Oneota or Plains Village agricultural populations. For Roosevelt Lake, Thompson et al. (1995:5.15) describes an AMS date of A.D. 970 from food residue on a sherd with vertical cord marking that suggests a Sandy Lake vessel. A carbon isotope ratio of -21.6, the least negative of any of the analyzed residues from the site, suggests consumption of tropical foods such as corn. There were too few phytoliths to determine whether the phytolith assemblage indicated corn, although starch grains were within the range of variation for corn. The authors (Thompson et al. 1995:5:15) report that the carbon isotope ratio is "nearly identical to that of a food residue from a vessel from eastern North Dakota which contained an assemblage of corn phytoliths and starch grains." They suggest that corn might have been obtained through trade. However, the Roosevelt Lake carbon isotope value is comparable to the range of -21.4 to -23.1 from burials at the Reigh site in Wisconsin, an Archaic Old Copper culture site with no evidence of corn. Agricultural populations at the Late Woodland/Middle Mississippian site of Aztalan in Wisconsin show values of -12 to -19 (Bender et al. 1981:349). Thus, the interpretation of corn from carbon isotope values should be treated with caution.

11.7 Mortuary Practices and Ideology

Birk (1977a:31) provided an overview of the complex as he understood it at the time, including "Sandy Lake ceramic wares; intrusive mound burials; … circular mound with shallow burial pits; primary flexed interments with associated mortuary vessels." Few burials are known to be associated with Psinomani. These include burials from two mound sites, one nonmound site, one site with both mound and nonmound burial contexts, and a site of unknown context (Arzigian and Stevenson 2003:101–102). Based on work at the Norway Lake site (21CA22), Birk (1977a) speculated that burial in mounds might represent a special mortuary treatment, with more remains occurring in village midden deposits. Norway Lake is a multicomponent habitation site with one conical mound that apparently dates to the Psinomani complex. Most of the mound was excavated by avocational archaeologists in 1958 after it was endangered by cabin construction. The excavators found a probable primary flexed burial in a shallow submound pit or depression, associated with a Sandy Lake vessel and unworked mussel shells. Birk (1977a:29) discussed the significance of the burial:

> *While "pure" Sandy Lake archaeological deposits are known from elsewhere…it is the burial mound itself that is unique. The Norway Lake mound burial—a primary flexed interment exclusively associated with Sandy Lake pottery—is paralleled in type by only two intrusive "Sandy Lake" burials at the Osufsen Mound Site (21-IC-2)*

in Itasca County. Considering the wide spatial and temporal parameters for Sandy Lake and the suggested high human population density for this period in the Mississippi Headwaters region (Johnson 1969[a]:35), it is likely that these three isolated mound burials represent some form of status interment rather than a common mortuary practice. Unpublished data suggest that a more ordinary method of inhumation may have been within shallow pits excavated in midden deposits or other areas within or close to habitation sites. If the Norway Lake mound is typical, exclusive Sandy Lake mound burials may be widely unrecognized because of their small size and singular occurrence.

As noted above, Birk interpreted two intrusive burials at Osufsen as Psinomani, although he did not specify which burials. Wilford (1943b) reported two intrusive burials at the site, one of which he presumed to be an original, primary burial in the mound fill associated with a possible Sandy Lake vessel. At the Leland R. Cooper Mounds (21ML16), both mound and nonmound burials were present. One disarticulated, primary burial of an adult male with a crushed Sandy Lake vessel in direct association was found in a nonmound context (Aufderheide et al. 1994:295). Mound 2 had Sandy Lake pottery in the mound fill, possibly dating the central burial pit, which had a primary flexed burial. Elsewhere, an isolated primary burial with a Sandy Lake vessel was reported by a landowner at the Tip Top Inn Resort (21CW207), according to a 1956 Wilford memo. For the Episcopal Mission site (21BL8), there were reports of human remains eroding out of a riverbank in 1958 and again in 1980, but it is not known whether the remains were from one of the site's eroded mounds. The site form says, "About 1960 a cave-in of the river bank near this point revealed a flexed primary burial of an old female together with an almost complete pot of Sandy Lake ware." Burials at unnamed site 21BL31 in Bemidji also have produced Sandy Lake pottery, although their mound or nonmound status is unclear (Peterson et al. 1998). At the Thunder Lake Burial site (21CA506), three disturbed nonmound burials were encountered, and Anfinson identified Sandyota-like sherds (personal communication, 2008).

Birk (1979b:178) notes that a check-stamped mortuary bowl similar to those at Osufsen and Norway Lake was associated with two bundle burials in a small burial mound at the Cotton Lake Island site (21BK20): "These interments underlie a multiple and intrusive, primary flexed (?) burial associated with what is probably an incomplete Sandy Lake mortuary bowl. Single, low-profile mounds with primary flexed burials and associated Sandy Lake mortuary vessels" are defined as characteristic for Wanikan/Psinomani. Birk says bundle burials have not been reported with other non-check-stamped varieties of Sandy Lake ceramics.

Burials at Cooper Mound 1 (21ML16) contained both Sandy Lake and Ogechie vessels in direct association with French Period trade goods. Mound 2 contained only Sandy Lake artifacts, with no European trade goods; this might indicate either a slightly earlier, precontact date for Mound 2, or a different burial pattern, since the remains are those of a female. Streiff (1994) argues that the chronological explanation is more likely.

A feature approximately 4 × 5 m across and up to 35 cm deep, containing possibly 500 black bear skulls, was found at the Elders' site (21ML68) and has been left in place. Mather and McFarlane (1999) note that this feature fits within a circumpolar pattern of bear ceremonialism and might have been deposited after a winter bear hunt or series of hunts. Artifacts identified as probable Sandy Lake and Oneota/Ogechie/Sandyota, including smooth-surfaced sherds with grit and shell temper and a quartz triangular point with serrated edges, were recovered from the vicinity of the bear feature, and some flakes and fire-cracked rock were found within the feature. Other bear features have been identified from earlier contexts, including the Crace site (21ML3) and Christensen mound (21SH1/16) (Mather and McFarlane 1999:7).

Other possible indications of ceremonialism might be the tobacco and morning glory (hallucinogen) seeds recovered from some sites in Mille Lacs, as discussed earlier.

11.8 Social, Economic, and Political Organization

As with the other Woodland complexes, there is little hard evidence related to Psinomani social and political organization. Distribution of exotic resources, particularly lithics, is the main source of information on trade networks and economic organization. With Psinomani, however, links to the historic era allow some additional speculation on precontact practices. For example, the historic Dakota at Mille Lacs (Birk and Johnson 1992) traveled widely and had trade connections or knowledge of areas from the Great Lakes to the Missouri River, north to Lake Winnipeg and

south to Illinois, with movement of ideas, information, people, and materials throughout this area. Such a broad network might also be evident in the precontact record. Michlovic and Schneider (1993) discuss the connection between Sandy Lake pottery and Dakota peoples. If the area of distribution of Sandy Lake pottery really represents an area of active use by a group of people, then the procurement networks, exploitation of the Plains, and trade networks noted for the historic era (such as trade fairs described by Ewers 1968) might provide a model for earlier interaction and movement. Fortified sites such as the Plains Village tradition Shea site (32CS101; Michlovic and Schneider 1993) also suggest a certain degree of regional conflict as part of social interaction and strife.

As discussed with the lithics, the distribution of Knife River flint might be another indicator of strong connections to the west. Justin and Schuster (1994) report that most of the lithic materials at site 21DL90 were nonlocal, with the most common being Maynes Creek Speckled chert from central Iowa (Morrow 1984, 1994), and no evidence of local cherts being used. With a radiocarbon date of A.D. 1750 (uncalibrated), this site suggests considerable movement of people and/or artifacts, at least at this time.

Gibbon (2003:38–39) argues that the emergence of Psinomani in central Minnesota, which he places at about A.D. 1300, reflects a major change in social and political structure. He presents a model for tribalization of the culture and suggests that this change might have come about as a result of interaction and conflict with Oneota and other Upper Mississippian groups. However, there is currently little archaeological evidence to support the model, particularly the social and political aspects. Thus, examining this model would be an important area of future research. Gibbon (2003:39–40) says:

> *In contrast to the band social organization of earlier groups, the Psinomani were a tribal society consisting of thousands of people. The lived for much of the year in larger, more permanent villages that clustered together to facilitate defense and economic cooperation. There were perhaps as few as ten or eleven of these clusters. This means that many counties in central Minnesota lack evidence of a Psinomani presence.*
>
> *These scattered village clusters with their associated mortuary facilities were integrated through kinship ties, sodalities, friendships, and temporary alliances, and could have acted as focal points for social and political activities. Smaller camps for hunting, fishing, ricing, and other specialized activities were located for the most part within several kilometers of the central villages. However, even the central villages were no more than hamlets, with Cooper an estimated 1 hectare (2.5 acres) in size and Wilford a half hectare (1.2 acres); the largest, the Vineland Bay site (21ML7), was probably only 3-4 hectares (7.5-10 acres) in size. Like the Oneota to the south, the Psinomani – the ancestral Sioux – might have intensified the harvesting of a grain (here wild rice) to feed their concentrated populations, for other local food resources would have been rapidly depleted if they were the sole source of food energy. This process of intensification might have included the adoption of some aspects of the maize roasting and storing complex of southern horticulturalists*
>
> *In this scenario, Sioux ethnic identity was established with the aggregation of scattered family groups into clustered villages and the formation of tribal alliances. Psinomani camps like the Upper Rice Lake site in Clearwater County that are outside these settlement aggregations are uncommon and probably mark zones of specialized seasonal utilization or exploitation. The new Sandy Lake ceramics, which blend both Oneota (shell temper) and traditional Woodland (cord-marking and some grit as temper) elements, are one social symbol of this emerging, large-scale ethnic unity. Presumably, distinctive hairstyles, clothes, and other readily visible cues were also used to set themselves apart from the groups they were competing with. A measure of the strength of their intergroup social network and the magnitude of the external threat is the uniformity of Sandy Lake ceramics throughout the vast southern portion of the northwoods. Like other tribal societies, Psinomani tribal divisions were segmentary lineages that joined in shifting combinations in response to the magnitude and direction of external, hostile social interactions. At other times, they remained autonomous social groups that might have fought each other.*

Gibbon (2003:219) lists these possible settlement clusters and notes that determining their number and location is an important area of research: Mille Lacs Lake, Big Sandy Lake, Knife Lake, Red Lake, Leech Lake, Lake Winnibigoshish, Yellow Lake (Wisconsin), Pokegama Lake, and Bay Lake.

11.9 Cultural Relationships

Important aspects of Psinomani cultural relationships includes origins in earlier complexes, ties to historic Siouan peoples, and relationships with contemporary cultures to the west, north, and south, Although such cultural connections are usually marked by the distribution of characteristic ceramics, Psinomani is not coterminous with Sandy Lake and Ogechie ceramics. Not all sites with Sandy Lake pottery are included within Psinomani, particularly beyond Minnesota. This is particularly true to the west, where Sandy Lake pottery is found on Plains Village sites.

Discussions of the origins of Psinomani consider radiocarbon dates and the contrast between Sandy Lake and earlier ceramics. Thomas (2000:14.62) describes a sharp change from pre–Sandy Lake to Sandy Lake ceramics in terms of temper, vessel form, decorative motif, and a lack of transitional forms. Gibbon (1994:146) notes that Psinomani resembles earlier cultures, except for its ceramics. Bakken (1994:75), however, does mention some possible transitional forms: "In some respects, many vessels from the site [21CE5] seem to be intermediate between Onamia/St. Croix and Sandy Lake. This idea, although difficult to evaluate without good stratigraphic and chronological control over the sample, deserves further consideration based on better evidence."

Debate continues on whether Psinomani reflects a population replacement or an in-situ development. Some distinct differences between Psinomani and earlier complexes have been proposed; as discussed in the case of social and political organization above, Psinomani origins during the time of Upper Mississippian development in the region could explain these differences. Gibbon (1994:148) discusses the process of developing cultural complexity that might have been at work with Oneota, Plains Village, and Psinomani:

> *The process refers to the appearance and elaboration of structurally decentralized and functionally generalized multicommunity alliances for nonaggression, mutual defense, and exchange among dispersed "egalitarian" populations. The causes of the process are as disputatious as its definition.…In the emerging set of models for the upper Mississippi Valley, the gradual elaboration of Woodland cultures and their rapid transformation to Oneota, Plains Village, and Psinomani cultural systems are regarded as historical processes "involving the reorganization of productive relations and the development of pan-ethnic symbols of dominance" (Benn 1989:233); eventually, the expansive organization of the Oneota and Psinomani production systems resulted in their domination of the prairies and mixed deciduous-coniferous forests of the upper Valley.*

Alternatively, Psinomani might reflect a new population moving into the area. Bakken (1994:134) reviews this debate on

> *the apparent displacement of Blackduck populations by Psinomani (Sandy Lake) populations. Lugenbeal (1978a:50) notes the absence of "late Blackduck" (i.e., post AD 1000) ceramics in this region. These "missing" ceramics are what Lenius and Olinyk (1990) would identify with the "Rainy River Composite," and which they associate with other social reorganizations taking place farther to the north. A number of authors have noted the association of these ceramics with Algonkian, although not necessarily Chippewa, populations (Lenius and Olinyk 1990; Lugenbeal 1978a; Dawson 1987). This displacement could represent a 'takeover' of the region by Psinomani populations, or alternately a "withdrawal" on the part of the Rainy River populations related more to their own social reorganization than to competition with the Psinomani.*

Western connections are also of interest. Psinomani was contemporaneous with and probably interacted with Plains Village groups, particularly along the Red River. Sherds of Northern Plains Village ceramics are found at Sandy Lake sites, and vice versa. For example, the Shea site (32CS101), a fortified agricultural village in South Dakota (Michlovic and Schneider 1993), has Sandy Lake pottery similar to that found in central Minnesota. The site also has a few Oneota sherds as well as Plains Village ceramics. Michlovic, however, includes the site within the Plains Village tradition. It does not meet the criteria for a Woodland site as considered here, because it shows extensive use of corn agriculture, as indicated by hoes and numerous cobs, as well as bell-shaped pits and houses within a fortified village.

Sherds that reflect other regions are also found at Psinomani sites, as discussed above with the ceramics. Michlovic (1985) argues that the Plains adaptation of Psinomani Dakota peoples was precontact in origin, rather than a function of historic influences. The presence of Knife River flint also suggests connections to the west.

Michlovic (1983:27–28) discusses the Red River valley and interaction between Plains and Woodland areas during historic and precontact times within the context of the Syms Co-Influence sphere (Syms 1977), in which multiple

groups might use a single environmental area or, conversely, a single group might use multiple environmental resource zones, as discussed later in the case of settlement patterns (Michlovic 1983:27). Michlovic notes the abundance of habitation and mound sites with contemporary ceramics such as Sandy Lake, Ogechie, Blackduck/Kathio, and Plains forms. He argues that "by late prehistoric times in the Red River Valley and adjacent Plains there had developed an inter-digitation of Woodland and Plains cultures produced by the multi-ethnic utilization of this environment and some degree of actual trade" (1983:28).

Farther to the north, sites seem different and might represent a different culture or a different historical connection. The participants in the 1988 Lake Superior Basin Workshop came to an informal consensus that the Sandy Lake cultural affiliation was Assiniboine, based on historic reports of the spread of the Assiniboine during the historic era. The broad geographic range would seem to argue for the affiliation of multiple Siouan groups with the precontact Psinomani complex.

Sandy Lake pottery appears to overlap in time and space with Selkirk pottery. Meyer and Hamilton (1994:124) discuss some sites from the Boundary Waters and Lake of the Woods areas that have Sandy Lake sherds with Selkirk attributes, such as fabric-impressed surfaces. They speculate on whether this pattern reflects cultural contact and attribute borrowing, or a cultural relationship between Sandy Lake and Selkirk. They note that some sherds previously classified as Selkirk have been reclassified as Sandy Lake (citing Participants of the Lake Superior Basin Workshop 1988:50, for Selkirk pottery from the Wanipigow Lake site).

The presence of Ogechie sherds as local variants of Oneota pottery suggests some connections with Oneota agricultural populations to the south, east, and west of Psinomani. Anfinson and Dobbs (1994) report that a few Sandy Lake sherds have been found at the Bryan site, a Mississippian site in Red Wing.

A direct historical connection seems likely between Psinomani and Siouan-speaking peoples. At Mille Lacs the connection is made to the Mdewakanton Dakota (Birk and Johnson 1992) based on Bradbury phase Psinomani materials found in good contexts with early French artifacts, particularly at Cooper Mound 1 (21ML16), and also on historic narratives such as that of Hennepin, who wintered with the Mdewakanton Dakota at Mille Lacs in 1680. However, the historical connections for other Psinomani regions and how they relate to other Siouan peoples remain unclear: "There is general agreement that the Psinomani Context represents Siouan speaking peoples. However, whether they may have been proto-Assiniboine or proto-Eastern Dakota is still a matter of debate (Birk 1977a:31, 1979[b]; Arthurs 1978:62; Lugenbeal 1978a:50–51)." Meyer and Hamilton (1994) note that the distribution of the northernmost Sandy Lake ceramics might be tied to the northern branch of Siouan-speaking peoples, the Assiniboine (citing Arthurs 1986:263–263), though this is still debated (Anfinson and Dobbs 1994:1).

11.10 Demography and Settlement

Johnson (1984) is often cited for his suggestion that Late Prehistoric populations at Mille Lacs underwent a major population increase as a result of mastering the harvesting and storage of wild rice. Johnson's statement has probably been misinterpreted or extrapolated to unintended situations. Johnson called all Woodland groups after about A.D. 600 "late prehistoric" and based his interpretation of population increase on the increase in the number of Late Prehistoric sites over those known for Malmo. However, his discussion of the Late Prehistoric does not distinguish between its various component cultures—the Isle, Vineland, Wahkon, and Shakopee phases, encompassing the Central Minnesota Transitional Woodland, Blackduck-Kathio, and Psinomani complexes. Although a population increase through time might well have occurred, it cannot be verified from the information Johnson provides.

For early historic Dakota peoples living in the Mille Lacs locality, Birk and Johnson (1992:216-219) discuss possible population levels and social organization. Families with multiple wives were noted by the French. Hunting parties of several hundred families are thought to have been drawn from several multifamily villages. Birk and Johnson cite other early estimates of the Dakota population in east-central Minnesota as 1,000 to more than 3,000 people.

Settlement patterns for Psinomani are still being debated. There is little direct evidence to support interpretations of season or duration of occupation, but general interpretations of the data have been proposed. Gibbon (2003:28) contrasts his view of Psinomani settlement patterns with that of Johnson, who saw basic similarities between

Psinomani and earlier complexes. Gibbon describes the Psinomani settlement pattern at Mille Lacs as consisting of clusters of villages and camps in widely separated localities, with intervening areas used only by seasonal extractive groups. He contrasts this pattern to the scattered settlement pattern of earlier groups. He calls Cooper (21ML9) and Wilford (21ML12) year-round Woodland villages with large house structures, although he does not know whether they date to the Shakopee or Bradbury phases. Seasonal bison hunting camps would be represented by sites such as Mooney (21NR29). However, there is little archaeological evidence of house structures; rather, much interpretation relies on ethnographic analogy.

Johnson (1985:161) postulates the exploitation of prairie, prairie-forest ecotone, and forest, with large mammals taken from each zone, wild plants from local upland and aquatic habitats, and other aquatic resources such as fish, waterfowl, and mollusks available locally. He suggests fairly continuous exploitation of the Mille Lacs locality, with seasonal incursions into the forest-prairie mosaic and to the western grasslands for large mammals such as bison, elk, and deer. He also suggests that a forest/prairie edge adaptation extended into the past, possibly back to the Archaic, and forward into the historic period. He disputes the idea of a "forest" homeland for the Mdewakanton (as cited by Landes 1968:9) and suggests instead that they were "forest fringe dwellers" (1985:163). He also argues that the Mdewakanton actively maintained prairie vegetation through fire, unlike the Ojibwe, whom he describes as a true forest group.

Birk and Johnson (1992:211) offer the following interpretation of settlement pattern:

> *Site sizes are small and the pattern is best described as a series of hamlets rather than villages (though "village" is the term used by seventeenth-century French observers). The Wilford site had no more than two or three houses occupied at any one time, the Cooper site may have had five or six houses, and the resident population at each probably numbered no more than fifty or sixty people. These habitation sites were likely occupied most of the year, at least by some members of the group, and thus the pattern is nearly sedentary, with large seasonal communal hunting parties leaving the villages for extended periods.*

For the Bradbury phase at Mille Lacs, Birk and Johnson (1992:211) suggest that:

> *The settlement pattern is one of lakeshore habitation, with the location either on a small protected bay on Mille Lacs Lake, as at Vineland, or on the small outlet lakes, as at Wilford, Cooper, and Aquipaguetin Island. Each habitation site has an associated burial mound group, the number of mounds ranges from two at the Wilford Site to perhaps fifteen at Vineland Bay. This association of burial area immediately adjacent to the habitation area persists in Mdewakanton culture into the nineteenth century—long after the construction of burial mounds ceased.*

Small sites throughout the range of Psinomani are part of the projected annual round, and are important as components of the overall subsistence-settlement system, as argued by Justin and Schuster (1994) for Basswood Shores (21DL90).

Syms's Co-Influence Sphere (Syms 1977), as discussed by Michlovic (1982:27), offers a way of viewing the multiple uses of divergent environmental zones: "Any region may be seen as a significant resource procurement area for many people, although it may be the primary region for only one of the groups involved. Multi-environmental use by single ethnic groups, and multi-ethnic use of a single environmental area, are key notions of the Co-Influence Sphere model."

Review of the published and grey literature on houses and features provides little definitive, well-dated information on this topic. Birk (1977a:31) mentions formally prepared ricing jigs or threshing pits, fire hearths and pits, and middens, but it is hard to find specific, dated features in the literature. Ricing features were discussed earlier with the floral remains. Some postholes might have been found with the Sandy Lake components at Portage Creek (Hohman-Caine and Goltz 1997), but no clear structure patterns were apparent. A large rectangular structure was reported for the Wilford site (21ML12) in a student paper, and apparently had Sandy Lake sherds (Fristad 1975), though neither the context nor the artifacts have been confirmed. Michlovic and Schneider (1993:118-119) note that the cylindrical and bell-shaped storage pits typical of Oneota sites are not known from Sandy Lake/Ogechie sites. Middens at the Creech site (Johnson 1991b:4) were described as small, roughly circular mounds of earth and cultural debris 20 cm high and 2.5 m in diameter. Johnson (1991b:5) also refers to a large midden at the Cooper site.

The Basswood Shores site (21DL90; Justin and Schuster 1994) was a multicomponent site, but a localized concentration in the northern part of the site contained a single component with Sandy Lake pottery. Excavation of a block of 22 units 1 × 1 m in size identified discrete concentrations of artifacts, including lithics, ceramics, and bone, and areas with "sharply defined artifact densities. This suggests that the concentrations may represent an activity area relating to a single occupation of the site" (1994:78), which the authors note is rare and has significant research potential.

Although researchers have offered additional interpretations of site patterning, supporting evidence is often problematic or less than adequate. For example, Birk and Johnson (1992:209–210) offered the following general interpretation for Bradbury phase sites at Mille Lacs:

> *Although moderate sheet trash is present on the sites, each habitation site has one or more distinct midden deposits on the lake edge. House floors are relatively clear of debris, suggesting a pattern of keeping living areas free of accumulating trash. The most common features in these sites, other than post molds, are shallow, circular, basin-shaped pits. The majority of these form the base of wild rice threshing pits whereas some are fire pits. The latter are present both inside and outside structures. Those outside appear to have been hearth areas where wild rice was parched. The only deep pits are single ash pits within semisubterranean houses; there are no deep storage pits.*

Unfortunately, each site also had a historic Ojibwe occupation, and identifying features as Bradbury phase versus Ojibwe can prove difficult. As noted earlier in the discussion of floral remains, identifying the function and age of suspected ricing features can also be difficult. Could the Ojibwe occupation be the source of the "wild ricing threshing pits"?

Birk and Johnson (1992:210) also report that

> *Bradbury Phase house forms include the surface summer house, which is rectangular and varies from six to twelve meters in length. This structure has very large corner posts and one or more central fire pits. It is probably like the rectangular, gabled bark house built by the Mdewakanton in their nineteenth-century villages. The winter house is rectangular, has a sunken floor, an entry ramp, a central fire pit, and a deep ash pit. A narrow platform along one or more sides probably served as a sitting or sleeping bench.*

These inferences about house structures are based heavily on ethnographic information using the direct-historic approach, and on large depressions, postholes, and features observed at some Mille Lacs sites. However, virtually all of the sites in Mille Lacs Kathio State Park have not been adequately described with comprehensive reports detailing both excavations and results. Thus, inferences about potential house structures are risky in the absence of the supporting data.

11.11 Principal Sites and Property Types

Principal Sites

The following sites are from Anfinson and Dobbs (1994:3), Birk (1979b), and others:

21AK9	Battle Island (predominantly Sandy Lake pottery and one Oneota sherd, with some Blackduck and St. Croix pottery)
21AK18	Miner's Point (might have a pure Psinomani occupation?)
21BK1	Mitchell Dam (Sandy Lake rims associated with Blackduck rims)
21BK20	Cotton Lake Island
21CA1	Scott (Blackduck and Psinomani)
21CA14	Creech (possibly stratified midden with Blackduck and Sandy Lake pottery)
21CA22	Norway Lake (part of initial definition of Sandy Lake pottery; unstratified Middle and Late Woodland habitation site, including St. Croix, Blackduck, Sandy Lake, Ogechie ceramics, and Psinomani burial mound)
21CA52	Portage Creek (multicomponent Woodland with early and late Psinomani components as well as Malmo, Blackduck, and Brainerd ceramics)

21CA138	Onigum Marina (single-component site)
21CA169	Nushka Lake (multicomponent Sandy Lake and Brainerd site, with horizontal and vertical separation between the two, although artifact frequencies are low given extent of excavations)
21CA506	Thunder Lake Burial (mortuary-nonmound)
21CE4	Upper Rice Lake (has substantial Sandy Lake ceramics, but also at least a Blackduck ceramics component [cannot tell early or late] and sherds related to other types such as Laurel; no field notes, so cannot separate out the different components spatially or link the faunal analysis to any particular component)
21CE-5	Lower Rice Lake [NRHP] (multicomponent, with no vertical stratification; ceramics include Brainerd, St. Croix, Onamia, Blackduck, Sandy Lake, Plains Village)
21DL90	Basswood Shores (site might be multicomponent but there is a distinguishable short-term Sandy Lake component, with an early historic date of A.D.1660–1840)
21IC1	White Oak Point [NRHP] (no meaningful stratigraphy)
21IC2	Osufsen (Sandy Lake pottery with two intrusive burials in Blackduck mound)
21IC46	Third River Bridge West (multicomponent with Blackduck predominant, also Bird Lake, Sandy Lake, Duck Bay ceramics. Little vertical stratigraphy, but some features with excellent bone preservation could be attributed to a specific component with diagnostic ceramics and radiocarbon dates, including a feature with a thick solid layer of more than 50,000 fish bones.)
21ML2	Aquipaguetin Island (multicomponent with no real stratigraphy; ceramics include St. Croix, Kathio, Clam River, Sandy Lake, Ogechie)
21ML6	Indian School (includes Robbins Mounds; multicomponent, with Malmo, Brainerd, Onamia, Kathio ceramics most common, also some Ogechie ceramics; though existing excavation data cannot be separated by component, Rothaus et al. 2005:102 argue that intact undisturbed deposits with potential stratigraphic differentiation might still exist at the site, and they recommend it as highest priority for preservation or intensive excavation.)
21ML7	Vineland Bay (ceramics including St. Croix, Onamia, Kathio, Sandy Lake, Ogechie, Malmo, Blackduck, possibly Brainerd; also French artifacts)
21ML9/16	Cooper habitation site and mounds [NRHP] (Dakota and French materials in association; also precontact with St. Croix, Kathio, Ogechie, and Sandy Lake ceramics, and historic Ojibwe; one mound had an Ogechie pot with French artifacts in a burial. Thomas 2000:14.23 indicates over 100,000 sherds excavated but most unanalyzed; he suggests [2000:14.24] that the site has both the artifacts and context to refine the local chronology.)
21ML10	Saw Mill [NRHP] (extensively disturbed; historic ricing pits pre-1900; Brainerd, Ogechie, and Sandy Lake components)
21ML11	Petaga Point [NRHP] (multicomponent, Archaic, Kathio, St. Croix, Sandy Lake ceramics, Psinomani including early historic artifacts; some separation between Archaic and Woodland occupations, but no separation within Woodland components; never fully analyzed)
21ML12	Lloyd A. Wilford [NRHP] (Mdewakanton Dakota and French materials in association; also precontact, predominantly Sandy Lake ceramics, but formal analysis not done and earlier ceramics are present; needs ceramic and feature analyses to provide context for floral data from Bailey 1997)
21ML18	Bromley Griffin [NRHP] (habitation and mound group; Malmo, Onamia, Sandy Lake, and Ogechie ceramics)
21ML20	Old Shakopee Bridge [NRHP] (badly mixed, Kathio, St. Croix, Sandy Lake ceramics)
21ML21	Cunz [NRHP] (habitation and mound; only surface collections and limited testing; Sandy Lake and Ogechie ceramics; possibly also Malmo)
21ML33	Croiser Cemetery Mounds and Habitation (at least Psinomani, Brainerd)
21ML68	Elders' (large bear ceremonial feature)
21NR9	Canning [NRHP] (well-preserved discrete and buried Archaic bison processing component; Sandy Lake component badly disturbed and predominantly plow zone but no other Woodland components reported at the site, so the Woodland assemblage might be considered effectively single-component)
21NR29	Mooney (predominantly Sandy Lake; some Late Archaic/Initial Woodland occupation)
21SL82	(no name) [NRHP] (multicomponent with Laurel, Blackduck, Psinomani)
21WA49	St. Croix River Access [NRHP]

Property Types

Based on the existing literature, these property types should exist for Psinomani:

Habitation sites: An example of a habitation site is 21DL90, which the excavators described as a temporary camp (Justin and Schuster 1994); the artifact variety suggests that the site was not merely a hunting station or a limited-activity area, but instead a temporary habitation site where multiple activities occurred. The sparse nature and small size of the site suggest that it might have been a single-use occupation of relatively short duration. Another site where it might be possible to separate different components is Indian School (21ML6).

Resource-procurement sites (e.g., quarry site, fishing camp, bison-hunting site, wild-ricing site): Third River Bridge (21IC46) might be an example of a fishing camp because of features with many thousands of fish bones.

Special-use sites: These sites could encompass a range of special activities, most of which have not yet been defined for Psinomani. The Elders' site (21ML68), with a large feature containing about 500 bear crania, might be a special-use ceremonial site (Mather and McFarlane 1999).

Mortuary sites–mounds. Cooper (21ML16) is an example of a mound site, with Mound 2 attributable to Psinomani based on an Ogechie pot and French artifacts with a burial.

Mortuary sites–nonmounds. Thunder Lake (21CA506) reportedly has Sandyota-like sherds with nonmound burials.

11.12 Major Research Questions for the Psinomani Complex

In addition to the statewide research themes identified in Section 1.5, the following are some important directions for future research on the Psinomani complex:

Origins of Psinomani. The origins of the Psinomani complex and Sandy Lake ceramics are poorly understood. From current research it looks as though Psinomani overlaps at least Blackduck, but the nature of this transition or replacement is still unclear and is in need of further study. Additional radiometric dates are needed in tight association with both early Psinomani components and later components of the other complexes. As Anfinson and Dobbs (1994) have asked, "Does the appearance of Sandy Lake and the disappearance of antecedent cultures and/or ceramic types represent succession or evolution of different archaeological cultures, or does this represent displacement of one population group by another?" Do these ceramics really represent a movement of new people into the area, replacing the Rainy River Late Woodland/Blackduck people or living beside them? If there was a movement into an area, then presumably the lithics on these initial Psinomani sites might represent a profile more similar to that of another area. With time, one might expect Psinomani sites to become more similar to the earlier pattern, if the earlier Rainy River and Blackduck lithics were largely of local origin. The same could apply to the pottery. Physical methods such as neutron activation analysis might show a trend through time in Psinomani pottery in a given area, reflecting a reduction in the number of vessels brought with the group vs. those made from local clays.

Relationships between Psinomani and neighboring complexes. Psinomani emerged within the period of post-Mississippian influence in Minnesota, including both Oneota and the Middle Missouri tradition of Plains Village cultures. What are the chronological parameters and relationships of these cultures in Minnesota? Was Psinomani a function of Mississippian influence? At sites such as Mooney, Sandy Lake pottery and Plains Village wares overlap. Does this pattern indicate two contemporaneous groups of people interacting, one culture evolving into the other, or one community making multiple ceramic wares? What kinds of Psinomani artifacts are found at sites of other complexes, and vice versa? What kinds of resources, people, and ideas were being exchanged? Where were the trade routes (based on exotics and other resources)? What was the relationship between sites in the Red River drainage and those farther east, including at Mille Lacs? Were these sites part of one settlement system, with people moving between the two areas seasonally? Or do they represent two separate cultural systems or ethnic groups? Potential avenues of study include lithic raw material sources, ceramic clays, ceramic decorative motifs, and other ceramic attributes. Movement of corn, wild rice, and bison might be traceable.

It is likely that at least some additional Ogechie ceramics exist but have been classified as Oneota or local variants of Oneota. Anfinson and Dobbs (1994) report that a few Sandy Lake sherds have been found at the Bryan site, a Mississippian site in Red Wing. A closer examination of "Oneota" and Plains Village ceramics at sites that also have Sandy Lake pottery could aid in evaluating relationships. Likewise, are any Sandy Lake sherds found at contemporaneous Oneota sites, as is the case at the Plains Village Shea site in eastern North Dakota (Michlovic and Schneider 1993)?

Historical connections. Does Psinomani represent proto-Siouan speaking peoples, as suggested by the participants at a Lake Superior Basin Workshop (Participants 1988)? What specific connections can be made with particular Siouan groups? What was the nature of the interactions between Native peoples and early Europeans? What cultural changes did the Dakota undergo during the early postcontact era, including the conflict with the Ojibwe and the final abandonment of the Mille Lacs area? Did access to copper, brass, iron, and other trade items have an effect on Native stone, bone, and ceramic technologies? Given the geographic extent of Psinomani, and more broadly of Sandy Lake ceramics, how does the historical connection vary across the region? Are the people proto-Assinboine, proto–Eastern Dakota, or both, depending on the region under consideration? If the Psinomani at Mille Lacs are connected to the Mdewakanton Dakota, what connections can be made for groups in the Mississippi Headwaters or the Red River valley? DNA studies of human remains from historic and precontact populations might be useful in this regard. In addition, study of early Euro-American contact sites might show what aspects of Psinomani culture were changed by contact.

Ceramics. There is a need for developing a better understanding of the spatial distribution and regional and temporal variations for Sandy Lake and St. Croix, Onamia, Selkirk, and Blackduck pottery, along with detailed attribute analysis. The occurrence of different tempers in Sandy Lake pottery needs to be explored for its temporal, regional, technological, and social implications. Likewise, variation in surface treatment needs to be examined. Bakken (1994:71) notes the wide range of variation in cordmarking, including some fine or indistinct patterning that might be confused with fabric impressions, and also wonders whether the type of cordmarking might have chronological significance. What is the relationship to check-stamped ceramics (after Birk 1977a:32)? Is stamped surface treatment exclusive to Sandy Lake? Such research might also allow better attribution of undecorated body sherds to type. Currently, most researchers seem to attribute undecorated, cord-roughened body sherds to Sandy Lake only when the sherds are shell tempered.

Dating houses and features. Another major research topic would involve reanalysis of diagnostic artifacts and their contexts to precisely (or at least better) date potential house structures, different feature types such as jig pits, and other features and to attempt to verify or correct interpretations made to date. Some generalizations about feature types and house structures have been presented, but it is difficult to identify the original archaeological records that led to such interpretations. In at least one case, Elden Johnson (1984:12) clearly noted that there was no definitive archaeological evidence for his argument that a shift from diffuse to focal adaptation was due to a system of drying, parching, and storing wild rice. Yet, this interpretation is often repeated as if it is well documented. The Old Shakopee Bridge site (21ML20) had a series of ricing jigs, but Gibbon (1976) refused to attribute them to a specific occupation and described his tentative attributions as "clearly unsatisfactory" (1976:25). Yet, Gibbon's reluctant suggestions have been repeated as if they were definitive identifications of features and a house structure.

Other features at Psinomani sites need to be examined more carefully in terms of both age and function. For example, how old are palisades, and what other evidence of conflict is present? Other key research questions deal with the processing and storage of wild rice. It remains unclear when specialized "ricing jigs" began to be used, how wild rice fit within the rest of the harvesting economy, and what if any changes occurred in the rest of the complex with wild rice processing and exploitation. Contemporary Oneota sites, such as those at La Crosse, Wisconsin, have abundant wild rice along with corn, but no specialized wild rice processing pits have been identified (Arzigian 1989). A comparison of historic Dakota and Ojibwe wild-ricing practices could help identify potential attributes for distinguishing postcontact from precontact features. Are there any storage pits at Psinomani sites, as is the case at Oneota and Plains Village sites? What are the general sizes of pit features that do exist? Can the pits be identified as to function? The historic record might also offer pertinent information—for instance, Johnson (1971b:19) suggested, based on the historic record, that wild rice was stored in the rafters, so that no deep storage pits were needed.

The University of Minnesota's site collections from Mille Lacs offer vast amounts of information that have not been fully studied and interpreted. Although many of these sites are stratigraphically mixed, specific features might be datable, along with their associated subsistence remains and artifacts. Until reports of the excavations are completed, much of what has been said remains speculative in nature. A modest effort should be initiated to determine whether the current records and collections remain reasonably intact and if so, whether they can be used productively to write a site report or reports that clearly describe what was excavated and where, describe any features located, and associate artifacts with any features or excavation units.

Models of social complexity. Testing Gibbon's model of increasing social complexity (2003:38–39), as discussed in Section 11.8, would be a useful area of future research, though it would require information from a large number of sites, not single sites. To test this model, it would be helpful to compare the types of sites in the central clusters as well as those dispersed between them. Are there differences in size, range of activities, seasonality, structures, features, etc. between sites? How do these compare to earlier Blackduck-Kathio sites in the same region and to contemporary Rainy River Late Woodland sites to the north? If Psinomani reflects a more complex social organization, there should be differences in settlement patterns, interregional and intersite connections, and other facets of the cultures. There should also be evidence of conflict, both between Psinomani communities and with other groups. Such evidence might include fortifications as seen with some Oneota and Plains Village sites. The distribution of exotic and specific local lithic raw materials might help document access to particular resource areas, which might reflect associated villages.

F. ASSOCIATED PROPERTY TYPES

Five property types are listed for this MPDF: habitation sites; resource procurement and processing sites; special-use sites; and mortuary sites, subdivided into mound and nonmound mortuary sites. It is assumed that the initial or Phase II field investigations at the site have been sufficient to describe it in terms of size, types of artifacts and ecofacts, artifact density, presence of single or multiple components, presence or absence of features or the potential for features or ecofacts, or other site characteristics. These property types address inferred site function, and the assignment of a site to one of these site types should serve to focus research questions, not to preclude further analysis into the range of activities that might have taken place at the site. In addition, one site might reflect aspects of multiple property types (for example a nonmound burial within a habitation site).

In general, Woodland properties in Minnesota will be evaluated under National Register Criterion D, sites that have yielded, or may be likely to yield, information important in prehistory, and to address research questions such as those identified above in the statewide themes or for each complex. Specific information for Criterion D is discussed below. In some instances, Criteria A or C might also be relevant. Criterion A (sites that are associated with events that have made a significant contribution to the broad patterns of our history) might be relevant for a site that was important in the history of Minnesota archaeology, such as the type site for a complex or phase, or a site where critical information has been acquired (such as Gull Lake Dam 21CA27, or Petaga Point 21ML11). Criterion C (sites that embody distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction) might be applicable to a complex site, such as a large mound group with a distinctive arrangement of mounds, or a rock art site. In this case, integrity of Setting and Feeling might be important.

Although not all property types have been identified for each of the Woodland complexes, all could be expected with any of the complexes, with the possible exception of mounds, as indicated above with specific complexes.

I. Name of property type: Habitation

II. Description: Habitation sites are the most common Woodland property type in Minnesota, encompassing the great majority of the nonmortuary sites, and are found in all geographic regions and landscape settings. They are identified on the basis of the types and variety of artifacts and features that reflect a broad range of activities undertaken by the group occupying a site, such as food preparation; manufacture, use, and repair of tools and ceramics; and other aspects of domestic life. Although both smaller campsites and larger village sites exist for Woodland complexes, there is insufficient information at this time to distinguish formal subtypes of habitation sites. Habitation sites will tend to have a denser, more extensive, and more diverse artifact assemblage than would characterize a resource procurement and processing site, and the assemblage would suggest multiple activities rather than a single activity. Habitation sites might have evidence of features such as structures, refuse pits, storage pits, hearths, or middens. Occupation might have been by part of a community or the whole community, or by smaller or larger numbers of people, and might reflect short-term, seasonal, annual, or long-term occupation. Habitation sites might be associated with either mound or nonmound mortuary sites, though sometimes the actual connection between adjacent mounds and habitation sites is unclear.

III. Significance: Habitation sites are potentially eligible for listing on the National Register under **Criterion D** if they can answer important research questions as identified above in the statewide research themes and for each complex. Larger sites and multicomponent sites with separable components will be better able to address questions of chronology and changes through time. Single-component sites and sites in diverse landscape settings and geographic locations can provide information on the full range of activities and material culture, and contribute to an understanding of settlement patterns. Table 2 indicates how the research themes presented for the state and for each complex can be addressed by specific information categories at habitation sites.

IV. Registration requirements: To be considered as an eligible habitation site under this Woodland tradition MPDF and under **Criterion D**, a site must have information sufficient to associate it with a particular Woodland complex, and must have the potential to answer important research questions as described in the statewide research questions or with the individual complexes. All habitation sites should have integrity of Materials and Association, specifically:

1) Diagnostic artifacts or other attributes associating the site with a particular cultural complex or context within the Woodland tradition.
2) A single component attributed to the Woodland complex, or a distinguishable Woodland component at a multicomponent site. Separation of components might be either horizontal or vertical. Although there might be some mixing of components at multicomponent sites, a substantial part of at least one component should be separable.

Depending on the particular complex, the priority of additional site attributes will vary, but in general, at least one of the following categories of information should also be present, or have strong potential to be present. The categories are ranked based on current research priorities for most of the Woodland complexes:

3) Datable material that is tightly associated with diagnostic artifacts or significant features such as structures. Datable materials might include plant or animal remains, residues on ceramics, or ceramics associated with a complex that can be dated with thermoluminescence.
4) A diverse, abundant, unique, or focused material culture assemblage that can be clearly associated with a specific complex.
5) Features of any kind, including but not limited to hearths, storage pits, refuse pits, middens, or structures (postholes, depressions, wall trenches, compact surfaces). These might be identified either through excavation or by various remote sensing techniques such as ground-penetrating radar, resistivity, or magnetometer survey.
6) Ecofacts from contexts that can be associated with a particular complex, including plant and animal remains, pollen, phytoliths, and gastropods, in sufficient quantity and quality to determine the nature of the exploitation of these resources.

7) Internal site patterning from the distribution of cultural materials, including recognizable activity areas or other evidence of community plan.

8) An unusual site location, either with a substantial component located well outside of the main region of distribution for that complex, or in a unique or unusual landscape setting (e.g., by an important portage route).

9) Materials unusual for the area or the complex, including but not limited to exotic or non-locally derived raw materials, manufactured items such as exotic ceramics, or special material culture expressions such as rock art. Exotic materials should be present in at least moderate quantities to establish a pattern; isolated artifacts would not be sufficient.

10) Evidence of particularly dense occupation, exceptional size, or other unique attributes compared to other known sites associated with the complex.

I. Name of property type: Resource procurement and processing sites

II. Description: Resource procurement and processing sites will appear to have as their primary focus the exploitation of a limited range of specific resources at one location. Activities would include procurement of material and could also include workshop materials representative of initial stages of processing that material. These sites will tend to be smaller and activity or function specific and will lack many of the indicators of a habitation site (dense, extensive, and diverse artifact assemblage), although lithic workshops and quarries could be large and have a dense artifact assemblage. Although there might be some evidence of short-term occupation at the site, the presumed focus of activities should be the specialized acquisition or processing of some specific material. By contrast, a habitation site would have a more diverse set of inferred activities.

Although information is insufficient to propose comprehensive formal subtypes, there are two major classes of resource procurement and processing sites: sites that focus on the acquisition of food (e.g., wild ricing, bison hunting, or sturgeon fishing sites); and sites that focus on acquisition of raw materials (e.g., quarrying stone, copper mining, acquiring clay). For example, lithic quarry and workshop sites will often be located at a particular source of a lithic raw material, either a bedrock outcropping or a lag deposit, and will show predominantly initial stages of lithic reduction, rather than final manufacture and tool use. Lithic workshop sites could also occur near more diffuse and scattered sources such as stream transported cobbles.

III. Significance: Resource procurement and processing sites are potentially eligible for listing on the National Register under **Criterion D** if they can address important research themes, including technology and material culture, subsistence, regional interaction, geographic distribution, resource extraction, environmental change, economic and trade networks, demography, and settlement patterns. These specialized sites are likely to gain at least some of their significance from their roles in the regional settlement system, including their relationships to habitation sites. Because of the nature of resource-procurement sites, research questions would focus on understanding the particular function of each site within the overall settlement and subsistence system, as well as understanding the activities at the site itself. For example, a fishing camp or bison-hunting camp could provide information sufficient to understand resource procurement, processing, and consumption, including information on season of occupation and place within the subsistence-settlement system. A quarry or workshop site might possess information relevant to understanding lithic reduction technologies, patterns of trade, or population movements such as would be expected when lithic resources are directly exploited by distant peoples.

IV. Registration requirements: To be considered as an eligible resource procurement and processing site under **Criterion D**, a site should possess attributes sufficient to identify the site's function as the procurement or processing of a specific resource, and should possess deposits with sufficient integrity to provide important information. Sites will generally possess integrity of Location, Materials and Association, specifically:

1) Cultural materials (either artifacts or features or both) or a site location or natural feature (such as a bedrock outcrop) that is distinctive to the procurement and processing of a specific resource.
2) Diagnostic artifacts or other attributes associating the site with a particular cultural complex or context within the Woodland tradition. However, some unique or complex sites might be attributable only to the Woodland tradition, or indirectly linked to the resource by the presence of materials at other sites assigned to a specific complex (e.g., lithic raw materials found in habitation sites).

In some cases, repeatedly revisited resource procurement and processing sites might show a long period of use, without individual components being separable. The nature of the activities might still be identifiable, even if specific features cannot be attributed to particular Woodland complexes. For example, a copper-mining site or chipped-stone quarry might show evidence of multiple complexes that cannot be isolated, but the nature of exploitation and processing itself could still be examined to provide important information for the Woodland tradition as a whole. Thus, a site should also possess:

3) A single component, or a distinguishable component at a multicomponent site. Separation of components might be either horizontal or vertical.

Or:

4) Evidence of repeated use of unique or important resources during the Woodland period, even if individual components or complexes cannot be readily isolated (e.g., a copper-mining site, or a chipped-stone or pipestone quarry site).

Additional relevant attributes could include:

5) Datable material that is tightly associated with diagnostic artifacts or significant features such as wild ricing pits or quarry pits. Datable materials might include plant or animal remains, residues on ceramics, or ceramics associated with a complex that can be dated with thermoluminescence.
6) A diverse, abundant, unique, or focused material culture assemblage that can be clearly associated with a specific activity and complex.
7) Features of any kind, such as quarry pits, wild rice threshing pits, fish weirs and stone alignments for directing movements of animals such as bison, particularly those that are directly connected with the resource procurement or processing activities that characterize the site.
8) Ecofacts from contexts that can be associated with a specific activity and complex, including plant and animal remains, pollen, or phytoliths, in sufficient quantity and quality to determine the nature of the exploitation of the particular resource.
9) Internal site patterning reflected in the distribution of cultural materials, particularly recognizable activity areas that can be clearly associated with a specific activity and complex.
10) An unusual location, either with a substantial component located well outside of the main region of distribution for that complex or beyond the area expected for exploitation of a particular resource, or in a unique or unusual landscape setting (e.g., a bison-kill site within the prairie/deciduous forest ecotone).
11) Materials unusual for the area, type of site, or complex, including but not limited to exotic or non-locally derived lithic raw materials or manufactured items. Exotic materials should be present in at least moderate quantities to establish a pattern; isolated artifacts would not be sufficient.
12) Evidence of particularly dense occupation, exceptional size, or other unique attributes compared to other known sites associated with the complex or property type.

I. Name of property type: Special-use sites

II. Description: A special-use site would be one generally recognized as comparatively rare or unique within the Woodland tradition, with the presence or concentration of artifacts, ecofacts, or features in a context suggesting use for a special purpose other than general habitation or resource procurement and processing. Some possible kinds of sites that could be included here are dated rock art sites, caches, or boulder effigies. Special-use sites are likely to be rare and unusual and reflect activities other than subsistence or resource extraction.

III. Significance: Special-use sites are potentially eligible for listing on the National Register under **Criterion D** when their unique attributes or material assemblage could provide important or unique information, with the specific relevant themes dependent on the nature of the site. For example, rock art sites (e.g., Steinbring 1990) could provide insights into ideology and artistic expression. Caches of exotic materials would be important for understanding patterns of technology, trade, interaction, or population movements (e.g., seasonal rounds).

IV. Registration requirements: Special-use sites would be considered eligible for listing on the National Register under **Criterion D** if they can provide information relevant to research questions as discussed in the statewide or complex-specific research themes and questions. They would generally possess integrity of Materials and Association, specifically:

1) Cultural materials (either artifacts or features or both) or a site location or natural feature that is distinctive or unique and suggest use for a special purpose other than habitation, resource procurement and processing, or mortuary activities.
2) Diagnostic artifacts or other attributes associating the site with a particular cultural complex or context within the Woodland tradition. However, some unique or complex sites might be attributable only to the Woodland tradition (e.g., rock art sites).

Additional registration requirements would depend on the specific nature of the site, but might include the requirement that there be a single component or a distinguishable component at a multicomponent site, with either horizontal or vertical separation.

I. Name of property type: Mortuary–mound

II. Description: Earthen mounds constructed for burial and other purposes are a distinctive attribute of the Woodland tradition in Minnesota, though they are not found with all complexes. Research into the results of mound excavations in Minnesota (Arzigian and Stevenson 2003) indicates that at least 75% of all of the mounds contained burials, including all excavated mounds more than 3 feet high. Thus, mounds are included here as a subcategory within the broader property type of mortuary sites. Excavation of and damage to burial sites is strictly governed by both state (MS 207.0-8) and federal law (Native American Graves Protection and Repatriation Act), although such sites must still be evaluated for their archaeological research potential and other National Register significance criteria under Section 106 of the National Historic Preservation Act if they may be affected by federally funded projects.

Other types of earthworks, such as enclosures and ditchworks, are often undated or only rarely associated with the Woodland tradition and are not covered by this MPDF. However, another MPDF, Precontact American Indian Earthworks (Dobbs 1996), includes both burial mounds and these other earthworks. The following discussion of the National Register eligibility of mounds is adapted from that document. Two relevant property types are grouped together for discussion here: lone mounds, and groups of earthworks and mounds. In Minnesota, the dominant form of mound is conical, although there are also linear, effigy, and flat-topped mounds. The mounds vary in height from less than a foot to 45 feet. Groups of mounds range from 2 to 225 mounds per group; a few sites with large numbers of mounds account for a significant proportion of the mounds. Mounds are typically located in prominent settings overlooking rivers, streams, or lakes, although there are exceptions.

III. Significance: Mortuary mound sites could be considered eligible under National Register **Criteria A, C, or D**.

Criterion A. Under Criterion A, mortuary mound sites are potentially eligible for listing on the National Register if their setting and size are consistent with an ethnographic and historically identified pattern suggesting association of distinctive mounds in prominent settings with individuals who were important in their community. In addition, mounds and their study played a significant role in the early Euro-American settlement of Minnesota, the development of American archaeology, and the evolution of attitudes and relationships between Native and Euro-American peoples. Thus, a mound group might be considered eligible under Criterion A if it can be associated with a specific Woodland complex, is the type site for a specific Woodland complex, or is associated with a key event in the history of archaeology in Minnesota or the development of archaeological method and theory.

Criterion C. Under Criterion C, mounds or mound groups might be considered eligible if they have a rare or distinctive form.

Criterion D. Under Criterion D, mounds, and any people interred within them, might be considered eligible if they can contribute information on a variety of research themes, including demography, mortality, nutrition, health and disease status of the population, mortuary practices, ceremonial behavior and ideology, cultural relationships between complexes, settlement patterns, geographic distributions, and connections with historic groups. Associated artifact assemblages often have exotic artifacts or raw materials not found in habitation sites, providing unique insights into ritual behavior, regional trade and interaction, chronology, and social and political organization. Methods of study might include a range of noninvasive techniques (e.g., landscape and viewshed analysis, analysis of geographic distribution, environmental and locational parameters, consideration of size, form, and location of mounds), as well as excavation.

IV. Registration requirements: The Precontact American Indian Earthworks MPDF (Dobbs 1996:section F8-9) presents integrity requirements for lone mounds and mound groups that are also relevant under this MPDF:

Criterion A. To be considered under Criterion A, a mound site:

1. Should have integrity of Design, Setting, Materials, Workmanship, and Association, including association with a specific Woodland complex.

2. It might also be the type site for a particular complex, or be associated with a key event in the history and development of archaeological research and interpretation.

Criterion C. To be considered under Criterion C, a mound site should have:

1. An unusual form, or typify a particular cultural expression (e.g. Hopewell, Effigy Mound).
2. A significant number of the earthworks within a group still visible, or where some earthworks within a group are no longer present, elements of Design, Setting, Workmanship, and Association must counterbalance the loss of some of the earthworks.

Criterion D. To be considered under Criterion D, mound sites should generally have integrity of Materials and Association, specifically:

1. Diagnostic artifacts or other attributes associating the mound site with a particular complex within the Woodland tradition.
2. Potential to contain significant information collected through excavation, geophysical examination, or other surveying techniques.

Mounds that retain integrity and that can reliably be attributed to a specific Woodland complex through setting, context, burial goods, or radiometric or other dating, are potentially eligible under both the Earthworks MPDF and this Woodland MPDF. However, some mounds or mound remnants that might not be eligible under the Earthworks MPDF might still be eligible under this Woodland MPDF, including mortuary features or remnants such as submound burials that have survived even if the mound itself has been destroyed.

I. Name of property type: Mortuary–nonmound

II. Description: Nonmound mortuary sites will consist of human remains in intentional inhumations in nonmound contexts. These can include single burials (including both isolated burials and burials within a habitation site) and multiple burials (such as ossuaries or cemeteries). The burials can be primary or secondary interments or cremations, but would not include isolated human remains in nonmortuary contexts, such as isolated teeth or fragmentary human remains in habitation middens. Nonmound mortuary sites will usually be attributed to a particular Woodland complex based on context (such as a burial within a dated habitation site), diagnostic burial goods, or radiometric dating of organics found with the burial.

Excavation of and damage to burial sites is strictly governed by both state (MS 307.0-8) and federal law (Native American Graves Protection and Repatriation Act), although such sites must still be evaluated for their archaeological research potential and other National Register significance criteria under Section 106 of the National Historic Preservation Act if they may be impacted by federal projects.

III. Significance: Nonmound mortuary sites are potentially eligible for listing on the National Register under **Criterion D** if they have the potential to address important research questions on a number of themes including demography, mortality, nutrition, health and disease status of the population, mortuary practices, ceremonial behavior and ideology, cultural relationships between complexes, settlement patterns, geographic distributions, and connections with historic groups. Associated artifact assemblages often have exotic artifacts or raw materials not found in habitation sites, providing unique insights into ritual behavior, regional trade and interaction, chronology, and social and political organization. Comparisons between nonmound burials or between mound and nonmound burials can provide indications of social stratification or status differentiation within communities and over time.

IV. Registration requirements: To be considered as an eligible nonmound mortuary site under **Criterion D**, a site should possess sufficient integrity to allow recovery of important information, generally including attribution to a particular Woodland complex, as well as materials that can be used to address statewide research themes or complex-specific research questions.

G. GEOGRAPHICAL DATA

The State of Minnesota

H. SUMMARY OF IDENTIFICATION AND EVALUATION METHODS

Preparation of this MPDF was initiated by the Minnesota Department of Transportation in 2006, with the Mississippi Valley Archaeology Center contracted to prepare it. A Steering Committee was formed that included Mn/DOT personnel, Scott Anfinson of the Office of the State Archaeologist, David Mather, the SHPO National Register Archaeologist, and Michael Michlovic of Minnesota State University Moorhead. In preparing the MPDF, work began with discussions with the Steering Committee to establish project parameters and agree on a set of complexes. This was followed by a review of existing SHPO contexts (Anfinson 1994a, 1994b; Dobbs and Anfinson 1990) and other syntheses (such as Anfinson 1979c) to identify the broad outlines of each complex, the major sites, and some key references. Primary sources were emphasized, including reports on major Phase III and some Phase II investigations and larger-scale research projects. Most of these are unpublished reports available at SHPO, OSA, and Mn/DOT. Others have been published in *The Minnesota Archaeologist, American Antiquity, Minnesota History,* other journals, and publications by the Minnesota Historical Society and Minnesota Archaeological Society. Published syntheses were consulted to understand current thinking on topics, but an effort was made to identify the nature and extent of the supporting archaeological data. Specific information was sought, such as the quality of subsistence data or the integrity of features, to identify conclusions and topics that were well supported by archaeological data and those that were largely speculative. This review was used to suggest major research themes that remain unanswered and methodological approaches that would facilitate their study.

Several databases were used for information. Mn/DOT and SHPO provided GIS environmental layers and archaeological site location data to generate distribution maps. Data on Woodland archaeological site distributions was obtained from Elizabeth Hobbs (Mn/DOT) as a series of shapefiles for use in ARCView, including the files WoodlandSites.shp, Archlines.shp, Archpolys.shp, and Archman.doc with metadata. SHPO provided the current archaeological site database, which included information on available reports. The SHPO site database and Mn/Model database and environmental datasets were used to generate the maps of geographic distributions. Some additional coding was done to create a more accurate dataset, but the recoding was neither comprehensive nor extensive. Anfinson (OSA) provided a database of radiocarbon dates that was used to generate the radiocarbon charts. The dates were calibrated with CALIB 5.1 (available online at http://calib.qub.ac.uk/calib/).

The Steering Committee agreed upon a framework of Woodland complexes that were adapted by Anfinson (2006) from the current SHPO Woodland contexts. This framework reflects a heavy reliance on diagnostic ceramics to define complexes, though with better information the complexes could be more fully developed into meaningful phases with cultural, geographic, and spatial dimensions. Some adaptations were necessary due to the limitations of the data. Two separate complexes, Blackduck-Kathio and Rainy River Late Woodland, both include Blackduck ceramics, though of different types. Unfortunately, the existing archaeological records do not consistently distinguish the different types of early or late Blackduck ceramics, making separation of the complexes difficult at this point from the published literature, so the two were combined for discussion, though future work should be able to identify a particular complex.

The complexes discussed here are not the only ones possible, and others should be defined for areas that are currently inadequately represented. In particular, west-central Minnesota (around Meeker and Kandiyohi Counties) has a series of untyped ceramics that might be unique and are likely to warrant a separate complex, though none has yet been defined in the literature. Thus, sites in these poorly documented areas take on greater significance because our current knowledge is so limited. Some complexes correspond to those defined for other states, particularly in southeastern Minnesota and on the Plains border.

Although it would be helpful to have a uniform terminology for Minnesota precontact sites, the major differences in cultural sequences in different parts of the state preclude this. Terms such as “Early Woodland” have specific connotations for archaeologists that are not appropriate in all areas of the state and would imply cultural attributes that

do not exist, or imply more uniformity than appears to be present. The terms used by the archaeologists in each region are retained here. Thus, in southeastern, east-central, and Headwaters Lakes areas of Minnesota, the Woodland tradition is divided into Early, Middle, and Late Woodland. In northern Minnesota, researchers also use the terms Initial and Terminal Woodland to describe cultural sequences because for years the area was thought to lack a true Early Woodland occupation, with the first pottery appearing at a time that matched the appearance of Middle Woodland elsewhere in the state. Thus, the terms Initial and Terminal were adopted, with Laurel included as Initial Woodland, and Blackduck, Rainy River Late Woodland, and Psinomani identified as Terminal Woodland. With new dates for Brainerd pushing back the first appearance of pottery, these terms may need to be redefined.

The precontact era in the Prairie Lake region has been divided into three periods marked by major changes in adaptive strategies (Anfinson 1997:5): the Early Prehistoric, Middle Prehistoric, and Late Prehistoric periods. The Early Prehistoric spans the period from the end of the glacial era to the establishment of the modern environment about 3000 B.C. The Middle Prehistoric period includes three phases, Mountain Lake, Fox Lake, and Lake Benton, with ceramics first appearing with Fox Lake, but otherwise the period reflects long-term cultural stability. The Late Prehistoric period includes horticultural village complexes and extends up to the contact era.

There are a number of limitations to the MPDF study. No attempt was made to reexamine specific artifacts or reformulate ceramic or projectile point typological attributions beyond what was in the archaeological literature. Except for some complexes that substantially overlap into other states or territories, the focus was on Minnesota. In addition, coding in the archaeological site database is not complete. Particularly for older sites, there is no information on the kinds of ceramics found or the complexes present at a site; many of these sites were reported prior to definition of the complexes. Further, for more recently recorded sites, the database often lists each kind of pottery found, whether it is present as a substantial component or just an isolated sherd, so that identification of substantial components for a complex is not feasible just from the database. Thus the distribution maps generated from this database have significant limitations. Finally, a large proportion of the sites in northern Minnesota are on federally owned property, and many of them are on National Forest land. For example, of the 1752 sites in the SHPO database from Saint Louis county, 533 (30%) are from the Superior National Forest. Information on the National Forest sites has not been fully integrated into the SHPO/OSA database and site files.

The defined property types are functional categories because it was felt that descriptive types led to too many subcategories. In theory, a Phase I and II survey should provide adequate information to describe the site sufficiently to make a determination about the site's National Register eligibility. Further research should allow refinement of the property type categories. The sites listed with each complex are those identified in the SHPO contexts or other syntheses as being significant sites, or that have had major excavations in recent years. The multiple components identified for each site are generally those listed in the SHPO/OSA database and might not be complete.

Finally, time limitations precluded review of all of the vast gray literature or the published literature on the Woodland tradition in Minnesota that did not deal with specific complexes or major excavations. This is not, nor is it intended to be, a comprehensive record of all Woodland archaeology in Minnesota. Rather it is an overview of what is known about specific complexes in Minnesota at this time, and some directions for future work that would be important in the nomination of sites for the National Register.

It is expected that the historic contexts included here will be refined and updated based on future research. In particular, an overview study of the Brainerd complex is currently underway, the results of which may significantly change our understanding of that historic context.

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APPENDIX: TABLES, DISTRIBUTION MAPS, AND RADIOCARBON CHARTS

Table 1: Large-scale climatic episodes. (Taken from Gibbon et al. 2005, after Bryson 1998).

Climatic Episode	Sub-Episode	Provisional Termini	Character
	Modern		Maximum warmth ca. 1945
		A.D. 1915	
			Cool N. hemisphere, mild N. hemisphere
Post Sub-Atlantic	Neo-Boreal ("Little Ice Age")		Coldest A.D. 1600–1630
		A.D. 1550	Warm N. Atlantic
	Pacific		Cooler N. America, N. Atlantic
		A.D. 1200–1150	
	Neo-Atlantic		"Medieval Warm Period"
		A.D. 750–700	
	Scandic		Character unknown
		A.D. 400–300	
Sub-Atlantic			Beginning of 2000-year general decline of N. American summer temperature
		ca. A.D. 950	
Sub-Boreal			Expanded tundra, glacial advances
		2900–3000 B.C.	
Atlantic ("Climatic Optimum")			Probably warmest postglacial summers Quite warm summers, cold winters
		ca. 6000 B.C.	
Boreal			Cochrane glacial advance, "Younger Dryas"
		ca. 7200 B.C.	
Pre-Boreal			Rapid warming
		ca. 8850 B.C.	

Table 2: Information categories at habitation sites that can typically be used to address different research themes.

Research Themes	3) Datable materials	4) Diverse, abundant or unique material culture	5) Features and structures	6) Ecofacts	7) Internal site patterns	8) Unique location or setting	9) Unusual materials	10) Particularly dense or large
Primary Research Themes								
Chronology	X	X		X			X	
Technology & material culture	X	X	X		X		X	X
Subsistence systems		X	X	X		X		X
Geographic distribution	X	X				X	X	
Cultural relations and regional interaction	X	X				X	X	
Secondary Research Themes								
Settlement patterns	X	X	X		X	X		X
Demography and site patterning			X		X	X		
Mortuary			X				X	
Ideology		X				X	X	
Environmental change	X			X		X		
Social, economic, & political organization		X	X		X	X	X	X

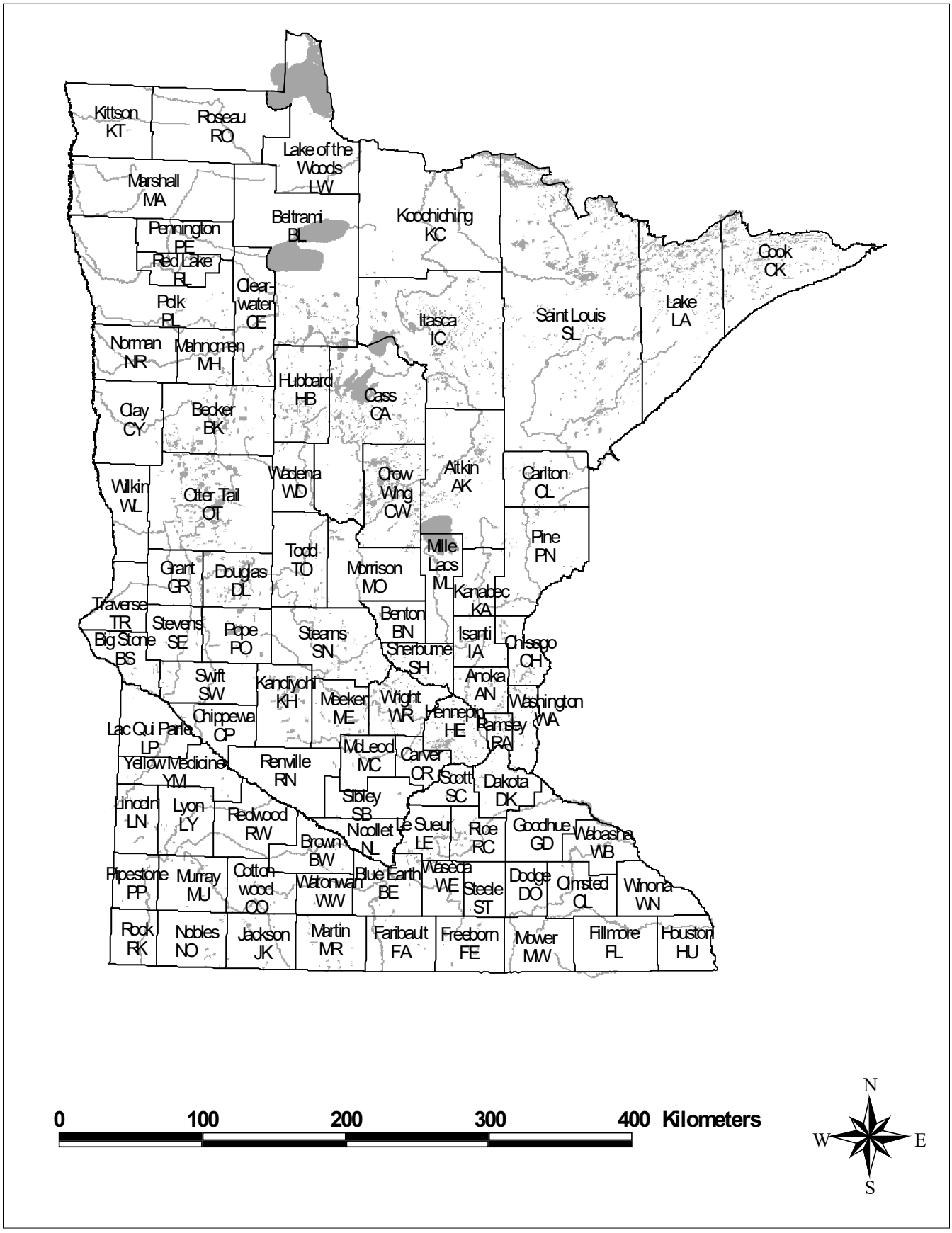

Figure 1: Minnesota counties and their alphabetical site number prefix.

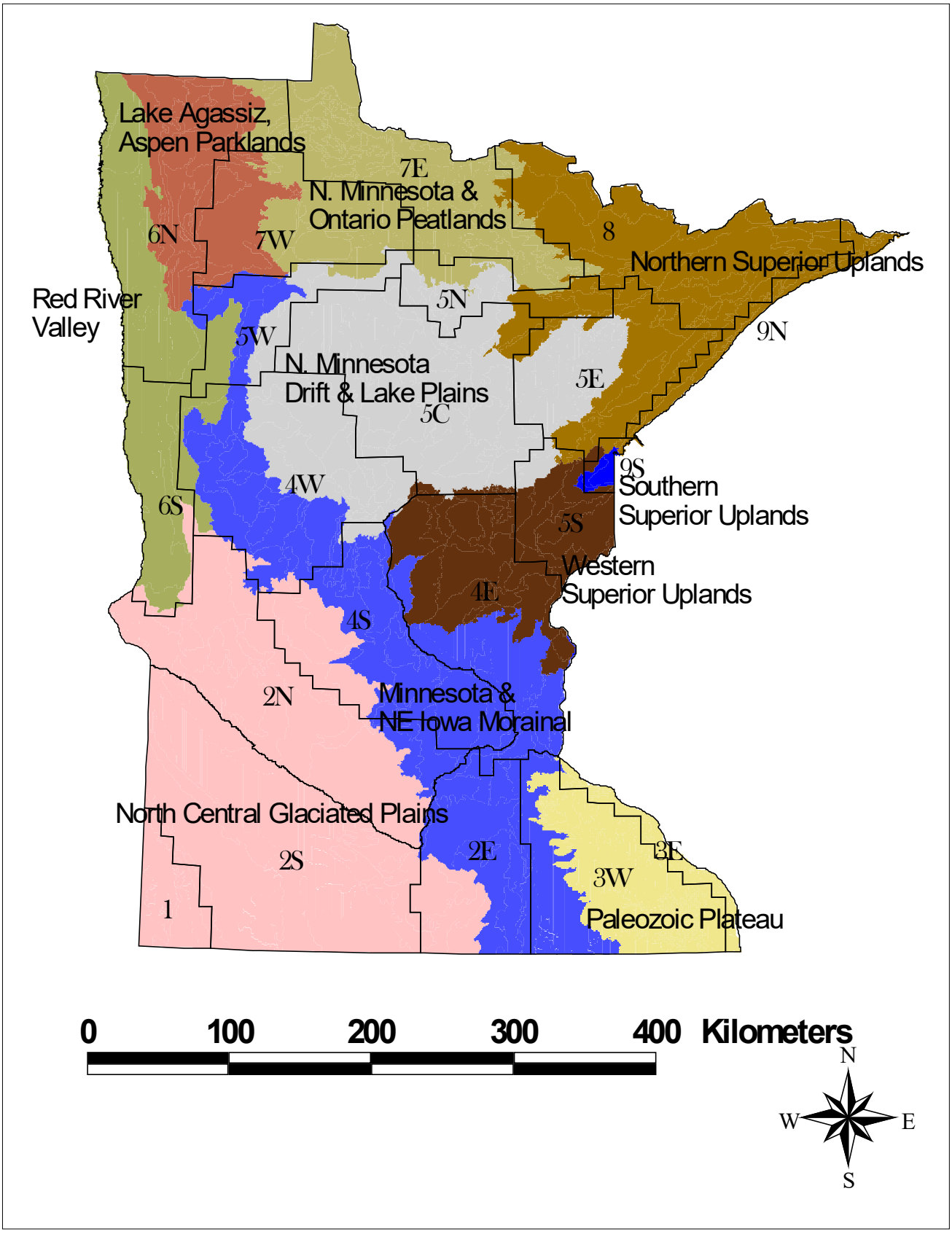

Figure 2: Distribution of environmental zones and SHPO archaeological regions. (ECS sections are shaded and labeled with text; archaeological regions are outlined and labeled with region number and letter designation. See text for full description).

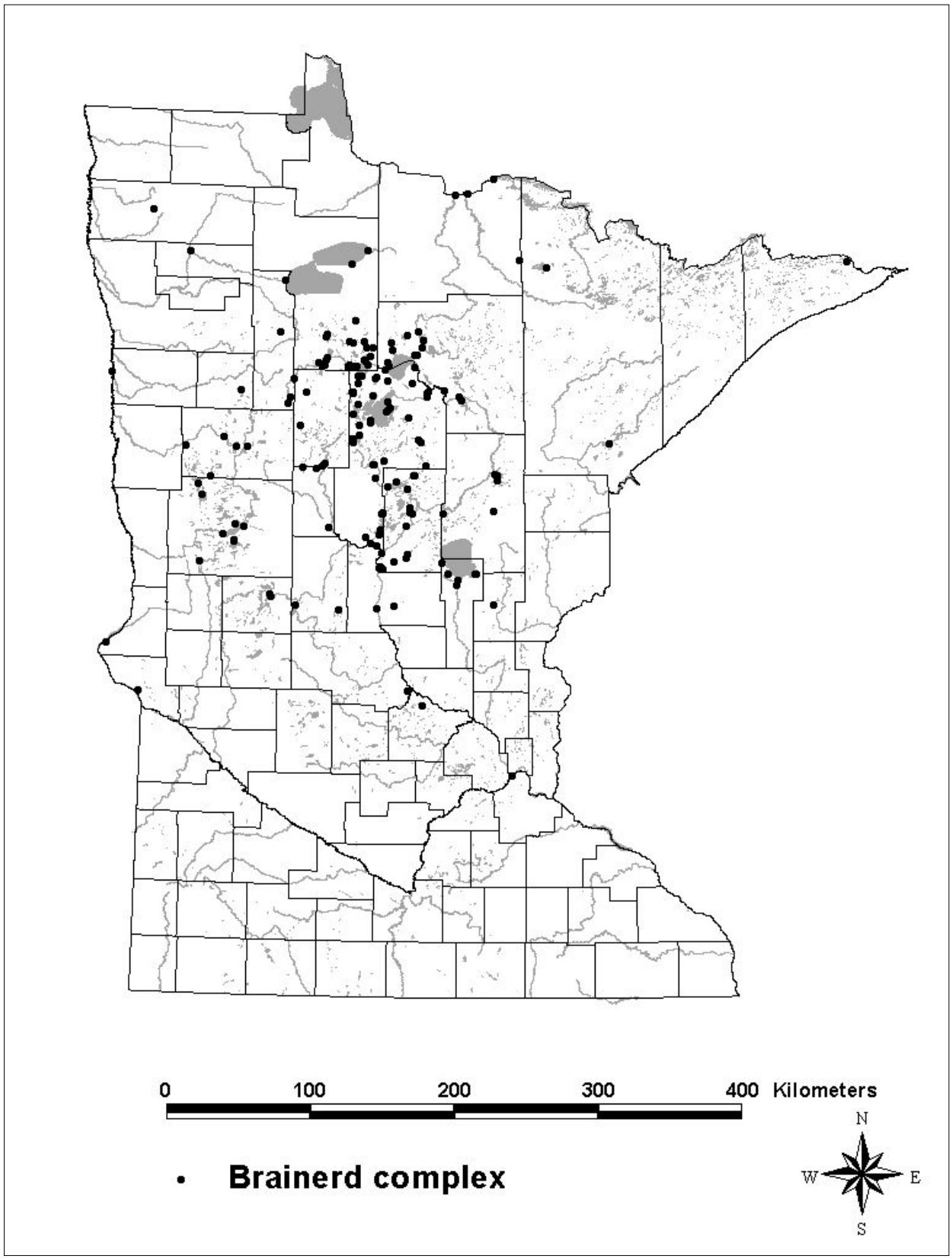

Figure 3: Distribution of the Brainerd complex.

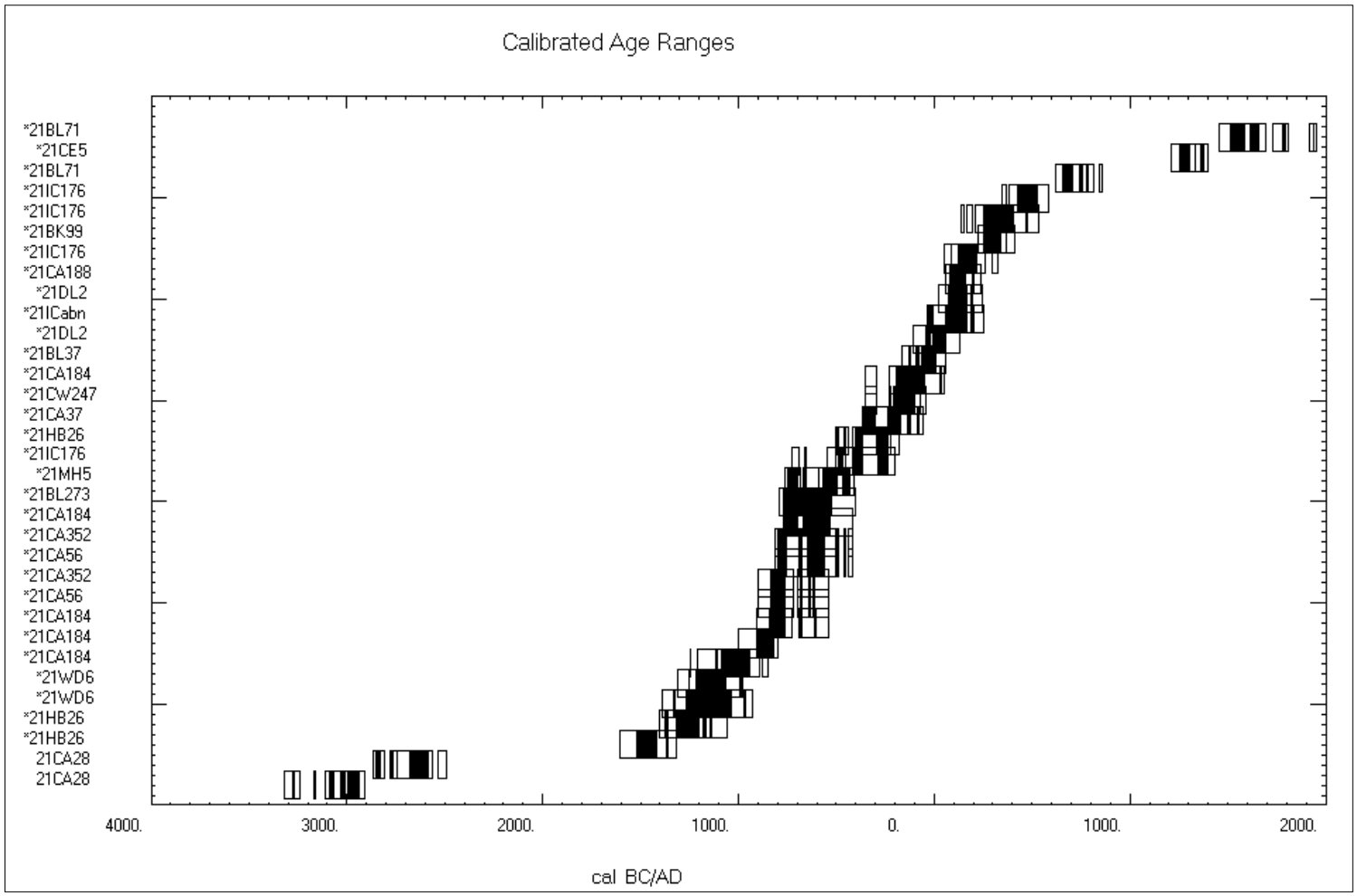

Figure 4: Calibrated radiocarbon dates for the Brainerd complex (Anfinson radiocarbon database). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. Dates on pottery residues are indicated by an asterisk *.

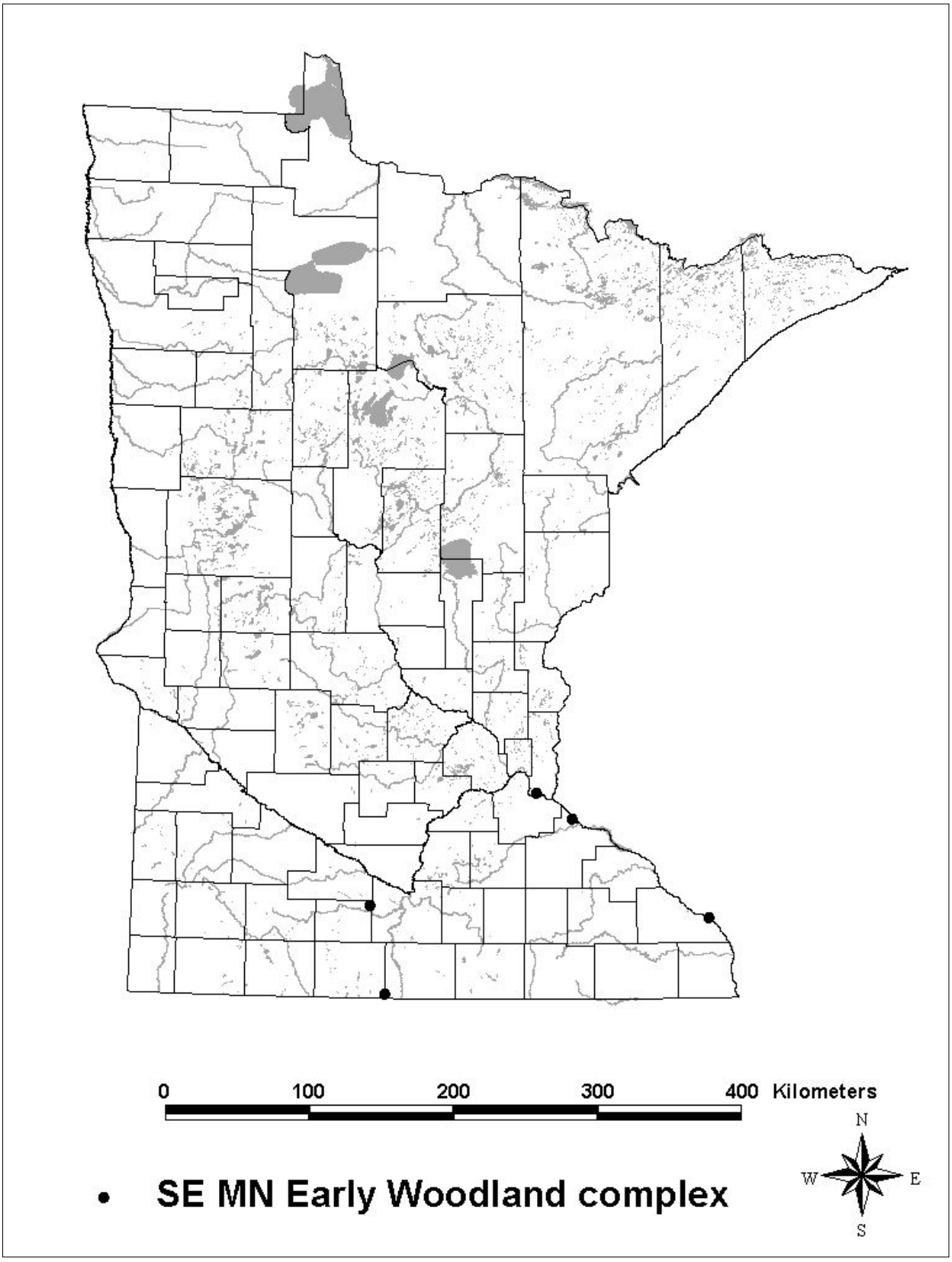

Figure 5: Distribution of the Southeast Minnesota Early Woodland complex (La Moille ceramics).

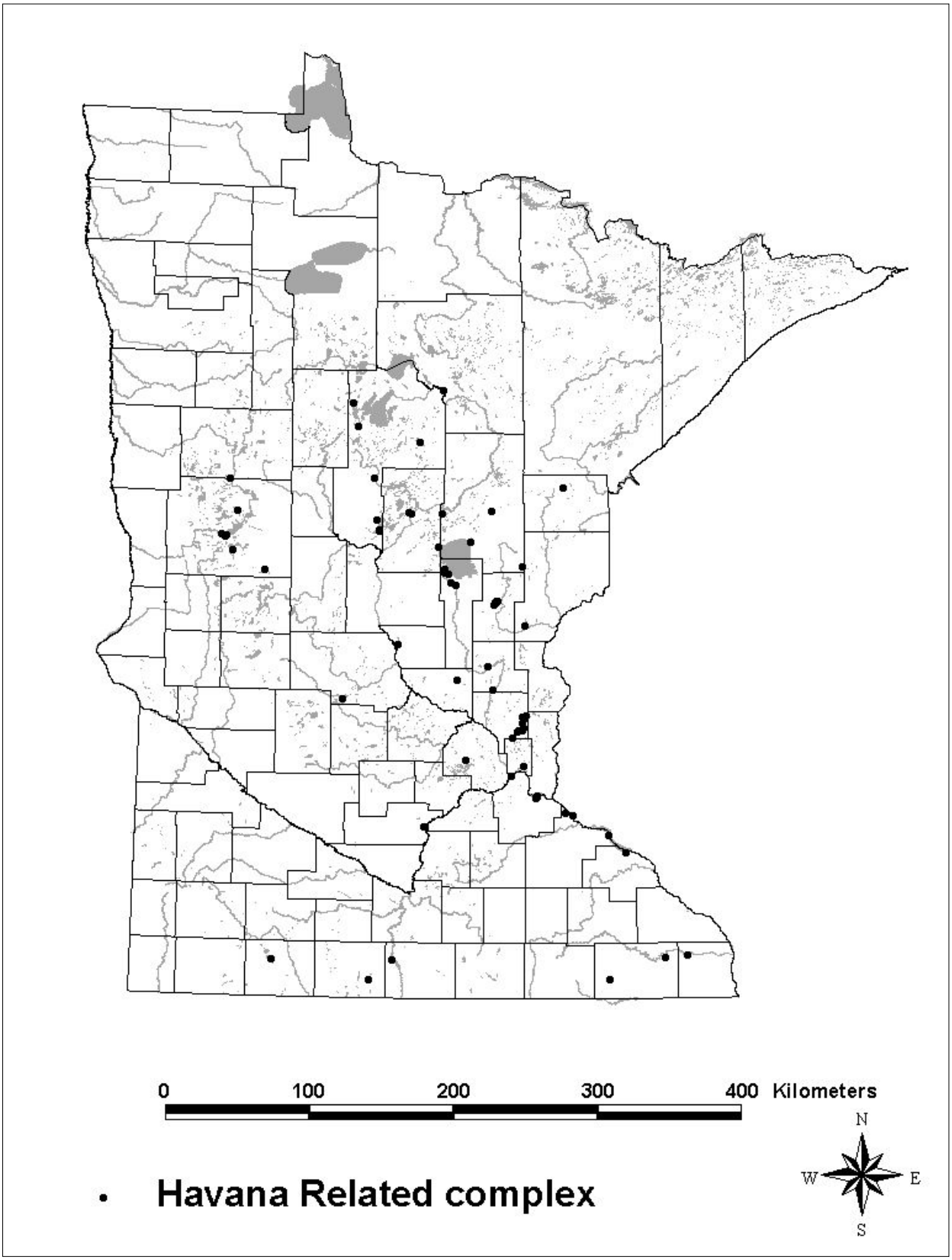

Figure 6: Distribution of the Havana-related complex (Howard Lake, Sorg, Malmo ceramics).

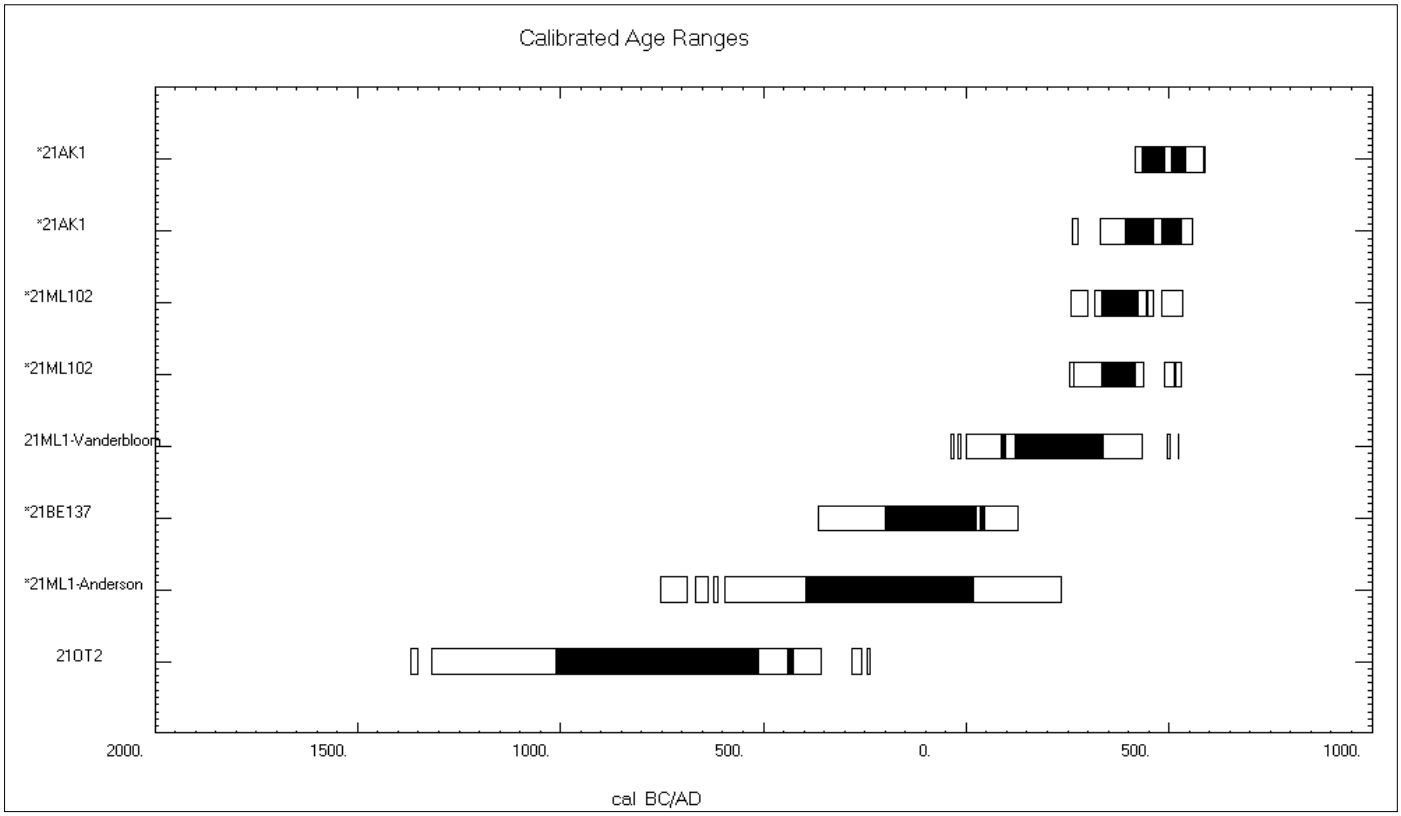

Figure 7: Calibrated radiocarbon dates for the Havana-related complex (Anfinson radiocarbon database). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. Dates on pottery residues are indicated by an asterisk *. Not all dates are accepted as appropriate for this complex.

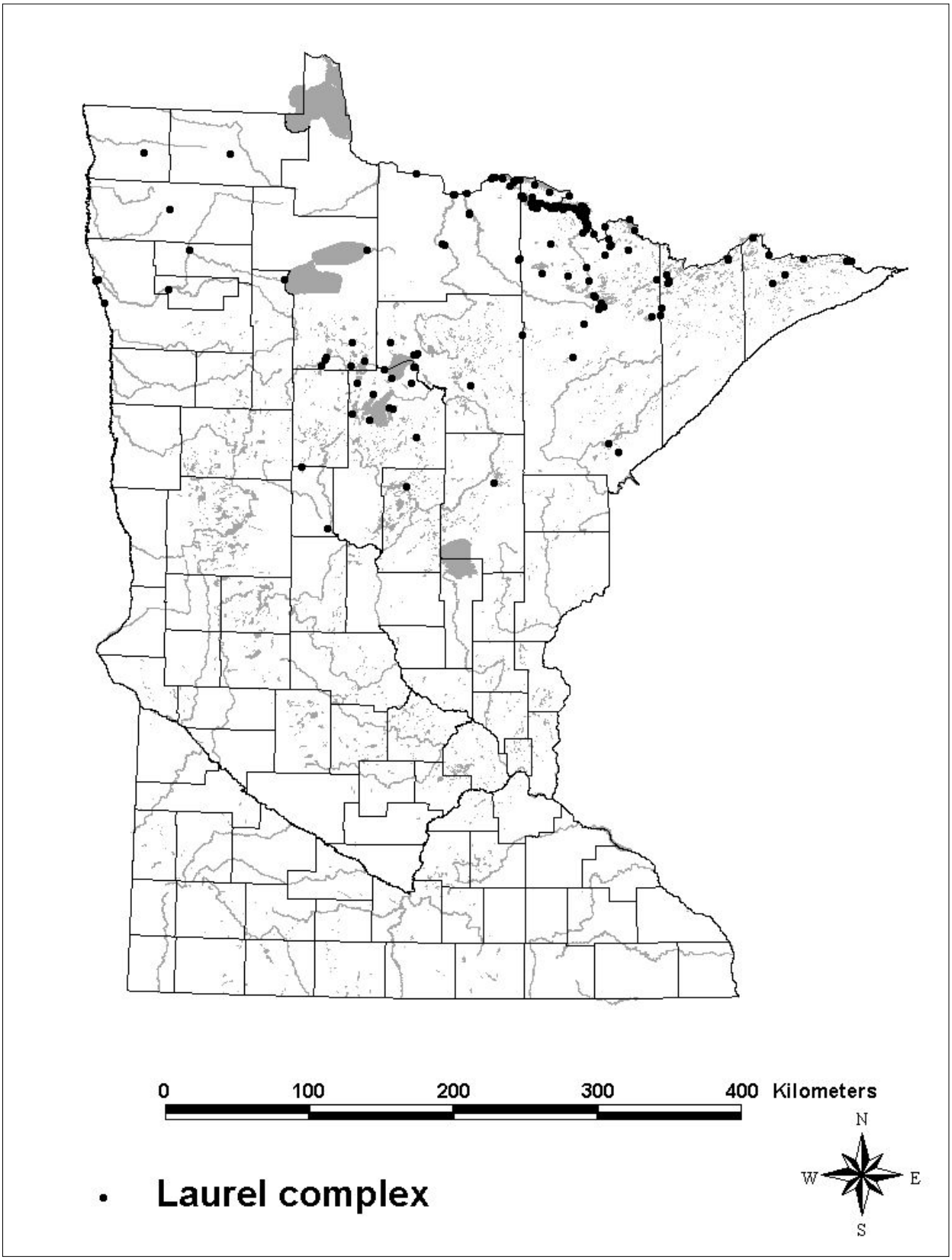

Figure 8: Distribution of the Laurel complex.

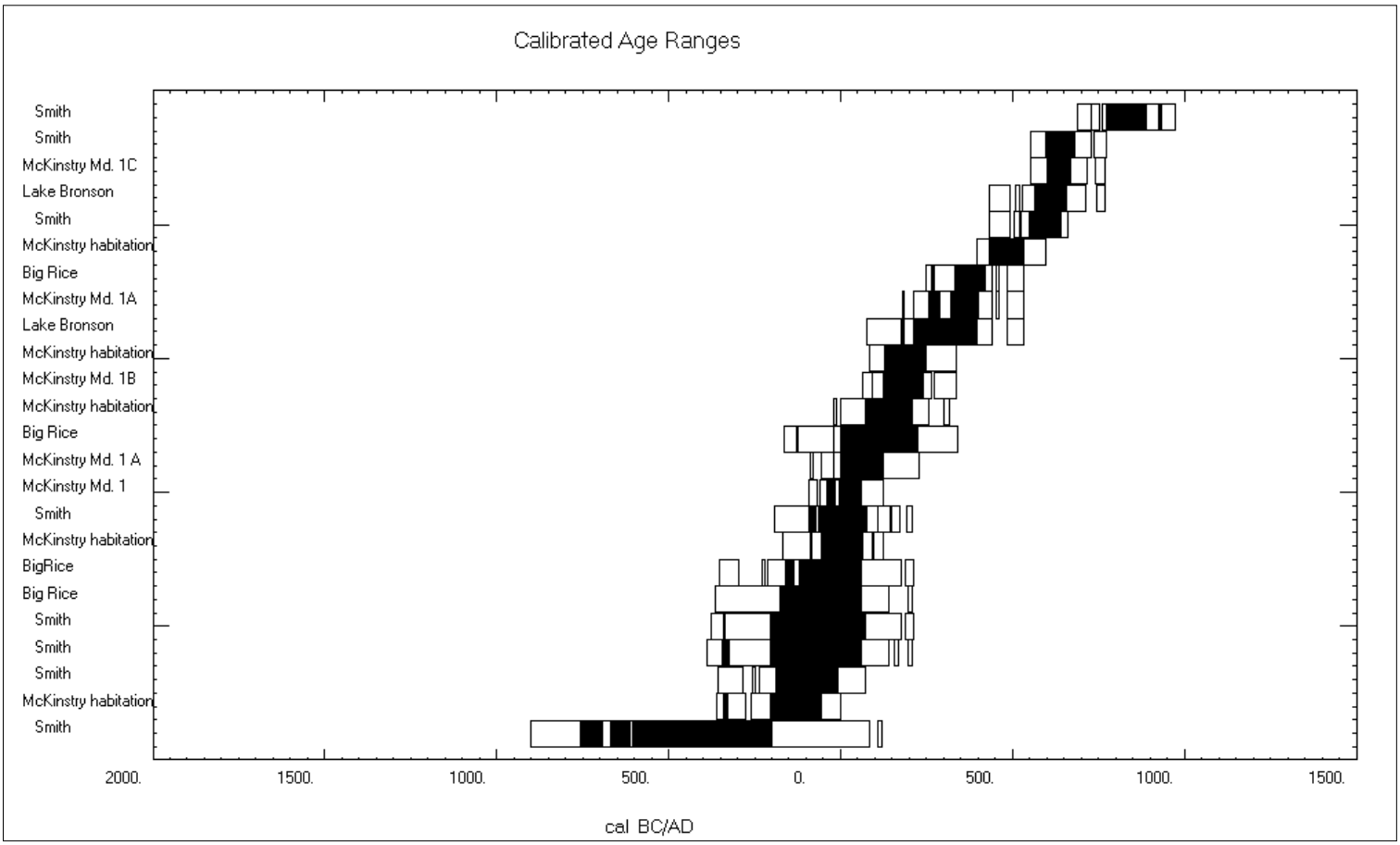

Figure 9: Calibrated radiocarbon dates for the Laurel complex (Anfinson radiocarbon database; Rajnovich 2003:Tables 5 and 6). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. (No dates are on pottery residues).

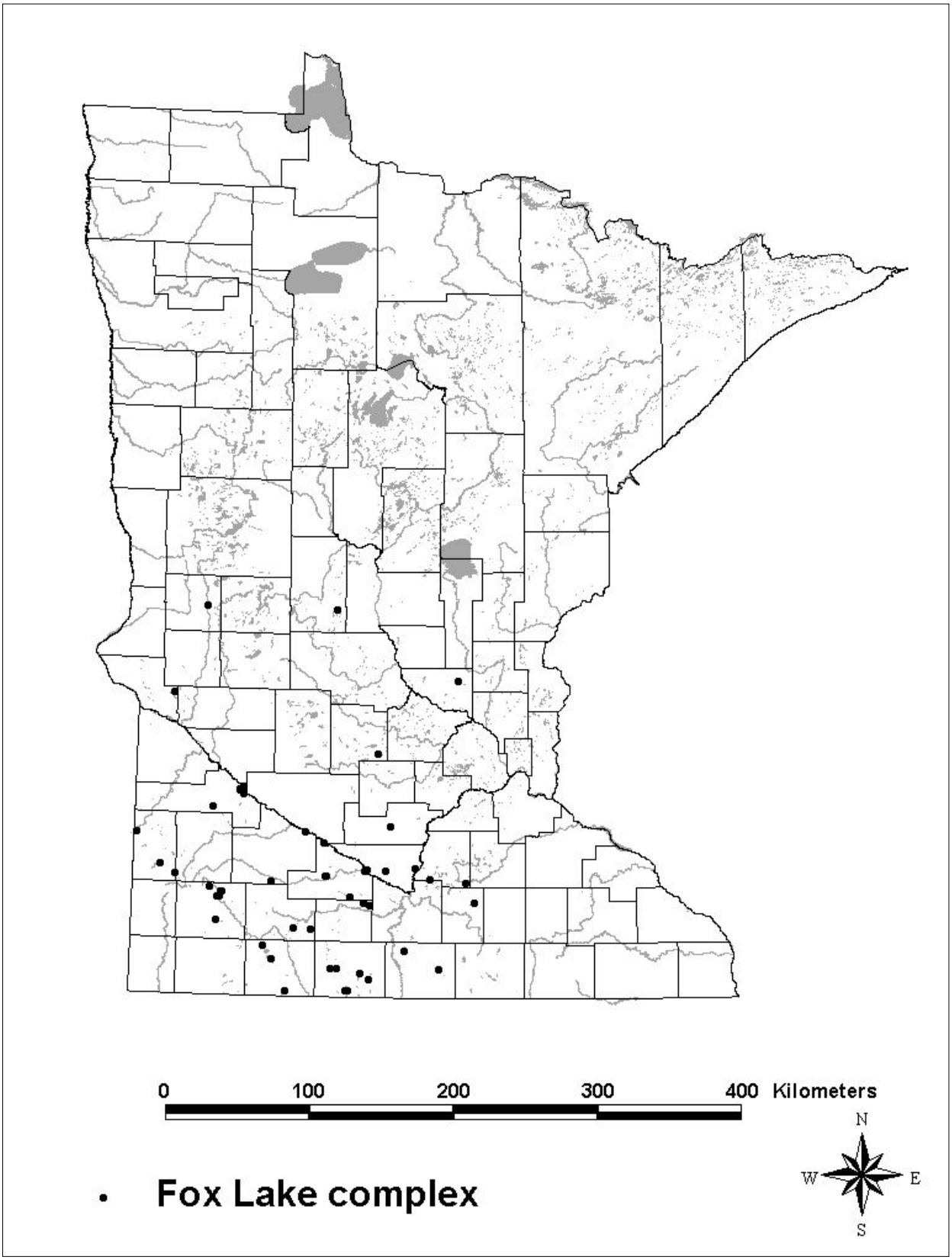

Figure 10: Distribution of the Fox Lake complex.

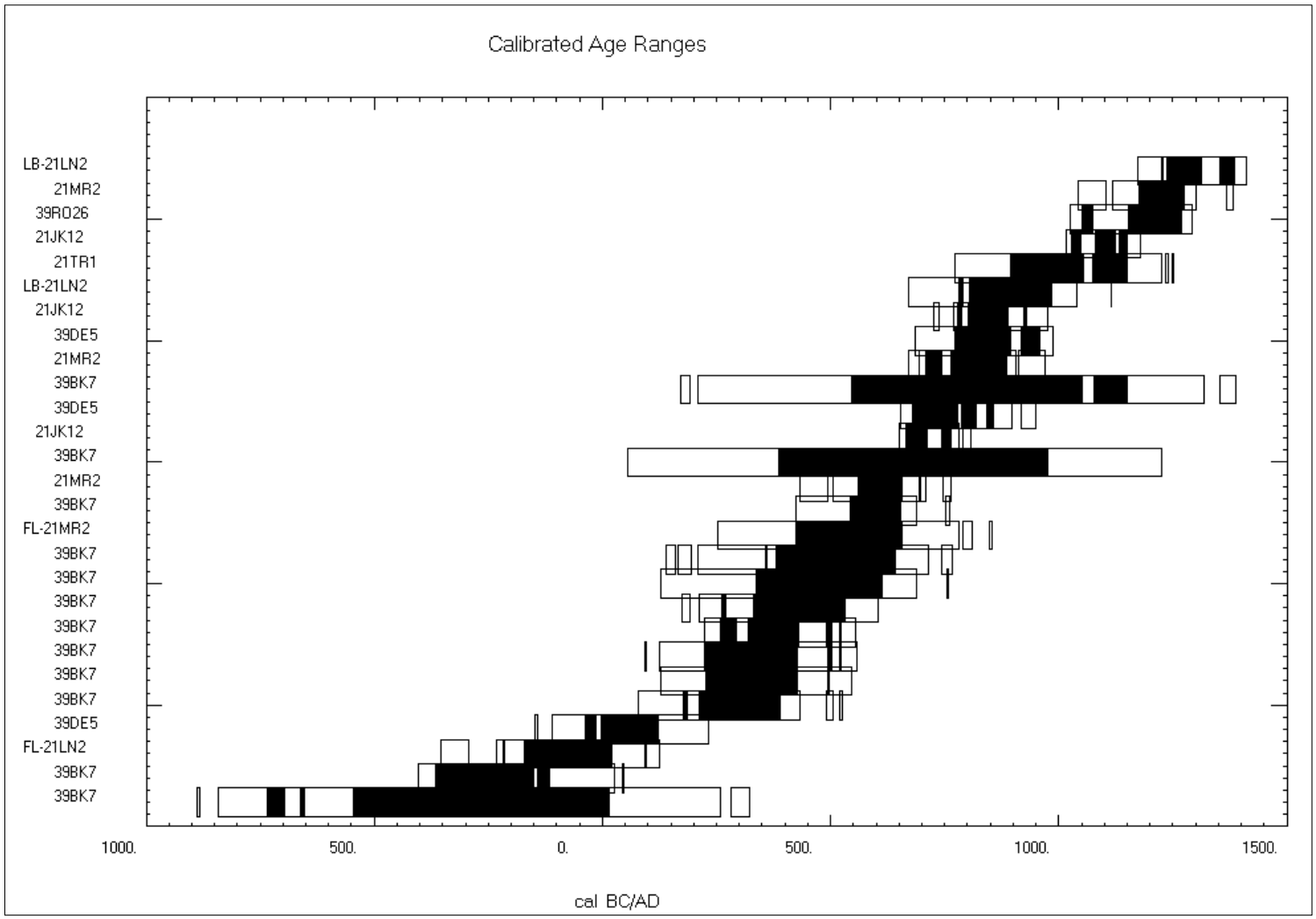

Figure11: Calibrated radiocarbon dates for the Fox Lake and Lake Benton complexes (Anfinson radiocarbon database; Schoen 2002). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. (No dates are on pottery residues.) Dates consistently attributed to a complex are indicated as such: FL=Fox Lake; LB=Lake Benton; others were designated in the archaeological literature as simply Woodland or only tentatively attributed to either complex.

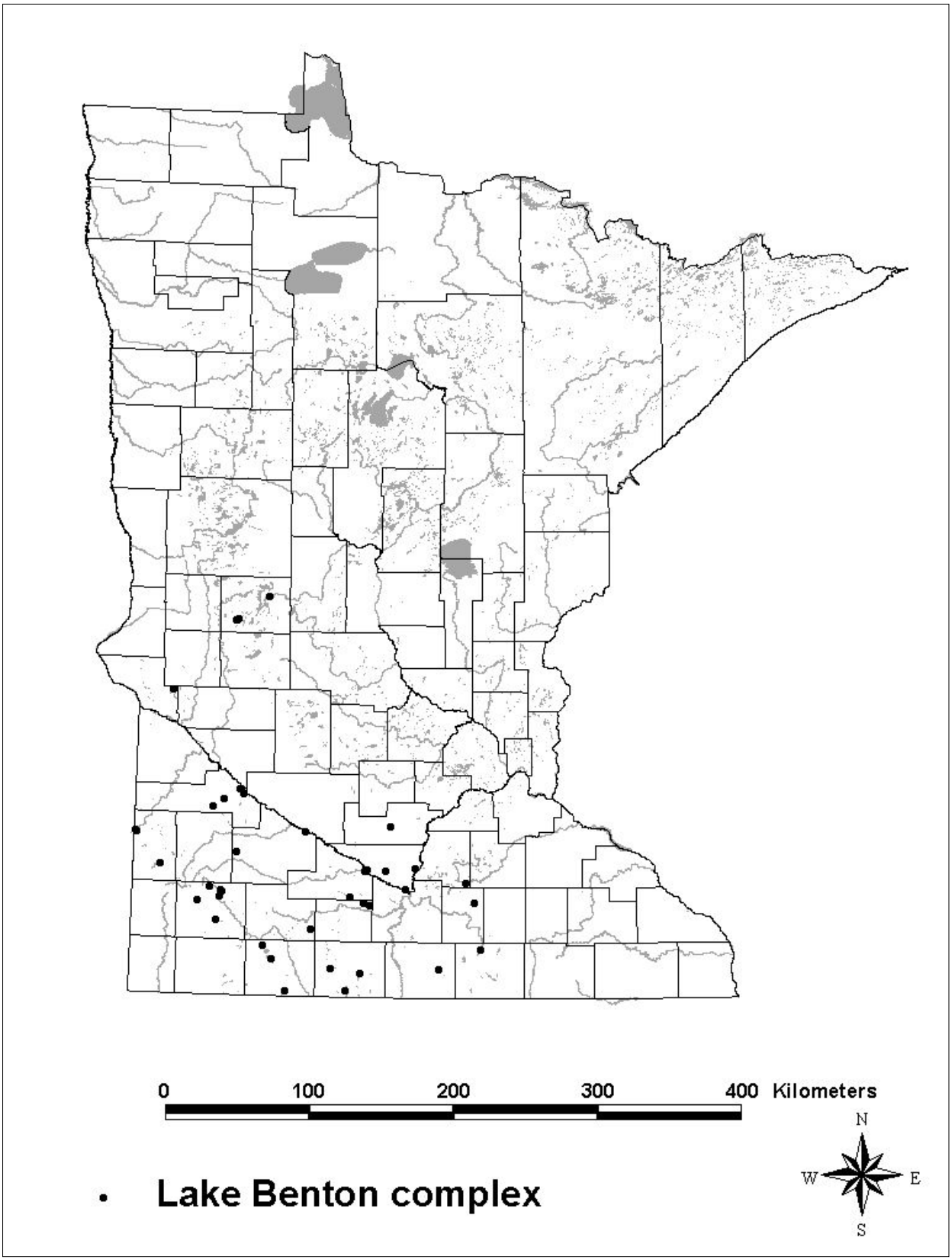

Figure 12: Distribution of the Lake Benton complex.

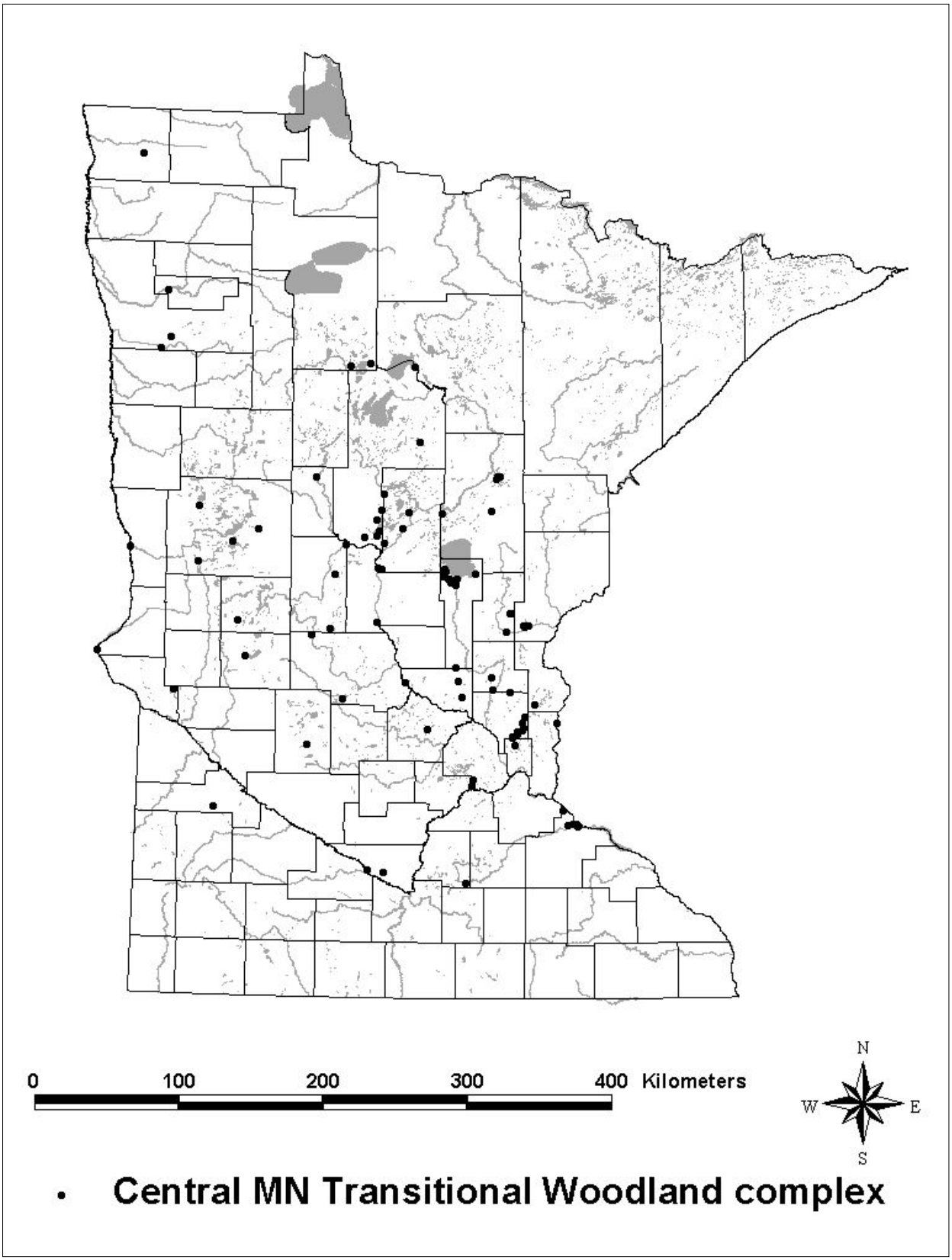

Figure 13: Distribution of the Central Minnesota Transitional Woodland complex (St. Croix and Onamia ceramics).

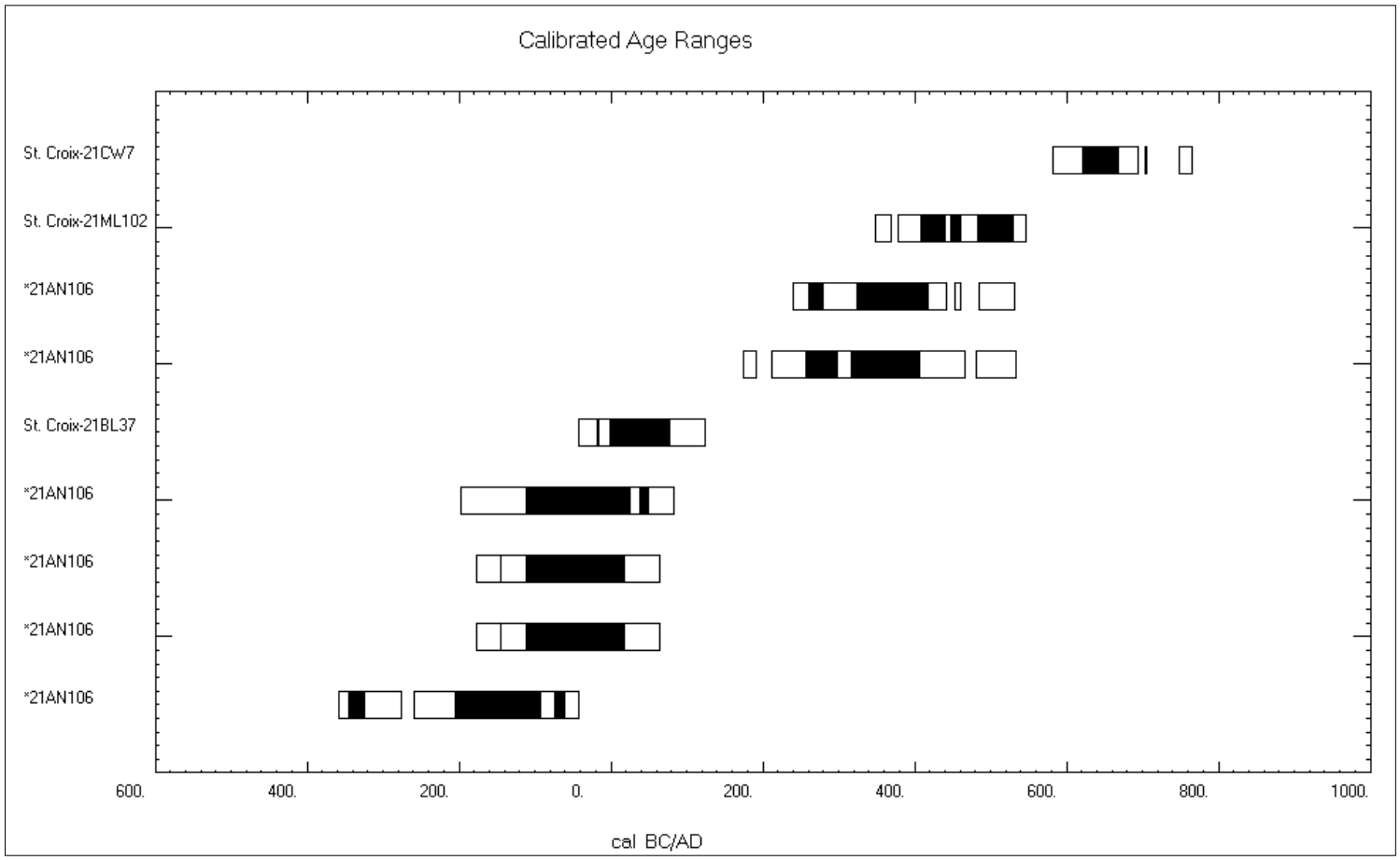

Figure 14: Calibrated radiocarbon dates for the Central Minnesota Transitional Woodland complex (Anfinson 2008 radiocarbon database). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. Dates on pottery residues are indicated by an asterisk *. Dates associated with a particular ceramic type are so noted.

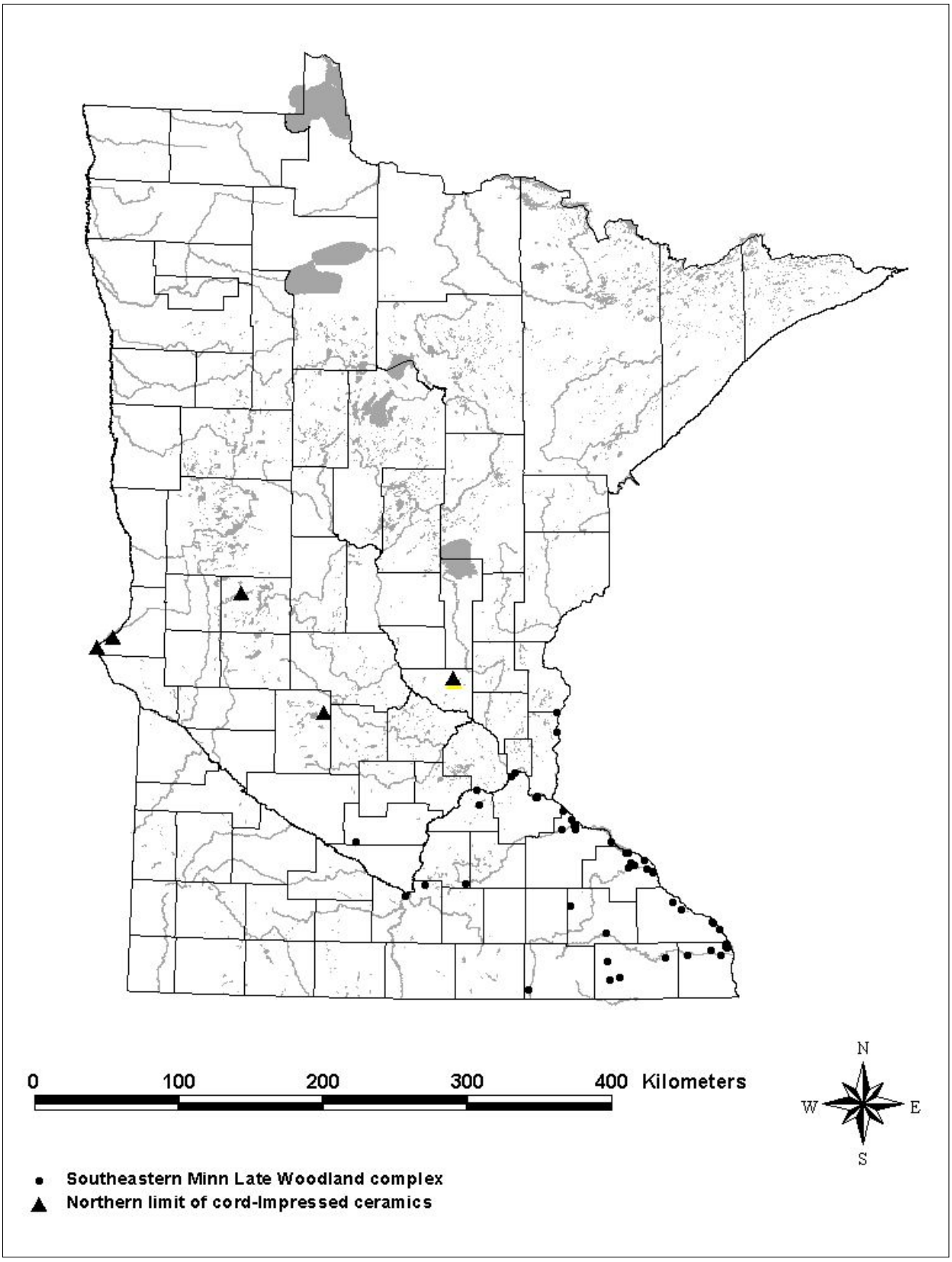

Figure 15: Distribution of the Southeast Minnesota Late Woodland complex, and the northern distribution of single-cord impressed ceramics.

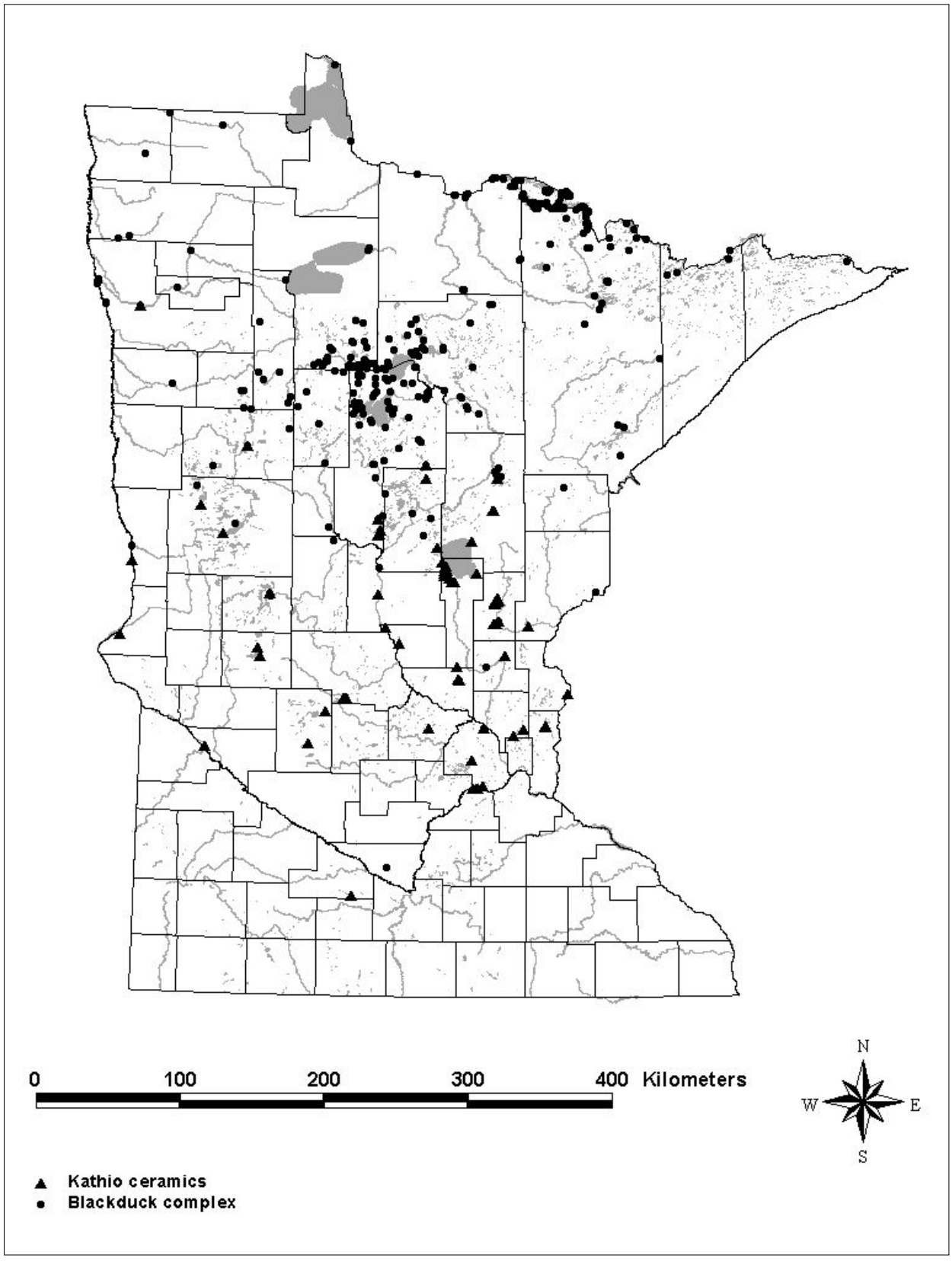

Figure 16: Distribution of the Blackduck-Kathio and Rainy River Late Woodland complexes (as marked by Blackduck, Kathio, and Selkirk ceramics).

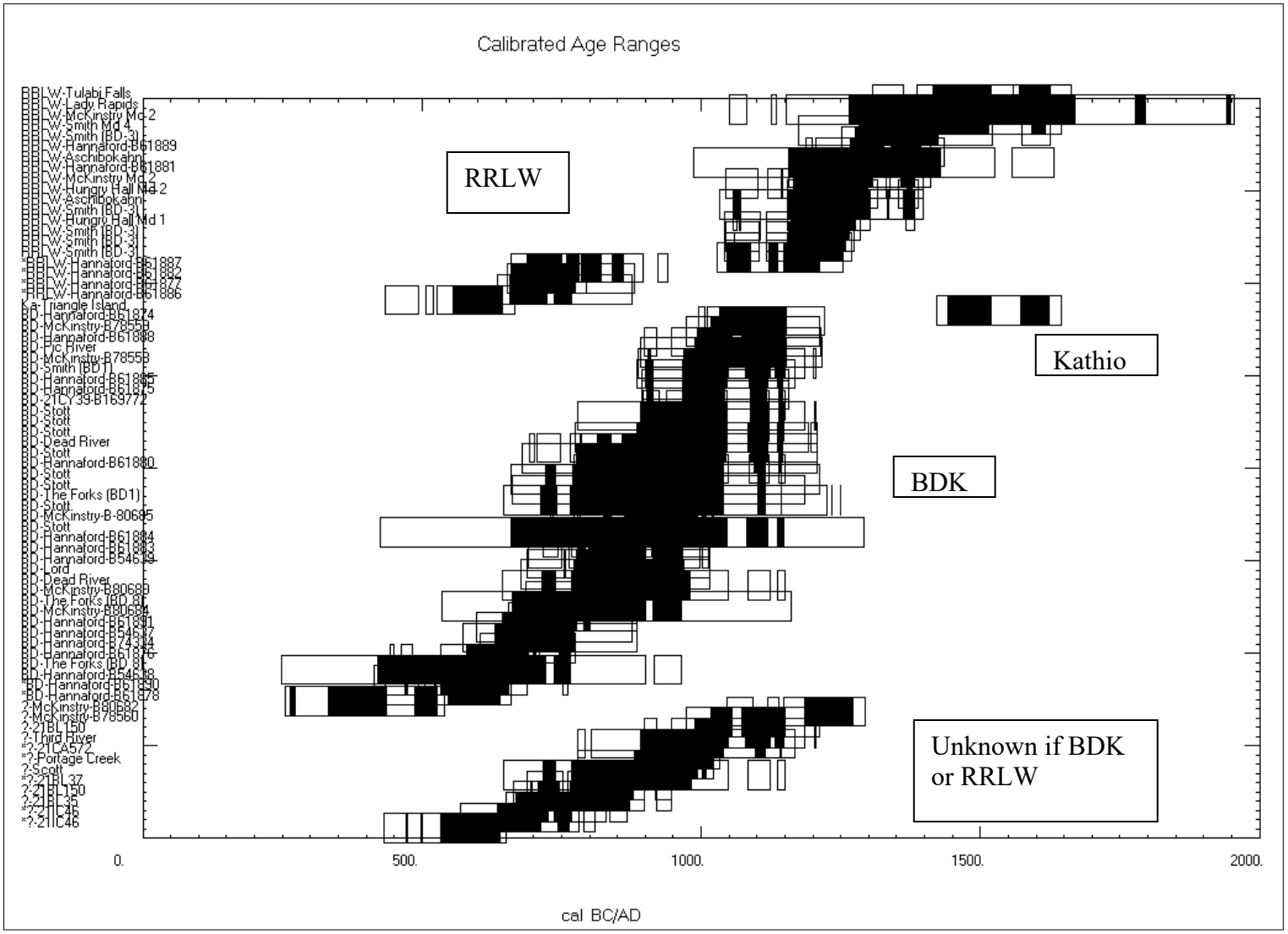

Figure 17: Calibrated radiocarbon dates for the Blackduck-Kathio and Rainy River Late Woodland complexes (Anfinson radiocarbon database; Lenius and Olinyk 1990; Rapp et al. 1995; Thomas and Mather 1996). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. Dates on pottery residues are indicated by asterisk*. Dates from pottery scrapings from Hannaford appear to be over a hundred years earlier than the charcoal dates from comparable components (Rapp et al. 1995:Table 7.1) and were not used for establishing the timeline.

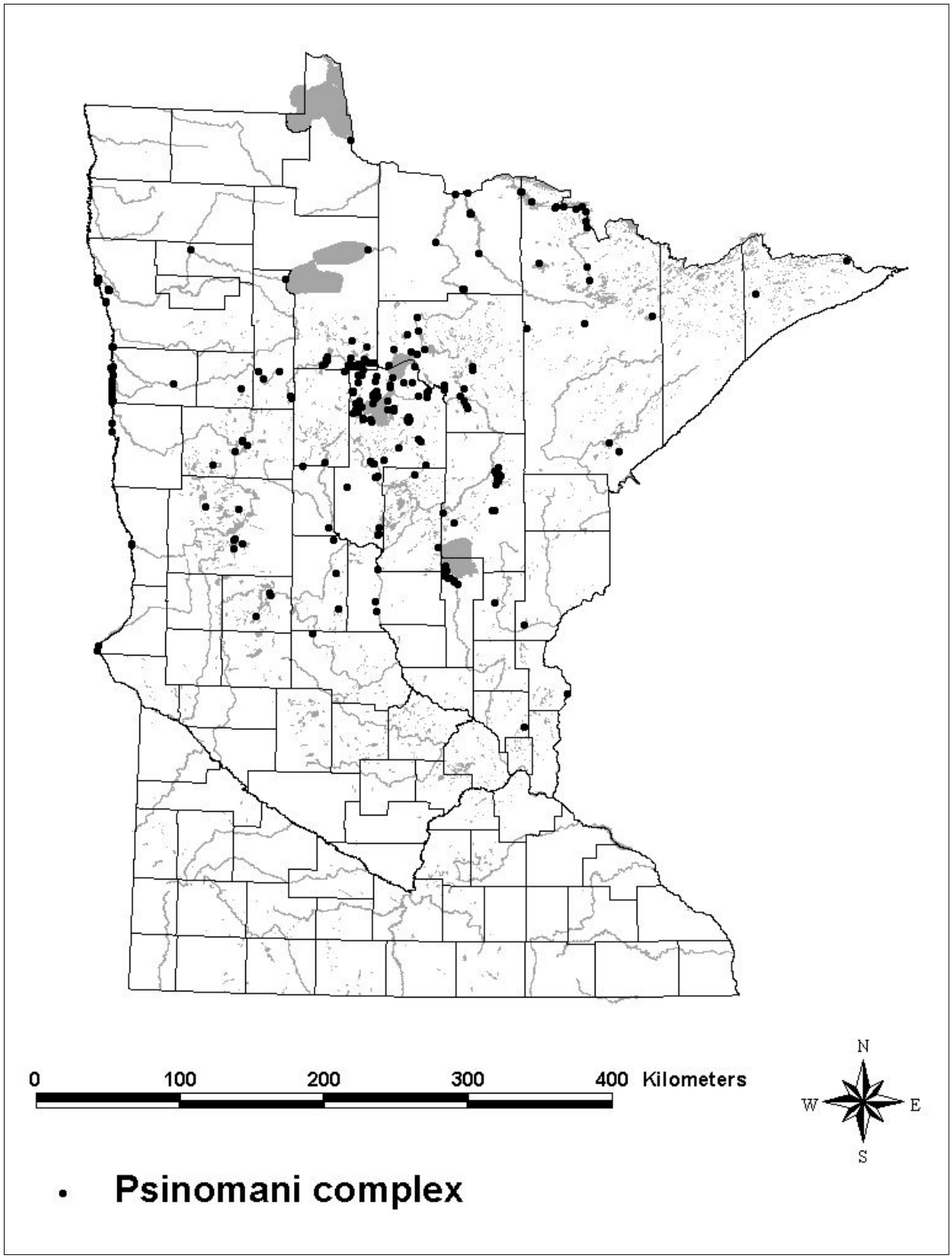

Figure 18: Distribution of the Psinomani complex.

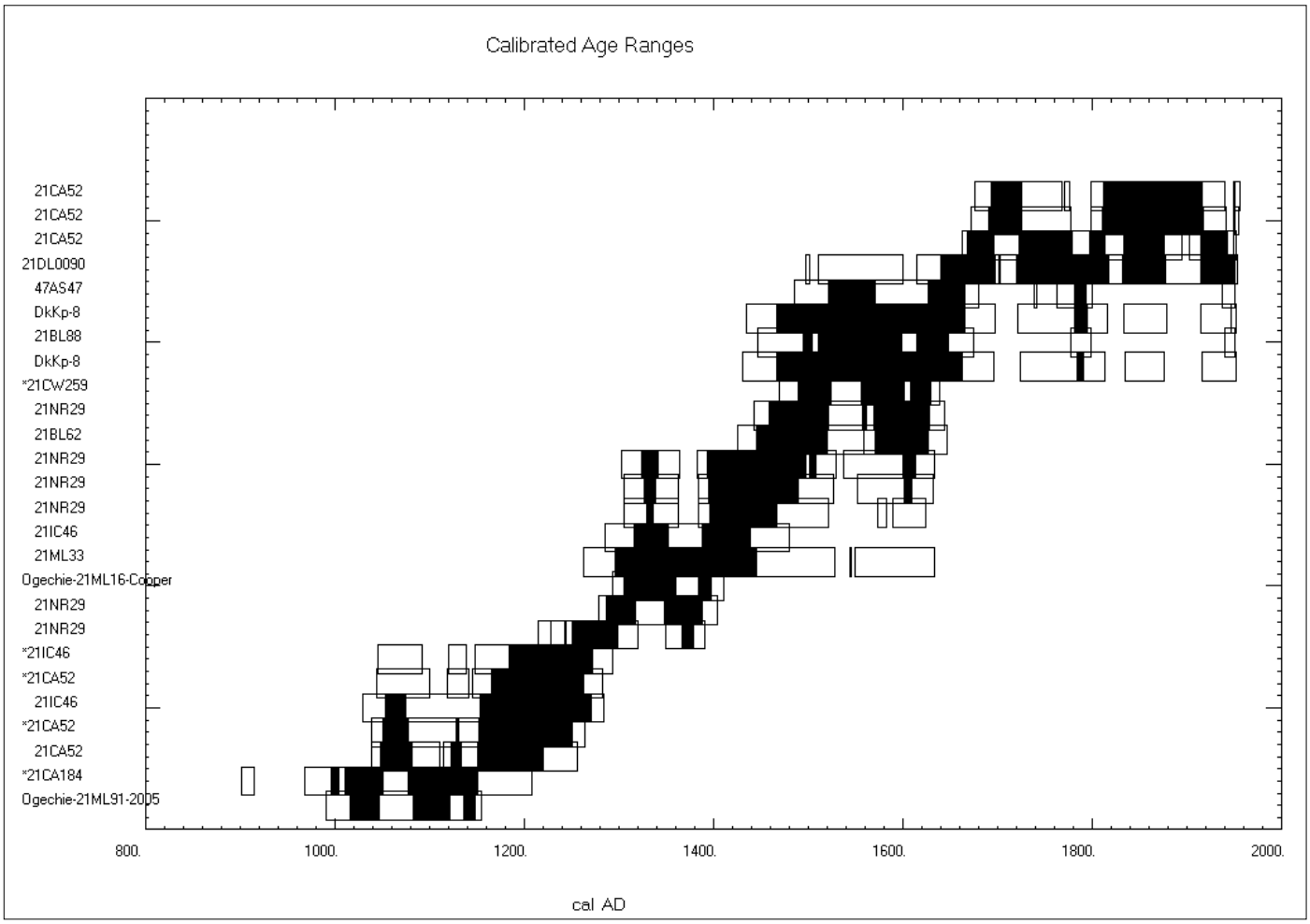

Figure 19: Calibrated radiocarbon dates for the Psinomani complex. All are associated with Sandy Lake pottery except where specifically identified as Ogechie (Anfinson radiocarbon database). Calibrated using Calib 5.01; solid bar represents 1 sigma, open bar 2 sigmas. Dates on pottery residues are indicated by an asterisk *.