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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 ___ Old Submission

A. Name of Multiple Property Listing

The Historic Logging Industry in State Region 2 and the Nicolet National Forest

B. Associated Historic Contexts

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

Nineteenth and Early Twentieth Century Logging Industry in Northern Wisconsin

C. Form Prepared By

name/title Cynthia M. Stiles, State Region 2 Archeologist

organization Nicolet National Forest date 12/13/93

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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 — Date 6/16/94

State Historic Preservation Officer-WI
State or Federal agency and bureau

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 8-1-94

Name of Multiple Property Listing — State
The Historic Logging Industry in State Region 2 and Nicolet National Forest, Wisconsin

Table of Contents for Written Narrative

Provide the following information on continuation sheets. Cite the letter and the title before each section of the narrative. Assign page numbers according to the instructions for the continuation sheets in How to Complete the Multiple Property Documantation Form (National Register Bulletin 16B). Fill in page numbers for each section in the space below.

Page Numbers

Paperwork Reduction Act: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

E. STATEMENT OF HISTORIC CONTEXT

INTRODUCTION

Over the past 10,000 years, since people began to use the resources of northern Wisconsin, they have molded the landscape to their needs. The most intensive, and possibly devastating use of this landscape occurred between ca 1856 and 1945 - during the era of the historic logging industry in the state. While timber removal occurred before 1856, and still continues today, the demand for forest products was never as high as it was during those years. The beginning of this time period coincided with the westward movement of settlers onto the rich open prairie lands of the plains states and ended with two continental wars and two world wars. This time period also saw the development of America from a primarily agrarian society to an industrialized one. These settlers, factories and mills needed fuel and building material. Wood supplied those needs. Wood also supplied fuel and building material for the two major transportation modes of the 19th and early 20th centuries - the steamboat and the railroad. The logging industry took advantage of both of those means of transportation to bring the logs out of the forest and to bring the finished lumber to the market.

In the nineteenth century, America saw the vast forests of the Great Lakes states as an endless supply of timber. Despite warnings from a few visionary scientists, entrepreneurs stripped the forests, initially with the government's silence. At first it appeared that the industry was actually preparing the land for agricultural settlement. However, repeated fires intensified by slash and debris, followed in the wake of the cut, and destroyed topsoil. Attempts made to farm the cutover met with poor soil and boulder-laden fields. By the late 1920s, the landscape had been badly scarred. Government programs such as the Civilian Conservation Corps and agencies such as the USDA Forest Service then designed strategies to take the mismanaged and seemingly useless land and replant new forests. Today, in northern Wisconsin, logging is still a primary industry, but the cuts are managed and fires controlled.

The historic logging industry not only left a landscape devoid of merchantable timber but also left a plethora of towns, camps, farms, landings, mills and railroad track. Logging crews also built dams, chutes, booms and boom lakes, and cleared streams of obstacles so that logs could flow swiftly and easily down to the mills. Some structures were reused by settlers or other industries, some buildings were taken down and reused in new locations, and some towns survived the decline of the industry, but most of the remains are only apparent as archaeological sites. The largest percentage of archaeological sites in northern Wisconsin can be assigned to the historic logging industry.

Until the last 15 years, no coordinated effort was made to inventory and evaluate the large number of logging sites in the area encompassing State Archeological Region 2 and the Nicolet National Forest. In fact, many sites were not considered historic properties as they were not yet 50 years old. In 1980, the Great Lakes Archaeological Research Center was contracted by the Nicolet National Forest to develop an historic context for logging sites, define guidelines for evaluation and to create a management plan (Overstreet 1982). To date, over 500 hundred sites have been located and 62 evaluated.

GEOGRAPHY

State Archeological Region 2 and the Nicolet National Forest fall within the Northern Highland Geographical Province of Wisconsin and Michigan (Fig.1). This province is part of a large upland area extending into southeastern Canada. While the Northern Highland Province contains the highest elevations in the state, in general the relief is low and gives the appearance of a smooth upland plain. Where hills are evident, they are rarely over 200 feet higher than the adjacent valley (Martin 1965:366-373).

The Highland Lakes District is a unique area within the Northern Highland. Lying primarily in Vilas and Oneida counties, the ratio of lakes per square mile is the largest in the state. In fact, only three other areas of the world can claim a higher ratio - portions of Minnesota, Ontario, and part of southern Finland (Martin 1965:413-414). Martin describes the origin of

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the Highland Lakes as follows:

> They are as a rule, small lakes, closely spaced, irregular in outline, and connected by streams which have the most irregular courses. All this is typical of lakes in a glaciated region. These bodies of water are all glacial but the origins of the lakes are diverse. Some are in shallow depressions in the ground moraine, some are held in by recessional moraines, and great numbers are in hollows in the outwash gravel plains. The smaller hollows are kettles formed at the close of the Glacial Period by the melting of buried ice blocks (Martin 1965:416).

In addition to the lakes, 21% of the Highland Lakes District is comprised of swamps, bogs and marshes. The variety of wetlands include open swamps, cranberry and blueberry marshes, tree-covered tamarack swamps and hummocky cedar swamps. Most are level with surfaces covered by peat and decayed vegetation. Prior to the extensive damming of the major river courses for water power, the swamps helped regulate the flow of water in these rivers (Martin 1965:416-418). Lakes and swamps came to be important to the logging industry.

State Region 2 and the Nicolet National Forest are also the location of a number of headwater systems: the Wisconsin River, which flows south to the Mississippi River; the Manitowish (Flambeau) and Jump rivers, part of the Chippewa River drainage system which flow west and south to the Mississippi River; the Presque Isle and Ontonagon rivers which flow north into Lake Superior; the Brule, Pine, and Popple rivers, part of the Menominee River drainage system, which flows east and south to Green Bay (Lake Michigan); the Peshtigo and Oconto rivers, which flow east to Green Bay (Lake Michigan); and, the Wolf River, part of the Fox River drainage system, which flows to Green Bay (Lake Michigan). This region contains water transportation to the three most important shipping areas in the Midwest: the Mississippi River, Lake Superior and Lake Michigan. In the early decades of the logging industry in Wisconsin, the spring log drive, using major rivers and streams, was the only method used to transport logs to the mills and market.

In summary, the rivers and streams of what is now State Region 2 and the Nicolet National Forest provided a number of options for transporting timber to the mills. Additionally, the lakes, marshes, and connecting streams provided area to store logs in preparation for the spring drive. When the railroad expanded into northern Wisconsin, planners found few obstacles on the upland plain. Logging companies took advantage of the relative lack of relief by placing narrow gauge spurs into the forest and opening areas previously beyond the reach of the industry. Lumbermen found that the vast drainage systems and the gentle topography, combined with the rich inventory of pine, other softwoods, and hardwoods was an ideal place to build their fortunes.

VEGETATION

When Wisconsin became a state in 1848, a large percentage of the land within its boundaries was still unsurveyed and unknown to European and Yankee settlement. A series of treaties, ending in the Treaty of La Pointe in 1854, set the Indian reservation boundaries. Shortly thereafter the General Land Office (GLO) sent surveyors to carve the land into townships. These surveys, conducted in the study area in the 1850s and 1860s, also documented the water resources and vegetation present at the time and constitute the best available description of the pre-logging industry canopy and undergrowth species. Several researchers in the past few decades have poured through those surveyors' notes and maps to reconstruct the vegetation of the mid-19th century.

In Vegetation of Wisconsin, Curtis estimates that 63% of the state land surface was forested at the time of the GLO surveys and that 46% of the state land surface was northern forests (1959:Table 3). The predominant type of forest was called Northern Mesic Forest and covered 34% of the state land surface. Stands in this forest type contained sugar maple, beech, hemlock or yellow birch as the dominant species, with ironwood, American elm, red oak, red maple, white birch, white ash and balsam fir also present. White pine was usually the largest tree but the density of the species was low (Curtis 1959:57,71). To the lumberman of the 19th century, stands in Northern Mesic Forests "with only 2 or 3 pine

trees per acre were highly profitable, since the trees were likely to be forest giants from 3 to 6 feet or more in diameter" (Curtis 1959:200). Until the introduction of the railroad into the area, the hardwoods in these forests were virtually untouched by the axe, although fire took its toll in some areas. While most of these forests were eventually cut for their hardwood value, archaeological survey has discovered numerous maple sugar production sites, indicating a dual purpose for these sugar maple dominant forests. According to the Curtis map, the Northern Mesic Forest was the dominant forest type in Florence, Forest, Oconto and Price counties, and constituted about 30% to 40% of the land surface in Vilas and Oneida counties around 1840 (Fig.2).

Six and a half per cent of the state land surface was characterized by Northern Xeric Forest (Curtis 1959:Table 3). These are: 1) dry-mesic forests dominated by white pine, red maple or red oak with associated species of white birch, sugar maple, hemlock and red pine; and 2) dry forests of Jack pine, red pine or Hill's oak with associated species of trembling aspen, large-toothed aspen and white oak (Curtis 1959:203). Vilas and Oneida counties are mapped as containing approximately 50% of the Northern Xeric Forest around 1840 (see Fig.2). These pine forests were the most valued pieces of land in the state in the late 19th century, although the price paid to the state or federal government did not always reflect this value. Curtis estimates that 103.4 billion board feet of pine was cut in the state from the northern forests, a quantity worth over 10 billion dollars in a 1959 economy (Curtis 1959:218-219).

The third type of northern forest described by Curtis is the Lowland or Wet Forest, again comprising approximately 6 1/2% of the state land surface (Curtis 1959:Table 3). These forests include tamarack-black spruce bog forests, white cedar-balsam fir-conifer swamps, and black ash-yellow birch-hemlock hardwood swamps. These forests occur in low areas such as lake bottoms or river floodplains and thrive in open water or peat-filled lowland areas. Small areas of these swamps can be found in all of the counties of State Region 2 and the Nicolet National Forest (Curtis 1959:221-222). These forests were considered wasteland and useless by early historic loggers.

A vegetation map was compiled from the GLO surveys in 1976 by Robert Finley. Although

the descriptions are worded in a slightly different manner, the conclusions are very similar. Finley describes the dominant forest type in the northern portion of the state as the Hemlock-Sugar Maple-Yellow Birch-Pine Forest. This is the primary forest type in the study area. A second forest type, predominant in Vilas and Oneida counties is labeled Pine Forest:

> Pines occur in some places in pure stands, but throughout most of the mixed coniferous-deciduous forest area they occurred in various concentrations among the other species...Pure stands of white pine-red pine forest were somewhat limited in area, yet such forests did occur as distinct entities...The major stands were centered in Vilas and Oneida Counties...(Finley 1976).

As perfect as the topography was for the logging industry, the evolutionary stage of the northern Wisconsin forest in the last half of the 19th century was even more perfect.

LOGGING IN NORTHERN WISCONSIN

LAND ACQUISITION

In the 19th century, the laws governing the sale of federal lands were designed for an agrarian society, not the lumber industry. Under the Land Law of 1820, the Pre-emption Act of 1841 and the Homestead Act of 1862, up to 160 acres of public land could be acquired for a small fee, usually $1.25 an acre. Under most conditions, improvements such as cleared and planted fields and/or buildings had to be evident within the first five years. Consequently, the lumbermen were forced to buy land when their interest was only in the rights to harvest the timber. The land was also offered in such small quantities that the industry had to adjust their acquisition practices to be able to accumulate the large parcels of land needed to profit from logging. On the other hand, lumbermen bought valuable timberlands well below their market value. Since government surveys evaluated the land for its agricultural potential, local land offices and public auctioneers did not usually know when they were selling parcels containing prime pine stands. Fries noted a common practice for lumbermen at auction:

> It was a simple matter for a lumberman who wanted to buy land at a low price to bid ridiculously high at the public sale and then quietly forfeit his purchase after the sale had closed, allowing a partner to buy it privately before news of the forfeiture had leaked out. (Fries 1951:167)

By 1898, only a half million acres of federal lands remained. By 1914, only eight thousand acres remained (Fries 1951:173).

State lands, those granted to the states by the federal government for such use as schools were disposed of in a similar manner. School lands and swamp lands were usually sold at auction for between 50 cents and three dollars an acre (Fries 1951:170). Beginning in 1850, large land grants were used to subsidize the development of the railroad. Most of that land in northern Wisconsin was timbered and either logged off under lease or sold outright to private industry (Allen 1950:19). Companies also registered land under the Homestead Act in the name of crew members or officers of the company. This gave the company up to five years to remove the timber or produce improvements on the land. Many fraudulent schemes were developed to comply with the letter of the law (Gates 1965; Allen 1950:19).

Although the federal GLO and state land commissioners saw that resale of these lands brought upwards of $15-$30 an acre, attempts to change the laws and stop the land sale frauds failed. Sale of government lands continued at well below market value. As Fries noted,

> It was not uncommon for the price of a timber sale tract to double within two years. Many of the lumber fortunes represent the profits not from a manufacturing enterprise but from the resale of land bought at a low price (Fries 1951:173-174).

Lumbermen were not the only group of people to take advantage of cheap government land. States with no more public land could, under the Morrill Act of 1862, acquire public lands in other states with script, given in proportion to the number of Congressional seats the state held. The state of New York, prompted by Ezra Cornell, bought almost one million acres of federal land in the Chippewa River valley, including a portion of Price County. The resale of this land was to benefit Cornell University. Between 1880 and 1922, this land produced a profit of more than five million dollars for the university (Fries 1951:172; Gates 1965).

Property taxes and tax assessment also varied from county to county, and often from township to township. Lumbermen often controlled the tax assessment policies in areas

where they owned large parcels of land. High property taxes were assessed absentee landowners, shifting the cost of developments such as schools and roads from those situated locally. As a result, once the timber harvest was completed, many of the lumber companies let the tax payments lapse and millions of acres of worthless cutover fell into county hands with thousands of dollars of back taxes due. These counties were so poor that state and federal efforts to promote reforestation were unsuccessful. Instead, these lands were sold primarily as agricultural land to unsuspecting immigrants, a practice that the lumber companies themselves often followed (Fries 1951:176-178; Gates 1965:86-89).

While some of the schemes practiced by the historic logging industry to acquire land and timber may have been fraudulent, they were also imaginative (Fries 1950:179-203). As a result, historical accounts and the deed and tax records for a particular property may not agree. In the early years, the recorded landowner could be 1) a company employee or relative registered under the Homestead Act, 2) a railroad company, 3) the state of Wisconsin or even another state under the Morrill Act, or 4) a corporation, university or college. It may not always be possible to determine who actually controlled the land, who harvested the timber or who built the camp that may still exist as an archeological site. Overstreet (1982) noted that, minimally, 70 companies and individuals had operated within Nicolet National Forest.

FROM HORSE TO IRON HORSE TO HORSE POWER

Introduction

The historic logging industry in Wisconsin falls within what has been aptly called the "Wooden Age" (Karamanski 1984:16). During this age, settlement and industry were dependent on wood for building material and fuel. In America, European timber harvesting began in the forests of New England and Pennsylvania in the 17th century. As the eastern forests were depleted and lands of the Midwest and Plains were opened for settlement, the vast conifer-hardwood forests of Michigan, Wisconsin and Minnesota were viewed as an endless source of building material for this westward expansion. Lumbermen from Maine and Pennsylvania set up offices in the ports of Lake Michigan, Green Bay and in the major

river cities along the Mississippi, Fox and Wisconsin rivers. These men brought both necessary funds and technology with them to the north woods.

Prior to statehood, lead mining and fur trade ranked higher than agriculture and timber harvesting in the economy of the Wisconsin Territory. Timber was initally cut to supply only the local needs in the mining region and to supply some building materials for isolated settlements in the north central part of what was soon to become the state of Wisconsin. The lack of mills in the territory forced people to order the finished materials from the east and ship it by steamboat and ox cart. After the Treaty of La Pointe opened the northern portion of the territory, it became profitable to advance into the vast forests. Numerous mills sprang up along the banks of major rivers and streams.

The first companies to send logging crews into the woods encountered obstacles that did not affect later enterprises. The first obstacle was simply to provide regular supplies to camps. Local agricultural communities had not yet been established so there were no food sources close to the camps. Additionally, store owners were reluctant to extend credit to early logging companies. As a result, many logging companies expanded their interests into building and maintaining supply stores. The practice of company stores supplying company crews began early in the industry. Few roads were cut into the forests, therefore transportation of food, clothing, tools and other supplies was difficult. Bateaux, keelboats and ox carts were the first means by which supplies were carried to the camps (Fries 1951).

A second difficulty encountered by early logging concerns was the lack of skilled crew members, mill workers, managers and camp foremen. As early as the 1850's, extensive advertisements designed to entice skilled workers from the eastern lumber states described Wisconsin in the most appealing terms. The third major obstacle of the early company owners was financial. As prime land was opened for sale, large amounts of capital were needed. Mill machinery, camp supplies, transportation, and crew payroll all contributed to a large initial outlay of money needed to begin a logging company. Advertisements to major eastern cities attracted investors to this new industry (Fries 1951).

Even after these obstacles were met, the first companies to venture into the woods encountered danger from rapids, fire, uncontrolled water levels, or droughts, any combination of which could spell doom to a logging company after the first few seasons. Despite these early hazards, the period from 1850 to 1870 saw a rapid rise in the number of mills and logging crews working in northern Wisconsin. The accelerating pace of the industry during these two decades was due to the growing demand for lumber as settlers moved westward onto the prairies after the Civil War. It was also due to the expansion of the railroad into the Midwest, making it easier and cheaper to ship finished lumber to these settlements (Fries 1951:11-23).

The Changing Resource

By the turn of the century, the landscape seen by the government surveyors had undergone a drastic change. Pine yields were declining due to indiscriminant cutting and the uncontrolled forest fires that swept the slash. USDA special agent Filbert Roth evaluated the forest condition in 1897. He stated,

> During the forty years of lumbering nearly the entire territory has been logged over. The pine has disappeared from most of the mixed forests and the greater portion of pineries proper has been cut...There is today hardly a township in this large area where no logging has been done. In addition to this, the fires, following all logging operations or starting on new clearings of the settler have done much to change these woods. Nearly half of the territory has been burned over at least once: about 3 million acres are without any forest cover whatever, and several million acres more are but partly covered by the dead and dying remnants of the former forest. (1898:12)

Roth estimates that out of 18.5 million acres of northern Wisconsin forest, 9.3 million acres, or 50%, were owned by lumbermen. Table 1 breaks down the number of acres in cultivation, cutover, swamp and forest from Roth's 1897 survey.

TABLE 1: DIVISION OF LAND BY USE - 1897
(taken from Roth 1898:Table II)

County	*Total acres*	*Remaining Forest*	*Cutover*	*Cultivated*	*Swamp*
Florence	312,000	160,000	100,000	2,000	50,000
Forest	681,000	400,000	140,000	1,000	140,000
Langlade	555,000	350,000	115,000	20,000	70,000
Oconto	713,000	180,000	390,000	58,000	85,000
Oneida	694,000	150,000	390,000	2,000	150,000
Price	815,000	380,000	300,000	8,000	125,000
Vilas	566,000	200,000	230,000	1,000	135,000

Cutover, wasteland and openings (all included in the cutover category) in 1897 constituted 32% of Florence County, 21% of Forest County, 21% of Langlade County, 55% of Oconto County, 56% of Oneida County, 37% of Price County and 41% of Vilas County. The high percentages in Oneida and Vilas counties are probably due to the former existence of high grade pine stands described by the government surveys in those counties (Curtis 1959). Roth estimates that 80% of these cutover lands were unproductive wastelands repeatedly burned (1898:6,8,55).

In 1897, white pine was still the preferred species and

> ...in most camps everything is taken that will make a 2" x 4", so that even sapling thickets are no longer spared...(Roth 1898:18)

Roth evaluated the condition of all the major species in the forests at that time. The average diameter of pine logs was 14 inches, down from an average of 30 inches in 1857. Red or Norway pine was still present in the area as well and Roth recommended that this species be used for reforestation since it was a rapid growth, high yield species - more so than white pine. Hemlock in 1897 was cut only when the bark was needed, the rest of the tree was used as pulpwood. He estimated that a fortune in hemlock still existed. Cedar logging was

done on a small scale for ties, posts, telegraph and telephone poles and shingles. Since most of the cedar grew in or near swamp land only that which was along roadways had been harvested. Again, Roth estimated that a large percentage of cedar still existed in the forests. Little tamarack was cut and this species was not considered marketable. When cut at all, spruce and balsam fir were used as pulpwood (Roth 1898:14-27).

Roth found the number of hardwoods difficult to estimate since little attention had been paid to these species by the timber cruisers. He stated that oak, birch, basswood, butternut, aspen (poplar), maple, elm, ash, all existed in northern Wisconsin in varying proportions. Hardwood harvesting, while present, was order specific and only the best trees sought. White oak was the most valuable, followed by basswood and elm. Birch, maple and aspen were cut in large quantities but not considered a valuable wood. Roth believed that the hardwood forests were able to restock themselves far better than the pines at the present rate of forest use (Roth 1898:27-33).

Roth estimated that from 1873 to 1897, 66 billion board feet, mostly pine, was milled. In addition to milled lumber,

> ...large quantities of cedar timber, ties, posts, piling, etc., also ties, piling and construction timber of hardwoods and hemlock; ship timbers, the exploitation of which has brought special crews from Quebec and other points to these woods; large quantities of cooperage and wagon stock; many million feet of mining timbers; besides many more million feet of material for home use, fuel and charcoal. (Roth 1898:38)

Warnings about damage to the forests and the effect that this would have on the Wisconsin landscape and economy had begun as early as the 1840s. Geologists and geographers had seen what massive indiscriminant logging had done to New England and Pennsylvania. Besides stripping the woods of merchantable trees, loggers were responsible for vast amounts of waste. They left high stumps and log cuts that were not economical. Windfalls were ignored when they could have been cut for logs and large piles of slash were left in the woods as fodder for forest fires (Fries 1951:245). Increase Lapham and others tried to

influence the state legislature as early as 1857 to temper the greed of the logging industry. However, since many legislative seats were held by the industry and its proponents, these warnings were ignored.

By 1897, the truth of these predictions began to be seen. Roth stated that half of the mills that existed in 1877 were bankrupt due to high prices and the decrease in pine supplies. Furthermore,

> The hardwood forest is being reduced by logging and (agricultural) clearing, the pineries are disappearing and fires assist the destruction of both besides burning out the swamps... This loss is primarily a communal loss, a damage to county and state, for the individual owner does not suffer; the land is bought for the timber and when this is cut the land is only held if it appears that a low tax assessment and opportunities to sell, etc., will promise more profit in holding than in abandoning it. (Roth 1898:43).

His final statement pleaded for the institution of a fire police to help stop the massive forest fires as well as a program of regeneration (Roth 1898:55). While both the state and federal government took steps in this direction, another 30 years would go by before the logging industry influence declined enough for effective fire control, reforestation and forest management programs to be instituted. In the interim, numerous forest fires consumed a large area of primary and naturally regenerating stands. The fires were started by lightning or carelessness and ran their course for lack of fire fighting knowledge. Burning cutover lands in preparation for farming (and possibly burning slash to cover illegal cutting, if some of the stories are to be believed) constituted most human caused fires. Areas that experienced fires year after year were soon reduced to wastelands since organic topsoil containing nutrients needed for seedlings was destroyed. Several spectacular fires causing loss of life have been recounted, the most famous being the Peshtigo Fire of 1871. This fire killed almost 1000 people and destroyed 1 million acres of timber (Connor 1971:32; Pernin 1971). Most fires were small and most large fires were actually numerous small fires coming together (Roth 1898:46-47). However, that did not lessen their effect on the

landscape. An apt description of the woods at this time,

> The desolation of much of the pine area is difficult to describe. In many places the entire landscape as far as the eye could see supported not a single tree more than a few inches in diameter. Only the gaunt stumps of the former pines, frequently with their root systems fully exposed as a result of the consumption of the topsoil by fire, remained to indicate that the area was once a forest rather than a perpetual barren. (John Curtis as quoted in Mead et al. 1971:6).

An Evolving Industry

In the northern Wisconsin logging industry, water transportation began with the earliest development of the industry in the 1850s and lasted until almost the 1920s. This form of transportation was exclusively associated with the harvesting of pine. The first spring log drive on the Upper Wisconsin River was conducted in 1857-58 by the Fox and Helm Lumber Company of Stevens Point, and ran from Eagle River (present day Vilas County) to the mills in Mosinee. The last river drive took place in Vilas County in 1917 (Huston 1982:2; Espeseth 1953:28; Olson nd:100-113). The presence of dams encountered by the GLO surveyors on the North Branch of the Oconto River in 1857 also suggests that early log drives occurred in this area as well (Birmingham 1985:461). It is possible that the first drive on the North Branch of the Oconto River was conducted within the project area in 1856-57 by the Balcom, Anson and Eldred operation out of Stiles, Wisconsin (Holt 1948:26). Log driving persisted even after railroad transportation became common for several reasons. The extensive drainage systems in this part of the state continued to supply a cheaper transportation cost for many companies cutting pine especially during times of rate disputes and in areas where rail cars were scarce. And, even though rails were laid to almost every mill, many continued to offload logs into boom lakes for holding until the mills could accommodate them. Mills depended on water power up until the 1920s and 1930s when the combination of the Great Depression, hydroelectric power and truck transportation put most small mills out of business.

The introduction of the railroad opened up new opportunities for the logging industry. The 1860s saw rail lines reaching across the state from Milwaukee to Prairie du Chien and La

Crosse. The first major rail line through the study area connected Green Bay to the Menominee River in 1871. In 1877, the Wisconsin Central cut a line through the heart of the northeastern Wisconsin forests, connecting Milwaukee to Ashland and points in between. In 1882, the Milwaukee-Lakeshore-Western Railroad (now the Chicago-Northwestern) laid a branch line to Rhinelander. By 1892, the Soo line ran east from Minneapolis to Rhinelander (Fries 1951:84-86; Huston 1982:2). Narrow gauge lines were laid in the 1890s and continued as an integral part of the system until the 1940s. The last narrow gauge line in State Region 2, the Thunder Lake Line, was closed in 1945 (Huston 1982). Rail lines carried hardwood and pine as both logs and finished products.

The first segment of the logging industry to take advantage of the railroad were the mill owners. Mills found that shipping directly to the customer by rail was cheaper and faster. Lumber arrived dry and clean, instead of water-logged and muddy from rafting, and thereby commanded a larger profit. Eliminating the middleman, in this case the wholesale yards of Chicago and St. Louis, was also an attractive proposition. By shipping directly to the West, money that would have been paid to the wholesale yards became additional profit. Railroad transportation also opened up other possibilities - turning rough cut lumber into finished products such as furniture, barrels, doors, etc. By 1890, the railroad carried more finished lumber out of Wisconsin than the rivers (Fries 1951:91).

Hundreds of miles of railroad track were built by companies between 1900 and 1940 as part of the mill complex,

> Some were subsidiary corporations while others were operated directly by lumber companies and hence were private railroads as distinguished from common carriers...mills with extensive logging railroad operations were the Connor Lumber & Land company of Laona and Stratford; Yawkey-Bissell Lumber Company of Arbor Vitae and White Lake; Menominee Bay Shore Lumber Company of Soperton; Goodman Lumber Company of Goodman; Girard Lumber Company of Dunbar; J.W. Wells Lumber Company of Wausaukee; Holt Lumber Company and Oconto Lumber Company of Oconto; Rib Lake Lumber Company of Rib Lake;... Kneeland-McKlurg

> Lumber Company of Phillips and Morse;... J.S. Sterns of Odanah;... Roddis Lumber & Veneer Company of Park Falls... (Kaysen 1978:41). In some cases, railroads built trunk lines into the woods which were used by the lumber companies to ship logs to the mills, saving the company from constructing their own rail lines.

Railroad lines into forests could also place the mills closer to the logs. Before rail transportation, loggers were at the mercy of the weather. Extensive flooding or drought conditions could result in damaged logs or no logs at all coming to the mills. River driving or rafting of logs also limited the number of logs that could be sent each spring and the speed by which they arrived at the mills. In addition, most camps, mills and lumber yards had to be located near a large navigable river or stream. Railroads allowed the logging industry to work year round if they chose, move deeper into the forests to follow the timber, and develop new ways to market and ship finished goods. The railroad could also carry men and supplies to the camps, making the outside supply lines faster, safer and less dependent on weather conditions. Narrow gauge lines, laid by the lumber companies to the main rail lines, allowed the companies to transfer men, supplies and equipment from camp to camp. Since these auxiliary track lines could be moved from place to place as needed, more complete clear cutting of the forest was now possible.

The rail lines themselves supplied a large market for the logging industry. Railroads needed wood for fuel as well as lumber for

> ...bridges, piles, turntables, depots, cars and many other adjuncts of railroading...By 1894, the railroads of the country were using about a million acres of timber every year much of which came from Wisconsin. In 1899, railways placed orders for five million ties in northern Wisconsin. Lumber journals spoke truly when they observed that the country's railroads were the lumber industry's best customers. (Fries 1951:92)

However, there were disadvantages to the use of the railroads. At first, there were never enough cars to transport the logs to the mills. But the most vexing problem to the logging

industry was the rate system. Railroad rates for transporting logs, men, supplies or finished goods fluctuated and rate wars between the lumber industry and the railroads began in the 1870s and continued until well into the twentieth century. Throughout this time, water transportation never completely ceased for pine logs. Even with its drawbacks, water transportation was a cheap method of delivering logs to the mills and rough cut lumber to the wholesale yards. Logging companies would continually revert back to driving and rafting when railroad rates became prohibitive.

By the end of World War II, truck transport began to replace the railroad in small hauls from forest to local mills. Extensive highway improvements, cheap and seemingly limitless gas, and company control of the railroads, pushed the truck into the forefront for the logging industry. By then however, the pre-1840 forest was gone and the new forests were being managed on both private and public lands.

AN ANALYTICAL FRAMEWORK

INTRODUCTION

In order to organize the vast amount of information contained in the historic record of the logging industry, three divisions were postulated by Overstreet (1982:55). These divisions, based on dominant species harvested and labor and technology were the Pinewood Era, from the beginning of the industry to 1910, the Hardwood Era, from 1910 to 1945, and the Pulpwood Era, from 1945 to the present (Fig.3). Since Overstreet's work, however, many additional sites have been recorded and considerable data has been gathered on the companies that had worked within the study area. This additional research indicates that the cutoff dates for species harvesting as well as for dates when certain technologies were advanced, was not necessarily consistent across the study area.

Another approach to dividing logging industry activities is by transportation method. This is similar to Karamanski's (1984) use of eotechnic, paleotechnic and neotechnic categories (Fig.4).

> The eotechnic era...lasted roughly from 1840 to 1900. It was a period marked by the felling of much of the region's pine and massive log drives...The paleotechnic era begins with the end of the nineteenth century and lasts into the 1930's, roughly 1900 -1938. Railroad logging networks spread through the forest to harvest vast stands of hardwood. The neotechnic era saw the emergence of the truck in logging and, with the improvement of roads and the rise of automobile ownership, the demise of the logging camp. From 1938 to the present, the dominant resource of the forest has been pulpwood (Karamanski 1984:25).

Categorizing Wisconsin's logging industry based on transportation results in the following divisions: the Water Transportation Era, beginning of industry to 1917, the Railroad Transportation Era, from the 1870s to 1945, and the Truck Transportation Era, from the 1920s to the present (Fig.5).

Wisconsin's logging activities do not fall neatly into either Karamanski's or Overstreet's frameworks and this study adopts a combination of both. Since industry activities traditionally have been defined by the type of harvested wood, Overstreet's terminology is retained. However, extended and more general boundaries are proposed to take into consideration the industry's adjustment to depleting resources and changes in technology and modes of transportation. The divisions used in this study for State Archeological Region 2 and the Nicolet National Forest are (see Fig.6):

Pinewood Era	Beginning of the industry to 1910s
Hardwood Era	1890s to 1940s
Pulpwood Era	1930s to present

As more information comes to light through archival research on individual sites, even these dates may undergo modification. Fries (1951:240-241), for example, suggests that there was considerably more overlap in activities, suggesting that hardwood cutting became important as early as the 1870s, and that the last large stands of white pine were not harvested until the 1930s. While that may be true as a general statement for northern Wisconsin, more evidence needs to be documented for this specific study area. Pulpwood is also mentioned as early as 1897 (Roth 1898) but it was a secondary product and its influence on the industry's actions was not evident until around World War II. Given the overlap between eras, it is also difficult to assign archaeological sites to specific eras based on the archaeology alone. Historic archival research is and will continue to be an integral part of the identification and evaluation process. This statement of context concentrates on only the first two eras which fall within the current 50 year eligibility requirement of the National Register of Historic Places. These two eras also had the most effect on the early northern forests and left behind the most archeological remains in the form of camps, water structures, and rail lines.

THE PINEWOOD ERA

Four characteristics define the Pinewood Era. First, throughout much of this era there was a dependence upon water transportation to drive logs to the mill, boom them and then ship the finished lumber to the wholesale yards. Too little snow in the winter, or too much or too little spring rain, could disrupt a log drive and bring bankruptcy to a company. Despite these annual uncertainties, log driving continued for decades even after the introduction of railroads because water transportation was cheap and the mills and other related industries were located along the major river courses. As noted, early rail transport could also be undependable and expensive; the extensive river, stream and lake system that nature provided was used until all pine within a reasonable distance from the water course was exhausted. When rail transportation opened areas of the forest farther from the drainage system, a combination of water and rail use was in effect until the depletion of the pine stands.

Northern Wisconsin can be divided into six natural logging districts during the Pinewood era: the Green Bay District, including the Menominee, Peshtigo and Oconto rivers; the Wolf River District; the Wisconsin River District; the Chippewa River District; the Black River District and the St. Croix River District (Fig.7). State Region 2 and the Nicolet National Forest contain land in the first four of these six districts (Fig.8). The Wisconsin River, St. Croix River, Black River and Chippewa River districts sent their products down the Mississippi River to the St. Louis wholesale yard. The Green Bay and Wolf River districts shipped their products by steamer on Lake Michigan to the Chicago wholesale yard. From these yards, finished goods were sent by rail or steamboat to the mines and settlements of the west.

A second distinction of the Pinewood Era was its technology. This era was labor intensive; streams and rivers needed annual preparation for log driving. This work included blasting rocks and building dams and booms. Additionally, workers built roads, landings and camps, harvested timber with axe and saw, and loaded and unloaded sleighs. All of these tasks were done manually with help only from block and tackle pulley systems and teams of oxen and horses. The spring log drive depended on skilled men to ride the logs downstream to the mills and logging companies were constantly looking for skilled foremen and crews. When railroads made it possible to log pine in the interior forests, horse teams still skidded logs to the landings.

The third characteristic of the Pinewood Era was its seasonal round as pineries logging depended on a spring log drive during most of this era. In the fall, the streams were checked for obstacles, dams were built, and roads, camps and landings were constructed. Once the ground was frozen and became snow covered, skid roads were iced and the harvesting began. Logs were piled on landings, areas along lakeshores, and on the banks of rivers and streams; sometimes logs were piled directly on the ice so they would drop in the water once the lakes thawed. As soon as the ice broke in the spring, the log drive began. When all the logs arrived at the mill, the year in the woods ended.

The last, but most important characteristic of the Pinewood Era was the fact that logging

companies cut and transported pine almost exclusively durmg this era. Pine was king in the woods of northern Wisconsin. It is a sturdy, light weight building material that floats both as a log and as a milled board. Although not the most numerous species, this tree was the largest and the oldest in 19th century northern Wisconsin forests. White pine was preferred; red or Norway pine was also prized. Stands of 2 to 3 trees per acre were valuable. Roth described the pervasiveness of white pine as follows,

> In almost all parts of the mixed forest of the loam lands, the hardwoods formed the body of the forest and the conifers the admixture...The hardwoods were represented by trees of all sizes...The white pine...and hemlock were represented almost entirely by mature old timber...The white pine occurred in nearly all parts of the area; in most counties it was found in every township, on almost every section, and though checked at the 'openings', apparently by a lack of moisture, it followed all the streams (the Wisconsin, Black, Chippewa, St. Croix,etc.), for a considerable distance beyond the limits of the forest. Generally it seems quite independent of the quality of the soil; it grew as fast, as steadily and to as large proportions on the sandy and gravelly lands along the Flambeau, Chippewa and Wisconsin as on the heavier soils of the divides and the famous Wolf river basin. (1898:10,14-15).

The lore of the lumberjack and river drive was spawned during the Pinewood Era. Paul Bunyan and his blue ox, Babe, as well as the daring tales of the river drive made good stories for the summer lay off periods (Wells 1978; Fitzmaurice 1889; Nelligan 1929). In truth, the woods jobs were tedious and dangerous. Loggers worked in below zero temperatures from dawn until dark, with only Sundays and Christmas Day off. Sundays were usually used to check and repair equipment. River drivers worked long hours and sometimes spent the night on the logs. Often, they worked waist deep in icy water to gather strays. Pulling the last log to release a jam cost many a driver his life (Nelligan 1929).

One account describes a typical camp,

> Even in the darkest December and January, the lumberjack's day began any time from four o'clock in the morning on...The timberbeast ate off tin plates, drank out of tin cups, and used tin utensils. A crew of 100 loggers bolting their food in fifteen

> minutes or less must have made a tremendous racket...It was the lumberjack's job to cut trees...From daylight to dark, from first thaw, the lumberjack worked in sub-zero cold and snow...After a long day in the woods, the bunkhouse was another world. It was hazy with smoke, hot and stuffy near the big stove, cold and drafty away from it. And only a little of the fragrance of wet woolen clothing was wafted out through the skylight! The life of the lumberjack was not easy and it certainly was not romantic. (Mead et al. 1971:6)

The men who worked in the woods had to be hardy and able to put up with the most adverse conditions.

Pinewood Era Activities

Cutting timber and driving logs to the mill involved a lot of preparation and many types of activities including timber cruising, fall camp preparation, winter logging, the spring log drive, boom activities, and milling. These activities resulted in a variety of archeological sites.

Timber cruisers - Finding land with enough pine to bring in a profit was a company's first concern. Most logging companies hired timber cruisers or land lookers to ascertain the potential pine yields of government lands opened for sale. In many cases, the government survey records were scrutinized for information about timber stands. Cruisers, using surveyors' notes and compass, relocated survey boundary markers, paced off an acre within a section, counted the number of harvestable trees in the acre, scaled a portion and, by multiplying by 640, estimated the pine yield for the complete section. This information was sent back to the company with recommendations on land to buy. Cruisers travelled in groups of 3 to 5, setting up a base camp and supply depot in the cruising area (Fries 1951:164-165; Olson nd:98; Anonymous 1874:352-354).

Fall camp preparation - Every fall, an advance crew consisting of the camp foreman and a few others prepared for the winter timber harvest. The land selected to be cut was walked over, a campsite chosen and built, log landings chosen and cleared, and roads to the landings and major supply roads were marked and cleared. River and streams were checked and dam

structures were built if necessary.

Winter logging - Logging during the Pinewood Era was conducted in the winter when ice and snow could be used to transport logs to the landings. Winter logging camps and activities were well-organized. Each man had a job and these jobs were interdependent. The foreman and the cook were the two most important people in the camp, it is most likely that the cook was the key. Logging crews consisted of choppers, who felled the trees; sawyers who cut the trees into logs; skidders who dragged the logs to the skids; swampers who trimmed branches from the logs, cut the bark from one side, kept the roads in repair and placed the bark marks on the logs; teamsters who were responsible for oxen and horses and drove the sleds; loaders who loaded logs on the sleds; landing men who saw that the logs were banked and ready for the spring thaw and who also stamped the ends of the logs; scalers who kept track of the logs at the landings; and the clerk who kept the time sheets and store records. Until 1880, skilled axemen felled the trees. After 1880, two men with a crosscut saw, generally six or seven feet long, were common.

Early camps, prior to 1860, usually had less than 15 men. By the 1880's, crews numbered over 60 men. The larger crews had a blacksmith, a carpenter and saw filer. Oxen were the most common draft animal until the 1870s, when crews began to ice the roads and horses were able to handle larger loads. By 1900, oxen were completely gone. Supplies were initially carried into the camps by keelboat, but soon ox-drawn wagons replaced the water transport (Fries 1951:25-34; Karamanski 1984:36; Nelligan 1929). The camps themselves were built of rough logs with shake roofs. Dirt was banked around the buildings for insulation. Before the 1860s, most camps consisted of one kitchen/bunkhouse and a stable and sometimes an additional small building for making shingles. Bunks were built along the walls and a mound of sand called a camboose contained the fire hearth. A small hole was cut in the roof beneath the hearth (Fries 1951:25).

As crews increased in number, it was necessary to increase the size of the camp. Around 1870, the dingle style building became common, separating the sleeping quarters from the

kitchen. The bunk side contained tiers of bunks surrounding a stove for heat. The kitchen contained a stove for cooking and a number of tables and benches. The two sides were connected by a covered passageway, open on two sides, called a dingle. This area was used as a refrigerator and often contained barrels of meat and other perishables. The dingle style building with its stable is the hallmark of the Pinewoods Era logging camp. Additional buildings were added to the camp over time: more stables, blacksmith shop, carpenter shop, company store (wanigan), granary, hayshed, root cellars, and in Finnish camps, a sauna (Fries 1951:26).

A number of roads existed within each season's logging area. The supply road was the most important since it was the lifeline for food and communication with the rest of the world. A main logging road to the river landing was marked in the fall season with branch roads into the forest. Numerous skid roads were laid as needed to skid logs to the sleds. By the 1870s, icing the sled roads became a common practice. As pine disappeared from the lakeshores, river and stream banks, logging operations had to go deeper into the forests. Larger sleds were needed to transport the logs for greater distances. By the 1890's, the practice of grading roads for these sleds became common (Fries 1951:34).

Spring log drive - When the cutting was completed, jobs for most of the crew were finished for the season. A few of the men remained to check the drive stream, remove obstacles and replace or repair dams in preparation for the drive. As Karamanski noted, the innovation represented by log driving was not merely the process of pushing the logs downstream since water transportation for bulk goods was a common practice in the nineteenth century.

> Rather, what made the log drive unique was the way in which the entire river was integrated into the process of moving logs. Feeder streams were dammed to regulate the flow of water into the river; lakes at the head of a river were similarly dammed and transformed into reservoirs; obstacles in the river bed had to be removed or the stream rechannelled, all to facilitate the log drive...(Karamanski 1984:37)

Logs were moved into the water as soon as the ice broke in the spring and before sap flow, insects or fire could ruin them. Logs were then driven downriver to the company mill or the contractor's mill. Locations of the mills were dependent on the number and size of rapids

and other obstacles on the river. Rivers, where driving was difficult, had mills placed close to the cutting areas. Rivers with few obstacles had centralized milling centers which eventually became urban centers that, for the most part, survived the economic fluctuations of the logging industry. Log drives were controlled by river men who rode the logs to keep them moving smoothly and who made sure that no logs were stranded in backwater areas. Pike poles, peaveys and heavy caulked boots were the trademarks of these river men. A pike pole was about 16 feet long with a steel point on the end. The peavey was a five foot pole with a steel point at one end and an adjustable hook on the side. A wanigan/kitchen boat followed the men down the stream, supplying four to five meals a day. At night, the crew camped on the side of the drive river (Fries 1951:41-43).

Boom companies - As logging intensified and the number of logs in the river each year increased, it became difficult to control the drives and keep the streams clear of obstacles. Dams built to aid one crew would cause a shortage of water to others. Logs would be misplaced at mill sites and sorting logs at the mill was time consuming and costly. Disagreements between crews, some escalating into law suits between companies, became commonplace. Starting around 1855, boom and river improvement organizations were established. These organizations were funded by all of the lumbermen working on the river, their purpose being to build and maintain booms in order to gather and sort logs, to build and maintain flooding dams, to remove obstacles in the rivers and to gather stray logs from backwaters and river banks. By 1870, all of the logging districts had negotiated boom organizations. By the end of the Pinewood Era, these organizations were even conducting the river drives (Fries 1951:48-51).

Sawmills - By the 1860s, sawmills in Wisconsin used a rotary or circular saw. Many mills installed a gang saw, which consisted of several circular saws, to cut logs into boards in one pass. The disadvantage of this saw was its waste, it cut a half inch kerf. The band saw was introduced into Wisconsin in the 1880s and within the decade, all major mills had changed to this saw. The thin kerf cut by this saw produced more boards per log and less sawdust to be swept away. Water powered the turbine engines in these mills.

Farms - As the lumber industry cleared timber, settlers moved in to farm the area. Lumber camps and farms often complemented each other - farmers had ready market for vegetables, fresh meat, eggs, milk and especially hay for the horses. Hay was well suited to the northern forests and was an important cash crop in the early years of farming in this region (Karamanski 1984:22). Camps also employed farmers, their families or their livestock in the winter.

> The lumber camps ... were a ready source of employment for farmers and their sons. Occasionally farmers' daughters could work as cooks. Leasing one's idle plow horse for the winter to nearby loggers could bring in extra income, or a farmer could use the horse himself to cut timber on the homestead for sale to lumber companies. (Karamanski 1984:23)

Larger companies established their own farms to feed their camps, for instance, the Holt mill and farm on McCaslin Brook near present day Wabeno.

HARDWOOD ERA

The use of rail lines opened up new areas of the forest to the logging companies because it was no longer necessary to locate camps and other activities near navigable streams. Logging could be done throughout the year. But most importantly, species other than pine could be harvested since the ability to float to market was no longer critical. Preference for pine, or prejudice against other species, however, continued into the twentieth century. The first camps associated with railroad logging still cut pine, but by 1897, almost half of the forests had been reduced to wastelands and most of the remaining forest was hardwood. Loggers were beginning to cut secondary growth or move their operations to harvest the yellow pine of the southern states or the ponderosa and western white pine of the Rockies and the Pacific Northwest.

Fries painted a slightly different picture however,

> Hardwood logging began to assume sizeable proportions during the early seventies, and by 1876 hardwood and hemlock lands were booming. In the early nineties some

mills that had been cutting only pine announced that henceforth they would cut nothing but hardwood. By 1899 the hardwood and hemlock cut was slightly over nine hundred million board feet, and by 1906 it had increased to more than a billion board feet (Fries 1951:240-241). It is likely that a transition period existed from about 1880 to 1910 with some companies cutting only pine, other companies leaving the area, a third group making the transition from pine to hardwoods and a new generation of hardwood companies entering the arena.

Four characteristics distinguish this era from the Pinewood Era. First, rail transportation was used exclusively to deliver hardwood from forest to mill. Hardwood species could not float. Further, many logging operations used narrow gauge track to extend the standard line. Narrow gauge roads were cheaper to construct than the wider gauge lines because they required less fill for grades, could withstand sharper curves, and needed lighter weight and smaller equipment (Karamanski 1984:67). Narrow gauge lines could also be laid and removed easily for short term use, thereby making it possible to exploit a wider area. Another feature of logging practice which accounted for the popularity of hardwoods was the adoption of clear cutting to railroad operations (Karamanski 1984:72). Clearcutting increased the volume and variety of species harvested.

Secondly, while winter was still the primary cutting season, trees could be harvested in all seasons since the spring log drive was eliminated and rail could run year round. Although many loggers recognized the advantage of harvesting hardwoods in the winter, when the sap was in the roots (Huston 1982:61), trees could be cut in all seasons if the market demand was high.

The third characteristic of the Hardwood Era was the change in logging camps, specifically in camp size, location and site duration. Camps were now typically 50 to 100 men. The camp could be centrally located within the area to be harvested and remain in place for a number of years. Proximity to rail lines permitted the camp foremen to disassemble the camp and move it to a new location, saving the company money and labor costs.

Finally, pine was no longer king. Most of the remaining forest was composed of maple, oak beech, basswood, ash and elm as well as birch and aspen (poplar). In 1897, the composition of hardwood forests were still not completely inventoried, a fact that caused problems for Roth's evaluation. He admits that some of his information on harvesting preference was gained through conversations with loggers (Roth 1898:1, 28). Their preference for pine would account for some of his statements on the prejudice against other species that he felt the industry had. Fire had not consumed as much of these forests as the remaining pine and he predicted that a market would open for hardwood species since the pine forests were almost depleted.

Hardwood logging had a number of subsidiary industries. Production of potash, used to produce glass and soap, gained in importance. Charcoal iron, a "strong, easily welded iron produced most easily through the use of charcoal in the smelting process" (Karamanski 1984:20), was preferred by blacksmiths. Hardwood flooring for gymnasiums, bowling alleys and residences as well as hardwood furniture resulted in a number of specialized factories (Karamanski 1984:20-21).

Besides hardwoods, cedar, spruce and tamarack became important. Cedar was cut for railroad ties, barbed wire fence posts, and later for telephone poles. Spruce and tamarack sections were sold to ship builders for wooden ribs (Karamanski 1984:73). Hemlock also gained in importance due primarily to the tanning industry. Hemlock bark did not survive long trips to the tanneries so many lumber companies added a tanning factory to their mill and furniture factory operations. Bark peeling was done in the late spring-early summer with the sap in the tree. The bark was dried (cured) in the woods before shipping to ensure mold would not grow in storage. The remaining logs were cut and sold for lumber or pulpwood (Corrigan 1978).

Hardwood Era Activities

Timber harvesting and moving the logs to the mill were conducted through a coordinated effort of two men: the camp foreman, who was in charge of the camp and the loggers, and the railroad superintendent, who was responsible for the rail lines, their construction and

maintenance.

Camps and timber harvesting - Camp locations were selected along the rail lines. As it was costly to move, camps were placed in proximity to timber in two or three sections of uncut forest. The time it would take to harvest the trees from such a large area varied, depending upon the quality of the forest and ease of access (Karamanski 1984:59).

Camps consisted of a bunkhouse, root cellar, cookhouse, outhouses, office/commissary cabin, locomotive house, equipment shed (for storage of logging tools) and a horse barn. The bunkhouse was a separate building which could house 50 to 100 men in double bunks. Hastily constructed camps of saw timber and tar paper eventually replaced the sturdy log structures. These frame structures could easily be torn down and moved. With the aid of railroads, food could now be brought to the camps on a regular basis. Large root cellars stored perishable items as it was no longer necessary to rely on barrelled, briny meat for the winter (Karamanski 1984:118). At first, kerosene lamps were used for lighting, but gave way to electric lights. Heat and cooking were provided by wood burning stoves. Telephone service was added in the twentieth century. Supplies were brought to the camp by rail as were the men. Cache pits may also have been present to store tools and other equipment over the summer, if the camp was to be reoccupied.

Ice roads and horse drawn sleds were used well into the 1920s to skid logs to the river and rail landings. When the timber was too far from the rail landing, some companies, for instance Robbins and Thunder Lake, used

> ...60-ton gasoline tractors, operating in the winter time on ice roads 18-20 inches thick. Each tractor could haul a train of 10 to 12 sleighs loaded with logs, and in some areas as many as 25 rail carloads of logs per day were received in this manner. (Huston 1982:61)

Logs were placed on the rail cars by steam or gas powered log loaders (Huston 1982:61). Jobbers were frequently used during this era, harvesting logs and delivering them to the company log landing.

Some companies used rail camps: cars designed as bunkhouses, cookhouses, offices, portable saw mills, log loaders, boiler plants, and tank cars were moved from timber stand to timber stand (Karamanski 1984:71). These cars were a basic box car design, mostly wider and higher than the standard cars. These camps were used only on the company rails since these lines were not subject to federal and state restrictions (Karamanski 1984;43; Kaysens 1978:43).

Railroads - Rail spurs were constructed in the forest where the harvesting was to be done. Landings with log loaders were constructed at the head of each spur. Each of these spurs and landings was meant to be temporary, the narrow 36 inch gauge often used for this reason instead of the standard 56 inch gauge. As Huston describes for the Thunder Lake line, spurs into the forest

> ...seldom were in use more than one or two years, and as the need for a particular spur terminated, the 30-pound rail was taken up promptly and relaid on new spurs...In fact, during the late 1920's as many as 25 miles of spurs would be relocated during a single year. (Huston 1982:62)

In advance of these spur movements were crews of 4 men called "station men"

> ...whose job it was to cut and fell timber for a 24-foot right of way, burn the brush, dynamite the stumps, and throw up a dirt grade 10 feet wide, receiving payment on the basis of linear feet completed. The 'station men' were followed by the 'steel gang' who spent the summers laying rail and picking up rail from the abandoned spurs. (Huston 1982:76)

Bridges, culverts and trestles were built of logs and sawed timber. Timber not considered valuable, such as peeled hemlock logs, were sometimes used as fill for road beds (Kaysen 1978:42).

Maintenance of the rail lines was done by teams under the railroad superintendent. Routine maintenance also included reconstructing the rail lines after an accident or derailment.

> As might be expected, derailments were quite frequent but loggers were adept at picking up the pieces and getting things back to normal. Collisions were less common due to low speeds and the abundance of black smoke from engines and

jammers which provided a good warning signal. The nature of the business did not require any sophisticated dispatching system but it was fairly common to provide a private telephone line connecting camps with the mill headquarters (Kaysens 1978:44).

Sawmills - Although mills could be transported directly to the harvest area by rail, few companies used the rails for this purpose. Portable sawmills were important to some small lumber companies working in isolated or cutover areas (Karamanski 1984:71) but most mills were still located adjacent to major rivers and ports for the water power needed to run the equipment. The boom system of log storage continued in use for whatever pine was cut in the harvest. Rail lines also delivered logs to the mills and turntables were often built to facilitate the steady flow of locomotives into the mill area. Crews hired to unload log cars and keep track in repair were additional mill employees.

During the Hardwood Era, sawmills expanded their operations to include

> ...plants for woodenware, wood alcohol, fence posts, telephone poles, flooring and veneer, ties, cooperage (casks and barrels), furniture, tanneries and planing mills. Of these, planing mills were the most important. The facility produced smoother more finely sawn lumber than traditional mills...In a short time this became standard in the industry and most lumber companies erected planing mills. (Karamanski 1984:69)

PULPWOOD ERA

The Pulpwood Era is primarily distinguished by the reliance on truck transportation and the internal combustion engine. Additionally, during this era, pulpwood for paper manufacture replaced sawn timber for building purposes as the chief forest product. Clear cutting gave way to more selective cutting and the use of logging camps eventually ended in this period (Karamanski 1984:90). Forest land was owned by county, state and federal agencies who practiced forest management and controlled the quantity and quality of timber harvested. Nicolet National Forest, for instance, began buying land in 1929. Spruce, balsam fir, tamarack, hemlock, aspen and jack pine were used primarily as pulpwood.

The introduction of the automobile to American society and the improvement of the highway

system in the 1930s and again after World War II eventually spelled doom to the lumber camp.

> Lumberjacks with cars ended forever the image of the 'timber beast'...in search of a camp with a good cook. In fact, the lumberjack of the 1940's and 1950's was more likely to seek out a good cook through marriage...The automobile and forest highways allowed modern lumber workers to live at home and drive to the cuttings each morning. (Karamanski 1984:109)

With bulldozers, large trucks and graveled all-weather roads, no remote areas of forest existed anymore (Connor 1978:36).

F. ASSOCIATED PROPERTY TYPES

INTRODUCTION

Numerous property types have been associated with the historic logging industry including campsites, log landings, tote roads, rail grades, spurs and sidings, railroad depots, trestles and bridges, shingle factories, sawmills, planing mills, sorting works, dams and revetments, impoundments, log slides and decking/skidding/loading areas, logging and supply roads, farm camps, cabins, company towns, and section houses. To date, thirteen site types have been reported within the project area: campsites, dams, railroad trestles and bridges, railroad grades, railroad sidings, railroad depots, log slides, logging roads, log landings, towns, sawmills, company farmcamps as well as miscellaneous isolated finds. Campsites are by far the most numerous, ranging in age from the Pinewood Era to the Pulpwood Era. The remaining site types together comprise only about 20% of the current total of 519.

PROPERTY TYPES

CAMPSITES

Campsites can be placed in time through archival research, site size, site layout, artifacts and sometimes by site location. Small camps are most likely related to the Pinewood Era but could also represent a jobber operation in any era. All but the latest Hardwood and

Pulpwood Era camps would be located close to a lake or perennial river, stream or spring. The later camps associated with intensive railroad use sometimes had access to tanker cars or dug wells for their water. Prior to 1860, camps would be little more than rough log cabins, 30 feet long and 20 feet wide, with moss chinking and dirt berm insulation around the base. Called "State of Maine" camps, they housed less than 15 men. Both kitchen and bunkhouse were in one building; the only other buildings were a stable and possibly an outhouse and a shed for shingle making. Within the bunkhouse/kitchen, a hearth was placed on "an elevated platform of earth formed by four large logs laid in a rectangle, six by ten feet. The interior was filled with sand, and on top of that the fire was built" (Rohe 1986:19) This hearth was called a camboose. The roof was often shingles overlain with boughs and contained a hole for ventilation. Beds were placed with the head of the logger by the walls. The kitchen contained a storage area and a long table. Stationary benches called deacon's benches often separated the sleeping area from the cooking area. Typical construction of this type of camp:

> The bottom log was laid on the ground, called a 'mud-sill', or occasionally set on large stones or log butts. Subsequent logs were laid parallel to the first. Simple saddle notching was almost universally employed to lock the logs quickly together at the corners, providing solidity and minimizing the interstices between logs. The logs were rolled up using oxen or horses and logging chains, then bored and pegged to hold them in place...spaces between the logs were filled in with small poles and then chinked with moss and clay (Rohe 1986:18)

By the 1870s, a dingle style building was used, which could house between 50 and 100 men. Typically, it consisted of a 65 foot by 30 foot bunkhouse separated from a 65 foot by 30 foot kitchen by a 12 to 16 foot passageway. The doors to each of the separations faced each other in the passageway. The passage or dingle was often used to store barrels of food and perishables that could stand the cold. The buildings were constructed of rough hewn logs, with shingle roofs and dirt embankments for insulation. Doors were low and windows few in the early camps. Bunks were placed in parallel tiers surrounding the stove. The kitchen side had several rough tables and benches and a stove for cooking. One or more

stables for up to 18 teams and possibly an outhouse (or trench with a lean-to) and root cellar completed the early sites. Typical food stores included makings for soup, salt pork or beef, beans, potatoes, cabbage, beets, carrots, onions, apples, peaches, apricots, prunes, cookies, donuts, coffee or tea. Stables were usually lean-to construction. As companies grew larger, other buildings were added: a blacksmith shop, a carpenter shop, a office/store, a granary and a hayshed. Wood floors replaced dirt and tar paper replaced shingles as roofing material. It was not uncommon in the late 1870s to see a camp with a variety of structures, resembling a small town (Holt 1948; Karamanski 1984; Rohe 1972, 1986).

Early rail camps were also built with logs. Roof construction was usually of lumber overlain with roofing paper then another layer of lumber or shingle. By the 1890s, frame structures became typical. Tarpaper covering both roof and sides became common by 1900. Dirt was no longer bermed around the exterior perimeter. Camps built along railroad tracks were laid out in a straight line facing the track. These camps could house over 100 men and contained several bunkhouses, a machine shed, a stable or barn, a hen house, a feed shed, a blacksmith shop, an office/store, a kitchen and mess hall, a root cellar, a toilet and sometimes a well (Karamanski 1984; Rohe 1986).

Railroad or car camps were introduced around 1890 but were never commonly used. Park Falls Lumber Company in the 1910s was one concern that placed its loggers on the rails. The camps included 12 cars for a crew of 150 men and 24 horses:

> One car was equipped with a boiler, small engine, and dynamo and the entire train was lighted by electricity and heated with steam...There were three sleeping cars...The office car comprised a washroom for the men, a wanigan, an office and sleeping rooms for the clerks and camp foreman. There were two barn cars, each accommodating 12 horses. The blacksmith shop and filing room occupied another car. The kitchen car and supply car (completed the train). (Rohe 1986:28)

For those companies who could not afford electricity, the root cellar, well, stable or barn, and outhouse were constructed at each location (Karamanski 1984).

Logging camps were sometimes reoccupied, an occurrence which can complicate

archaeological site analysis. Later occupants of camps included Indians, farmers, trappers, hunters, jobbers, hunting and fishing parties, and men with families who hired out to logging companies (Franzen 1984:9). That these occupations can be distinguished from the original logging operations is evidenced by excavations conducted by Bastien and Rutter at Elmwood Logging Camp. Here, a second occupation by Black American settlers was clearly evident as an overlay to the original logging debris (Bastien and Rutter 1987).

In addition to the campsites involved with the actual log harvesting, there are more ephemeral campsites found throughout the study area and these could represent activities of timber cruisers, log drive camps (located along waterways) or jobber camps from any era. Timber cruiser camps were short-term, tent camps housing 3 to 5 individuals, and located throughout the northern forests. The camps were situated on level ground with access to a supply road, water and the timber to be cut (Dinsmore 1985:34). The only remains of these camps would probably consist of midden deposits, specifically food remains, lost or broken personal items and possibly lost or broken equipment such as a compass or measuring tape. These sites would be almost indistinguishable from GLO or other survey team camps.

Log driving camps would be located close to a major driving stream or river and variable in size. Early drives employed 3-5 men (Huston 1982:2) but turn of the century drive camps could accomodate 50 men, with ox or horse teams and a wanigan which carried personal items, equipment and food. These campsites would also be short-term sites, used for daytime meals since drivers were usually fed four to five times a day, or for night camps. Artifacts such as food remains, lost or broken personal items, lost or broken equipment such as peaveys or pike poles, oxen yoke and shoes or horse shoes and tackle, and wagon remains could be present at these sites. Given the ephemeral nature of these types of campsites, it is unlikely that any of these would be considered significant in and of themselves. They could, however, be considered a contributing element to a district nomination if they retain integrity.

SIGNIFICANCE

Logging campsites can be nominated under Criterion D, at the local level, for the information they can provide on the history of the Wisconsin logging industry, and more broadly, on cultural change and adaptation in the Wisconsin northwoods. By the late 1800s, Wisconsin was one of the top lumber-producing states and for 30 years (1890-1910), lumber and timber products led Wisconsin's industrial economy by a large margin (Lusignan 1986). The logging industry played a significant role in the economic and social development of northern Wisconsin and literally transformed both the cultural and physical landscape of the region. At the time of their occupation, the efficient organization and operation of logging camps were critical to the success of the lumber companies and the remnants of these sites are now critical to our understanding of the development of the logging industry. Historic records and oral tradition can only provide a partial record of logging activities and camp lifeways. Archeological excavations hold the promise of not only retrieving the unintentional record of past behaviors at specific sites but also of extracting patterns of human behavior not recoverable in historical narratives.

In recent years, a number of topics have been addressed by archeologists, historians, landscape architects, and geographers interested in the logging industry. Significant research questions that could potentially be addressed by archeological data include the following:

1. Relationship to landscape and settlement patterns (Karamanski 1984; Rohe 1972 and 1985; Franzen 1984; Dinsmore 1985). What is the nature and distribution of campsites across the landscape? Is there any discernable effect on later settlements in the region? Archeological evidence indicates that some logging campsites were reoccupied. Are there any distinguishing characteristics, such as soil type or position on landscape, that can be used to predict reoccupied sites?

2. Chronology (Dinsmore 1985; Karamanski 1984; Overstreet 1982). Can chronologies be established by material remains or intra-camp structure that can then be used to date sites without archival documentation?

3. Camp structure (intrasite patterning) (Dinsmore 1985; Richner 1986; Rohe 1986). How did camp structure evolve through the different logging eras? Did camp structures differ consistently between companies? Are differences correlated with corporation size? Previous research suggests an increasing functional specialization of camp buildings. Is this consistent across the region and between companies?

4. Material culture and ethnicity (Franzen 1992; Bastian and Rutter 1987). Holt (1948:55) stated that their camps were "a mixture of all nationalities,...composed largely of Germans and Scandinavians, while our neighbors, the Oconto Company, had a large proportion of French and Irish." Do differences exist between camps occupied by predominantly one ethnic group? Were elements of traditional culture retained or adapted? Are there differences in artifact assemblages and camp structure that can be attributed to ethnicity?

5. Subsistence (Franzen 1992; Richner 1986). According to a number of historic accounts, food was a critical component in worker satisfaction. Are there differences between companies, across regions, or through time?

6. Effect of families on camp life (Franzen 1992). How does camp structure differ when families are present? Are there marked differences in the artifact assemblages?

7. Adaptation to "industrial" work (Franzen 1992). How did workers adapt to industrial working conditions? Were elements of traditional culture retained?

8. Adaptation to the northern forest environment (Bruhy et al. 1990; Dinsdale 1965) What technological adaptations were made to the Upper Great Lakes forests? Are there differences in site structure and landscape distribution between this study area and those in other logging areas? What variables affected the adoption of specific tools and technologies? Did some companies or ethnic groups change more readily?

9. Relationship between the archeological and historical records (Rohe 1985; Franzen 1992). Does the archeological record confirm or contradict the legends of logging camp life?

REGISTRATION REQUIREMENTS

Campsites can be nominated under Criterion D at the local level. To be eligible under Criterion D, the site must have yielded, or have the potential to yield, specific data that can be used to address the research areas noted under the discussion of significance. Minimally these sites must retain integrity of location, design, and materials. Given the large number of late nineteenth-early 20th century logging campsites, an eligible site must retain excellent preservation of features such as living quarters, cooking quarters, outbuildings, and refuse pits, as well as the preservation of the spatial relationships between these features (see Figs. 9, 10, 11). Only those properties that retain integrity of the archeological deposits and appear to retain most of their original site structure will be considered eligible. It is not necessary to evaluate a campsite against other logging campsites if it clearly retains all elements of the original site structure. Ideally, for sites that date to after 1870, there should also be historic records to document the company's name, dates of occupation and type of logging. Given the relative rarity of campsites dating prior to the 1870s, historic records and complete site structure are not necessary. Ultimately, the eligibility of a campsite under Criterion D depends upon documenting its particular data set and establishing a clear connection between that data set and specific research questions. The level of historical documentation required for a site will vary accordingly; if one argues that a site is eligible based on its potential to address differences in camp lifeways between Czechs and Finns, there must be historic records to document the presence of these ethnic groups at the site.

G. GEOGRAPHICAL DATA

The geographical area encompasses the Nicolet National Forest and the five counties that comprise Wisconsin State Archeological Region 2: Vilas, Price, Oneida, Forest and Florence Counties.

H. IDENTIFICATION AND EVALUATION METHODS

Numerous documents have been written about the historic logging industry. General treatises on the industry abound, elaborating on such topics as the misuse of the law, fluctuations of the lumber market, industry monopolies, individual fortunes, fraudulent advertising of cutover lands, as well as justification for the actions of the lumber barons. Diaries and journals on the details of camp life, the myths and legends of colorful people or singular events are also extensive. The bibliography at the end of this document includes many entries in these categories.

Approximately one-third (519) of all the sites recorded in State Region 2 and the Nicolet National Forest are related to the historic logging industry. Archival documentation, such as company records, aerial photographs, deed and title records, incorporation records, diaries and oral histories, have been an integral part of site identification. To date, systematic site survey has been conducted primarily, but not solely, on the national forests. Generally, the procedure is to choose a forest compartment, examine the 1938, 1951 and more recent aerial photographs for historic structures, clearings, roads, railroad grades and modern disturbance, and then walk the roads and trails looking for foundations, pits, middens and artifact scatter. Each site is mapped when found and preliminary archival documentation is sometimes done.

Site identification has been aided by several factors. First, the historic logging industry operations were so numerous that subsequent operations such as Civilian Conservation Corps tree planting, resort and private development, and federal, state, and county activities have not encompassed all of the areas that this industry touched. Second, 1938 aerial photographs and remnants of supply roads, roads to camps and landings, and railroad spurs can lead survey teams directly to a site. And third, company records and photographs, as well as personal accounts and oral histories describe the layout of sites and sometimes the activities conducted there which further help survey teams with on-the-ground site identification.

Since documentation may not always be crystal clear, archival records in complement with archaeology has proven to be the best combination. Artifacts in these sites may be the best time indicators, especially if the landowners were imaginative in their purchasing strategies. Furthermore, depending on the economic status of the company or jobber (in any era), the camp could be elaborate with many well-made structures or a primitive rough log cabin (Rohe 1986: 27). Bottles and cans, crockery and dinnerware, medicine or tobacco containers, and personal items could indicate a time period for use of the camp. For instance, kerosene lamps were common after the 1860's. Until the 1870s, oxen were most common as draft animals. After the introduction of iced roads, horses were preferred and by 1900, oxen were gone. Tools such as shingle making tools, axes, crosscut saws, sleds and sleighs, blacksmith and carpenter tools are all time indicators for these sites. For example, only single bit axes would be found in camps prior to the 1870's, while a combination of double bit and single bit axes could be found after that time. Shingle making tools or bark stripping tools may indicate the type of camp found. Ethnic food items may also indicate a camp's period of use, since European immigration patterns have been documented for the Midwest. Saunas are a typical marker for a camp employing Finnish loggers. Early camps were usually built of materials close to hand since transportation costs were high. By the second decade of the twentieth century, building materials, bedding and other accoutrements were being shipped in by rail.

By 1980, almost 300 archaeological sites, attributed to the historic logging industry had been recorded for the project area. In 1979, a non-destructive evaluation procedure had been used on three sites in Forest County (Van Dyke 1979). In 1980, the Great Lakes Archaeological Research Center was contracted by the Nicolet National Forest to develop a procedure and criteria to evaluate the historic logging sites for National Register of Historic Places consideration, in compliance with the forest's Section 106 responsibilities (Overstreet 1982).

It was necessary to develop an evaluation procedure that was simple, speedy and cost-effective, since there was no archaeological program resident at the forest at the beginning of the project and forest activities took priority over site identification and preservation. Overstreet, expanding on Van Dyke, presented a five step evaluation procedure for the forest (Overstreet 1982:50-70).

1) Preliminary Determination - Taking the information from informant interviews and published and unpublished data, the site would be placed in a general category, such as a Wisconsin River 19th century logging camp of the Fox and Helms operation.
2) Descriptive Narrative Based on Field Check - This step consists of reconstructing the surface portions of the site on paper: legal description, physical description, artifact description, current condition, site map and photographs.
3) Archive Process-Site Identification Confirmation - This step includes deeper investigation into corporate records, legal records, such as tax, deed, mortgage and court documents as well as further investigation of informant and historical sources.
4) Determination of Significance - All sites would be evaluated under Criterion D, "have yielded, or may be likely to yield, information important in prehistory or history." (36CFR60.4). Additionally, Overstreet offered three clarifying sub-criteria relating to historic logging sites: research value, interpretive value and redundancy. All determinations are submitted to the State Historic Preservation Office for comment.
5) Management Action - A recommendation is made to the landowner or management agency either outlining preservation and management goals or stating that no further protection is needed.

This procedure provided a simple and non-destructive way to deal with hundreds of sites identified at that time. The procedure was tested on 59 sites of four site types (campsites, dams, sawmills and railroad spurs) during the course of the project. These steps were suggested as guidelines to be expanded and redefined as research demanded and as new players such as geographers, historians and others partnered with archaeologists to study the historic logging industry (Overstreet 1982:50).

Since 1982, 62 sites have been evaluated against the criteria proposed by Overstreet (1982).

These criteria, research value, interpretative value and redundancy, and site condition were used to determine eligibility of the sites. Out of the 62 sites, 25 were considered to have eligible historic logging components and 37 were considered to be not eligible. As of 1994, only three logging-related sites, Round Lake Logging Dam, Price County, and the Holt and Balcom Logging Camp No. 1 and the Holt and Balcom Lumber Office, Oconto County, (each with standing structures) are listed on the National Register. Additionally, two logging campsites, Flanner-Steger Camp 5 and Florence-Steger Lumber & Land Company Camp 6 & 7, both in Forest County, have been formally determined eligible. Overstreet's evaluation procedure was used in most of the 62 evaluations. However, since there are now over 500 sites in the project area, many of which would fall out based on the redundancy of physical features, additional field work has been added to Procedure 2. At first, some shovel testing was done to help determine modern disturbance (Bruhy and Ippolito 1984).

In the most recent evaluations, test excavations, designed to address research questions important to archaeologists and historians, are becoming important to the evaluation process (see Rohe 1985). In 1990, excavations at the Sherry and Gerry logging camp employed an interdisciplinary approach, combining history, geography and archaeology.

> ...at the outset, it was the investigators contention that this site was likely to yield important information of both local and state significance regarding: (1) the intra-site patterning of an 1870's camp; (2) adaptive technological responses to local topography, climate, and distribution of timber resources; and (3) provide a basis for developing a descriptive artifact assemblage for a camp of this vintage (Bruhy et al. 1993).

This site was the first in the project area to have extensive test excavation included in the evaluation procedure. Since then, test excavations have been conducted on three other sites with logging components: Cleereman Lumber Company camp (Newell 1992), and the Butternut and Violet Road Sites (in analysis).

With over 500 historic logging industry sites and the benefit of recent research by a wide range of disciplines interested in the industry, it is evident that questions will continue to be formulated. Future direction for sites in this period in State Region 2 and the Nicolet

National Forest should focus on the following:
1) Evaluation of sites will continue to use the four sub-criteria listed above: research value, interpretive value, redundancy and site condition.
2) In 1982, it was suggested that certain property types, such as railroad spurs, dams and sawmills could be categorically excluded from the evaluation process and all sites in these types would not be considered eligible. As several dam sites have been evaluated as eligible since 1982, it is no longer valid to categorically exclude a property type and this will no longer be done.
3) Test excavation designed to answer research questions or clarify criteria of evaluation should be considered a integral part of the evaluation process and will be conducted on all historic logging site evaluations. Many research questions can be answered only through excavation. For instance, while archival records may be able to document the occupation of the site by crews of a certain company, it has been suggested that American Indians, Euro-Americans and Black Americans reoccupied many abandoned camps. Archaeological excavation has proved this to be true and excavation is the only way that these reoccupation episodes can be discovered.
4) Almost all the sites within the project area have been found within the boundaries of the Nicolet and Chequamegon National Forests. An effort will be made to locate sites, through non-destructive survey, in other areas of State Region 2. Since most of the sites are visible on the surface, this type of project is excellent for volunteer crews with professional archaeological supervision. In addition, volunteers can conduct preliminary documentation on sites.
5) Most of the information gathered on companies has been in relation to specific sites (Bruhy et al. 1993). Few comprehensive company histories have been compiled, such as the one for Jones Lumber Company (Rohe 1993). An effort to compile more of these histories should be made. Included in the outcome should be not only corporate and legal history but also hiring practices, supply practices, transition period data (such as changes from small to large crews, shifts in harvesting practices from pine to hardwood, etc.). This type of information would be helpful in reconstructing camp life, in comparisons between companies, and in determining the makeup of the forests at the time the company was

logging.
6) Most of the archival information gathered on the use of a specific area comes from tax rolls, deed and title records, probate records, and court proceedings. These records are housed in county courthouses. In some cases, these records are in deplorable shape. Older records are kept in basements and other out of the way storage areas, exposed to water and humidity. At times, these records are inaccessible to outside researchers or are in such a state of chaos that an inordinate amount of time is needed to find the appropriate reference. A statewide effort should be launched to retrieve these records, or microfilm them for posterity before it is too late.

I. MAJOR BIBLIOGRAPHIC REFERENCES

Allen, Shirley Walter
1950 An Introduction to American Forestry. McGraw-Hill Book Company, Inc., New York.

Anonymous
1874 "Looking" Pine in Wisconsin. Wisconsin Lumberman :352-354.

1894a Plat Book of Forest County, Wisconsin. W.W. Hixson and Company.

1894b Report of proceedings of the Menominee River Annual Drive Meeting, March 15, 1894. Copy on file with State Historical Society of Wisconsin, Madison.

1906 Crandon: It's (sic) Industries and Resources. Brady and Son, Printers, Crandon.

1910 Plat Book of Price County, Wisconsin. W.W. Hixson and Company.

1920 Plat Book of Price County, Wisconsin. W.W. Hixson and Company.

1925a Plat Book of Florence County, Wisconsin. W.W. Hixson and Company.

1925b Plat Book of Forest County, Wisconsin. W.W. Hixson and Company.

1925c Plat Book of Oneida County, Wisconsin. W.W. Hixson and Company.

1925d Plat Book of Price County, Wisconsin. W.W. Hixson and Company.

1987 Hazelhurst . . . the first 100 years. Copy on file with Rhinelander Public Library, Rhinelander.

Bastian, Beverly E. and William E. Rutter
1987 Documentary, Oral Historical and Phase III Archaeological Investigations at Elmwood Logging Camp (20I058), Iron County, Michigan. Gilbert/Commonwealth, Inc. of Michigan. Copy on file with Nicolet National Forest, Rhinelander.

Birmingham, Robert
1985 The Pineries Era on the North Branch of the Oconto River: A Regional Historical Study. In Final Report on a 1984 Cultural Resource Survey, Nicolet National Forest, ed. Kristin L. Griffin and Diane L. Lehman. Archaeological Research Laboratory, Report of Investigation No. 79., University of Wisconsin-Milwaukee, Milwaukee.

Bruhy, Mark E. and Andrew B. Ippolito
1982 Cultural Resource Survey and Historic Site Evaluation, Nicolet National Forest, 1982. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 2, Rhinelander.

1984 Cultural Resources Survey and Historic Site Evaluation, Nicolet National Forest, 1983. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 3, Rhinelander.

Bruhy, Mark E., Gordon R. Peters and Edgar S. Oerichbauer
1979 A Cultural Resource Overview of the Nicolet National Forest. Great Lakes Archaeological Research Center, Inc., Reports of Investigation No. 49, Milwaukee.

Bruhy, Mark E., Kim L. Potaracke, and Loxley A. Newell
1993 Heritage Resources Management 1990, Nicolet National Forest. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 8, Rhinelander

Bruhy, Mark E., Angie R. Teater and Grayson E. Larimer
1989 Cultural Resource Survey and Site Evaluations, Nicolet National Forest, 1988. USDA Forest Service, Nicolet National Forest, Cult. Resources Rep. No. 6, Rhinelander.

Bruhy, Mark E., Angie R. Teater, Charles M. Clover, Neal Endacott, Grayson E. Larimer, Lenny Newell
1987 Cultural Resource Survey and Site Evaluations, Nicolet National Forest. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 5, Rhinelander.

Bruhy, Mark E., Angie R. Teater, Cari Ver Planck, Kim L. Potaracke
1990 Heritage Resources Management 1989, Nicolet National Forest. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 5, Rhinelander.

Burke, Fred C.
1936 Logs on the Menominee: The History of the Menominee River Boom Company. Copy on file with Nicolet National Forest, Rhinelander.

Connor, Mary Roddiss
1978 Logging in Northeastern Wisconsin. In Some Historic Events in Wisconsin Logging Industry. Proceedings of Third Annual Meeting, Forest History Association of Wisconsin, Inc. Copy on file with Nicolet National Forest, Rhinelander.

Corrigan, George
1978 Tanneries and the Hemlock Bark Industry in Wisconsin. In Some Historic Events in Wisconsin Logging Industry. Proceedings of Third Annual Meeting, Forest History Association of Wisconsin, Inc. Copy on file with Nicolet National Forest, Rhinelander.

Cunningham, Jean
1936 The Retreat of the Forest: Being a brief account of logging activities in and around the Nicolet National Forest. Copy on file with Nicolet National Forest, Rhinelander.

Current, Richard Nelson
1950 Pine Logs and Politics: A Life of Philetus Sawyer 1816-1900. State Historical Society of Wisconsin, Madison.

Curtis, John T.
1959 The Vegetation of Wisconsin. University of Wisconsin Press, Madison.

Davis, Mark
1990 Boosters, Bootleggers and Bamboozlers. Unpublished MA Thesis, University of Wisconsin-Madison, Madison.

Dinsdale, Evelyn M.
1965 Spatial Patterns of Technological Change: the lumber industry of northern New York. Economic Geography 41:252-274.

Dinsmore, Rebecca
1985 Archaeological Perspectives of Lumber Industry in Northern Lower Michigan 1865-1920. Unpublished MA Thesis, Western Michigan University, Kalamazoo.

Drees, Lillian N.
1947 Peshtigo's Other Day. Wisconsin Magazine of History 31(5):61-67.

Espeseth, Edmund C.
1952 Lodestar of the Northland. Wisconsin Magazine of History 36(1):23-27, 56.

1953 Early Vilas County - Cradle of an Industry. Wisconsin Magazine of History 37(1):27-34, 51-54.

Everest, D.C.
1952 A Reappraisal of the Lumber Barons. Wisconsin Magazine of History 36(1):17-22.

Finley, Robert C.
1976 Original Vegetation Cover of Wisconsin. North Central Forest Experiment Station, USDA Forest Service, St. Paul.

Fitzmaurice, John W.
1889 The Shanty Boy or Life in a Lumber Camp. Democrat Steam Print, Cheboygan, Michigan.

Franzen, John G.
1992 Northern Michigan Logging Camps: Material Culture and Worker Adaptation on the Industrial Frontier. Historical Archaeology 26:74-98.

1984 Intrasite Settlement Pattern at 19th and 20th Century Logging Camps in Michigan's Upper Peninsula. Paper presented at the 17th Annual Meeting, Society for Historical Archaeology, Williamsburg Virginia. Copy on file Hiawatha National Forest, Escanaba.

Fries, Robert
1951 Empire in Pine: The Story of Lumbering in Wisconsin. State Historical Society of Wisconsin, Madison.

Gates, Paul Wallace
1965 The Wisconsin Pine Lands of Cornell University. University of Wisconsin Press, Madison.

Goldsworthy, Walt
1986 Three Lakes Logging History. In Pine, Plow and Pioneer: A History of Three Lakes and Clearwater Lake, Wisconsin 1881-1984 Vol.II. Three Lakes Historical Society, Three Lakes.

Griffin, Kristin and George E. Avery
1985 Final Report on a 1983 Cultural Resources Survey on the Nicolet National Forest, Wisconsin. University of Wisconsin-Milwaukee, Archaeological Research Laboratory, Report of Investigation No. 76, Milwaukee.

Griffin, Kristin L. and Diane L. Lehman
1986 Final Report on a 1985 Cultural Resource Survey, Nicolet National Forest, Wisconsin. University of Wisconsin-Milwaukee, Archaeological Research Laboratory, Report of Investigation No. 82, Milwaukee.

Helgeson, Arlan
1952 Nineteenth Century Land Colonization in Northern Wisconsin. Wisconsin Magazine of History 36(2):115-121.

Holt, William A.
1948 A Wisconsin Lumberman Looks Backward. Copy on file, Nicolet National Forest, Rhinelander.

Huston, Harvey
1982 Thunder Lake Narrow Gauge. Copy on file with Nicolet National Forest, Rhinelander.

Jones, George O. and Norman S. McVean
1924 History of Lincoln, Oneida, and Vilas Counties, Wisconsin. H.C. Cooper, Jr., and Co. Minneapolis-Winona.

Karamanski, Theodore
1984 Historical Records Study - Logging Industry and Pioneer Homesteading. Cultural Resources in the Hiawatha National Forest, Michigan, Vol. 1 & 2. Mid-American Research Center, Loyola University, Chicago.

Kaysen, James P.
1978 Railroad Logging in Wisconsin. In Some Historic Events in Wisconsin Logging Industry. Proceedings of Third Annual Meeting, Forest History Association of Wisconsin, Inc. Copy on file with Nicolet National Forest, Rhinelander.

Kouba, Theodore F.
1973 Wisconsin's Amazing Woods: Then and Now. Wisconsin House, Ltd., Madison.

Lundsted, James E.
1955 Log Marks, Forgotten Lore of the Logging Era. Wisconsin Magazine of History 39(1):44-46

Lusignan, Paul
1986 Logging and Lumber Milling. In Cultural Resources Management in Wisconsin, Vol. 2, edited by Barbara Wyatt, Historic Preservation Division, State Historical Society of Wisconsin, Madison.

Martin, Lawrence
1965 The Physical Geography of Wisconsin, 3rd Edition. University of Wisconsin Press, Madison.

Mayo, Walter
1982 A History of Logging in Vilas County 1856-1982. Proceedings of the Seventh Annual Meeting of Forest History Association of Wisconsin, Inc. Copy on file with Nicolet National Forest, Rhinelander.

Mead, Howard, Jill Dean and Susan Smith
1971 Portrait of the Past: A Photographic Journey Through Wisconsin, Vol. I. Wisconsin Tales and Trails, Incorporated of Madison, Madison.

Nelligan, John E.
1929 Life of a Lumberman. Wisconsin Magazine of History Part 1-13(1):2-65; Part 2-13(2):131-185; Part 3-13 (3):241-304.

Nesbit, Robert C. and William F. Thompson
1989 Wisconsin: A History. University of Wisconsin Press, Madison.

Newell, Loxley
1992 1992 Evaluation of Cleereman Logging Camp, FS Site Number 09-06-03-242. USDA Forest Service, Nicolet National Forest, Cultural Resources Report No. 11, Rhinelander.

Newell, Loxley A. and Kim L. Potaracke
1990 Heritage Resources Management 1990, Nicolet National Forest. USDA Forest Service, Nicolet National Forest, Cultural Resource Report No. 11, Rhinelander.

Olson, T. V.
nd Roots of the North: The Rhinelander Country, Vol 1. Pineview Publishing, Rhinelander.

Overstreet, David F.
1982 Identification and Evaluation of Logging Industry-Related Cultural Resources, Nicolet National Forest, Wisconsin. Great Lakes Archaeological Research Center, Inc., Report of Investigation No. 114, Milwaukee.

Overstreet, David, Annette Nekola and Andrew Ippolito
1983 Identification and Evaluation of Logging Industry-Related Cultural Resources, Nicolet National Forest, Wisconsin - 1983 Addendum. Great Lakes Archaeological Research Center, Inc., Reports of Investigation, No. 114, Milwaukee.

Peddle, Howard
1980 Wisconsin Log Marks. Copy on file with Nicolet National Forest, Rhinelander.

Pernin, Reverend Peter
1971 The Great Peshtigo Fire: An Eyewitness Account. Wisconsin Magazine of History 54(4): 246-272.

Rector, William G.
1950 Working with Lumber Industry Records. Wisconsin Magazine of History 33:472-478.

Richner, Jeffrey J.
1986 An Archaeological Evaluation of the Trout Point Logging Camp. Midwest Archaeological Center Occasional Studies in Anthropology No. 17. National Park Service, Lincoln.

Rohe, Randall
1972 The Landscape and the Era of Lumbering in Northeastern Wisconsin. Geographical Bulletin 4:1-27.

1985 Archaeology-A Key to the Great Lakes Lumber Era. The Wisconsin Archeologist 66(4):359-384.

1985 Settlement Patterns of Logging Camps in the Great Lakes Region. Journal of Cultural Geography 6:79-107.

1986 The Evolution of the Great Lakes Logging Camp 1830-1930. The Journal of Forest History 30:17-28.

1993 Survival of the Fittest: A Centennial History of the Jones Lumber Corporation. The Print Shop, Wisconsin Rapids.

Roth, Filbert
1898 On the Forestry Conditions of Northern Wisconsin. Wisconsin Geological and Natural History Survey Bulletin No. 1, Economic Series No. 1, Madison.

Rusch, Robert
1981 A Pictorial History of the Rib Lake Area (1848-1948). Copy on file with Nicolet National Forest, Rhinelander.

Ryan, J.C.
1973 Early Loggers in Minnesota. Minnesota Timber Producers Association, Duluth.

Schafer, Joseph
1927 Great Fires of Seventy-One. Wisconsin Magazine of History 9(1):96-106.

Schubert, W.E.
1950 The Menominee River. Wisconsin Magazine of History 34(2):67-72, 105,107.

Turner, Captain J. M.
1940 Rafting on the Mississippi. Wisconsin Magazine of History 23(3):313-327; 23 (4): 430-438.

Twining, Charles E.
1963 Plunder and Progress: The Lumbering Industry in Perspective. Wisconsin Magazine of History 47(2)116-124.

1977 The Long Lost State of Superior. Wisconsin Magazine of History 61(2):91-111.

Van Dyke, Allen R.
1979 Cultural Resources Survey and Evaluation of aa Historic Site (47FR103), Nicolet National Forest, Forest County, Wisconsin. Great Lakes Archaeological Research Center, Reports of Investigation No. 85, Milwaukee.

Vogel, John N.
1980 Folk Technology: A History of the Round Lake Logging Dam. USDA Forest Service Contract No. R9-02-80-6. Copy on file with Nicolet National Forest, Rhinelander.

1983 The Round Lake Logging Dam: A Survivor of Wisconsin's Log-Driving Days. The Wisconsin Magazine 66(3):171-191.

Wells, Robert W.
1978 Daylight in the Swamp. NorthWords Press, Minoqua.

Wackman, John F. and Robert A. Birmingham
1981 The 1980-81 Cultural Resources Survey on the Nicolet National Forest. Great Lakes Archaeological Research Center, Inc., Reports of Investigation No. 102, Milwaukee.

Wackman, John F. and Jennifer L. Musil
1980 A Cultural Resource Survey of Proposed Undertakings, Nicolet National Forest, Wisconsin. Great Lakes Archaeological Research Center, Inc., Reports of Investigation No. 88, Milwaukee.

Wisconsin Historical Library
1920a Knapp-Stout and Co. Lumber Company. Wisconsin Magazine of History 3(4): 469-471.

1920b Early Lumbering and Lumber Kings of Wisconsin. Wisconsin Magazine of History 4(1):102-104.

Works Project Administration
1940 The Rhinelander Logging Museum. Cooperative project between Workers of the Writer's Program, Works Projects Administration, Wisconsin Art Project, University of Wisconsin, and Rhinelander Logging Museum, Rhinelander.

Wyman, Walker
1969 The Lumberjack Frontier. University of Nebraska Press, Lincoln.

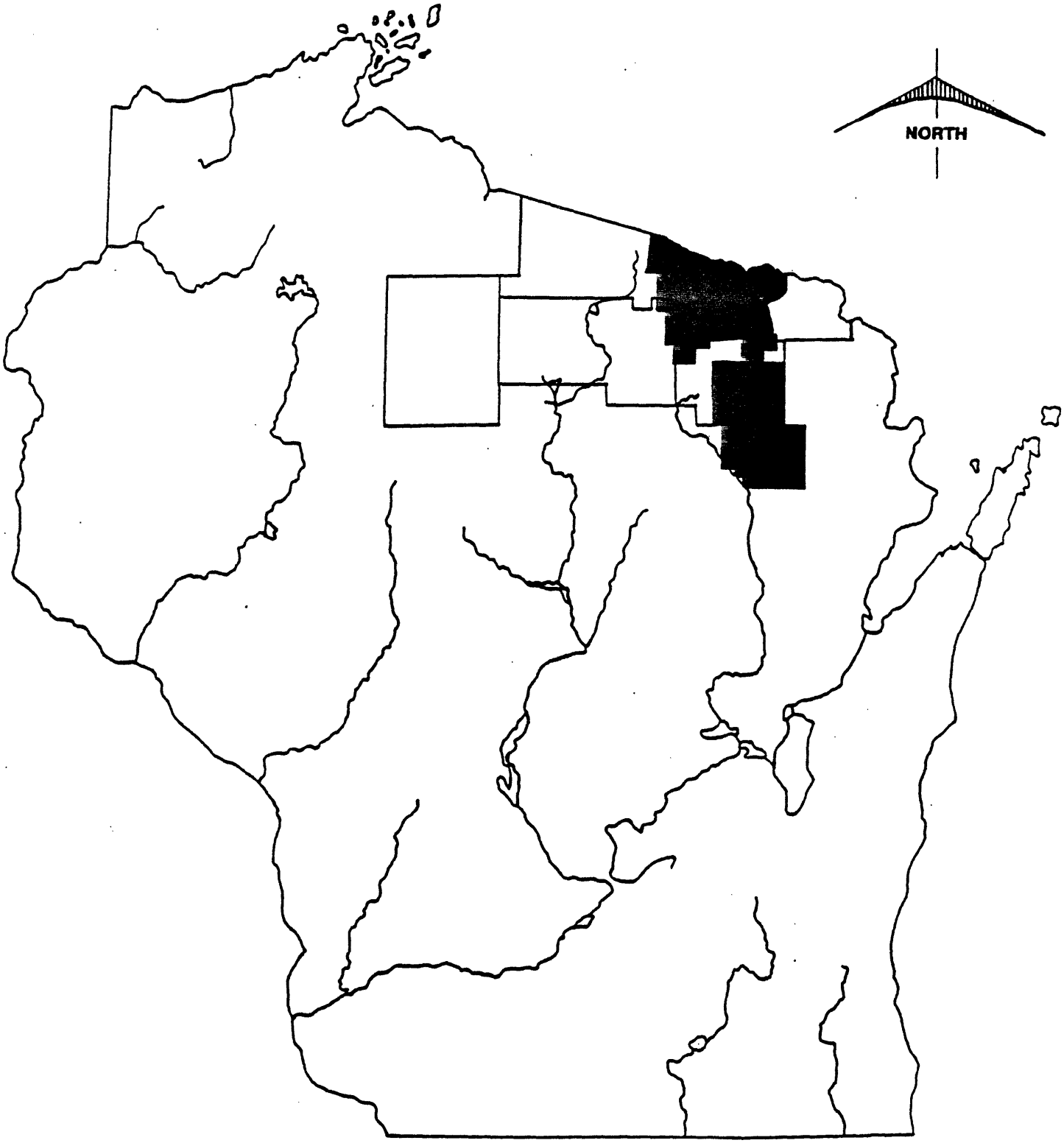


Figure 1: State Region 2 and the Nicolet National Forest

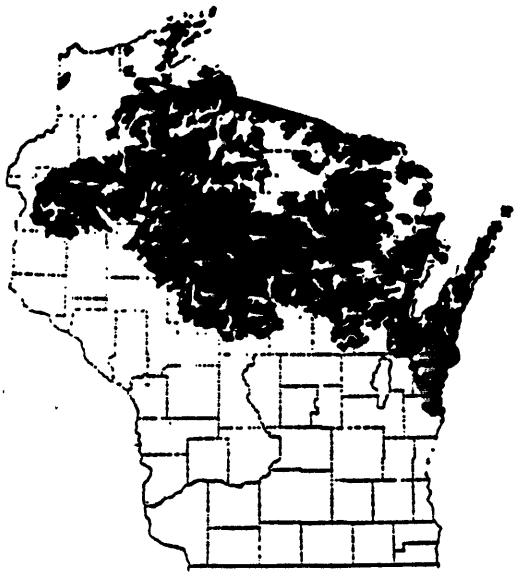


Figure 2a: Original mesic forest.

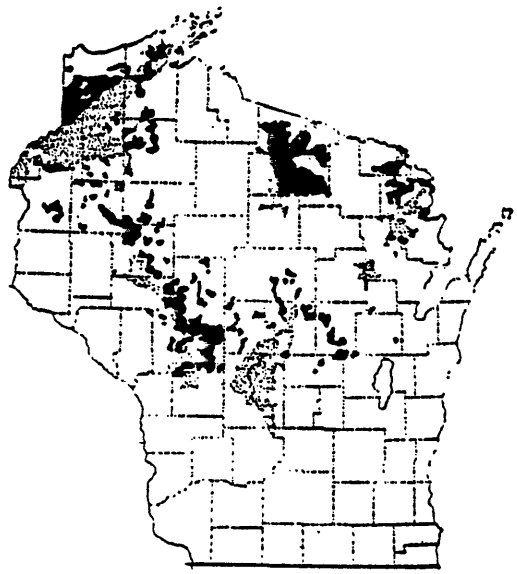


Figure 2b: Original pine forest, dots indicate pine barrens.

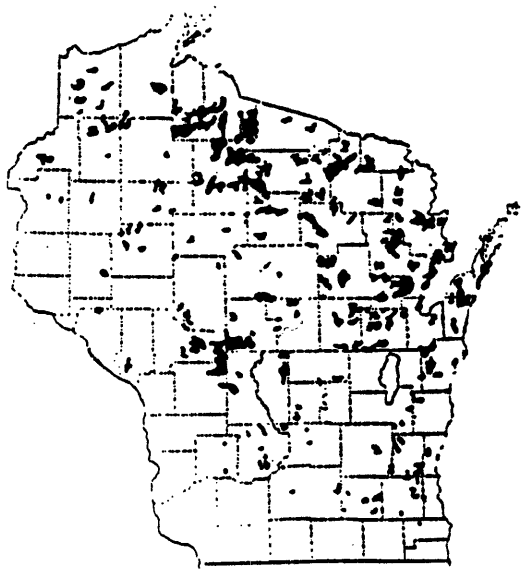
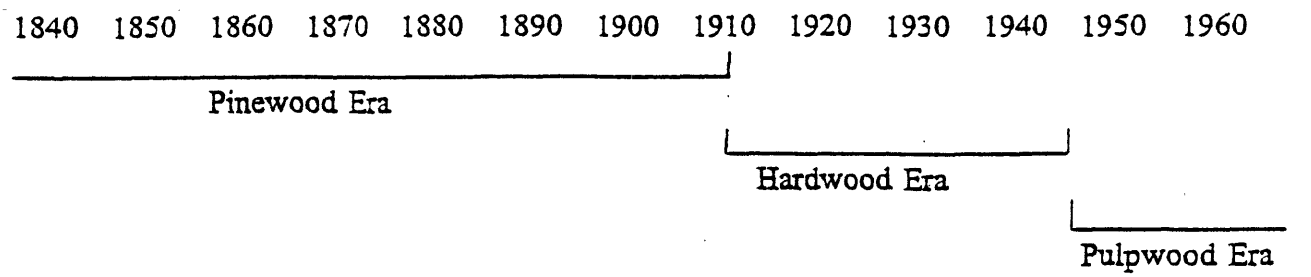


Figure 2c: Original conifer swamps.

Figure 2: Land area in northern Wisconsin covered by forest prior to the historic logging industry. (Maps reproduced from Curtis 1959:533, 536, 541)

FIGURE 3: DIAGRAM OF OVERSTREET 'S TEMPORAL DIVISIONS



Pinewood Era	Beginning of the industry to 1910
Hardwood Era	1910 to 1945
Pulpwood Era	1945 to present

FIGURE 4: DIAGRAM OF KARAMANSKI'S TRANSPORTATION DIVISIONS

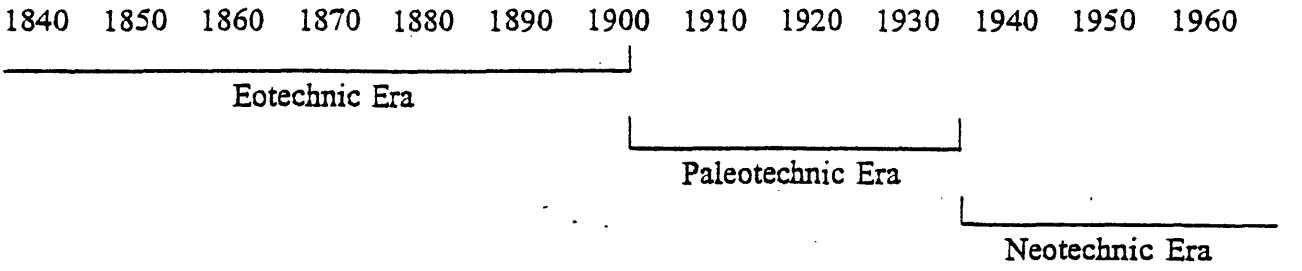


FIGURE 5: DIAGRAM OF KARAMANSKI'S DIVISIONS APPLIED TO THE PROJECT AREA

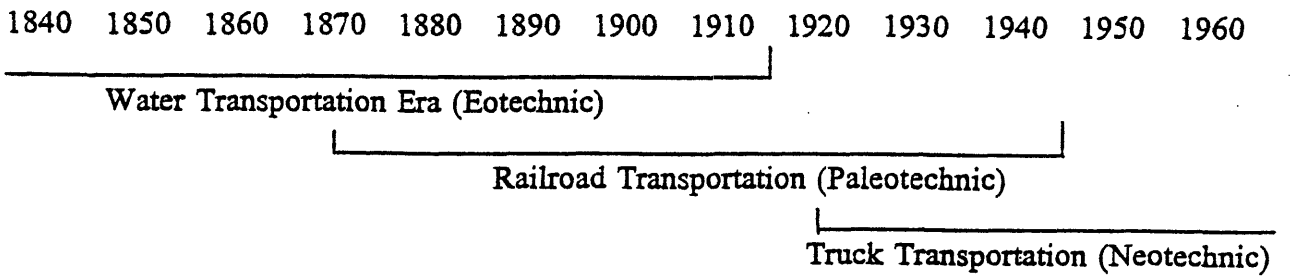


FIGURE 6: DIAGRAM OF DIVISIONS USED IN THIS STUDY

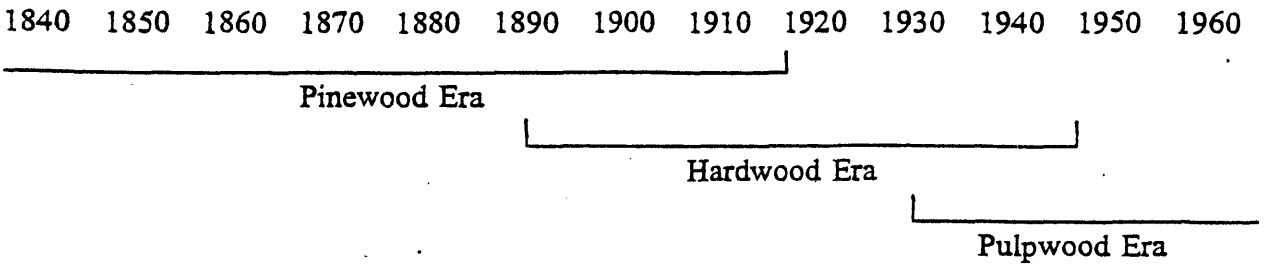


Figure 7: Natural Logging Districts of Northern Wisconsin

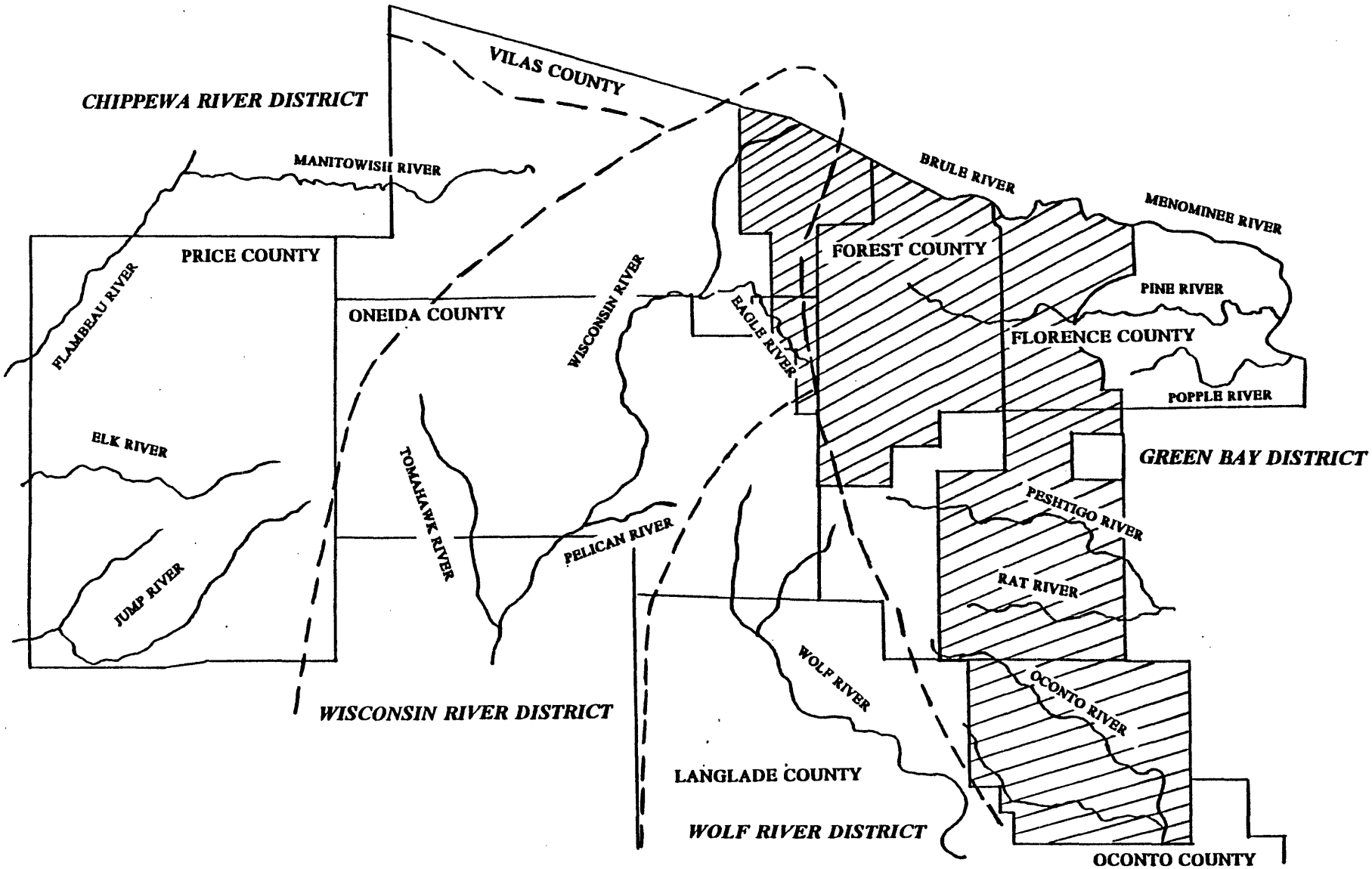


Figure 8: Natural Logging Districts Within State Region 2 and Nicolet National Forest.

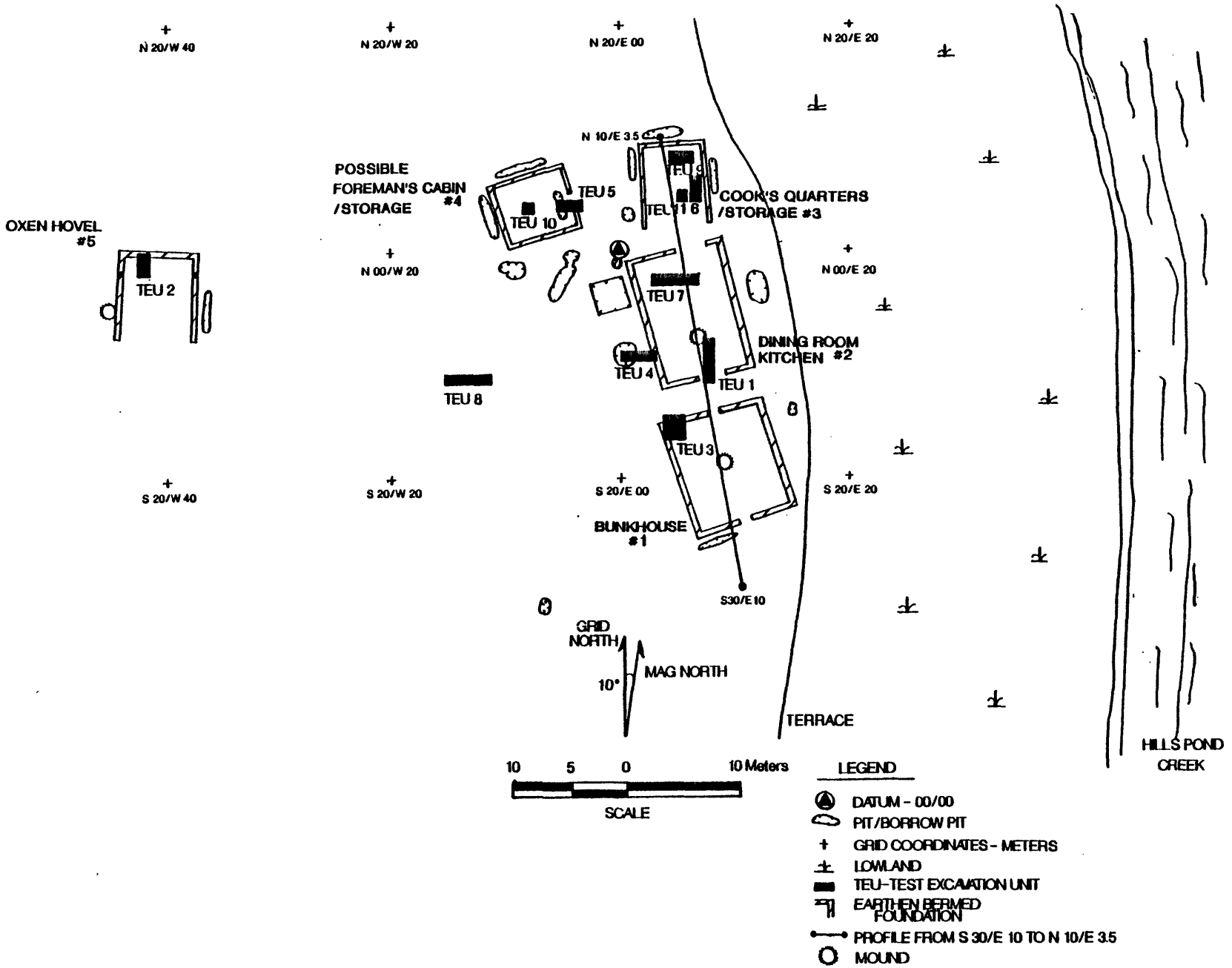


Figure 9. 1876-1878 Pineries Logging Camp of Sherry and Gerry Company, Oconto County. Reproduced from Bruhy et al 1993: 177.

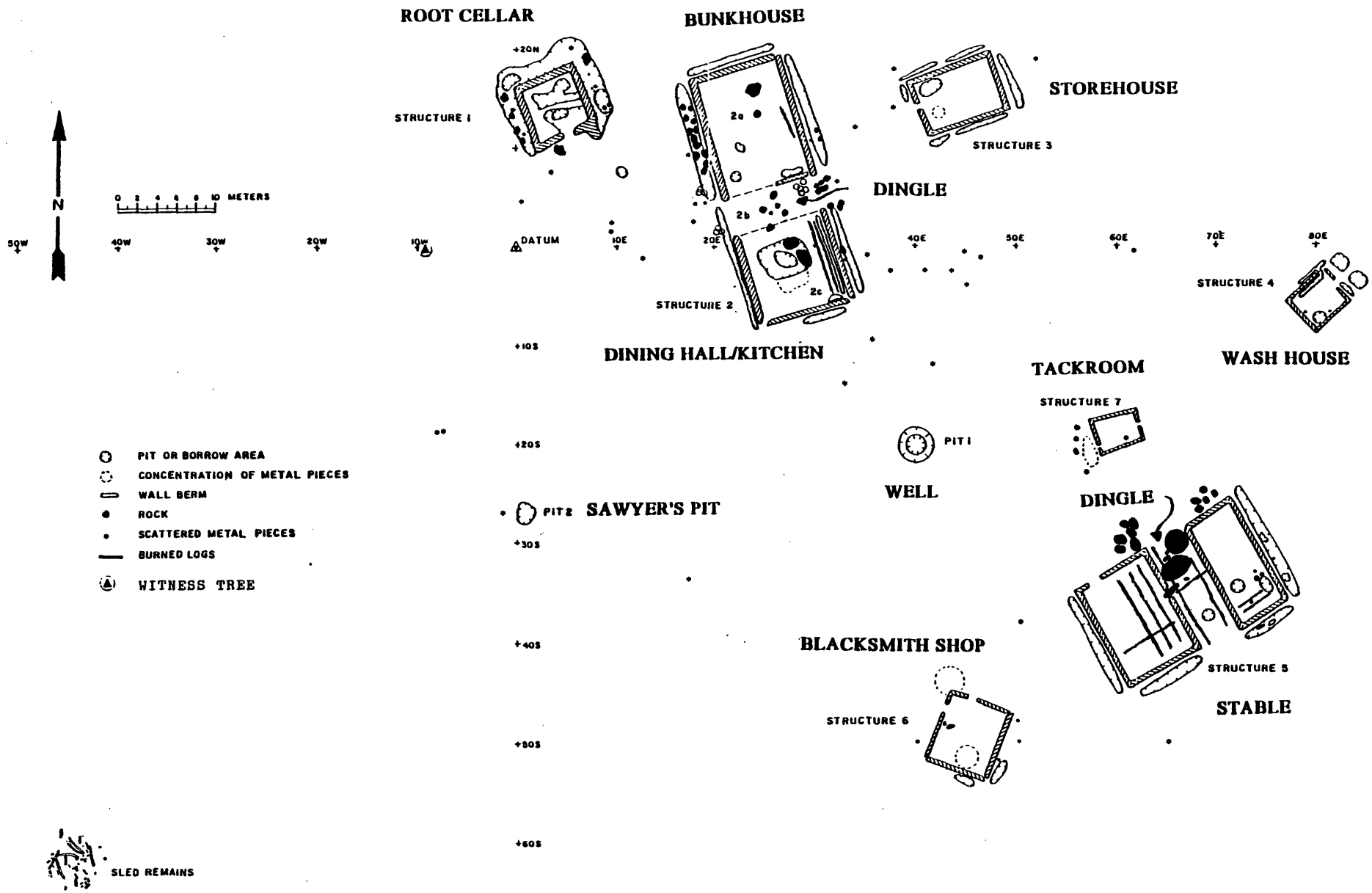


Figure 10: 1895 Dingle Style Logging Camp of Menominee Bayshore Company, Forest County. Reproduced from Overstreet 1982:81.

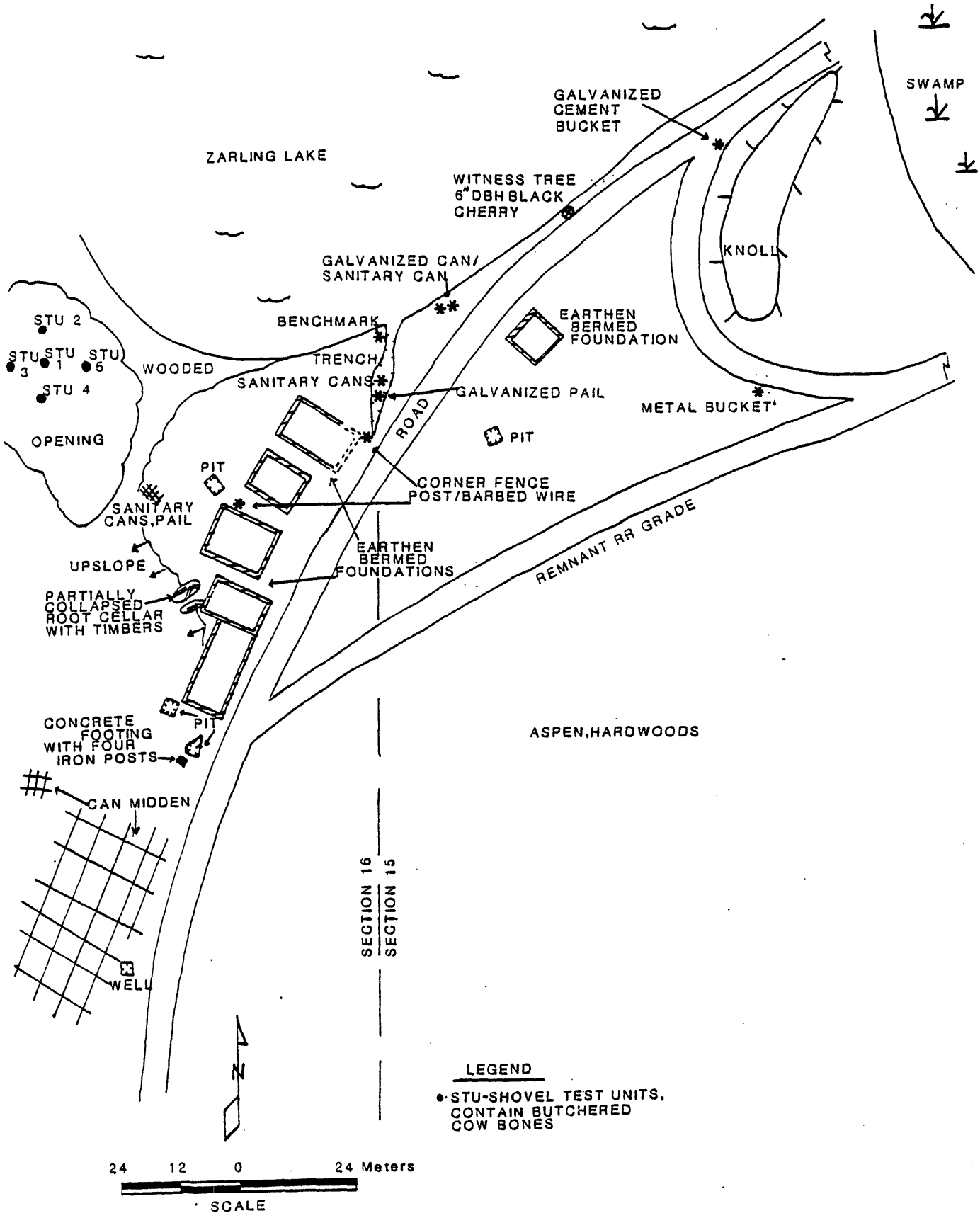


Figure 11: Early 20th Century Railroad Camp, Forest County. Reproduced from Nicolet National Forest site files.