PRODUCTION AND CONSUMPTION
OF MAJOR WOOD PRODUCTS IN THE LAKE STATES:
PERSPECTIVES AND TRENDS (1)

by

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May 1985

STAFF PAPER SERIES NUMBER 49

- (1) Cooperative research supported and cooperatively undertaken by the Division of Forestry, Minnesota Department of Natural Resources; Division of Forest Management, Michigan Department of Natural Resources; Bureau of Forestry, Wisconsin Department of Natural Resources; Eastern Region, National Forest Administration, USDA Forest Service; North Central Forest Experiment Station, USDA Forest Service; and Department of Forest Resources, University of Minnesota. Published as Paper No. 14,394 of the miscellaneous journal series of the Minnesota Agricultural Experiment Station.
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INTRODUCTION

The Lake States Region

Michigan, Minnesota and Wisconsin comprise the Lake States, a region covering 191,000 square miles (5 percent of the total U.S. land area). More than 18 million people (8 percent of the total U.S. population) live within the region, most residing in the region's large southern metropolitan areas. Agriculture plays a major role in the southern part of the region, growing in significance toward the west. Timber production activities span the region's northern reaches, with associated wood products manufacturing occurring throughout the central and southern portions. Mining, primarily iron, concentrates in northeastern Minnesota yet stretches across northern Wisconsin and Michigan's upper peninsula. The region's expansiveness, significant population and important economic activities make the Lake States a vital part of the nation's political economy.

The recession of the early 1980's brought extraordinary economic hardship to the Lake States. Michigan, with its huge manufacturing sector, was particularly stricken. Unemployment in the state rose from 6.9 percent in 1978 to 15.5 percent in 1982, compared to a 1982 national unemployment rate of 9.7 percent (47). On average, Wisconsin and Minnesota fared slightly better; however, some areas, notably Minnesota's Iron Range, experienced unemployment rates approaching 20 percent. Many believed that the fundamental structure of some regional industries, especially

mining and automobile manufacturing, was changing and that prospects for future employment in such industries were bleak. Each state undertook massive efforts to provide assistance and retraining programs for the unemployed in an effort to curb economic distress and stem the outflow of labor. The forest products sector, which directly employed more than 180 thousand workers in the region, was given particular attention since it had weathered the recession relatively well and the region contained vast and underutilized timber resources. Forestry officials within the region sought increased cooperation as a means of identifying new opportunities for development within the forest products sector.

Forest Planning Information

State and federal forestry agencies within the Lake States have been involved with comprehensive forest planning activities since the early 1970's. These planning efforts intensified during the early 1980's, largely in response to the Forest and Rangeland Renewable Resources Planning Act, as amended by the National Forest Management Act of 1976. Forest resource managers and planners developed a common concern during this period about the quality, quantity and form of information available for planning purposes (18). The lack of adequate information presented a significant barrier to the development of long-term timber management strategies necessary to promote growth and stability in the Lake States forest products sector. Five problems were of special concern:

- o Incomplete timber resource requirement projections for several geographic areas within the Lake States;
- o Inconsistent forest resource plans among several government agencies, and between geographic areas;
- o Misallocation of resources in attempting to efficiently meet forest resource requirements;
- o Duplication of effort and costs in making various, limited timber supply and demand projections; and
- o An inability to identify and resolve regional problems.

In an attempt to address some of these difficulties, a unique cooperative effort was undertaken. The Lake States Planning Coordination Committee initiated the effort. Financial support was provided by state forestry agencies in Minnesota, Michigan and Wisconsin; USDA Forest Service National Forest Administration; USDA Forest Service Research; and the Department of Forest Resources, University of Minnesota¹. The objectives of the cooperative agreement were to:

- o Develop reliable estimates of current primary and secondary wood product production and consumption in the Lake States;
- o Identify major issues related to the ability of Lake States timber resources to meet future timber requirements;
- o Improve the consistency, reliability and availability of information pertaining to Lake States timber supply and demand; and
- o Promote cooperation among the Lake States in addressing regional forestry problems and opportunities.

¹Concurrent with this project was a study by the Conservation Foundation on forest policies in the Lake States which also encourages regional cooperation and coordination (33).

In pursuing these objectives, the perspective of forest resource managers and planners was maintained. The focus was on types of information necessary to develop workable strategies for meeting long-term timber resource demands in the Lake States. Relevant economic, technological and demographic factors were considered and characteristics of the region's timber resources explored in order to identify significant issues and opportunities.

REGIONAL TIMBER RESOURCES

Forest Land

Area

The Lake States is one of the nation's most densely forested regions, second only to New England. The 45.5 million acres of commercial forest land in the region, which represent nearly 10 percent of the national total, are distributed fairly evenly among the three states: Michigan, 17.5 million acres; Minnesota, 13.5 million acres; and Wisconsin, 14.5 million acres (Table A-1). Minnesota and Michigan have experienced significant reduction in commercial forest land since 1952. Minnesota's commercial forest land declined about 11 percent, largely as a result of the creation of the Voyageurs National Park and the expansion of the Boundary Waters Canoe Area (15). Michigan's commercial forest land declined about 7 percent, due primarily to urban and related development, much of which occurred in the state's

southern lower peninsula (37). Wisconsin's commercial forest land held fairly steady between 1952 and 1968 (38). The state's 1983 forest survey, however, shows that commercial forest land increased by 1.5 percent since 1968 due to farmland in the southern part of the state reverting back to forest land. Despite Wisconsin's promising reversal, the trend toward a declining commercial forest land base remains an important forestry issue in the Lake States.

Ownership

Nearly half of the commercial forest land in the Lake States is publicly owned, with state and county ownership accounting for about 26 percent (Figure A-1). This relatively high proportion of non-federal public forest land ownership is unique to the region and represents an opportunity for state and county forestry agencies to largely determine the future of the Lake States forest.

Timber Resources

Forest Types

The region's forests can be characterized by six major forest types. Aspen-birch dominates the region, covering 32 percent of the commercial forest land, followed by maple-beech-birch (24 percent), spruce-fir (15 percent), oak-hickory (12 percent), white-red-jack pine (8 percent) and elm-ash-cottonwood (7 percent) (Figure A-2). About two percent of the region's commercial forest land is classified as nonstocked. There are some distinct differences between the states in the region. Minnesota is

heavily dominated by aspen-birch (50 percent) while maple-beech-birch predominates in Michigan (35 percent). Wisconsin is dominated by roughly equal proportions of these two forest types.

Timber Volume

Hardwoods account for nearly three-fourths of the growing-stock volume in the region (Figure A-7). The distribution of growing-stock volume among ownership classes is closely related to the distribution of commercial forest land. The proportion of hardwoods, however, varies among ownership classes, being slightly higher for private nonindustrial owners (about 80 percent) than for federal and state ownerships (about 60 percent) (Figure A-6).

Productivity

The average growing-stock volume per acre is relatively consistent across ownership classes in the Lake States. The regional average of 921 cubic feet per acre is low when compared to the national average of 1466 cubic feet, partially reflecting small timber sizes and low levels of management intensity in the region (15). But also, the average site class (i.e., a measure of potential site productivity assuming fully-stocked natural stands at culmination of mean annual increment) in the region is only 58 cubic feet per acre per year whereas the average site class in the nation is 73 cubic feet per acre per year (Figure A-3). This measure suggests that the Lake States may have to overcome the disadvantage of having a less productive forest land base than other regions. However, the region holds

the advantage of having greater opportunity to increase timber productivity, especially compared to the South which has nearly achieved its productive potential (13).

Age-Class Distribution

Stands between 40 and 60 years of age dominate commercial forest land in the Lake States and are evenly distributed among the three states (Figure A-4). These stand-ages resulted from heavy cutting combined with fire and wind disturbances that occurred in the early part of the 20th century. Because two of the region's major species, aspen and birch, are relatively short-lived, many of the stands are beginning to deteriorate. Such deterioration implies a lost opportunity to utilize existing timber resources and a failure to achieve the physical capability of the land base to produce timber.

The skewed age-class distribution also raises an important and complex question: how can the "wall of wood" now occupying the Lake States forests be effectively utilized without entailing a subsequent decline in timber resource availability? Assumptions about the species composition of the Lake States "third forest" and increased growth rates after harvesting the slow-growing, mature timber carry significant implications.

Size-Class Distribution

The Lake States is the nation's only region dominated by pole-size timber (Figure A-5). Forty-five percent of the region's commercial forest land is covered by pole timber, a distribution pattern which holds fairly consistently across the three states.

Although species composition, stocking levels and age class largely determine size, the size class distribution pattern in the Lake States also can be attributed to regional timber industries that primarily harvest and process pole-size trees. Whether pole timber or larger-sized timber products should be the focus of the Lake State's third forest represents an important question for the region.

Growth and Removals

Despite an 8 percent reduction in commercial forest land between 1952 and 1977, growing stock volumes of hardwoods and softwoods in the Lake States increased at a faster rate than in any other region of the country (14). These increases were attributable in part to low levels of utilization. In 1977, for example, net annual hardwood growth exceeded removals by nearly 40 percent and softwood growth exceeded removals by 30 percent. Over the past few years, expansion in the pulp and paper industry, rapid growth in the structural particleboard industry and rising consumption of wood for energy have narrowed the gap between growth and removals. For aspen, the species in greatest demand, the gap might have closed completely (33). However, since a large proportion of the productive potential in the Lake States is not being achieved, there is opportunity to increase production and sustain growth in the timber product industries for some time (43).

Supply-Demand-Consumption Relations

The terms "timber supply," "timber demand," and "timber

consumption" are often loosely used. Supply is sometimes confused with timber volume or growth while demand is misinterpreted as growing-stock removals or timber receipts at the mill gate. Supply and demand are economic variables affected by changes in numerous factors: population, income, preferences, technology, etc. Timber supply refers to the volume that timber owners would be willing to sell at given stumpage prices at a given place and time. As stumpage prices rise owners presumably would be willing to offer greater volumes for sale. Stumpage price alone does not determine whether a particular timber stand would be made available for purchase. The stand must also be considered "operable" (i.e., logging and transportation costs must also be covered by the purchaser).

Timber demand refers to the volume of timber that users would be willing to purchase at given prices at a given place and time. Rising stumpage prices generally result in reduced timber purchases; however, timber demand is affected by important factors other than stumpage prices (e.g., population and income changes, shifts in the relative prices of final timber products and their substitutes, changes in society's preferences).

Timber consumption is the actual amount of timber which clears the market at a price agreed upon by seller and purchaser. In sum, timber supply, demand and consumption are determined by complex economic relationships and thus must be differentiated from information such as volume, growth, removals and receipts.

Regional Timber Demand

Relative Prices

Changes in relative stumpage prices often represent the driving force behind regional shifts in mill capacity and thus, regional timber demand (43). This is particularly true for the lumber industry in which stumpage prices represent a large percentage of the final product's selling price. For example, relative stumpage prices were critical factors in the shift of U.S. lumber production from the Pacific Northwest to the South. As competition for timber increases and stumpage prices rise in the South relative to other regions, lumber production may shift again, perhaps back to the Pacific Northwest.

Stumpage prices in the Lake States are relatively low. Furthermore, proximity to large Midwestern markets represents a competitive advantage for the region, particularly with respect to the West but also the South. The wood products industry has responded to these factors by locating several new mills in the region during the past few years. An important question is whether the region is capable of meeting the timber requirements of these and perhaps additional mills without incurring significant stumpage price increases.

Technology

Advances in technology have been critical to renewed interest in the Lake States forest. For example, new harvesting systems have responded to many problems associated with large volumes of pole-size timber; reconstituted board technologies have enabled

industries to utilize pole-size timber for structural panel products (e.g., waferboard and oriented strand board); and hardwood species, especially aspen, have become extremely desirable for particleboard products and as a component of the woodpulp mix paper and board production. Other technologies, such as sawing and drying techniques that reduce the warpage in hardwood dimension lumber, are being developed that will continue to enhance the position of the Lake States as a supplier of wood products.

ESTIMATING REGIONAL TIMBER PRODUCT CONSUMPTION

Derived Demand

The traditional approach to estimating timber demand assumes that demand equals the consumption of final timber products (9). This "derived demand" approach will be used in this report. For simplicity and accuracy, however, demand will be referred to as "consumption." In effect, timber products will be traced through their various processing phases to the final or end-use markets in which they are consumed.

Definitions

Timber product categories are difficult to define because of the complex nature of product manufacturing. Mill residues from a sawmill, for example, may be shipped to a pulpmill for pulping. Are they a secondary product of the sawmill or a primary product for the pulpmill? For purposes of this report, primary

timber products are defined as roundwood products such as pulpwood, sawlogs, veneer logs and fuelwood. Mill residues are also included since they re-enter the primary-mill processing stage. Like fuelwood, if residues are used as fuel, they are considered both a primary product and a final product.

Secondary timber products are any primary products that undergo further processing. This broad definition simplifies the complex of processes and products involved in timber product manufacturing. For reasons of practicality, however, it is necessary to limit the number of secondary products considered. Therefore, four more specific product classifications will represent secondary products: paper and board, lumber, particleboard, and plywood and veneer. Although these four product classifications may be relatively specific, problems with definitions remain. The most troublesome classification is particleboard. At times particleboard represents a broad range of products manufactured from wood particles, such as waferboard, oriented strand board, and medium-density fiberboard (43,46). At other times it specifies a dry, reconstituted board product used for industrial purposes, primarily furniture manufacturing (28). For purposes of this report, the broad particleboard definition will be used for the classification. The narrow particleboard definition will represent one product within the classification. It will be called "industrial particleboard" as differentiated from the "structural particleboard" products in the classification (see Particleboard section).

Data Sources

The availability of data on the production and consumption of primary and secondary timber products varies among products. In general, the amount of available data is directly related to the perceived importance of the product to the region at a given time. For example, a very good data series has been maintained for pulpwood because of its significant contribution to the Lake States economy. By comparison, less data is available for veneer logs and sawlogs because they hold less economic importance. In addition, data on sawlogs is more difficult to obtain due to the large number of small mills that comprise the region's lumber industry.

There is generally more and better data available for primary timber products than for secondary timber products. The USDA Forest Service, North Central Forest Experiment Station (NCFES) has been conducting mill surveys for many years, often in conjunction with state forestry agencies. These surveys represent a reliable and fairly consistent data series for primary production and consumption.

By comparison, secondary product data comes from multiple sources, is laden with inconsistent industry and product definitions, and often has a questionable degree of reliability. The Bureau of the Census (U.S. Department of Commerce) and the USDA Forest Service are the major sources of secondary product data. However, trade organizations (e.g., the American Paper Institute, American Plywood Association, and National Particleboard Association),

and private research organizations (e.g., Data Resources Incorporated, Stanford Research Institute and Morgan Stanley & Company) also generate such data.

This report relies heavily on data gathered by the USDA Forest Service and Bureau of the Census. Since both of these sources present secondary data within the framework of the Standard Industrial Classification (SIC) system, they are relatively consistent. Although the best available, much of the USDA Forest Service and Bureau of the Census data is subject to large sampling errors and should be approached with some caution².

Product Flow Concepts

The flow of primary and secondary timber products can be very complex (Figure 1). Some primary products flow directly to end-use markets (e.g., fuelwood). Most products, however, receive further processing before they reach such markets. Imports and exports of various products occur along the flow, often in perplexing patterns. For example, softwood residues and woodpulp are imported for the region's pulp and paper industry while significant volumes of low-cost red pine remain unused in one part of the region and roundwood pulpwood is being exported

²The Bureau of the Census has been underestimating lumber production in the South for some time. This also appears to be true for the Lake States where lumber production estimates by the Bureau of the Census are as much as 25 percent lower than estimates by the North Central Forest Experiment Station for some years, (e.g., Michigan's 1977 lumber production was reported as 350 million board feet by the Bureau of the Census whereas the North Central Forest Experiment Station reported it as 457 million board feet).

PRIMARY AND SECONDARY WOOD PRODUCT FLOWS IN THE LAKE STATES

FIGURE 1

from other parts. These patterns could probably be explained given information about transportation costs and trade relationships. Without such information, however, some import and export patterns remain enigmatic.

Use-Factor Approach

As discussed previously, the demand for primary timber products is derived from the demand for secondary products, which is represented by secondary product consumption. Estimates of secondary product consumption in major end-use markets in the Lake States for this report were determined by the use-factor approach. This approach was first applied to wood product markets in the 1950's (39) and has gained popularity due to advantages over traditional statistical analysis (9).

The use-factor approach begins by identifying the major end-uses or individual markets in which a secondary product is consumed. Associated with each end-use is a "demand indicator" (i.e., an indicator of the level of market activity) and a "use-factor" (i.e., a measure of wood consumed per end-use unit). For example, the demand indicators and use-factors associated with each end-use market for lumber identified in the Lake States are presented in Table 1. The product of the demand indicator and the use-factor associated with each market equals the lumber consumption in that market. The sum of the consumption in all markets estimates total lumber consumption in the Lake States.

Because the use-factor approach incorporates the results of major market surveys conducted by the USDA Forest Service

LUMBER MARKET DEFINITIONS

End-Use Market -----	Demand Indicator -----	Use-Factor -----
Residential Construction	Single-family housing Multi-family housing Mobile home shipments Additions & repairs (valuation)	BF/sq.ft. of floor BF/\$1977
Nonresidential Construction	Nonresidential buildings (valuation)	BF/\$1977
Pallets	Pallet production	BF/pallet
Containers & Dunnage	Index of all manufacturing (index, 1967 = 1.0)	BBF/index unit
Furniture	Furniture production index (index, 1967 = 1.0)	BBF/index unit
Other Manufacturing	Index of all manufacturing (index, 1967 = 1.0)	BBF/index unit

TABLE 1

(8), it provides detailed data about individual markets. Such detail, however, introduces some problems. Large sampling errors exist in some of the data and inconsistent industry and product definitions are sometimes difficult to reconcile (8). As a result, different estimates of the same use-factor sometimes appear. For example, estimates of lumber-use per single-family home in 1977 by Spelter and Phelps (36), the U.S. Forest Service (43), and Clephane (10), were 11,970, 11,600 and 10,800 board feet per home, respectively.

National use-factors were used in conjunction with Lake States demand indicators to derive estimates of secondary product consumption in this report. Appropriate state demand indicators were found for some end-use markets; for others, methods were developed to estimate regional shares of national demand indicators. Use-factors and demand indicators, where available, are presented in the appendices in association with the appropriate end-use markets. The use-factor approach was not used to estimate the consumption of paper and board because another per-capita consumption approach was deemed more suitable.

Successful application of the use-factor approach to the Lake States region implies two major assumptions. First, we assumed that the costs and technologies of end-use markets in the Lake States do not differ significantly from the costs and technologies of those same end-use markets in the nation as a whole. For example, this presumes that a hardwood pallet manufactured in the Lake States uses the same amount of hardwood

lumber as the average hardwood pallet manufactured in the U.S., or that the amount of plywood used in the Lake States per dollar of expenditure in the residential alteration and repair market is the same as the average amount of plywood used per dollar of expenditure in the same end-use market nationally.

Second, we assumed that regional data sources can serve as demand indicators even though some are not directly comparable to the national demand indicators and others are estimates derived through regional share-analysis of national demand indicators. For example, shipments of mobile homes to the region are assumed to reflect mobile home production in the region. Also, pallet production is assumed to be a regional share of national production, since no regional data exists.

These two assumptions compound the problem of large sampling error which already exists in the national data for certain markets; however, the use-factor approach still provides a logical and informative method for estimating secondary product consumption. Moreover, new market information from surveys or knowledgeable individuals may easily be incorporated into the estimates. Therefore, the estimates can be considered to be as reliable as the best information available for any given market, and, in aggregate, as the sum of the best existing information.

PAPER AND BOARD

The paper and board industry in the Lake States began developing in the early 1900's and grew while the region's lumber industry declined³. Today it is the region's major wood products industry, employing over 100,000 workers and utilizing more than twice as much roundwood as all other regional wood products industries combined.

The Lake States paper industry has found an especially good market niche in the production of high-quality paper for writing, magazines and books (20). Domestic markets for such paper products have grown rapidly as personal disposable incomes have increased. Future prospects for growth appear strong both domestically and in export markets⁴.

Paper production in the region increased from 2.8 million tons in 1960 to 4.2 million tons in 1975 while board production held relatively steady. The increasing ratio of paper to board production represents the rising significance of paper to the region (Figure B-2). In 1977 the Lake States accounted for 16 percent of the nation's total paper production and claimed

³Paper and board is defined to represent all grades of paper, all grades of paperboard, wet machine board, and construction paper and board, including insulation board and hardboard (Current Industrial Report M26A).

⁴United States exports of book paper and fine paper to Canada and Latin America have been increasing rapidly in recent years, (An Analysis of the Timber Situation in the United States, 1952-2030, Appendix, Table 2.9).

the nation's number one paper-producing state (Wisconsin).

Total paper and board production in the region rose from 4.9 million tons to 7.8 million tons between 1960 and 1980 while estimates of paper and board consumption during the same period rose from 3.3 to 5.5 million tons (Figure B-1). The 1.5 to 2 million ton gap between production and consumption represents net exports of paper and board to markets outside of the Lake States. Although not precisely known, these export markets are probably located in Midwest and Northeast publishing centers.

Woodpulp and Wastepaper

The manufacture of paper and board requires the consumption of fibrous material, generally in the form of woodpulp or wastepaper. In 1980, 38 woodpulp mills in the Lake States produced 3.5 million tons of woodpulp; an additional 1.7 million tons were imported to meet woodpulp requirements for that year (6). In total, an estimated 5.2 million tons of woodpulp plus 1.8 million tons of wastepaper were consumed by the region in the manufacture of 7.8 million tons of paper and board (Table B-3). The Lake States has relied upon significant woodpulp imports for at least the last 20 years, the majority of which originated in Canada (Figure B-5).

Pulpwood

In 1982, thirty-eight pulpmills and 8 particleboard mills received 5.66 million cords of pulpwood in the form of roundwood

or residue (3)⁵. Of this total, 5.52 million cords were produced in the Lake States; the remaining volume (mostly softwood residues) was imported from other states (primarily western states) and Canada⁶.

Pulpwood receipts by Lake States mills consistently exceeded pulpwood production between 1960 and 1980, although the gap narrowed in the latter years (Figure B-8). The composition of the region's imports, however, changed during this period (Figures B-11 and B-12). In the earlier years, roundwood pulpwood accounted for the majority while in the latter years residues comprised virtually all of the imports. The source of these imports also changed during the period. In the earlier years, the majority came from Canada whereas western states (e.g., South Dakota and Wyoming) provided most imports in the latter years.

The reliance on pulpwood imports, although diminishing in recent years, could represent a concern to the Lake States, particularly Wisconsin. If the supply of softwood residues from the West were to diminish with the advent of more efficient sawmill techniques and reduced lumber production, Lake States pulpmills would have to seek new softwood sources, or perhaps

⁵Particleboard mills are defined as those manufacturing industrial particleboard, waferboard, oriented strand board and other composition boards. The 8 mills active in 1982 included 3 industrial particleboard, 3 waferboard and 2 oriented strand board mills.

⁶For simplicity, it is assumed that pulpwood exports from the Lake States are insignificant (Figure B-19). Thus, pulpwood receipts by Lake States' mills minus pulpwood production within the region represents net pulpwood imports.

hardwood substitutes, in order to meet their requirements. Whether the forests of the region can physically produce such increases at competitive prices is subject to speculation.

Aspen is the region's key pulpwood species (Figures B-13 and B-14), although there is a significant upward trend in production and mill receipts of other hardwoods such as paper birch, hard and soft maple and red oak. The region produces all of the hardwood roundwood it uses as pulpwood (Figures B-17 and B-18). For many of the last twenty years, softwood roundwood has been imported, although such imports appear to be declining (Figures B-15 and B-16). Ponderosa pine from western states and jack pine from Canada have been the significant "hard pine" imports, while Canadian spruce has been the major "other softwood" import. In recent years, Lake States production of both hard pine and other softwoods has surpassed mill receipts in the region. However, hard pine receipts have continued to rise while other softwood receipts appear to be declining, suggesting a regional preference for the former.

Particleboard Effect

The eight particleboard mills active in the region used 675 thousand cords of pulpwood (mostly aspen) in 1982 (Table B-18) for the production of 780 million square feet of particleboard

(3)⁷. The growth of the particleboard industry, primarily structural particleboard (e.g., waferboard and oriented strand board), has been dramatic in the past five years (Figure E-1). In 1983, Lake States mills became the leading producers of waferboard and oriented strand board in the nation and in the world. The industry's future appears bright, although questions remain about the ability of Lake States forests, especially aspen resources to sustain continued growth in the particleboard industry as well as the paper and board industry.

Future Consumption and Exports

The future consumption of Lake States paper and board products will depend upon trends in national and international markets as well as the ability of the Lake States to compete with other regions in providing these products. Assumptions about population growth, economic activity and the character of the region's timber resources and industry become critical. In general, national and international markets for high-quality paper are expected to continue growing at rates several points above the Gross National Product (29). The potential for Lake States paper production to grow with these markets appears to be great. Prospects for competing with other regions in the nation also appear good. Although the region's paper and board industry

⁷Particleboard pulpwood requirements have been included in pulpwood data since 1979 (NCFES Res.Bull. NC-56). Therefore, an adjustment must be made to determine the amount of pulpwood produced strictly for pulpmills. In 1982, the revised pulpwood receipts at pulpmills would be approximately 5 million cords; almost the entire reduction would be composed of aspen receipts.

has a significant dependency on imports of both woodpulp and softwood residue and faces increasing competition from the particleboard industry for the aspen resource, several factors support the assumption that the industry will continue to grow and be in a favorable position to compete with other regions:

- o Relative proximity to publishing centers in the Midwest and Northeast and to international ports;
- o Extensive 38 mill infrastructure in a capital intensive industry;
- o Stumpage costs representing only a small percentage of the selling price of paper and board products, i.e., rising stumpage prices have relatively little effect on stumpage demand;
- o History of cost-saving technical improvements at all levels of processing, as exemplified by the increased use of low-cost hardwoods; and
- o Vast timber resource base with a significant potential for gains in productivity.

LUMBER

During the late 19th century, the Lake States led the nation in lumber production. White pine, red pine and other softwoods were the dominant species. After steady decline to the 1930's, the region's lumber industry began to grow once more. This time, however, production consisted primarily of hardwoods, since the Lake States "second forest" was a hardwood forest. Of the 889 primary wood-using mills in the Lake States in 1975, 775 were sawmills most of which were small (i.e., they used

only half as much roundwood as the region's 41 active pulpmills) (7). Sawlog production has been increasing in recent years, and, as more of the region's poletimber moves into the sawtimber size class, production should continue to rise. Lumber consumption in the region, however, will largely determine the level of sawlog production.

Lumber Consumption and Production

More than 1.5 billion board feet of softwood lumber and nearly 0.8 billion board feet of hardwood lumber are consumed in the region's major end-use markets each year (Table 2) (36)⁸. Softwood lumber consumption depends upon residential construction markets, primarily single-family home construction. It is therefore subject to great fluctuation, such as the 40 percent decline seen during the 1981 building recession (Figure C-4). Hardwood lumber consumption, on the other hand, depends on industrial markets which have shown steady growth (Figure C-3). Pallet manufacturing represents about one-half of the region's industrial wood consumption.

Consumption estimates are more reliable for some markets than others because of statistical errors in the national use-factor estimates and the method of applying use-factors to the region. Estimates of lumber consumption in single and multi-family home

⁸Spelter and Phelps (36) estimate that the end-use markets included here represent about 75 percent of total softwood lumber consumption and 85 percent of total hardwood lumber consumption in the nation. Because it is reasonable to assume that similar proportions apply for the region, consumption estimates for the region probably understate actual consumption.

LAKE STATES LUMBER CONSUMPTION BY END USE

(million board feet)

Softwoods	1973	1977	1981
Residential			
Single-family	974.8	1071.5	329.9
Multi-family	269.8	206.2	87.6
Mobile homes	82.4	47.1	32.9
Alterations & repairs	NA	NA	63.3
Nonresidential Buildings	NA	NA	63.4
Industrial			
Pallets	124.0	150.4	153.0
Containers & dunnage	102.5	70.2	69.6
Furniture	108.9	139.5	158.7
Other mfg.	114.5	117.7	125.2
Total	1776.9	1802.6	1083.6
Hardwoods			
Residential			
Single-family	41.8	38.3	12.0
Multi-family	4.9	3.0	0.8
Mobile homes	3.4	1.8	1.2
Nonresidential Buildings	NA	NA	10.6
Industrial			
Pallets	310.0	355.0	384.0
Containers & dunnage	119.6	111.3	117.3
Furniture	203.4	203.8	211.6
Other mfg.	63.3	54.0	54.6
	746.4	767.2	792.1

TABLE 2

LAKE STATES LUMBER CONSUMPTION BY END USE

(million board feet)

Softwoods	1973	1977	1981
Residential			
Single-family	974.8	1071.5	329.9
Multi-family	269.8	206.2	87.6
Mobile homes	82.4	47.1	32.9
Alterations & repairs	NA	NA	63.3
Nonresidential Buildings	NA	NA	63.4
Industrial			
Pallets	124.0	150.4	153.0
Containers & dunnage	102.5	70.2	69.6
Furniture	108.9	139.5	158.7
Other mfg.	114.5	117.7	125.2
Total	1776.9	1802.6	1083.6
Hardwoods			
Residential			
Single-family	41.8	38.3	12.0
Multi-family	4.9	3.0	0.8
Mobile homes	3.4	1.8	1.2
Nonresidential Buildings	NA	NA	10.6
Industrial			
Pallets	310.0	355.0	384.0
Containers & dunnage	119.6	111.3	117.3
Furniture	203.4	203.8	211.6
Other mfg.	63.3	54.0	54.6
	746.4	767.2	792.1

TABLE 2

board feet of sawlogs, three-quarters of which was hardwoods. Aspen was the dominant species with red oak and hard maple being significant other species. Aspen was used primarily in pallets, furniture, containers and construction, while red oak and hard maple were important species for furniture, flooring, railroad ties and pallets. Less than one percent of the region's sawlog production is exported, although some sawlog shipments occur between the region's states. Michigan is the region's largest sawlog producer with Wisconsin a close second (Figures C-5, C-6 and C-7). Wisconsin, however, exhibits the greatest volumes delivered to mills in the region. This is explained by sawlog imports from Michigan's western upper peninsula as well as a smaller number of imports from Minnesota. Sawlog imports to the Lake States, like exports, are insignificant.

Future Consumption

Since World War II, more efficient manufacture and use of lumber and the substitution of plywood and particleboard panels for various lumber products have resulted in a decline in lumber-use by end-product within the Lake States region. Residential construction, traditionally the largest end-use for lumber, has, for example, been affected by three key developments (36):

- o More efficient utilization of lumber framing;
- o Substitution of plywood for boards in sheathing;
- o Trend toward basementless homes.

Regional growth in residential and industrial end-use markets for lumber will largely determine future lumber consumption by the region. Although the region's growth rate is expected to be lower than the national average, it is still projected at about 7 percent for the 1980-1990 period (16,48). Such growth would result in substantial increases in lumber consumption within the region.

The Lake States ability to compete with other regions serving national and regional lumber markets will depend heavily on relative stumpage prices. Projections suggest that rising softwood stumpage prices in the U.S., relative to those in Canada, will result in increased imports of Canadian softwood lumber, especially in the Northeast and North Central regions (43). This scenario is expected to prevail until Canadian timber resources begin to decline in quality and increase in distance from the mills. Given such circumstances, inroads into softwood lumber markets may be difficult for Lake States softwood lumber producers. There is also some question as to whether adequate volumes of softwood sawlogs will exist in the region to provide for a competitive softwood lumber industry. Opportunities may exist, however, for Lake States hardwoods to compete in traditional softwood markets. Recent advances in sawing and drying techniques have made feasible the production of construction grade lumber from some lighter hardwood species, such as aspen and yellow poplar (36).

As the Lake States forests mature, a growing proportion

of the timber will move into the sawtimber size class. Since the majority of this sawtimber will be hardwoods, it appears that the greatest opportunity for the region may be to increase production of hardwood lumber in order to meet the growing requirements in industrial end-use markets. Hardwood lumber production nationwide is projected to increase steadily between 1985 and 1990 by more than 3 percent per year (43). As long as hardwood stumpage prices in the region do not rise relative to other regions, the Lake States hardwood lumber industry should be able to maintain its market share within regional markets and thus grow with these markets. Operators of the region's numerous small sawmills, however, will need to stay abreast of the changing technologies and of the product characteristics that lumber-users desire in order to maintain their market share.

PLYWOOD AND VENEER

Veneer logs used in the manufacture of plywood and veneer represent the third most valuable timber product in the Lake States, behind pulpwood and sawlogs. Because veneer logs are almost exclusively hardwoods, the region's plywood and veneer industry is essentially a hardwood industry. In addition, more than 90 percent of the veneer logs produced in the region are standard veneer logs (i.e., used in doors, furniture, wall panels, exterior sheathing, and similar items); the remainder is container

veneer logs (i.e., used in boxes, crates, packing cases and other containers).

The region's plywood and veneer industry declined between 1950 and 1970, due largely to a decline in Wisconsin's industry (4). Since 1970, however, the region's industry has grown, primarily due to growth in Michigan. Future prospects depend upon the industry's ability to compete with other structural panels such as waferboard and oriented strand board in residential and nonresidential construction markets and the industry's adoption of technologies necessary to compete in veneer export markets.

Plywood and Veneer Consumption and Production

Plywood and veneer consumption in the region's major end-use markets totaled 608 million square feet in 1981 (Table 3). Residential markets generally represent about half of the region's consumption, with furniture manufacturing constituting the most significant industrial use. Consumption of plywood and veneer in the region is five times greater than regional production (Figures D-1 and D-2). More than 500 million square feet of plywood and veneer is imported into the region each year. These imports consist mostly of softwood plywood from Canada and from western and southern states. Because the hardwood plywood and veneer industry relies more on nonresidential construction markets (e.g., office buildings) than residential markets, production in the Lake States dropped less severely during the 1980 building recession than total plywood and veneer consumption in the region (38).

LAKE STATES PLYWOOD AND VENEER CONSUMPTION BY END USE

(million square feet, 3/8-inch basis)

End-Use Market	1973	1977	1981
Residential			
Single-family	467.2	539.5	201.5
Multi-family	145.0	133.6	59.3
Mobile homes	56.6	28.9	20.9
Alterations & repairs	NA	NA	33.9
Nonresidential Buildings	NA	NA	55.5
Industrial			
Pallets	41.9	66.8	85.2
Containers & dunnage	40.8	36.2	34.6
Furniture	89.4	102.4	117.0
Total	840.9	907.4	607.9

TABLE 3

Veneer Logs

Veneer log production increased and surpassed receipts in the region during the last two decades (Figure D-4). Imports have fallen and exports risen sufficiently to shift the region from a net importer to net exporter (Figure D-9). Imports from Canada fell most dramatically (7 million to 0.5 million board feet) although imports from other states (e.g., Iowa, Illinois and Indiana) showed significant declines as well (5.4 million to 1.6 million board feet). The region's exports are shipped to Indiana, Ohio and Kentucky and to other countries such as Canada and West Germany.

Twenty-eight plywood and veneer mills were active in the Lake States in 1980. Although the majority were located in Wisconsin, Michigan mills received nearly the same volume -- about 27 million board feet (4). Wisconsin's plywood and veneer industry gradually declined over the last two decades whereas Michigan's industry showed a sudden growth (Figure D-6). A similar but less dramatic pattern occurred for veneer log production in Wisconsin and Michigan (Figure D-5). Minnesota's veneer log production declined slightly during this period, although receipts increased substantially in 1980. Both Michigan and Minnesota are net exporters of veneer logs, while Wisconsin is a net importer.

Aspen is the most significant veneer log species in the Lake States, although twenty years ago it was insignificant (Figures D-7 and D-8). Other major veneer log species include

hard maple, red oak and yellow birch. Because aspen veneer log production equals consumption (Figure D-11), exports from the region are composed of other hardwood species (Figure D-12).

Future Consumption and Exports

Although hardwood plywood and veneer products are expected to lose some market share to waferboard and oriented strand board products, growth in construction and industrial markets should be sufficient to generate a net increase in plywood and veneer consumption. Furthermore, waferboard and oriented strand board are expected to compete more with softwood plywood than hardwood plywood and veneer, so domestic markets should show steadier growth for hardwood plywood and veneer than for softwood plywood. Production of hardwood plywood and veneer nationwide is projected to grow at an average rate of nearly 6 percent per year between 1985 and 1990 whereas softwood plywood production is expected to grow at less than 3 percent per year during the same period (43).

Export markets for plywood and veneer products manufactured in the Lake States show substantial promise, especially European markets (40). Although more than one-half of all veneer produced in the U.S. in 1979 was exported, mostly to Europe, Lake States mills have been slow to make the changes necessary to compete in these export markets. In fact most new and efficient veneer mills in the United States are owned by European capitalists (40). New capital investment, the adoption of new production techniques and aggressive marketing will probably be needed

if the Lake States region is to expand exports to European markets.

Increases in veneer log production and the region's emergence as a net exporter of veneer logs are trends consistent with the maturing of the region's timber resources. The plywood and veneer industry, however, requires high-quality hardwoods; some producers are concerned that although growing stock trees may be getting larger, quality veneer logs may not be available in the future. The industry also may be troubled by a possible regional reorientation toward fiber production rather than larger timber products.

PARTICLEBOARD

In 1983, the Lake States region secured the position of being the world's leading producer of structural particleboard. Regional production in that year exceeded one billion square feet, a quantity that, for the first time, surpassed Canadian production. Although nationwide production of structural particleboard is expected to increase dramatically over the next 5 to 10 years (especially in the Southeastern United States), Lake States leadership should continue given growth in the region's construction and industrial markets and great opportunity to serve markets in foreign countries (2).

Particleboard is composed of a number of products, each of which adds to confusion over an appropriate definition for

"particleboard." For purposes here, particleboard is defined as follows:

- o Industrial particleboard -- the first of the dry, reconstituted board products introduced, plus medium density fiberboard. These products are generally consumed in industrial uses (e.g., furniture manufacturing).
- o Structural particleboard -- reconstituted board products (e.g., waferboard, oriented strand board, composite plywood) which generally compete with softwood plywood in construction markets.

Particleboard Consumption and Production

Particleboard consumption within the Lake States probably exceeds 100 million square feet. This estimate assumes that residential construction markets account for about one-half of all particleboard consumption (28). Table 4 does not include estimates of particleboard consumed in several important markets (e.g., residential alterations and repairs, pallets and containers) because national end-use factors, on which to base regional consumption estimates, do not exist.

Particleboard production has grown significantly in the Lake States, especially since 1980. Structural particleboard, for example, grew from approximately 150 million square feet in 1980 to over one billion square feet in 1983 (Figure E-1). The majority of this growth (70 percent) occurred in Minnesota. The region's capacity to produce industrial particleboard has also increased but at a more moderate rate (Figure E-2). In 1982, total regional production of particleboard (structural and industrial) was more than 700 million square feet and required

LAKE STATES PARTICLEBOARD CONSUMPTION BY END USE

(million square feet, 3/4-inch basis)

End-Use Market	1973	1977	1981
Residential			
Single-family	24.6	34.9	17.9
Multi-family	4.9	4.9	3.1
Mobile homes	27.7	15.0	9.6
Industrial			
Furniture	10.3	14.8	17.4
Total	67.5	69.6	48.0

TABLE 4

the use of 675 thousand cords of pulpwood, mostly aspen.

Lake States regional exports of particleboard are substantial. In 1983, they probably exceeded one billion square feet. Large midwestern residential and industrial markets (e.g., Chicago, St. Louis) are very likely the major recipients of these exports. High transportation costs associated with the heavy weight of particleboard may well be curbing the use of Lake States particleboard in more distant markets.

Future Consumption and Exports

The American Plywood Association projects waferboard and oriented strand board production to nearly triple between 1984 and 1990. Two trends supporting this contention are:

- o Increases in the average volume of particleboard used per new residential unit; and
- o Increased penetration of markets other than residential construction markets (e.g., residential alterations and repairs, nonresidential construction) which grew to 60 percent of total particleboard consumption in 1983 (27).

Export markets, particularly in Europe, also represent an opportunity for the structural particleboard industry (2). Future increases in the use of particleboard will depend largely on the industry's ability to maintain low product prices relative to softwood plywood (35).

Major structural-particleboard mill construction programs have been undertaken by U.S. wood-based corporations (e.g., Louisiana-Pacific Corporation and Georgia-Pacific Corporation). Low-cost timber resources seem to be the determining factor in locating mills (27). As the industry grows within a region,

intensifying competition for timber resources may entail increasing stumpage prices which, in turn, could shift future industry expansion to other regions (32). In the short run, however, Southern U.S. mills will probably serve rapidly expanding markets in the Sunbelt, while Lake States mills will continue to serve growing Midwestern markets.

The rapid growth of Lake States waferboard and oriented strand board production in the Lake States has raised concern about the adequacy of the region's timber resources, particularly aspen. Concern focuses on meeting the raw material requirements of the particleboard industry as well as the paper and board industry. Hardwoods other than aspen will probably have to satisfy a greater proportion of these future requirements. Oriented strand board production may increase in the region relative to waferboard production since it requires less aspen than the latter (28).

FUELWOOD

Wood was the primary source of energy in the U.S. during the late 1800's and remained a major source of residential heat until the 1930's. As fossil fuels became popular, wood used for fuel declined until the 1970's when fossil fuel prices began to rise. Between 1974 and 1981, the use of wood fuels in the U.S. rose by 45 percent, due to increases in both residential and industrial use (5).

Fuelwood Consumption

Residential consumption of fuelwood in the Lake States in 1980 was about 4.4 million cords (Table F-1). Only about one-fifth of the urban households (i.e., those located in villages and cities of 2500 people or more) used wood for fuel, compared to nearly one-half of the rural households. Also, urban households, on average, burned only 1.6 cords in that year whereas rural households burned 3.1 cords (34). Since then, residential fuelwood consumption has grown significantly, as indicated by 45 and 75 percent increases in Michigan and Wisconsin, respectively, between 1980 and 1981. A slowing trend, however, may be seen between 1981 and 1982 in Michigan where residential fuelwood consumption increased by only 10 percent. This was probably due to a declining rate in the number of homes converting to fuelwood as a major heating source.

Industrial use of fuelwood in the region is also increasing and should continue to rise as the relative costs of alternative fuels rise. In 1981, about 40 percent of all primary wood-using mill residues produced in Wisconsin, or about 250 thousand tons of residue, were consumed as fuel. About three-fifths were used by industrial consumers while the remainder went to residential consumers. Since all primary wood-using mill residues in Wisconsin are currently being consumed, as fuel or in other wood product manufacturing, increased industrial use of fuelwood will result either directly or indirectly in expanded use of logging residue, such as tops and limbs, imports of residues, or increased roundwood

harvesting (5).

Michigan and Minnesota both consume considerably less primary wood-using mill residue than they generate (24,26). Thus, sufficient residue is available for increased industrial fuelwood use in the near future. Indeed, Minnesota forestry officials consider excess primary wood-using mill residue plus the state's considerable logging residue a significant resource for energy purposes (26).

Fuelwood Production

The region's only intensive survey of fuelwood production was completed in 1981 in the state of Wisconsin (5). Nearly 90 percent of the fuelwood consumed in the state was produced from roundwood. Households dominated this production, producing 7 out of every 8 cords. In the more heavily forested areas of the north, however, loggers harvested 1 out of every 4 cords. Private rural woodland was the major source of fuelwood in Wisconsin providing more than 90 percent of the state's overall production. However, in the northern portions of the state public lands provided about one-fourth of the fuelwood harvest. Nongrowing stock on commercial forest land (e.g., dead trees, cull trees, tops and limbs) provided more than 60 percent of the fuelwood harvest. Growing-stock accounted for only 15 percent overall, although it represented between 20 and 24 percent of production in the states northern area. Hardwoods represented 96 percent of Wisconsin's fuelwood harvest. Red oak and elm were the dominant species; hard maple, white oak, aspen, white birch and ash were also significant contributors.

Future Consumption and Exports

Future growth or decline in residential fuelwood consumption in the Lake States will depend largely on the price of wood fuels relative to alternative fuels. Rural households will probably use notably more fuelwood if prices of alternative fuels rise; urban households, however, may not increase fuelwood use as significantly since they face higher dollar costs and greater inconveniences in using wood fuels (34). Industrial consumption is expected to increase also, as the relative price and environmental advantages of fuelwood become more pronounced. Primary wood-using residue and logging residue will probably provide for some of this increased consumption over the short run; in the long run, however, an increasing proportion will probably come from roundwood. More efficient logging and sawing techniques will probably result in lower rates of residue production, and competition for residue between fuelwood and other products will probably increase.

In 1981 about 15 percent of all roundwood harvested in Wisconsin came from growing stock on commercial forest land. In volume, this represented enough roundwood to supply one 500 ton per day pulpmill for one year (5). Assuming that this 15 percent ratio applied to each of the Lake States, growing stock harvested for fuelwood in the region represented the annual requirements of more than three 500 ton per day pulpmills. Currently, this volume is relatively insignificant. As fuelwood consumption increases, however, it may infringe upon the growing

pulpwood requirements of the paper and board and particleboard industries. This may result in upward price pressures for hardwoods in the North Central Region (42).

SUMMARY AND CONCLUSIONS

The Lake States forest represents an important economic resource which holds promise for relieving some of the region's economic woes. Forest resource managers and planners are searching for appropriate strategies to encourage growth in the region's wood products economy while also ensuring long-term timber supply.

Timber Resources

Forty-five million acres of commercial forest land comprise the Lake States forest. Nearly half is publicly owned, with state and county ownership accounting for about 26 percent. This high proportion of non-federal public ownership represents an opportunity, unique to the Lake States, for state and local governments to have a major influence on the future of the region's forest.

Aspen-birch is the dominant forest type in the region (32 percent coverage of the commercial forest land) with maple-beech-birch and spruce-fir types following in importance (24 percent and 15 percent coverage, respectively). Oak-hickory, white-red-jack-pine and elm-ash-cottonwood types account for the remainder.

The Lake States is the nation's only region in which pole-size

timber predominates, covering 45 percent of the commercial forest land. The preponderance of 40 to 60 year old aspen and birch partially explains this unique characteristic. It also accounts for the skewed age-class distribution evident in the region. This "wall of wood" phenomenon raises important questions about the utilization of the existing timber resource and the achievement of the forest's productive capability.

Hardwoods account for three-quarters of the region's growing-stock volume. Despite an eight-percent decline in commercial forest land over the last two decades, growing-stock volumes of hardwoods and softwoods have increased substantially. For most species, growth has exceeded removals by a significant margin. The productive-potential of the Lake States forest is low relative to other regions; however, the region has a greater opportunity than many others to improve upon its current productivity.

Prospects for the development of the Lake States forest are better today than in the past (34). Advances in technology have effectively transformed the region's pole-size hardwoods into a fiber resource, highly desirable for paper and board products and for structural particleboard products such as waferboard and oriented strand board.

Paper and Board

In recent years, the region's paper and board industry has increased production of paper relative to board. As a result, the Lake States has become one of the largest paper-producing

regions in the country, accounting for 16 percent of the nation's total production in 1977. The region is a significant net exporter, specializing in the production of fine writing, book and magazine papers. Domestic and international markets for such products show strong growth potential and Lake States producers appear to be well-situated to compete in these markets. However, two major issues face the industry: a significant dependency on imports of woodpulp and softwood residue and increasing competition for roundwood, primarily aspen.

Lumber

The Lake States lumber industry is characterized by a large number of small sawmills which, in aggregate, use about half as much roundwood as the paper and board industry. Hardwoods, primarily aspen, red oak and hard maple, account for three-quarters of the region's production. Hardwood lumber is largely consumed in the manufacture of pallets, containers and furniture (industrial end-use markets), while softwood lumber is consumed in residential and nonresidential construction markets. The region's production of hardwood lumber nearly equals regional consumption. Softwood lumber production, however, represents only a small portion of regional consumption. Thus, significant volumes of softwood lumber are imported from Canada and from southern and western states. As long as hardwood stumpage prices in the region do not rise relative to other regions, the hardwood lumber industry should be able to maintain its market share within the region's industrial end-use markets and grow with these markets. Furthermore,

recent advances in sawing and drying techniques may create opportunities for hardwood lumber to compete in traditional softwood markets.

Plywood and Veneer

The plywood and veneer industry in the region is essentially a hardwood industry which produces standard veneer logs used in doors, furniture, wall panels, exterior sheathing and similar items. The industry declined steadily between 1950 and 1970, after which it began to grow. Due to increasing production, the region has become a net exporter of veneer logs. Aspen is the most significant veneer-log species; other species (e.g., hard maple, red oak and yellow birch) account largely for the region's exports. Hardwood plywood and veneer consumption is relatively insignificant when compared to softwood plywood consumption. Thus, although the region is a net exporter of hardwood plywood and veneer, it imports tremendous volumes of softwood plywood. As a result, total plywood and veneer consumption in the region is five times greater than regional production. Hardwood plywood and veneer is expected to lose some market share to structural particleboard products; however, these relatively new products compete primarily with softwood plywood in residential construction markets. Therefore, markets for hardwood plywood and veneer should show steadier growth than softwood plywood markets. Furthermore, international markets, especially Europe, represent significant opportunities for exports of high-quality hardwood veneer.

Particleboard

The Lake States region is one of the world's leading producers of structural particleboard (e.g., waferboard and oriented strand board). It also produces significant volumes of industrial particleboard. Total particleboard production in the region exceeds regional consumption by more than one billion square feet. Regional exports probably go to residential and industrial markets in the Midwest. Although structural particleboard production is expected to increase dramatically in the South, such production will probably serve expanding Southern markets. As long as Lake States producers can maintain competitive prices, they should be able to maintain or increase their share in Midwestern markets. They are also favorably located to compete in export markets, especially in Europe, which are expected to expand once the product gains acceptance. Increasing competition for aspen, the industry's primary roundwood requirement, is a major concern.

Fuelwood

Residential fuelwood consumption in the Lake States was 4.4 million cords in 1980 and has grown significantly since then. Rural households are much more likely than urban households to use wood for fuel and burn nearly twice as much wood per household. Industrial consumption of fuelwood has also been increasing in the region as the relative prices of alternative fuels have risen. Private rural woodland represents the major source of fuelwood in the entire region; however, public forest

land contributes about 25 percent in the region's northern portion. Similarly, growing-stock trees provide only about 15 percent of all fuelwood produced in the region, but in the northern portion their share approaches 25 percent. Future growth in residential and industrial fuelwood consumption will depend largely on the price of wood relative to alternative fuel prices. Increasing regional use of wood for fuel may result in upward price pressures for hardwoods.

Policy Implications

Assuming that end-use markets for secondary wood products expand as projected (43), Lake States regional timber production will probably increase, thereby resulting in greater competition for the region's timber resource. Competition for raw materials appears inevitable between the paper and board industry and the structural particleboard industry: both face strong growth prospects and rely significantly upon aspen. Furthermore, rapid increases in consumption of wood for fuel seem likely to intensify such competition.

A recent study of pulpwood, sawlog and fuelwood consumption in northeastern Minnesota estimated that total timber requirements in 2030 would exceed timber growth, based on current growth levels (31). Future requirements for aspen were estimated to exceed aspen growth by a much greater margin. These findings can probably be generalized to the Lake States region; however, a broad array of factors will influence the future of the region's forest and different assumptions can lead to markedly different

results (1). Among factors important to the region's forestry sector, other than traditional ones of population growth, general levels of economic activity and forest management intensity, are:

- o Expansion of export trade;
- o Increased use of low-quality hardwoods other than aspen in the product-species mix;
- o Growing consumption of wood for energy;
- o Improvements in wood utilization, both in logging and manufacturing; and
- o Shifting stumpage prices in other regions of the United States and Canada with respect to those in the Lake States.

Forest resource managers and planners may have difficulty anticipating the effects of these factors, especially in the distant future. They can, however, assess the region's strengths and weaknesses, many of which have been identified here, and subsequently, assume a posture which will enable the region to capitalize upon opportunities as well as minimize the effects of threats.

Increased cooperation among the three states appears to hold significant potential benefits for the region. Coordination of certain forest policies and programs, for example, could enhance wood products trade between the states, resulting in improved utilization of the region's timber resource and a reduced dependency on imports. Improved systems of information exchange and the revision or elimination of laws and regulations which

impede wood products trade represent initial steps toward achieving such objectives.

A positive regional forestry image also may benefit the region's wood producing and manufacturing sector. It could serve as the basis of both a campaign to promote the region's forestry opportunities among policymakers at the national and regional levels and a marketing strategy to attract new wood products industry investment to the Lake States rather than other regions. Cooperation is the key to successfully developing such a regional image.

Research and Information Needs

The process of systematically gathering and organizing information about the production and consumption of major wood products in the Lake States demonstrates our limited knowledge of the region's wood products trade. Further research is needed in a number of areas to reduce the uncertainty and improve our understanding. Three areas appear to warrant the greatest attention:

- o **Wood product flows and market structure.** Without better information about the markets to which Lake States wood products flow and reasons for the development of such trade patterns, it is extremely difficult to assess opportunities and design strategies for further development of regional wood products industries. A well-designed survey of regional wood products producers, wholesalers and retailers could obtain such information. Current directories of primary and secondary wood-using mills are available for each state to assist in such a survey (23,25,51,52). Also, utilization and marketing specialists in each state could probably provide valuable information.

- o **Regional wood product prices.** Wood product prices in Midwestern markets hold important implications about the competitive position of Lake States wood products industries with respect to such industries in other regions. A study of comparative prices for wood products from competing regions (e.g., the Lake States, the South, Canada) could provide useful information to assess the potential for expanding the market share of Lake States industries in major Midwestern wood products markets.
- o **Regional forest policies.** A systematic identification of regional forest policies (local, state, federal) which affect investment and trade by wood products industries is needed to assess opportunities for improving the environment for such activities. A comparison of Lake States policies with those in other regions could be useful for determining the region's policy strengths and weaknesses.

During the course of this review, the statistical evidence on wood product production and consumption often proved to be lacking, outdated or inconsistent between states. Some of the more critical information needs are as follows:

- o Timber inventory data by state for comparable periods of time.
- o State or regional consumption, import and export data for paper and board products.
- o State or regional import and export data for woodpulp.
- o Separate reports for pulpwood used in particleboard production as opposed to paper and board production.
- o More regular and reliable reporting of lumber production by state.
- o Sawlog production, import and export data by state for comparable years.
- o Hardwood plywood and veneer production, import and export data for the region.
- o Consistent particleboard product definitions.

- o State or regional production, consumption, import and export data for defined particleboard products.
- o Residential and industrial fuelwood production and consumption data by state.
- o Regional use-factors for major wood products in major end-use markets
- o Single and multi-family housing starts by state.
- o Mobile home production by state.
- o Expenditures on residential alterations and repairs by state.
- o State or regional pallet production.
- o State or regional furniture production indexes.

LITERATURE CITED

1. Adams, D.M. and R.W. Haynes. 1985. Changing Perspectives on the Outlook for Timber in the United States. Journal of Forestry. 83(1):32-35.
2. Anderson, R.G. 1984. Regional Production and Distribution Patterns of the Structural Panel Industry. Economics Report E37. American Plywood Association. Tacoma, WA.
3. Blyth, J.E. and W.B. Smith. 1984. Pulpwood Production in the North-Central Region, by County, 1982. Res. Bull. NC-79. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
4. Blyth, J.E. and W.B. Smith. 1984. Veneer Industry and Timber Use, North Central Region, 1980. Res. Bull. NC-76. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
5. Blyth, J.E.; M.E. Bailey; and W.B. Smith. 1984. Fuelwood Production and Sources in Wisconsin, 1981. Res. Bull. NC-75. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
6. Blyth, J.E. and W.B. Smith. 1982. Pulpwood Production in the North-Central Region, by County, 1982. Res. Bull. NC-59. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
7. Blyth, J.E.; J.H. Whipple; A.H. Boelter; and S. Wilhelm. 1980. Lake States Primary Forest Industry and Timber Use, 1975. Res. Bull. NC-49. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
8. Cardellichio, P.A. and C.S. Binkley. 1984. Hardwood Lumber Demand in the United States: 1950-1980. Forest Products Journal. 34(2):15-22.
9. Cardellichio, P.A. and J. Veltkamp. 1981. Demand for Pacific Northwest Timber and Timber Products. Prepared for the Pacific Northwest Regional Commission, Forest Policy Project, Washington State University. Vancouver, WA.

10. Clephane, T.P. 1982. Outlook for Timber Supply/Demand Through 1990. In Proceedings of Financing Forestry Investments: Attracting Capital to Timber and Timberland. Duke University. Durham, NC.
11. Gill, T.G. and R. Phelps. 1969. Wood Used in Manufacturing, 1965. Stat. Bull. No. 440. USDA Forest Service. Washington, D.C.
12. Gill, T.G. 1964. Wood Used in Manufacturing, 1960. Stat. Bull. No. 353. USDA Forest Service. Washington, D.C.
13. Hagler, R.W. 1983. Failure to Repeat "Events" May Slow Yield in South. Forest Industries. 110(8):18-19.
14. Jakes, P.J. 1981. Lake States' Resource Trends. In: Proceedings of 1980 Minnesota Forest Resources Inventory Conferences. USDA Gen. Tech. Rep. NC-64. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
15. Jakes, P.J. 1980. The Fourth Minnesota Forest Inventory: Area. Res. Bull. NC-54. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
16. Jackson, G.A. and G.S. Masnick. 1983. Take Another Look At U.S. Regional Growth. Harvard Business Review. 83(2):76-87.
17. James, L.M.; S.E. Heinen; D.D. Olson; and D.E. Chappelle. 1982. Timber Products Economy of Michigan. Research Report 446. Michigan State University, Agricultural Experiment Station. East Lansing, MI.
18. Lewis, B.L. and P.V. Ellefson. 1983. Information for Timber and Policy: An Assessment of Availability and Adequacy in Minnesota. Stat. Bull. 547-1983, University of Minnesota Agricultural Experiment Station. St. Paul, MN.
19. Lindberg, R.D. and H.G. Hovind. 1980. Wisconsin's Forests: An Assessment. Wisconsin Department of Natural Resources, Bureau of Forestry. Madison, WI.

20. Lothner, D.C. and R.A. Skok. 1977. Changing Minnesota and Wisconsin Roundwood Pulpwood Markets: An Econometric Study of Past and Future Trends. Unpublished manuscript. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
21. McKeever, D.B. 1983. Wood Used in U.S. Manufacturing Industries, 1977. Res. Bull. FPL-12. USDA Forest Service, Forest Products Laboratory. Madison, WI.
22. Michigan Department of Natural Resources, Forest Management Division. 1984. Fuelwood Use in Michigan Homes: 1982-83 Survey Results. Lansing, MI.
23. Michigan Department of Natural Resources, Forest Management Division. 1980. Michigan Directory of Primary Wood Using Companies, 1980. Lansing, MI.
24. Michigan Department of Natural Resources, Forest Management Division. 1979. Michigan's Forest Resources: An Assessment, 1979. Lansing, MI.
25. Milton, F.T. and J. Krantz. 1982. Minnesota Forest Products Directory, 1982. University of Minnesota, Agricultural Extension Service. St. Paul, MN.
26. Minnesota Department of Natural Resources, Division of Forestry. 1983. Minnesota Forest Resources Plan. Volume 3: Assessment. St. Paul, MN.
27. Pease, D.A. 1984. Structural Panels, MDF, Set Production Records. Forest Industries. 111(4):24-25.
28. Pennington, W.H. 1984. Market Expansion Forecast For Reconstituted Boards. Forest Industries. 111(4):40-43.
29. Pulp and Paper: North American Industry Factbook, 1982-1983. 1982. Miller Freeman Publications. San Francisco, CA.
30. Risbrudt, C.D. and R.N. Stone. Trends and Patterns in Wood Products Consumption and Production. Paper presented at Forest Products Research Society Meeting, Sept. 9-11, 1980. New Orleans, LA.

31. Rockel, M.; J. Buongiorno; D.C. Lothner; and E. Kallio. 1983. Future Consumption of Timber Grown in Northern Minnesota: 1980-2030. Research Paper NC-244. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
32. Seale, R.D. and D.E. Lyon. Changes in Structural Panel Products and Their Implication on Competing Wood Utilization. In Proceedings of SOFEW Workshop, November 14-16, 1984. Atlanta, GA.
33. Shands, W.E. and D.H. Dawson. 1984. Policies for the Lake States Forests. The Conservation Foundation. Washington, D.C.
34. Skog, K.E. and I.A. Watterson. 1984. Residential Fuelwood Use in the United States. Journal of Forestry. 82(12):742-747.
35. Spelter, H. 1984. Price Elasticities For Softwood Plywood and Structural Particleboard in the United States. Canadian Journal of Forest Research. 14: 528-535.
36. Spelter, H. and R.B. Phelps. 1984. Changes in Postwar U.S. Lumber Consumption Patterns. Forest Products Journal. 34(2):35-41.
37. Spencer, J.S. 1983. Michigan's Fourth Forest Inventory: Area. Res. Bull. NC-68. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
38. Spencer, J.S. and H.W. Thorne. 1972. Wisconsin's 1968 Timber Resource: A Perspective. Res. Bull. NC-15. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.
39. Stanford Research Institute. 1954. America's Demand for Wood, 1929-1975. A Report to Weyerhaeuser Timber Company. Tacoma, WA.
40. Stier, J.C. and G.L. Vick. 1984. An Economic Perspective on the Wisconsin Hardwood Veneer and Plywood Industry. Res. Bull. R3270. University of Wisconsin, School of Natural Resources. Madison, WI.

41. Stone, R.N. New Products: A Review of the Past and A Future Analysis. In The Hardwood Lumber Industry From Producer to User: Proceedings of 1982 Symposium. Michigan State University. Lansing, MI.
42. USDA Forest Service. 1984. America's Renewable Resources: A Supplement to the 1979 Assessment of the Forest and Range Land Situation in the U.S. FS-386. Washington, D.C.
43. USDA Forest Service. 1982. An Analysis of the Timber Situation in the U.S., 1952-2030. Forest Resource Report No. 23. Washington, D.C.
44. USDA Forest Service. 1972. The Outlook for Timber in the U.S. Forest Resource Report No. 20. Washington, D.C.
45. USDA Forest Service. 1956. Timber Resources for America's Future. Forest Resource Report No. 14. Washington, D.C.
46. U.S. Department of Commerce, Bureau of the Census. 1954, 1958, 1963, 1967, 1972, 1977. Census of Manufactures and Industry Series. Washington, D.C.
47. U.S. Department of Commerce, Bureau of the Census. 1984. Statistical Abstract of the United States, 1984. Washington, D.C.
48. U.S. Department of Commerce, Bureau of Industrial Economics. 1983. The Outlook for Solid Wood Products in the 1980's. Staff Paper BIE-SP83-2. Washington, D.C.
49. U.S. Department of Commerce, International Trade Administration. 1983. Regional Developments in Construction Activity. Construction Review. 29(2):4-11.
50. U.S. Department of Commerce, International Trade Administration. Construction Review. Bimonthly Industry Report. Washington, D.C.
51. Wisconsin Department of Natural Resources, Forest Products Unit. 1982. Wisconsin Primary Wood Using Industry Directory, 1982. Madison, WI.

52. Wisconsin Department of Natural Resources, Forest Products Unit. 1982. Wisconsin Secondary Wood Using Industry Directory, 1982. Madison, WI.

DATA SOURCES AND NOTES

TIMBER RESOURCES

MICHIGAN

Sources: Michigan Forest Statistics, 1980. 1983. Res. Bull. NC-67.
USDA Forest Service, North Central Forest Experiment Station.
St. Paul, MN.

Michigan's Fourth Forest Inventory: AREA. 1983. Res. Bull.
NC-68. USDA Forest Service, North Central Forest Experiment
Station. St. Paul, MN.

MINNESOTA

Sources: Minnesota Forest Statistics, 1977. 1980. Res. Bull. NC-53.
USDA Forest Service, North Central Forest Experiment Station.
St. Paul, MN.

The Fourth Minnesota Forest Inventory: AREA. 1980. Res. Bull.
NC-54. USDA Forest Service, North Central Forest Experiment
Station. St. Paul, MN.

The Fourth Minnesota Inventory: Timber Volumes and Projections
of Timber Supply. 1982. Res. Bull. NC-57. USDA Forest
Service, North Central Forest Experiment Station. St. Paul,
MN.

WISCONSIN

Sources: Wisconsin's 1968 Timber Resource: A Perspective. 1972.
Res. Bull. NC-15. USDA Forest Service, North Central Forest
Experiment Station. St. Paul, MN.

A Simulated Inventory Update: Wisconsin's 1979 Timber
Resource. 1982. Research Paper NC-209. USDA Forest Service,
North Central Forest Experiment Station. St. Paul, MN.

USDA Forest Service. 1982. An Analysis of the Timber
Situation in the U.S., 1952-2030. For. Res. Rep. No. 23.
Washington, D.C.

PAPER AND BOARD

PRODUCTION

Sources: U.S. Department of Commerce, Bureau of the Census. Pulp, Paper and Board. Current Industrial Report Series M26A. Washington, D.C.

Statistics of Paper, Paperboard and Woodpulp. American Paper Institute. New York, NY.

--- Board: All Grades equals the total production of Paperboard, Wet Machine Board, and Construction Paper and Board.

CONSUMPTION

Sources: U.S. Timber Production, Trade, Consumption, and Price Statistics, 1950-1981. 1983. USDA Forest Service, Misc. Pub. 1424, p. 63. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. Statistical Abstract of the U.S., 1984. Washington, D.C.

WOODPULP

PRODUCTION AND CONSUMPTION

Sources: U.S. Department of Commerce, Bureau of the Census. Pulp, Paper and Board. Current Industrial Report Series M26A. Washington, D.C.

Statistics of Paper, Paperboard and Woodpulp. American Paper Institute. New York, NY.

WASTEPAPER

CONSUMPTION

Sources: U.S. Department of Commerce, Bureau of the Census. Pulp, Paper and Board. Current Industrial Report Series M26A. Washington, D.C.

Statistics of Paper, Paperboard and Woodpulp. American Paper Institute. New York, NY.

Pulp and Paper, North American Industry Factbook, 1982-83. Miller Freeman Publications. San Francisco, CA.

--- Estimates based on the national utilization rate for wastepaper (American Paper Institute) may differ from estimates derived through mill surveys (Bureau of the Census).

PULPWOOD

PRODUCTION AND RECEIPTS

Source: Pulpwood Production in the North-Central Region by County. Res. Bull. Series (Table 1) 1960-1981. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.

--- 1974 was the first year that the "Pine" category was broken into Red Pine, Jack Pine and White Pine so that "Hard Pine" (i.e. Red and Jack pine) could be identified.

--- 1979 was the first year that logs, bolts and wood residue used in manufacturing particleboard and waferboard were included. Because composition board plants primarily use aspen and wood residue in the Lake States, it is possible to analyze roundwood use trends for other species and to compare survey results to prior years without large distortions.

LUMBER

PRODUCTION

Sources: U.S. Department of Commerce, Bureau of the Census. Lumber Production and Mill Stocks. Current Industrial Report Series MA-24T. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. Census of Manufactures, 1972 and 1977.

--- Lumber production is reported by both the Bureau of the Census and the USDA Forest Service, North Central Forest Experiment Station (Resource Bulletin Series). Because the units of measure in the two data series are equivalent, (i.e., lumber tally and million board feet, international 1/4-inch rule, respectively), they are directly comparable.

--- Michigan's and Wisconsin's production are given; Minnesota's production was estimated by taking its share of the value-added by manufacture in the Sawmills and Planing Mills industry and multiplying by the West North Central Region's production.

*** Value-added is "considered to be the best value measure available in the census data for comparing the relative economic importance of manufacturing among industries and geographic areas," (by census definition). Therefore, it is used throughout this study when estimating state or regional shares.

CONSUMPTION

(Residential and Nonresidential Construction)

Sources: U.S. Department of Commerce, International Trade Commission. Construction Review. Bimonthly Industry Report. Washington, D.C.

Changes in Postwar U.S. Lumber Consumption Patterns, by H. Spelter and R. Phelps, Forest Products Journal, 34:2, pp. 35-41.

--- Assume that the proportion of single-family homes in each state is the same as in the North Central Region. (Use Tables C-1, C-2 and use-factors)

- Assume that the proportion of mobile homes shipped to each state is the same as each state's share of the residential construction in the region.
(Use Tables B-6, C-1, C-2 and use-factors)
- Assume that each state's share of the regional value of additions and repairs is the same as its share of residential construction.
(Use Tables C-1, C-2 and use-factors)
- Table C-7 shows the value of nonresidential building construction in each state.
(Use with use-factors)

(Industrial Uses)

Sources: Wood Used in U.S. Manufacturing Industries, 1977, by D. McKeever. Res. Bull. FPL-12. USDA Forest Service, Forest Products Laboratory. Madison, WI.

An Analysis of the Timber Situation in the U.S., 1952-2030. 1982. Forest Service, For. Res. Rep. 23. Washington, D.C. (Chapter tables 3.7, 3.9, 3.14 and 3.17)
(Appendix tables 1.5, 1.7, 1.8, 1.9, 1.11, 1.12, 1.13 and 1.14)

SAWLOGS

PRODUCTION AND RECEIPTS

Sources: Preliminary data, 1981 Wisconsin survey, NCFES.

Preliminary data, 1980 Lake States survey, NCFES.

Preliminary data, 1978 Michigan survey, NCFES.

"Primary Forest Products Industry and Timber Use" series.
Res. Bulletins NC-55, NC-49, NC-39, NC-31, NC-24 and NC-12.
USDA Forest Service, North Central Forest Experiment Station.
St. Paul, MN.

PLYWOOD AND VENEER

PRODUCTION

Sources: U.S. Department of Commerce, Bureau of the Census. Pulp, Paper and Board. Current Industrial Report Series M26A. Washington, D.C.

Hardwood Plywood Manufacturers Association. Reston, VA.

Forest Industries, Annual Panel Review. April 1984.

--- Only North Central regional production is shown in MA-24F.

--- The Hardwood Plywood Assoc. has a directory in which some member mills disclose their production.

CONSUMPTION

Sources: Wood Used in U.S. Manufacturing Industries, 1977, by D. McKeever. Res. Bull. FPL-12. USDA Forest Service, Forest Products Laboratory. Madison, WI.

An Analysis of the Timber Situation in the U.S., 1952-2030. 1982. Forest Service, For. Res. Rep. 23. Washington, D.C.

--- No distinction between hardwood and softwood plywood in consumption tables.

VENEER LOGS

PRODUCTION AND RECEIPTS

Source: Veneer Log Production and Receipts, North Central Region. Res. Bull. Series (Table 1) 1960-1980 intermittent. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.

STRUCTURAL PANELS

PRODUCTION

Sources: Regional Production and Distribution Patterns of the Structural Panel Industry. 1984. Economics Rep. E37. American Plywood Association. Tacoma, WA.

--- Shows regional production by state, 1980-1983.

Forest Industries, Annual Panel Review. April 1984.

--- Shows national production and contains articles concerning industry trends.

CONSUMPTION

Sources: Wood Used in U.S. Manufacturing Industries, 1977, by D. McKeever. Res. Bull. FPL-12. USDA Forest Service, Forest Products Laboratory. Madison, WI.

An Analysis of the Timber Situation in the U.S., 1952-2030. 1982. Forest Service, For. Res. Rep. 23. Washington, D.C.

--- No distinction between hardwood and softwood plywood in tables. (Softwood plywood is a structural panel.)

PARTICLEBOARD

PRODUCTION

Sources: U.S. Department of Commerce, Bureau of the Census. Particleboard and Medium-Density Fiberboard. Current Industrial Report Series MA-24T. Washington, D.C.

--- Shows pre-1975 production, however, data is mostly non-disclosed in the Lake States.

National Particleboard Association. Particleboard and Medium-Density Fiberboard Industries, Capacity Surveys. Silver Spring, MD.

--- Plant capacities shown by state.

Particleboard, MDF, ... Plants in the U.S.: Capacity, Production and Raw Material Trends, 1956-1976. 1979. Res. Bull. FPL-6. USDA Forest Service, Forest Products Laboratory. Madison, WI.

CONSUMPTION

Sources: Wood Used in U.S. Manufacturing Industries, 1977,
by D. McKeever. Res. Bull. FPL-12. USDA Forest Service,
Forest Products Laboratory. Madison, WI.

An Analysis of the Timber Situation in the U.S., 1952-2030.
1982. Forest Service, For. Res. Rep. 23. Washington, D.C.

MEDIUM-DENSITY FIBERBOARD

PRODUCTION

Sources: U.S. Department of Commerce, Bureau of the Census.
Particleboard and Medium-Density Fiberboard. Current
Industrial Report Series MA-24T. Washington, D.C.

--- Pre-1975 production was zero in the Lake States.

National Particleboard Association. Particleboard and
Medium-Density Fiberboard Industries, Capacity Surveys.
Silver Spring, MD.

--- Shows no production capacity in the Lake States.

Particleboard, MDF,...Plants in the U.S.: Capacity,
Production and Raw Material Trends, 1956-1976. 1979.
Res. Bull. FPL-6. USDA Forest Service, Forest Products
Laboratory. Madison, WI.

CONSUMPTION

Sources: Wood Used in U.S. Manufacturing Industries, 1977,
by D. McKeever. Res. Bull. FPL-12. USDA Forest Service,
Forest Products Laboratory. Madison, WI.

An Analysis of the Timber Situation in the U.S., 1952-2030.
1982. Forest Service, For. Res. Rep. 23. Washington, D.C.

--- Embedded in Particleboard data.

FUELWOOD

PRODUCTION AND CONSUMPTION

Sources: Fuelwood Production and Sources in Wisconsin, 1981. 1984. Res. Bull. NC-75. USDA Forest Service, North Central Forest Experiment Station. St. Paul, MN.

Residential Fuelwood Use in the United States by K.E. Skog and I.A. Watterson. 1984. Journal of Forestry. 82(12): 742-747.

Residential fuelwood surveys conducted by state departments of natural resources, in cooperation with Northeastern Area State and Private Forestry, U.S. Forest Service.

GLOSSARY

COMMERCIAL FOREST LAND

Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization.

COMPOSITE PLYWOOD (COM-PLY)

A structural panel that combines a reconstituted board core with a veneer cover top and bottom.

DEMAND INDICATOR (SEE USE-FACTOR APPROACH)

DIAMETER CLASSES

A classification of trees based on diameter outside bark, measured at breast height (4.5 feet above the ground).

END-USE MARKET (SEE USE-FACTOR APPROACH)

FOREST LAND

Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

FOREST SITE PRODUCTIVITY CLASS

A classification of forest lands in terms of potential cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.

FOREST TYPE

A classification of forest land based upon the tree species forming a plurality of the stocking.

MAJOR EASTERN FOREST TYPES IN THE LAKE STATES:

WHITE-RED-JACK PINE

Forests in which eastern white, red pine, or jack pine, singly or in combination, comprise a plurality of the stocking.

SPRUCE-FIR

Forests in which spruce or true firs, singly or in combination, comprise a plurality of the stocking.

OAK-HICKORY

Forests in which upland oaks, or hickory, singly or in combination, comprise a plurality of the stocking.

ELM-ASH-COTTONWOOD

Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of the stocking.

MAPLE-BEECH-BIRCH

Forests in which maple, beech, or yellow birch, singly or in combination, comprise a plurality of the stocking.

ASPEN-BIRCH

Forests in which aspen, balsam poplar, paper birch, or gray birch, singly or in combination, comprise a plurality of the stocking.

GROWING-STOCK TREES

Live sawtimber trees, poletimber trees, saplings, and seedlings meeting specified standards of quality or vigor; excludes cull trees.

GROWING-STOCK VOLUME

Net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch top (of central stem) outside bark or to the point where central stem breaks into limbs.

GROWTH (SEE NET ANNUAL GROWTH)

HARD PINE

Includes red pine and jack pine.

LOGGING RESIDUE

The unused portions of poletimber and sawtimber trees cut or killed by logging.

MEDIUM-DENSITY FIBERBOARD (MDF)

Combines technologies of hardboard and early industrial particleboard to create new panel product for furniture manufacturers.

NET ANNUAL GROWTH

The net increase in the volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten during the year.

NONFOREST LAND

Land that has never supported forests and land formerly forested where use of timber management is precluded by development for other uses.

NONSTOCKED AREAS

Commercial forest land less than 10 percent stocked with growing-stock trees.

OTHER HARDWOODS

Includes all hardwoods other than aspen.

OTHER SOFTWOODS

Includes all softwoods other than hard pine, i.e. red pine and jack pine.

ORIENTED STRAND BOARD (OSB)

A reconstituted board product which attempts to duplicate the physical properties of plywood through orientation of the wood particles or strands.

PARTICLEBOARD

Reconstituted board products manufactured by reducing solid wood to smaller components (i.e. particles, fibers, strands, flakes, wafers, etc.) and then gluing the small components back together again into a usable board product.

STRUCTURAL PARTICLEBOARD

Generally includes waferboard, OSB, and composite plywood or com-ply. These products compete primarily with softwood plywood in construction markets.

INDUSTRIAL PARTICLEBOARD

Generally includes "particleboard" (i.e. the first of the dry, reconstituted board products introduced) and medium-density fiberboard. (Hardboard is sometimes included as well; in this study, however, it is contained within paper and board.) These products are consumed in industrial uses, primarily furniture manufacturing.

POLETIMBER (SEE STAND-SIZE CLASS)

PRIMARY TIMBER PRODUCT

Roundwood products, such as pulpwood, sawlogs, veneer logs, and fuelwood. Mill residues are also included if they re-enter the primary-mill processing stage.

PRIMARY TIMBER PRODUCT PRODUCTION

The annual quantity, determined from mill receipts, of one or a group of roundwood products cut in a specific geographic area, plus the annual wood residue quantity produced by sawmills, veneer mills, etc., in a specific geographic area that was used for the product.

PRIMARY TIMBER PRODUCT RECEIPTS

The annual quantity of wood received by mills in a specific geographic area, regardless of the geographic source.

PRIMARY WOOD-USING MILL

Mills receiving roundwood or chips from roundwood.

PRIMARY WOOD-USING MILL RESIDUE

Wood materials and bark not utilized for principal products at primary mills using roundwood.

REMOVALS

The net volume of growing-stock or sawtimber trees removed from inventory by harvesting; cultural operations, such as timber stand improvement; land clearings; or changes in land use.

ROUNDWOOD

Logs, bolts, or other round sections cut from trees.

SAWTIMBER (SEE STAND-SIZE CLASS)

SECONDARY TIMBER PRODUCT

Primary timber products which undergo further processing, such as paper and board, lumber, plywood and veneer, and particleboard.

SITE CLASS (SEE FOREST SITE PRODUCTIVITY CLASS)

STAND-AGE CLASS

Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

STAND-SIZE CLASS

A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

SAWTIMBER

Growing-stock trees of commercial species containing at least a 12-foot sawlog or two noncontiguous saw logs 8 feet or longer, International 1/4-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

POLETIMBER

Growing-stock trees of commercial species at least 5.0 inches in diameter at breast height, but smaller than sawtimber size.

SAPLINGS

Live trees 1.0 to 5.0 inches in diameter at breast height.

STRUCTURAL PANEL

Includes softwood plywood as well as reconstituted board products which compete with plywood, such as waferboard, OSB, and composite plywood.

USE-FACTOR APPROACH

Method of estimating product consumption (e.g. secondary wood product consumption) in major end-use markets which employs use-factors and demand indicators.

DEMAND INDICATOR

An indicator of the level of activity in an end-use market.

END-USE MARKET

Major markets or activities in which products (e.g. secondary wood products) are used or consumed.

USE-FACTOR

A measure of product consumed (e.g. wood consumed) per unit of activity in an end-use market.

APPENDICES

Figures and Tables

Appendix A. Timber Resources in the Lake States

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- A-1 Commercial Forest Land Ownership in the Lake States
- A-2 Forest Types in the Lakes States
- A-3 Site Classes in the Lake States
- A-4 Stand-Age Classes in the Lake States
- A-5 Lake States Growing Stock by Diameter Class
- A-6 Lake States Growing Stock by Ownership and Species Group
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- A-1 Forest Land Area in the Lake States by Land Class
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- A-5 Lake States Commercial Forest Land Area by Site Class
- A-6 Net Volume of Growing-Stock in the Lake States by Ownership and Species Group
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- A-8 Net Volume of Growing-Stock in the Lake States by Species Group
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Appendix B. Lake States Paper and Board Industry

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- B-1 Lake States Paper and Board Production and Consumption
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- B-5 Lake States Woodpulp Production and Consumption
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- B-9 Pulpwood Production in the Lake States
- B-10 Pulpwood Receipts in the Lake States
- B-11 Roundwood Pulpwood: Lake States Production and Receipts
- B-12 Pulpwood Residues: Lake States Production and Receipts
- B-13 Roundwood Pulpwood Production: Lake States Species Groups
- B-14 Roundwood Pulpwood Receipts: Lake States Species Groups
- B-15 Roundwood Pulpwood: Hard Pine; Lake States Production and Receipts
- B-16 Roundwood Pulpwood: Other Softwood; Lake States Production and Receipts
- B-17 Roundwood Pulpwood: Aspen; Lake States Production and Receipts
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Appendix B. Lake States Paper and Board Industry (continued)

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Appendix B. Lake States Paper and Board Industry (continued)

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Appendix C. Lake States Lumber Industry

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- C-3 Lake States Lumber Consumption: Hardwoods by End Use
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- C-5 Sawlog Production and Receipts in Michigan
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- C-2 Lumber Production in Michigan
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- C-4 Lumber Production in Minnesota and West North Central Division
- C-5 Lumber Used in Single-family Home Construction in the Lake States
- C-6 Lumber Used in Multi-family Home Construction in the Lake States
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- C-8 Lumber Used in Residential Alterations and Repairs in the Lake States
- C-9 Lumber Used in Nonresidential Building Construction in the Lake States
- C-10 Lumber Used in Pallet Manufacturing in the Lake States
- C-11 Lumber Used in Container and Dunnage Manufacturing in the Lake States
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- C-13 Lumber Used in Other Manufacturing in the Lake States
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Appendix C. Lake States Lumber Industry (continued)

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C-16	Residential Construction in Minnesota
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C-19	Lumber Used in New Mobile Homes in Michigan
C-20	Lumber Used in Single-family Home Construction in Wisconsin
C-21	Lumber Used in Multi-family Home Construction in Wisconsin
C-22	Lumber Used in New Mobile Homes in Wisconsin
C-23	Lumber Used in Single-family Home Construction in Minnesota
C-24	Lumber Used in Multi-family Home Construction in Minnesota
C-25	Lumber Used in New Mobile Homes in Minnesota
C-26	Lumber Used in Residential Alterations and Repairs in Michigan
C-27	Lumber Used in Residential Alterations and Repairs in Wisconsin
C-28	Lumber Used in Residential Alterations and Repairs in Minnesota
C-29	Lumber Used in Nonresidential Building Construction in Michigan
C-30	Lumber Used in Nonresidential Building Construction in Wisconsin
C-31	Lumber Used in Nonresidential Building Construction in Minnesota
C-32	Lumber Used in Furniture Manufacturing in Michigan
C-33	Lumber Used in Furniture Manufacturing in Wisconsin
C-34	Lumber Used in Furniture Manufacturing in Minnesota
C-35	Lumber Used in Pallet Manufacturing in Michigan
C-36	Lumber Used in Pallet Manufacturing in Wisconsin
C-37	Lumber Used in Pallet Manufacturing in Minnesota
C-38	Lumber Used in Container and Dunnage Manufacturing in Michigan
C-39	Lumber Used in Container and Dunnage Manufacturing in Wisconsin
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Appendix C. Lake States Lumber Industry (continued)

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C-41	Lumber Used in Other Manufacturing in Michigan
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C-45	Sawlog Production in Michigan by Species Group
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C-48	Sawlog Imports into Michigan by Species Group
C-49	Sawlog Exports from Michigan by Species Group
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C-51	Sawlog Production in Wisconsin by Species Group
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C-53	Sawlog Receipts in Wisconsin by Species Group
C-54	Sawlog Imports into Wisconsin by Species Group
C-55	Sawlog Exports from Wisconsin by Species Group
C-56	Sawlog Production in Minnesota by State of Destination
C-57	Sawlog Production in Minnesota by Species Group
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C-59	Sawlog Receipts in Minnesota by Species Group
C-60	Sawlog Imports into Minnesota by Species Group
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Appendix D. Lake States Plywood and Veneer Industry

Figure

- D-1 Hardwood Veneer Log Receipts in the Lake States
- D-2 Plywood and Veneer Consumption in the Lake States
- D-3 Lake States Plywood and Veneer Consumption by End Use
- D-4 Veneer Log Production and Receipts
- D-5 Veneer Log Production in the Lake States
- D-6 Veneer Log Receipts in the Lake States
- D-7 Veneer Log Production Lake States Species Groups
- D-8 Veneer Log Receipts Lake States Species Groups
- D-9 Veneer Log Imports and Exports to and from the Lake States
- D-10 Lake States Veneer Log Imports from other States and Canada
- D-11 Veneer Logs: Aspen; Lake States Production and Receipts
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- D-2 Plywood Used in Single-family Home Construction in the Lake States
- D-3 Plywood Used in Multi-family Home Construction in the Lake States
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- D-5 Plywood Used in Residential Alterations and Repairs in the Lake States
- D-6 Plywood Used in Nonresidential Building Construction in the Lake States
- D-7 Plywood and Veneer Used in Furniture Manufacturing in the Lake States
- D-8 Plywood and Veneer Used in Pallet Manufacturing in the Lake States
- D-9 Plywood and Veneer Used in Container and Dunnage Manufacturing in the Lake States

Appendix D. Lake States Plywood and Veneer Industry (continued)

Table

D-10	Plywood Used in Single-family Home Construction in Michigan
D-11	Plywood Used in Multi-family Home Construction in Michigan
D-12	Plywood Used in New Mobile Homes in Michigan
D-13	Plywood Used in Single-family Home Construction in Wisconsin
D-14	Plywood Used in Multi-family Home Construction in Wisconsin
D-15	Plywood Used in New Mobile Homes in Wisconsin
D-16	Plywood Used in Single-family Home Construction in Minnesota
D-17	Plywood Used in Multi-family Home Construction in Minnesota
D-18	Plywood Used in New Mobile Homes in Minnesota
D-19	Plywood Used in Residential Alterations and Repairs in Michigan
D-20	Plywood Used in Residential Alterations and Repairs in Wisconsin
D-21	Plywood Used in Residential Alterations and Repairs in Minnesota
D-22	Plywood Used in Nonresidential Building Construction in Michigan
D-23	Plywood Used in Nonresidential Building Construction in Wisconsin
D-24	Plywood Used in Nonresidential Building Construction in Minnesota
D-25	Plywood and Veneer Used in Furniture Manufacturing in Michigan
D-26	Plywood and Veneer Used in Furniture Manufacturing in Wisconsin
D-27	Plywood and Veneer Used in Furniture Manufacturing in Minnesota
D-28	Plywood and Veneer Used in Pallet Manufacturing in Michigan
D-29	Plywood and Veneer Used in Pallet Manufacturing in Wisconsin
D-30	Plywood and Veneer Used in Pallet Manufacturing in Minnesota
D-31	Plywood and Veneer Used in Container and Dunnage Manufacturing in Michigan
D-32	Plywood and Veneer Used in Container and Dunnage Manufacturing in Wisconsin
D-33	Plywood and Veneer Used in Container and Dunnage Manufacturing in Minnesota

Appendix D. Lake States Plywood and Veneer Industry (continued)

Table

D-34	Veneer Log Production in the Lake States
D-35	Lake States Veneer Log Production by Species Group
D-36	Veneer Log Receipts in the Lake States
D-37	Veneer Log Receipts in the Lake States by Species Group
D-38	Veneer Log Imports and Exports in the Lake States
D-39	Veneer Log Production in Michigan by State of Destination
D-40	Veneer Log Production in Michigan by Species Group
D-41	Veneer Log Receipts in Michigan by State of Origin
D-42	Veneer Log Receipts in Michigan by Species Group
D-43	Veneer Log Imports into Michigan by Species Group
D-44	Veneer Log Exports from Michigan by Species Group
D-45	Veneer Log Production in Wisconsin by State of Destination
D-46	Veneer Log Production in Wisconsin by Species Group
D-47	Veneer Log Receipts in Wisconsin by State of Origin
D-48	Veneer Log Receipts in Wisconsin by Species Group
D-49	Veneer Log Imports into Wisconsin by Species Group
D-50	Veneer Log Exports from Wisconsin by Species Group
D-51	Veneer Log Production in Minnesota by State of Destination
D-52	Veneer Log Production in Minnesota by Species Group
D-53	Veneer Log Receipts in Minnesota by State of Origin
D-54	Veneer Log Receipts in Minnesota by Species Group
D-55	Veneer Log Imports into Minnesota by Species Group
D-56	Veneer Log Exports from Minnesota by Species Group

Appendix E. Lake States Particleboard Industry

Figure

- E-1 Structural Panel Production in the Lake States
- E-2 Particleboard Productive-Capacity in the Lake States
- E-3 Lake States Particleboard Consumption by End Use

Table

- E-1 Structural Panel Production in the Lake States
- E-2 Particleboard Productive-Capacity in the Lake States
- E-3 Particleboard Used in Single-family Home Construction in the Lake States
- E-4 Particleboard Used in Multi-family Home Construction in the Lake States
- E-5 Particleboard Used in New Mobile Homes in the Lake States
- E-6 Particleboard Used in Furniture Manufacturing in the Lake States
- E-7 Particleboard Used in Single-family Home Construction in Michigan
- E-8 Particleboard Used in Multi-family Home Construction in Michigan
- E-9 Particleboard Used in New Mobile Homes in Michigan
- E-10 Particleboard Used in Single-family Home Construction in Wisconsin
- E-11 Particleboard Used in Multi-family Home Construction in Wisconsin
- E-12 Particleboard Used in New Mobile Homes in Wisconsin
- E-13 Particleboard Used in Single-family Home Construction in Minnesota
- E-14 Particleboard Used in Multi-family Home Construction in Minnesota
- E-15 Particleboard Used in New Mobile Homes in Minnesota
- E-16 Particleboard Used in Furniture Manufacturing in Michigan
- E-17 Particleboard Used in Furniture Manufacturing in Wisconsin
- E-18 Particleboard Used in Furniture Manufacturing in Minnesota

Appendix F. Lake States Fuelwood

Table

F-1 Residential Fuelwood Consumption in the Lake States

FIGURE A-1

FIGURE A-2

FIGURE A-3

FIGURE A-4

FIGURE A-5

FIGURE A-6

FIGURE A-7

Forest Land Area in the Lake States by Land Class
(in million acres)

Forest Land Class	MI	MN	WI	Lake States
	(1)	(2)	(3)	
Commercial	17.5	13.7	14.5	45.7
Noncommercial				
Unproductive	0.3	1.8	0.4	2.5
Productive- Reserved	0.6	1.2	0.0	1.8
Total	18.4	16.7	14.9	50.0

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
 (2) Minnesota Forest Statistics, 1977. NC-53
 (3) An Analysis of the Timber Situation in the
 U.S. 1982. For. Res. Rep. 23.

TABLE A-1

Commercial Forest Land Ownership in the Lake States
(in million acres)

Ownership	MI	MN	WI	Lake States
	(1)	(2)	(3)	
County/Municipal	0.2	2.3	2.4	4.9
State	3.6	2.7	0.6	6.8
Federal	2.5	2.3	1.8	6.6
Industry	2.0	0.8	1.2	3.9
Farm/Nonindustrial Private	9.2	5.6	8.6	23.5
Total	17.5	13.7	14.5	45.6

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
 (2) Minnesota Forest Statistics, 1977. NC-53
 (3) An Analysis of the Timber Situation in the
 U.S. 1982. For. Res. Rep. 23.

TABLE A-2

Lake States Forest Types on Commercial Forest Land
(in million acres)

Forest Type	MI	MN	WI	Lake States
-----	-----	-----	-----	-----
	(1)	(2)	(3)	
Pine	1.7	0.8	1.2	3.7
Spruce-Fir	2.5	2.9	1.3	6.8
Oak-Hickory	1.8	0.9	2.7	5.3
Elm-Ash- Cottonwood	1.3	0.7	1.2	3.2
Maple-Beech- Birch	6.1	1.3	3.6	10.9
Aspen-Birch	3.8	6.9	4.2	14.8
Nonstocked	0.3	0.2	0.3	0.8

Total	17.5	13.7	14.5	45.6

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
(2) Minnesota Forest Statistics, 1977. NC-53
(3) A Simulated Inventory Update: Wisconsin's
1979 Timber Resource. NC-209.

TABLE A-3

Lake States Commercial Forest Land Area
by Stand-Age Class
(in million acres)

Age Class	MI	MN	WI	Lake States
-----	-----	-----	-----	-----
	(1)	(2)	(3)	
1 to 10	2.0	1.2	1.2	4.4
11 to 20	1.9	1.2	1.0	4.1
21 to 30	1.0	1.0	1.3	3.3
31 to 40	1.5	1.8	1.5	4.8
41 to 50	2.3	2.6	2.6	7.5
51 to 60	2.3	2.3	2.2	6.9
61 to 70	1.5	1.3	1.5	4.2
71 to 80	1.2	0.8	0.9	2.8
81 to 90	1.1	0.6	0.6	2.2
91 to 100	0.8	0.5	0.5	1.8
101 to 120	1.2	0.3	0.8	2.3
121 to 140	0.5	0.2	0.3	1.0
141 +	0.2	0.0	0.0	0.2

* "0.0" means less than 50 thousand cubic feet.

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
(2) Minnesota Forest Statistics, 1977. NC-53
(3) A Simulated Inventory Update: Wisconsin's
1979 Timber Resource. NC-209.

TABLE A-4

Lake States Commercial Forest Land Area by Site Class
(in million acres)

Site Class	MI	MN	WI	Lake States
-----	-----	-----	-----	-----
	(1)	(2)	(3)	
20 to 49	6.7	6.5	7.7	20.8
50 to 84	6.9	5.0	5.2	17.1
85 to 119	3.5	2.0	1.5	7.0
120 to 164	0.5	0.2	0.2	0.8

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
 (2) Minnesota Forest Statistics, 1977. NC-53
 (3) Wisconsin's 1968 Timber Resource: A
 Perspective. NC-15.

TABLE A-5

Net Volume of Growing-Stock in the Lake States
by Ownership and Species Group
(in billion cubic feet)

Ownership	MI	MN	WI	Lake States
-----	-----	-----	-----	-----
	(1)	(2)	(3)	
County/Municipal				
softwood	0.1	0.6	0.6	1.2
hardwood	0.1	1.5	1.5	3.1
State				
softwood	1.3	0.8	0.2	2.3
hardwood	2.2	1.1	0.3	3.7
Federal				
softwood	1.1	1.1	0.8	3.0
hardwood	1.8	1.3	1.5	4.6
Industry				
softwood	0.8	0.3	0.4	1.4
hardwood	1.7	0.4	0.9	2.9
Farm/Nonindustrial				
Private				
softwood	2.1	0.8	1.6	4.4
hardwood	8.0	3.7	6.7	18.5

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
 (2) Minnesota Forest Statistics, 1977. NC-53
 (3) Wisconsin's 1968 Timber Resource: A
 Perspective. NC-15.

TABLE A-6

Net Volume of Growing-Stock in the Lake States
by Forest Type
(in billion cubic feet)

Forest Type	MI	MN	WI	Lake States
	(1)	(2)	(3)	
Pine	1.6	1.0	1.2	3.8
Spruce-Fir	2.6	1.8	1.2	5.5
Oak-Hickory	2.0	0.8	2.1	4.9
Elm-Ash- Cottonwood	1.3	0.6	1.1	2.9
Maple-Beech- Birch	8.1	1.2	4.3	13.5
Aspen-Birch	3.6	5.6	2.9	12.1
Nonstocked	0.1	0.0	0.0	0.1
Total	19.1	11.0	12.7	42.8

* "0.0" means less than 50 thousand cubic feet.

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
(2) Minnesota Forest Statistics, 1977. NC-53
(3) A Simulated Inventory Update: Wisconsin's
1979 Timber Resource. NC-209.

TABLE A-7

Net Volume of Growing-Stock in the Lake States
by Species Group
(in billion cubic feet)

Species Group	MI	MN	WI	Lake States
	(1)	(2)	(3)	
Softwoods	5.4	3.5	3.3	12.2
Hardwoods	13.8	8.0	10.1	31.9
Total	19.1	11.5	13.5	44.0

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
(2) Minnesota Forest Statistics, 1977. NC-53
(3) An Analysis of the Timber Situation in the
U.S. 1982. For. Res. Rep. 23.

TABLE A-8

Net Volume of Growing-Stock in the Lake States
by Diameter Class
(in billion cubic feet)

Diameter Class	MI	MN	WI	Lake States
	(1)	(2)	(3)	
5 to 6.9	3.5	2.2	2.7	8.4
7 to 8.9	4.0	2.8	2.5	9.2
9 to 10.9	3.5	2.4	1.9	7.9
11 to 12.9	2.6	1.7	1.3	5.6
13 to 14.9	1.9	1.0	0.9	3.8
15 to 16.9	1.3	0.6	0.7	2.6
17 to 18.9	0.9	0.4	0.5	1.7
19 to 20.9	0.5	0.2	0.3	1.0
21 to 22.9	0.3	0.1	0.2	0.6
23 to 28.9	0.4	0.2	0.3	0.8
29 +	0.1	0.1	0.1	0.2

Sources: (1) Michigan Forest Statistics, 1980. NC-67.
(2) Minnesota Forest Statistics, 1977. NC-53
(3) Wisconsin's 1968 Timber Resource: A
Perspective. NC-15.

TABLE A-9

FIGURE B-1

FIGURE B-2

FIGURE B-3

FIGURE B-4

LAKE STATES WOODPULP PRODUCTION AND CONSUMPTION

FIGURE B-5

WOODPULP PRODUCTION IN THE LAKE STATES

FIGURE B-6

FIGURE B-7

FIGURE B-8

FIGURE B-9

FIGURE B-10

FIGURE B-11

FIGURE B-12

FIGURE B-13

FIGURE B-14

FIGURE B-15

FIGURE B-16

FIGURE B-17

FIGURE B-18

FIGURE B-19

FIGURE B-20

Paper and Board
Production and Consumption in the Lake States
(in thousand short tons)

Year	Production (1)	Consumption (2)
1982		
1981		
1980		
1979	7846	5564
1978	8580	5779
1977	7793	5664
1976	7337	5432
1975	NA	5183
1974	6182	4559
1973	7344	
1972	7563	
1971	7155	
1970	6527	4849
1969	6762	
1968	6404	
1967	6118	
1966	6397	
1965	6134	
1964	5770	
1963	5369	
1962	5184	
1961	4931	
1960	4978	3296

(1) Paper and board production based on Bureau of Census, Current Industrial Report, Series M26A.

(2) This estimate is based on per capita paper and board consumption as shown in USDA Forest Service Misc. Pub. 1424, p. 63.

TABLE B-1

Woodpulp Production and Consumption in the Lake States
(in thousand short tons)

Year	Production	Consumption
1982	(1) 3189	4482
1981	3426	4911
1980	3555	5209
1979	3593	5539
1978	3355	4983
1977	3265	4820
1976	3201	4732
1975	2802	4207
1974	3287	(1) 5081
1973	3005	5046
1972	2972	4827
1971	2921	4550
1970	2838	4503
1969	2982	4712
1968	2641	4042
1967	2652	4076
1966	2762	3894
1965	2750	3830
1964	(1) 2766	3762
1963	2550	
1962	2507	
1961	2421	
1960	2394	

(1) Minnesota's production data was not disclosed for these years, nor was consumption data prior to 1974; therefore, West North Central data represents Minnesota.

Source: Bureau of Census, Current Industrial Reports, Series M26A.

TABLE B-2

Wastepaper Utilization
by Paper and Board Mills
in the Lake States
(in thousand short tons)

Year	Paper & Board Produced	Utili- zation Rate(1)	Waste- paper Used
1981	NA	23.9	NA
1980	7846	23.4	1836
1979	8580	23.8	2042
1978	7793	23.7	1847
1977	7337	23.3	1710
1976	NA	23.3	NA
1975	6182	22.9	1416
1974	7344	23.6	1733
1973	7563	23.5	1777
1972	7155	22.5	1610
1971	6705	22.8	1529
1970	6527	22.8	1488

(1) The Utilization Rate equals the ratio of recyclable paper consumption to total production of paper and board.

Source: Statistics of Paper, Paperboard and Woodpulp, American Paper Institute.

TABLE B-3

Paper and Board
Production and Consumption
in Michigan
(in thousand short tons)

Year	PRODUCTION			CONSUMPTION		
	Paper	Board: (1) All Grades	Total	(2) Per Capita (lbs)	Resid. Popul. (1000)	Total
1982	913	(D)	(D)		9109	
1981	1177	(D)	(D)		9215	
1980	1115	1289	2404	616	9255	2851
1979	1290	1248	2538	644	9249	2978
1978	1261	1281	2542	635	9202	2922
1977	1141	1300	2441	612	9157	2802
1976	NA	NA	NA	587	9117	2676
1975	829	1026	1855	518	9108	2359
1974	1133	1341	2474	605		
1973	1134	1456	2590	631		
1972	998	1416	2414	615		
1971	892	1383	2275	575		
1970	955	1280	2235	566	8895	2517
1969	949	1356	2305	582		
1968	910	1319	2229	556		
1967	822	1391	2213	524		
1966	925	1455	2380	537		
1965	885	1403	2288	507		
1964	818	1340	2158	485		
1963	802	1197	1999	464		
1962	789	1147	1936	454		
1961	748	1080	1828	440		
1960	731	1112	1843	434	7823	1698

(1) Board: All Grades equals the total production of Paperboard, Wet Machine Board, and Construction Paper and Board.

(2) This is an estimate of per capita paper and board consumption as shown in USDA Forest Service Misc. Pub. 1424 p. 63.

Bureau of Census, Current Industrial Report, Series M26A.

TABLE B-4

Paper and Board
Production and Consumption
in Wisconsin
(in thousand short tons)

Year	PRODUCTION			CONSUMPTION		
	Paper	Board: (1) All Grades	Total	(2) Per Capita (lbs)	Resid. Popul. (1000)	Total
1982	3459				4765	
1981	3582	537	4119		4740	
1980	3491	668	4159	616	4728	1456
1979	3594	768	4362	644	4660	1501
1978	3151	656	3807	635	4631	1470
1977	2899	533	3432	612	4613	1412
1976	NA	NA	NA	587	4585	1346
1975	2657	445	3102	518	4570	1184
1974	3015	559	3574	605		
1973	3045	622	3667	631		
1972	2817	640	3457	615		
1971	2621	612	3233	575		
1970	2550	580	3130	566	4426	1253
1969	2717	575	3292	582		
1968	2438	589	3027	556		
1967	2302	531	2833	524		
1966	2339	581	2920	537		
1965	2221	566	2787	507		
1964	2080	544	2624	485		
1963	1942	519	2461	464		
1962	1840	515	2355	454		
1961	1766	487	2253	440		
1960	1763	462	2225	434	3952	858

(1) Board: All Grades equals the total production of Paperboard, Wet Machine Board, and Construction Paper and Board.

(2) This is an estimate of per capita paper and board consumption as shown in USDA Forest Service Misc. Pub. 1424, p. 63.

Bureau of Census, Current Industrial Report, Series M26A.

TABLE B-5

Paper and Board
Production and Consumption
in Minnesota
(in thousand short tons)

Year	PRODUCTION			CONSUMPTION		
	Paper	Board: (1) All Grades	Total	(2) Per Capita (lbs)	Resid. Popul. (1000)	Total
1982	856	(D)	(D)		4133	
1981	816	(D)	(D)		4113	
1980	(D)	(D)	1283	616	4083	1258
1979	(D)	(D)	1680	644	4038	1300
1978	(D)	(D)	1444	635	4005	1272
1977	808	656	1464	612	3980	1218
1976	NA	NA	NA	587	3957	1161
1975	620	605	1225	518	3926	1017
1974	664	632	1296	605		
1973	652	654	1306	631		
1972	657	627	1284	615		
1971	606	591	1197	575		
1970	609	553	1162	566	3814	1079
1969	608	557	1165	582		
1968	574	574	1148	556		
1967	546	526	1072	524		
1966	530	567	1097	537		
1965	484	575	1059	507		
1964	453	535	988	485		
1963	415	494	909	464		
1962	405	488	893	454		
1961	367	483	850	440		
1960	374	536	910	434	3414	741

(1) Board: All Grades equals the total production of Paperboard, Wet Machine Board, and Construction Paper and Board.

(2) This is an estimate of per capita paper and board consumption as shown in USDA Forest Service Misc. Pub. 1424 p. 63.

Bureau of Census, Current Industrial Report, Series M26A.

TABLE B-6

Woodpulp
Production and Consumption
in Michigan
(in thousand short tons)

Year	PRODUCTION		CONSUMPTION		Total
	Total	Own	Purchase	Total	
1982	849	615	463	1078	
1981	967	738	488	1226	
1980	958	885	645	1530	
1979	955	905	734	1639	
1978	923	882	545	1427	
1977	862	834	466	1300	
1976	805	774	466	1240	
1975	649	672	387	1059	
1974	873	902	531	1433	
1973	594	865	534	1399	
1972	615	807	517	1324	
1971	573	789	415	1204	
1970	587	839	425	1264	
1969	589	850	475	1325	
1968	496	757	367	1124	
1967	576	835	340	1175	
1966	590	763	443	1206	
1965	606	806	398	1204	
1964	570	727	407	1134	
1963	549				
1962	500				
1961	477				
1960	515				

Bureau of Census, Current Industrial Reports, Series M26A.

TABLE B-7

Woodpulp
Production and Consumption
in Wisconsin
(in thousand short tons)

Year	PRODUCTION		CONSUMPTION		Total
	Total	Own	Purchase	Total	
1982	1541	1778	735	2513	
1981	1688	1910	817	2727	
1980	1750	1655	979	2634	
1979	1711	1825	975	2800	
1978	1486	1625	805	2430	
1977	1471	1637	774	2411	
1976	1489	1622	804	2426	
1975	1363	1530	705	2235	
1974	1537	1693	880	2573	
1973	1619	1818	886	2704	
1972	1596	1758	793	2551	
1971	1610	1779	652	2431	
1970	1545	1700	659	2359	
1969	1657	1816	646	2462	
1968	1444	1638	589	2227	
1967	1424	1550	559	2109	
1966	1471	1633	472	2105	
1965	1448	1606	435	2041	
1964	1407	1515	384	1899	
1963	1400				
1962	1340				
1961	1290				
1960	1257				

Bureau of Census, Current Industrial Reports, Series M26A.

TABLE B-8

Woodpulp
Production and Consumption
in Minnesota
(in thousand short tons)

Year	PRODUCTION		CONSUMPTION		Total
	Total	Own	Purchase	Total	
1982	(1)799	(D)	(D)	891	
1981	771	(D)	(D)	958	
1980	847	819	226	1045	
1979	927	899	201	1100	
1978	946	941	185	1126	
1977	932	916	194	1109	
1976	907	899	167	1066	
1975	790	773	140	913	
1974	877	(1)908	(1)167	1075	
1973	792	(1)836	(1)108	943	
1972	761	(1)859	(1)93	952	
1971	738	(1)791	(1)124	915	
1970	706	(1)755	(1)124	880	
1969	736	(1)796	(1)129	925	
1968	701	(1)576	(1)115	691	
1967	652	(1)687	(1)106	792	
1966	701	(1)479	(1)104	583	
1965	696	(1)482	(1)103	585	
1964	(1)789	636	93	729	
1963	601				
1962	667				
1961	654				
1960	622				

(1) Minnesota's figures were not disclosed in these categories; therefore, West North Central figures are shown, in which Minnesota represents a large share.

Bureau of Census, Current Industrial Reports, Series M26A.

TABLE B-9

Wastepaper Utilization
by Paper and Board Mills
in Michigan
(in thousand short tons)

Year	Paper & Board Produced	Utili- zation Rate(1)	Waste- paper Used
1981	(D)	23.9	NA
1980	2404	23.4	563
1979	2538	23.8	604
1978	2542	23.7	602
1977	2441	23.3	569
1976	NA	23.3	NA
1975	1855	22.9	425
1974	2474	23.6	584
1973	2590	23.5	609
1972	2414	22.5	543
1971	2275	22.8	519
1970	2235	22.8	510

(1) The Utilization Rate equals the ratio of recyclable paper consumption to total production of paper and board.

Statistics of Paper, Paperboard and Woodpulp, American Paper Institute.

TABLE B-10

Wastepaper Utilization
by Paper and Board Mills
in Wisconsin
(in thousand short tons)

Year	Paper & Board Produced	Utili- zation Rate(1)	Waste- paper Used
1981	4119	23.9	984
1980	4159	23.4	973
1979	4362	23.8	1038
1978	3807	23.7	902
1977	3432	23.3	800
1976	NA	23.3	NA
1975	3102	22.9	710
1974	3574	23.6	843
1973	3667	23.5	862
1972	3457	22.5	778
1971	3233	22.8	737
1970	3130	22.8	714

(1) The Utilization Rate equals the ratio of recyclable paper consumption to total production of paper and board.

Statistics of Paper, Paperboard and Woodpulp, American Paper Institute.

TABLE B-11

Wastepaper Utilization
by Paper and Board Mills
in Minnesota
(in thousand short tons)

Year	Paper & Board Produced	Utili- zation Rate(1)	Waste- paper Used
1981	(D)	23.9	NA
1980	1283	23.4	300
1979	1680	23.8	400
1978	1444	23.7	342
1977	1464	23.3	341
1976	NA	23.3	NA
1975	1225	22.9	281
1974	1296	23.6	306
1973	1306	23.5	307
1972	1284	22.5	289
1971	1197	22.8	273
1970	1162	22.8	265

(1) The Utilization Rate equals the ratio of recyclable paper consumption to total production of paper and board.

Statistics of Paper, Paperboard and Woodpulp, American Paper Institute.

TABLE B-12

Pulpwood Production in the Lake States
(all wood, in thousand standard cords)

Year	MI	WI	MN	Total
1982	1750	2286	1484	5520
1981	1837	2389	1370	5596
1980	1969	2362	1333	5664
1979	1980	2109	1459	5548
1978	1675	1895	1338	4908
1977	1595	1816	1333	4744
1976	1541	1840	1308	4689
1975	1281	1505	1359	4145
1974	1842	2053	1578	5473
1973	1586	1758	1377	4721
1972	1396	1537	1354	4287
1971	1267	1552	1196	4015
1970	1406	1656	1224	4286
1969	1302	1450	1192	3944
1968	1168	1297	1087	3552
1967	1344	1416	1205	3965
1966	1570	1536	1174	4280
1965	1365	1253	1018	3636
1964	1321	1244	1062	3627
1963	1297	1302	1063	3662
1962	1223	1141	978	3342
1961	1107	1078	968	3153
1960	1237	1052	1048	3337

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

TABLE B-13

Pulpwood Production in the Lake States by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	881	759	2382	1042	5063	457	5520
1981	751	680	2418	1190	5039	557	5596
1980	763	776	2277	1309	5125	539	5664
1979	836	664	2298	1195	4992	555	5548
1978	786	661	1959	1021	4427	481	4908
1977	702	679	1925	936	4242	602	4744
1976	710	661	1857	1006	4234	455	4689
1975	646	754	1640	638	3677	468	4145
1974	760	696	2307	1196	4959	514	5473
1973	640	607	2037	976	4260	461	4721
1972	690	546	1902	797	3935	352	4287
1971	717	493	1891	605	3706	309	4015
1970	720	592	1967	659	3938	348	4286
1969	660	479	1963	555	3657	287	3944
1968	607	484	1753	449	3293	259	3552
1967	569	666	1976	539	3750	215	3965
1966	721	666	2198	520	4105	175	4280
1965	611	657	1780	444	3492	144	3636
1964	570	707	1729	493	3499	128	3627
1963	552	782	1708	488	3530	132	3662
1962	573	696	1579	430	3278	64	3342
1961	515	757	1457	382	3111	42	3153
1960	537	841	1601	324	3303	33	3337

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

TABLE B-14

Pulpwood Receipts in the Lake States
(all wood, in thousand standard cords)

Year	MI	WI	MN	Total
1982	1388	2978	1298	5664
1981	1448	3154	1164	5766
1980	1493	3266	1097	5856
1979	1491	3067	1295	5853
1978	1332	2676	1218	5226
1977	1231	2596	1209	5036
1976	1115	2713	1177	5005
1975	843	2344	1226	4413
1974	1324	3135	1392	5851
1973	1198	2696	1222	5116
1972	931	2450	1224	4605
1971	699	2581	1064	4344
1970	806	2821	1058	4685
1969	772	2513	1082	4367
1968	774	2226	992	3992
1967	773	2729	958	4460
1966	1003	2701	1140	4844
1965	825	2290	912	4027
1964	791	2271	938	4000
1963	742	2429	921	4092
1962	679	2124	828	3631
1961	700	1972	784	3456
1960	810	2115	787	3712

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-15

Pulpwood Receipts in the Lake States by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	882	735	2370	1042	5029	637	5666
1981	763	650	2393	1186	4992	775	5767
1980	782	722	2257	1306	5067	789	5856
1979	886	659	2258	1186	4989	863	5852
1978	827	658	1958	1010	4453	772	5225
1977	738	691	1909	931	4269	771	5040
1976	756	697	1852	1002	4307	698	5005
1975	701	794	1639	634	3768	647	4415
1974	826	745	2308	1198	5077	774	5851
1973	676	710	2027	959	4372	744	5116
1972	736	631	1910	796	4073	533	4606
1971	783	570	1894	607	3854	491	4345
1970	838	685	1977	659	4159	525	4684
1969	803	581	1969	557	3910	457	4367
1968	744	645	1764	449	3602	392	3994
1967	712	884	1990	543	4129	332	4461
1966	823	955	2225	513	4516	251	4767
1965	729	861	1797	431	3818	209	4027
1964	670	911	1739	484	3804	198	4002
1963	688	1014	1722	481	3905	188	4093
1962	681	840	1589	422	3532	100	3632
1961	626	967	1467	372	3432	24	3456
1960	680	1073	1624	320	3697	15	3712

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-16

Lake States Pulpwood Imports and Exports
(all wood, in thousand standard cords)

Year	IMPORTS			EXPORTS
	Other States	Canada	Total	Outside Region
1982	147	53	200	56
1981	180	90	270	101
1980	203	110	313	121
1979	309	113	422	118
1978	272	109	381	64
1977	255	110	365	71
1976	236	132	368	53
1975	205	95	300	31
1974	294	132	426	48
1973	332	150	482	84
1972	244	118	362	48
1971	246	126	372	43
1970	260	181	441	43
1969	268	207	475	52
1968	231	254	485	44
1967	239	292	531	36
1966	264	332	596	32
1965	136	298	434	44
1964	135	271	406	32
1963	153	309	462	32
1962	108	206	314	26
1961	44	303	347	43
1960	82	347	429	54

Source: Pulpwood Production in the North-Central Region by county, NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-17

Lake States Pulpwood Production
for Flakeboard Plants
(in thousand cords)

ROUNDWOOD	1981	1982
Aspen	382	554
Other species	54	48
RESIDUE	60	73
TOTAL	496	675

Source: Pulpwood Production in the North Central Region by County NCFES Res. Bull. NC-79, 1984.

(1) Flakeboard production equals particleboard production as defined in this study.

TABLE B-18

Pulpwood Production in Michigan by State of Destination
(all wood, in thousand standard cords)

Year	EXPORTS				Total
	MI	WI	MN	Outside Region	
1982	1341	396	0	15	1752
1981	1402	419	0	17	1838
1980	1442	490	0	36	1968
1979	1428	516	0	37	1981
1978	1248	404	0	23	1675
1977	1158	407	0	29	1594
1976	1081	434	0	26	1541
1975	814	449	0	17	1280
1974	1290	534	0	19	1843
1973	1131	418	0	36	1585
1972	917	470	0	14	1401
1971	688	567	0	12	1267
1970	785	610	0	11	1406
1969	752	537	0	13	1302
1968	702	455	0	11	1168
1967	684	660	0	0	1344
1966	901	666	1	2	1570
1965	750	608	0	7	1365
1964	730	588	0	3	1321
1963	664	628	0	0	1292
1962	677	540	0	7	1224
1961	628	464	0	14	1106
1960	727	510	0	0	1237

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-19

Pulpwood Production in Michigan by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	243	269	632	485	1629	121	1750
1981	217	224	652	578	1671	166	1837
1980	250	256	705	605	1816	153	1969
1979	341	188	709	564	1802	178	1980
1978	266	197	586	479	1528	147	1675
1977	249	227	532	395	1403	192	1595
1976	267	206	491	389	1353	188	1541
1975	228	181	436	254	1099	182	1281
1974	250	182	706	508	1646	196	1842
1973	203	178	603	426	1410	176	1586
1972	228	151	529	345	1253	143	1396
1971	235	142	547	220	1144	123	1267
1970	240	189	596	229	1254	152	1406
1969	207	148	606	219	1180	122	1302
1968	205	148	541	184	1078	90	1168
1967	193	227	646	210	1276	68	1344
1966	250	262	776	207	1495	75	1570
1965	224	205	704	181	1314	51	1365
1964	198	217	675	184	1274	47	1321
1963	174	274	662	154	1264	33	1297
1962	184	251	601	165	1201	22	1223
1961	156	260	558	112	1086	21	1107
1960	188	295	669	83	1235	2	1237

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

TABLE B-20

Pulpwood Receipts in Michigan by State of Origin
(all wood, in thousand standard cords)

Year	MI	IMPORTS				Total
		WI	MN	Other States	Canada	
1982	1341	28	0	16	3	1388
1981	1402	26	0	16	4	1448
1980	1442	35	0	13	3	1493
1979	1428	47	0	14	2	1491
1978	1248	70	0	10	4	1332
1977	1158	64	0	9	0	1231
1976	1081	24	0	7	3	1115
1975	814	19	0	10	0	843
1974	1290	25	0	9	0	1324
1973	1131	55	0	12	0	1198
1972	917	2	0	12	0	931
1971	688	0	0	11	0	699
1970	785	10	0	10	1	806
1969	752	9	0	9	2	772
1968	702	4	0	7	61	774
1967	684	0	0	4	85	773
1966	901	3	0	2	97	1003
1965	750	1	0	0	74	825
1964	730	2	0	0	59	791
1963	669	2	0	0	71	742
1962	677	1	1	0	0	679
1961	628	1	0	0	71	700
1960	727	0	0	0	83	810

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-21

Pulpwood Receipts in Michigan by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	198	202	493	379	1272	116	1388
1981	170	160	486	467	1283	165	1448
1980	188	156	525	467	1336	157	1493
1979	217	122	526	428	1293	197	1490
1978	208	143	423	382	1156	176	1332
1977	197	160	370	316	1043	190	1233
1976	202	104	327	310	943	171	1114
1975	162	57	288	204	711	133	844
1974	151	85	481	447	1164	160	1324
1973	134	91	404	414	1043	154	1197
1972	127	70	322	317	836	96	932
1971	115	39	298	187	639	62	701
1970	152	51	332	182	717	88	805
1969	116	38	358	173	685	86	771
1968	133	99	328	158	718	56	774
1967	117	129	323	167	736	37	773
1966	143	127	526	167	963	41	1004
1965	114	110	436	147	807	18	825
1964	107	107	429	146	789	3	792
1963	84	127	399	132	742	0	742
1962	97	64	387	131	679	0	679
1961	109	143	351	97	700	0	700
1960	128	181	431	70	810	0	810

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-22

Pulpwood Imports into Michigan by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	3	2	0	0	5	42	47
1981	3	3	0	0	6	40	46
1980	2	5	0	1	8	43	51
1979	3	12	1	1	17	45	62
1978	9	20	1	3	33	51	84
1977	15	24	1	3	43	31	74
1976	5	1	1	5	12	22	34
1975	2	4	3	3	12	17	29
1974	1	3	5	12	21	13	34
1973	1	3	5	29	38	30	68
1972	0	0	0	2	2	11	13
1971	0	1	0	0	1	11	12
1970	0	2	1	0	3	18	21
1969	0	1	2	0	3	15	18
1968	0	60	4	0	64	7	71
1967	0	82	4	0	86	4	90
1966	0	76	25	1	102	1	103
1965	0	64	10	0	74	0	74
1964	0	57	4	0	61	0	61
1963	0	68	5	0	73	0	73
1962	0	1	1	0	2	0	2
1961	0	71	0	0	71	0	71
1960	0	72	11	0	83	0	83

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-23

Pulpwood Exports from Michigan by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	48	69	139	107	363	47	410
1981	50	67	167	111	395	41	436
1980	64	105	180	139	488	39	527
1979	127	79	184	138	528	26	554
1978	68	74	164	99	405	22	427
1977	68	91	163	81	403	33	436
1976	71	103	165	82	421	39	460
1975	68	129	150	52	399	67	466
1974	100	100	230	74	504	49	553
1973	70	88	204	40	402	52	454
1972	102	86	207	31	426	58	484
1971	120	90	249	33	492	72	564
1970	88	140	265	47	540	82	622
1969	91	112	250	47	500	51	551
1968	72	110	217	26	425	41	466
1967	76	179	327	44	626	34	660
1966	108	210	276	40	634	35	669
1965	110	160	278	34	582	33	615
1964	90	169	249	39	547	44	591
1963	90	215	269	22	596	33	629
1962	86	189	215	35	525	22	547
1961	47	188	208	14	457	21	478
1960	59	185	250	14	508	2	510

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-24

Pulpwood Production in Wisconsin by State of Destination
(all wood, in thousand standard cords)

Year	EXPORTS				Total
	WI	MN	MI	Outside Region	
1982	2231	26	28	0	2286
1981	2320	34	26	9	2389
1980	2298	18	35	12	2362
1979	2024	21	47	18	2109
1978	1779	26	70	20	1895
1977	1714	26	64	12	1816
1976	1784	23	24	9	1840
1975	1460	20	19	6	1505
1974	2004	14	25	10	2053
1973	1671	14	55	18	1758
1972	1493	28	2	14	1437
1971	1502	35	0	15	1552
1970	1627	11	10	8	1656
1969	1412	17	9	12	1450
1968	1259	22	4	12	1297
1967	1387	15	0	14	1416
1966	1501	13	3	19	1536
1965	1225	8	1	19	1253
1964	1207	19	2	16	1244
1963	1262	20	2	18	1302
1962	1114	15	1	10	1140
1961	1050	14	1	14	1078
1960	1008	19	0	25	1052

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-25

Pulpwood Production in Wisconsin by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	473	193	884	494	2043	243	2286
1981	398	187	965	548	2098	291	2389
1980	369	190	873	641	2073	289	2362
1979	341	165	751	593	1849	259	2109
1978	339	169	669	494	1671	224	1895
1977	283	154	696	486	1619	297	1816
1976	274	166	693	539	1672	168	1840
1975	227	186	588	327	1327	178	1505
1974	278	164	797	608	1847	206	2053
1973	232	116	761	472	1581	177	1758
1972	246	106	684	380	1416	121	1537
1971	268	111	736	320	1435	117	1552
1970	259	141	771	372	1543	113	1656
1969	216	116	697	301	1330	120	1450
1968	199	111	629	241	1180	117	1297
1967	174	105	739	287	1305	111	1416
1966	215	145	810	281	1451	85	1536
1965	206	129	608	222	1165	88	1253
1964	168	132	603	265	1168	76	1244
1963	170	138	613	283	1204	98	1302
1962	188	110	572	229	1099	42	1141
1961	154	138	530	235	1057	21	1078
1960	124	126	540	230	1020	31	1052

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

TABLE B-26

Pulpwood Receipts in Wisconsin by State of Origin
(all wood, in thousand standard cords)

Year	IMPORTS					Total
	WI	MN	MI	Other States	Canada	
1982	2231	179	396	131	42	2978
1981	2320	177	419	164	75	3154
1980	2298	216	490	170	92	3266
1979	2024	169	516	266	92	3067
1978	1779	162	404	242	88	2676
1977	1714	154	407	227	95	2596
1976	1784	182	434	203	110	2713
1975	1460	178	449	177	80	2344
1974	2004	262	534	269	67	3135
1973	1671	194	418	291	123	2696
1972	1493	166	470	230	92	2450
1971	1502	188	567	234	90	2581
1970	1627	219	610	249	115	2821
1969	1412	188	537	257	119	2513
1968	1259	166	455	223	124	2226
1967	1387	299	660	234	149	2729
1966	1501	193	666	185	156	2701
1965	1225	159	608	135	163	2290
1964	1207	193	588	135	149	2271
1963	1262	221	628	153	165	2429
1962	1114	216	540	108	146	2124
1961	1050	240	464	44	174	1972
1960	1008	308	510	82	207	2115

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

TABLE B-27

Pulpwood Receipts in Wisconsin by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	544	305	1092	606	2547	431	2978
1981	488	307	1182	666	2643	511	3154
1980	495	338	1119	792	2744	522	3266
1979	544	274	999	727	2544	524	3068
1978	472	275	888	595	2230	446	2676
1977	402	292	915	564	2173	424	2597
1976	423	373	926	617	2339	374	2713
1975	377	419	791	376	1963	381	2344
1974	490	416	1109	674	2689	446	3135
1973	387	410	1005	466	2268	428	2696
1972	443	364	902	402	2111	339	2450
1971	514	375	1011	348	2248	333	2581
1970	498	481	1088	413	2480	341	2821
1969	456	426	978	341	2201	313	2514
1968	405	420	860	264	1949	278	2227
1967	416	590	1116	349	2471	259	2730
1966	473	613	1112	314	2512	189	2701
1965	410	553	899	245	2107	183	2290
1964	350	583	855	295	2083	189	2272
1963	414	653	877	299	2243	187	2430
1962	395	591	784	255	2025	100	2125
1961	330	637	741	240	1948	24	1972
1960	388	688	785	239	2100	15	2115

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

TABLE B-28

Pulpwood Imports into Wisconsin by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	80	114	226	114	534	212	746
1981	96	122	249	122	589	246	835
1980	129	152	264	156	701	267	968
1979	205	122	266	143	736	308	1044
1978	142	131	233	112	618	279	897
1977	134	162	231	85	612	271	883
1976	154	208	245	85	692	236	928
1975	152	238	216	55	661	224	885
1974	214	255	318	80	867	264	1131
1973	157	295	252	32	736	290	1026
1972	197	259	242	30	728	230	958
1971	246	265	296	33	840	239	1079
1970	239	339	322	46	946	248	1194
1969	240	310	290	46	886	216	1102
1968	206	309	243	27	785	183	968
1967	242	484	378	67	1171	172	1343
1966	257	468	310	40	1075	125	1200
1965	204	423	294	34	955	110	1065
1964	183	449	269	39	940	123	1063
1963	245	515	285	22	1067	101	1168
1962	208	481	228	35	952	59	1011
1961	176	500	225	15	916	7	923
1960	265	562	263	14	1104	3	1107

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

TABLE B-29

Pulpwood Exports from Wisconsin by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	9	3	18	2	32	23	55
1981	5	3	32	4	44	25	69
1980	3	5	18	4	30	34	64
1979	3	12	18	9	42	43	85
1978	9	25	14	11	59	57	116
1977	15	24	13	7	59	44	103
1976	5	1	12	8	26	30	56
1975	2	5	13	4	24	21	45
1974	1	2	6	16	25	25	50
1973	1	3	7	37	48	39	87
1972	0	0	25	8	33	11	44
1971	0	0	22	5	27	23	50
1970	0	0	5	4	9	21	30
1969	0	0	9	5	14	24	38
1968	0	0	12	4	16	22	38
1967	0	0	1	4	5	24	29
1966	0	0	7	8	15	20	35
1965	0	0	2	10	12	15	27
1964	1	0	17	8	26	11	37
1963	1	0	21	6	28	12	40
1962	0	0	16	9	25	1	26
1961	0	0	15	9	24	4	28
1960	1	0	18	6	25	20	45

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-30

Pulpwood Production in Minnesota by State of Destination
(all wood, in thousand standard cords)

Year	EXPORTS				Total
	MN	MI	WI	Outside Region	
1982	1264	0	179	41	1484
1981	1119	0	177	75	1371
1980	1044	0	216	73	1333
1979	1226	0	169	63	1458
1978	1155	0	162	21	1338
1977	1149	0	154	30	1333
1976	1109	0	182	18	1309
1975	1173	0	178	8	1359
1974	1297	0	262	19	1578
1973	1152	0	194	30	1376
1972	1168	0	166	20	1354
1971	992	0	188	16	1196
1970	981	0	219	24	1224
1969	977	0	188	27	1192
1968	900	0	166	21	1087
1967	884	0	299	22	1205
1966	970	0	193	11	1174
1965	842	0	159	18	1019
1964	856	0	193	13	1062
1963	828	0	221	14	1063
1962	753	1	216	9	979
1961	712	0	240	15	967
1960	711	0	308	29	1048

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-31

Pulpwood Production in Minnesota by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	165	297	866	63	1391	93	1484
1981	136	269	801	64	1270	100	1370
1980	144	330	699	63	1236	97	1333
1979	154	311	838	38	1341	118	1459
1978	181	295	704	48	1228	110	1338
1977	170	298	697	55	1220	113	1333
1976	169	289	673	78	1209	99	1308
1975	191	387	616	57	1251	108	1359
1974	232	350	804	80	1466	112	1578
1973	205	313	673	78	1269	108	1377
1972	216	289	689	72	1266	88	1354
1971	214	240	608	65	1127	69	1196
1970	221	262	600	58	1141	83	1224
1969	237	215	660	35	1147	45	1192
1968	203	225	583	24	1035	52	1087
1967	202	334	591	42	1169	36	1205
1966	256	259	612	32	1159	15	1174
1965	181	323	468	41	1013	5	1018
1964	204	358	451	44	1057	5	1062
1963	208	370	433	51	1062	1	1063
1962	201	335	406	36	978	0	978
1961	205	359	369	35	968	0	968
1960	225	420	392	11	1048	0	1048

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific state or region plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific state or region that was used to manufacture pulp (and, after 1979, composition board.)

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-32

Pulpwood Receipts in Minnesota by State of Origin
(all wood, in thousand standard cords)

Year	IMPORTS					Total
	MN	MI	WI	Other States	Canada	
1982	1264	0	26	0	8	1298
1981	1119	0	34	0	11	1164
1980	1044	0	18	20	15	1097
1979	1226	0	21	29	19	1295
1978	1155	0	26	20	17	1218
1977	1149	0	26	19	15	1209
1976	1109	0	23	26	19	1177
1975	1173	0	20	18	15	1226
1974	1297	0	14	16	65	1392
1973	1152	0	14	29	27	1222
1972	1168	0	28	2	26	1224
1971	992	0	35	1	36	1064
1970	981	0	11	1	65	1058
1969	977	0	17	2	86	1082
1968	900	0	22	1	69	992
1967	884	0	15	1	58	958
1966	970	1	13	77	79	1140
1965	842	0	8	1	61	912
1964	856	0	19	0	63	938
1963	828	0	20	0	73	921
1962	753	0	15	0	60	828
1961	712	0	14	0	58	784
1960	711	0	19	0	57	787

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-33

Pulpwood Receipts in Minnesota by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	140	228	785	57	1210	90	1300
1981	105	183	725	53	1066	99	1165
1980	99	228	613	47	987	110	1097
1979	125	263	733	31	1152	142	1294
1978	147	240	647	33	1067	150	1217
1977	139	239	624	51	1053	157	1210
1976	131	220	599	75	1025	153	1178
1975	162	318	560	54	1094	133	1227
1974	185	244	718	77	1224	168	1392
1973	155	209	618	79	1061	162	1223
1972	166	197	686	77	1126	98	1224
1971	154	156	585	72	967	96	1063
1970	188	153	557	64	962	96	1058
1969	231	117	633	43	1024	58	1082
1968	206	126	576	27	935	58	993
1967	179	165	551	27	922	36	958
1966	207	215	587	32	1041	21	1062
1965	205	198	462	39	904	8	912
1964	213	221	455	43	932	6	938
1963	190	234	446	50	920	1	921
1962	189	185	418	36	828	0	828
1961	187	187	375	35	784	0	784
1960	164	204	408	11	787	0	787

Source: Pulpwood Production in the North-Central Region by County, NCFES Res. Bull. series, Table 1, 1960-1981.

Pulpwood receipts are the volume of wood received by mills in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-34

Pulpwood Imports into Minnesota by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	6	4	18	1	29	5	34
1981	2	3	32	1	38	8	46
1980	0	7	18	0	25	28	53
1979	3	5	16	0	24	43	67
1978	2	4	12	0	18	45	63
1977	2	0	11	0	13	48	61
1976	2	0	11	0	13	55	68
1975	16	0	11	0	27	27	54
1974	19	0	6	6	31	64	95
1973	1	1	9	4	15	56	71
1972	0	1	35	6	42	13	55
1971	9	0	24	7	40	30	70
1970	38	2	9	7	56	20	76
1969	58	3	16	10	87	18	105
1968	48	3	21	6	78	14	92
1967	35	9	8	7	59	15	74
1966	8	65	10	0	83	10	93
1965	48	6	10	0	64	6	70
1964	48	7	24	0	79	3	82
1963	45	18	30	0	93	0	93
1962	43	7	25	0	75	0	75
1961	41	8	23	0	72	0	72
1960	39	7	29	0	75	0	75

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-35

Pulpwood Exports from Minnesota by Species Group
(in thousand standard cords)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total Rndwd	Residue	All Wood
1982	32	73	100	8	213	8	221
1981	33	90	108	12	243	9	252
1980	45	109	104	17	275	15	290
1979	32	53	121	7	213	19	232
1978	36	59	69	15	179	4	183
1977	33	59	84	4	180	4	184
1976	43	69	85	1	198	2	200
1975	45	69	68	3	185	1	186
1974	66	106	91	9	272	8	280
1973	51	104	63	4	222	2	224
1972	50	93	38	2	183	3	186
1971	69	85	47	0	201	5	206
1970	72	111	52	1	236	7	243
1969	64	101	43	2	210	5	215
1968	45	104	28	2	179	8	187
1967	58	177	49	2	286	15	301
1966	57	109	34	0	200	3	203
1965	25	132	16	2	175	3	178
1964	38	145	19	2	204	2	206
1963	63	154	16	1	234	0	234
1962	56	157	13	1	227	0	227
1961	59	179	17	1	256	0	256
1960	100	224	13	0	337	0	337

Source: Pulpwood Production in the North-Central Region by County,
NCFES Res. Bull. series, Table 1, 1960-1981.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 500 standard cords.

TABLE B-36

FIGURE C-1

FIGURE C-2

FIGURE C-3

FIGURE C-4

FIGURE C-5

FIGURE C-6

FIGURE C-7

Lumber Production in the Lake States
(million board feet, lumber tally)

Year	Sftwd	Hrdwd	Total
1982			
1981			
1980			
1979	182	831	1014
1978	189	828	1018
1977	168	816	984
1976	151	735	887
1975	141	666	807
1974	141	703	844
1973	145	754	899
1972	119	688	807
1971	116	685	802
1970	124	704	827
1969	158	656	814
1968	150	674	823
1967	131	654	785
1966	142	627	769
1965	142	644	786
1964	144	645	789
1963	190	547	737
1962		476	
1961		471	
1960			

Source: Current Industrial Reports,
Series MA-241, Lumber Production and
Mill Stocks. USDC, Bureau of Census.

- (1) State data was discontinued in
the North Central Region after 1979.
(2) Minnesota's production was not shown;
therefore, it was estimated by taking
a share of the production in the
West North Central Division. See
Table C-4.

TABLE C-1

Lumber Production in Michigan
(million board feet, lumber tally)

Year	Sftwd	Hrdwd	Total
1982			
1981			
1980			
1979	40	334	374
1978	39	326	365
1977	31	319	350
1976	37	297	334
1975	39	278	317
1974	37	314	351
1973	43	348	391
1972	39	347	386
1971	37	366	403
1970	42	365	407
1969	67	321	388
1968	64	335	399
1967	48	320	368
1966	54	295	349
1965	56	314	370
1964	63	314	377
1963	77	293	370
1962	42	231	273
1961	51	222	273
1960			

Source: Current Industrial Reports,
Series MA-241, Lumber Production and
Mill Stocks. USDC, Bureau of Census.

Note: State data was discontinued in
the North Central Region after 1979.

TABLE C-2

Lumber Production in Wisconsin
(million board feet, lumber tally)

Year	Sftwd	Hrdwd	Total
1982			
1981			
1980			
1979	81	418	499
1978	88	419	507
1977	78	416	494
1976	66	357	423
1975	56	314	370
1974	60	307	367
1973	57	320	377
1972	38	266	304
1971	39	234	273
1970	41	245	286
1969	46	241	287
1968	41	253	294
1967	42	244	286
1966	48	243	291
1965	50	249	299
1964	45	248	293
1963	78	178	256
1962	41	176	217
1961	39	189	228
1960			

Source: Current Industrial Reports, Series MA-24T, Lumber Production and Mill Stocks. USDC, Bureau of Census.

Note: State data was discontinued in the North Central Region after 1979.

TABLE C-3

Lumber Production in Minnesota(1)
and West North Central Division
(million board feet, lumber tally)

Year	SOFTWOOD		HARDWOOD		TOTAL	
	WNC	MN	WNC	MN	WNC	MN
1982	70		(s)			
1981	75		(s)			
1980	273	60	330	73	603	133
1979	279	61	360	79	639	141
1978	284	62	379	83	663	146
1977	270	59	367	81	637	140
1976	219	48	370	81	589	130
1975	210	46	337	74	547	120
1974	200	44	374	82	574	126
1973	205	45	392	86	597	131
1972	190	42	340	75	530	117
1971	183	40	388	85	571	126
1970	185	41	426	94	611	134
1969	(2) 203	45	427	94	630	139
1968	203	45	389	86	592	130
1967	188	41	407	90	595	131
1966	184	40	403	89	587	129
1965	165	36	367	81	532	117
1964	164	36	376	83	540	119
1963	159	35	344	76	503	111
1962	(s)		314	69		
1961	(s)		273	60		

(1) Minnesota's production was not shown in Current Industrial Reports, Series MA-24T. Therefore, this state's production in the West North Central Division. The assumption was made that its production share equals its share of the value-added by manufacture in SIC 242, Sawmills and Planing Mills, within the same region, (i.e., about 22 percent).

(2) Softwood production estimates between 1969 and 1964 are below standard levels of consistency.

(s) suppressed

TABLE C-4

Lumber Used in Single-family Home
Construction in the Lake States

Year	CONSUMPTION (million board feet)		
	sftwd	hrdwd	total
1981	329.9	12.0	341.9
1977	1071.5	38.3	1109.7
1973	974.8	41.8	1016.6

Sources: U.S. Department of Commerce,
International Trade Administration.
Construction Review.

Spelter and Phelps. Forest Prod.
J. 34(2):35-41.

TABLE C-5

Lumber Used in Multi-family Home
Construction in the Lake States

Year	CONSUMPTION (million board feet)		
	sftwd	hrdwd	total
1981	87.6	0.8	88.4
1977	206.2	3.0	209.2
1973	269.8	4.9	274.7

Sources: U.S. Department of Commerce,
International Trade Administration.
Construction Review.

Spelter and Phelps. Forest Prod.
J. 34(2):35-41.

TABLE C-6

Lumber Used in New Mobile
Homes in the Lake States

Year	CONSUMPTION (million board feet)		
	sftwd	hrdwd	total
1981	32.9	1.2	34.1
1977	47.1	1.8	48.8
1973	82.4	3.4	85.8

Sources: U.S. Department of Commerce,
International Trade Administration.
Construction Review.

Spelter and Phelps. Forest Prod.
J. 34(2):35-41.

TABLE C-7

Lumber Used in Residential Alterations
and Repairs in the Lake States (1)

Year	Consumption (million BF) sftwd
1983	62.0
1982	59.8
1981	63.3
1980	73.4
1979	74.1
1978	72.4

(1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's alterations and repairs.

(2) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

Sources: U.S. Department of Commerce, International Trade Administration. Construction Review.

Spelter and Phelps. Forest Prod. J.
34(2):35-41.

TABLE C-8

Lumber Used in Nonresidential Building
Construction in the Lake States (1)

Year	CONSUMPTION (million board feet)		
	sftwd	hrdwd	total
1983	53.7	8.9	62.6
1982	51.5	8.6	60.0
1981	63.4	10.6	74.0
1980	76.5	12.8	89.3
1979	92.1	18.4	110.5
1978	88.0	17.6	105.6

(1) Includes nonresidential alterations and repairs.

Sources: U.S. Department of Commerce, International Trade Administration. Construction Review.

Spelter and Phelps. Forest Prod. J.
34(2):35-41.

TABLE C-9

Lumber Used in Pallet
Manufacturing in the Lake States

Year	Consumption (million BF)		
	sftwd	hrdwd	total
1981	153.0	384.0	537.0
1977	150.4	355.0	505.3
1973	124.0	310.0	434.0

This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total lumber consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-10

Lumber Used in Furniture Manufacturing
in the Lake States

Year	Consumption (million BF)		
	sftwd	hrdwd	total
1981	158.7	211.6	370.3
1977	139.5	203.8	343.35
1973	108.9	203.4	312.3

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-12

Lumber Used in Container and Dunnage
Manufacturing in the Lake States

Year	Consumption (million BF)		
	sftwd	hrdwd	total
1981	69.6	117.3	186.8
1977	70.2	111.3	181.5
1973	102.5	119.6	222.1

This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-11

Lumber Used in Other Manufacturing
in the Lake States

Year	Consumption (million BF)		
	sftwd	hrdwd	total
1981	125.2	54.6	179.8
1977	117.7	54.0	171.7
1973	114.5	63.2	177.7

This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-13

Residential Construction in Michigan

Year	Const. Permits (1000)	Single-family		Multi-family	
		(1) %	(1000)	(1) %	(1000)
1983	21.2	0.61	12.9	0.38	8.1
1982	14.3	0.53	7.6	0.44	6.3
1981	19.1	0.58	11.1	0.40	7.6
1980	29.8	0.56	16.7	0.42	12.5
1979	49.3	0.63	31.1	0.36	17.7
1978	61.1	0.67	40.9	0.33	20.2
(2) 1977	58.7	0.67	39.3	0.33	19.4
1976	45.9	0.67	30.8	0.33	15.1
1975	37.0	0.70	25.9	0.29	10.7
1974	44.3	0.63	27.9	0.36	15.9
1973	71.3	0.64	45.6	0.45	32.1
1972	76.6	0.52	39.8	0.47	36.0

- (1) Assumes that Michigan's ratios for single and multi-family home construction are the same as those in the North Central region.
- (2) Data for 1983-1978 is from survey of 16000 permit-issuing places. Data for 1977-1972 is from survey of 14000 permit-issuing places. Comparisons of the data are reasonable.

Source: U.S. Department of Commerce, International Trade Administration. Construction Review.

TABLE C-14

Residential Construction in Wisconsin

Year	Const. Permits (1000)	Single-family		Multi-family	
		(1) %	(1000)	(1) %	(1000)
1983	16.1	0.61	9.8	0.38	6.1
1982	12.3	0.53	6.5	0.44	5.4
1981	14.2	0.58	8.2	0.40	5.7
1980	18.5	0.56	10.4	0.42	7.8
1979	26.6	0.63	16.8	0.36	9.6
1978	37.7	0.67	25.3	0.33	12.4
(2) 1977	41.3	0.67	27.7	0.33	13.6
1976	35.3	0.67	23.7	0.33	11.6
1975	26.0	0.70	18.2	0.29	7.5
1974	26.0	0.63	16.4	0.36	9.4
1973	34.2	0.64	21.9	0.45	15.4
1972	36.3	0.52	18.9	0.47	17.1

- (1) Assumes that Wisconsin's ratios for single and multi-family home construction are the same as those in the North Central region.
- (2) Data for 1983-1978 is from survey of 16000 permit-issuing places. Data for 1977-1972 is from survey of 14000 permit-issuing places. Comparisons of the data are reasonable.

Source: U.S. Department of Commerce, International Trade Administration. Construction Review.

TABLE C-15

Residential Construction in Minnesota

Year	Const. Permits (1000)	Single-family		Multi-family	
		(1) %	(1000)	(1) %	(1000)
1983	24.9	0.61	15.2	0.38	9.5
1982	19.0	0.53	10.1	0.44	8.4
1981	17.4	0.58	10.1	0.40	7.0
1980	21.7	0.56	12.2	0.42	9.1
1979	29.4	0.63	18.5	0.36	10.6
1978	37.8	0.67	25.3	0.33	12.5
(2) 1977	38.3	0.67	25.7	0.33	12.6
1976	27.0	0.67	18.1	0.33	8.9
1975	19.2	0.70	13.4	0.29	5.6
1974	20.6	0.63	13.0	0.36	7.4
1973	23.3	0.64	14.9	0.45	10.5
1972	37.3	0.52	19.4	0.47	17.5

- (1) Assumes that Minnesota's ratios for single and multi-family home construction are the same as those in the North Central region.
- (2) Data for 1983-1978 is from survey of 16000 permit-issuing places. Data for 1977-1972 is from survey of 14000 permit-issuing places. Comparisons of the data are reasonable.

Source: U.S. Department of Commerce, International Trade Administration. Construction Review.

TABLE C-16

Lumber Used in Single-family
Home Construction in Michigan

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	11.1	1.70	6.60	0.24	124.5	4.5	129.1
1977	39.3	1.72	6.72	0.24	454.2	16.2	470.5
1973	45.6	1.69	7.00	0.30	539.4	23.1	562.6

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-17

Lumber Used in Multi-family
Home Construction in Michigan

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	7.6	0.97	4.45	0.04	32.8	0.3	33.1
1977	19.4	0.94	4.81	0.07	87.7	1.3	89.0
1973	32.1	1.05	4.43	0.08	149.3	2.7	152.0

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-18

Lumber Used in New Mobile Homes
in Michigan

Year	(1)Ship- ments (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	4.3	1.05	2.75	0.10	12.4	0.5	12.9
1977	7.5	1.00	2.69	0.10	20.2	0.8	20.9
1973	22.3	0.88	2.40	0.10	47.1	2.0	49.1

(1) Mobile home shipments to Michigan are estimated from shipments to the North Central region, assuming that the state's share is the same as its share of residential construction within the region.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-19

Lumber Used in Single-family
Home Construction in Wisconsin

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	8.2	1.70	6.60	0.24	92.0	3.3	95.3
1977	27.7	1.72	6.72	0.24	320.2	11.4	331.6
1973	21.9	1.69	7.00	0.30	259.1	11.1	270.2

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-20

Lumber Used in Multi-family
Home Construction in Wisconsin

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	5.7	0.97	4.45	0.04	24.6	0.2	24.8
1977	13.6	0.94	4.81	0.07	61.5	0.9	62.4
1973	15.4	1.05	4.43	0.08	71.6	1.3	72.9

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-21

Lumber Used in New Mobile Homes
in Wisconsin

Year	(1)Ship- ments (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	3.1	1.05	2.75	0.10	9.0	0.3	9.3
1977	5.0	1.00	2.69	0.10	13.5	0.5	14.0
1973	10.0	0.88	2.40	0.10	21.1	0.9	22.0

(1) Mobile home shipments to Wisconsin are estimated from shipments
to the North Central region, assuming that the state's share is
the same as its share of residential construction within the
region.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

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TABLE C-22

Lumber Used in Single-family
Home Construction in Minnesota

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	10.1	1.70	6.60	0.24	113.3	4.1	117.4
1977	25.7	1.72	6.72	0.24	297.1	10.6	307.7
1973	14.9	1.69	7.00	0.30	176.3	7.6	183.8

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-23

Lumber Used in Multi-family
Home Construction in Minnesota

Year	Const. Permits (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	7.0	0.97	4.45	0.04	30.2	0.3	30.5
1977	12.6	0.94	4.81	0.07	57.0	0.8	57.8
1973	10.5	1.05	4.43	0.08	48.8	0.9	49.7

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

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TABLE C-24

Lumber Used in New Mobile Homes
in Minnesota

Year	(1) Ship- ments (1000)	Size (1000 sq.ft.)	BF/sq.ft.		CONSUMPTION (million board feet)		
			sftwd	hrdwd	sftwd	hrdwd	total
1981	4.0	1.05	2.75	0.10	11.6	0.4	12.0
1977	5.0	1.00	2.69	0.10	13.5	0.5	14.0
1973	6.7	0.88	2.40	0.10	14.2	0.6	14.7

(1) Mobile home shipments to Minnesota are estimated from shipments
to the North Central region, assuming that the state's share is
the same as its share of residential construction within the
region.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-25

Lumber Used in Residential
Alterations and Repairs in Michigan (1)

Year	Valuation (\$Millions)			BF/\$77 ----- sftwd	Consumption (million BF) sftwd
	Nominal	CPI	\$1977		
1983	160.9	0.612	98.5	0.21	20.7
1982	138.5	0.628	87.0	0.21	18.3
1981	171.5	0.665	114.0	0.21	23.9
1980	203.6	0.736	149.8	0.21	31.5
1979	209.3	0.836	175.0	0.20	35.0
1978	173.3	0.929	161.0	0.20	32.2

(2)

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's additions and repairs.
- (2) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

Sources: U.S. Department of Commerce, International Trade Administration. Construction Review.

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TABLE C-26

Lumber Used in Residential
Alterations and Repairs in Wisconsin (1)

Year	Valuation (\$Millions)			BF/\$77 ----- sftwd	Consumption (million BF) sftwd
	Nominal	CPI	\$1977		
1983	131.7	0.612	80.6	0.21	16.9
1982	125.9	0.628	79.1	0.21	16.6
1981	122.5	0.665	81.5	0.21	17.1
1980	122.1	0.736	89.9	0.21	18.9
1979	110.8	0.836	92.6	0.20	18.5
1978	108.3	0.929	100.6	0.20	20.1

(2)

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's additions and repairs.
- (2) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

Sources: U.S. Department of Commerce, International Trade Administration. Construction Review.

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TABLE C-27

Lumber Used in Residential
Alterations and Repairs in Minnesota (1)

Year	Valuation (\$Millions)			BF/\$77 ----- sftwd	Consumption (million BF) sftwd
	Nominal	CPI	\$1977		
1983	190.2	0.612	116.4	0.21	24.4
1982	188.9	0.628	118.6	0.21	24.9
1981	159.3	0.665	105.9	0.21	22.2
1980	149.3	0.736	109.9	0.21	23.1
1979	123.1	0.836	102.9	0.20	20.6
1978	108.3	0.929	100.6	0.20	20.1

(2)

(1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's additions and repairs.

(2) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

Sources: U.S. Department of Commerce, International Trade Administration. Construction Review.

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TABLE C-28

Lumber Used in Nonresidential Building
Construction in Michigan (1)

Year	Construction Value (\$Million)			BF/\$77		CONSUMPTION (million board feet)		
	Nominal	CPI	1977	sftwd	hrdwd	sftwd	hrdwd	total
1983	1191	0.612	729	0.03	0.005	21.9	3.6	25.5
1982	1092	0.628	686	0.03	0.005	20.6	3.4	24.0
1981	1439	0.665	957	0.03	0.005	28.7	4.8	33.5
1980	1631	0.736	1200	0.03	0.005	36.0	6.0	42.0
1979	1619	0.836	1353	0.03	0.006	40.6	8.1	48.7
1978	1391	0.929	1292	0.03	0.006	38.8	7.8	46.5

(1) Includes nonresidential alterations and repairs.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-29

Lumber Used in Nonresidential Building
Construction in Wisconsin (1)

Year	Construction Value (\$Million)			BF/\$77		CONSUMPTION (million board feet)		
	Nominal	CPI	1977	sftwd	hrdwd	sftwd	hrdwd	total
1983	685	0.612	419	0.03	0.005	12.6	2.1	14.7
1982	634	0.628	398	0.03	0.005	11.9	2.0	13.9
1981	777	0.665	517	0.03	0.005	15.5	2.6	18.1
1980	805	0.736	592	0.03	0.005	17.8	3.0	20.7
1979	883	0.836	738	0.03	0.006	22.1	4.4	26.6
1978	741	0.929	688	0.03	0.006	20.7	4.1	24.8

(1) Includes nonresidential alterations and repairs.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-30

Lumber Used in Nonresidential Building
Construction in Minnesota (1)

Year	Construction Value (\$Million)			BF/\$77		CONSUMPTION (million board feet)		
	Nominal	CPI	1977	sftwd	hrdwd	sftwd	hrdwd	total
1983	1048	0.612	641	0.03	0.005	19.2	3.2	22.4
1982	1006	0.628	632	0.03	0.005	19.0	3.2	22.1
1981	962	0.665	640	0.03	0.005	19.2	3.2	22.4
1980	1029	0.736	757	0.03	0.005	22.7	3.8	26.5
1979	1171	0.836	979	0.03	0.006	29.4	5.9	35.2
1978	1026	0.929	953	0.03	0.006	28.6	5.7	34.3

(1) Includes nonresidential alterations and repairs.

Sources: U.S. Department of Commerce, International Trade
Administration. Construction Review.

Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-31

Lumber Used in Furniture
Manufacturing in Michigan

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1380	1840	8.0	110.4	147.2	257.6
1977	1280	1870	7.5	96.0	140.3	236.3
1973	1210	2260	6.0	72.6	135.6	208.2

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
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TABLE C-32

Lumber Used in Furniture
Manufacturing in Wisconsin

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1380	1840	2.5	34.5	46.0	80.5
1977	1280	1870	2.4	30.7	44.9	75.6
1973	1210	2260	2.1	25.4	47.5	72.9

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
Forest Prod. J. 34(2):35-41.

TABLE C-33

Lumber Used in Furniture
Manufacturing in Minnesota

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1380	1840	1.0	13.8	18.4	32.2
1977	1280	1870	1.0	12.8	18.7	31.5
1973	1210	2260	0.9	10.9	20.3	31.2

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
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TABLE C-34

Lumber Used in Pallet
Manufacturing in Michigan

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1000	2510	8.0	80.0	200.8	280.8
1977	970	2290	8.6	83.4	196.9	280.4
1973	800	2000	9.9	79.2	198.0	277.2

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total lumber consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
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TABLE C-35

Lumber Used in Pallet
Manufacturing in Wisconsin

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1000	2510	6.0	60.0	150.6	210.6
1977	970	2290	5.6	54.3	128.2	182.6
1973	800	2000	4.3	34.4	86.0	120.4

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total lumber consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
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TABLE C-36

Lumber Used in Pallet
Manufacturing in Minnesota

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1000	2510	1.3	13.0	32.6	45.6
1977	970	2290	1.3	12.6	29.8	42.4
1973	800	2000	1.3	10.4	26.0	36.4

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total lumber consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps.
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TABLE C-37

Lumber Used in Container and
Dunnage Manufacturing in Michigan

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	650	570	6.2	40.3	35.3	75.6
1977	650	590	6.4	41.6	37.8	79.4
1973	940	800	6.6	62.0	52.8	114.8

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-38

Lumber Used in Container and
Dunnage Manufacturing in Wisconsin

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	650	2510	2.9	18.9	72.8	91.6
1977	650	2290	2.8	18.2	64.1	82.3
1973	940	2000	2.7	25.4	54.0	79.4

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-39

Lumber Used in Container and
Dunnage Manufacturing in Minnesota

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	650	570	1.6	10.4	9.1	19.5
1977	650	590	1.6	10.4	9.4	19.8
1973	940	800	1.6	15.0	12.8	27.8

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-40

Lumber Used in Other
Manufacturing in Michigan

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1170	510	6.2	72.5	31.6	104.2
1977	1090	500	6.4	69.8	32.0	101.8
1973	1050	580	6.6	69.3	38.3	107.6

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-41

Lumber Used in Other
Manufacturing in Wisconsin

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1170	510	2.9	33.9	14.8	48.7
1977	1090	500	2.8	30.5	14.0	44.5
1973	1050	580	2.7	28.4	15.7	44.0

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-42

Lumber Used in Other
Manufacturing in Minnesota

Year	U.S. Consumption (million BF)		State Share(1) (%)	State Consumption (million BF)		
	sftwd	hrdwd		sftwd	hrdwd	total
1981	1170	510	1.6	18.7	8.2	26.9
1977	1090	500	1.6	17.4	8.0	25.4
1973	1050	580	1.6	16.8	9.3	26.1

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total lumber consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are from Spelter and Phelps. Forest Prod. J. 34(2):35-41.

TABLE C-43

Sawlog Production in Michigan by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS						Total
	MI	WI	MN	IN	KY	OH	
1982							
1981							
1980	357.5	29.2	0.0	5.6	0.3	0.0	392.6
1979							
1978	520.0	39.4	0.0	3.9	0.0	0.0	563.3
1977	454.2	55.7	0.0	4.0	0.0	0.1	514.0
1976							
1975	331.4	25.0	0.0	2.8	0.1	0.0	359.3
1974							
1973							
1972	427.0	24.5	0.0	2.9	0.0	0.0	454.4
1971							
1970							
1969	417.6	8.1	0.0	0.3	0.0	0.1	426.1

(1) Other Central States also received some MI exports.

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-44

Sawlog Production in Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	13.1	33.6	73.4	272.6	392.7
1979					
1978	23.0	42.1	127.1	371.1	563.3
1977	37.7	53.8	98.4	324.1	514.0
1976					
1975	14.7	35.2	63.2	246.1	359.2
1974					
1973					
1972	12.5	46.8	64.0	331.1	454.4
1971					
1970					
1969	7.3	43.9	43.1	331.8	426.1
1968					
1967					
1966					
1965	6.0	32.9	35.7	312.9	387.5

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-45

Sawlog Receipts in Michigan by State of Origin
(all species, million board feet, international 1/4-inch)

Year	IMPORTS					Total
	MI	WI	MN	OH	IN	
1982						
1981						
1980	357.5	1.4	0.0	0.0	0.0	358.9
1979						
1978	520.0	4.4	0.0	1.0	0.0	525.4
1977	454.2	1.6	0.0	1.3	0.0	457.1
1976						
1975						
1974						
1973						
1972	427.0	1.9	0.0	0.0	0.7	429.6
1971						
1970						
1969	417.6	0.2	0.0	0.0	0.4	418.2

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-46

Sawlog Receipts in Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	9.7	26.1	64.9	258.2	358.9
1979					
1978	15.6	34.2	108.6	366.9	525.3
1977	26.1	34.5	81.7	314.8	457.1
1976					
1975					
1974					
1973					
1972	11.3	44.2	49.5	324.6	429.6
1971					
1970					
1969	7.1	43.0	38.5	329.7	418.3

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-47

Sawlog Imports into Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.0	0.0	0.6	0.8	1.4
1979					
1978	0.0	0.4	0.4	4.6	5.4
1977	0.0	0.2	0.5	2.2	2.9
1976					
1975					
1974					
1973					
1972	0.3	0.7	0.1	1.5	2.6
1971					
1970					
1969	0.0	0.2	0.0	0.4	0.6

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-48

Sawlog Exports from Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	3.3	7.6	9.1	15.1	35.1
1979					
1978	7.4	8.3	18.9	8.8	43.4
1977	11.6	19.5	17.2	11.5	59.8
1976					
1975	1.1	1.2	14.7	11.4	28.4
1974					
1973					
1972	1.6	3.2	14.3	8.4	27.5
1971					
1970					
1969	0.1	1.2	4.7	2.4	8.4

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-49

Sawlog Production in Wisconsin by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS					Total
	WI	MN	MI	Iowa	(1) Other	
1982						
1981	490.0	0.0	0.8	0.0	0.0	490.8
1980	385.4	0.2	1.4	0.0	0.3	387.3
1979						
1978						
1977						
1976						
1975	329.5	0.0	3.6	0.6	1.0	334.7
1974						
1973	382.8	0.5	1.5	0.9	0.8	386.5

(1) Other states that receive WI exports include Indiana, Illinois and other Central States.

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-50

Sawlog Production in Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	19.7	56.0	76.4	338.7	490.8
1980	16.6	50.6	57.2	262.9	387.3
1979					
1978					
1977					
1976					
1975	16.8	46.4	50.1	221.3	334.6
1974					
1973	11.3	32.3	74.3	268.6	386.5
1972					
1971					
1970					
1969					
1968					
1967	4.1	24.6	30.7	213.1	272.5

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-51

Sawlog Receipts in Wisconsin by State of Origin
(all species, million board feet, international 1/4-inch)

Year	WI	IMPORTS			Total
		MN	MI	Iowa	
1982					
1981	490.0	8.6	39.4	0.8	538.9
1980	385.4	3.0	29.2	5.0	422.6
1979					
1978					
1977					
1976					
1975					
1974					
1973	382.8	6.9	17.9	0.7	408.3

(1) Wisconsin also receives some sawlogs from Illinois and Canada.

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-52

Sawlog Receipts in Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	23.4	65.7	88.7	361.0	538.9
1980	20.1	58.6	65.8	278.2	422.6
1979					
1978					
1977					
1976					
1975					
1974					
1973	14.7	36.4	82.2	275.0	408.3
1972					
1971					
1970					
1969					
1968					
1967	4.1	26.1	34.9	292.8	288.0

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-53

Sawlog Imports into Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	3.8	9.6	12.4	23.0	48.8
1980	3.6	7.9	9.4	16.4	37.2
1979					
1978					
1977					
1976					
1975					
1974					
1973	3.5	4.5	7.9	9.7	25.6

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-54

Sawlog Exports from Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	0.0	0.0	0.1	0.7	0.8
1980	0.0	0.0	0.8	1.1	1.9
1979					
1978					
1977					
1976					
1975	0.5	0.8	0.2	3.7	5.2
1974					
1973	0.0	0.5	0.0	3.3	3.7

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-55

Sawlog Production in Minnesota by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS					Total
	MN	MI	WI	Iowa	MO	
1982						
1981						
1980	225.2	0.0	3.0	2.5	0.0	230.7
1979						
1978						
1977						
1976						
1975	152.4	0.0	3.6	0.0	0.1	156.1
1974						
1973	170.3	0.0	7.0	0.1	0.2	177.5

(1) Other states that receive MN exports include Indiana and Kentucky.

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-56

Sawlog Production in Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	50.3	28.5	80.8	71.1	230.7
1979					
1978					
1977					
1976					
1975	39.8	21.1	49.5	45.7	156.1
1974					
1973	25.8	29.4	60.7	61.6	177.5
1972					
1971					
1970					
1969					
1968					
1967					
1966					
1965					
1964					
1963					
1962					
1961					
1960	39.6	36.5	37.6	54.4	168.1

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Sawlog production, determined from mill receipts, is the annual volume of sawlogs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-57

Sawlog Receipts in Minnesota by State of Origin
(all species, million board feet, international 1/4-inch)

Year	IMPORTS				Total
	MN	MI	WI	Iowa	
1982					
1981					
1980	225.2	0.0	0.2	0.9	226.3
1979					
1978					
1977					
1976					
1975					
1974					
1973	170.3	0.0	0.4	1.6	172.2

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-58

Sawlog Receipts in Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	50.0	28.2	80.9	67.2	226.3
1979					
1978					
1977					
1976					
1975					
1974					
1973	25.3	28.0	60.5	58.4	172.2

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

Receipts are the volume of sawlogs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-59

Sawlog Imports into Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.0	0.0	0.2	0.9	1.1
1979					

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-60

Sawlog Exports from Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Hard Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.3	0.3	0.1	4.8	5.5
1979					
1978					
1977					
1976					
1975	1.1	0.5	0.1	2.0	3.7
1974					
1973	0.6	1.7	0.2	4.8	7.3

Source: Primary Forest Products Industry and Timber Use.
NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE C-61

FIGURE D-1

FIGURE D-2

FIGURE D-3

FIGURE D-4

FIGURE D-5

FIGURE D-6

FIGURE D-7

FIGURE D-8

VENEER LOG IMPORTS AND EXPORTS TO AND FROM THE LAKE STATES

FIGURE D-9

LAKE STATES VENEER LOG IMPORTS FROM OTHER STATES AND CANADA

FIGURE D-10

FIGURE D-11

FIGURE D-12

Hardwood Veneer Log Receipts in the Lake States
(million square feet, 3/8-inch)

Year	Aspen	Other	Total
1982			
1981			
1980	52.5	101.6	154.2
1979			
1978			
1977			
1976	56.8	117.5	174.2
1975			
1974			
1973			
1972	6.3	105.3	111.7
1971			
1970	3.4	94.5	97.9
1969			
1968	1.6	124.1	125.7
1967			
1966	1.8	144.1	146.0
1965	1.6	147.8	149.4
1964			
1963	4.0	135.2	139.2
1962			
1961			
1960	5.5	164.5	170.0

*Figures obtained by converting board feet to square feet using conversion factor 2640 square feet (3/8") per 1000 board feet (Int'l 1 1/4").

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

TABLE D-1

Plywood Used in Single-family
Home Construction in the Lake States
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	34.5	5.84	201.5
1977	92.7	5.82	539.5
1973	82.4	5.67	467.2

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-2

Plywood Used in Multi-family
Home Construction in the Lake States
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	20.3	2.92	59.3
1977	45.6	2.93	133.6
1973	58	2.50	145.0

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-3

Plywood Used in New Mobile
Homes in the Lake States
(3/8-inch basis)

Year	(1) Ship- ments (1000)	(2) Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	11.4	1.83	20.9
1977	17.5	1.65	28.9
1973	39.0	1.45	56.6

(1) Mobile home shipments to the Lake States are estimated for
shipments to the North Central region, assuming that the
Lake State's share is the same as its share of residential
construction within the North Central region.

(2) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-4

Plywood Used in Residential
Alterations and Repairs in the Lake States
(3/8-inch basis)

Year	Valuation (\$Millions)		\$1972	(2) Sq.Ft. per \$1972	Consumption (million sq.ft.)
	Nominal	CPI			
1983	482.8	0.422	203.7	0.162	33.0
1982	453.3	0.433	196.3	0.163	32.0
1981	453.3	0.459	208.1	0.163	33.9
1980	475.0	0.508	241.3	0.164	39.6
1979	443.2	0.577	255.7	0.164	41.9
1978	389.9	0.641	249.9	0.165	41.2

(3)

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's alterations and repairs.
- (2) Use-factors are interpolations based on Table 3.9, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.
- (3) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

TABLE D-5

Plywood Used in Nonresidential Building
Construction in the Lake States
(3/8-inch basis)

Year	Construction Value (\$Millions)			Sq.Ft./ \$1972 (1)	Consumption (million sq.ft.)
	Nominal	CPI	1972		
1983	2924	0.422	1233.9	0.039	48.1
1982	2732	0.433	1183.0	0.039	46.1
1981	3180	0.459	1459.6	0.038	55.5
1980	3465	0.508	1760.2	0.038	66.9
1979	3673	0.577	2119.3	0.037	78.4
1978	3158	0.641	2024.3	0.037	74.9

- (1) Use-factors are interpolations based on Table 1.8, Appendix 1, An Analysis of the Timber Situation in the U.S., 1952-2030. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-6

Plywood and Veneer Used in Furniture
Manufacturing in the Lake States
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	Region Share(1) (%)	Region Consumption (million sq.ft.)
1981	1017	11.5	117.0
1977	939	10.9	102.4
1973	993	9.0	89.4

(1) This assumes that the region's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total plywood and veneer consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.12, Appendix 1, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-7

(1) This assumes that the region's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total plywood and veneer consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 3.18, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-8

Plywood and Veneer Used in Container
and Dunnage Manufacturing in the Lake States
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	Region Share(1) (%)	Region Consumption (million sq.ft.)
1981	323	10.7	34.6
1977	335	10.8	36.2
1973	374	10.9	40.8

(1) This assumes that the region's share of value-added in all U.S. manufacturing industries represents its share of the nation's total plywood and veneer consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Tables 3.19 and 3.20, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-9

Plywood Used in Single-family
Home Construction in Michigan
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	11.1	5.84	64.8
1977	39.3	5.82	228.7
1973	45.6	5.67	258.6

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-10

Plywood Used in Multi-family
Home Construction in Michigan
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	7.6	2.92	22.2
1977	19.4	2.93	56.8
1973	32.1	2.50	80.3

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-11

Plywood Used in New Mobile
Homes in Michigan
(3/8-inch basis)

Year	(1)Ship- ments (1000)	(2)Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	4.3	1.83	7.9
1977	7.5	1.65	12.4
1973	22.3	1.45	32.3

(1) Mobile home shipments to the state are estimated from
shipments to the North Central region, assuming that the
state's share is the same as its share of residential
construction within the region.

(2) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-12

Plywood Used in Single-family
Home Construction in Wisconsin
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	8.2	5.84	47.9
1977	27.7	5.82	161.2
1973	21.9	5.67	124.2

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-13

Plywood Used in Multi-family
Home Construction in Wisconsin
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	5.7	2.92	16.6
1977	13.6	2.93	39.8
1973	15.4	2.50	38.5

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-14

Plywood Used in New Mobile
Homes in Wisconsin
(3/8-inch basis)

Year	(1) Ship- ments (1000)	(2) Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	3.1	1.83	5.7
1977	5.0	1.65	8.3
1973	10.0	1.45	14.5

(1) Mobile home shipments to the state are estimated from
shipments to the North Central region, assuming that the
state's share is the same as its share of residential
construction within the region.

(2) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-15

Plywood Used in Single-family
Home Construction in Minnesota
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	15.2	5.84	88.8
1977	25.7	5.82	149.6
1973	14.9	5.67	84.5

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-16

Plywood Used in Multi-family
Home Construction in Minnesota
(3/8-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	7.0	2.92	20.4
1977	12.6	2.93	36.9
1973	10.5	2.50	26.3

(1) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030.
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-17

Plywood Used in New Mobile
Homes in Minnesota
(3/8-inch basis)

Year	(1) Ship- ments (1000)	(2) Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	4.0	1.83	7.3
1977	5.0	1.65	8.3
1973	6.7	1.45	9.7

(1) Mobile home shipments to the state are estimated from
shipments to the North Central region, assuming that the
state's share is the same as its share of residential
construction within the region.

(2) 1981 and 1973 use-factors are interpolations.

An Analysis of the Timber Situation in the U.S., 1952-2030
Forest Service, For. Res. Rep. 23, 1982. Table 3.7.

TABLE D-18

Plywood Used in Residential
Alterations and Repairs in Michigan
(3/8-inch basis)

Year	Valuation (\$Millions)		(2) Sq.Ft. per \$1972	Consumption (million sq.ft.)
	Nominal	CPI		
1983	160.9	0.422	67.9	0.162
1982	138.5	0.433	60.0	0.163
1981	171.5	0.459	78.7	0.163
1980	203.6	0.508	103.4	0.164
1979	209.3	0.577	120.8	0.164
1978	173.3	0.641	111.1	0.165
(3)				

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's alterations and repairs.
- (2) Use-factors are interpolations based on Table 3.9, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.
- (3) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

TABLE D-19

Plywood Used in Residential
Alterations and Repairs in Wisconsin
(3/8-inch basis)

Year	Valuation (\$Millions)		(2) Sq.Ft. per \$1972	Consumption (million sq.ft.)
	Nominal	CPI		
1983	131.7	0.422	55.6	0.162
1982	125.9	0.433	54.5	0.163
1981	122.5	0.459	56.2	0.163
1980	122.1	0.508	62.0	0.164
1979	110.8	0.577	63.9	0.164
1978	108.3	0.641	69.4	0.165
(3)				

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's alterations and repairs.
- (2) Use-factors are interpolations based on Table 3.9, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.
- (3) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

TABLE D-20

Plywood Used in Residential
Alterations and Repairs in Minnesota
(3/8-inch basis)

Year	Valuation (\$Millions)		(2) Sq.Ft. per \$1972	Consumption (million sq.ft.)
	Nominal	CPI		
1983	190.2	0.422	80.3	0.162
1982	188.9	0.433	81.8	0.163
1981	159.3	0.459	73.1	0.163
1980	149.3	0.508	75.8	0.164
1979	123.1	0.577	71.0	0.164
1978	108.3	0.641	69.4	0.165
(3)				

- (1) Based on valuation of residential alterations and repairs in the North Central Region. Assumes that each state's share of the region's residential permits is the same as its share of the region's alterations and repairs.
- (2) Use-factors are interpolations based on Table 3.9, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.
- (3) Construction Review does not show residential alterations and repairs in the North Central Region prior to 1978.

TABLE D-21

Plywood Used in Nonresidential Building
Construction in Michigan
(3/8-inch basis)

Year	Construction Value (\$Millions)			Sq.Ft./ \$1972 (1)	Consumption (million sq.ft.)
	Nominal	CPI	1972		
1983	1191	0.422	502.6	0.039	19.6
1982	1092	0.433	472.8	0.039	18.4
1981	1439	0.459	660.5	0.038	25.1
1980	1631	0.508	828.5	0.038	31.5
1979	1619	0.577	934.2	0.037	34.6
1978	1391	0.641	891.6	0.037	33.0

(1) Use-factors are interpolations based on Table 1.8, Appendix 1,
An Analysis of the Timber Situation in the U.S., 1952-2030.
1982. Forest Service, For. Res. Rep. 23.

TABLE D-22

Plywood Used in Nonresidential Building
Construction in Wisconsin
(3/8-inch basis)

Year	Construction Value (\$Millions)			Sq.Ft./ \$1972 (1)	Consumption (million sq.ft.)
	Nominal	CPI	1972		
1983	685	0.422	289.1	0.039	11.3
1982	634	0.433	274.5	0.039	10.7
1981	779	0.459	357.6	0.038	13.6
1980	805	0.508	408.9	0.038	15.5
1979	883	0.577	509.5	0.037	18.9
1978	741	0.641	475.0	0.037	17.6

(1) Use-factors are interpolations based on Table 1.8, Appendix 1,
An Analysis of the Timber Situation in the U.S., 1952-2030.
1982. Forest Service, For. Res. Rep. 23.

TABLE D-23

Plywood Used in Nonresidential Building
Construction in Minnesota
(3/8-inch basis)

Year	Construction Value (\$Millions)			Sq.Ft./ \$1972 (1)	Consumption (million sq.ft.)
	Nominal	CPI	1972		
1983	1048	0.422	442.3	0.039	17.2
1982	1006	0.433	435.6	0.039	17.0
1981	962	0.459	441.6	0.038	16.8
1980	1029	0.508	522.7	0.038	19.9
1979	1171	0.577	675.7	0.037	25.0
1978	1026	0.641	657.7	0.037	24.3

(1) Use-factors are interpolations based on Table 1.8, Appendix 1,
An Analysis of the Timber Situation in the U.S., 1952-2030.
1982. Forest Service, For. Res. Rep. 23.

TABLE D-24

Plywood and Veneer Used in Furniture
Manufacturing in Michigan
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1017	8.0	81.4
1977	939	7.5	70.4
1973	993	6.0	59.6

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total plywood and veneer consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.12, Appendix 1, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-25

Plywood and Veneer Used in Furniture
Manufacturing in Wisconsin
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1017	2.5	25.4
1977	939	2.4	22.5
1973	993	2.1	20.9

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total plywood and veneer consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.12, Appendix 1, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-26

Plywood and Veneer Used in Furniture
Manufacturing in Minnesota
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1017	1.0	10.2
1977	939	1.0	9.4
1973	993	0.9	8.9

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total plywood and veneer consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.12, Appendix 1, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-27

Plywood and Veneer Used in Pallet
Manufacturing in Michigan
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	557	8.0	44.6
1977	431	8.6	37.1
1973	270	9.9	26.7

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total plywood and veneer consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 3.18, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-28

Plywood and Veneer Used in Pallet
Manufacturing in Wisconsin
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	557	6.0	33.4
1977	431	5.6	24.1
1973	270	4.3	11.6

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total plywood and veneer consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 3.18, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-29

Plywood and Veneer Used in Pallet
Manufacturing in Minnesota
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	557	1.3	7.2
1977	431	1.3	5.6
1973	270	1.3	3.5

(1) This assumes that the state's share of value-added in SIC 2448, Wood pallets and skids, represents its share of the nation's total plywood and veneer consumption in pallet manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 3.18, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-30

Plywood and Veneer Used in Container
and Dunnage Manufacturing in Michigan
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	323	6.2	20.0
1977	335	6.4	21.4
1973	374	6.6	24.7

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total plywood and veneer consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Tables 3.19 and 3.20, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-31

Plywood and Veneer Used in Container
and Dunnage Manufacturing in Wisconsin
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	323	2.9	9.4
1977	335	2.8	9.4
1973	374	2.7	10.1

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total plywood and veneer consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Tables 3.19 and 3.20, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-32

Plywood and Veneer Used in Container
and Dunnage Manufacturing in Minnesota
(3/8-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	323	1.6	5.2
1977	335	1.6	5.4
1973	374	1.6	6.0

(1) This assumes that the state's share of value-added in all U.S. manufacturing industries represents its share of the nation's total plywood and veneer consumption in container and dunnage manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Tables 3.19 and 3.20, An Analysis of the Timber Situation in the U.S. 1982. Forest Service, For. Res. Rep. 23.

TABLE D-33

Veneer Log Production in the Lake States
(all species, MMBF, international 1/4-inch)

Year	MI	WI	MN	Total
1982				
1981		27.3		
1980	36.8	20.9	6.5	64.2
1979				
1978	35.2			
1977	42.8			
1976	33.4	31.7	4.5	69.6
1975	26.0	31.7	3.2	60.9
1974				
1973		32.2	5.2	
1972	18.6	19.5	4.2	42.3
1971				
1970	15.0	15.8	3.5	34.3
1969	19.2			
1968	19.3	21.1	5.2	45.6
1967				
1966	21.9	22.9	6.0	50.8
1965	22.4	24.4	8.5	55.3
1964				
1963	15.3	25.2	9.9	50.4
1962				
1961				
1960	18.5	25.5	10.2	54.2

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-34

Lake States Veneer Log Production by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.3	0.0	20.3	43.6	64.2
1979					
1978					
1977					
1976	0.4	0.0	21.9	47.4	69.7
1975	0.0	0.0	24.2	36.7	60.9
1974					
1973					
1972	0.0	0.0	2.6	39.5	42.1
1971					
1970	0.0	0.0	1.3	33.2	34.5
1969					
1968	0.0	0.0	0.6	45.0	45.6
1967					
1966	0.1	0.0	0.7	50.1	50.9
1965	0.0	0.0	0.6	53.8	54.4
1964					
1963	0.0	0.0	1.5	49.0	50.5
1962					
1961					
1960	0.0	0.0	2.1	51.9	54.0

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-35

Veneer Log Receipts in the Lake States
(all species, MMBF, international 1/4-inch)

Year	MI	WI	MN	Total
1982				
1981		34.5		
1980	27.3	27.9	3.5	58.7
1979				
1978	39.2			
1977	30.8			
1976	28.7	37.0	0.6	66.3
1975				
1974				
1973		37.8		
1972	5.4	36.6	0.5	42.5
1971				
1970	6.7	29.8	0.4	36.9
1969	15.1			
1968	9.6	37.6	0.5	47.7
1967				
1966	13.0	42.2	0.5	55.7
1965	12.4	43.0	1.1	56.5
1964				
1963	7.6	41.8	3.2	52.6
1962		37.6		
1961				
1960	12.1	51.3	1.1	64.5

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific
state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-36

Veneer Log Receipts in the Lake States by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.2	0.0	19.9	38.5	58.6
1979					
1978					
1977					
1976	0.4	0.0	21.5	44.5	66.4
1975					
1974					
1973					
1972	0.0	0.0	2.4	39.9	42.3
1971					
1970	0.0	0.0	1.3	35.8	37.1
1969					
1968	0.0	0.0	0.6	47.0	47.6
1967					
1966	0.1	0.0	0.7	54.6	55.4
1965	0.0	0.0	0.6	56.0	56.6
1964					
1963	0.0	0.0	1.5	51.2	52.7
1962					
1961					
1960	0.0	0.0	2.1	62.3	64.4

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific
state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-37

Veneer Log Imports and Exports in the Lake States
(million board feet, international 1/4-inch)

Year	IMPORTS			EXPORTS
	Other States	Canada	Total	Outside Region
1982				
1981				
1980	1.6	0.5	2.1	7.4
1979				
1978				
1977				
1976	2.5	0.5	3.0	6.4
1975				2.0
1974				
1973				
1972	1.6	3.1	4.7	4.6
1971				
1970	1.9	3.6	5.5	3.0
1969				
1968	3.0	4.9	7.9	5.9
1967				
1966	2.8	7.0	9.8	5.0
1965	1.8	5.8	7.6	6.3
1964				
1963	1.9	5.8	7.7	5.6
1962	2.8	4.8	7.6	
1961				
1960	5.4	7.1	12.5	2.2

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-38

Veneer Log Production in Michigan by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS							Total
	MI	WI	MN	IN	OH	KY	Other States	
1982								
1981								
1980	22.1	9.0	(1)				(2)5.6	36.8
1979								
1978	22.6	8.7	0.0	1.5	0.3	0.1	1.2	35.2
1977	30.4	8.5	0.0	2.3	0.3	0.5	0.0	42.8
1976	18.5	10.3	0.0				(2)4.6	33.4
1975	15.6	9.0	0.0	0.7	0.2	0.2	0.0	26.0
1974								
1973								
1972	4.6	10.9	0.0	1.5	0.7	0.4	0.0	18.6
1971								
1970	5.4	7.3	0.0				(2)2.3	15.0
1969	12.7	4.5	0.0	1.1	0.2	0.3	0.0	19.2
1968	8.4	8.0	0.0				(2)3.0	19.3
1967								
1966	10.7	8.3	0.0				(2)3.0	21.9
1965	10.3	8.0	0.0				(2)4.0	22.4
1964								
1963	5.3	5.9	0.0				(2)4.1	15.3
1962								
1961								
1960	8.6	8.7	0.0				(2)1.2	18.5

- (1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.
(2) Includes veneer logs shipped to states outside the Lake States and to Canada.
(3) Includes veneer logs shipped to Canada and other countries.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-39

Veneer Log Production in Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.1	0.0	11.0	25.7	36.8
1979					
1978	0.0	0.0	16.0	19.0	35.0
1977	0.0	0.0	22.2	20.5	42.7
1976	0.1	0.0	11.0	22.3	33.4
1975	0.0	0.0	12.7	13.4	26.1
1974					
1973					
1972	0.0	0.0	0.3	18.2	18.5
1971					
1970	0.0	0.0	0.1	15.0	15.1
1969	0.0	0.0	4.0	15.2	19.2
1968	0.0	0.0	0.2	19.1	19.3
1967					
1966	0.0	0.0	0.3	21.6	21.9
1965	0.0	0.0	0.4	22.0	22.4
1964					
1963	0.0	0.0	0.3	15.0	15.3
1962					
1961					
1960	0.0	0.0	0.2	18.3	18.5

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-40

Veneer Log Receipts in Michigan by State of Origin
(all species, million board feet, international 1/4-inch)

Year	IMPORTS					Total
	MI	WI	MN	(1) Other States	Canada	
1982						
1981						
1980	22.1	5.2	0.0	0.0	0.0	27.3
1979						
1978	22.6	15.0	1.0	0.5	0.1	39.2
1977	30.4	0.0	0.0	0.4	0.0	30.8
1976	18.5	9.8	0.4	0.0	0.0	28.7
1975						
1974						
1973						
1972	4.6	0.1	0.0	0.0	0.7	5.4
1971						
1970	5.4	0.1	0.1	0.2	0.9	6.7
1969	12.7	1.5	0.3	0.1	0.5	15.1
1968	8.4	0.3	0.2	0.3	0.4	9.6
1967						
1966	10.7	0.6	0.1	0.2	1.4	13.0
1965	10.3	0.8	0.1	0.2	1.0	12.4
1964						
1963	5.3	0.5	0.2	0.2	1.4	7.6
1962						
1961						
1960	8.6	0.5	0.5	0.2	2.3	12.1

(1) Includes shipments from Indiana, Kentucky, Ohio and small amounts from other Central and Western states.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-41

Veneer Log Receipts in Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.0	0.0	15.7	11.5	27.2
1979					
1978	0.0	0.0	31.7	7.4	39.1
1977	0.0	0.0	22.2	8.7	30.9
1976	0.1	0.0	21.0	7.7	28.8
1975					
1974					
1973					
1972	0.0	0.0	0.2	5.1	5.3
1971					
1970	0.0	0.0	0.1	6.7	6.8
1969	0.0	0.0	5.1	10.0	15.1
1968	0.0	0.0	0.2	9.4	9.6
1967					
1966	0.0	0.0	0.2	12.6	12.8
1965	0.0	0.0	0.3	12.1	12.4
1964					
1963	0.0	0.0	0.2	7.4	7.6
1962					
1961					
1960	0.0	0.0	0.0	12.1	12.1

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-42

Veneer Log Imports into Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.0	0.0	5.2	0.0	5.2
1979					
1978	0.0	0.0	16.0	0.6	16.6
1977	0.0	0.0	0.0	0.5	0.5
1976	0.1	0.0	10.0	0.2	10.3
1975					
1974					
1973					
1972	0.0	0.0	0.0	0.8	0.8
1971					
1970	0.0	0.0	0.0	1.3	1.3
1969	0.0	0.0	1.1	1.2	2.3
1968	0.0	0.0	0.0	1.2	1.2
1967					
1966	0.0	0.0	0.0	2.1	2.1
1965	0.0	0.0	0.0	2.1	2.1
1964					
1963	0.0	0.0	0.0	2.3	2.3
1962					
1961					
1960	0.0	0.0	0.0	3.4	3.4

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-43

Veneer Log Exports from Michigan by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.1	0.0	0.5	14.2	14.8
1979					
1978	0.0	0.0	0.2	12.2	12.4
1977	0.0	0.0	0.0	12.3	12.3
1976	0.1	0.0	0.0	14.7	14.8
1975	0.0	0.0	0.0	10.5	10.5
1974					
1973					
1972	0.0	0.0	0.0	13.9	13.9
1971					
1970	0.0	0.0	0.0	9.6	9.6
1969	0.0	0.0	0.0	6.5	6.5
1968	0.0	0.0	0.0	11.0	11.0
1967					
1966	0.0	0.0	0.1	11.2	11.3
1965	0.0	0.0	0.0	12.0	12.0
1964					
1963	0.0	0.0	0.1	10.0	10.1
1962					
1961					
1960	0.0	0.0	0.2	9.9	10.1

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-44

Veneer Log Production in Wisconsin by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS				Total
	WI	MN	MI	(1)Other	
1982					
1981	14.2	0.0	12.4	0.6	27.3
1980	14.3	(2)0	5.2	1.3	20.9
1979					
1978					
1977					
1976	20.8	0.0	9.8	1.1	31.7
1975	20.4	0.1	10.9	0.3	31.7
1974					
1973	19.6	0.0	11.4	1.2	32.2
1972	18.2	0.0	0.1	1.2	19.5
1971					
1970	14.1	0.0	0.1	0.6	15.8
1969					
1968	18.9	0.0	0.3	1.9	21.1
1967					
1966	20.5	0.0	0.6	1.8	22.9
1965	22.5	0.0	0.8	1.1	24.4
1964					
1963	23.8	0.0	0.5	0.9	25.2
1962					
1961					
1960	24.2	0.0	0.5	0.8	25.5

(1) Other states that receive WI exports include Indiana, Iowa, Kentucky and Missouri. Canada and other countries also receive some veneer log exports from WI.

(2) MN-WI veneer log receipts were combined in 1980 survey. This study assumes that all WI production was retained.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-45

Veneer Log Production in Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	0.0	0.0	13.0	14.2	27.2
1980	0.2	0.0	5.8	14.9	20.9
1979					
1978					
1977					
1976	0.3	0.0	10.1	21.3	31.7
1975	0.0	0.0	11.1	20.5	31.6
1974					
1973	0.0	0.0	11.5	20.6	32.1
1972	0.0	0.0	2.1	17.3	19.4
1971					
1970	0.0	0.0	1.2	14.7	15.9
1969					
1968	0.0	0.0	0.4	20.7	21.1
1967					
1966	0.1	0.0	0.4	22.4	22.9
1965	0.0	0.0	0.2	24.2	24.4
1964					
1963	0.0	0.0	0.2	25.0	25.2
1962					
1961					
1960	0.0	0.0	1.3	24.1	25.4

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-46

Veneer Log Receipts in Wisconsin by State of Origin
(all species, million board feet, international 1/4-inch)

Year	IMPORTS					Total
	WI	MN	MI	(1) Other States	Canada	
1982						
1981	14.2	2.5	14.1	3.0	0.7	34.5
1980	(2) 14.3	2.5	9.0	1.6	0.5	27.9
1979						
1978						
1977						
1976	20.8	3.0	10.3	2.4	0.5	37.0
1975						
1974						
1973	19.6	4.1	10.9	2.0	1.2	37.8
1972	18.2	3.5	10.9	1.6	2.4	36.6
1971						
1970	15.1	3.0	7.3	1.7	2.7	29.8
1969						
1968	18.9	3.5	8.0	2.7	4.5	37.6
1967						
1966	20.5	5.2	8.3	2.6	5.6	42.2
1965	22.5	6.1	8.0	1.6	4.8	43.0
1964						
1963	23.8	6.1	5.9	1.7	4.3	41.8
1962	18.8	6.2	5.0	2.8	4.8	37.6
1961						
1960	24.2	8.4	8.7	5.2	4.8	51.3

(1) Other states include Iowa, Illinois, Indiana and Pennsylvania
(2) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-47

Veneer Log Receipts in Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	0.2	0.0	0.6	33.8	34.6
1980	(1) 0.2	0.0	0.7	27.0	27.9
1979					
1978					
1977					
1976	0.3	0.0	0.5	36.2	37.0
1975					
1974					
1973	0.0	0.0	0.4	37.3	37.7
1972	0.0	0.0	2.2	34.3	36.5
1971					
1970	0.0	0.0	1.2	28.7	29.9
1969					
1968	0.0	0.0	0.4	37.1	37.5
1967					
1966	0.1	0.0	0.5	41.5	42.1
1965	0.0	0.0	0.3	42.8	43.1
1964					
1963	0.0	0.0	0.3	41.6	41.9
1962					
1961					
1960	0.0	0.0	2.1	49.2	51.3

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-48

Veneer Log Imports into Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	0.1	0.0	0.0	20.2	20.3
1980	(1)0.1	0.0	0.2	13.4	13.5
1979					
1978					
1977					
1976	0.1	0.0	0.0	16.1	16.2
1975					
1974					
1973	0.0	0.0	0.2	17.9	18.1
1972	0.0	0.0	0.1	18.3	18.4
1971					
1970	0.0	0.0	0.0	14.7	14.7
1969					
1968	0.0	0.0	0.0	18.7	18.7
1967					
1966	0.0	0.0	0.1	21.6	21.7
1965	0.0	0.0	0.0	20.5	20.5
1964					
1963	0.0	0.0	0.1	18.0	18.1
1962					
1961					
1960	0.0	0.0	0.7	26.3	27.0

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-49

Veneer Log Exports from Wisconsin by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981	0.0	0.0	12.4	0.6	13.0
1980	0.0	0.0	(1)5.2	1.3	6.5
1979					
1978					
1977					
1976	0.1	0.0	9.6	1.2	10.9
1975	0.0	0.0	10.9	0.4	11.3
1974					
1973	0.0	0.0	11.3	1.3	12.6
1972	0.0	0.0	0.0	1.3	1.3
1971					
1970	0.0	0.0	0.0	0.7	0.7
1969					
1968	0.0	0.0	0.0	2.2	2.2
1967					
1966	0.0	0.0	0.0	2.4	2.4
1965	0.0	0.0	0.0	1.9	1.9
1964					
1963	0.0	0.0	0.0	1.4	1.4
1962					
1961					
1960	0.0	0.0	0.0	1.2	1.2

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-50

Veneer Log Production in Minnesota by State of Destination
(all species, million board feet, international 1/4-inch)

Year	EXPORTS				Total
	WI	MN	MI	(1)Other	
1982					
1981					
1980	(2)3.5	0.0	2.5	0.5	6.5
1979					
1978					
1977					
1976	0.4	0.4	3.0	0.7	4.5
1975	0.4	0.4	2.1	0.3	3.2
1974					
1973	0.4	0.5	4.1	0.2	5.2
1972	0.4	0.0	3.5	0.3	4.2
1971					
1970	0.3	0.1	3.0	0.1	3.5
1969					
1968	0.5	0.2	3.5	1.0	5.2
1967					
1966	0.5	0.1	5.2	0.2	6.0
1965	1.1	0.1	6.1	1.2	8.5
1964					
1963	3.0	0.2	6.1	0.6	9.9
1962					
1961					
1960	1.1	0.5	8.4	0.2	10.2

(1) Other states that receive MN exports include Indiana, Iowa, Kentucky and Missouri. Canada and other countries also receive some veneer log exports.

(2) MN-WI veneer log receipts were combined in 1980 survey. The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-51

Veneer Log Production in Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	0.0	0.0	3.5	3.0	6.5
1979					
1978					
1977					
1976	0.0	0.0	0.8	3.8	4.6
1975	0.0	0.0	0.4	2.8	3.2
1974					
1973	0.0	0.0	0.5	4.6	5.1
1972	0.0	0.0	0.2	4.0	4.2
1971					
1970	0.0	0.0	0.0	3.5	3.5
1969					
1968	0.0	0.0	0.0	5.2	5.2
1967					
1966	0.0	0.0	0.0	6.1	6.1
1965	0.0	0.0	0.0	7.6	7.6
1964					
1963	0.0	0.0	1.0	9.0	10.0
1962					
1961					
1960	0.0	0.0	0.6	9.5	10.1

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Veneer log production, determined from mill receipts, is the annual volume of veneer logs cut in a specific state or region.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-52

Veneer Log Receipts in Minnesota by State of Origin
(all species, million board feet, international 1/4-inch)

Year	IMPORTS				Total
	MN	MI	WI	Other States	
1982					
1981					
1980					
1979					
1978					
1977					
1976					
1975					
1974					
1973					
1972					
1971					
1970					
1969					
1968					
1967					
1966					
1965					
1964					
1963					
1962					
1961					
1960					

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-53

Veneer Log Receipts in Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980					
1979					
1978					
1977					
1976					
1975					
1974					
1973					
1972					
1971					
1970					
1969					
1968					
1967					
1966					
1965					
1964					
1963					
1962					
1961					
1960					

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North Central Region, NCFES Res. Bull. series.

Receipts are the volume of veneer logs received in a specific state or region, regardless of geographic source.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-54

Veneer Log Imports into Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	(1)0.0	0.0	0.0	0.0	0.0
1979					
1978					
1977					
1976	0.0	0.0	0.0	0.2	0.2
1975					
1974					
1973					
1972	0.0	0.0	0.0	0.1	0.1
1971					
1970	0.0	0.0	0.0	0.1	0.1
1969					
1968	0.0	0.0	0.0	0.0	0.0
1967					
1966	0.0	0.0	0.0	0.0	0.0
1965	0.0	0.0	0.0	0.0	0.0
1964					
1963	0.0	0.0	0.0	0.1	0.1
1962					
1961					
1960	0.0	0.0	0.0	0.0	0.0

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-55

Veneer Log Exports from Minnesota by Species Group
(million board feet, international 1/4-inch)

Year	Pine	Other Sftwds	Aspen	Other Hrdwds	Total
1982					
1981					
1980	(1)0.0	0.0	0.0	3.0	3.0
1979					
1978					
1977					
1976	0.0	0.0	0.8	3.4	4.2
1975	0.0	0.0	0.4	2.4	2.8
1974					
1973	0.0	0.0	0.4	4.3	4.7
1972	0.0	0.0	0.2	3.6	3.8
1971					
1970	0.0	0.0	0.0	3.1	3.1
1969					
1968	0.0	0.0	0.0	4.7	4.7
1967					
1966	0.0	0.0	0.0	5.6	5.6
1965	0.0	0.0	0.0	6.5	6.5
1964					
1963	0.0	0.0	0.0	6.9	6.9
1962					
1961					
1960	0.0	0.0	0.6	8.5	9.1

(1) MN-WI veneer log receipts were combined in 1980 survey.
The study assumes that most of these receipts were within WI.

Source: Veneer Log Production and Receipts, North
Central Region, NCFES Res. Bull. series.

* Figures may differ from NCFES data due to rounding.

* "0" means less than 50 thousand board feet.

TABLE D-56

STRUCTURAL PANEL PRODUCTION IN THE LAKE STATES

FIGURE E-1

PARTICLEBOARD PRODUCTIVE-CAPACITY IN THE LAKE STATES

FIGURE E-2

FIGURE E-3

Structural Panel Production
in the Lake States
(in million square feet, 3/8-inch)

Year	MI	MN	WI	Total
1983	(2)185	(4)670	(1)151	1006
1982	(2)21	(3)328	(1)99	448
1981	(1)19	(3)148	(1)111	278
1980	(1)20	(1)65	(1)70	155

Estimates are from Economics Report E37,
American Plywood Association.

() shows the number of mills

By definition, structural panel includes softwood plywood, waferboard, oriented strand board and composite plywood. Waferboard and OSB comprise most of the production in the Lake States. They are referred to as structural particleboard throughout the study.

TABLE E-1

Particleboard Productive-Capacity
in the Lake States
(in million square feet, 3/4-inch)

Year	MI	MN	WI	Total
1984	(1)200	----	(2)99	299
1981	(1)180	----	(2)91	271
1980	(1)172	----	(2)81	253
1976	(1)108	(2)45	(2)86	239

Estimates are from the National Particleboard Association, Capacity Surveys.

() shows the number of mills

Lake States mills produce "platenboard" or "mat-formed" particleboard which is used primarily in industrial markets.

TABLE E-2

Particleboard Used in Single-family
Home Construction in the Lake States
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1) (1000)	Total (million sq.ft.)
1981	34.5	0.52	17.9
1977	92.7	0.38	34.9
1973	82.4	0.30	24.6

- (1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-3

Particleboard Used in Multi-family
Home Construction in the Lake States
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	20.3	0.16	3.1
1977	45.6	0.11	4.9
1973	58.0	0.09	4.9

- (1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-4

Particleboard Used in New Mobile
Homes in the Lake States
(3/4-inch basis)

Year	(1)Ship- ments (1000)	(2)Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	11.4	0.85	9.6
1977	17.5	0.86	15.0
1973	39.0	0.71	27.7

- (1) Mobile home shipments to the Lake States are estimated from shipments to the North Central region, assuming that the Lake State's share is the same as its share of residential construction within the North Central region.
- (2) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-5

Particleboard Used in Furniture
Manufacturing in the Lake States
(3/4-inch basis)

Year	U.S. Consumption (million sq.ft.)	Region Share(1) (%)	Region Consumption (million sq.ft.)
1981	1739	11.5	200.0
1977	1476	10.9	160.9
1973	1145	9.0	103.1

(1) This assumes that the region's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.14, Appendix 1, An Analysis of the Timber Situation in the U.S., 1982. By definition, particleboard includes waferboard, OSB, composite board and medium-density fiberboard.

TABLE E-6

Particleboard Used in Single-family
Home Construction in Michigan
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home(1) (1000)	Total (million sq.ft.)
1981	11.1	0.52	5.8
1977	39.3	0.38	14.8
1973	45.6	0.30	13.6

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-7

Particleboard Used in Multi-family
Home Construction in Michigan
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	7.6	0.16	1.2
1977	19.4	0.11	2.1
1973	32.1	0.09	2.7

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-8

Particleboard Used in New Mobile
Homes in Michigan
(3/4-inch basis)

Year	(1)Ship- ments (1000)	(2)Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	4.3	0.85	3.6
1977	7.5	0.86	6.4
1973	22.3	0.71	15.8

(1) Mobile home shipments to the state are estimated from shipments to the North Central region, assuming that the state's share is the same as its share of residential construction within the region.

(2) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-9

Particleboard Used in Single-family
Home Construction in Wisconsin
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home(1) (1000)	Total (million sq.ft.)
1981	8.2	0.52	4.3
1977	27.7	0.38	10.4
1973	21.9	0.30	6.5

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-10

Particleboard Used in Multi-family
Home Construction in Wisconsin
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	5.7	0.16	0.9
1977	13.6	0.11	1.5
1973	15.4	0.09	1.3

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-11

Particleboard Used in New Mobile
Homes in Wisconsin
(3/4-inch basis)

Year	(1)Ship- ments (1000)	(2)Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	3.1	0.85	2.6
1977	5.0	0.86	4.3
1973	10.0	0.71	7.1

(1) Mobile home shipments to the state are estimated from shipments to the North Central region, assuming that the state's share is the same as its share of residential construction within the region.

(2) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-12

Particleboard Used in Single-family
Home Construction in Minnesota
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1) (1000)	Total (million sq.ft.)
1981	15.2	0.52	7.9
1977	25.7	0.38	9.7
1973	14.9	0.30	4.4

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-13

Particleboard Used in Multi-family
Home Construction in Minnesota
(3/4-inch basis)

Year	Const. Permits (1000)	Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	7.0	0.16	1.1
1977	12.6	0.11	1.3
1973	10.5	0.09	0.9

(1) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-14

Particleboard Used in New Mobile
Homes in Minnesota
(3/4-inch basis)

Year	(1) Ship- ments (1000)	(2) Sq.ft./ Home (1000)	Total (million sq.ft.)
1981	4.0	0.85	3.4
1977	5.0	0.86	4.3
1973	6.7	0.71	4.8

(1) Mobile home shipments to the state are estimated from shipments to the North Central region, assuming that the state's share is the same as its share of residential construction within the region.

(2) Use-factors are interpolations from Table 1.5, Appendix 1, An Analysis of the Timber Situation in the U.S. By definition, particleboard includes waferboard, OSB, composite board, and medium-density fiberboard.

TABLE E-15

Particleboard Used in Furniture
Manufacturing in Michigan
(3/4-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1739	8.0	139.1
1977	1476	7.5	110.7
1973	1145	6.0	68.7

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.14, Appendix 1, An Analysis of the Timber Situation in the U.S., 1982. By definition, particleboard includes waferboard, OSB, composite board and medium-density fiberboard.

TABLE E-16

Particleboard Used in Furniture
Manufacturing in Wisconsin
(3/4-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1739	2.5	43.5
1977	1476	2.4	35.4
1973	1145	2.1	24.0

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.14, Appendix 1, An Analysis of the Timber Situation in the U.S., 1982. By definition, particleboard includes waferboard, OSB, composite board and medium-density fiberboard.

TABLE E-17

Particleboard Used in Furniture
Manufacturing in Minnesota
(3/4-inch basis)

Year	U.S. Consumption (million sq.ft.)	State Share(1) (%)	State Consumption (million sq.ft.)
1981	1739	1.0	17.4
1977	1476	1.0	14.8
1973	1145	0.9	10.3

(1) This assumes that the state's share of value-added in SIC 25, Furniture and Fixtures, represents its share of the nation's total lumber consumption in furniture manufacturing. Trends shown in the 1972 and 1977 Censuses of Manufactures are extended to 1981.

U.S. Consumption estimates are interpolations based on Table 1.14, Appendix 1, An Analysis of the Timber Situation in the U.S., 1982. By definition, particleboard includes waferboard, OSB, composite board and medium-density fiberboard.

TABLE E-18

RESIDENTIAL FUELWOOD CONSUMPTION IN THE LAKE STATES

(million standard cords)

Year	MI	WI	MN	Total
1982	3.20			
1981	2.90	(2)2.02		
1980	(1)1.65	1.37	1.37	4.39

(1) Residential Fuelwood Study by Michigan State University.

(2) Blyth, J.E. 1981. Fuelwood Production and Sources in Wisconsin, 1981. NCFES Res. Bull. NC-75.

Other data is from residential fuelwood surveys conducted by state departments of natural resources, in cooperation with Northeastern Area State and Private Forestry, U.S. Forest Service.

TABLE F-1