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North Central
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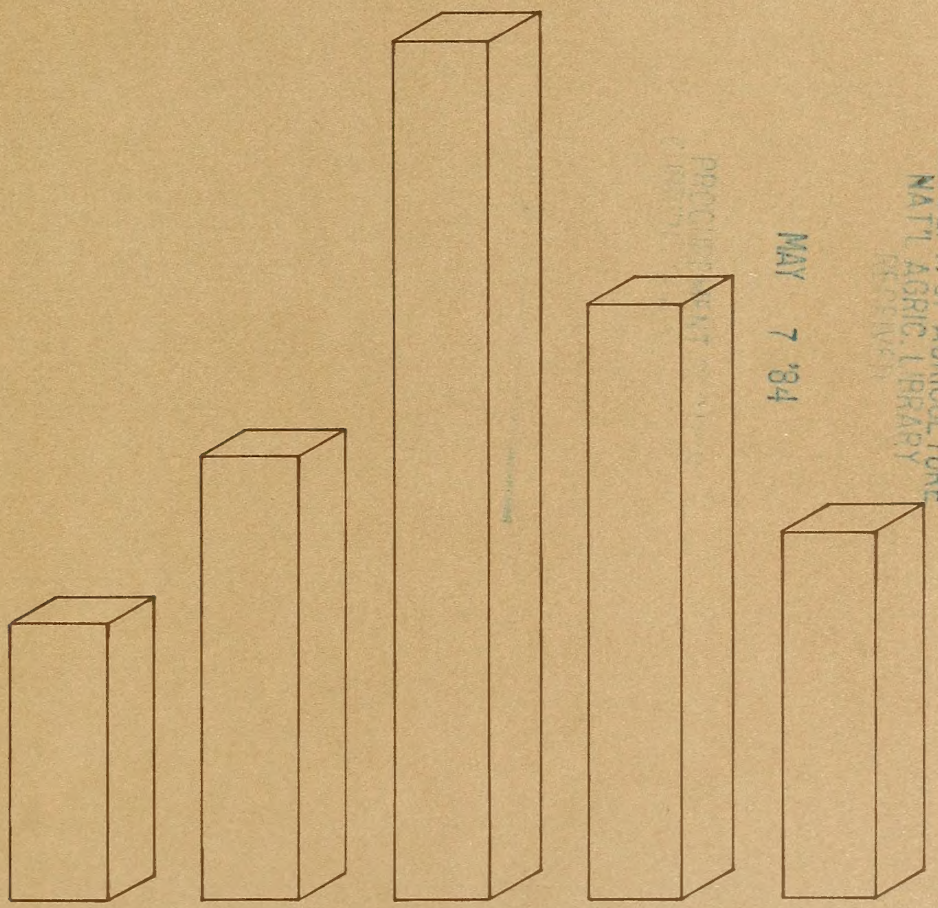
Station

Resource
Bulletin **NC-68**

# Michigan's Fourth Forest Inventory: AREA

John S. Spencer, Jr.



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Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complete retrieval involving the services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

# FOREWORD

Forest Inventory and Analysis (formerly called Resources Evaluation) is a continuing endeavor as mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974, which was preceded by the McSweeney-McNary Forest Research Act of 1928. Its objective is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. This kind of up-to-date information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Inventory and Analysis work done in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the 1980 Michigan forest inventory was begun in October 1977 and was completed in May 1981. Reports on the three previous surveys of Michigan's timber resource are dated 1935, 1955, and 1966.

Resource Bulletins reporting statistical highlights and detailed tables of the four Survey Units in Michigan are available.

More accurate survey information was obtained during the 1980 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and personnel provided the North Central Station by the Michigan Department of Natural Resources and by interested forest industries. Data from the Department's canvass of all primary wood-using plants in the State were used to help estimate the quantity of timber products harvested in Michigan.

Aerial photos used in the Michigan Forest Inventory were furnished by the Michigan Department of Natural Resources and the National Forests.

# CONTENTS

# MICHIGAN'S FOURTH FOREST INVENTORY: AREA

**John S. Spencer, Jr.,** *Principal Resource Analyst*

## HIGHLIGHTS

- Forest land declined from 19.4 to 18.4 million acres between 1966 and 1980.
- Commercial forest land dropped from 18.9 to 17.5 million acres during the same 14-year period, a 7 percent loss.
- Greatest proportional loss of commercial forest was in the Southern Lower Peninsula—12 percent.
- Noncommercial forest area increased from 516 to 879 thousand acres between surveys, mostly from a doubling of productive-reserved forest area.
- Eighty-two percent of the land area in the Western Upper Peninsula is commercial forest land—highest proportion in the State.
- Nonindustrial private parties own 53 percent of the total commercial forest area.
- One-fourth of the commercial forest owned by nonindustrial private parties is in tracts from 101 to 500 acres in size.
- Thirty-eight percent of the nonindustrial private forest land has been owned by the same party for at least 20 years.
- The maple-birch forest type increased from 5.2 million acres in 1966 (28 percent of the total commercial area) to 6.1 million acres in 1980 (35 percent of the total commercial area).
- Poletimber stands account for the largest area by stand-size class—7.8 million acres or 44 percent of the total.
- The largest commercial area is in stands from 41 to 60 years old.
- Forest plantations total 1.2 million acres in 1980, 7 percent of the total commercial forest area.
- Fifty-eight percent of commercial forest is on deep, well-drained soils .
- Average site index is 61.2 feet, compared to a Lake States average of 59.1 feet.
- Timber was harvested on 2.4 million acres between 1966 and 1980.
- Eighty-seven percent of the commercial forest is medium-stocked or better.
- Thirty-nine percent of the commercial forest land is within ¼ mile of a maintained road.

* * * *

From the deep northern hardwood stands of the Upper Peninsula to the scattered oak-hickory woodlots of the southern Lower Peninsula, forest land declined from 19.4 to 18.4 million acres between 1966 and 1980. This 5.2 percent drop averages out to a loss of 72 thousand acres per year.

## FOREST LAND USE AND OWNERSHIP

### Commercial Forest Area Falls 7.3 Percent

Commercial forest land, which accounts for 95 percent of the total forest land, dropped from 18.9[1] to 17.5 million acres between 1966 and 1980. The average yearly loss was 98 thousand acres during the 14 years between surveys. The annual rate of change, then, was (-) 0.5 percent compared to (-) 0.7 percent in Minnesota and (-) 0.2 percent in Wisconsin from the most recent inventories of the latter two States.

The loss of commercial forest land varied widely by Survey Unit (fig. 1). The Southern Lower Peninsula Unit showed the greatest proportional decline between surveys (12.4 percent), and the Northern Lower Peninsula Unit revealed the smallest decline (3.7 percent) (table 1).

The remeasurement of plots established during the 1966 inventory permitted a rough idea of the

[1] *1966 area figures have been adjusted slightly from those published after the 1966 survey to conform to 1980 areas due to changes in survey procedures and definitions.*

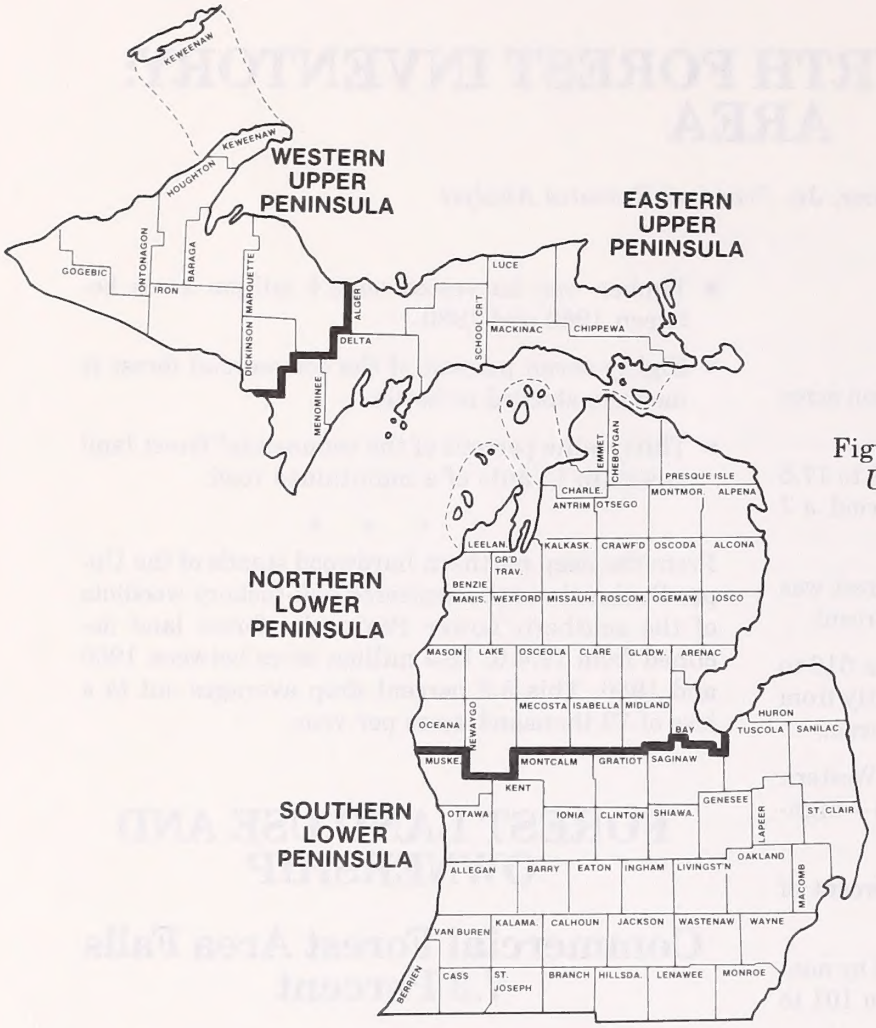


Figure 1.—*Michigan Forest Survey Units, 1980.*

Table 1.—*Area of commercial forest land, Michigan, 1966 and 1980, and percent change between surveys*

| Survey Unit | Area of commercial forest | | Percent change |
|---|---|---|---|
| | 1966 | 1980 | |
| | (Thousand acres) | | |
| Western Upper Peninsula | 4,920.9 | 4,529.6 | (-) 8.0 |
| Eastern Upper Peninsula | 4,169.1 | 3,801.6 | (-) 8.8 |
| Northern Lower Peninsula | 6,955.1 | 6,694.9 | (-) 3.7 |
| Southern Lower Peninsula | 2,812.2 | 2,463.4 | (-) 12.4 |
| State Total | 18,857.3 | 17,489.5 | (-) 7.3 |

uses made of some of the commercial forest lost between surveys. Because plots were not remeasured on all the National Forests or on State land, the results cannot be applied to that land. Analysis of the plots showed that 95 percent of them remained commercial forest land in 1980. Of the plots that changed land use, half were converted to the urban and related classification as shown in the following tabulation:

| Land use class | Percent of remeasured commercial forest plots by land use class in 1980[2] |
|---|---|
| Commercial forest | 95.4 |
| Urban and related | 2.4 |
| Water and marsh | 0.9 |
| Cropland | 0.5 |
| Productive-reserved forest | 0.4 |
| Unproductive forest | 0.2 |
| Pasture and range | 0.2 |
| Total | 100.0 |

## Timber Harvest Most Extensive Treatment Between Surveys

As field crews remeasure field plots, they gather information concerning man-caused disturbance or improvement to the timber stand since the past survey. They also record any damage (natural or man-

[2]*Excludes National Forest and State commercial forest land.*

caused) to the stand. The estimate of stand history resulting from this information is useful in gauging the intensity of management or level of damage in the State's commercial forest.

Between 1966 and 1980, 79 percent of the commercial forest (13.8 million acres) was undisturbed by man and suffered no major damage (table 2). The changes that did occur to this area were the result of natural processes.

Timber harvest affected 2.4 million acres between surveys, 14 percent of the commercial forest and more than any other treatment class. Partial cutting was observed on 79 percent of the harvested area, and clearcutting accounted for the remaining 21 percent. Even though forest industry land makes up only 11 percent of the commercial forest, harvesting on it accounted for 22 percent of the acres harvested by all owners.

Timber stand improvement was the next most extensive treatment, having been performed on 0.7 million acres, 4 percent of the total commercial area. Ninety percent of this work (mostly thinnings) was done on public land, although another 9 percent of it was performed on nonindustrial privately owned forest land.

Tree planting was the treatment on 0.4 million acres, 3 percent of the total area. About one-fifth of the tree planting was done on formerly nonforest land. Nonindustrial private land accounted for 53 percent of the acres planted and public land accounted for 45 percent of it.

Significant damage was observed on 0.2 million acres. Most of it (86 percent) was due to natural causes such as disease, wind, fire, or insects. The remainder was man-caused, primarily flooding and draining.

## Area of Noncommercial Forest Increases

Noncommercial forest land jumped from 516 to 879 thousand acres between 1966 and 1980, a gain of 70 percent. Most of this increase was due to the doubling of productive-reserved forest land, from 311 to 622 thousand acres. The new productive-reserved areas consist of scattered tracts throughout the State and include State recreation areas, State parks, State sharptail grouse management areas, the Sleeping Bear National Lakeshore, the Sturgeon River and Sylvania RARE II areas, the McCormick and Sylvania tracts on the Ottawa National Forest, and others. Most of these areas were classed as commercial forest before they were designated as places where timber harvesting would be precluded and, therefore, they represent part of the reason for the decline in commercial forest between surveys.

Unproductive forest land, that incapable of growing crops of industrial wood because of adverse site conditions, also increased between surveys—from 205 to 257 thousand acres.

## Nonforest Land With Trees—An Additional Resource

Besides commercial and noncommercial forest land, some nonforest land grows trees, too—in some cases

Table 2.—*Area of commercial forest land by treatment or damage class and owner group, Michigan, 1966-1980*

(In thousand acres)

| Treatment or damage class 1966-1980 | Owner group | | | | |
|---|---|---|---|---|---|
| | All owners | Public | Forest industry | Farmer | Miscellaneous private |
| No disturbance | 13,782.6 | 4,575.2 | 1,424.7 | 2,599.1 | 5,183.6 |
| Timber stand improvement | 656.3 | 590.9 | 7.6 | 29.3 | 28.5 |
| Harvest (clearcut) | 487.5 | 291.5 | 50.6 | 39.9 | 105.5 |
| Harvest (partial cut) | 1,870.2 | 512.6 | 472.9 | 325.1 | 559.6 |
| Damage (natural) | 198.7 | 86.3 | 11.6 | 22.5 | 78.3 |
| Damage (man-caused) | 33.0 | 11.4 | 2.3 | 3.8 | 15.5 |
| Artificial regeneration: | | | | | |
| Forest land | 340.8 | 177.1 | 7.9 | 43.1 | 112.7 |
| Nonforest land | 96.1 | 19.2 | 1.6 | 24.2 | 51.1 |
| Natural regeneration: | | | | | |
| Nonforest land | 24.3 | 2.5 | 1.5 | 4.4 | 15.9 |
| All treatments | 17,489.5 | 6,266.7 | 1,980.7 | 3,091.4 | 6,150.7 |

in substantial numbers. To be classed as nonforest land with trees, an area must contain at least one tree per acre that is at least 5 inches in diameter at breast height (d.b.h.). Such areas amount to 719 thousand acres in Michigan.

As shown in the following tabulation, wooded strips are the largest portion of this area with 241 thousand acres. They meet the definition for commercial forest except that they are in parcels less than 120 feet wide. In general, nonforest land with trees offers some opportunities for management and harvest, particularly for fuelwood. However, the small areas involved and the scattered frequency of the trees impose economic constraints on the harvest of other timber products.

| Land use | Area of nonforest land with trees (Thousand acres) |
|---|---|
| Wooded strips | 241.3 |
| Marsh | 235.3 |
| Cropland | 96.8 |
| Improved pasture | 82.2 |
| Windbreaks | 37.5 |
| Wooded pasture | 13.4 |
| Idle farmland | 12.8 |
| Total | 719.3 |

## Upper Peninsula Most Heavily Timbered

Commercial forests grow on 79 percent of the land area in the Upper Peninsula compared to 35 percent in the Lower Peninsula. The Western Upper Peninsula is the most heavily forested Survey Unit with 82 percent of its land area in commercial forest, and it contains the three most heavily forested counties in the State: Baraga (89 percent), Gogebic (88), and Iron (87). Every county in the Western Upper Peninsula maintains commercial forest cover on at least three-fourths of its land area except Keweenaw County, which has a large area of productive-reserved forest in Isle Royal National Park. Least heavily forested counties are generally found in the Southern Lower Peninsula, although Bay County in the Northern Lower Peninsula has the lowest proportion of commercial forest land in the State (6 percent) (fig. 2).

## Nonindustrial Private Owners Account for 53 percent of Commercial Forest

Private parties (other than farmers) own the largest share of the State's commercial forest, 6.1 million acres or 35 percent of the total. When combined with the 3.1 million acres owned by farmers (18 percent of the total), the resulting 9.2 million acres of nonindustrial private-owned commercial forest represents over half of Michigan's total (fig. 3). Nonindustrial private owners are a diverse group representing many persons with contrasting backgrounds, goals and strategies of management.

Nonindustrial private parties own more area in the Lower Peninsula (67 percent) than in the Upper Peninsula (37 percent). For example, farmers only own 4 percent of the commercial forest in the Western Upper Peninsula but they own 47 percent of it in the Southern Lower Peninsula.

One-fifth of the nonindustrial private forest land is owned by parties with more than 500 acres of commercial forest land. Another one-fourth is owned by parties with from 101 to 500 acres as shown in the following tabulation. These areas represent the total area owned by an individual, and may include one or more non-contiguous tracts.

| Size of holding (Acres) | Area owned by nonindustrial private parties (Thousand acres) |
|---|---|
| 1-4 | 180.0 |
| 5-10 | 432.8 |
| 11-20 | 684.6 |
| 21-50 | 2,017.1 |
| 51-100 | 1,746.5 |
| 101-500 | 2,418.4 |
| 501-2,500 | 709.2 |
| 2,501-5,000 | 68.4 |
| 5,001 + | 985.0 |
| Total | 9,242.0 |

Thirty-eight percent of the nonindustrial private forest land has been owned by the same party for 20 years or more:

| Owner tenure (Years) | Area owned by nonindustrial private parties (Thousand acres) |
|---|---|
| 1-4 | 1,837.6 |
| 5-9 | 1,755.6 |
| 10-19 | 2,146.3 |
| 20 + | 3,502.5 |
| Total | 9,242.0 |

## State Owns 20 Percent of Commercial Forest

The State of Michigan owns 3.6 million acres of commercial forest, half of which is in the Northern Lower Peninsula. National Forests account for 2.4 million acres (14 percent of the total), approximately evenly divided among the three northernmost Survey Units. Forest industry holds 2.0 million acres

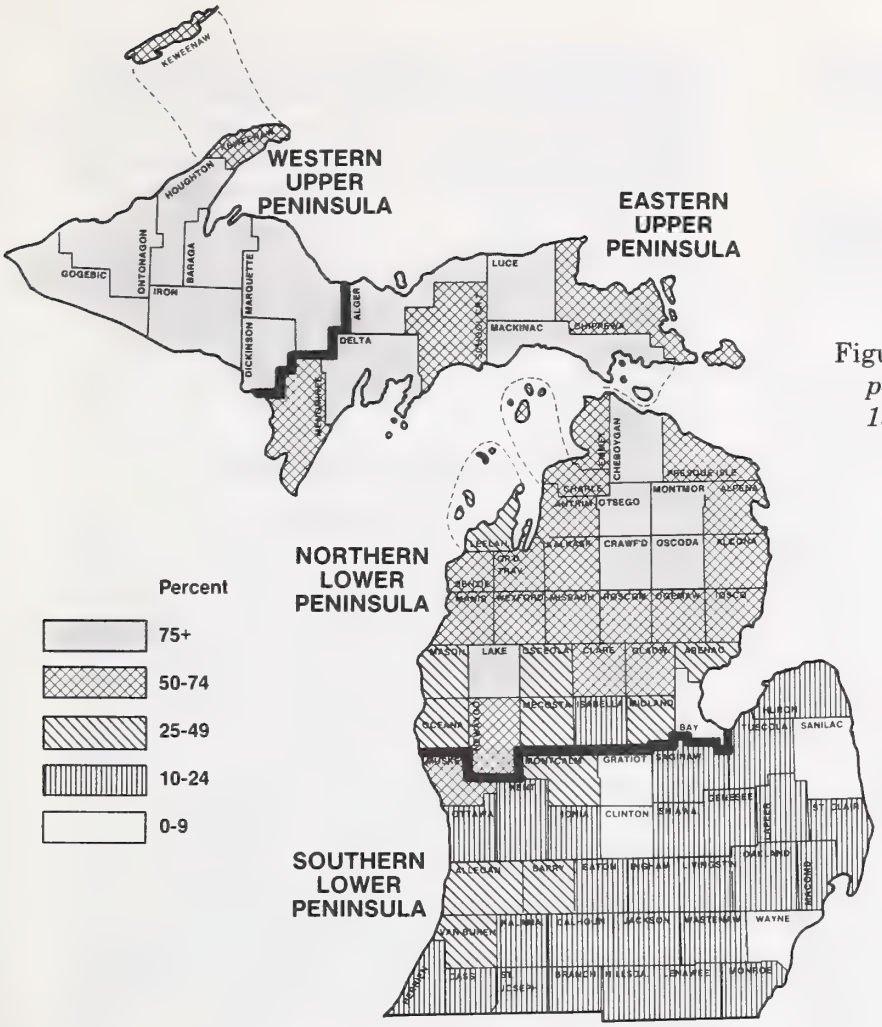


Figure 2.—*Commercial forest area as a percent of all land area, Michigan, 1980.*

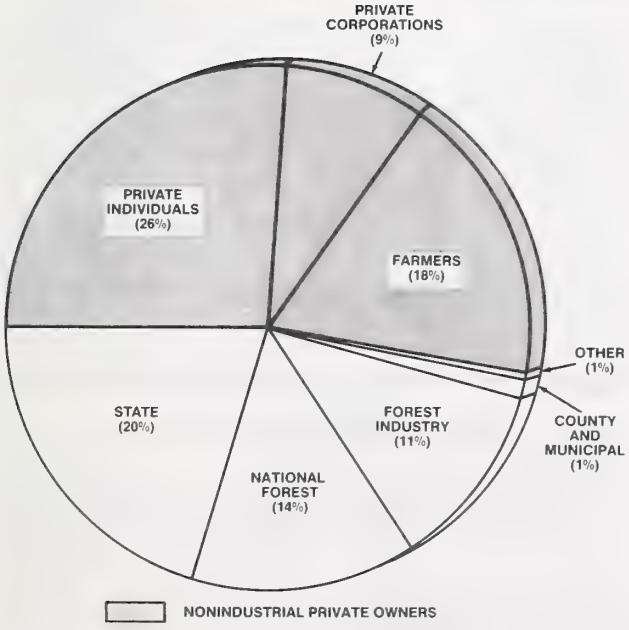


Figure 3.—*Area of commercial forest land by ownership class, Michigan, 1980.*

(11 percent of the total), two-thirds in the Western Upper Peninsula alone and only 76,000 acres in the Lower Peninsula. Practically all (98 percent) of the forest industry land is owned by companies with holdings of more than 5,000 acres. Fifty-three percent of forest industry forest land has been held by the same owner for at least 20 years. Another 22 percent has been held for at least 10 years.

The remaining 0.3 million acres of commercial forest are owned by county and municipal governments (1 percent of the State total), and by miscellaneous federal agencies and Indian tribes (both less than 1 percent).

# CHARACTERISTICS OF COMMERCIAL FOREST LAND

## Maple-Birch and Aspen Types Account for More Than Half of Commercial Area

Maple-birch stands dominate Michigan's forests now even more than they did in 1966. The 6.1 million acres in the maple-birch forest type in 1980 represents 35 percent of the commercial forest, compared to the 5.2 million acres in 1966 which comprised 28 percent of the total. The maple-birch type is most extensive in the Western Upper Peninsula where it amounts to half of the Unit's commercial area.

The next largest forest type is aspen with 3.4 million acres or 19 percent of the total commercial area. Unlike the maple-birch type, the aspen type declined in area between inventories—from 4.2 million acres in 1966. Some of the gain of the maple-birch type from 1966 to 1980 undoubtedly came at the expense of the aspen type as mature aspen stands gave way to their more tolerant understories, some of which were made up of species associated with the maple-birch type. (Data from the inventory do not completely explain the movement of area between forest types since the last inventory.) The aspen type is most widespread in the Northern Lower Peninsula where it comprises 27 percent of the area.

Almost twice as many forest types lost area between surveys as did types that gained area, as seen in the following tabulation:

| Forest type | Commercial forest area 1966 | 1980 |
|---|---|---|
| | (Thousand acres) | |
| Jack pine | 883.5 | 836.7 |
| Red pine | 594.8 | 655.9 |
| White pine | 147.9 | 214.1 |
| Spruce-fir | 1,071.9 | 735.5 |
| Black spruce | 421.1 | 520.6 |
| No. white-cedar | 1,166.0 | 1,173.6 |
| Tamarack | 168.9 | 114.8 |
| Oak-hickory | 2,360.9 | 1,773.6 |
| Elm-ash-soft maple | 1,897.1 | 1,326.4 |
| Maple-birch | 5,215.8 | 6,098.4 |
| Aspen | 4,150.4 | 3,406.6 |
| Paper birch | 416.5 | 374.8 |
| Exotic[3] | 86.2 | 86.3 |
| Nonstocked | 276.3 | 172.2 |
| All types | 18,857.3 | 17,489.5 |

The largest area increase was the 883 thousand acres gained by the maple-birch type, but the greatest proportional increase was the 45 percent jump made by the white pine type. The largest area loss was the 744 thousand acre decline registered by the aspen type. However, the 38 percent contraction in nonstocked area between surveys was the highest proportional loss. Other large losses were taken by the tamarack type (32 percent or 54 thousand acres), the elm-ash-soft maple type (30 percent or 571 thousand acres), and the oak-hickory type (25 percent or 587 thousand acres).

## Poletimber Stands Predominate

As in the other two Lake States[4], poletimber stands in Michigan account for the largest area by stand-size class—7.8 million acres or 44 percent of the total. This compares to a National average for the proportion of poletimber stands of 28 percent. The Lake States is the only region of the country where sawtimber stands do not predominate. This reflects the continuing rebuilding and maturation of stands from the cutover and burned over conditions in the late nineteenth and early twentieth centuries.

Sawtimber stands make up 29 percent of the State's commercial forest area, more than the other Lake States, but substantially lower than the National average of 45 percent. In 1966 sawtimber stands represented 25 percent of the State total.

| Stand-size class | 1980 area |
|---|---|
| | (Thousand acres) |
| Sawtimber | 5,146.0 |
| Poletimber | 7,753.4 |
| Sapling and seedling | 4,417.9 |
| Nonstocked | 172.2 |
| All stands | 17,489.5 |

The largest area of sawtimber stands is in the maple-birch type (2.5 million acres), but the highest proportion within any forest type is the 69 percent in the white pine type.

## Largest Area in Stands From 41 to 60 Years Old

Half of the stands in the State are 50 years of age or younger. Areas by 10-year age classes are somewhat uneven, with largest areas in the 41-60 year

[3]*The exotic forest type includes species not native to Michigan, mostly Scotch pine.*

[4]*The Lake States Region includes Michigan, Wisconsin, and Minnesota in this report.*

classes (fig. 4). These stands, originating between 1920 and 1939, got their start as a result of the then newly implemented fire control and tree planting programs that did so much to turn the forest situation around in Michigan.

The distribution of area by stand age for individual forest types reveals much about the history and vitality of those stands. The maple-birch type, consisting of generally long-lived species, includes 1.4 million acres (23 percent of the total type area) in stands older than 90 years. Ninety is the rotation age[5] suggested by the Michigan Department of Natural Resources for the maple-birch type on average sites. Unmanaged maple-birch stands more than 90 years of age, then, can be expected to decline in growth and vigor. Many maple-birch stands came into being because of the shade-tolerance and longevity of species associated with the type. These species formed part of the understory of other forest types and simply outlived the overstory as well as other understory species.

Aspen is a short-lived species. Aspen stands usually begin to deteriorate at about age 40 to 60 years and then are replaced by a new stand, not always aspen. Therefore, aspen stands more than 60 years old are prime candidates for conversion to other types, especially those with understories that are not aspen. In Michigan 617 thousand acres of the aspen type (18 percent of the type area) are older than 60 years of age.

One third of the aspen type (1.1 million acres) supports a natural coniferous understory, and another 42 thousand acres of aspen supports an understory of planted conifers. If these stands are not managed to favor aspen, some of them will convert to a conifer type. Clearcutting aspen tends to bring about pure aspen stands on the same site. As more aspen stands are harvested, the decline of area in the aspen type noticed between 1966 and 1980 may slow and reverse. The large areas in stands aged between 1 and 20 years (1.3 million acres) suggest that this process may have begun.

Substantial areas of softwood types are in older age classes and, therefore, are most susceptible to the ravages of forest pests such as the spruce budworm, which is currently causing significant mortality in the State.

[5]*Rotation is the planned number of years between regeneration of a stand and its final cutting for a specific product.*

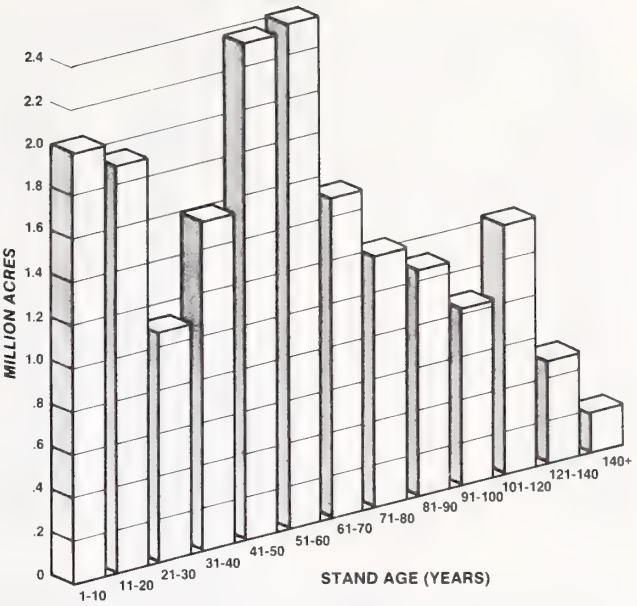


Figure 4.—*Area of commercial forest land by stand-age class, Michigan, 1980.*

## Fifty-Eight Percent of Commercial Forest on Deep, Well-Drained Soils

Physiographic class is a measure of soil and water conditions on a site that affect tree growth. The five classes are a continuum, ranging from exceptionally wet sites (hydric) to very dry sites (xeric). The midpoint of the classes contains sites where conditions are most favorable for growth for most species (mesic). Fifty-eight percent of Michigan's commercial forest land occupies mesic sites, including 89 percent of the maple-birch type and 69 percent of the oak-hickory and white pine types. Forest types that generally prefer drier sites in Michigan include jack pine, red pine, oak-hickory, and exotic (table 3).

## Average Site Index is 61 Feet

Site index provides another perspective of forest site quality by classing forest land in terms of the height growth made by dominant or codominant trees of selected species at 50 years of age. Seventy-five percent of the State's commercial forest (13.1 million acres) grows trees taller than 51 feet at age 50, and 11 percent of the total area grows trees taller than 81 feet (fig. 5).

Site index values fluctuate by forest type. A site index in the high range for one type may be considered average for another type. And if a forest type is converted to another type, the new site index for that site may bear little resemblance to the old one.

Table 3—*Area of commercial forest land by forest type and physiographic class, Michigan, 1980*

(In thousand acres)

| Forest type | All classes | Physiographic class | | | | |
|---|---|---|---|---|---|---|
| | | Hydric | Hydromesic | Mesic | Xeromesic | Xeric |
| Jack pine | 836.7 | 4.1 | 63.3 | 87.8 | 610.6 | 70.9 |
| Red pine | 655.9 | 1.7 | 8.2 | 224.6 | 421.4 | — |
| White pine | 214.1 | 5.4 | 34.0 | 147.9 | 26.8 | — |
| Balsam fir | 635.4 | 39.5 | 357.8 | 219.8 | 18.3 | — |
| White spruce | 100.1 | 1.4 | 29.3 | 63.5 | 5.9 | — |
| Black spruce | 520.6 | 144.3 | 291.2 | 37.9 | 47.2 | — |
| Northern white-cedar | 1,173.6 | 151.8 | 948.3 | 73.5 | — | — |
| Tamarack | 114.8 | 47.6 | 67.2 | — | — | — |
| Oak-hickory | 1,773.6 | — | 123.2 | 1,222.2 | 414.4 | 13.8 |
| Elm-ash-soft maple | 1,326.4 | 127.4 | 1,152.1 | 46.9 | — | — |
| Maple-birch | 6,098.4 | 15.5 | 514.5 | 5,405.0 | 159.2 | 4.2 |
| Aspen | 3,406.6 | 43.6 | 870.3 | 2,206.7 | 277.3 | 8.7 |
| Paper birch | 374.8 | 8.3 | 133.0 | 225.8 | 7.7 | — |
| Exotic | 86.3 | — | 3.9 | 52.9 | 29.5 | — |
| Nonstocked | 172.2 | 20.6 | 30.1 | 76.4 | 37.8 | 7.3 |
| All types | 17,489.5 | 611.2 | 4,626.4 | 10,090.9 | 2,056.1 | 104.9 |

The weighted average site index for all types in Michigan is 61.2 feet, compared to the Lake States average[6] of 59.1 feet. The highest weighted average of any forest type in the State is the 69.0 feet for the aspen type, followed by maple-birch (66.0 feet), elm-ash-soft maple (64.0 feet), and oak-hickory (62.4 feet). The lowest average is the 32.6 feet of the northern white-cedar type.

[6]*Based on 1968 data for Wisconsin and 1977 data for Minnesota.*

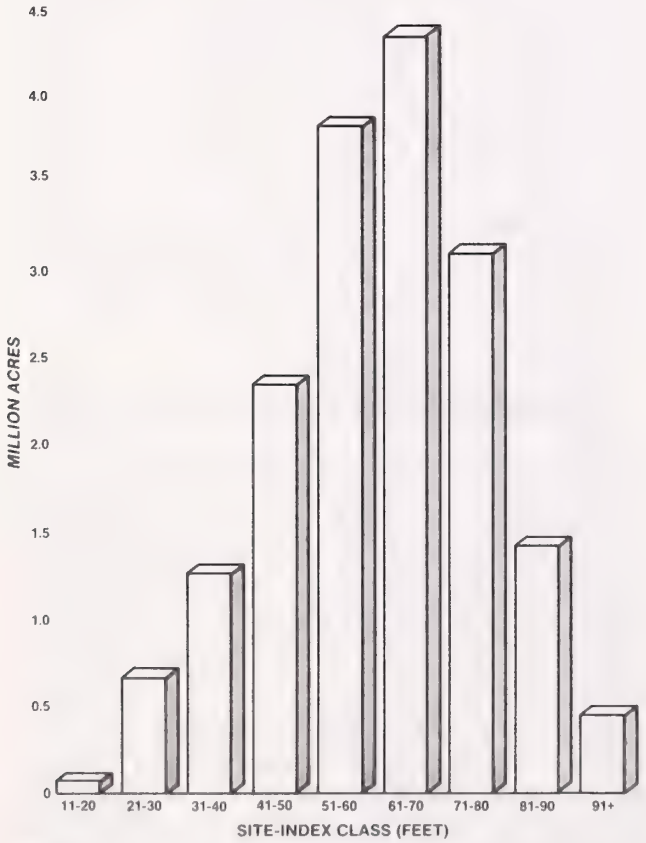


Figure 5.—*Area of commercial forest land by site-index class, Michigan, 1980.*

## Site Class—Another Way of Looking at Site Quality

A third mechanism by which the quality of a forest site can be judged is site class. Site class is a means of describing forest land in terms of its inherent capacity to grow wood based on the culmination of mean annual increment[7] for fully stocked natural stands. Site class values are the cubic feet of growth per acre per year that might be expected from such stands.

The weighted average site class for Michigan is 63.6 cubic feet of growth per acre per year, compared to the Lake States average of 58.9. The highest average among types in the State is the 92.7 cubic feet per acre per year of the balsam fir type, followed by the red pine type (83.9 cubic feet), exotic (79.3 cubic feet), aspen (77.2 cubic feet), white pine (74.1 cubic feet), and white spruce (70.6 cubic feet).

## Plantations Make Up 7 Percent of Commercial Forest

Forest plantations totaled 1.2 million acres in 1980. Seventy-seven percent of the plantation area is in the Lower Peninsula:

[7]*Culmination of mean annual increment is the point at which a curve plotting current annual increment crosses a curve plotting mean annual increment.*

| Survey unit | Area of plantations (Thousand acres) | Percent of total |
|---|---|---|
| Eastern Upper Peninsula | 168.6 | 14 |
| Western Upper Peninsula | 110.4 | 9 |
| Northern Lower Peninsula | 742.4 | 61 |
| Southern Lower Peninsula | 191.4 | 16 |
| All Units | 1,212.8 | 100 |

Forest plantations were classed into forest types in the same way that other forest land was typed. Therefore, a field plot that fell in a red pine plantation beneath an overstory of species associated with the maple-birch type would be typed maple-birch if the stocking and size of the overstory trees were sufficient to meet the requirements for the type. Likewise, a plot that fell in a red pine plantation with competing trees of species associated with the oak-hickory type would be typed oak-hickory if the stocking and size of the competing trees were sufficient to warrant it. The type assigned to a plantation, then, does not always correspond to the species planted.

Plantations in the red pine type are the most extensive with 508 thousand acres, 42 percent of the total plantation area. Jack pine is the second largest plantation type with 225 thousand acres (19 percent of the total), followed by maple-birch with 127 thousand acres (11 percent), exotic with 96 thousand acres (8 percent), and oak-hickory with 95 thousand acres (8 percent).

A look at the species composition of plantations by forest type is helpful in estimating the species planted. Table 26 in the Appendix shows the total number of growing-stock trees by species group and forest type in plantations, but the following tabulation suggests the primary species that were probably planted in plantations of each forest type:

| Forest type | Species planted |
|---|---|
| Jack pine | Jack pine, red pine |
| Red pine | Red pine, jack pine |
| White pine | White pine |
| Balsam fir | Balsam fir |
| White spruce | White spruce |
| Black spruce | Black spruce |
| Oak-hickory | Red pine, jack pine |
| Elm-ash-cottonwood | Red pine |
| Maple-birch | Red pine, white pine |
| Aspen | Red pine, jack pine |
| Paper birch | White spruce |
| Exotic | Scotch pine, Austrian pine |

Forty-three percent of the plantations are from 11 to 30 years of age, having been planted between 1950 and 1969. Seventy-five percent of the area of plantations is on sites with site indices ranging from 41 to 70 feet.

## Stocking of Growing-Stock Trees is Good

Eighty-seven percent of the commercial forest (15.3 million acres) is at least 61 percent stocked with growing-stock trees (medium stocking or better). Of this area, 10 percent (1.5 million acres) is overstocked with trees (134 percent stocked or more).

Although these figures indicate that the stocking level of forests in the State is not a major problem, the stocking of sapling and seedling stands is more sparse than in other stand-size classes. Twenty percent of sapling-seedling stands are poorly stocked (16.7 to 60.9 percent stocked), compared to 10 percent of poletimber stands and 8 percent of sawtimber stands.

## Almost Two-Fifths of Forest Within ¼ Mile of Road

The proximity of stands to maintained roads is an indicator of potential use by man—whether for timber harvesting, recreation, or other use. In Michigan, 39 percent of the commercial forest is within one-fourth mile of a maintained road (one that is graded at least once a year), and 85 percent of it is within 1 mile of a road:

| Distance to road (Miles) | Area of commercial forest land (Thousand acres) | Percent |
|---|---|---|
| 0–⅛ | 3,663.4 | 21 |
| ⅛–¼ | 3,138.0 | 18 |
| ¼–1 | 8,018.3 | 46 |
| 1–2½ | 2,121.2 | 12 |
| 2½–5 | 368.2 | 2 |
| 5–10 | 11.9 | ([8]) |
| 10–20 | 159.0 | 1 |
| 20+ | 9.5 | ([8]) |
| Total | 17,489.5 | 100 |

## One-Third of Forest Within 1 Mile of Open Water

The nearness of a forest stand to a body of open water may have an impact on its recreational potential or its operability if a watershed is threatened. Nine percent of the State's commercial forest is within one-fourth mile of open water—a lake at least 5 acres in size or a stream at least 66 feet wide. Another 25 percent is between one-fourth and 1 mile of open water:

[8]*Less than 1 percent.*

| Distance to open water (Miles) | Area of commercial forest land (Thousand acres) | Percent |
|---|---|---|
| 0–⅛ | 739.9 | 4 |
| ⅛–¼ | 864.5 | 5 |
| ¼–1 | 4,349.9 | 25 |
| 1–2½ | 6,474.2 | 37 |
| 2½–5 | 4,072.3 | 23 |
| 5–10 | 841.0 | 5 |
| 10–20 | 109.7 | 1 |
| 20+ | 38.0 | ([8]) |
| Total | 17,489.5 | 100 |

[8]*Less than 1 percent.*

The largest areas of forest types normally associated with hydric sites (black spruce, northern white-cedar, and tamarack) occur within one-fourth to 5 miles of open water, just as the tabulation above shows for all types. The fact that they grow within or adjacent to swamps or areas of standing water has no effect on this measure of distance to water for swamp conifer types.

# APPENDIX

## ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Survey Unit level. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean the chances are two out of three that the true inventory value is within the limits indicated.

For example, the estimated commercial forest area in Michigan in 1980, 17,489.5 thousand acres has a sampling error of ±0.33 percent (±57.7 thousand acres). Therefore, the commercial forest area from a 100-percent inventory would have a two in three chance of falling between 17,431.8 and 17,547.2 thousand acres.

As survey data are broken down into sections smaller than State or Survey Unit totals, the sampling error increases. The smaller the breakdown, the larger the sampling error. For example, the sampling error for commercial forest area in a particular Unit or county is higher than that for total commercial forest area in the State (table 27 shows the sampling errors for estimates smaller than State totals).

## SURVEY PROCEDURES

The major steps in the survey of Michigan were as follows:

1. A total of 176,976 1-acre points were systematically distributed across aerial photos of the entire State, except the National Forests. To make a preliminary estimate of forest area, these points were classified into land classes (table 4). Next, 83,103 of these points were stereoclassified by forest type, stand-size class, and density. Finally, 13,991 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre.

2. Under an agreement with the National Forest Eastern Region, North Central Station crews established 10-point variable radius plots on the Hiawatha and Huron-Manistee National Forests in 1976; and the Ottawa National Forest in 1980. National Forest personnel provided the Station with the area of commercial forest land by forest type, stand-size class, and density for the Forest, and the North Central Station computed all area data in the same manner non-National Forest data were computed. Area and volume tables were approved by the Forest staff and the Regional office before publication.

Table 4.—*Number of photo points observed and ground plots visited, by land class, Michigan, 1980*

| Land class | Photo points classified | Photo points stereoclassified | Ground plots visited |
|---|---|---|---|
| Forest land | 82,170 | 82,170 | 7,706 |
| Unproductive forest land | 114 | 114 | 16 |
| Nonforest land | | | |
| with trees | 3,029 | 303 | 182 |
| without trees | 86,327 | 0 | 5,626 |
| water | 4,699 | 0 | 379 |
| Questionable | 637 | 637 | 82 |
| Total | 176,976 | 83,224 | 13,991 |

## COMPARING MICHIGAN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. Changes in procedures and definitions between surveys make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check was made for each Forest Survey Unit in Michigan to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

### Identifying and Correcting Definitional or Procedural Changes

Definitional or procedural changes between the 1966 and 1980 inventories of Michigan included changes in (1) the definitions of ownership classes, (2) the definition of productive-reserved forest land, and (3) the procedures for determining the area of nonforest land by land class.

In 1966, State Forest was a separate owner class and included only land on State Forests. Other forested State-owned land was included under the Other Public ownership class. In 1980, the State owner

class included all State land. However, State-owned commercial forest land outside the State Forest areas is small in Michigan and general comparisons may be made between the 1966 and 1980 State estimates.

Some mining companies were called diversified forest industry in 1966 and classed under the Forest Industry ownership class. In 1980 these companies were classed under Miscellaneous Private Corporation ownership class. Therefore, a comparison of statistics for Forest Industry owner between 1966 and 1980 is only possible if Forest Industry and Miscellaneous Private Corporation ownerships are combined in 1980.

During the 1966 forest inventory, Christmas tree plantations were classified as commercial forest land, whereas they are now classified as productive-reserved forest land. The 1966 commercial forest and productive-reserved areas were adjusted so that they are comparable to 1980 estimates.

In the 1966 forest inventory, the 1964 Census of Agriculture estimates of cropland, pasture, and rangeland areas were used in our inventory report tables. The 1980 inventory estimates of cropland, pasture, and rangeland come from aerial photo interpretation done by Forest Inventory and Analysis personnel in St. Paul. The published 1966 estimates of cropland, pasture, and rangeland areas were adjusted to be compatible with 1980 estimates.

# TREE SPECIES GROUPS IN MICHIGAN[9]

Softwoods
- Eastern white pine ..... *Pinus strobus*
- Red pine ..... *Pinus resinosa*
- Jack pine ..... *Pinus banksiana*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar .... *Thuja occidentalis*

Other softwoods
- Eastern redcedar ..... *Juniperus virginiana*
- Norway spruce ..... *Picea abies*
- Engelmann spruce ..... *Picea engelmannii*
- Austrian pine ..... *Pinus nigra*
- Scotch pine ..... *Pinus sylvestris*

Hardwoods
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
  - Chestnut oak ..... *Quercus prinus*
- Select red oak
  - Northern Red oak ..... *Quercus rubra*
- Other red oaks
  - Scarlet oak ..... *Quercus coccinea*
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Pin oak ..... *Quercus palustris*
  - Black oak ..... *Quercus velutina*
- Hickories
  - Bitternut hickory ..... *Carya cordiformis*
  - Pignut hickory ..... *Carya glabra*
  - Shellbark hickory ..... *Carya laciniosa*
  - Shagbark hickory ..... *Carya ovata*
  - Mockernut hickory ..... *Carya tomentosa*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maples
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- American beech ..... *Fagus grandifolia*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- Basswood ..... *Tilia americana*
- Yellow poplar ..... *Liriodendron tulipifera*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Paper birch ..... *Betula papyrifera*

Other hardwoods
- Boxelder ..... *Acer negundo*
- Sweet birch ..... *Betula lenta*
- River birch ..... *Betula nigra*
- Black willow ..... *Salix nigra*
- Ohio buckeye ..... *Aesculus glabra*
- Flowering dogwood ..... *Cornus florida*
- Honeylocust ..... *Gleditsia triacanthos*
- Osage orange ..... *Maclura pomifera*

[9]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service, 1979. 375 p.*

Black tupelo ..... *Nyssa sylvatica var. sylvatica*
Sycamore ..... *Platanus occidentalis*
Black locust ..... *Robinia pseudoacacia*
Sassafras ..... *Sassafras albidum*
Red mulberry ..... *Morus rubra*
American chestnut ..... *Castanea dentata*

# METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1,000 board feet (International ¼-inch log rule) = 3.48 cubic meters.
Breast height = 1.4 meters above the ground.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

# DEFINITION OF TERMS

**Basal area.**—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

**Commercial forest land.**—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

**Commercial species.**—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

**County and municipal land.**—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

**Cropland.**—Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improved crops, but excluding land cultivated in developing improved pasture.

**Diameter classes.**—A classification of trees based on diameter outside bark, measured at breast height (4½ feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Inventory and Analysis tables, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.).

**Farm.**—Any place from which $1,000 or more of agricultural products were sold or normally would have been sold during the year.

**Farmer-owned land.**—Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

**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. (Note: Stocking is measured by comparing basal area and/or number of trees, by age or size and spacing with specified standards.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

**Forest industry land.**—Land owned by companies or individuals operating primary wood-using plants.

**Forest trees.**—Woody plants having a well-developed stem and usually more than 12 feet in height at maturity.

**Forest type.**—A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Michigan are:

*Jack pine.*—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and maple.)

*Red pine.*—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and maple.)

*White pine.*—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, jack pine, aspen, birch, and maple.)

*Balsam fir.*—Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and tamarack.)

*White spruce.*—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, northern white-cedar, and tamarack.)

*Black spruce.*—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack and northern white-cedar.)

*Northern white-cedar.*—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include tamarack and black spruce.)

*Tamarack.*—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce and northern white-cedar.)

*Oak-hickory.*—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, beech, yellow-poplar, elm, and maple.)

*Elm-ash-soft maple.*—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include birch, spruce, and balsam fir.)

*Maple-birch.*—Forests in which sugar maple, basswood, yellow birch, upland American elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

*Aspen.*—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include balsam poplar, balsam fir, and paper birch.)

*Paper birch.*—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

*Exotic.*—Forests in which species not native to Michigan comprise a plurality of the stocking. (Mostly Scotch pine in plantations.)

**Gross area.**—The entire area of land and water as determined by the Bureau of the Census, 1970.

**Growing-stock trees.**—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

**Hardwoods..**—Dicotyledonous trees, usually broad-leaved and deciduous.

**Idle farmland.**—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

**Improved pasture.**—Land currently improved for grazing, by cultivation, seeding, irrigation, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

**Indian land.**—Tribal land held in fee but administered by the Federal Government.

**Land area.**—A. *Bureau of the Census.*—The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river floodplains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.*—The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

**Maintained road.**—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

**Marsh.**—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

**Miscellaneous federal land.**—Federal land other than National Forest, and land administered by the Bureau of Land Management.

**Miscellaneous private land.**—Privately owned land other than forest-industry and farmer-owned land.

**National Forest land.**—Federal land that has been legally designated as National Forest or purchase units, and other land under the administration of the USDA Forest Service.

**Noncommercial forest land.**—(a) Unproductive forest land and (b) productive-reserved forest land. (See individual definitions).

**Noncommercial species.**—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

**Nonforest land.**—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

**Nonstocked land.**—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

**Ownership.**—Property owned by one owner, regardless of the number of parcels in a specified area.

**Ownership size class.**—The amount of commercial forest land owned by one owner, regardless of the number or parcels.

**Owner tenure.**—The length of time a property has been held by the owner.

**Pasture and range.**—Land that is currently improved for grazing by cultivation, seeding, or irrigation, plus land on which the natural plant cover is composed principally of native grasses, forbs, or shrubs valuable as forage.

**Physiographic class.**—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

*Xeric sites.*—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

*Xeromesic sites.*—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

*Mesic sites.*—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

*Hydromesic sites.*—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

*Hydric sites.*—Very wet sites where excess water seriously limits both growth and species occurrence. Example: wet, frequently flooded river bottoms and spruce bogs.

**Productive-reserved forest land.**—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administrative regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

**Sapling-seedling stands.**—(See stand-size class.)

**Sawtimber stands.**—(See stand-size class.)

**Seedlings.**—Live trees less than 1.0 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

**Site class.**—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

**Site index.**—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

**Softwoods.**—Coniferous trees, usually evergreen, having needles or scale-like leaves.

**Stand.**—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

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

**Stand-area class.**—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density 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:

a. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

**State land.**—Land owned by States, or land leased to these governmental units for 50 years or more.

**Stocking.**—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

*Overstocked stands.*—Stands in which stocking of trees is 134.0 percent or more.

*Fully stocked stands.*—Stands in which stocking of trees is from 101.0 to 133.9 percent.

*Medium stocked stands.*—Stands in which stocking of trees is from 61.0 to 100.9 percent.

*Poorly stocked stands.*—Stands in which stocking of trees is from 16.7 to 60.9 percent.

*Nonstocked areas.*—Commercial forest land on which stocking of trees is less than 16.7 percent.

**Tree size class.**—A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

**Unproductive forest land.**—Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soils, dry climate, poor drainage, high elevation, steepness, and rockiness.)

**Urban and other areas.**—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries; roads; railroads; airports; beaches; powerlines and other rights-of-way; or other nonforest land not included in any other specified land use class.

**Water.**—(a) *Bureau of the Census.*—Streams, sloughs, estuaries, and canals more than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds more than 40 acres in area.

(b) *Noncensus.*—The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

**Wooded pasture.**—Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or shows evidence of grazing.

**Wooded strip.**—An acre or more of natural continuous forest land that would otherwise meet Forest Inventory and Analysis standards for commercial forest land except that it is less than 120 feet wide.

# TABLES

Table 1.—Area of commercial forest land, Michigan, 1966 and 1980, and percent change between surveys

Table 5.--Area of land by land class, Michigan 1966[1/] and 1980

(In thousand acres)

| Land class | 1966[1/] | 1980 |
|---|---|---|
| FOREST LAND | | |
| Commercial forest | | |
| Jack pine | 883.5 | 836.7 |
| Red pine | 594.8 | 655.9 |
| White pine | 147.9 | 214.1 |
| Balsam fir-white spruce | 1,071.9 | 735.5 |
| Black spruce | 421.1 | 520.6 |
| Northern white-cedar | 1,166.0 | 1,173.6 |
| Tamarack | 168.9 | 114.8 |
| Oak-hickory | 2,360.9 | 1,773.6 |
| Elm-ash-soft maple | 1,897.1 | 1,326.4 |
| Maple-birch | 5,215.8 | 6,098.4 |
| Aspen | 4,150.4 | 3,406.6 |
| Paper birch | 416.5 | 374.8 |
| Exotic | 86.2 | 86.3 |
| Nonstocked | 276.3 | 172.2 |
| Subtotal | 18,857.3 | 17,489.5 |
| Noncommercial forest land | | |
| Unproductive | 205.0 | 257.2 |
| Productive-reserved | 311.1 | 622.1 |
| Subtotal | 516.1 | 879.3 |
| Total | 19,373.4 | 18,368.8 |
| NONFOREST LAND | | |
| Cropland | 9,713.8 | 12,292.7 |
| Pasture and range | 1,624.6 | 1,338.5 |
| Other | 5,780.3 | 4,362.9 |
| Total | 17,118.7 | 17,994.1 |
| TOTAL LAND | [2/]36,492.1 | [3/]36,362.9 |
| WATER (BUREAU OF THE CENSUS) | [2/]766.1 | [3/]895.3 |
| TOTAL LAND AND WATER | [2/]37,258.2 | [3/]37,258.2 |

[1/]Figures have been adjusted from those published after the 1966 survey to conform to 1980 areas because of changes in survey procedures and definitions.

[2/]U.S. Department of Commerce, Bureau of Census. 1950.

[3/]U.S. Department of Commerce, Bureau of Census, 1970. Area Measurement Reports, GE-20, No. 1.

Table 6.--Area of land by land use class and Forest Survey Unit, Michigan, 1980

(In thousand acres)

| Land use class | All Units | Forest Survey Unit: Eastern Upper Peninsula | Western Upper Peninsula | Northern Lower Peninsula | Southern Lower Peninsula |
|---|---|---|---|---|---|
| FOREST LAND | | | | | |
| Commercial forest | 17,489.5 | 3,801.6 | 4,529.6 | 6,694.9 | 2,463.4 |
| Unproductive forest | 257.2 | 102.4 | 62.2 | 87.7 | 4.9 |
| Productive reserved | 622.1 | 127.6 | 266.7 | 147.0 | 80.8 |
| Total | 18,368.8 | 4,031.6 | 4,858.5 | 6,929.6 | 2,549.1 |
| NONFOREST LAND | | | | | |
| Nonforest with trees | | | | | |
| Cropland with trees | 96.8 | 3.4 | 3.5 | 46.7 | 43.2 |
| Improved pasture with trees | 82.2 | 2.5 | 12.7 | 62.3 | 4.7 |
| Wooded strips | 241.3 | 24.9 | -- | 33.8 | 182.6 |
| Idle farmland with trees | 12.8 | 1.8 | -- | 2.3 | 8.7 |
| Marsh with trees | 235.3 | 49.0 | 15.1 | 97.8 | 73.4 |
| Urban and other windbreaks | -- | -- | -- | -- | -- |
| Windbreaks | 37.5 | 1.7 | -- | 7.5 | 28.3 |
| Wooded pasture | 13.4 | -- | 1.8 | 2.2 | 9.4 |
| Subtotal | 719.3 | 83.3 | 33.1 | 252.6 | 350.3 |
| Nonforest without trees | | | | | |
| Cropland without trees | 11,718.3 | 446.4 | 189.2 | 2,384.1 | 8,698.6 |
| Improved pasture without trees | 1,254.5 | 1.8 | 141.5 | 692.5 | 418.7 |
| Idle farm without trees | 19.8 | 2.0 | -- | 2.5 | 15.3 |
| Marsh without trees | 628.5 | 240.3 | 89.1 | 166.7 | 132.4 |
| Other farm-farmstead | 477.6 | 17.4 | 31.8 | 172.4 | 256.0 |
| Urban and other | 3,105.6 | 162.5 | 183.2 | 727.6 | 2,032.3 |
| Noncensus water | 70.5 | 13.7 | -- | 22.7 | 34.1 |
| Subtotal | 17,274.8 | 884.1 | 634.8 | 4,168.5 | 11,587.4 |
| Total | 17,994.1 | 967.4 | 667.9 | 4,421.1 | 11,937.7 |
| TOTAL LAND | [1/] 36,362.9 | 4,999.0 | 5,526.4 | 11,350.7 | 14,486.8 |
| WATER (BUREAU OF THE CENSUS) | [1/] 895.3 | 165.8 | 167.0 | 362.6 | 199.9 |
| TOTAL LAND AND WATER | [1/] 37,258.2 | 5,164.8 | 5,693.4 | 11,713.3 | 14,686.7 |

[1/] U.S. Department of Commerce, Bureau of Census, 1970. Area Measurement Reports, GE-20 No. 1.

Table 7.--Area of commercial forest land by ownership class and Forest Survey Unit, Michigan, 1980

(In thousand acres)

| Ownership Class | All Units | Forest Survey Unit: Eastern Upper Peninsula | Western Upper Peninsula | Northern Lower Peninsula | Southern Lower Peninsula |
|---|---|---|---|---|---|
| National Forest | 2,441.5 | 741.4 | 827.7 | 859.5 | 12.9 |
| Bureau of Land Mgmt. | -- | -- | -- | -- | -- |
| Miscellaneous federal | 44.9 | 20.6 | 1.6 | 15.1 | 7.6 |
| Indian | 22.3 | 6.0 | 16.3 | -- | -- |
| State | 3,571.3 | 976.6 | 620.3 | 1,825.1 | 149.3 |
| County and municipal | 186.7 | 8.9 | 87.6 | 37.6 | 52.6 |
| Forest industry | 1,980.8 | 635.5 | 1,269.3 | 76.0 | -- |
| Farmer | 3,097.7 | 478.2 | 194.1 | 1,274.5 | 1,150.9 |
| Misc. private-corp. | 1,510.5 | 227.9 | 668.4 | 474.0 | 140.2 |
| Misc. private-indiv. | 4,633.8 | 706.5 | 844.3 | 2,133.1 | 949.9 |
| All owners | 17,489.5 | 3,801.6 | 4,529.6 | 6,694.9 | 2,463.4 |

Table 8.--Area of land and forest land by county and Forest Survey Unit, Michigan, 1980

| County | All land[1/] | Forest land[2/] | | | Commercial forest as a percent of land area | All forest as a percent of land area |
|---|---|---|---|---|---|---|
| | | All forest | Non commercial[3/] | Commercial[4/] | | |
| | -Thousand acres- | | | | -Percent- | |
| **EASTERN UPPER PENINSULA** | | | | | | |
| Alger | 578.9 | 530.7 | 38.8 | 491.9 | 85 | 92 |
| Chippewa | 1,017.6 | 757.5 | 51.6 | 705.9 | 69 | 74 |
| Delta | 753.0 | 596.8 | 22.3 | 574.5 | 76 | 79 |
| Luce | 580.1 | 496.5 | 28.1 | 468.4 | 81 | 86 |
| Mackinac | 649.1 | 565.0 | 40.7 | 524.3 | 81 | 87 |
| Menominee | 664.3 | 496.2 | 2.8 | 493.4 | 74 | 75 |
| Schoolcraft | 756.0 | 588.9 | 45.7 | 543.2 | 72 | 78 |
| Total | 4,999.0 | 4,031.6 | 230.0 | 3,801.6 | 76 | 81 |
| **WESTERN UPPER PENINSULA** | | | | | | |
| Baraga | 576.5 | 539.8 | 26.6 | 513.2 | 89 | 94 |
| Dickinson | 484.6 | 381.0 | 4.4 | 376.6 | 78 | 79 |
| Gogebic | 708.4 | 654.6 | 34.7 | 619.9 | 88 | 92 |
| Houghton | 650.9 | 533.7 | 20.0 | 513.7 | 79 | 82 |
| Iron | 749.5 | 664.7 | 10.7 | 654.0 | 87 | 89 |
| Keweenaw | 344.1 | 333.1 | 126.0 | 207.1 | 60 | 97 |
| Marquette | 1,170.4 | 1,026.9 | 56.5 | 970.4 | 83 | 88 |
| Ontonagon | 842.0 | 724.7 | 50.0 | 674.7 | 80 | 86 |
| Total | 5,526.4 | 4,858.5 | 328.9 | 4,529.6 | 82 | 88 |
| **NORTHERN LOWER PENINSULA** | | | | | | |
| Alcona | 433.6 | 318.9 | 12.4 | 306.5 | 71 | 74 |
| Alpena | 361.3 | 222.6 | 4.9 | 217.7 | 60 | 62 |
| Antrim | 304.3 | 159.9 | 3.3 | 156.6 | 51 | 53 |
| Arenac | 235.2 | 94.4 | 1.7 | 92.7 | 39 | 40 |
| Bay | 286.2 | 20.1 | 2.3 | 17.8 | 6 | 7 |
| Benzie | 201.9 | 131.0 | 9.9 | 121.1 | 60 | 65 |
| Charlevoix | 265.1 | 139.1 | 0.5 | 138.6 | 52 | 52 |
| Cheboygan | 461.2 | 383.0 | 16.4 | 366.6 | 79 | 83 |
| Clare | 365.4 | 219.9 | 4.2 | 215.7 | 59 | 60 |
| Crawford | 359.3 | 304.8 | 31.9 | 272.9 | 76 | 85 |
| Emmet | 294.7 | 202.2 | 7.0 | 195.2 | 66 | 69 |
| Gladwin | 322.2 | 193.1 | 0.3 | 192.8 | 60 | 60 |
| Grand Traverse | 295.8 | 154.4 | 2.2 | 152.2 | 51 | 52 |
| Iosco | 347.9 | 231.9 | 7.3 | 224.6 | 65 | 67 |
| Isabella | 365.9 | 78.4 | -- | 78.4 | 21 | 21 |
| Kalkaska | 362.0 | 275.3 | 22.0 | 253.3 | 70 | 76 |
| Lake | 365.3 | 300.0 | 0.2 | 299.8 | 82 | 82 |
| Leelanau | 220.5 | 94.1 | 18.3 | 75.8 | 34 | 43 |
| Manistee | 353.9 | 225.7 | 0.2 | 225.5 | 64 | 64 |
| Mason | 313.4 | 156.0 | 8.0 | 148.0 | 47 | 50 |
| Mecosta | 358.4 | 125.2 | 2.5 | 122.7 | 34 | 35 |
| Midland | 332.7 | 149.8 | 2.3 | 147.5 | 44 | 45 |
| Missaukee | 361.3 | 212.5 | 8.1 | 204.4 | 57 | 59 |
| Montmorency | 355.2 | 302.3 | 0.3 | 302.0 | 85 | 85 |
| Newaygo | 543.7 | 316.3 | 6.3 | 310.0 | 57 | 58 |

(Table 8 continued on next page)

(Table 8 continued)

| County | All land[1] | Forest land[2] | | | | |
|---|---|---|---|---|---|---|
| | | All forest | Non commercial[3] | Commercial[4] | Commercial forest as a percent of land area | All forest as a percent of land area |
| | -Thousand acres- | | | | -Percent- | |
| **NORTHERN LOWER PENINSULA** | | | | | | |
| Oceana | 343.2 | 160.0 | 11.7 | 148.3 | 43 | 47 |
| Ogemaw | 365.7 | 235.3 | 15.8 | 219.5 | 60 | 64 |
| Osceola | 371.8 | 158.5 | 1.7 | 156.8 | 42 | 43 |
| Oscoda | 360.2 | 309.9 | 2.7 | 307.2 | 85 | 86 |
| Otsego | 337.5 | 262.9 | 2.1 | 260.8 | 77 | 78 |
| Presque Isle | 414.6 | 277.6 | 10.7 | 266.9 | 64 | 67 |
| Roscommon | 333.4 | 252.8 | 6.1 | 246.7 | 74 | 76 |
| Wexford | 357.9 | 261.7 | 11.4 | 250.3 | 70 | 73 |
| Total | 11,350.7 | 6,929.6 | 234.7 | 6,694.9 | 59 | 61 |
| **SOUTHERN LOWER PENINSULA** | | | | | | |
| Allegan | 528.6 | 137.4 | -- | 137.4 | 26 | 26 |
| Barry | 354.7 | 119.9 | 8.7 | 111.2 | 31 | 34 |
| Berrien | 371.0 | 67.3 | 1.2 | 66.1 | 18 | 18 |
| Branch | 323.8 | 44.1 | -- | 44.1 | 14 | 14 |
| Calhoun | 453.8 | 76.5 | 0.5 | 76.0 | 17 | 17 |
| Cass | 314.0 | 54.0 | -- | 54.0 | 17 | 17 |
| Clinton | 366.0 | 31.0 | 0.5 | 30.5 | 8 | 8 |
| Eaton | 365.5 | 45.5 | -- | 45.5 | 12 | 12 |
| Genesee | 410.9 | 44.0 | -- | 44.0 | 11 | 11 |
| Gratiot | 361.9 | 27.4 | -- | 27.4 | 8 | 8 |
| Hillsdale | 384.3 | 45.6 | 0.6 | 45.0 | 12 | 12 |
| Huron | 524.1 | 57.3 | 1.3 | 56.0 | 11 | 11 |
| Ingham | 357.7 | 42.1 | -- | 42.1 | 12 | 12 |
| Ionia | 367.8 | 38.6 | 1.4 | 37.2 | 10 | 10 |
| Jackson | 446.8 | 87.4 | 4.0 | 83.4 | 19 | 20 |
| Kalamazoo | 359.5 | 73.4 | 6.8 | 66.6 | 19 | 20 |
| Kent | 548.5 | 123.6 | 1.0 | 122.6 | 22 | 23 |
| Lapeer | 420.9 | 83.6 | 2.5 | 81.1 | 19 | 20 |
| Lenawee | 481.9 | 48.2 | 0.5 | 47.7 | 10 | 10 |
| Livingston | 366.1 | 78.2 | 9.0 | 69.2 | 19 | 21 |
| Macomb | 307.3 | 46.2 | 1.2 | 45.0 | 15 | 15 |
| Monroe | 356.5 | 35.2 | 0.1 | 35.1 | 10 | 10 |
| Montcalm | 455.9 | 145.3 | -- | 145.3 | 32 | 32 |
| Muskegon | 320.9 | 165.8 | 1.2 | 164.6 | 51 | 52 |
| Oakland | 554.6 | 104.2 | 22.1 | 82.1 | 15 | 19 |
| Ottawa | 360.5 | 77.8 | 0.2 | 77.6 | 22 | 22 |
| Saginaw | 520.7 | 82.7 | -- | 82.7 | 16 | 16 |
| St. Clair | 469.6 | 89.0 | 1.1 | 87.9 | 19 | 19 |
| St. Joseph | 323.6 | 59.9 | -- | 59.9 | 19 | 19 |
| Sanilac | 615.0 | 50.2 | 0.1 | 50.1 | 8 | 8 |
| Shiawassee | 345.4 | 52.8 | -- | 52.8 | 15 | 15 |
| Tuscola | 521.5 | 83.7 | -- | 83.7 | 16 | 16 |
| Van Buren | 385.6 | 106.2 | 4.2 | 102.0 | 26 | 28 |
| Washtenaw | 454.7 | 82.8 | 10.8 | 72.0 | 16 | 18 |
| Wayne | 387.2 | 42.2 | 6.7 | 35.5 | 9 | 11 |
| Total | 14,486.8 | 2,549.1 | 85.7 | 2,463.4 | 17 | 18 |
| State total | 36,362.9 | 18,368.8 | 879.3 | 17,489.5 | 48 | 51 |

[1] 1970 Bureau of the Census estimates.

[2] Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover; excludes land currently developed for nonforest use such as urban or heavily settled residential or resort area, city parks, orchards, improved roads, or improved pasture land. The minimum forest area classified was 1 acre. Roadside, streamside, and shelterbelt strips of timber with a crown width of at least 120 feet and unimproved roads and trails, streams, and clearings in forested areas if less than 120 feet in width were classified as forest.

[3] Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber production through statute or administrative regulation or exclusive use for Christmas tree production.

[4] Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation.

Table 9.--Area of commercial forest land by ownership class and site class, Michigan, 1980

(In thousand acres)

| Ownership class | All classes | Site class (cubic feet of growth per acre per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 225+ | 165-224 | 120-164 | 85-119 | 50-84 | 20-49 |
| National Forest | 2,441.5 | -- | -- | 43.5 | 365.3 | 989.1 | 1,043.6 |
| Bureau of Land Mgmt. | -- | -- | -- | -- | -- | -- | -- |
| Miscellaneous federal | 44.9 | -- | -- | 1.5 | 8.3 | 12.7 | 22.4 |
| Indian | 22.3 | -- | -- | -- | 1.7 | 14.5 | 6.1 |
| State | 3,571.3 | -- | 3.3 | 75.1 | 596.7 | 1,323.5 | 1,572.7 |
| County and municipal | 186.7 | -- | -- | 4.8 | 49.1 | 70.8 | 62.0 |
| Forest industry | 1,980.8 | -- | -- | 22.6 | 234.5 | 730.1 | 993.6 |
| Farmer | 3,097.7 | -- | -- | 119.7 | 848.0 | 1,236.5 | 893.5 |
| Misc. private-corp. | 1,510.5 | -- | -- | 42.2 | 265.7 | 595.6 | 607.0 |
| Misc. private-indiv. | 4,633.8 | -- | 1.6 | 151.9 | 1,124.3 | 1,906.4 | 1,449.6 |
| All owners | 17,489.5 | -- | 4.9 | 461.3 | 3,493.6 | 6,879.2 | 6,650.5 |

Table 10.--Area of commercial forest land by ownership class and stand-volume class, Michigan, 1980

(In thousand acres)

| Ownership class | All classes | Stand-volume class (board feet[1/]) | | |
|---|---|---|---|---|
| | | Less than 1,500 | 1,500 to 5,000 | 5,000+ |
| National Forest | 2,441.5 | 1,132.7 | 963.0 | 345.8 |
| Bureau of Land Mgmt. | -- | -- | -- | -- |
| Miscellaneous federal | 44.9 | 33.9 | 11.0 | -- |
| Indian | 22.3 | 4.7 | 12.7 | 4.9 |
| State | 3,571.3 | 1,804.3 | 1,320.4 | 446.6 |
| County and municipal | 186.7 | 86.3 | 77.1 | 23.3 |
| Forest industry | 1,980.8 | 561.4 | 878.9 | 540.5 |
| Farmer | 3,097.7 | 1,324.7 | 1,255.0 | 518.0 |
| Misc. private-corp. | 1,510.5 | 565.1 | 584.3 | 361.1 |
| Misc. private-indiv. | 4,633.8 | 2,012.7 | 1,859.2 | 761.9 |
| All owners | 17,489.5 | 7,525.8 | 6,961.6 | 3,002.1 |

[1/] International 1/4-inch rule.

Table 11.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Michigan, 1980

(In thousand acres)

| Ownership class and owner tenure class | Total | Size of holding (acres) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-4 | 5-10 | 11-20 | 21-50 | 51-100 | 101-500 | 501-2,500 | 2,501-5,000 | 5001+ |
| Forest Industry | | | | | | | | | | |
| 1-4 years | 372.4 | -- | -- | -- | 1.6 | -- | 1.6 | 6.4 | -- | 362.8 |
| 5-9 years | 115.8 | -- | -- | -- | 2.3 | -- | 1.6 | 4.8 | -- | 107.1 |
| 10-19 years | 441.2 | -- | -- | -- | -- | -- | -- | 3.1 | 4.9 | 433.2 |
| 20+ years | 1,051.4 | -- | 2.7 | -- | -- | 2.3 | 3.3 | 3.1 | 4.3 | 1,035.7 |
| All classes | 1,980.8 | -- | 2.7 | -- | 3.9 | 2.3 | 6.5 | 17.4 | 9.2 | 1,938.8 |
| Farmer | | | | | | | | | | |
| 1-4 years | 503.6 | 13.6 | 22.8 | 51.8 | 118.9 | 116.5 | 155.8 | 16.9 | 5.7 | 1.6 |
| 5-9 years | 530.7 | 3.5 | 46.1 | 38.6 | 136.8 | 141.8 | 141.2 | 21.3 | -- | 1.4 |
| 10-19 years | 766.9 | 6.4 | 43.3 | 67.8 | 166.7 | 187.7 | 249.5 | 37.6 | 3.8 | 4.1 |
| 20+ years | 1,296.5 | 13.4 | 52.2 | 105.6 | 254.1 | 319.5 | 453.8 | 60.2 | 5.6 | 32.1 |
| All classes | 3,097.7 | 36.9 | 164.4 | 263.8 | 676.5 | 765.5 | 1,000.3 | 136.0 | 15.1 | 39.2 |
| Misc. priv.-corporation | | | | | | | | | | |
| 1-4 years | 156.6 | 2.7 | 4.2 | 2.2 | 6.4 | 5.2 | 41.4 | 42.1 | 6.2 | 46.2 |
| 5-9 years | 203.1 | -- | 3.6 | 2.6 | 13.8 | 29.0 | 55.3 | 43.4 | 10.8 | 44.6 |
| 10-19 years | 345.2 | -- | 2.7 | 4.1 | 12.6 | 8.3 | 44.0 | 34.8 | 8.7 | 230.0 |
| 20+ years | 805.6 | -- | -- | -- | 19.2 | 47.8 | 65.0 | 90.3 | 8.6 | 574.7 |
| All classes | 1,510.5 | 2.7 | 10.5 | 8.9 | 52.0 | 90.3 | 205.7 | 210.6 | 34.3 | 895.5 |
| Misc. priv.-individual | | | | | | | | | | |
| 1-4 years | 1,177.4 | 47.2 | 83.6 | 116.2 | 316.3 | 224.9 | 275.0 | 87.6 | 6.2 | 20.4 |
| 5-9 years | 1,021.8 | 34.5 | 87.3 | 116.5 | 320.6 | 164.0 | 234.7 | 57.6 | 1.8 | 4.8 |
| 10-19 years | 1,034.2 | 23.9 | 32.0 | 61.6 | 271.9 | 223.8 | 319.5 | 87.1 | 9.4 | 5.0 |
| 20+ years | 1,400.4 | 34.8 | 55.0 | 117.6 | 379.8 | 278.0 | 383.2 | 130.3 | 1.6 | 20.1 |
| All classes | 4,633.8 | 140.4 | 257.9 | 411.9 | 1,288.6 | 890.7 | 1,212.4 | 362.6 | 19.0 | 50.3 |
| All private owners | | | | | | | | | | |
| 1-4 years | 2,210.0 | 63.5 | 110.6 | 170.2 | 443.2 | 346.6 | 473.8 | 153.0 | 18.1 | 431.0 |
| 5-9 years | 1,871.4 | 38.0 | 137.0 | 157.7 | 473.5 | 334.8 | 432.8 | 127.1 | 12.6 | 157.9 |
| 10-19 years | 2,587.5 | 30.3 | 78.0 | 133.5 | 451.2 | 419.8 | 613.0 | 162.6 | 26.8 | 672.3 |
| 20+ years | 4,553.9 | 48.2 | 109.9 | 223.2 | 653.1 | 647.6 | 905.3 | 283.9 | 20.1 | 1,662.6 |
| All classes | 11,222.8 | 180.0 | 435.5 | 684.6 | 2,021.0 | 1,748.8 | 2,424.9 | 726.6 | 77.6 | 2,923.8 |

Table 12.--Area of commercial forest land by forest type, stand-size class, and ownership class, Michigan, 1980

(In thousand acres)

| Forest type and stand-size class | All owners | Ownership class | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | National Forest | Bureau of Land Mgmt. | Misc. federal | Indian | State | County & municipal | Forest industry | Farmer | Misc. priv.-corp. | Misc. priv.-indiv. |
| Jack pine | | | | | | | | | | | |
| Sawtimber | 163.8 | 2.4 | -- | 2.9 | -- | 93.6 | 4.8 | 4.8 | 7.0 | 14.9 | 33.4 |
| Poletimber | 454.9 | 204.1 | -- | 4.2 | -- | 162.8 | 4.2 | 5.9 | 8.0 | 10.9 | 54.8 |
| Sapling & seedling | 218.0 | 61.9 | -- | 1.8 | -- | 104.0 | 8.3 | 1.2 | 10.6 | -- | 30.2 |
| All stands | 836.7 | 268.4 | -- | 8.9 | -- | 360.4 | 17.3 | 11.9 | 25.6 | 25.8 | 118.4 |
| Red pine | | | | | | | | | | | |
| Sawtimber | 140.0 | 26.9 | -- | 1.9 | -- | 59.7 | 3.3 | 1.7 | 16.4 | 7.2 | 22.9 |
| Poletimber | 329.2 | 168.0 | -- | -- | -- | 70.8 | 4.7 | 3.1 | 34.9 | 16.9 | 30.8 |
| Sapling & seedling | 186.7 | 124.7 | -- | -- | -- | 30.4 | 1.7 | -- | 7.5 | 3.9 | 18.5 |
| All stands | 655.9 | 319.6 | -- | 1.9 | -- | 160.9 | 9.7 | 4.8 | 58.8 | 28.0 | 72.2 |
| White pine | | | | | | | | | | | |
| Sawtimber | 147.5 | 19.2 | -- | -- | -- | 37.3 | -- | 16.9 | 19.5 | 24.6 | 30.0 |
| Poletimber | 40.5 | 3.3 | -- | -- | -- | 13.3 | -- | 1.7 | 4.3 | 4.5 | 13.4 |
| Sapling & seedling | 26.1 | -- | -- | -- | -- | 17.3 | -- | -- | 3.9 | -- | 4.9 |
| All stands | 214.1 | 22.5 | -- | -- | -- | 67.9 | -- | 18.6 | 27.7 | 29.1 | 48.3 |
| Balsam fir | | | | | | | | | | | |
| Sawtimber | 143.0 | 27.1 | -- | 3.1 | -- | 21.2 | -- | 30.6 | 8.3 | 12.4 | 40.3 |
| Poletimber | 315.9 | 68.6 | -- | -- | -- | 61.5 | 1.7 | 52.5 | 25.5 | 37.7 | 68.4 |
| Sapling & seedling | 176.5 | 20.3 | -- | -- | -- | 35.5 | 1.6 | 52.2 | 13.3 | 18.0 | 35.6 |
| All stands | 635.4 | 116.0 | -- | 3.1 | -- | 118.2 | 3.3 | 135.3 | 47.1 | 68.1 | 144.3 |
| White spruce | | | | | | | | | | | |
| Sawtimber | 28.6 | -- | -- | -- | -- | 3.1 | -- | 5.3 | 6.1 | 9.6 | 4.5 |
| Poletimber | 44.7 | -- | -- | -- | -- | 9.8 | -- | 12.8 | 1.7 | 3.0 | 17.4 |
| Sapling & seedling | 26.8 | -- | -- | -- | -- | 9.8 | 2.5 | 2.8 | 2.3 | 1.5 | 7.9 |
| All stands | 100.1 | -- | -- | -- | -- | 22.7 | 2.5 | 20.9 | 10.1 | 14.1 | 29.8 |
| Black spruce | | | | | | | | | | | |
| Sawtimber | 13.7 | -- | -- | -- | -- | 7.7 | -- | 1.5 | -- | 1.2 | 3.3 |
| Poletimber | 261.2 | 130.3 | -- | -- | -- | 53.1 | 1.7 | 25.0 | 7.5 | 6.6 | 37.0 |
| Sapling & seedling | 245.7 | 32.0 | -- | -- | -- | 89.2 | 1.6 | 43.5 | 12.5 | 22.5 | 44.4 |
| All stands | 520.6 | 162.3 | -- | -- | -- | 150.0 | 3.3 | 70.0 | 20.0 | 30.3 | 84.7 |
| Northern white-cedar | | | | | | | | | | | |
| Sawtimber | 305.8 | 5.2 | -- | -- | -- | 75.8 | 3.2 | 74.0 | 29.4 | 55.3 | 62.9 |
| Poletimber | 640.6 | 57.8 | -- | -- | -- | 195.1 | 4.8 | 100.1 | 121.8 | 31.9 | 129.1 |
| Sapling & seedling | 227.2 | 5.3 | -- | -- | 1.6 | 52.8 | 2.8 | 31.3 | 61.1 | 16.7 | 55.6 |
| All stands | 1,173.6 | 68.3 | -- | -- | 1.6 | 323.7 | 10.8 | 205.4 | 212.3 | 103.9 | 247.6 |

(Table 12 continued on next page)

(Table 12 continued)

| Forest type and stand-size class | All owners | Ownership class | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | National Forest | Bureau of Land Mgmt. | Misc. Federal | Indian | State | County & municipal | Forest industry | Farmer | Misc. priv.-corp. | Misc. priv.-indiv. |
| Tamarack | | | | | | | | | | | |
| Sawtimber | 12.6 | -- | -- | -- | -- | 2.3 | -- | -- | | 2.4 | 7.9 |
| Poletimber | 35.5 | -- | -- | -- | -- | 14.9 | -- | 9.8 | 5.3 | -- | 5.5 |
| Sapling & seedling | 66.7 | -- | -- | -- | -- | 27.5 | -- | 10.3 | 5.9 | 3.8 | 19.2 |
| All stands | 114.8 | -- | -- | -- | -- | 44.7 | -- | 20.1 | 11.2 | 6.2 | 32.6 |
| Oak-hickory | | | | | | | | | | | |
| Sawtimber | 684.0 | 42.2 | -- | -- | -- | 86.1 | 2.3 | 8.1 | 197.6 | 51.0 | 296.7 |
| Poletimber | 782.2 | 167.2 | -- | -- | -- | 183.0 | 11.0 | 4.9 | 121.5 | 48.3 | 246.3 |
| Sapling & seedling | 307.4 | 37.0 | -- | 10.8 | -- | 71.8 | 5.9 | -- | 45.0 | 19.4 | 117.5 |
| All stands | 1,773.6 | 246.4 | -- | 10.8 | -- | 340.9 | 19.2 | 13.0 | 364.1 | 118.7 | 660.5 |
| Elm-ash-soft maple | | | | | | | | | | | |
| Sawtimber | 453.5 | 15.9 | -- | 4.2 | 1.5 | 59.2 | 8.0 | 34.3 | 144.9 | 49.3 | 136.2 |
| Poletimber | 471.1 | 25.1 | -- | -- | -- | 65.6 | 8.4 | 42.3 | 159.4 | 33.8 | 136.5 |
| Sapling & seedling | 401.8 | -- | -- | -- | -- | 60.3 | 6.9 | 24.5 | 135.7 | 45.9 | 128.5 |
| All stands | 1,326.4 | 41.0 | -- | 4.2 | 1.5 | 185.1 | 23.3 | 101.1 | 440.0 | 129.0 | 401.2 |
| Maple-birch | | | | | | | | | | | |
| Sawtimber | 2,479.7 | 230.0 | -- | -- | 3.2 | 286.6 | 17.1 | 693.3 | 413.6 | 270.4 | 565.5 |
| Poletimber | 2,568.2 | 442.8 | -- | 1.6 | 9.3 | 380.9 | 38.9 | 306.5 | 482.3 | 218.1 | 687.8 |
| Sapling & seedling | 1,050.5 | 14.9 | -- | 3.4 | -- | 179.1 | 6.6 | 105.3 | 316.0 | 97.0 | 328.2 |
| All stands | 6,098.4 | 687.7 | -- | 5.0 | 12.5 | 846.6 | 62.6 | 1,105.1 | 1,211.9 | 585.5 | 1,581.5 |
| Aspen | | | | | | | | | | | |
| Sawtimber | 533.8 | 20.9 | -- | -- | -- | 116.1 | 5.5 | 25.3 | 127.9 | 69.9 | 168.2 |
| Poletimber | 1,504.5 | 263.3 | -- | 6.4 | 5.1 | 286.0 | 14.6 | 88.1 | 255.8 | 112.7 | 472.5 |
| Sapling & seedling | 1,368.3 | 168.0 | -- | 1.5 | 1.6 | 430.7 | 9.3 | 96.9 | 172.4 | 111.2 | 376.7 |
| All stands | 3,406.6 | 452.2 | -- | 7.9 | 6.7 | 832.8 | 29.4 | 210.3 | 556.1 | 293.8 | 1,017.4 |
| Paper birch | | | | | | | | | | | |
| Sawtimber | 35.2 | 1.9 | -- | -- | -- | 4.7 | -- | 12.7 | -- | 6.6 | 9.3 |
| Poletimber | 269.9 | 39.2 | -- | 1.5 | -- | 64.0 | -- | 36.3 | 40.8 | 38.0 | 50.1 |
| Sapling & seedling | 69.7 | -- | -- | -- | -- | 4.3 | 5.3 | 11.7 | 15.9 | 3.3 | 29.2 |
| All stands | 374.8 | 41.1 | -- | 1.5 | -- | 73.0 | 5.3 | 60.7 | 56.7 | 47.9 | 88.6 |
| Exotic | | | | | | | | | | | |
| Sawtimber | 4.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.8 |
| Poletimber | 35.0 | -- | -- | -- | -- | -- | -- | -- | 13.2 | 2.2 | 19.6 |
| Sapling & seedling | 46.5 | -- | -- | -- | -- | -- | -- | 1.1 | 4.6 | 11.1 | 29.7 |
| All stands | 86.3 | -- | -- | -- | -- | -- | -- | 1.1 | 17.8 | 13.3 | 54.1 |
| Nonstocked | 172.2 | 16.0 | -- | 1.6 | -- | 44.4 | -- | 2.5 | 38.3 | 16.8 | 52.6 |
| All types | | | | | | | | | | | |
| Sawtimber | 5,146.0 | 391.7 | -- | 12.1 | 4.7 | 853.4 | 44.2 | 908.5 | 970.7 | 574.8 | 1,385.9 |
| Poletimber | 7,753.4 | 1,569.7 | -- | 13.7 | 14.4 | 1,560.8 | 90.0 | 689.0 | 1,282.0 | 564.6 | 1,969.2 |
| Sapling & seedling | 4,417.9 | 464.1 | -- | 17.5 | 3.2 | 1,112.7 | 52.5 | 380.8 | 806.7 | 354.3 | 1,226.1 |
| Nonstocked | 172.2 | 16.0 | -- | 1.6 | -- | 44.4 | -- | 2.5 | 38.3 | 16.8 | 52.6 |
| All stands | 17,489.5 | 2,441.5 | -- | 44.9 | 22.3 | 3,571.3 | 186.7 | 1,980.8 | 3,097.7 | 1,510.5 | 4,633.8 |

Table 13.--Area of commercial forest land by forest type and Forest Survey Unit, Michigan, 1980

(In thousand acres)

| Forest type | All Units | Forest Survey Unit | | | |
|---|---|---|---|---|---|
| | | Eastern Upper Peninsula | Western Upper Peninsula | Northern Lower Peninsula | Southern Lower Peninsula |
| Jack pine | 836.7 | 229.1 | 88.3 | 506.7 | 12.6 |
| Red pine | 655.9 | 139.8 | 57.6 | 427.0 | 31.5 |
| White pine | 214.1 | 68.7 | 48.7 | 75.2 | 21.5 |
| Balsam fir | 635.4 | 217.4 | 366.6 | 51.4 | -- |
| White spruce | 100.1 | 30.1 | 40.6 | 21.9 | 7.5 |
| Black spruce | 520.6 | 283.1 | 209.5 | 28.0 | -- |
| Northern white-cedar | 1,173.6 | 594.9 | 210.2 | 355.5 | 13.0 |
| Tamarack | 114.8 | 43.8 | 36.0 | 30.6 | 4.4 |
| Oak-hickory | 1,773.6 | 19.3 | 22.6 | 1,068.1 | 663.6 |
| Elm-ash-soft maple | 1,326.4 | 191.8 | 169.7 | 416.3 | 548.6 |
| Maple-birch | 6,098.4 | 1,160.3 | 2,372.4 | 1,662.4 | 903.3 |
| Aspen | 3,406.6 | 671.4 | 733.3 | 1,817.5 | 184.4 |
| Paper birch | 374.8 | 110.5 | 143.8 | 113.9 | 6.6 |
| Exotic | 86.3 | 1.2 | 1.6 | 57.2 | 26.3 |
| Nonstocked | 172.2 | 40.2 | 28.7 | 63.2 | 40.1 |
| All types | 17,489.5 | 3,801.6 | 4,529.6 | 6,694.9 | 2,463.4 |

Table 14.--Area of commercial forest land by county, stand-size class, and Forest Survey Unit, Michigan, 1980

(In thousand acres)

| County | All stands | Stand-size class | | | |
|---|---|---|---|---|---|
| | | Sawtimber stands | Poletimber stands | Sapling and seedling stands | Nonstocked areas |
| **EASTERN UPPER PENINSULA** | | | | | |
| Alger | 491.9 | 212.6 | 194.5 | 77.1 | 7.7 |
| Chippewa | 705.9 | 173.5 | 378.6 | 151.4 | 2.4 |
| Delta | 574.5 | 99.2 | 329.4 | 145.2 | 0.7 |
| Luce | 468.4 | 179.8 | 163.3 | 119.4 | 5.9 |
| Mackinac | 524.2 | 122.1 | 283.2 | 111.3 | 7.6 |
| Menonimee | 493.4 | 79.2 | 230.6 | 181.1 | 2.5 |
| Schoolcraft | 543.3 | 139.6 | 245.5 | 144.8 | 13.4 |
| All counties | 3,801.6 | 1,006.0 | 1,825.1 | 930.3 | 40.2 |
| **WESTERN UPPER PENINSULA** | | | | | |
| Baraga | 513.2 | 283.8 | 154.4 | 72.1 | 2.9 |
| Dickinson | 376.6 | 74.1 | 190.8 | 108.6 | 3.1 |
| Gogebic | 619.9 | 168.3 | 354.3 | 93.5 | 3.8 |
| Houghton | 513.7 | 212.5 | 233.8 | 61.7 | 5.7 |
| Iron | 654.0 | 208.9 | 309.1 | 133.7 | 2.3 |
| Keweenaw | 207.1 | 121.2 | 62.2 | 23.7 | -- |
| Marquette | 970.4 | 367.1 | 436.2 | 161.9 | 5.2 |
| Ontonagon | 674.7 | 211.7 | 363.7 | 93.6 | 5.7 |
| All counties | 4,529.6 | 1,647.6 | 2,104.5 | 748.8 | 28.7 |
| **NORTHERN LOWER PENINSULA** | | | | | |
| Alcona | 306.5 | 74.8 | 152.0 | 77.4 | 2.3 |
| Alepna | 217.7 | 55.7 | 85.3 | 68.4 | 8.3 |
| Antrim | 156.6 | 25.1 | 107.1 | 22.2 | 2.2 |
| Arenac | 92.7 | 16.2 | 46.5 | 30.0 | -- |
| Bay | 17.8 | 2.0 | 8.8 | 7.0 | -- |
| Benzie | 121.1 | 29.2 | 56.0 | 35.9 | -- |
| Charlevoix | 138.6 | 46.5 | 80.9 | 8.8 | 2.4 |
| Cheboygan | 366.6 | 74.7 | 207.2 | 82.5 | 2.2 |
| Clare | 215.7 | 50.0 | 77.5 | 88.2 | -- |
| Crawford | 272.9 | 35.8 | 136.5 | 100.6 | -- |
| Emmet | 195.2 | 54.1 | 114.2 | 26.9 | -- |
| Gladwin | 192.8 | 36.3 | 89.9 | 64.5 | 2.1 |
| Grand Traverse | 152.2 | 43.6 | 70.8 | 37.8 | -- |
| Iosco | 224.6 | 49.7 | 115.7 | 59.2 | -- |
| Isabella | 78.4 | 24.3 | 20.4 | 30.2 | 3.5 |
| Kalkaska | 253.3 | 39.6 | 129.8 | 76.2 | 7.7 |
| Lake | 299.8 | 67.4 | 162.8 | 69.6 | -- |
| Leelanau | 75.8 | 42.1 | 24.4 | 9.3 | -- |
| Manistee | 225.5 | 57.9 | 83.2 | 75.6 | 8.8 |
| Mason | 148.0 | 40.5 | 70.0 | 35.9 | 1.6 |
| Mecosta | 122.7 | 32.4 | 34.6 | 53.4 | 2.3 |
| Midland | 147.5 | 41.3 | 60.3 | 45.9 | -- |
| Missaukee | 204.4 | 39.7 | 79.2 | 85.5 | -- |
| Montmorency | 302.0 | 40.6 | 107.9 | 141.5 | 12.0 |

(Table 14 continued on next page)

(Table 14 continued)

| County | All stands | Stand-size class: Sawtimber stands | Poletimber stands | Sapling and seedling stands | Nonstocked areas |
|---|---|---|---|---|---|
| **NORTHERN LOWER PENINSULA** | | | | | |
| Newaygo | 310.0 | 86.6 | 126.1 | 97.3 | -- |
| Oceana | 148.3 | 44.3 | 64.7 | 35.4 | 3.9 |
| Ogemaw | 219.5 | 35.3 | 117.8 | 64.6 | 1.8 |
| Osceola | 156.8 | 66.6 | 39.6 | 50.6 | -- |
| Oscoda | 307.2 | 52.0 | 125.9 | 129.3 | -- |
| Otsego | 260.8 | 43.2 | 137.0 | 80.6 | -- |
| Presque Isle | 266.9 | 54.4 | 125.4 | 87.1 | -- |
| Roscommon | 246.7 | 58.3 | 137.6 | 50.8 | -- |
| Wexford | 250.3 | 48.5 | 142.0 | 57.7 | 2.1 |
| All counties | 6,694.9 | 1,508.7 | 3,137.1 | 1,985.9 | 63.2 |
| **SOUTHERN LOWER PENINSULA** | | | | | |
| Allegan | 137.4 | 57.0 | 41.8 | 38.6 | -- |
| Barry | 111.2 | 62.0 | 24.4 | 24.8 | -- |
| Berrien | 66.1 | 42.0 | 12.5 | 11.6 | -- |
| Branch | 44.1 | 23.5 | 11.2 | 9.4 | -- |
| Calhoun | 76.1 | 40.5 | 23.0 | 12.6 | -- |
| Cass | 54.0 | 24.6 | 20.6 | 8.8 | -- |
| Clinton | 30.5 | 10.7 | 8.4 | 11.4 | -- |
| Eaton | 45.5 | 15.5 | 18.9 | 11.1 | -- |
| Genesee | 44.0 | 12.3 | 11.7 | 20.0 | -- |
| Gratiot | 27.4 | 13.7 | 6.2 | 7.5 | -- |
| Hillsdale | 45.0 | 12.1 | 9.7 | 17.3 | 5.9 |
| Huron | 56.1 | 14.0 | 19.4 | 18.5 | 4.2 |
| Ingham | 42.1 | 27.0 | 6.6 | 8.5 | -- |
| Ionia | 37.2 | 15.4 | 4.4 | 17.4 | -- |
| Jackson | 83.4 | 41.8 | 20.7 | 20.9 | -- |
| Kalamazoo | 66.6 | 19.8 | 15.5 | 31.3 | -- |
| Kent | 122.6 | 26.8 | 52.1 | 43.7 | -- |
| Lapeer | 81.0 | 36.8 | 19.1 | 25.1 | -- |
| Lenawee | 47.7 | 20.1 | 10.1 | 15.5 | 2.0 |
| Livingston | 69.1 | 45.4 | 16.7 | 7.0 | -- |
| Macomb | 45.0 | 13.5 | -- | 31.5 | -- |
| Monroe | 35.1 | 17.6 | 5.1 | 10.4 | 2.0 |
| Montcalm | 145.3 | 36.9 | 67.1 | 36.6 | 4.7 |
| Muskegon | 164.6 | 62.7 | 49.8 | 46.2 | 5.9 |
| Oakland | 82.2 | 26.9 | 17.8 | 32.9 | 4.6 |
| Ottawa | 77.5 | 39.4 | 11.2 | 26.9 | -- |
| Saginaw | 82.7 | 19.3 | 21.9 | 41.5 | -- |
| St. Clair | 87.9 | 41.4 | 12.5 | 34.0 | -- |
| St. Joseph | 59.9 | 27.0 | 7.4 | 23.7 | 1.8 |
| Sanilac | 50.1 | 4.2 | 9.4 | 32.0 | 4.5 |
| Shiawassee | 52.8 | 25.5 | 17.4 | 9.9 | -- |
| Tuscola | 83.7 | 11.8 | 56.6 | 15.3 | -- |
| Van Buren | 102.0 | 30.5 | 35.5 | 36.0 | -- |
| Washtenaw | 72.0 | 41.6 | 17.8 | 8.1 | 4.5 |
| Wayne | 35.5 | 24.4 | 4.2 | 6.9 | -- |
| All counties | 2,463.4 | 983.7 | 686.7 | 752.9 | 40.1 |
| All units | 17,489.5 | 5,146.0 | 7,753.4 | 4,417.9 | 172.2 |

Table 15.--Area of commercial forest land by forest type, stand-size class, and site class, Michigan, 1980

(In thousand acres)

| Forest type and stand-size class | All classes | Site class (cubic feet of growth per acre per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 225+ | 165-224 | 120-164 | 85-119 | 50-84 | 20-49 |
| Jack pine | | | | | | | |
| Sawtimber | 163.8 | -- | -- | -- | 15.6 | 52.3 | 95.9 |
| Poletimber | 454.9 | -- | -- | -- | 8.7 | 100.4 | 345.8 |
| Sapling & seedling | 218.0 | -- | -- | -- | -- | 22.9 | 195.1 |
| All stands | 836.7 | -- | -- | -- | 24.3 | 175.6 | 636.8 |
| Red pine | | | | | | | |
| Sawtimber | 140.0 | -- | -- | 6.6 | 55.3 | 64.6 | 13.5 |
| Poletimber | 329.2 | -- | -- | 48.4 | 137.9 | 118.7 | 24.2 |
| Sapling & seedling | 186.7 | -- | -- | 6.9 | 37.5 | 129.8 | 12.5 |
| All stands | 655.9 | -- | -- | 61.9 | 230.7 | 313.1 | 50.2 |
| White pine | | | | | | | |
| Sawtimber | 147.5 | -- | -- | 15.7 | 33.7 | 71.1 | 27.0 |
| Poletimber | 40.5 | -- | -- | -- | 9.9 | 22.7 | 7.9 |
| Sapling & seedling | 26.1 | -- | -- | 2.2 | 4.1 | 8.9 | 10.9 |
| All stands | 214.1 | -- | -- | 17.9 | 47.7 | 102.7 | 45.8 |
| Balsam fir | | | | | | | |
| Sawtimber | 143.0 | -- | 1.7 | 23.1 | 57.9 | 45.2 | 15.1 |
| Poletimber | 315.9 | -- | 3.2 | 55.3 | 178.0 | 65.9 | 13.5 |
| Sapling & seedling | 176.5 | -- | -- | 18.2 | 76.4 | 35.6 | 46.3 |
| All stands | 635.4 | -- | 4.9 | 96.6 | 312.3 | 146.7 | 74.9 |
| White spruce | | | | | | | |
| Sawtimber | 28.6 | -- | -- | -- | 4.6 | 17.1 | 6.9 |
| Poletimber | 44.7 | -- | -- | -- | 14.4 | 19.6 | 10.7 |
| Sapling & seedling | 26.8 | -- | -- | -- | 9.8 | 14.7 | 2.3 |
| All stands | 100.1 | -- | -- | -- | 28.8 | 51.4 | 19.9 |
| Black spruce | | | | | | | |
| Sawtimber | 13.7 | -- | -- | -- | -- | 2.9 | 10.8 |
| Poletimber | 261.2 | -- | -- | -- | 13.6 | 29.7 | 217.9 |
| Sapling & seedling | 245.7 | -- | -- | -- | 1.9 | 17.8 | 226.0 |
| All stands | 520.6 | -- | -- | -- | 15.5 | 50.4 | 454.7 |
| Northern white-cedar | | | | | | | |
| Sawtimber | 305.8 | -- | -- | -- | -- | 43.0 | 262.8 |
| Poletimber | 640.6 | -- | -- | -- | 6.9 | 54.3 | 579.4 |
| Sapling & seedling | 227.2 | -- | -- | -- | -- | 13.0 | 214.2 |
| All stands | 1,173.6 | -- | -- | -- | 6.9 | 110.3 | 1,056.4 |

(Table 15 continued on next page)

(Table 15 continued)

| Forest type and stand-size class | All classes | Site class (cubic feet of growth per acre per year) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 225+ | 165-224 | 120-164 | 85-119 | 50-84 | 20-49 |
| Tamarack | | | | | | | |
| Sawtimber | 12.6 | -- | -- | -- | -- | 6.5 | 6.1 |
| Poletimber | 35.5 | -- | -- | -- | 2.3 | 10.7 | 22.5 |
| Sapling & seedling | 66.7 | -- | -- | -- | -- | 9.8 | 56.9 |
| All stands | 114.8 | -- | -- | -- | 2.3 | 27.0 | 85.5 |
| Oak-hickory | | | | | | | |
| Sawtimber | 684.0 | -- | -- | 21.4 | 174.2 | 315.3 | 173.1 |
| Poletimber | 782.2 | -- | -- | -- | 112.9 | 387.3 | 282.0 |
| Sapling & seedling | 307.4 | -- | -- | -- | 26.3 | 136.5 | 144.6 |
| All stands | 1,773.6 | -- | -- | 21.4 | 313.4 | 839.1 | 599.7 |
| Elm-ash-soft maple | | | | | | | |
| Sawtimber | 453.5 | -- | -- | -- | 126.8 | 122.7 | 204.0 |
| Poletimber | 471.1 | -- | -- | -- | 86.6 | 101.5 | 283.0 |
| Sapling & seedling | 401.8 | -- | -- | -- | 26.0 | 115.3 | 260.5 |
| All stands | 1,326.4 | -- | -- | -- | 239.4 | 339.5 | 747.5 |
| Maple-birch | | | | | | | |
| Sawtimber | 2,479.7 | -- | -- | 59.0 | 418.9 | 1,169.2 | 832.6 |
| Poletimber | 2,568.2 | -- | -- | 54.0 | 405.1 | 1,354.0 | 755.1 |
| Sapling & seedling | 1,050.5 | -- | -- | 13.8 | 133.3 | 471.2 | 432.2 |
| All stands | 6,098.4 | -- | -- | 126.8 | 957.3 | 2,994.4 | 2,019.9 |
| Aspen | | | | | | | |
| Sawtimber | 533.8 | -- | -- | 34.3 | 223.7 | 205.3 | 70.5 |
| Poletimber | 1,504.5 | -- | -- | 26.7 | 575.6 | 711.9 | 190.3 |
| Sapling & seedling | 1,368.3 | -- | -- | 44.0 | 462.4 | 592.0 | 269.9 |
| All stands | 3,406.6 | -- | -- | 105.0 | 1,261.7 | 1,509.2 | 530.7 |
| Paper birch | | | | | | | |
| Sawtimber | 35.2 | -- | -- | 2.0 | -- | 6.9 | 26.3 |
| Poletimber | 269.9 | -- | -- | 21.5 | 4.9 | 120.1 | 123.4 |
| Sapling & seedling | 69.7 | -- | -- | -- | 1.5 | 13.4 | 54.8 |
| All stands | 374.8 | -- | -- | 23.5 | 6.4 | 140.4 | 204.5 |
| Exotic | | | | | | | |
| Sawtimber | 4.8 | -- | -- | -- | -- | 4.8 | -- |
| Poletimber | 35.0 | -- | -- | 3.5 | 22.0 | 4.7 | 4.8 |
| Sapling & seedling | 46.5 | -- | -- | 2.3 | 11.1 | 21.6 | 11.5 |
| All stands | 86.3 | -- | -- | 5.8 | 33.1 | 31.1 | 16.3 |
| Nonstocked | 172.2 | -- | -- | 2.4 | 13.8 | 48.3 | 107.7 |
| All types | | | | | | | |
| Sawtimber | 5,146.0 | -- | 1.7 | 162.1 | 1,110.7 | 2,126.9 | 1,744.6 |
| Poletimber | 7,753.4 | -- | 3.2 | 209.4 | 1,578.8 | 3,101.5 | 2,860.5 |
| Sapling & seedling | 4,417.9 | -- | -- | 87.4 | 790.3 | 1,602.5 | 1,937.7 |
| Nonstocked | 172.2 | -- | -- | 2.4 | 13.8 | 48.3 | 107.7 |
| All stands | 17,489.5 | -- | 4.9 | 461.3 | 3,493.6 | 6,879.2 | 6,650.5 |

Table 16.--Area of commercial forest land by forest type and stand-age class, Michigan, 1980

(In thousand acres)

| Forest type | All ages | Stand-age class (years) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 | 101-120 | 121-140 | 141+ |
| Jack pine | 836.7 | 82.6 | 101.4 | 75.1 | 156.1 | 196.0 | 110.5 | 45.9 | 45.2 | 14.7 | 4.4 | 2.3 | 2.5 | -- |
| Red pine | 655.9 | 56.4 | 135.4 | 182.1 | 117.2 | 69.5 | 12.8 | 23.7 | 17.4 | 14.1 | 9.4 | 16.4 | 1.5 | -- |
| White pine | 214.1 | 7.3 | 12.2 | 17.8 | 5.0 | 18.5 | 15.6 | 33.7 | 26.9 | 24.5 | 22.2 | 13.0 | 12.7 | 4.7 |
| Balsam fir | 635.4 | 51.9 | 73.6 | 52.7 | 69.9 | 117.1 | 94.1 | 57.1 | 42.3 | 22.5 | 14.6 | 23.7 | 11.0 | 4.9 |
| White spruce | 100.1 | 7.0 | 18.6 | 1.2 | 19.8 | 14.0 | 11.6 | 3.3 | 4.8 | 8.0 | -- | 9.6 | -- | 2.2 |
| Black spruce | 520.6 | 58.7 | 67.3 | 129.8 | 72.5 | 50.4 | 51.9 | 35.5 | 17.2 | 3.2 | 7.6 | 13.4 | 7.3 | 5.8 |
| Northern white-cedar | 1,173.6 | 26.9 | 54.6 | 88.4 | 73.6 | 62.6 | 113.7 | 141.4 | 127.0 | 135.2 | 86.5 | 139.2 | 67.2 | 57.3 |
| Tamarack | 114.8 | 20.2 | 15.2 | 16.0 | 11.6 | 5.9 | 18.1 | 10.7 | 5.1 | 1.5 | 4.5 | 3.7 | -- | 2.3 |
| Oak-hickory | 1,773.6 | 162.7 | 135.0 | 20.9 | 100.9 | 194.0 | 291.8 | 204.7 | 190.2 | 157.0 | 93.9 | 166.9 | 44.3 | 11.3 |
| Elm-ash-soft maple | 1,326.4 | 169.2 | 166.5 | 98.0 | 117.0 | 124.9 | 138.8 | 103.4 | 103.4 | 87.8 | 53.1 | 102.5 | 45.9 | 15.9 |
| Maple-birch | 6,098.4 | 506.1 | 423.7 | 192.4 | 376.2 | 896.7 | 891.5 | 504.7 | 408.3 | 475.0 | 442.4 | 618.4 | 269.6 | 93.4 |
| Aspen | 3,406.6 | 708.0 | 576.5 | 149.6 | 358.4 | 516.2 | 481.3 | 238.0 | 158.0 | 95.0 | 66.8 | 50.1 | 8.7 | -- |
| Paper birch | 374.8 | 31.1 | 32.7 | 10.9 | 26.3 | 41.1 | 96.8 | 79.9 | 26.2 | 8.2 | 12.0 | 3.0 | 5.0 | 1.6 |
| Exotic | 86.3 | 11.4 | 27.5 | 28.8 | 9.4 | 2.2 | 7.0 | -- | -- | -- | -- | -- | -- | -- |
| Nonstocked | 172.2 | 98.8 | 40.3 | 10.3 | 8.4 | 5.7 | 5.1 | -- | -- | 3.6 | -- | -- | -- | -- |
| All types | 17,489.5 | 1,998.3 | 1,880.5 | 1,074.0 | 1,522.3 | 2,314.8 | 2,340.6 | 1,482.0 | 1,172.0 | 1,050.3 | 817.4 | 1,162.2 | 475.7 | 199.4 |

Table 17.--Area of commercial forest land by forest type, site-index class, and Forest Survey Unit, Michigan, 1980

(In thousand acres)

ALL UNITS

| Forest type | All classes | Site-index class (feet) 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91+ |
|---|---|---|---|---|---|---|---|---|---|---|
| Jack pine | 836.7 | -- | 11.8 | 123.1 | 255.0 | 270.4 | 128.8 | 28.2 | 19.4 | -- |
| Red pine | 655.9 | -- | -- | 2.6 | 146.4 | 214.3 | 161.3 | 92.6 | 38.7 | -- |
| White pine | 214.1 | -- | -- | 17.6 | 41.7 | 89.4 | 36.9 | 20.0 | 8.5 | -- |
| Balsam fir | 635.4 | 2.9 | 9.5 | 62.6 | 176.2 | 268.6 | 90.2 | 10.4 | 11.9 | 3.1 |
| White spruce | 100.1 | -- | 4.7 | 13.6 | 19.2 | 25.8 | 14.4 | 19.7 | 2.7 | -- |
| Black spruce | 520.6 | -- | 50.9 | 226.1 | 177.7 | 50.3 | 13.7 | 1.9 | -- | -- |
| Northern white-cedar | 1,173.6 | 74.7 | 534.1 | 365.8 | 129.4 | 29.5 | 33.2 | 6.9 | -- | -- |
| Tamarack | 114.8 | -- | 17.2 | 40.8 | 27.7 | 18.3 | 8.5 | -- | 2.3 | -- |
| Oak-hickory | 1,773.6 | -- | 2.3 | 65.7 | 310.4 | 463.5 | 456.9 | 303.6 | 130.7 | 40.5 |
| Elm-ash-soft maple | 1,326.4 | -- | 10.0 | 128.1 | 162.0 | 261.2 | 333.8 | 191.8 | 120.3 | 119.2 |
| Maple-birch | 6,098.4 | -- | 21.6 | 120.5 | 562.8 | 1,320.2 | 1,926.0 | 1,404.3 | 564.0 | 179.0 |
| Aspen | 3,406.6 | -- | 2.7 | 55.8 | 214.0 | 592.1 | 969.9 | 954.1 | 512.9 | 105.1 |
| Paper birch | 374.8 | -- | 1.4 | 19.2 | 38.5 | 147.1 | 124.9 | 37.3 | 6.4 | -- |
| Exotic | 86.3 | -- | -- | 4.2 | 22.5 | 20.6 | 28.3 | 9.6 | -- | 1.1 |
| Nonstocked | 172.2 | 1.7 | 4.6 | 17.1 | 60.0 | 54.1 | 14.9 | 15.6 | 4.2 | -- |
| All types | 17,489.5 | 79.3 | 670.8 | 1,262.8 | 2,343.5 | 3,825.4 | 4,341.7 | 3,096.0 | 1,422.0 | 448.0 |
| EASTERN UPPER PENINSULA | | | | | | | | | | |
| Jack pine | 229.1 | -- | 11.8 | 60.4 | 48.3 | 76.7 | 25.1 | 5.2 | 1.6 | -- |
| Red pine | 139.8 | -- | -- | -- | 33.5 | 58.6 | 46.0 | 1.7 | -- | -- |
| White pine | 68.7 | -- | -- | 11.2 | 21.5 | 26.5 | 4.8 | 3.0 | 1.7 | -- |
| Balsam fir | 217.4 | 1.5 | 3.0 | 15.0 | 67.0 | 97.3 | 29.0 | 3.1 | -- | 1.5 |
| White spruce | 30.1 | -- | -- | 6.0 | 7.2 | 2.8 | 11.1 | 3.0 | -- | -- |
| Black spruce | 283.1 | -- | 13.4 | 127.7 | 114.6 | 21.5 | 4.4 | 1.5 | -- | -- |
| Northern white-cedar | 594.9 | 43.0 | 303.3 | 161.6 | 60.1 | 14.3 | 8.0 | 4.6 | -- | -- |
| Tamarack | 43.8 | -- | 4.6 | 19.2 | 13.6 | 4.8 | 1.6 | -- | -- | -- |
| Oak-hickory | 19.3 | -- | -- | 1.5 | 0.4 | 4.6 | 6.6 | 6.2 | -- | -- |
| Elm-ash-soft maple | 191.8 | -- | 1.5 | 25.2 | 54.0 | 57.7 | 39.6 | 10.8 | 3.0 | -- |
| Maple-birch | 1,160.3 | -- | 12.3 | 32.1 | 136.9 | 319.2 | 428.7 | 186.6 | 38.1 | 6.4 |
| Aspen | 671.4 | -- | -- | 25.9 | 77.2 | 157.9 | 204.3 | 160.8 | 40.3 | 5.0 |
| Paper birch | 110.5 | -- | -- | 6.3 | 13.8 | 47.6 | 36.6 | 4.7 | 1.5 | -- |
| Exotic | 1.2 | -- | -- | -- | -- | -- | 1.2 | -- | -- | -- |
| Nonstocked | 40.2 | 1.7 | 0.7 | 3.2 | 13.6 | 14.3 | 3.6 | 3.1 | -- | -- |
| All types | 3,801.6 | 46.2 | 350.6 | 495.3 | 661.7 | 903.8 | 850.6 | 394.3 | 86.2 | 12.9 |
| WESTERN UPPER PENINSULA | | | | | | | | | | |
| Jack pine | 88.3 | -- | -- | 1.7 | 5.9 | 10.2 | 45.0 | 15.2 | 10.3 | -- |
| Red pine | 57.6 | -- | -- | -- | 19.3 | 13.6 | 6.8 | 17.9 | -- | -- |
| White pine | 48.7 | -- | -- | -- | 8.1 | 29.3 | 9.7 | 1.6 | -- | -- |
| Balsam fir | 366.6 | 1.4 | 6.5 | 44.8 | 92.0 | 146.4 | 57.0 | 5.0 | 11.9 | 1.6 |
| White spruce | 40.6 | -- | -- | 3.3 | 9.8 | 13.0 | 3.3 | 11.2 | -- | -- |
| Black spruce | 209.5 | -- | 35.6 | 88.5 | 55.5 | 25.1 | 4.4 | 0.4 | -- | -- |
| Northern white-cedar | 210.2 | 16.3 | 103.8 | 58.3 | 18.2 | 2.7 | 10.9 | -- | -- | -- |
| Tamarack | 36.0 | -- | -- | 12.9 | 14.1 | 5.2 | 3.8 | -- | -- | -- |
| Oak-hickory | 22.6 | -- | -- | 1.7 | 3.2 | 4.7 | 11.4 | 1.6 | -- | -- |
| Elm-ash-soft maple | 169.7 | -- | 3.0 | 39.2 | 41.0 | 35.2 | 35.5 | 14.2 | 1.6 | -- |
| Maple-birch | 2,372.4 | -- | 9.3 | 51.7 | 267.1 | 616.8 | 825.5 | 463.1 | 126.2 | 12.7 |
| Aspen | 733.3 | -- | -- | 5.3 | 31.9 | 127.4 | 217.3 | 232.0 | 101.2 | 18.2 |
| Paper birch | 143.8 | -- | 1.3 | 3.1 | 6.7 | 62.1 | 54.6 | 16.0 | -- | -- |
| Exotic | 1.6 | -- | -- | -- | -- | 1.6 | -- | -- | -- | -- |
| Nonstocked | 28.7 | -- | 2.3 | 2.6 | 2.8 | 17.0 | 2.9 | 1.1 | -- | -- |
| All types | 4,529.6 | 17.7 | 161.8 | 313.1 | 575.6 | 1,110.3 | 1,288.1 | 779.3 | 251.2 | 32.5 |

(Table 17 continued on next page)

(Table 17 continued)

| Forest type | All classes | Site-index class (feet) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91+ |
| **NORTHERN LOWER PENINSULA** | | | | | | | | | | |
| Jack pine | 506.7 | -- | -- | 60.8 | 200.7 | 183.5 | 46.4 | 7.8 | 7.5 | -- |
| Red pine | 427.0 | -- | -- | 2.6 | 90.9 | 139.2 | 108.3 | 66.3 | 19.7 | -- |
| White pine | 75.2 | -- | -- | 6.4 | 12.1 | 22.5 | 22.4 | 7.1 | 4.7 | -- |
| Balsam fir | 51.4 | -- | -- | 2.8 | 17.2 | 24.9 | 4.2 | 2.3 | -- | -- |
| White spruce | 21.9 | -- | 4.7 | 4.3 | 2.2 | 2.5 | -- | 5.5 | 2.7 | -- |
| Black spruce | 28.0 | -- | 1.9 | 9.9 | 7.6 | 3.7 | 4.9 | -- | -- | -- |
| Northern white-cedar | 355.5 | 15.4 | 120.4 | 142.6 | 51.1 | 12.3 | 11.4 | 2.3 | -- | -- |
| Tamarack | 30.6 | -- | 8.2 | 8.7 | -- | 8.3 | 3.1 | -- | 2.3 | -- |
| Oak-hickory | 1,068.1 | -- | 2.3 | 49.4 | 271.5 | 339.9 | 244.2 | 119.1 | 29.6 | 12.1 |
| Elm-ash-soft maple | 416.3 | -- | 5.5 | 39.6 | 48.5 | 97.1 | 120.2 | 68.8 | 13.8 | 22.8 |
| Maple-birch | 1,662.4 | -- | -- | 27.5 | 116.6 | 297.5 | 465.8 | 477.0 | 210.7 | 67.3 |
| Aspen | 1,817.5 | -- | 2.7 | 24.6 | 104.9 | 273.0 | 507.8 | 532.9 | 293.9 | 77.7 |
| Paper birch | 113.9 | -- | 0.1 | 9.8 | 18.0 | 34.1 | 33.7 | 13.3 | 4.9 | -- |
| Exotic | 57.2 | -- | -- | -- | 12.5 | 13.0 | 21.0 | 9.6 | -- | 1.1 |
| Nonstocked | 63.2 | -- | 1.6 | 11.3 | 23.4 | 12.7 | 6.6 | 7.6 | -- | -- |
| All types | 6,694.9 | 15.4 | 147.4 | 400.3 | 977.2 | 1,464.2 | 1,600.0 | 1,319.6 | 589.8 | 181.0 |
| **SOUTHERN LOWER PENINSULA** | | | | | | | | | | |
| Jack pine | 12.6 | -- | -- | 0.2 | 0.1 | -- | 12.3 | -- | -- | -- |
| Red pine | 31.5 | -- | -- | -- | 2.7 | 2.9 | 0.2 | 6.7 | 19.0 | -- |
| White pine | 21.5 | -- | -- | -- | -- | 11.1 | -- | 8.3 | 2.1 | -- |
| Balsam fir | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| White spruce | 7.5 | -- | -- | -- | -- | 7.5 | -- | -- | -- | -- |
| Black spruce | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Northern white-cedar | 13.0 | -- | 6.6 | 3.3 | -- | 0.2 | 2.9 | -- | -- | -- |
| Tamarack | 4.4 | -- | 4.4 | -- | -- | -- | -- | -- | -- | -- |
| Oak-hickory | 663.6 | -- | -- | 13.1 | 35.3 | 114.3 | 194.7 | 176.7 | 101.1 | 28.4 |
| Elm-ash-soft maple | 548.6 | -- | -- | 24.1 | 18.5 | 71.2 | 138.5 | 98.0 | 101.9 | 96.4 |
| Maple-birch | 903.3 | -- | -- | 9.2 | 42.2 | 86.7 | 206.0 | 277.6 | 189.0 | 92.6 |
| Aspen | 184.4 | -- | -- | -- | -- | 33.8 | 40.5 | 28.4 | 77.5 | 4.2 |
| Paper birch | 6.6 | -- | -- | -- | -- | 3.3 | -- | 3.3 | -- | -- |
| EXotic | 26.3 | -- | -- | 4.2 | 10.0 | 6.0 | 6.1 | -- | -- | -- |
| Nonstocked | 40.1 | -- | -- | -- | 20.2 | 10.1 | 1.8 | 3.8 | 4.2 | -- |
| All types | 2,463.4 | -- | 11.0 | 54.1 | 129.0 | 347.1 | 603.0 | 602.8 | 494.8 | 221.6 |

Table 18.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Michigan, 1980

(In thousand acres)

| Forest type and stand-size class | All classes | Basal area class (square feet per acre) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 | 101-120 | 121-150 | 151-180 | 181+ |
| Jack pine | | | | | | | | | | | | | | | |
| Sawtimber | 163.8 | -- | -- | 4.2 | 10.8 | 23.1 | 22.8 | 32.4 | 24.4 | 15.5 | 16.6 | 14.0 | -- | -- | -- |
| Poletimber | 454.9 | -- | 4.4 | 20.2 | 18.3 | 72.0 | 29.9 | 46.0 | 55.2 | 34.9 | 65.4 | 56.8 | 50.2 | -- | 1.6 |
| Sapling & seedling | 218.0 | 27.4 | 16.9 | 18.7 | 38.1 | 35.4 | 24.0 | 21.5 | 18.7 | 4.9 | 4.1 | -- | 8.3 | -- | -- |
| All stands | 836.7 | 27.4 | 21.3 | 43.1 | 67.2 | 130.5 | 76.7 | 99.9 | 98.3 | 55.3 | 86.1 | 70.8 | 58.5 | -- | 1.6 |
| Red pine | | | | | | | | | | | | | | | |
| Sawtimber | 140.0 | -- | 1.9 | -- | 7.8 | 7.9 | 1.4 | 10.5 | 17.7 | 9.1 | 9.0 | 19.4 | 34.5 | 15.8 | 5.0 |
| Poletimber | 329.2 | -- | -- | -- | 2.2 | 7.5 | 14.3 | 17.0 | 49.7 | 19.5 | 17.8 | 54.9 | 54.4 | 59.5 | 32.4 |
| Sapling & seedling | 186.7 | 37.0 | 9.6 | 23.6 | 17.5 | 6.3 | 46.7 | 18.3 | 14.0 | 7.8 | -- | 3.5 | 2.4 | -- | -- |
| All stands | 655.9 | 37.0 | 11.5 | 23.6 | 27.5 | 21.7 | 62.4 | 45.8 | 81.4 | 36.4 | 26.8 | 77.8 | 91.3 | 75.3 | 37.4 |
| White pine | | | | | | | | | | | | | | | |
| Sawtimber | 147.5 | -- | -- | 1.4 | 7.4 | 5.5 | 3.0 | 8.9 | 20.2 | 11.6 | 18.6 | 32.2 | 8.2 | 30.5 | -- |
| Poletimber | 40.5 | -- | -- | -- | -- | 4.8 | 3.7 | 6.9 | 5.9 | 4.0 | 1.7 | 10.2 | 3.3 | -- | -- |
| Sapling & seedling | 26.1 | 1.5 | 3.4 | 7.1 | 1.7 | 4.4 | 2.3 | 5.7 | -- | -- | -- | -- | -- | -- | -- |
| All stands | 214.1 | 1.5 | 3.4 | 8.5 | 9.1 | 14.7 | 9.0 | 21.5 | 26.1 | 15.6 | 20.3 | 42.4 | 11.5 | 30.5 | -- |
| Balsam fir | | | | | | | | | | | | | | | |
| Sawtimber | 143.0 | -- | -- | -- | -- | -- | 11.3 | 1.6 | -- | 12.7 | 22.6 | 45.8 | 40.1 | 2.8 | 6.1 |
| Poletimber | 315.9 | -- | -- | 1.7 | 2.9 | 10.4 | 3.8 | 33.3 | 35.5 | 19.0 | 37.6 | 73.1 | 53.3 | 32.7 | 12.6 |
| Sapling & seedling | 176.5 | 2.8 | 25.0 | 7.9 | 22.4 | 21.2 | 13.8 | 28.7 | 15.5 | 12.0 | 16.2 | 4.9 | 4.7 | 1.4 | -- |
| All stands | 635.4 | 2.8 | 25.0 | 9.6 | 25.3 | 31.6 | 28.9 | 63.6 | 51.0 | 43.7 | 76.4 | 123.8 | 98.1 | 36.9 | 18.7 |
| White spruce | | | | | | | | | | | | | | | |
| Sawtimber | 28.6 | -- | -- | -- | 1.5 | 1.7 | -- | 1.7 | 2.0 | 1.5 | 2.5 | 7.0 | 4.8 | 2.9 | 3.0 |
| Poletimber | 44.7 | -- | -- | -- | -- | 1.7 | -- | 2.6 | 3.4 | 8.1 | 4.8 | 4.0 | 16.9 | 1.7 | 1.5 |
| Sapling & seedling | 26.8 | 2.3 | 7.9 | 1.6 | 3.8 | 1.7 | 1.6 | 2.7 | 2.5 | -- | -- | 2.7 | -- | -- | -- |
| All stands | 100.1 | 2.3 | 7.9 | 1.6 | 5.3 | 5.1 | 1.6 | 7.0 | 7.9 | 9.6 | 7.3 | 13.7 | 21.7 | 4.6 | 4.5 |
| Black spruce | | | | | | | | | | | | | | | |
| Sawtimber | 13.7 | -- | -- | -- | -- | -- | 1.8 | -- | 3.8 | 1.5 | -- | 1.7 | 4.9 | -- | -- |
| Poletimber | 261.2 | 1.5 | -- | 1.6 | 43.7 | 7.7 | 15.3 | 13.6 | 9.3 | 13.1 | 30.4 | 78.8 | 27.3 | 10.3 | 8.6 |
| Sapling & seedling | 245.7 | 16.4 | 43.9 | 17.9 | 28.2 | 39.2 | 15.7 | 32.6 | 14.0 | 6.4 | 15.6 | 10.6 | 5.2 | -- | -- |
| All stands | 520.6 | 17.9 | 43.9 | 19.5 | 71.9 | 46.9 | 32.8 | 46.2 | 27.1 | 21.0 | 46.0 | 91.1 | 37.4 | 10.3 | 8.6 |
| Northern white-cedar | | | | | | | | | | | | | | | |
| Sawtimber | 305.8 | -- | -- | -- | 4.8 | 3.2 | 4.4 | 9.8 | 10.3 | -- | 18.0 | 70.7 | 58.0 | 64.6 | 62.0 |
| Poletimber | 640.6 | -- | -- | -- | 5.5 | 1.8 | 5.6 | 13.3 | 19.2 | 19.4 | 32.3 | 80.2 | 167.9 | 138.5 | 156.9 |
| Sapling & seedling | 227.2 | 9.9 | 13.3 | 5.0 | 9.3 | 14.9 | 7.2 | 21.5 | 26.0 | 11.9 | 16.3 | 25.9 | 38.4 | 26.0 | 1.6 |
| All stands | 1,173.6 | 9.9 | 13.3 | 5.0 | 19.6 | 19.9 | 17.2 | 44.6 | 55.5 | 31.3 | 66.6 | 176.8 | 264.3 | 229.1 | 220.5 |

(Table 18 continued on next page)

(Table 18 continued)

| Forest type and stand-size class | All classes | Basal area class (square feet per acre) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 | 101-120 | 121-150 | 151-180 | 181+ |
| Tamarack | | | | | | | | | | | | | | | |
| Sawtimber | 12.6 | -- | -- | 2.7 | 2.3 | 2.4 | -- | -- | 3.9 | -- | -- | -- | 1.3 | -- | -- |
| Poletimber | 35.5 | -- | -- | -- | 4.3 | 3.6 | 3.4 | 10.1 | 3.2 | 5.6 | 3.3 | 2.0 | -- | -- | -- |
| Sapling & seedling | 66.7 | 3.0 | 3.8 | 14.6 | 15.0 | 3.2 | 4.5 | 4.2 | 8.8 | 6.4 | 1.6 | -- | 1.6 | -- | -- |
| All stands | 114.8 | 3.0 | 3.8 | 17.3 | 21.6 | 9.2 | 7.9 | 14.3 | 15.9 | 12.0 | 4.9 | 2.0 | 2.9 | -- | -- |
| Oak-hickory | | | | | | | | | | | | | | | |
| Sawtimber | 684.0 | 1.7 | -- | 7.5 | 14.3 | 34.8 | 60.1 | 71.0 | 94.2 | 83.5 | 72.0 | 127.9 | 99.0 | 18.0 | -- |
| Poletimber | 782.2 | -- | 1.1 | -- | 4.3 | 46.6 | 100.8 | 103.5 | 118.4 | 101.1 | 103.9 | 129.5 | 56.1 | 10.7 | 6.2 |
| Sapling & seedling | 307.4 | 38.1 | 47.6 | 31.1 | 58.1 | 65.2 | 29.8 | 30.0 | 1.2 | 1.2 | 3.5 | 1.6 | -- | -- | -- |
| All stands | 1,773.6 | 39.8 | 48.7 | 38.6 | 76.7 | 146.6 | 190.7 | 204.5 | 213.8 | 185.8 | 179.4 | 259.0 | 155.1 | 28.7 | 6.2 |
| Elm-ash-soft maple | | | | | | | | | | | | | | | |
| Sawtimber | 453.5 | -- | -- | 12.0 | 27.3 | 37.2 | 20.3 | 33.0 | 64.5 | 25.6 | 21.0 | 74.6 | 95.3 | 37.0 | 5.7 |
| Poletimber | 471.1 | -- | 7.2 | 14.0 | 27.8 | 45.9 | 13.4 | 46.3 | 64.6 | 20.7 | 86.0 | 54.4 | 55.5 | 31.4 | 3.9 |
| Sapling & seedling | 401.8 | 44.2 | 35.2 | 32.6 | 88.0 | 52.5 | 50.2 | 37.5 | 30.5 | 3.0 | 16.3 | 8.8 | 3.0 | -- | -- |
| All stands | 1,326.4 | 44.2 | 42.4 | 58.6 | 143.1 | 135.6 | 83.9 | 116.8 | 159.6 | 49.3 | 123.3 | 137.8 | 153.8 | 68.4 | 9.6 |
| Maple-birch | | | | | | | | | | | | | | | |
| Sawtimber | 2,479.7 | -- | 4.2 | -- | 18.6 | 55.8 | 45.0 | 132.1 | 217.9 | 168.6 | 351.4 | 534.8 | 668.7 | 219.8 | 62.8 |
| Poletimber | 2,568.2 | -- | 3.6 | 13.5 | 36.4 | 53.2 | 62.6 | 162.1 | 232.2 | 200.5 | 340.7 | 601.1 | 643.0 | 200.5 | 18.8 |
| Sapling & seedling | 1,050.5 | 88.1 | 126.2 | 91.7 | 154.6 | 135.9 | 98.3 | 136.6 | 73.7 | 60.2 | 34.8 | 41.6 | 8.8 | -- | -- |
| All stands | 6,098.4 | 88.1 | 134.0 | 105.2 | 209.6 | 244.9 | 205.9 | 430.8 | 523.8 | 429.3 | 726.9 | 1,177.5 | 1,320.5 | 420.3 | 81.6 |
| Aspen | | | | | | | | | | | | | | | |
| Sawtimber | 533.8 | -- | 2.6 | 3.8 | 17.6 | 44.6 | 19.4 | 46.8 | 62.7 | 41.8 | 61.3 | 62.3 | 103.8 | 43.2 | 23.9 |
| Poletimber | 1,504.5 | -- | 5.4 | 12.5 | 60.7 | 82.7 | 93.7 | 169.0 | 159.7 | 149.4 | 214.9 | 191.3 | 234.5 | 103.2 | 27.5 |
| Sapling & seedling | 1,368.3 | 157.8 | 164.9 | 177.0 | 210.1 | 237.4 | 114.7 | 132.8 | 58.8 | 23.0 | 50.3 | 26.8 | 14.7 | -- | -- |
| All stands | 3,406.6 | 157.8 | 172.9 | 193.3 | 288.4 | 364.7 | 227.8 | 348.6 | 281.2 | 214.2 | 326.5 | 280.4 | 353.0 | 146.4 | 51.4 |
| Paper birch | | | | | | | | | | | | | | | |
| Sawtimber | 35.2 | -- | -- | -- | 1.5 | -- | 2.2 | 3.1 | -- | 1.6 | 3.9 | 9.5 | 11.8 | -- | 1.6 |
| Poletimber | 269.9 | -- | -- | -- | 2.3 | 11.0 | 16.7 | 17.5 | 24.2 | 11.6 | 43.9 | 41.2 | 80.0 | 18.5 | 3.0 |
| Sapling & seedling | 69.7 | 5.5 | 7.2 | 7.1 | 7.0 | 12.4 | 6.3 | 8.8 | 3.0 | 4.8 | 4.3 | 3.3 | -- | -- | -- |
| All stands | 374.8 | 5.5 | 7.2 | 7.1 | 10.8 | 23.4 | 25.2 | 29.4 | 27.2 | 18.0 | 52.1 | 54.0 | 91.8 | 18.5 | 4.6 |
| Exotic | | | | | | | | | | | | | | | |
| Sawtimber | 4.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.8 | -- | -- | -- |
| Poletimber | 35.0 | -- | -- | -- | -- | -- | 3.5 | -- | 2.2 | 2.4 | 8.5 | 10.1 | 5.9 | 2.4 | -- |
| Sapling & seedling | 46.5 | 1.1 | 6.0 | 2.4 | 5.2 | 4.3 | -- | 6.8 | 14.6 | -- | 3.5 | -- | 2.6 | -- | -- |
| All stands | 86.3 | 1.1 | 6.0 | 2.4 | 5.2 | 4.3 | 3.5 | 6.8 | 16.8 | 2.4 | 12.0 | 14.9 | 8.5 | 2.4 | -- |
| Nonstocked | 172.2 | 109.6 | 50.2 | 4.0 | 2.6 | 2.7 | 0.4 | 2.2 | 0.5 | -- | -- | -- | -- | -- | -- |
| All types | | | | | | | | | | | | | | | |
| Sawtimber | 5,146.0 | 1.7 | 8.7 | 31.6 | 113.9 | 216.2 | 191.7 | 350.9 | 521.6 | 373.0 | 596.9 | 1,004.7 | 1,130.4 | 434.6 | 170.1 |
| Poletimber | 7,753.4 | 1.5 | 21.7 | 63.5 | 208.4 | 348.9 | 366.7 | 641.2 | 782.7 | 609.3 | 991.2 | 1,387.6 | 1,448.3 | 609.4 | 273.0 |
| Sapling & seedling | 4,417.9 | 435.1 | 510.9 | 438.3 | 659.0 | 634.0 | 415.1 | 487.7 | 281.3 | 141.6 | 166.5 | 129.7 | 89.7 | 27.4 | 1.6 |
| Nonstocked | 172.2 | 109.6 | 50.2 | 4.0 | 2.6 | 2.7 | 0.4 | 2.2 | 0.5 | -- | -- | -- | -- | -- | -- |
| All stands | 17,489.5 | 547.9 | 591.5 | 537.4 | 983.9 | 1,201.8 | 973.9 | 1,482.0 | 1,586.1 | 1,123.9 | 1,754.6 | 2,522.0 | 2,668.4 | 1,071.4 | 444.7 |

Table 19.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Michigan, 1980

(In thousand acres)

| Stocking class (percent) | All stands | Stand-size class | | | |
|---|---|---|---|---|---|
| | | Sawtimber stands | Poletimber stands | Sapling and seedling stands | Nonstocked areas |
| Less than 16.7 | 172.2 | -- | -- | -- | 172.2 |
| 16.7 to 60.9 | 2,050.7 | 401.3 | 751.9 | 897.5 | -- |
| 61.0 to 100.9 | 6,602.3 | 1,900.6 | 2,895.2 | 1,806.5 | -- |
| 101.0 to 133.9 | 7,125.0 | 2,382.9 | 3,416.6 | 1,325.5 | -- |
| 134.0+ | 1,539.3 | 461.2 | 689.7 | 388.4 | -- |
| All classes | 17,489.5 | 5,146.0 | 7,753.4 | 4,417.9 | 172.2 |

Table 20.--Area of commercial forest land by stocking class based on selected stand components, Michigan, 1980

(In thousand acres)

| Stocking class (percent) | Stocking classified in terms of | | | | |
|---|---|---|---|---|---|
| | All live trees | Growing-stock trees | Desirable trees | Acceptable trees | Rough and rotten trees |
| 0-10 | 38.9 | 94.6 | 17,069.4 | 94.6 | 10,172.9 |
| 11-20 | 76.2 | 208.7 | 313.3 | 211.4 | 4,373.5 |
| 21-30 | 206.2 | 248.1 | 75.1 | 253.5 | 1,841.5 |
| 31-40 | 188.5 | 345.0 | 21.8 | 365.3 | 680.3 |
| 41-50 | 384.5 | 592.8 | 3.4 | 603.6 | 270.4 |
| 51-60 | 485.8 | 734.1 | 3.8 | 777.4 | 94.6 |
| 61-70 | 787.8 | 1,072.4 | -- | 1,097.7 | 31.5 |
| 71-80 | 777.1 | 1,342.8 | 2.7 | 1,410.2 | 9.7 |
| 81-90 | 1,430.7 | 1,942.7 | -- | 1,994.3 | 4.8 |
| 91-100 | 1,772.6 | 2,244.3 | -- | 2,400.9 | 1.5 |
| 101-110 | 2,091.8 | 2,489.8 | -- | 2,490.9 | 1.8 |
| 111-120 | 2,542.6 | 2,279.7 | -- | 2,220.8 | 1.2 |
| 121-130 | 2,534.4 | 1,894.8 | -- | 1,823.7 | 3.1 |
| 131-140 | 2,070.4 | 1,230.0 | -- | 1,064.6 | 2.7 |
| 141-150 | 1,434.1 | 576.4 | -- | 511.9 | -- |
| 151-160 | 643.3 | 193.3 | -- | 168.7 | -- |
| 161+ | 24.6 | -- | -- | -- | -- |
| Total | 17,489.5 | 17,489.5 | 17,489.5 | 17,489.5 | 17,489.5 |

Table 21.--Area of noncommercial forest land by ownership class, Michigan, 1980

(In thousand acres)

| Ownership class | All areas | Productive-reserved areas | Unproductive areas |
|---|---|---|---|
| National Forest | 137.4 | 65.8[1/] | 71.6 |
| Bureau of Land Management | -- | -- | -- |
| Indian | -- | -- | -- |
| Miscellaneous federal | 184.0 | 180.5 | 3.5 |
| State | 382.1 | 321.4 | 60.7 |
| County and municipal | 15.3 | 13.7 | 1.6 |
| Forest industry | 24.7 | -- | 24.7 |
| Farmer | 42.9 | 17.7 | 25.2 |
| Misc. private-corp. | 35.1 | 10.1 | 25.0 |
| Misc. private-indiv. | 57.8 | 12.9 | 44.9 |
| Total | 879.3 | 622.1 | 257.2 |

[1/] Includes 42.6 thousand acres of productive-deferred areas.

Table 22.--Area of noncommercial forest land by forest type, Michigan, 1980

(In thousand acres)

| Forest type | All areas | Productive-reserved areas[1/] | Unproductive areas |
|---|---|---|---|
| Jack pine | 23.3 | 16.2 | 7.1 |
| Red pine | 13.5 | 11.6 | 1.9 |
| White pine | 4.8 | 3.2 | 1.6 |
| Balsam fir | 76.9 | 71.6 | 5.3 |
| White spruce | 13.2 | 10.7 | 2.5 |
| Black spruce | 78.0 | 18.2 | 59.8 |
| Northern white-cedar | 73.7 | 6.4 | 67.3 |
| Tamarack | 18.9 | 0.1 | 18.8 |
| Oak-hickory | 80.8 | 74.8 | 6.0 |
| Elm-ash-soft maple | 78.4 | 52.8 | 25.6 |
| Maple-birch | 191.2 | 185.4 | 5.8 |
| Aspen | 133.4 | 125.7 | 7.7 |
| Paper birch | 15.4 | 8.2 | 7.2 |
| Exotic | 33.8 | 33.8 | -- |
| Nonstocked | 44.0 | 3.4 | 40.6 |
| All types | 879.3 | 622.1 | 257.2 |

[1/] Includes 42.6 thousand acres of productive-deferred areas.

Table 23.--Area of nonforest land with trees by forest type and land use, Michigan 1980

(In thousand acres)

| Forest type | All uses | Land use | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cropland | Improved pasture | Wooded strips | Idle farmland | Marsh | Wind-breaks | Urban and other windbreaks | Wooded pasture |
| Jack pine | 12.4 | 4.7 | 4.1 | -- | -- | 1.2 | 2.4 | -- | -- |
| Red pine | 15.5 | -- | 2.3 | 13.2 | -- | -- | -- | -- | -- |
| White pine | 2.2 | -- | -- | -- | -- | 2.2 | -- | -- | -- |
| Balsam fir | 5.9 | 1.7 | -- | -- | -- | 4.2 | -- | -- | -- |
| White spruce | 4.5 | -- | 2.3 | -- | -- | -- | -- | -- | 2.2 |
| Black spruce | 23.6 | -- | -- | 1.8 | -- | 21.8 | -- | -- | -- |
| Northern white-cedar | 22.4 | -- | -- | 1.9 | -- | 20.5 | -- | -- | -- |
| Tamarack | 5.2 | -- | -- | -- | -- | 5.2 | -- | -- | -- |
| Oak-hickory | 97.2 | 31.2 | 22.8 | 41.2 | 2.0 | -- | -- | -- | -- |
| Elm-ash-soft maple | 243.5 | 18.5 | 2.4 | 95.9 | 6.7 | 100.6 | 12.1 | -- | 7.3 |
| Maple-birch | 139.7 | 25.3 | 25.2 | 60.5 | -- | 9.2 | 17.3 | -- | 2.2 |
| Aspen | 128.0 | 15.4 | 18.6 | 26.8 | 4.1 | 55.7 | 5.7 | -- | 1.7 |
| Paper birch | 19.2 | -- | 4.5 | -- | -- | 14.7 | -- | -- | -- |
| Exotic | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| All types | 719.3 | 96.8 | 82.2 | 241.3 | 12.8 | 235.3 | 37.5 | -- | 13.4 |

Table 24.--Area of plantations by forest type and stand-age class, Michigan, 1980

(In thousand acres)

| Forest type | All classes | Stand-age class (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 |
| Jack pine | 225.2 | 29.2 | 38.2 | 15.7 | 55.6 | 71.9 | 9.3 | 2.7 | 2.6 | -- | -- |
| Red pine | 507.6 | 44.6 | 120.4 | 170.2 | 110.2 | 51.0 | 2.1 | 6.0 | -- | 3.1 | -- |
| White pine | 30.0 | -- | -- | 14.7 | 1.7 | 5.4 | -- | 4.0 | 4.2 | -- | -- |
| Balsam fir | 11.6 | 1.3 | 10.3 | -- | -- | -- | -- | -- | -- | -- | -- |
| White spruce | 31.5 | -- | 11.3 | 1.2 | 17.0 | -- | -- | -- | 2.0 | -- | -- |
| Black spruce | 3.6 | -- | 0.8 | -- | 2.8 | -- | -- | -- | -- | -- | -- |
| Northern white-cedar | 2.3 | -- | 2.3 | -- | -- | -- | -- | -- | -- | -- | -- |
| Oak-hickory | 94.5 | 20.6 | 6.1 | 4.7 | 6.7 | 9.6 | 17.1 | 10.2 | 8.1 | 10.1 | 1.3 |
| Elm-ash-soft maple | 6.8 | -- | -- | 3.4 | -- | -- | -- | 3.4 | -- | -- | -- |
| Maple-birch | 127.4 | 25.7 | 26.5 | 11.2 | 13.6 | 15.1 | 14.5 | 10.5 | 7.9 | -- | 2.4 |
| Aspen | 71.1 | 21.6 | 19.3 | 5.0 | 6.0 | 7.2 | 5.6 | -- | 4.9 | -- | 1.5 |
| Paper birch | 5.0 | -- | -- | -- | 1.8 | -- | -- | 3.2 | -- | -- | -- |
| Exotic | 96.2 | 21.9 | 29.1 | 28.7 | 9.4 | -- | 7.1 | -- | -- | -- | -- |
| All types | 1,212.8 | 164.9 | 264.3 | 254.8 | 224.8 | 160.2 | 55.7 | 40.0 | 29.7 | 13.2 | 5.2 |

Table 25.--Area of plantations by forest type and site-index class, Michigan, 1980

(In thousand acres)

| Forest type | All classes | Site-index class (feet) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91+ |
| Jack pine | 225.2 | 9.6 | 36.1 | 79.3 | 58.6 | 31.8 | 8.2 | 1.6 | -- |
| Red pine | 507.6 | -- | 2.6 | 122.4 | 153.9 | 136.7 | 73.0 | 19.0 | -- |
| White pine | 30.0 | -- | 1.7 | 2.6 | 15.1 | 1.7 | 6.8 | 2.1 | -- |
| Balsam fir | 11.6 | -- | -- | 1.6 | 1.3 | -- | -- | 8.7 | -- |
| White spruce | 31.5 | -- | 2.3 | 1.3 | 11.1 | 1.6 | 12.5 | 2.7 | -- |
| Black spruce | 3.6 | -- | -- | 3.2 | -- | -- | 0.4 | -- | -- |
| Northern white-cedar | 2.3 | -- | -- | -- | -- | -- | 2.3 | -- | -- |
| Oak-hickory | 94.5 | -- | 4.1 | 39.7 | 23.6 | 4.1 | 14.7 | 8.3 | -- |
| Elm-ash-soft maple | 6.8 | -- | -- | -- | -- | -- | -- | -- | 6.8 |
| Maple-birch | 127.4 | -- | 1.5 | 20.0 | 30.5 | 32.5 | 32.6 | 10.3 | -- |
| Aspen | 71.1 | -- | 1.4 | 5.5 | 23.3 | 25.3 | 8.0 | 7.6 | -- |
| Paper birch | 5.0 | -- | -- | -- | 3.2 | 1.8 | -- | -- | -- |
| Exotic | 96.2 | -- | 8.5 | 28.1 | 23.0 | 28.4 | 7.1 | -- | 1.1 |
| All types | 1,212.8 | 9.6 | 58.2 | 303.7 | 343.6 | 263.9 | 165.6 | 60.3 | 7.9 |

Table 26.--Number of growing-stock trees by species group and forest type in plantations, Michigan, 1980

(In thousand trees)

| Species group | All types | Forest type | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jack pine | Red pine | White pine | Balsam fir | White spruce | Black spruce | Northern white-cedar | Oak-hickory | Elm-ash soft maple | Maple-birch | Aspen | Paper birch | Exotic |
| SOFTWOODS | | | | | | | | | | | | | | |
| White pine | 5,357 | 219 | 1,197 | 2,481 | -- | -- | -- | -- | 111 | -- | 856 | 124 | 51 | 318 |
| Red pine | 112,940 | 5,014 | 99,094 | 190 | 23 | 94 | 53 | -- | 3,289 | 105 | 2,096 | 1,287 | 38 | 1,657 |
| Jack pine | 45,941 | 32,262 | 12,028 | -- | -- | -- | -- | -- | 510 | -- | 148 | 896 | 7 | 90 |
| White spruce | 3,795 | -- | 289 | -- | 31 | 2,873 | -- | -- | 124 | -- | 31 | 363 | 84 | -- |
| Black spruce | 721 | -- | 149 | 210 | 26 | -- | 336 | -- | -- | -- | -- | -- | -- | -- |
| Balsam fir | 760 | -- | 476 | -- | 205 | 79 | -- | -- | -- | -- | -- | -- | -- | -- |
| Hemlock | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 | -- | -- | -- |
| Tamarack | 53 | -- | 21 | -- | -- | 32 | -- | -- | -- | -- | -- | -- | -- | -- |
| Northern white-cedar | 317 | -- | 200 | -- | -- | -- | -- | -- | -- | -- | 101 | 16 | -- | -- |
| Other softwoods | 15,101 | -- | 850 | 1,380 | -- | 557 | -- | 339 | 155 | 103 | 1,969 | -- | -- | 9,748 |
| Total | 184,987 | 37,495 | 114,304 | 4,261 | 285 | 3,635 | 389 | 339 | 4,189 | 208 | 5,203 | 2,686 | 180 | 11,813 |
| HARDWOODS | | | | | | | | | | | | | | |
| Select white oaks | 2,351 | 71 | 947 | -- | -- | -- | -- | -- | 1,249 | -- | 18 | 55 | 11 | -- |
| Select red oaks | 3,647 | 553 | 385 | 86 | -- | -- | -- | -- | 2,207 | -- | 226 | 82 | -- | 108 |
| Other red oaks | 4,221 | 619 | 1,002 | -- | -- | -- | -- | -- | 2,191 | -- | 365 | -- | -- | 44 |
| Hickory | 230 | 19 | -- | -- | -- | -- | -- | -- | 181 | -- | 30 | -- | -- | -- |
| Yellow birch | 4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4 |
| Hard maple | 4,710 | -- | 495 | -- | 80 | 15 | 51 | -- | -- | -- | 4,025 | 5 | -- | 39 |
| Soft maple | 4,399 | 247 | 1,258 | 89 | -- | -- | -- | -- | 420 | 86 | 1,908 | 342 | 21 | 28 |
| Beech | 225 | -- | 23 | -- | -- | -- | -- | -- | -- | -- | 202 | -- | -- | -- |
| Ash | 1,243 | -- | 24 | -- | -- | -- | -- | -- | -- | 389 | 712 | 114 | -- | 4 |
| Balsam poplar | 279 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10 | 138 | 30 | 101 |
| Cottonwood | 105 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 105 | -- | -- | -- |
| Bigtooth aspen | 2,504 | 174 | 690 | -- | -- | -- | -- | -- | 261 | -- | 19 | 1,360 | -- | -- |
| Quaking aspen | 8,740 | 661 | 2,443 | 27 | -- | 1,438 | -- | 95 | 78 | -- | 1,006 | 2,831 | 27 | 134 |
| Basswood | 709 | 66 | 63 | 51 | -- | -- | -- | -- | -- | -- | 418 | 3 | -- | 108 |
| Yellow-poplar | 81 | -- | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Black walnut | 17 | -- | 17 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Black cherry | 1,568 | 46 | 199 | -- | -- | 166 | -- | -- | 140 | -- | 1,005 | -- | -- | 12 |
| Butternut | 117 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 117 | -- | -- | -- |
| Elm | 719 | -- | -- | -- | -- | -- | -- | -- | 88 | 55 | 562 | 14 | -- | -- |
| Paper birch | 710 | 46 | 204 | -- | -- | -- | -- | -- | -- | -- | 33 | 128 | 299 | -- |
| Other hardwoods | 1,064 | 59 | -- | -- | -- | -- | -- | -- | 58 | 26 | 921 | -- | -- | -- |
| Total | 37,643 | 2,561 | 7,831 | 253 | 80 | 1,619 | 51 | 95 | 6,873 | 556 | 11,682 | 5,072 | 388 | 582 |
| All species | 222,630 | 40,056 | 122,135 | 4,514 | 365 | 5,254 | 440 | 434 | 11,062 | 764 | 16,885 | 7,758 | 568 | 12,395 |

Table 27.--Sampling errors[1/] for estimates of commercial forest area smaller than state totals, Michigan, 1980

| Sampling error | Commercial forest area |
|---|---|
| (Percent) | (Thousand acres) |
| 1 | 1,898.8 |
| 2 | 474.7 |
| 3 | 211.0 |
| 4 | 118.7 |
| 5 | 76.0 |
| 10 | 19.0 |
| 15 | 8.4 |
| 20 | 4.7 |
| 25 | 3.0 |
| 50 | 0.8 |
| 100 | 0.2 |

[1/] At the 68-percent probability level.

Spencer, John S., Jr.
Michigan's Fourth Forest Inventory: Area. Resour. Bull. NC-68. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1983. 39 p.

The fourth inventory of Michigan's forest resources found 17.5 million acres of commercial forest, down 7 percent from the 18.9 million found in 1966. This bulletin analyzes findings from the inventory and presents detailed tables of forest area.

KEY WORDS: Forest area, commercial forest area, forest inventory, land use.

U.S. Government Printing Office: 1983-765-019

☆ U.S. Government Printing Office: 1983-765-019

# MICHIGAN
# Major Forest Types
# 1980

- Maple - Birch
- Aspen - Birch
- White - Red - Jack Pine
- Elm - Ash - Cottonwood
- Spruce - Fir
- Oak - Hickory
- Unproductive forest
- Nonforest land

SCALE 1:1,000,000

10 0 10 20 30 40 Miles

10 0 10 20 30 40 50 Kilometers

**Compilation Procedure**

Forest types were interpreted on the most recent available aerial photography (1977-1978) 1:24,000 scale, using standard forest inventory procedures. The forest type information was recorded on Michigan Department of Natural Resources county maps. These data were transferred to a 1:1,000,000 scale base map.

Compiled by Ron Hackett. Drawn by Barbara Young.

Renewable Resources Evaluation Project
North Central Forest Experiment Station
Forest Service
U.S. Department of Agriculture
1992 Folwell Avenue
St. Paul, Minnesota 55108

LAKE SUPERIOR

WISCONSIN

CANADA

ISLE ROYAL (KEWEENAW CO.)

KEWEENAW
HOUGHTON
BARAGA
ONTONAGON
GOGEBIC
IRON
DICKINSON
MARQUETTE
ALGER
DELTA
SCHOOLCRAFT
LUCE
CHIPPEWA
MACKINAC
CHARLEVOIX CO.
EMMET
CHEBOYGAN
PRESQUE ISLE
ANTRIM
OTSEGO
MONTMORENCY
ALPENA
LEELANAU
GRAND TRAVERSE
BENZIE
WEXFORD
MISSAUKEE
ROSCOMMON
OSCEOLA
CLARE
LAKE
MECOSTA
MIDLAND
NEWAYGO
MONTCALM
GRATIOT
SAGINAW
BAY
GENESEE
SHIAWASSEE
CLINTON
IONIA
ST. CLAIR
MACOMB
OAKLAND
LAPEER
LAKE ST. CLAIR
ALLEGAN
BARRY
EATON
INGHAM
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
CANADA
BERRIEN
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
LAKE ERIE
INDIANA
OHIO

MICHIGAN

LAKE HURON