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Michigan's Forest Statistics, 1987: An Inventory Update

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FOREWORD

Forest Inventory and Analysis (FIA) 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. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential for framing 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 in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

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MICHIGAN'S FOREST STATISTICS, 1987: AN INVENTORY UPDATE

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UPDATE HIGHLIGHTS

Timberland

- Timberland area declined from 17.5 million acres in 1980 to 17.3 million acres in 1987, a loss of less than 1 percent.
- The area of maple-birch forest type climbed 1.4 percent to 6.2 million acres as Michigan's second-growth forests continue to mature.
- Red pine is still the most popular plantation species, as shown by the 15,000-acre gain in the red pine forest type since 1980.

Timber Volume

- Growing-stock volume in 1987 is 20.6 billion cubic feet, 10 percent higher than the 18.7 billion cubic feet reported in 1980.
- Average growing-stock volume per acre in 1987 is 1,185 cubic feet, compared with 1,068 cubic feet in 1980.
- Sawtimber volume totaled 52.3 billion board feet in 1987, up 19 percent from 1980.

Net Growth

- Annual net growth increased from 39 cubic feet per acre per year in 1980 to 43 cubic feet in 1987.
- Mortality declined from 0.8 percent of inventory in 1980 to 0.6 percent in 1987. Much of the decline is attributed to increased management activity simulated in the update process.

Removals

- Growing-stock removals have risen sharply since 1979, climbing from 275 million cubic feet to 398 million cubic feet annually in 1986. Major industrial expansion in the Upper Peninsula and in the northern Lower Peninsula are primarily responsible for the increase.

Biomass

- Tree biomass totaled 1.2 billion green tons in 1987. Seventy-eight percent of this volume is in growing-stock trees, 8 percent is in cull trees, and 14 percent is in trees less than 5 inches d.b.h.
- The average green weight per cubic foot (including bark) for softwood species was 43 pounds; the average for hardwoods was 56 pounds.

BACKGROUND

Current facts about the Nation's forest resources such as area, timber volume, biomass, and prospective supply and demand are essential in forming sound management practices and policies. The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) requires the Forest Service to make and keep current a comprehensive inventory and analysis of renewable forest and rangeland resources.

The most recent field inventory data available for Michigan are dated 1980; however, tree growth models developed at the North Central Forest Experiment Station have made it possible for the Forest Inventory and Analysis (FIA) work unit to update inventory data to estimate the current resource. The purpose of this report is to present updated statistics for the State of Michigan that will be used for the 1990 RPA assessment. The tables provide data by forest survey unit (fig. 1) and represent the timberland base as of January 1, 1987. The term "update", as it is used here, is an estimate of current forest statistics derived by modeling the dynamic change

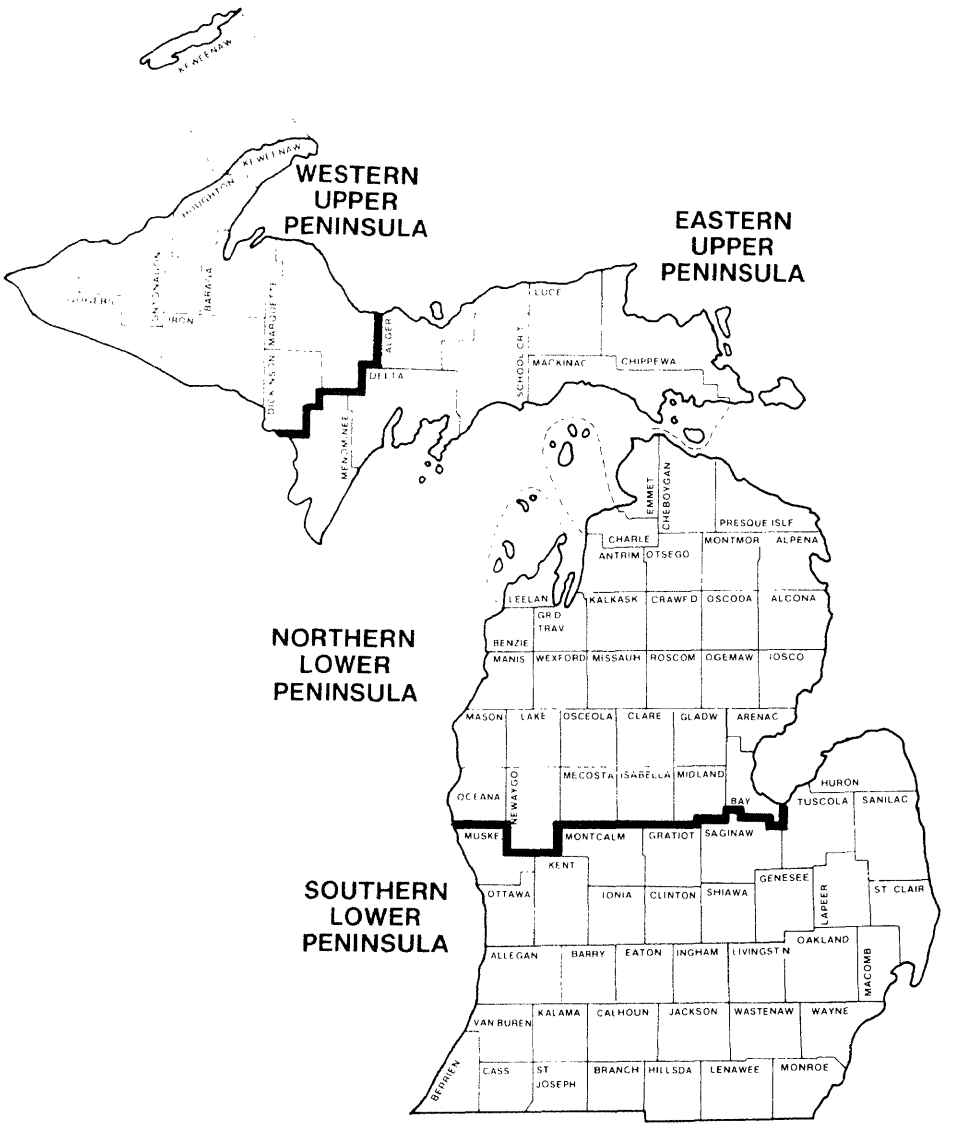

Figure 1.—*Forest Survey Units in Michigan, 1980.*

in a forest from a known time in the past. The major components of this change are land change, growth, mortality, regeneration, and removals.

METHODOLOGY

Land Change

The basic sample design used by FIA in the North Central Region is a two-phase sample consisting of a photo sample to estimate forest-nonforest area and a ground phase, which is a subsample of the photo sample to provide information about the volume and condition of the forest.

New photo work for the entire region would be too costly and time consuming with current technology. However, we've found that for update periods of 10 years or less, area change at the State level can be estimated using trend analysis and information from local resource managers. The data then provide the first-phase area factors to be applied to the updated plots.

We assumed the timberland base for public and industry ownerships was stable during the update period. For all other ownerships a modest annual decline of 0.1 percent was assumed, which reflects the resource managers' view that the impacts of urbanization and agricultural expansion have not seriously eroded the timberland base of the region.

The objectives of the diverse group of owners that hold Michigan's forest land play a significant role in the stability of the timberland base. Knowledge of these objectives is essential to strategic forest planning. Public agencies are mandated by law to provide detailed information about management plans that outline the policies and programs designed to ensure a viable forest resource into the future.

The timberland area figures presented here represent the most recent data available at the time the update was processed. The reader is cautioned to contact the appropriate public agency to verify or update area figures for any analysis that may be sensitive to local changes in the timberland base, such as recently designated reserved or deferred forest land. Area and volume figures would have to be adjusted accordingly for any ownerships affected by significant changes in the timberland base.

Additional information is available about nonindustrial private owners and their objectives in the North Central Station report, "The Private Forest Landowners of Michigan" (Carpenter and Hansen 1985).

Growth and Mortality

We used the Stand and Tree Evaluation and Modeling System (STEMS) (Belcher 1981) to update 7,706 forest inventory plots from the 1980 field survey to the year 1987. STEMS is a distance-independent, individual tree growth model designed to simulate tree growth and mortality for a diverse range of forest conditions.

Growth and mortality functions were calibrated and validated with data from throughout the Lake States (Buchman 1983, Holdaway and Brand 1983, 1985). Test projections over a range of forest conditions produced reliable results when compared with remeasurement data from the Lake States. Adjustment factors derived from recent remeasurement data in the Lake States were used to fine tune the model and improve precision (Holdaway 1985).

Regeneration

Although STEMS regeneration routines for the Lake States had not been fully developed at the time of the update, the outcome was not significantly affected. Most trees that became established on harvested land or in seedling stands at the beginning of the update would not have grown to merchantable size by the end of that 6-year period.

Removals

Removals data were derived by trend analysis using periodic pulpwood (Blyth and Smith 1985), saw log (Blyth *et al.* 1981), and veneer (Blyth and Smith 1984) reports and base year data for all removals provided in the 1980 Michigan report (Raile and Smith 1983). Removals attributed to loss of timberland were made by adjusting plot expansion factors to arrive at a specified set of current area figures by forest type. Estimates of timber removals in the Lake States may be reviewed in more detail in a recent article, "Tracking Timber Demand in the Lake States" (Smith and Blyth 1986).

The Lake States version of STEMS was modified to simulate actual removals. Computerized management guides (Brand 1981) were used to select a subset of inventory plots that were eligible for silvicultural treatment during the update period. These guides were used in lieu of detailed information on Michigan management strategies. A special removals algorithm scanned each selected plot to determine if it would be cut. The volume from cut plots was accumulated until the estimated volume of growing-stock removals by species was reached. Volume estimates were produced using volume equations developed for the Lake States (Hahn 1984, Smith 1985).

All area and volume figures for the update were reviewed for reasonableness and consistency by personnel from the Michigan Department of Natural Resources, the National Forest System, industry resource managers, and other private individuals. A more detailed description of the methodology will be presented later in a publication on inventory updating procedures in the North Central Region.

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APPENDIX

PRINCIPAL TREE SPECIES GROUPS IN MICHIGAN[1]

Softwoods
- Eastern white pine ..... *Pinus strobus*
- Red pine ..... *Pinus resinosa*
- Jack pine ..... *Pinus banksiana*
- Black spruce ..... *Picea mariana*
- White spruce ..... *Picea glauca*
- Balsam fir ..... *Abies balsamea*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern recedar ..... *Juniperus virginiana*
  - Scotch pine ..... *Pinus sylvestrus*

Hardwoods
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus marocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
  - Chestnut oak ..... *Quercus prinus*
- Select red oak
  - Northern red oak 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*
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 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.

DEFINITIONS

Acceptable trees.—Growing-stock trees of commercial species that meet specified standards of size and quality.

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.

Biomass.—The total above-ground weight, excluding foliage, of all live trees reported in green tons. Biomass is made up of 5 components:

Growing-stock bole and stump.—Biomass of a growing-stock tree from ground level to a 4-inch top.

Growing-stock top and limbs.—Biomass of a growing-stock tree above a 4-inch top and all limbs below the 4-inch top.

Cull bole and stump.—Biomass of a cull tree from ground level to a 4-inch top.

Cull top and limbs.—Biomass of a cull tree above a 4-inch top and all limbs below the 4-inch top.

1- to 5-inch trees.—Above ground biomass of all live trees 1- to 5-inches in diameter at breast height.

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 improvement crops, but excluding land cultivated in developing improved pasture.

Cull.—Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4.5 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 Survey, 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 or more of agricultural products were produced and sold during the year.

Farmer-owned land.—Land owned by farm operators.

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

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 comparison of 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, timberland, nontimberland, reserved forest land, stocking, woodland, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants. Excludes land owned by small sawmill firms sawing less than 100,000 board feet annually.

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

Forest type.—A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types 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 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 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 birches, 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 the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

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

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

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.—Dicotyledonous trees, usually broadleaved 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 cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.—All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Industrial wood.—All roundwood products, except fuelwood.

Land area.—*Bureau of the Census*.—The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (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.

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.

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

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

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest.

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

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing-stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Nontimberland.—(a) Woodland and (b) reserved forest land.

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.—Timberland less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the timberland classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

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

Pasture and range.—Land which 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 for 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: frequently flooded river bottoms and spruce bogs.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Reserved forest land.—Forest land sufficiently productive to qualify as timberland but withdrawn from timber utilization through statute, ad-

ministrative regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Salvable dead trees.—Standing or down dead trees that are considered merchantable by regional standards.

Saplings.—Live trees 1 to 5 inches d.b.h.

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

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

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

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International 1/4-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1 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.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

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 total height of free-growing dominant or codominant trees 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 all live trees; that is, sawtimber, poletimber of seedlings and saplings. Only those types contributing to no more than 16 percent stocking at a point will be used to determine stand size class. Remember that stands with less than 16.7 percent stocking in growing stock trees will be classified as nonstocked. Noncommercial trees are not used for determining stand size classes.

Sawtimber stands.—Stands with at least the all live stocking in sawtimber and poletimber trees and with the sawtimber stocking equal to or larger than the poletimber stocking.

Poletimber stands.—Stands with at least half of the all live stocking in sawtimber and poletimber trees and with the poletimber stocking larger than the sawtimber stocking.

Sapling-seedling stands.—Stands with more than half of the all live stocking in saplings and/or seedlings.

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.—Timberland on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.—The volume of sound wood in live sawtimber and poletimber trees removed annually for forest products (including roundwood products and logging residues) and for other removals. Roundwood products are logs, bolts, or other round sections cut from trees. Logging residues are the unused portions of cut trees plus unused trees killed by logging. Other removals are growing-stock trees removed by cultural operations such as timber stand improvement work, and by land clearing and changes in land use.

Timber removals from sawtimber.—The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timberland.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as timberland are capable of producing more than 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 producing of industrial wood in the foreseeable future.) Also see definition of pastured timberland.

Tree biomass.—The total aboveground weight (including the bark) of all live trees.

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

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

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.—*Bureau of the Census*.—Permanent inland water surfaces, such as lakes, reservoirs, and ponds having 40 acres or more of area; streams, sloughs, estuaries, and canals one-eighth of a statute mile or more in width.

Noncensus.—Permanent inland water surfaces, such as lakes, reservoirs, and ponds having 1-39.9 acres of area; streams, sloughs, estuaries, and canals 120 feet to one-eighth of a statute mile in width.

Windbreak.—A group of trees less than 120 feet wide used for the protection of soil, cropfields, and buildings in use.

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 there is other evidence of grazing.

Wooded strip.—An acre or more of natural continuous forest land that would otherwise meet survey standards for timberland except that it is less than 120 feet wide.

Woodland.—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.)

TABLES

Table 1.--Area of land by land class, Michigan, 1980 and 1987

(In thousand acres)

Land class	All units		Forest survey unit							
			Eastern upper peninsula		Western upper peninsula		Northern lower peninsula		Southern lower peninsula	
	1980	1987	1980	1987	1980	1987	1980	1987	1980	1987
FOREST LAND										
Timberland										
Jack pine	837.6	832.9	230.2	223.3	88.7	82.2	506.4	515.1	12.3	12.3
Red pine	653.6	668.1	139.9	143.0	57.6	63.7	428.2	433.5	27.9	27.9
White pine	214.1	218.9	68.7	73.8	48.5	45.2	75.3	78.3	21.6	21.6
Balsam fir	634.2	607.4	216.9	207.0	366.0	357.4	51.3	43.0	-	-
White spruce	99.9	99.9	29.9	29.9	40.6	40.6	21.9	21.9	7.5	7.5
Black spruce	519.8	512.7	282.9	279.3	209.0	205.5	27.9	27.9	-	-
Northern white-cedar	1,172.3	1,185.4	595.1	599.0	210.1	210.1	354.1	362.2	13.0	14.1
Tamarack	114.9	109.0	43.8	40.7	36.0	34.1	30.7	29.8	4.4	4.4
Oak-hickory	1,779.3	1,731.3	19.1	19.1	22.4	17.6	1,064.1	1,043.7	673.7	650.9
Elm-ash-soft maple	1,327.3	1,268.2	191.0	177.1	168.3	158.8	416.4	402.4	551.6	529.9
Maple-birch	6,075.0	6,162.5	1,150.4	1,156.7	2,349.4	2,405.1	1,668.5	1,675.3	906.7	925.4
Aspen	3,408.1	3,325.4	669.4	669.4	730.9	696.9	1,823.0	1,795.7	184.8	163.4
Paper birch	374.1	366.6	110.1	110.1	142.9	142.9	114.5	107.0	6.6	6.6
Exotic	85.7	85.7	1.2	1.2	1.6	1.6	56.7	56.7	26.2	26.2
Nonstocked	171.9	167.6	40.1	40.1	28.6	26.7	63.0	60.6	40.2	40.2
Subtotal	17,467.8	17,341.6	3,788.7	3,769.7	4,500.6	4,488.4	6,702.0	6,653.1	2,476.5	2,430.4
Woodland	257.2	257.2	102.4	102.4	62.2	62.2	87.7	87.7	4.9	4.9
Reserved	622.1	622.1	127.6	127.6	266.7	266.7	147.0	147.0	80.8	80.8
Total	18,347.1	18,220.9	4,018.7	3,999.7	4,829.5	4,817.3	6,936.7	6,887.8	2,562.2	2,516.1
NONFOREST LAND										
Cropland	11,636.1	11,636.1	449.8	449.8	192.7	192.7	2,430.8	2,430.8	8,741.8	8,741.8
Pasture and range	1,265.0	1,265.0	3.9	3.9	141.2	141.2	685.5	685.5	434.4	434.4
Other	4,654.2	4,780.4	526.6	545.6	381.3	375.2	1,297.7	1,346.6	2,748.4	2,794.5
Total	17,555.3	17,681.5	980.3	999.3	696.9	709.1	4,414.0	4,462.9	11,924.6	11,970.7
TOTAL LAND	36,362.9	36,362.9	4,999.0	4,999.0	5,526.4	5,526.4	11,350.7	11,350.7	14,486.8	14,486.8
WATER (BUREAU OF THE CENSUS)	895.3	895.3	165.8	165.8	167.0	167.0	362.6	362.6	199.9	199.9
TOTAL LAND AND WATER	37,258.2	37,258.2	5,164.8	5,164.8	5,693.4	5,693.4	11,713.3	11,713.3	14,686.7	14,686.7

Table 2.--Area of timberland by ownership class and Forest Survey Unit, Michigan, 1987

(In thousand acres)

Ownership class	All units	Forest survey unit			
		Eastern upper peninsula	Western upper peninsula	Northern lower peninsula	Southern lower peninsula
National forest	2,453.4	743.3	831.4	863.8	14.9
Miscellaneous fed.	45.0	20.6	1.6	15.2	7.6
State	3,581.1	979.3	618.8	1,833.0	150.0
County and municipal	186.8	8.9	87.3	37.9	52.7
Indian	22.2	6.0	16.2	-	-
Forest industry	1,965.7	631.5	1,258.0	76.2	-
Farmer	3,054.6	467.8	190.6	1,263.9	1,132.3
Misc. private-corp.	1,486.0	223.5	660.2	463.8	138.5
Misc. private-indiv.	4,546.8	688.8	824.3	2,099.3	934.4
All owners	17,341.6	3,769.7	4,488.4	6,653.1	2,430.4

Table 3.--Area of timberland by forest type and stand-age class, Michigan, 1987

(In thousand acres)

All units

Forest type	All ages	Stand-age class(years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Jack pine	832.9	152.8	103.4	73.7	157.6	193.0	99.6	22.2	25.8	2.3	2.5
Red pine	668.1	80.9	140.1	186.6	114.4	62.9	7.2	20.5	29.8	24.2	1.5
White pine	218.9	12 4	16.6	17.5	5.0	18.5	17.9	35.1	46.0	33.3	16.6
Balsam fir	607.4	69.5	70.1	51.1	95.4	87.6	88.8	58.0	61.4	22.5	3.0
White spruce	99.9	8.5	18.5	3.8	18.8	12.7	9.9	5.3	10.7	9.5	2.2
Black spruce	512.7	68.1	68.7	126.0	71.8	49.4	50.9	31.8	20.1	15.9	10.0
Northern white-cedar	1,185.4	27.2	55.3	90.2	74.4	63.0	115.1	142.6	267.2	224.9	125.5
Tamarack	109.0	19.6	13.8	15.6	10.9	5.6	16.6	10.5	6.5	7.9	2.0
Oak-hickory	1,731.3	502.9	117.8	29.8	106.7	174.3	286.1	240.3	241.4	30.4	1.6
Elm-ash-soft maple	1,268.2	216.6	150.3	93.7	114.1	115.9	144.7	93.1	168.4	131.4	40.0
Maple-birch	6,162.5	559.2	399.4	222.6	361.8	912.3	902.8	509.5	888.7	1,047.6	358.6
Aspen	3,325.4	1,107.7	544.0	143.4	343.2	478.9	406.5	157.4	108.8	30.8	4.7
Paper birch	366.6	32.4	29.5	10.6	25.6	40.1	94.2	80.4	32.4	14.9	6.5
Exotic	85.7	15.6	27.8	23.8	9.3	7.0	2.2	-	-	-	-
Nonstocked	167.6	112.1	25.1	8.3	8.0	5.4	5.1	-	3.6	-	-
All types	17,341.6	2,985.5	1,780.4	1,096.7	1,517.0	2,226.6	2,247.6	1,406.7	1,910.8	1,595.6	574.7
				Eastern upper peninsula							
Jack pine	223.3	48.1	10.7	14.5	47.5	74.9	18.8	5.9	2.9	-	-
Red pine	143.0	27.1	31.4	23.0	34.5	8.5	1.4	3.0	9.1	5.0	-
White pine	73.8	9.6	5.3	3.2	3.3	4.4	8.7	11.0	11.1	9.6	7.6
Balsam fir	207.0	23.3	27.0	12.3	61.0	28.2	28.2	14.0	5.2	6.3	1.5
White spruce	29.9	3.0	6.4	1.2	1.5	5.9	3.1	1.6	5.7	1.5	-
Black spruce	279.3	35.4	34.1	87.9	53.8	22.7	20.3	14.2	7.8	3.1	-
Northern white-cedar	599.0	13.6	37.7	60.0	56.3	37.7	51.3	64.1	112.0	105.8	60.5
Tamarack	40.7	2.5	5.2	6.2	4.3	1.1	7.1	6.5	4.8	3.0	-
Oak-hickory	19.1	1.6	1.6	-	0.4	3.4	6.0	3.1	3.0	-	-
Elm-ash-soft maple	177.1	31.8	17.0	15.1	9.5	19.3	24.8	10.7	22.5	22.1	4.3
Maple-birch	1,156.7	70.8	60.8	42.6	73.0	177.7	144.2	107.0	161.6	226.2	92.8
Aspen	669.4	212.6	68.6	28.2	108.9	101.7	91.5	41.4	12.6	3.9	-
Paper birch	110.1	15.9	7.7	3.2	4.8	16.1	23.3	26.9	6.1	6.1	-
Exotic	1.2	-	-	1.2	-	-	-	-	-	-	-
Nonstocked	40.1	25.7	3.1	-	5.1	1.5	3.3	-	1.4	-	-
All types	3,769.7	521.0	316.6	298.6	463.9	503.1	432.0	309.4	365.8	392.6	166.7
				Western upper peninsula							
Jack pine	82.2	15.5	4.2	7.2	12.2	22.7	20.4	-	-	-	-
Red pine	63.7	-	23.0	8.1	10.8	-	1.7	5.9	4.5	8.2	1.5
White pine	45.2	-	-	1.3	1.7	1.6	-	14.0	14.8	7.7	4.1
Balsam fir	357.4	38.8	32.1	36.6	34.4	55.8	55.6	35.9	50.5	16.2	1.5
White spruce	40.6	3.3	1.6	-	12.4	6.8	4.8	3.7	-	8.0	-
Black spruce	205.5	25.8	28.8	38.1	18.0	19.9	27.1	15.7	9.3	12.8	10.0
Northern white-cedar	210.1	4.7	7.6	9.8	2.8	11.7	17.9	26.0	48.8	51.4	29.4
Tamarack	34.1	4.9	6.4	5.2	1.2	4.5	5.6	1.6	-	2.7	2.0
Oak-hickory	17.6	-	-	1.1	1.2	3.4	-	2.3	3.7	4.3	1.6
Elm-ash-soft maple	158.8	23.8	16.4	7.5	9.1	10.2	12.7	13.0	27.0	22.5	16.6
Maple-birch	2,405.1	83.5	82.3	51.2	127.5	376.4	380.9	155.4	360.0	561.6	226.3
Aspen	696.9	192.5	79.0	25.9	76.8	151.1	99.0	24.0	45.5	3.1	-
Paper birch	142.9	5.0	10.8	5.0	8.0	14.6	42.8	25.9	17.8	6.5	6.5
Exotic	1.6	1.6	-	-	-	-	-	-	-	-	-
Nonstocked	26.7	19.9	5.5	-	1.3	-	-	-	-	-	-
All types	4,488.4	419.3	297.7	197.0	317.4	678.7	668.5	323.4	581.9	705.0	299.5

(Table 3 continued on next page)

(Table 3 continued)

Forest type	All ages	Stand-age class(years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Northern lower peninsula											
Jack pine	515.1	84.4	88.5	52.0	94.6	95.4	56.2	16.3	22.9	2.3	2.5
Red pine	433.5	49.0	85.7	143.9	65.8	46.2	4.1	11.6	16.2	11.0	-
White pine	78.3	2.8	11.3	5.2	-	7.1	9.2	1.7	20.1	16.0	4.9
Balsam fir	43.0	7.4	11.0	2.2	-	3.6	5.0	8.1	5.7	-	-
White spruce	21.9	2.2	10.5	-	-	-	2.0	-	5.0	-	2.2
Black spruce	27.9	6.9	5.8	-	-	6.8	3.5	1.9	3.0	-	-
Northern white-cedar	362.2	5.8	10.0	13.2	15.3	13.6	45.9	52.5	102.8	67.5	35.6
Tamarack	29.8	7.8	2.2	4.2	5.4	-	3.9	2.4	1.7	2.2	-
Oak-hickory	1,043.7	259.2	73.2	11.6	48.7	100.9	228.7	175.7	138.8	6.9	-
Elm-ash-soft maple	402.4	67.4	49.1	19.7	30.2	51.2	36.7	46.2	59.8	31.2	10.9
Maple-birch	1,675.3	169.3	126.6	48.0	105.0	290.9	332.3	168.3	249.4	165.3	20.2
Aspen	1,795.7	641.5	367.5	77.8	129.7	211.5	201.4	87.1	50.7	23.8	4.7
Paper birch	107.0	11.5	7.7	2.4	9.5	9.4	28.1	27.6	8.5	2.3	-
Exotic	56.7	6.0	20.4	20.0	5.9	2.2	2.2	-	-	-	-
Nonstocked	60.6	36.1	8.7	6.3	1.6	3.9	1.8	-	2.2	-	-
All types	6,653.1	1,357.3	878.2	406.5	511.7	842.7	961.0	599.4	686.8	328.5	81.0
Southern lower peninsula											
Jack pine	12.3	4.8	-	-	3.3	-	4.2	-	-	-	-
Red pine	27.9	4.8	-	11.6	3.3	8.2	-	-	-	-	-
White pine	21.6	-	-	7.8	-	5.4	-	8.4	-	-	-
Balsam fir	-	-	-	-	-	-	-	-	-	-	-
White spruce	7.5	-	-	2.6	4.9	-	-	-	-	-	-
Black spruce	-	-	-	-	-	-	-	-	-	-	-
Northern white-cedar	14.1	3.1	-	7.2	-	-	-	-	3.6	0.2	-
Tamarack	4.4	4.4	-	-	-	-	-	-	-	-	-
Oak-hickory	650.9	242.1	43.0	17.1	56.4	66.6	51.4	59.2	95.9	19.2	-
Elm-ash-soft maple	529.9	93.6	67.8	51.4	65.3	35.2	70.5	23.2	59.1	55.6	8.2
Maple-birch	925.4	235.6	129.7	80.8	56.3	67.3	45.4	78.8	117.7	94.5	19.3
Aspen	163.4	61.1	28.9	11.5	27.8	14.6	14.6	4.9	-	-	-
Paper birch	6.6	-	3.3	-	3.3	-	-	-	-	-	-
Exotic	26.2	8.0	7.4	2.6	3.4	4.8	-	-	-	-	-
Nonstocked	40.2	30.4	7.8	2.0	-	-	-	-	-	-	-
All types	2,430.4	687.9	287.9	194.6	224.0	202.1	186.1	174.5	276.3	169.5	27.5

Table 4.--Area of timberland by forest type and site-index class, Michigan, 1987

(In thousand acres)

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+
All units										
Jack pine	832.9	-	11.8	122.6	258.5	269.5	124.4	27.4	18.7	-
Red pine	668.1	-	-	2.6	153.3	217.0	162.5	94.0	38.7	-
White pine	218.9	-	-	18.1	44.8	89.8	37.4	19.7	9.1	-
Balsam fir	607.4	2.8	9.2	59.6	169.1	256.4	85.9	9.6	11.8	3.0
White spruce	99.9	-	4.7	13.6	19.1	25.8	14.3	19.7	2.7	-
Black spruce	512.7	-	49.6	223.4	175.4	48.8	13.6	1.9	-	-
Northern white-cedar	1,185.4	75.0	538.8	370.2	131.1	29.6	33.6	7.1	-	-
Tamarack	109.0	-	16.7	38.4	26.0	17.2	8.5	-	2.2	-
Oak-hickory	1,731.3	-	2.3	64.6	303.7	455.0	444.5	294.8	127.0	39.4
Elm-ash-soft maple	1,268.2	-	9.9	123.2	153.2	249.8	317.3	184.0	115.9	114.9
Maple-birch	6,162.5	-	21.7	123.6	567.5	1,324.1	1,944.9	1,423.6	574.4	182.7
Aspen	3,325.4	-	2.6	55.0	211.0	580.0	948.0	933.3	493.5	102.0
Paper birch	366.6	-	1.4	18.7	37.3	144.3	122.6	36.4	5.9	-
Exotic	85.7	-	-	4.2	22.4	20.5	28.0	9.5	-	1.1
Nonstocked	167.6	1.7	4.5	16.4	59.2	52.4	14.1	15.1	4.2	-
All types	17,341.6	79.5	673.2	1,254.2	2,331.6	3,780.2	4,299.6	3,076.1	1,404.1	443.1
Eastern upper peninsula										
Jack pine	223.3	-	11.8	58.6	48.7	74.7	23.4	5.2	0.9	-
Red pine	143.0	-	-	-	34.5	59.5	47.3	1.7	-	-
White pine	73.8	-	-	11.1	24.4	27.7	5.9	3.0	1.7	-
Balsam fir	207.0	1.5	2.8	14.0	64.2	93.3	26.8	3.0	-	1.4
White spruce	29.9	-	-	6.0	7.1	2.8	11.0	3.0	-	-
Black spruce	279.3	-	13.0	126.3	113.5	20.6	4.4	1.5	-	-
Northern white-cedar	599.0	43.3	305.5	162.7	60.5	14.2	8.1	4.7	-	-
Tamarack	40.7	-	4.2	18.0	12.5	4.4	1.6	-	-	-
Oak-hickory	19.1	-	-	1.5	0.4	4.6	6.5	6.1	-	-
Elm-ash-soft maple	177.1	-	1.5	24.0	50.0	53.3	36.2	9.5	2.6	-
Maple-birch	1,156.7	-	12.3	32.1	136.6	317.5	427.3	186.5	37.9	6.5
Aspen	669.4	-	-	25.9	77.1	157.3	203.8	160.2	40.1	5.0
Paper birch	110.1	-	-	6.3	13.7	47.5	36.5	4.6	1.5	-
Exotic	1.2	-	-	-	-	-	1.2	-	-	-
Nonstocked	40.1	1.7	0.7	3.3	13.6	14.1	3.5	3.2	-	-
All types	3,769.7	46.5	351.8	489.8	656.8	891.5	843.5	392.2	84.7	12.9
Western upper peninsula										
Jack pine	82.2	-	-	1.7	5.0	9.1	41.7	14.4	10.3	-
Red pine	63.7	-	-	-	24.3	13.6	6.8	19.0	-	-
White pine	45.2	-	-	-	7.7	27.9	8.4	1.2	-	-
Balsam fir	357.4	1.3	6.4	43.3	90.4	142.0	55.8	4.8	11.8	1.6
White spruce	40.6	-	-	3.3	9.8	13.0	3.3	11.2	-	-
Black spruce	205.5	-	34.7	87.2	54.3	24.5	4.4	0.4	-	-
Northern white-cedar	210.1	16.2	103.7	58.4	18.3	2.6	10.9	-	-	-
Tamarack	34.1	-	-	12.0	13.5	4.8	3.8	-	-	-
Oak-hickory	17.6	-	-	1.7	2.2	3.3	9.3	1.1	-	-
Elm-ash-soft maple	158.8	-	3.0	37.7	38.5	33.1	31.7	13.4	1.4	-
Maple-birch	2,405.1	-	9.4	54.2	270.0	617.7	837.7	472.4	130.6	13.1
Aspen	696.9	-	-	4.9	29.9	121.3	206.9	221.2	95.8	16.9
Paper birch	142.9	-	1.3	3.1	6.7	61.5	54.4	15.9	-	-
Exotic	1.6	-	-	-	-	1.6	-	-	-	-
Nonstocked	26.7	-	2.3	2.4	2.6	16.0	2.5	0.9	-	-
All types	4,488.4	17.5	160.8	309.9	573.2	1,092.0	1,277.6	775.9	249.9	31.6

(Table 4 continued on next page)

(Table 4 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	515.1	-	-	62.3	204.8	185.7	47.0	7.8	7.5	-
Red pine	433.5	-	-	2.6	94.5	141.6	108.4	66.7	19.7	-
White pine	78.3	-	-	7.0	12.7	23.1	23.1	7.1	5.3	-
Balsam fir	43.0	-	-	2.3	14.5	21.1	3.3	1.8	-	-
White spruce	21.9	-	4.7	4.3	2.2	2.5	-	5.5	2.7	-
Black spruce	27.9	-	1.9	9.9	7.6	3.7	4.8	-	-	-
Northern white-cedar	362.2	15.5	122.4	145.5	52.3	12.6	11.5	2.4	-	-
Tamarack	29.8	-	8.1	8.4	-	8.0	3.1	-	2.2	-
Oak-hickory	1,043.7	-	2.3	48.8	260.6	333.8	240.9	116.9	28.7	11.7
Elm-ash-soft maple	402.4	-	5.4	38.3	45.7	95.0	116.1	66.6	13.3	22.0
Maple-birch	1,675.3	-	-	27.8	117.8	300.3	469.1	480.5	212.0	67.8
Aspen	1,795.7	-	2.6	24.2	104.0	271.3	501.3	526.7	289.1	76.5
Paper birch	107.0	-	0.1	9.3	16.9	32.0	31.7	12.6	4.4	-
Exotic	56.7	-	-	-	12.4	12.9	20.8	9.5	-	1.1
Nonstocked	60.6	-	1.5	10.7	22.7	12.2	6.3	7.2	-	-
All types	6,653.1	15.5	149.0	401.4	968.7	1,455.8	1,587.4	1,311.3	584.9	179.1
Southern lower peninsula										
Jack pine	12.3	-	-	-	-	-	12.3	-	-	-
Red pine	27.9	-	-	-	-	2.3	-	6.6	19.0	-
White pine	21.6	-	-	-	-	11.1	-	8.4	2.1	-
Balsam fir	-	-	-	-	-	-	-	-	-	-
White spruce	7.5	-	-	-	-	7.5	-	-	-	-
Black spruce	-	-	-	-	-	-	-	-	-	-
Northern white-cedar	14.1	-	7.2	3.6	-	0.2	3.1	-	-	-
Tamarack	4.4	-	4.4	-	-	-	-	-	-	-
Oak-hickory	650.9	-	-	12.6	40.5	113.3	187.8	170.7	98.3	27.7
Elm-ash-soft maple	529.9	-	-	23.2	19.0	68.4	133.3	94.5	98.6	92.9
Maple-birch	925.4	-	-	9.5	43.1	88.6	210.8	284.2	193.9	95.3
Aspen	163.4	-	-	-	-	30.1	36.0	25.2	68.5	3.6
Paper birch	6.6	-	-	-	-	3.3	-	3.3	-	-
Exotic	26.2	-	-	4.2	10.0	6.0	6.0	-	-	-
Nonstocked	40.2	-	-	-	20.3	10.1	1.8	3.8	4.2	-
All types	2,430.4	-	11.6	53.1	132.9	340.9	591.1	596.7	484.6	219.5

Table 5.--Area of timberland by forest type and stand-size class, Michigan, 1987

(In thousand acres)

Forest type	All classes	Stand size class: Sawtimber	Poletimber	Sapling & seedling	Nonstocked
All units					
Jack pine	832.9	109.8	421.8	301.3	-
Red pine	668.1	124.8	328.9	214.4	-
White pine	218.9	143.4	39.9	35.6	-
Balsam fir	607.4	119.2	299.2	189.0	-
White spruce	99.9	27.0	44.7	28.2	-
Black spruce	512.7	7.5	250.3	254.9	-
Northern white-cedar	1,185.4	308.2	646.5	230.7	-
Tamarack	109.0	11.7	33.8	63.5	-
Oak-hickory	1,731.3	348.3	755.0	628.0	-
Elm-ash-soft maple	1,268.2	409.1	448.8	410.3	-
Maple-birch	6,162.5	2,501.9	2,594.7	1,065.9	-
Aspen	3,325.4	291.9	1,305.0	1,728.5	-
Paper birch	366.6	34.9	257.7	74.0	-
Exotic	85.7	4.8	34.7	46.2	-
Nonstocked	167.6	-	-	-	167.6
All types	17,341.6	4,442.5	7,461.0	5,270.5	167.6
Eastern upper peninsula					
Jack pine	223.3	23.1	142.1	58.1	-
Red pine	143.0	29.1	59.9	54.0	-
White pine	73.8	42.0	15.2	16.6	-
Balsam fir	207.0	45.9	97.0	64.1	-
White spruce	29.9	8.9	10.4	10.6	-
Black spruce	279.3	3.1	143.8	132.4	-
Northern white-cedar	599.0	132.4	307.6	159.0	-
Tamarack	40.7	1.4	18.3	21.0	-
Oak-hickory	19.1	4.6	11.3	3.2	-
Elm-ash-soft maple	177.1	44.8	65.3	67.0	-
Maple-birch	1,156.7	516.2	483.2	157.3	-
Aspen	669.4	56.7	318.5	294.2	-
Paper birch	110.1	9.5	72.3	28.3	-
Exotic	1.2	-	1.2	-	-
Nonstocked	40.1	-	-	-	40.1
All types	3,769.7	917.7	1,746.1	1,065.8	40.1
Western upper peninsula					
Jack pine	82.2	24.1	37.5	20.6	-
Red pine	63.7	21.8	22.6	19.3	-
White pine	45.2	38.9	6.3	-	-
Balsam fir	357.4	65.9	187.2	104.3	-
White spruce	40.6	13.4	22.3	4.9	-
Black spruce	205.5	4.4	93.2	107.9	-
Northern white-cedar	210.1	88.0	97.2	24.9	-
Tamarack	34.1	4.0	9.4	20.7	-
Oak-hickory	17.6	9.6	6.9	1.1	-
Elm-ash-soft maple	158.8	48.8	63.9	46.1	-
Maple-birch	2,405.1	1,156.5	1,045.5	203.1	-
Aspen	696.9	54.6	353.9	288.4	-
Paper birch	142.9	20.9	101.2	20.8	-
Exotic	1.6	-	-	1.6	-
Nonstocked	26.7	-	-	-	26.7
All types	4,488.4	1,550.9	2,047.1	863.7	26.7

(Table 5 continued on next page)

(Table 5 continued) Northern lower peninsula

Forest type	All classes	Stand size class: Sawtimber	Poletimber	Sapling & seedling	Nonstocked
	Northern lower peninsula				
Jack pine	515.1	58.4	238.9	217.8	-
Red pine	433.5	64.0	228.4	141.1	-
White pine	78.3	52.0	12.2	14.1	-
Balsam fir	43.0	7.4	15.0	20.6	-
White spruce	21.9	4.7	4.5	12.7	-
Black spruce	27.9	-	13.3	14.6	-
Northern white-cedar	362.2	87.8	237.9	36.5	-
Tamarack	29.8	6.3	6.1	17.4	-
Oak-hickory	1,043.7	135.8	564.6	343.3	-
Elm-ash-soft maple	402.4	115.5	146.5	140.4	-
Maple-birch	1,675.3	474.6	870.4	330.3	-
Aspen	1,795.7	169.6	565.9	1,060.2	-
Paper birch	107.0	4.5	80.9	21.6	-
Exotic	56.7	-	25.3	31.4	-
Nonstocked	60.6	-	-	-	60.6
All types	6,653.1	1,180.6	3,009.9	2,402.0	60.6
	Southern lower peninsula				
Jack pine	12.3	4.2	3.3	4.8	-
Red pine	27.9	9.9	18.0	-	-
White pine	21.6	10.5	6.2	4.9	-
Balsam fir	-	-	-	-	-
White spruce	7.5	-	7.5	-	-
Black spruce	-	-	-	-	-
Northern white-cedar	14.1	-	3.8	10.3	-
Tamarack	4.4	-	-	4.4	-
Oak-hickory	650.9	198.3	172.2	280.4	-
Elm-ash-soft maple	529.9	200.0	173.1	156.8	-
Maple-birch	925.4	354.6	195.6	375.2	-
Aspen	163.4	11.0	66.7	85.7	-
Paper birch	6.6	-	3.3	3.3	-
Exotic	26.2	4.8	8.2	13.2	-
Nonstocked	40.2	-	-	-	40.2
All types	2,430.4	793.3	657.9	939.0	40.2

Table 6.--Net volume of growing stock on timberland by forest type and stand-age class, Michigan, 1987

(In million cubic feet)

All units

Forest type	All ages	Stand-age class(years)									
		1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Jack pine	667.4	38.9	46.0	51.9	147.3	224.3	116.9	19.5	19.5	1.9	1.2
Red pine	1,124.5	44.8	135.4	421.8	245.5	110.0	8.9	46.9	53.3	55.7	2.2
White pine	363.1	6.8	12.0	19.9	4.0	31.1	24.2	92.9	77.4	67.3	27.5
Balsam fir	721.9	36.0	38.7	34.7	135.3	141.2	122.8	88.9	90.9	31.6	1.8
White spruce	141.0	4.1	15.4	4.0	32.5	17.8	16.8	14.1	20.1	13.6	2.6
Black spruce	358.1	27.3	28.4	58.3	63.9	45.8	47.3	30.0	23.3	20.6	13.2
Northern white-cedar	1,548.5	10.6	31.6	55.1	57.1	78.2	166.8	219.5	409.8	367.3	152.5
Tamarack	59.4	5.4	7.7	7.0	4.2	3.9	12.7	7.4	4.6	6.5	-
Oak-hickory	1,682.0	167.8	48.7	34.0	129.1	240.5	373.4	309.1	340.1	37.9	1.4
Elm-ash-soft maple	1,296.3	82.5	84.9	81.5	139.1	133.3	180.9	136.7	241.8	174.1	41.5
Maple-birch	8,887.1	270.8	253.0	267.5	534.7	1,530.3	1,479.0	839.1	1,485.5	1,698.3	528.9
Aspen	3,162.8	467.7	310.1	132.0	477.1	725.4	657.7	208.9	141.0	37.4	5.5
Paper birch	469.6	17.5	16.2	6.8	36.7	59.6	156.6	108.1	43.0	19.3	5.8
Exotic	69.5	2.9	11.2	23.9	16.9	12.8	1.8	-	-	-	-
Nonstocked	6.4	2.1	1.0	0.3	0.5	1.0	0.9	-	0.6	-	-
All types	20,557.6	1,185.2	1,040.3	1,198.7	2,023.9	3,355.2	3,366.7	2,121.1	2,950.9	2,531.5	784.1
Eastern upper peninsula											
Jack pine	161.2	6.9	3.5	8.4	43.9	70.7	21.2	4.1	2.5	-	-
Red pine	185.7	11.2	30.3	45.7	57.7	10.4	1.5	5.0	12.1	11.8	-
White pine	92.4	4.6	3.1	3.7	1.7	5.5	8.4	20.9	17.2	15.8	11.5
Balsam fir	232.8	12.9	14.6	7.5	87.1	42.7	38.1	17.2	6.9	4.8	1.0
White spruce	43.8	0.6	3.8	1.0	2.3	10.0	6.0	5.6	12.8	1.7	-
Black spruce	184.7	13.9	16.5	40.0	50.3	21.7	18.4	11.3	9.8	2.8	-
Northern white-cedar	732.5	4.1	20.0	36.8	45.2	43.7	73.9	100.1	170.8	164.8	73.1
Tamarack	24.4	0.4	2.3	2.9	1.0	1.0	5.0	4.9	4.2	2.7	-
Oak-hickory	15.6	-	2.2	-	-	2.4	6.9	1.8	2.3	-	-
Elm-ash-soft maple	174.1	10.6	11.9	10.1	8.8	20.9	36.5	14.9	25.8	30.9	3.7
Maple-birch	1,612.8	37.3	48.0	44.8	98.4	276.9	214.1	178.0	251.1	330.9	133.3
Aspen	633.4	86.9	33.8	15.5	148.7	151.4	128.7	48.1	14.5	5.8	-
Paper birch	133.2	10.7	4.4	1.2	5.0	20.4	40.1	35.9	7.3	8.2	-
Exotic	2.4	-	-	2.4	-	-	-	-	-	-	-
Nonstocked	2.6	0.9	0.2	-	0.3	0.4	0.6	-	0.2	-	-
All types	4,231.6	201.0	194.6	220.0	550.4	678.1	599.4	447.8	537.5	580.2	222.6
Western upper peninsula											
Jack pine	89.6	2.6	2.4	13.3	11.7	32.7	26.9	-	-	-	-
Red pine	118.1	-	18.4	23.6	25.0	-	2.4	15.8	11.1	19.6	2.2
White pine	101.4	-	-	2.3	2.3	2.0	-	40.1	27.6	19.7	7.4
Balsam fir	450.3	19.5	17.3	26.1	48.2	94.6	79.2	58.3	79.5	26.8	0.8
White spruce	66.3	2.1	1.1	-	25.6	7.8	9.3	8.5	-	11.9	-
Black spruce	157.5	12.4	10.0	18.3	13.6	16.7	27.2	18.2	10.1	17.8	13.2
Northern white-cedar	282.6	1.3	4.8	5.9	2.3	14.3	28.4	35.9	73.0	75.8	40.9
Tamarack	16.3	1.8	2.4	1.6	0.4	2.9	4.3	0.3	-	2.6	-
Oak-hickory	24.4	-	-	1.6	2.6	5.7	-	4.5	5.4	3.2	1.4
Elm-ash-soft maple	164.4	7.7	12.9	5.5	9.9	9.9	16.7	14.6	40.3	29.1	17.8
Maple-birch	3,783.5	49.9	59.5	59.8	207.4	644.2	630.2	250.5	605.9	951.3	324.8
Aspen	755.8	76.6	47.2	38.4	124.7	215.7	149.7	35.9	64.1	3.5	-
Paper birch	188.8	2.8	7.0	3.9	12.7	24.0	66.4	33.5	25.2	7.5	5.8
Exotic	-	-	-	-	-	-	-	-	-	-	-
Nonstocked	1.2	0.7	0.3	-	0.2	-	-	-	-	-	-
All types	6,200.2	177.4	183.3	200.3	486.6	1,070.5	1,040.7	516.1	942.2	1,168.8	414.3

(Table 6 continued on next page)

(Table 6 continued)

Northern lower peninsula

Forest type	All ages	Stand-age class(years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Jack pine	403.2	25.3	40.1	30.2	88.2	120.9	63.0	15.4	17.0	1.9	1.2
Red pine	763.5	28.3	86.7	327.9	154.9	80.2	5.0	26.1	30.1	24.3	-
White pine	122.7	2.2	8.9	11.5	-	10.2	15.8	1.1	32.6	31.8	8.6
Balsam fir	38.8	3.6	6.8	1.1	-	3.9	5.5	13.4	4.5	-	-
White spruce	23.3	1.4	10.5	-	-	-	1.5	-	7.3	-	2.6
Black spruce	15.9	1.0	1.9	-	-	7.4	1.7	0.5	3.4	-	-
Northern white-cedar	528.3	5.0	6.8	9.5	9.6	20.2	64.5	83.5	164.0	126.7	38.5
Tamarack	16.5	1.0	3.0	2.5	2.8	-	3.4	2.2	0.4	1.2	-
Oak-hickory	987.0	65.8	27.1	10.2	61.6	134.7	287.8	223.7	168.3	7.8	-
Elm-ash-soft maple	437.5	33.8	23.8	10.4	45.6	61.7	50.7	65.4	87.6	45.0	13.5
Maple-birch	2,478.5	74.4	81.8	53.3	155.6	506.3	554.7	296.5	447.2	274.1	34.6
Aspen	1,621.2	271.8	202.3	68.9	179.4	336.0	346.5	120.3	62.4	28.1	5.5
Paper birch	141.9	4.0	3.0	1.7	15.1	15.2	50.1	38.7	10.5	3.6	-
Exotic	44.6	0.5	5.2	20.7	13.8	2.6	1.8	-	-	-	-
Nonstocked	2.2	0.2	0.4	0.3	-	0.6	0.3	-	0.4	-	-
All types	7,625.1	518.3	508.3	548.2	726.6	1,299.9	1,452.3	886.8	1,035.7	544.5	104.5

Southern lower peninsula

Jack pine	13.4	4.1	-	-	3.5	-	5.8	-	-	-	-
Red pine	57.2	5.3	-	24.6	7.9	19.4	-	-	-	-	-
White pine	46.6	-	-	2.4	-	13.4	-	30.8	-	-	-
Balsam fir	-	-	-	-	-	-	-	-	-	-	-
White spruce	7.6	-	-	3.0	4.6	-	-	-	-	-	-
Black spruce	-	-	-	-	-	-	-	-	-	-	-
Northern white-cedar	5.1	0.2	-	2.9	-	-	-	-	2.0	-	-
Tamarack	2.2	2.2	-	-	-	-	-	-	-	-	-
Oak-hickory	655.0	102.0	19.4	22.2	64.9	97.7	78.7	79.1	164.1	26.9	-
Elm-ash-soft maple	520.3	30.4	36.3	55.5	74.8	40.8	77.0	41.8	88.1	69.1	6.5
Maple-birch	1,012.3	109.2	63.7	109.6	73.3	102.9	80.0	114.1	181.3	142.0	36.2
Aspen	152.4	32.4	26.8	9.2	24.3	22.3	32.8	4.6	-	-	-
Paper birch	5.7	-	1.8	-	3.9	-	-	-	-	-	-
Exotic	22.5	2.4	6.0	0.8	3.1	10.2	-	-	-	-	-
Nonstocked	0.4	0.3	0.1	-	-	-	-	-	-	-	-
All types	2,500.7	288.5	154.1	230.2	260.3	306.7	274.3	270.4	435.5	238.0	42.7

Table 7.--Net volume of sawtimber on timberland
by forest type and stand-age class, Michigan, 1987

(In million board feet) 1/

All units

Forest type	All ages	Stand-age class(years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Jack pine	1,643.6	97.8	96.2	70.7	375.4	526.7	336.9	58.7	69.5	6.2	5.5
Red pine	2,479.2	44.7	110.7	561.4	688.7	356.8	35.4	190.2	235.8	248.7	6.8
White pine	1,467.8	11.8	47.4	35.2	13.4	91.0	91.1	402.2	337.7	305.8	132.2
Balsam fir	1,862.8	98.7	62.8	52.3	394.1	344.1	299.3	205.8	295.9	103.5	6.3
White spruce	386.2	14.5	32.3	3.4	63.7	58.3	36.7	50.9	63.5	52.8	10.1
Black spruce	615.6	45.7	46.4	112.1	79.5	75.6	64.8	46.5	27.4	77.4	40.2
Northern white-cedar	2,978.0	19.0	35.7	56.9	57.4	120.5	246.5	308.2	665.5	977.0	491.3
Tamarack	112.0	8.6	17.0	12.6	1.2	6.5	16.6	17.4	15.2	16.9	-
Oak-hickory	4,514.7	563.1	127.8	74.9	260.9	525.5	782.2	833.8	1,174.9	165.3	6.3
Elm-ash-soft maple	3,452.1	167.1	137.4	163.2	272.6	245.1	491.1	387.2	818.0	622.6	147.8
Maple-birch	25,569.5	616.0	523.2	516.1	1,058.6	3,071.2	3,294.6	2,507.5	5,076.1	6,591.2	2,315.0
Aspen	6,288.0	985.5	465.5	194.9	805.6	1,410.1	1,408.7	484.0	391.1	123.5	19.1
Paper birch	781.2	29.5	25.1	3.2	49.9	93.4	226.5	166.7	100.5	64.6	21.8
Exotic	98.9	1.1	6.4	14.5	25.0	47.6	4.3	-	-	-	-
Nonstocked	14.2	0.5	1.5	0.9	1.5	4.5	3.2	-	2.1	-	-
All types	52,263.8	2,703.6	1,735.4	1,872.3	4,147.5	6,976.9	7,337.9	5,659.1	9,273.2	9,355.5	3,202.4
				Eastern upper peninsula							
Jack pine	418.7	18.6	13.0	12.9	118.5	169.0	55.6	19.4	11.7	-	-
Red pine	510.6	22.1	16.0	75.8	217.3	36.9	7.1	20.6	64.4	50.4	-
White pine	382.4	7.3	13.3	8.8	7.3	19.1	29.7	104.6	69.7	70.6	52.0
Balsam fir	620.6	40.9	28.8	2.4	292.5	99.0	83.0	30.0	21.3	18.0	4.7
White spruce	139.3	2.9	11.3	1.9	9.0	29.4	15.6	22.8	38.5	7.9	-
Black spruce	299.0	19.9	28.4	97.0	57.5	26.4	32.7	16.0	12.9	8.2	-
Northern white-cedar	1,307.3	9.3	23.0	34.1	49.0	58.2	102.9	128.2	291.5	393.7	217.4
Tamarack	45.6	1.3	2.2	4.1	1.2	1.5	6.2	10.3	12.0	6.8	-
Oak-hickory	49.1	-	1.4	-	0.1	6.4	22.7	10.7	7.8	-	-
Elm-ash-soft maple	427.6	19.4	16.0	13.1	11.2	38.7	83.0	31.1	93.3	107.7	14.1
Maple-birch	4,985.7	102.2	107.4	107.5	199.5	628.5	543.8	555.7	897.9	1,279.0	564.2
Aspen	1,179.8	173.5	45.0	26.2	222.3	289.5	250.5	109.5	45.2	18.1	-
Paper birch	233.6	17.9	9.7	-	3.8	37.8	69.1	51.6	15.0	28.7	-
Exotic	5.2	-	-	5.2	-	-	-	-	-	-	-
Nonstocked	6.9	0.5	0.7	-	0.8	2.4	2.0	-	0.5	-	-
All types	10,611.4	435.8	316.2	389.0	1,190.0	1,442.8	1,303.9	1,110.5	1,581.7	1,989.1	852.4
				Western upper peninsula							
Jack pine	277.8	8.9	7.0	24.1	27.8	95.5	114.5	-	-	-	-
Red pine	330.1	-	17.1	32.9	65.4	-	8.8	57.4	46.3	95.4	6.8
White pine	431.1	-	-	3.5	6.1	4.1	-	172.3	119.0	91.3	34.8
Balsam fir	1,153.1	44.6	24.8	46.7	101.6	238.6	206.7	141.5	261.5	85.5	1.6
White spruce	182.0	10.5	2.5	-	48.7	28.9	18.4	28.1	-	44.9	-
Black spruce	288.2	23.9	12.2	15.1	22.0	34.5	31.0	30.5	9.6	69.2	40.2
Northern white-cedar	683.8	2.7	6.0	8.0	2.4	18.7	49.5	61.4	148.7	236.4	150.0
Tamarack	38.5	7.3	8.5	1.9	-	5.0	8.2	0.7	-	6.9	-
Oak-hickory	77.7	-	-	2.3	5.2	15.4	-	8.3	22.0	18.2	6.3
Elm-ash-soft maple	439.1	21.4	21.6	11.4	22.3	18.2	40.9	30.6	103.6	100.8	68.3
Maple-birch	11,192.1	102.5	125.6	116.6	387.4	1,248.2	1,432.8	645.4	2,004.0	3,674.5	1,455.1
Aspen	1,600.8	179.1	88.8	37.0	201.8	457.4	332.4	94.2	200.4	9.7	-
Paper birch	343.4	4.6	10.2	2.2	24.7	35.1	86.0	66.7	65.6	26.5	21.8
Exotic	-	-	-	-	-	-	-	-	-	-	-
Nonstocked	1.5	-	0.8	-	0.7	-	-	-	-	-	-
All types	17,039.2	405.5	325.1	301.7	916.1	2,199.6	2,329.2	1,337.1	2,980.7	4,459.3	1,784.9

(Table 7 continued on next page)

(Table 7 continued)

Northern lower peninsula

Forest type	All ages	Stand-age class(years) 1-20	21-30	31-40	41-50	51-60	61-70	71-80	81-100	101-120	121+
Jack pine	917.4	61.8	76.2	33.7	227.7	262.2	147.0	39.3	57.8	6.2	5.5
Red pine	1,461.9	10.8	77.6	401.8	377.1	234.9	19.5	112.2	125.1	102.9	-
White pine	483.0	4.5	34.1	13.7	-	25.8	61.4	5.2	149.0	143.9	45.4
Balsam fir	89.1	13.2	9.2	3.2	-	6.5	9.6	34.3	13.1	-	-
White spruce	57.4	1.1	18.5	-	-	-	2.7	-	25.0	-	10.1
Black spruce	28.4	1.9	5.8	-	-	14.7	1.1	-	4.9	-	-
Northern white-cedar	977.9	7.0	6.7	13.6	6.0	43.6	94.1	118.6	218.4	346.0	123.9
Tamarack	27.9	-	6.3	6.6	-	-	2.2	6.4	3.2	3.2	-
Oak-hickory	2,284.0	202.7	63.4	13.3	112.3	264.6	530.8	539.5	521.4	36.0	-
Elm-ash-soft maple	1,126.9	67.5	37.3	16.9	90.1	108.8	131.8	172.8	289.4	166.6	45.7
Maple-birch	6,287.7	171.0	160.2	75.0	314.0	904.6	1,064.3	891.1	1,501.0	1,064.0	142.5
Aspen	3,214.5	569.6	315.8	117.0	344.7	626.0	718.1	263.0	145.5	95.7	19.1
Paper birch	193.6	7.0	-	1.0	16.0	20.5	71.4	48.4	19.9	9.4	-
Exotic	44.5	-	4.4	9.3	22.1	4.4	4.3	-	-	-	-
Nonstocked	5.8	-	-	0.9	-	2.1	1.2	-	1.6	-	-
All types	17,200.0	1,118.1	815.5	706.0	1,510.0	2,518.7	2,859.5	2,230.8	3,075.3	1,973.9	392.2

Southern lower peninsula

Jack pine	29.7	8.5	-	-	1.4	-	19.8	-	-	-	-
Red pine	176.6	11.8	-	50.9	28.9	85.0	-	-	-	-	-
White pine	171.3	-	-	9.2	-	42.0	-	120.1	-	-	-
Balsam fir	-	-	-	-	-	-	-	-	-	-	-
White spruce	7.5	-	-	1.5	6.0	-	-	-	-	-	-
Black spruce	-	-	-	-	-	-	-	-	-	-	-
Northern white-cedar	9.0	-	-	1.2	-	-	-	-	6.9	0.9	-
Tamarack	-	-	-	-	-	-	-	-	-	-	-
Oak-hickory	2,103.9	360.4	63.0	59.3	143.3	239.1	228.7	275.3	623.7	111.1	-
Elm-ash-soft maple	1,458.5	58.8	62.5	121.8	149.0	79.4	235.4	152.7	331.7	247.5	19.7
Maple-birch	3,104.0	240.3	130.0	217.0	157.7	289.9	253.7	415.3	673.2	573.7	153.2
Aspen	292.9	63.3	15.9	14.7	36.8	37.2	107.7	17.3	-	-	-
Paper birch	10.6	-	5.2	-	5.4	-	-	-	-	-	-
Exotic	49.2	1.1	2.0	-	2.9	43.2	-	-	-	-	-
Nonstocked	-	-	-	-	-	-	-	-	-	-	-
All types	7,413.2	744.2	278.6	475.6	531.4	815.8	845.3	980.7	1,635.5	933.2	172.9

1/ International 1/4-inch rule

Table 8.--Growing stock volume and periodic growth on timberland by forest type and component of growth, Michigan, 1980-1987

(In million cubic feet)

Forest type	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
All units									
Jack pine	620.6	117.6	35.9	30.5	-48.5	135.5	-80.6	-8.1	667.4
Red pine	743.0	225.4	156.0	46.4	-14.2	413.6	-32.1	-	1,124.5
White pine	304.0	68.3	8.7	10.2	-9.0	78.2	-13.0	-6.1	363.1
Balsam fir	657.2	127.9	35.6	20.3	-47.2	136.6	-49.9	-22.0	721.9
White spruce	110.7	37.4	5.4	6.7	-9.0	40.5	-10.2	-	141.0
Black spruce	342.1	39.4	19.3	7.4	-34.9	31.2	-14.0	-1.2	358.1
Northern white-cedar	1,507.5	105.1	84.2	33.6	-104.4	118.5	-77.5	-	1,548.5
Tamarack	53.1	5.7	7.0	1.7	-3.9	10.5	-1.8	-2.4	59.4
Oak-hickory	1,886.3	269.7	37.2	86.7	-75.1	318.5	-467.6	-55.2	1,682.0
Elm-ash-soft maple	1,248.9	186.6	61.4	28.9	-55.8	221.1	-134.7	-39.0	1,296.3
Maple-birch	7,624.5	1,540.0	266.2	269.8	-308.9	1,767.1	-504.5	-	8,887.1
Aspen	3,077.4	597.9	188.6	191.2	-217.8	759.9	-614.9	-59.6	3,162.8
Paper birch	428.3	65.7	21.3	5.9	-19.2	73.7	-17.3	-15.1	469.6
Exotic	47.0	13.6	7.8	1.5	-0.4	22.5	-	-	69.5
Nonstocked	3.6	1.5	1.1	0.3	-	2.9	-	-0.1	6.4
All types	18,654.2	3,401.8	935.7	741.1	-948.3	4,130.3	-2,018.1	-208.8	20,557.6
Eastern upper peninsula									
Jack pine	177.1	17.3	4.0	5.4	-11.8	14.9	-25.0	-5.8	161.2
Red pine	126.7	32.0	31.3	7.1	-4.2	66.2	-7.2	-	185.7
White pine	79.1	14.7	3.9	2.5	-3.1	18.0	-4.7	-	92.4
Balsam fir	215.1	35.1	11.2	4.3	-12.7	37.9	-14.1	-6.1	232.8
White spruce	41.9	8.1	0.9	1.3	-3.1	7.2	-5.3	-	43.8
Black spruce	172.8	17.9	10.0	2.5	-13.1	17.3	-5.2	-0.2	184.7
Northern white-cedar	743.0	21.2	47.1	9.7	-39.8	38.2	-48.7	-	732.5
Tamarack	24.3	0.8	1.5	0.6	-2.1	0.8	-	-0.7	24.4
Oak-hickory	16.6	1.0	0.8	1.2	-1.4	1.6	-2.6	-	15.6
Elm-ash-soft maple	189.6	12.6	8.1	2.8	-11.8	11.7	-24.1	-3.1	174.1
Maple-birch	1,469.9	242.2	42.2	40.5	-54.8	270.1	-127.2	-	1,612.8
Aspen	617.1	90.9	33.7	24.7	-48.6	100.7	-84.4	-	633.4
Paper birch	115.8	14.7	8.2	1.3	-3.8	20.4	-3.0	-	133.2
Exotic	1.6	0.4	0.4	-	-	0.8	-	-	2.4
Nonstocked	1.6	0.5	0.4	0.1	-	1.0	-	-	2.6
All types	3,992.2	509.4	203.7	104.0	-210.3	606.8	-351.5	-15.9	4,231.6
Western upper peninsula									
Jack pine	99.3	16.2	2.9	2.6	-9.5	12.2	-19.6	-2.3	89.6
Red pine	74.3	27.5	13.3	6.6	-2.0	45.4	-1.6	-	118.1
White pine	96.1	19.0	0.8	1.7	-3.1	18.4	-7.0	-6.1	101.4
Balsam fir	393.5	83.8	23.2	12.8	-29.8	90.0	-27.7	-5.5	450.3
White spruce	49.9	20.1	2.2	3.3	-4.9	20.7	-4.3	-	66.3
Black spruce	156.2	17.5	8.8	4.5	-19.7	11.1	-8.8	-1.0	157.5
Northern white-cedar	293.3	11.1	8.8	1.9	-22.9	-1.1	-9.6	-	282.6
Tamarack	16.4	2.1	1.2	0.8	-1.2	2.9	-1.8	-1.2	16.3
Oak-hickory	29.6	1.2	1.1	1.0	-1.5	1.8	-6.5	-0.5	24.4
Elm-ash-soft maple	187.9	15.0	7.8	5.9	-13.7	15.0	-35.6	-2.9	164.4
Maple-birch	3,190.5	747.4	101.6	107.3	-158.5	797.8	-204.8	-	3,783.5
Aspen	693.9	168.3	48.1	57.5	-56.5	217.4	-143.4	-12.1	755.8
Paper birch	179.3	19.9	7.3	2.3	-9.0	20.5	-11.0	-	188.8
Exotic	-	-	-	-	-	-	-	-	-
Nonstocked	0.5	0.1	0.5	0.1	-	0.7	-	-	1.2
All types	5,460.7	1,149.2	227.6	208.3	-332.3	1,252.8	-481.7	-31.6	6,200.2

(Table 8 continued on next page)

(Table 8 continued)

Forest type	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Northern lower peninsula									
Jack pine	332.9	83.0	27.9	22.3	-26.9	106.3	-36.0	-	403.2
Red pine	498.2	152.4	109.5	31.2	-8.0	285.1	-19.8	-	763.5
White pine	91.5	24.6	3.6	5.9	-1.6	32.5	-1.3	-	122.7
Balsam fir	48.6	9.0	1.2	3.2	-4.7	8.7	-8.1	-10.4	38.8
White spruce	14.6	6.5	1.7	2.1	-1.0	9.3	-0.6	-	23.3
Black spruce	13.1	4.0	0.5	0.4	-2.1	2.8	-	-	15.9
Northern white-cedar	467.7	72.7	27.5	21.0	-41.7	79.5	-18.9	-	528.3
Tamarack	11.5	2.5	3.4	0.2	-0.6	5.5	-	-0.5	16.5
Oak-hickory	1,018.9	175.0	27.4	44.7	-49.1	198.0	-200.8	-29.1	987.0
Elm-ash-soft maple	398.2	70.9	22.8	9.2	-16.4	86.5	-32.3	-14.9	437.5
Maple-birch	2,098.8	396.2	83.1	81.6	-69.2	491.7	-112.0	-	2,478.5
Aspen	1,633.8	307.9	95.4	102.9	-107.1	399.1	-378.8	-32.9	1,621.2
Paper birch	128.8	29.8	5.8	2.3	-6.4	31.5	-3.3	-15.1	141.9
Exotic	28.7	9.0	5.9	1.4	-0.4	15.9	-	-	44.6
Nonstocked	1.5	0.8	-	-	-	0.8	-	-0.1	2.2
All types	6,786.8	1,344.3	415.7	328.4	-335.2	1,753.2	-811.9	-103.0	7,625.1
Southern lower peninsula									
Jack pine	11.3	1.1	1.1	0.2	-0.3	2.1	-	-	13.4
Red pine	43.8	13.5	1.9	1.5	-	16.9	-3.5	-	57.2
White pine	37.3	10.0	0.4	0.1	-1.2	9.3	-	-	46.6
Balsam fir	-	-	-	-	-	-	-	-	-
White spruce	4.3	2.7	0.6	-	-	3.3	-	-	7.6
Black spruce	-	-	-	-	-	-	-	-	-
Northern white-cedar	3.5	0.1	0.8	1.0	-	1.9	-0.3	-	5.1
Tamarack	0.9	0.3	0.9	0.1	-	1.3	-	-	2.2
Oak-hickory	821.2	92.5	7.9	39.8	-23.1	117.1	-257.7	-25.6	655.0
Elm-ash-soft maple	473.2	88.1	22.7	11.0	-13.9	107.9	-42.7	-18.1	520.3
Maple-birch	865.3	154.2	39.3	40.4	-26.4	207.5	-60.5	-	1,012.3
Aspen	132.6	30.8	11.4	6.1	-5.6	42.7	-8.3	-14.6	152.4
Paper birch	4.4	1.3	-	-	-	1.3	-	-	5.7
Exotic	16.7	4.2	1.5	0.1	-	5.8	-	-	22.5
Nonstocked	-	0.1	0.2	0.1	-	0.4	-	-	0.4
All types	2,414.5	398.9	88.7	100.4	-70.5	517.5	-373.0	-58.3	2,500.7

1/ Figures have been adjusted from those published after the 1980 survey to conform to changes in survey definitions and procedures.
2/ Includes growth on ingrowth, mortality and removals.

Table 9.--Growing stock volume and periodic growth on timberland by species group and component of growth, Michigan, 1980-1987

(In million cubic feet)

All units

Species group	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	637.7	123.6	32.8	33.0	-55.5	133.9	-93.0	-8.8	669.8
Red pine	784.2	235.6	186.6	62.5	-1.7	483.0	-66.5	-3.9	1,196.8
White pine	559.7	130.3	6.8	9.8	-5.7	141.2	-19.6	-10.2	671.1
White spruce	368.9	191.2	19.5	25.9	-13.6	223.0	-17.5	-5.1	569.3
Black spruce	354.1	27.5	14.7	8.6	-61.7	-10.9	-20.1	-3.7	319.4
Balsam fir	789.2	155.2	58.9	27.0	-96.6	144.5	-48.9	-13.8	871.0
Hemlock	509.2	83.8	2.7	11.8	-14.7	83.6	-36.0	-1.2	555.6
Tamarack	104.8	7.5	8.5	3.6	-15.0	4.6	-4.3	-1.8	103.3
Eastern redcedar	1.0	0.1	-	-	-	0.1	-	-	1.1
Northern white-cedar	1,415.5	104.5	72.6	15.4	-25.9	166.6	-36.4	-3.4	1,542.3
Other softwoods	50.0	21.5	9.4	6.4	-0.1	37.2	-	-	87.2
Total	5,574.3	1,080.8	412.5	204.0	-290.5	1,406.8	-342.3	-51.9	6,586.9
Hardwoods									
Select white oak	463.9	67.6	5.4	13.6	-1.1	85.5	-72.1	-11.2	466.1
Select red oak	1,132.9	178.3	12.0	37.3	-50.9	176.7	-180.8	-27.8	1,101.0
Other red oak	240.9	28.6	0.7	9.1	-19.7	18.7	-59.9	-3.9	195.8
Select hickory	61.2	7.9	2.4	1.6	-1.6	10.3	-4.2	-1.2	66.1
Other hickory	51.3	7.1	3.0	1.0	-2.0	9.1	-3.3	-1.0	56.1
Basswood	634.9	166.0	7.8	18.3	-14.1	178.0	-31.9	-1.7	779.3
Beech	319.9	59.9	6.5	11.8	-6.3	71.9	-39.1	-0.6	352.1
Yellow birch	435.0	50.9	5.3	12.5	-52.6	16.1	-30.3	-1.0	419.8
Hard maple	2,483.7	493.4	113.4	107.7	-62.2	652.3	-236.8	-1.1	2,898.1
Soft maple	2,199.4	371.0	104.8	51.8	-72.7	454.9	-148.8	-24.5	2,481.0
Elm	232.3	52.0	4.0	18.6	-24.3	50.3	-60.2	-2.3	220.1
Black ash	256.8	24.6	30.8	7.6	-25.3	37.7	-10.7	-4.7	279.1
White & green ash	432.0	86.5	28.6	13.8	-10.0	118.9	-35.7	-7.5	507.7
Sycamore	14.8	2.3	-	0.2	-0.8	1.7	-1.4	-0.3	14.8
Cottonwood	67.5	14.1	-	1.9	-0.2	15.8	-11.2	-2.4	69.7
Willow	32.3	4.7	0.3	0.8	-1.0	4.8	-4.2	-0.8	32.1
Hackberry	0.8	0.1	-	0.1	-0.3	-0.1	-	-0.1	0.6
Balsam poplar	271.2	68.0	4.4	10.4	-30.9	51.9	-14.6	-4.9	303.6
Bigtooth aspen	925.8	209.4	25.7	81.0	-78.6	237.5	-266.6	-17.3	879.4
Quaking aspen	1,639.7	315.1	101.2	115.7	-165.4	366.6	-368.6	-23.8	1,613.9
Paper birch	780.6	61.2	38.4	9.8	-27.7	81.7	-50.8	-15.1	796.4
River birch	0.4	-	-	-	-	-	-	-	0.4
Black cherry	316.5	40.8	21.1	8.4	-6.5	63.8	-27.6	-2.7	350.0
Black walnut	27.0	1.7	0.9	0.5	-1.2	1.9	-2.3	-0.8	25.8
Butternut	4.3	0.7	1.3	0.4	-	2.4	-0.5	-	6.2
Yellow poplar	16.6	2.0	-	0.4	-	2.4	-4.1	-0.1	14.8
Other hardwoods	38.2	7.1	5.2	2.8	-2.4	12.7	-10.1	-0.1	40.7
Total	13,079.9	2,321.0	523.2	537.1	-657.8	2,723.5	-1,675.8	-156.9	13,970.7
All species	18,654.2	3,401.8	935.7	741.1	-948.3	4,130.3	-2,018.1	-208.8	20,557.6

(Table 9 continued on next page)

(Table 9 continued)

Eastern upper peninsula

Species group	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	184.3	15.9	3.1	5.0	-12.9	11.1	-27.1	-5.3	163.0
Red pine	127.0	32.0	32.8	9.9	-0.2	74.5	-16.4	-	185.1
White pine	152.0	33.0	0.8	3.9	-1.8	35.9	-11.5	-1.2	175.2
White spruce	132.4	56.0	6.6	7.2	-4.2	65.6	-8.9	-0.6	188.5
Black spruce	173.2	10.9	7.8	3.0	-26.9	-5.2	-12.4	-1.0	154.6
Balsam fir	270.8	41.0	24.2	9.6	-30.0	44.8	-24.4	-4.9	286.3
Hemlock	141.2	17.1	0.7	3.6	-3.7	17.7	-16.4	-0.5	142.0
Tamarack	40.8	0.9	2.4	1.4	-4.4	0.3	-1.9	-0.1	39.1
Eastern redcedar	-	-	-	-	-	-	-	-	-
Northern white-cedar	640.0	7.1	37.4	2.4	-10.3	36.6	-24.4	-0.3	651.9
Other softwoods	1.8	0.4	0.4	-	-	0.8	-	-	2.6
Total	1,863.5	214.3	116.2	46.0	-94.4	282.1	-143.4	-13.9	1,988.3
Hardwoods									
Select white oak	0.3	-	-	-	-	-	-	-	0.3
Select red oak	19.6	2.5	0.6	0.1	-0.6	2.6	-1.2	-	21.0
Other red oak	-	-	-	-	-	-	-	-	-
Select hickory	-	-	-	-	-	-	-	-	-
Other hickory	-	-	-	-	-	-	-	-	-
Basswood	46.8	8.5	0.9	1.0	-0.6	9.8	-5.8	-	50.8
Beech	142.2	38.3	4.5	6.4	-2.4	46.8	-21.1	-	167.9
Yellow birch	96.5	8.1	0.3	1.6	-10.7	-0.7	-9.4	-0.4	86.0
Hard maple	486.9	76.9	16.8	17.3	-10.7	100.3	-55.0	-	532.2
Soft maple	451.6	54.4	23.1	6.0	-17.1	66.4	-21.2	-0.3	496.5
Elm	33.0	6.1	0.2	1.8	-3.1	5.0	-9.2	-0.5	28.3
Black ash	47.3	1.3	8.1	0.8	-5.6	4.6	-1.4	-	50.5
White & green ash	22.0	2.2	1.2	0.5	-0.4	3.5	-0.6	-	24.9
Sycamore	-	-	-	-	-	-	-	-	-
Cottonwood	0.3	0.3	-	-	-	0.3	-	-	0.6
Willow	-	-	-	-	-	-	-	-	-
Hackberry	-	-	-	-	-	-	-	-	-
Balsam poplar	111.6	26.7	2.1	4.7	-13.6	19.9	-6.8	-0.6	124.1
Bigtooth aspen	60.7	12.5	0.8	2.4	-4.1	11.6	-9.4	-	62.9
Quaking aspen	331.1	43.5	16.2	12.5	-37.8	34.4	-48.8	-0.1	316.6
Paper birch	232.3	9.8	11.8	2.7	-8.3	16.0	-17.5	-0.1	230.7
River birch	-	-	-	-	-	-	-	-	-
Black cherry	46.3	4.0	0.9	0.2	-0.9	4.2	-0.6	-	49.9
Black walnut	-	-	-	-	-	-	-	-	-
Butternut	-	-	-	-	-	-	-	-	-
Yellow poplar	-	-	-	-	-	-	-	-	-
Other hardwoods	0.2	-	-	-	-	-	-0.1	-	0.1
Total	2,128.7	295.1	87.5	58.0	-115.9	324.7	-208.1	-2.0	2,243.3
All species	3,992.2	509.4	203.7	104.0	-210.3	606.8	-351.5	-15.9	4,231.6

(Table 9 continued on next page)

(Table 9 continued)

Western upper peninsula

Species group	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	106.5	15.6	3.6	2.5	-11.6	10.1	-20.1	-1.9	94.6
Red pine	73.8	27.9	16.4	11.2	-0.2	55.3	-14.4	-1.9	112.8
White pine	169.2	37.0	0.5	1.9	-1.4	38.0	-7.0	-7.2	193.0
White spruce	198.7	115.5	11.0	15.5	-6.1	135.9	-8.4	-3.6	322.6
Black spruce	144.9	12.4	5.5	4.7	-26.6	-4.0	-7.4	-2.3	131.2
Balsam fir	414.2	88.7	29.3	13.9	-50.3	81.6	-18.2	-4.8	472.8
Hemlock	297.0	53.4	0.8	7.1	-10.3	51.0	-19.1	-0.4	328.5
Tamarack	33.7	2.3	2.5	1.1	-3.7	2.2	-2.4	-1.0	32.5
Eastern redcedar	0.1	-	-	-	-	-	-	-	0.1
Northern white-cedar	368.9	18.1	8.2	0.8	-8.6	18.5	-6.0	-0.2	381.2
Other softwoods	0.3	0.2	-	-	-	0.2	-	-	0.5
Total	1,807.3	371.1	77.8	58.7	-118.8	388.8	-103.0	-23.3	2,069.8
Hardwoods									
Select white oak	0.8	0.1	-	-	-	0.1	-	-	0.9
Select red oak	76.0	14.6	0.8	2.0	-4.1	13.3	-3.9	-0.1	85.3
Other red oak	-	-	-	-	-	-	-	-	-
Select hickory	-	-	-	-	-	-	-	-	-
Other hickory	-	-	-	-	-	-	-	-	-
Basswood	191.1	70.0	3.7	5.3	-5.1	73.9	-9.1	-0.1	255.8
Beech	0.4	0.1	-	0.1	-	0.2	-0.4	-	0.2
Yellow birch	299.2	37.6	3.9	9.8	-38.6	12.7	-20.4	-0.5	291.0
Hard maple	1,244.0	276.4	59.0	44.9	-30.6	349.7	-97.2	-	1,496.5
Soft maple	589.2	113.5	27.1	8.6	-22.4	126.8	-21.4	-	694.6
Elm	124.6	24.3	1.0	9.0	-16.5	17.8	-32.0	-0.7	109.7
Black ash	94.5	7.1	5.5	2.2	-10.1	4.7	-2.8	-	96.4
White & green ash	29.5	10.6	2.0	0.8	-1.3	12.1	-1.3	-	40.3
Sycamore	-	-	-	-	-	-	-	-	-
Cottonwood	0.2	0.1	-	-	-	0.1	-	-0.1	0.2
Willow	-	-	-	-	-	-	-	-	-
Hackberry	-	-	-	-	-	-	-	-	-
Balsam poplar	50.5	13.2	1.0	2.8	-4.6	12.4	-4.5	-1.5	56.9
Bigtooth aspen	100.6	33.9	1.4	11.2	-8.7	37.8	-25.9	-4.1	108.4
Quaking aspen	553.8	154.2	29.7	49.9	-61.7	172.1	-141.4	-1.2	583.3
Paper birch	246.5	15.3	9.6	2.5	-8.6	18.8	-17.7	-	247.6
River birch	0.1	-	-	-	-	-	-	-	0.1
Black cherry	52.3	7.1	5.1	0.5	-1.2	11.5	-0.7	-	63.1
Black walnut	-	-	-	-	-	-	-	-	-
Butternut	-	-	-	-	-	-	-	-	-
Yellow poplar	-	-	-	-	-	-	-	-	-
Other hardwoods	0.1	-	-	-	-	-	-	-	0.1
Total	3,653.4	778.1	149.8	149.6	-213.5	864.0	-378.7	-8.3	4,130.4
All species	5,460.7	1,149.2	227.6	208.3	-332.3	1,252.8	-481.7	-31.6	6,200.2

(Table 9 continued on next page)

(Table 9 continued)

Northern lower peninsula

Species group	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	333.7	90.5	26.1	25.5	-30.3	111.8	-45.5	-1.4	398.6
Red pine	532.3	158.8	136.0	39.7	-1.3	333.2	-31.1	-2.0	832.4
White pine	171.1	42.6	4.5	2.9	-1.3	48.7	-1.1	-1.2	217.5
White spruce	36.0	17.3	1.9	3.2	-3.3	19.1	-0.2	-0.9	54.0
Black spruce	36.0	4.2	1.4	0.9	-8.2	-1.7	-0.3	-0.4	33.6
Balsam fir	104.0	25.5	5.4	3.5	-16.3	18.1	-6.3	-4.1	111.7
Hemlock	63.9	12.0	1.2	1.1	-0.7	13.6	-0.5	-0.3	76.7
Tamarack	26.5	3.6	1.9	1.0	-6.3	0.2	-	-0.6	26.1
Eastern redcedar	0.4	-	-	-	-	-	-	-	0.4
Northern white-cedar	402.9	79.3	26.4	11.3	-7.0	110.0	-6.0	-2.9	504.0
Other softwoods	24.4	14.9	7.0	4.2	-0.1	26.0	-	-	50.4
Total	1,731.2	448.7	211.8	93.3	-74.8	679.0	-91.0	-13.8	2,305.4
Hardwoods									
Select white oak	187.6	39.7	3.8	6.1	-0.8	48.8	-21.6	-4.5	210.3
Select red oak	706.4	115.1	8.7	21.1	-37.2	107.7	-92.4	-17.2	704.5
Other red oak	135.6	17.9	0.7	5.8	-11.5	12.9	-29.8	-1.2	117.5
Select hickory	0.8	-	-	-	-	-	-	-	0.8
Other hickory	1.4	0.1	0.7	0.1	-	0.9	-0.2	-	2.1
Basswood	312.1	72.3	2.4	8.2	-6.8	76.1	-11.6	-1.0	375.6
Beech	128.1	16.7	2.0	2.4	-2.2	18.9	-8.0	-0.3	138.7
Yellow birch	32.3	4.1	0.8	1.1	-3.3	2.7	-0.5	-	34.5
Hard maple	641.7	121.8	32.6	38.7	-18.0	175.1	-71.7	-0.7	744.4
Soft maple	765.5	138.2	41.4	23.4	-20.1	182.9	-54.4	-14.9	879.1
Elm	25.5	6.2	0.3	3.1	-2.4	7.2	-8.7	-0.1	23.9
Black ash	86.0	11.6	11.7	3.9	-7.5	19.7	-4.9	-3.5	97.3
White & green ash	178.3	38.5	6.4	3.7	-4.6	44.0	-11.1	-3.6	207.6
Sycamore	0.8	0.2	-	-	-	0.2	-	-0.2	0.8
Cottonwood	9.8	2.6	-	0.2	-	2.8	-2.2	-0.2	10.2
Willow	6.3	1.1	-	0.1	-0.3	0.9	-	-	7.2
Hackberry	-	-	-	-	-	-	-	-	-
Balsam poplar	98.7	24.7	1.0	1.9	-10.8	16.8	-3.3	-1.7	110.5
Bigtooth aspen	685.0	142.9	22.3	63.1	-60.1	168.2	-216.7	-8.1	628.4
Quaking aspen	671.6	97.1	47.9	47.0	-61.8	130.2	-167.9	-17.4	616.5
Paper birch	281.0	32.0	13.4	3.7	-10.5	38.6	-13.8	-13.9	291.9
River birch	0.3	-	-	-	-	-	-	-	0.3
Black cherry	97.6	11.8	6.9	1.3	-2.4	17.6	-1.1	-0.7	113.4
Black walnut	0.2	-	-	-	-	-	-	-	0.2
Butternut	0.3	-	-	-	-	-	-0.1	-	0.2
Yellow poplar	-	-	-	-	-	-	-	-	-
Other hardwoods	2.7	1.0	0.9	0.2	-0.1	2.0	-0.9	-	3.8
Total	5,055.6	895.6	203.9	235.1	-260.4	1,074.2	-720.9	-89.2	5,319.7
All species	6,786.8	1,344.3	415.7	328.4	-335.2	1,753.2	-811.9	-103.0	7,625.1

(Table 9 continued on next page)

(Table 9 continued)

Southern lower peninsula

Species group	1980 growing stock volume 1/	Components							1987 growing stock volume
		Survivor growth	Ingrowth	Other growth 2/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	13.2	1.6	-	-	-0.7	0.9	-0.3	-0.2	13.6
Red pine	51.1	16.9	1.4	1.7	-	20.0	-4.6	-	66.5
White pine	67.4	17.7	1.0	1.1	-1.2	18.6	-	-0.6	85.4
White spruce	1.8	2.4	-	-	-	2.4	-	-	4.2
Black spruce	-	-	-	-	-	-	-	-	-
Balsam fir	0.2	-	-	-	-	-	-	-	0.2
Hemlock	7.1	1.3	-	-	-	1.3	-	-	8.4
Tamarack	3.8	0.7	1.7	0.1	-0.6	1.9	-	-0.1	5.6
Eastern redcedar	0.5	0.1	-	-	-	0.1	-	-	0.6
Northern white-cedar	3.7	-	0.6	0.9	-	1.5	-	-	5.2
Other softwoods	23.5	6.0	2.0	2.2	-	10.2	-	-	33.7
Total	172.3	46.7	6.7	6.0	-2.5	56.9	-4.9	-0.9	223.4
Hardwoods									
Select white oak	275.2	27.8	1.6	7.5	-0.3	36.6	-50.5	-6.7	254.6
Select red oak	330.9	46.1	1.9	14.1	-9.0	53.1	-83.3	-10.5	290.2
Other red oak	105.3	10.7	-	3.3	-8.2	5.8	-30.1	-2.7	78.3
Select hickory	60.4	7.9	2.4	1.6	-1.6	10.3	-4.2	-1.2	65.3
Other hickory	49.9	7.0	2.3	0.9	-2.0	8.2	-3.1	-1.0	54.0
Basswood	84.9	15.2	0.8	3.8	-1.6	18.2	-5.4	-0.6	97.1
Beech	49.2	4.8	-	2.9	-1.7	6.0	-9.6	-0.3	45.3
Yellow birch	7.0	1.1	0.3	-	-	1.4	-	-0.1	8.3
Hard maple	111.1	18.3	5.0	6.8	-2.9	27.2	-12.9	-0.4	125.0
Soft maple	393.1	64.9	13.2	13.8	-13.1	78.8	-51.8	-9.3	410.8
Elm	49.2	15.4	2.5	4.7	-2.3	20.3	-10.3	-1.0	58.2
Black ash	29.0	4.6	5.5	0.7	-2.1	8.7	-1.6	-1.2	34.9
White & green ash	202.2	35.2	19.0	8.8	-3.7	59.3	-22.7	-3.9	234.9
Sycamore	14.0	2.1	-	0.2	-0.8	1.5	-1.4	-0.1	14.0
Cottonwood	57.2	11.1	-	1.7	-0.2	12.6	-9.0	-2.1	58.7
Willow	26.0	3.6	0.3	0.7	-0.7	3.9	-4.2	-0.8	24.9
Hackberry	0.8	0.1	-	0.1	-0.3	-0.1	-	-0.1	0.6
Balsam poplar	10.4	3.4	0.3	1.0	-1.9	2.8	-	-1.1	12.1
Bigtooth aspen	79.5	20.1	1.2	4.3	-5.7	19.9	-14.6	-5.1	79.7
Quaking aspen	83.2	20.3	7.4	6.3	-4.1	29.9	-10.5	-5.1	97.5
Paper birch	20.8	4.1	3.6	0.9	-0.3	8.3	-1.8	-1.1	26.2
River birch	-	-	-	-	-	-	-	-	-
Black cherry	120.3	17.9	8.2	6.4	-2.0	30.5	-25.2	-2.0	123.6
Black walnut	26.8	1.7	0.9	0.5	-1.2	1.9	-2.3	-0.8	25.6
Butternut	4.0	0.7	1.3	0.4	-	2.4	-0.4	-	6.0
Yellow poplar	16.6	2.0	-	0.4	-	2.4	-4.1	-0.1	14.8
Other hardwoods	35.2	6.1	4.3	2.6	-2.3	10.7	-9.1	-0.1	36.7
Total	2,242.2	352.2	82.0	94.4	-68.0	460.6	-368.1	-57.4	2,277.3
All species	2,414.5	398.9	88.7	100.4	-70.5	517.5	-373.0	-58.3	2,500.7

1/ Figures have been adjusted from those published after the 1980 survey to conform to changes in survey definitions and procedures.
2/ Includes growth on ingrowth, mortality and removals.

Table 10.--Sawtimber volume and periodic growth on timberland by forest type and component of growth, Michigan, 1980-1987

(In million board feet 1/)

Forest tyep	1980 sawtimber volume 2/	Components							1987 sawtimber volume
		Survivor growth	Ingrowth	Other growth 3/	Mortality	Net growth	Removals	Other removals	
Jack pine	1,324.5	222.2	367.0	145.1	-107.4	626.9	-270.9	-36.9	1,643.6
Red pine	1,546.8	323.6	640.0	128.7	-25.4	1,066.9	-134.5	-	2,479.2
White pine	1,165.0	260.4	89.5	38.9	-18.9	369.9	-42.7	-24.4	1,467.8
Balsam fir	1,453.8	361.2	246.7	96.5	-86.3	618.1	-151.6	-57.5	1,862.8
White spruce	265.3	74.3	70.8	33.7	-22.8	156.0	-35.1	-	386.2
Black spruce	492.4	89.1	83.3	31.3	-39.3	164.4	-35.9	-5.3	615.6
Northern white-cedar	2,732.0	278.6	296.7	102.3	-215.5	462.1	-216.1	-	2,978.0
Tamarack	89.9	13.5	19.9	5.2	-4.6	34.0	-6.9	-5.0	112.0
Oak-hickory	4,897.9	492.4	665.7	388.4	-128.4	1,418.1	-1,659.9	-141.4	4,514.7
Elm-ash-soft maple	3,224.9	386.4	420.7	131.0	-138.6	799.5	-430.9	-141.4	3,452.1
Maple-birch	20,539.5	3,165.1	2,961.7	810.7	-870.7	6,066.8	-1,036.8	-	25,569.5
Aspen	5,506.2	989.7	1,400.0	959.1	-443.9	2,904.9	-1,990.5	-132.6	6,288.0
Paper birch	570.0	103.7	166.2	41.7	-36.9	274.7	-56.2	-7.3	781.2
Exotic	59.7	11.4	26.5	3.2	-1.9	39.2	-	-	98.9
Nonstocked	8.1	2.6	3.1	0.5	-	6.2	-	-0.1	14.2
All types	43,876.0	6,774.2	7,457.8	2,916.3	-2,140.6	15,007.7	-6,068.0	-551.9	52,263.8

1/ International 1/4 inch rule
2/ Figures have been adjusted from those published after the 1980 survey to conform to changes in survey definitions and procedures.
3/ Includes growth on ingrowth, mortality and removals.

Table 11.--Sawtimber volume and periodic growth on timberland by species group and component of growth, Michigan, 1980-1987

(In million board feet 1/)

Species group	1980 sawtimber volume 2/	Components							1987 sawtimber volume
		Survivor growth	Ingrowth	Other growth 3/	Mortality	Net growth	Removals	Other removals	
Softwoods									
Jack pine	1,331.8	199.9	390.2	144.1	-132.7	601.5	-279.2	-29.0	1,625.1
Red pine	1,975.2	409.3	769.1	194.4	-2.5	1,370.3	-321.2	-19.2	3,005.1
White pine	2,681.0	598.1	86.0	59.2	-24.0	719.3	-108.3	-39.6	3,252.4
White spruce	1,299.5	582.3	269.0	150.7	-45.3	956.7	-60.1	-19.1	2,177.0
Black spruce	358.8	47.9	50.1	33.2	-81.9	49.3	-29.6	-5.3	373.2
Balsam fir	1,068.4	271.7	296.1	107.8	-150.3	525.3	-71.7	-20.1	1,501.9
Hemlock	2,069.7	276.7	34.8	45.7	-62.5	294.7	-131.4	-6.2	2,226.8
Tamarack	194.7	21.7	23.0	8.0	-20.6	32.1	-17.9	-5.3	203.6
Eastern redcedar	3.7	1.0	-	-	-	1.0	-	-	4.7
Northern white-cedar	2,955.6	347.4	373.1	78.3	-85.3	713.5	-128.3	-25.5	3,515.3
Other softwoods	71.5	15.5	34.7	5.7	-	55.9	-	-0.3	127.1
Total	14,009.9	2,771.5	2,326.1	827.1	-605.1	5,319.6	-1,147.7	-169.6	18,012.2
Hardwoods									
Select white oak	1,507.1	123.6	99.2	51.3	-3.8	270.3	-265.5	-36.0	1,475.9
Select red oak	3,293.9	446.1	413.8	193.8	-74.7	979.0	-775.7	-74.6	3,422.6
Other red oak	688.9	59.0	76.4	46.0	-40.9	140.5	-238.0	-12.6	578.8
Select hickory	156.7	14.0	23.6	2.7	-4.7	35.6	-9.5	-3.4	179.4
Other hickory	132.0	9.4	27.3	3.0	-4.5	35.2	-9.4	-3.0	154.8
Basswood	1,534.4	282.6	344.2	78.7	-38.3	667.2	-66.9	-5.3	2,129.4
Beech	1,152.2	132.6	99.0	31.4	-26.3	236.7	-113.2	-0.8	1,274.9
Yellow birch	1,422.6	120.1	61.6	36.1	-192.9	24.9	-100.9	-4.7	1,341.9
Hard maple	5,987.4	923.6	833.0	233.9	-140.8	1,849.7	-384.7	-5.0	7,447.4
Soft maple	4,551.6	540.3	953.8	194.3	-158.6	1,529.8	-410.4	-69.8	5,601.2
Elm	514.8	66.5	61.9	42.3	-80.7	90.0	-102.5	-5.2	497.1
Black ash	338.6	21.0	72.8	9.2	-35.4	67.6	-17.8	-8.8	379.6
White & green ash	1,084.9	128.1	227.8	41.9	-23.5	374.3	-96.8	-14.9	1,347.5
Sycamore	57.1	10.0	1.7	1.6	-3.8	9.5	-5.5	-1.4	59.7
Cottonwood	223.6	29.3	25.8	12.9	-	68.0	-45.4	-8.1	238.1
Willow	115.1	13.4	9.1	3.0	-2.8	22.7	-12.8	-3.4	121.6
Hackberry	2.2	0.2	-	0.3	-1.3	-0.8	-	-	1.4
Balsam poplar	741.1	143.9	97.7	38.7	-89.0	191.3	-55.3	-12.8	864.3
Bigtooth aspen	1,697.4	261.8	522.3	410.6	-181.1	1,013.6	-816.9	-31.4	1,862.7
Quaking aspen	2,994.8	493.3	755.1	565.8	-372.2	1,442.0	-1,181.2	-59.6	3,196.0
Paper birch	838.8	102.8	254.8	45.6	-39.8	363.4	-85.6	-12.0	1,104.6
River birch	0.8	-	-	-	-	-	-	-	0.8
Black cherry	618.6	62.5	142.7	32.2	-15.3	222.1	-84.3	-5.7	750.7
Black walnut	91.3	7.2	14.4	2.3	-2.9	21.0	-7.9	-3.0	101.4
Butternut	11.3	0.9	3.6	0.9	-	5.4	-2.8	-0.2	13.7
Yellow poplar	66.5	5.1	3.9	2.8	-	11.8	-21.8	-0.3	56.2
Other hardwoods	42.4	5.4	6.2	7.9	-2.2	17.3	-9.5	-0.3	49.9
Total	29,866.1	4,002.7	5,131.7	2,089.2	-1,535.5	9,688.1	-4,920.3	-382.3	34,251.6
All species	43,876.0	6,774.2	7,457.8	2,916.3	-2,140.6	15,007.7	-6,068.0	-551.9	52,263.8

1/ International 1/4 inch rule
2/ Figures have been adjusted from those published after the 1980 survey to conform to changes in survey definitions and procedures.
3/ Includes growth on ingrowth, mortality and removals.

Table 12.--Net volume of growing stock on timberland by species group and forest type, Michigan, 1987

(In million cubic feet)

Species group	All types	Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	669.8	491.3	63.4	4.9	0.8	0.7	21.8	-
Red pine	1,196.8	76.5	912.2	30.7	1.9	0.6	8.8	2.3
White pine	671.1	14.6	39.2	214.6	35.1	8.8	20.2	42.0
White spruce	569.3	0.6	4.1	12.5	147.5	76.6	8.2	43.9
Black spruce	319.4	5.3	2.6	5.5	33.5	1.7	165.7	64.1
Balsam fir	871.0	1.7	5.9	7.7	244.5	9.9	25.9	112.2
Hemlock	555.6	-	1.6	2.2	9.5	0.1	1.8	14.4
Tamarack	103.3	0.1	0.3	0.6	5.4	0.4	14.1	30.9
Eastern redcedar	1.1	-	-	-	-	-	-	-
Northern white-cedar	1,542.3	0.3	1.3	3.9	71.8	11.8	37.7	996.8
Other softwoods	87.2	-	4.0	13.4	0.1	3.7	0.1	2.8
Total	6,586.9	590.4	1,034.6	296.0	550.1	114.3	304.3	1,309.4
Hardwoods								
Select white oak	466.1	2.2	7.2	5.0	-	-	-	-
Select red oak	1,101.0	37.7	16.0	8.7	0.5	-	-	-
Other red oak	195.8	8.8	8.1	-	-	-	-	-
Select hickory	66.1	-	-	-	-	-	-	-
Other hickory	56.1	0.3	-	-	-	-	-	-
Basswood	779.3	0.4	0.8	0.2	0.4	-	-	1.9
Beech	352.1	-	0.3	0.3	0.2	0.1	-	-
Yellow birch	419.8	-	-	0.4	7.1	0.1	0.7	11.3
Hard maple	2,898.1	0.2	2.8	2.5	5.8	0.6	1.0	4.6
Soft maple	2,481.0	5.6	13.1	15.2	41.7	2.9	5.9	47.9
Elm	220.1	0.1	-	0.2	2.2	0.2	-	1.2
Black ash	279.1	-	-	-	5.1	-	2.3	30.4
White & green ash	507.7	-	0.2	-	0.2	-	-	2.3
Sycamore	14.8	-	-	-	-	-	-	-
Cottonwood	69.7	-	-	-	-	-	-	-
Willow	32.1	-	-	-	-	-	-	-
Hackberry	0.6	-	-	-	-	-	-	-
Balsam poplar	303.6	-	0.2	0.8	15.9	3.5	1.9	32.1
Bigtooth aspen	879.4	3.5	14.1	3.9	0.6	0.3	2.0	5.4
Quaking aspen	1,613.9	16.7	18.2	12.8	46.3	15.2	27.1	18.9
Paper birch	796.4	0.9	4.6	15.6	40.7	2.0	12.4	81.8
River birch	0.4	-	-	-	-	-	-	0.3
Black cherry	350.0	0.4	3.6	1.5	5.1	1.8	0.5	0.6
Black walnut	25.8	-	0.2	-	-	-	-	-
Butternut	6.2	-	-	-	-	-	-	0.4
Yellow poplar	14.8	-	0.5	-	-	-	-	-
Other hardwoods	40.7	0.2	-	-	-	-	-	-
Total	13,970.7	77.0	89.9	67.1	171.8	26.7	53.8	239.1
All species	20,557.6	667.4	1,124.5	363.1	721.9	141.0	358.1	1,548.5

(Table 12 continued on next page)

(Table 12 continued)

Species group	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Nonstocked
Softwoods								
Jack pine	0.8	44.3	-	14.9	22.7	2.6	0.9	0.7
Red pine	0.2	44.2	3.3	40.0	58.2	5.7	11.2	1.0
White pine	1.6	35.2	20.3	156.3	70.2	10.2	2.5	0.3
White spruce	0.1	0.7	15.4	126.9	114.7	18.1	-	-
Black spruce	5.8	0.2	7.1	10.6	14.8	2.4	-	0.1
Balsam fir	2.4	1.0	35.0	208.9	185.9	29.6	-	0.4
Hemlock	-	1.5	18.4	490.1	11.8	4.2	-	-
Tamarack	36.0	-	5.6	2.5	5.0	2.1	-	0.3
Eastern redcedar	-	0.6	-	0.5	-	-	-	-
Northern white-cedar	7.5	0.5	85.2	153.5	134.7	37.0	0.1	0.2
Other softwoods	-	1.6	0.4	13.8	0.9	-	46.4	-
Total	54.4	129.8	190.7	1,218.0	618.9	111.9	61.1	3.0
Hardwoods								
Select white oak	-	335.9	24.5	69.2	21.3	0.8	-	-
Select red oak	-	638.5	14.3	242.7	134.4	7.0	1.1	0.1
Other red oak	-	157.3	2.5	15.0	3.8	-	0.3	-
Select hickory	-	38.3	2.6	24.7	0.5	-	-	-
Other hickory	-	30.0	0.6	25.0	-	0.2	-	
Basswood	-	9.0	24.7	716.0	18.9	6.4	0.6	
Beech	-	3.4	3.3	335.7	8.1	0.7	-	-
Yellow birch	-	0.7	18.8	372.3	6.2	2.1	0.1	-
Hard maple	-	5.6	13.3	2,796.1	52.7	12.5	0.4	-
Soft maple	0.1	118.9	473.3	1,403.2	306.3	45.7	0.6	0.6
Elm	-	1.9	42.8	158.1	11.6	1.3	0.1	0.4
Black ash	0.4	3.1	146.6	63.8	22.3	4.7	-	0.4
White & green ash	-	13.1	100.5	355.0	30.9	5.3	0.1	0.1
Sycamore	-	-	9.9	4.9	-	-	-	-
Cottonwood	-	3.4	36.3	23.3	6.7	-	-	-
Willow	-	1.6	22.0	7.0	1.5	-	-	-
Hackberry	-	-	0.6	-	-	-	-	-
Balsam poplar	1.2	0.7	18.8	26.2	193.0	8.0	1.0	0.3
Bigtooth aspen	-	101.0	8.1	201.8	527.1	11.1	0.5	-
Quaking aspen	1.4	25.3	62.6	383.0	949.9	33.3	2.8	0.4
Paper birch	1.9	11.2	40.3	155.3	212.2	216.8	-	0.7
River birch	-	-	-	0.1	-	-	-	-
Black cherry	-	32.4	24.8	240.9	35.5	1.7	0.8	0.4
Black walnut	-	15.3	3.4	6.9	-	-	-	-
Butternut	-	3.1	0.8	1.9	-	-	-	-
Yellow poplar	-	0.7	1.2	12.4	-	-	-	-
Other hardwoods	-	1.8	9.0	28.6	1.0	0.1	-	-
Total	5.0	1,552.2	1,105.6	7,669.1	2,543.9	357.7	8.4	3.4
All species	59.4	1,682.0	1,296.3	8,887.1	3,162.8	469.6	69.5	6.4

Table 13.--Net volume of sawtimber on timberland by species group and forest type, Michigan, 1987

(In million board feet) 1/

Species group	All types	Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	1,625.1	1,140.2	146.9	17.9	1.2	1.5	75.0	-
Red pine	3,005.1	295.3	1,951.1	152.8	9.5	1.4	37.2	13.4
White pine	3,252.4	66.3	169.5	1,055.1	180.1	40.3	104.8	219.5
White spruce	2,177.0	3.5	12.3	46.1	590.3	239.8	33.0	151.4
Black spruce	373.2	7.1	5.0	8.3	57.8	2.1	134.4	79.5
Balsam fir	1,501.9	6.5	10.9	16.1	432.3	20.5	43.6	105.3
Hemlock	2,226.8	-	4.3	9.0	33.2	0.4	5.7	51.0
Tamarack	203.6	-	1.0	2.8	17.6	1.3	17.8	52.0
Eastern redcedar	4.7	-	-	-	-	-	-	-
Northern white-cedar	3,515.3	-	1.4	9.2	219.6	31.0	106.8	1,905.7
Other softwoods	127.1	-	8.3	24.3	-	1.9	-	1.2
Total	18,012.2	1,518.9	2,310.7	1,341.6	1,541.6	340.2	558.3	2,579.0
Hardwoods								
Select white oak	1,475.9	6.9	25.6	20.0	-	-	-	-
Select red oak	3,422.6	83.8	57.7	21.5	1.2	-	-	-
Other red oak	578.8	15.9	23.5	-	-	-	-	-
Select hickory	179.4	-	-	-	-	-	-	-
Other hickory	154.8	1.4	-	-	-	-	-	-
Basswood	2,129.4	1.2	2.2	-	1.5	-	-	5.6
Beech	1,274.9	-	1.5	-	0.7	0.6	-	-
Yellow birch	1,341.9	-	-	0.9	25.1	-	1.7	33.9
Hard maple	7,447.4	-	2.0	3.3	13.2	0.7	2.4	11.2
Soft maple	5,601.2	3.7	15.6	16.3	81.7	3.0	5.5	89.0
Elm	497.1	-	-	-	1.1	0.6	-	1.6
Black ash	379.6	-	-	-	4.6	-	1.3	13.3
White & green ash	1,347.5	-	-	-	-	-	-	3.9
Sycamore	59.7	-	-	-	-	-	-	-
Cottonwood	238.1	-	-	-	-	-	-	-
Willow	121.6	-	-	-	-	-	-	-
Hackberry	1.4	-	-	-	-	-	-	-
Balsam poplar	864.3	-	0.7	1.4	45.2	11.0	2.7	86.5
Bigtooth aspen	1,862.7	6.0	19.6	8.5	1.5	1.3	1.3	17.4
Quaking aspen	3,196.0	5.8	6.3	18.2	78.6	22.9	21.6	44.9
Paper birch	1,104.6	-	7.9	33.4	61.1	1.8	20.8	87.7
River birch	0.8	-	-	-	-	-	-	0.8
Black cherry	750.7	-	5.9	2.7	5.7	4.1	-	0.7
Black walnut	101.4	-	-	-	-		-	-
Butternut	13.7	-	-	-	-	-	-	2.5
Yellow poplar	56.2	-	-	-	-	-	-	-
Other hardwoods	49.9	-	-	-	-	-	-	-
Total	34,251.6	124.7	168.5	126.2	321.2	46.0	57.3	399.0
All species	52,263.8	1,643.6	2,479.2	1,467.8	1,862.8	386.2	615.6	2,978.0

(Table 13 continued on next page)

(Table 13 continued)

Species group	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Nonstocked
Softwoods								
Jack pine	2.8	114.2	-	33.6	69.8	16.0	4.0	2.0
Red pine	1.3	133.5	20.2	139.1	212.7	16.1	19.4	2.1
White pine	7.0	156.5	100.9	761.9	336.0	44.8	8.9	0.8
White spruce	-	1.1	64.3	541.5	420.6	73.0	-	0.1
Black spruce	8.3	-	15.9	30.5	20.8	2.8	-	0.7
Balsam fir	2.7	1.6	51.1	453.4	315.6	40.7	-	1.6
Hemlock	-	5.2	59.4	2,010.5	34.8	13.3	-	-
Tamarack	67.5	-	14.1	10.5	15.8	1.5	-	1.7
Eastern redcedar	-	3.9	-	0.8	-	-	-	-
Northern white-cedar	15.5	1.7	225.4	615.8	308.1	74.6	-	0.5
Other softwoods	-	9.1	1.4	22.2	0.8	-	57.9	-
Total	105.1	426.8	552.7	4,619.8	1,735.0	282.8	90.2	9.5
Hardwoods								
Select white oak	-	996.6	98.6	256.8	68.1	3.3	-	-
Select red oak	-	1,829.6	51.7	937.0	413.6	24.8	1.1	0.6
Other red oak	-	467.1	7.8	56.4	8.1	-	-	-
Select hickory	-	89.3	7.5	81.0	1.6	-	-	-
Other hickory	-	86.1	1.3	65.1	-	0.9	-	-
Basswood	-	16.9	75.9	1,967.4	42.6	16.1	-	-
Beech	-	7.2	10.1	1,246.2	8.2	0.4	-	-
Yellow birch	-	1.0	43.5	1,224.8	7.5	2.8	0.7	-
Hard maple	-	12.5	30.3	7,283.1	63.3	23.5	1.9	-
Soft maple	-	156.9	1,403.9	3,418.0	348.8	54.8	1.6	2.4
Elm	-	1.5	62.8	416.1	11.5	1.9	-	-
Black ash	-	1.5	222.5	120.0	15.4	1.0	-	-
White & green ash	-	30.8	263.0	991.0	51.2	7.0	0.6	-
Sycamore	-	-	41.4	18.3	-	-	-	-
Cottonwood	-	14.6	114.2	82.3	27.0	-	-	-
Willow	-	6.7	79.4	29.9	5.6	-	-	-
Hackberry	-	-	1.4	-	-	-	-	-
Balsam poplar	3.5	2.9	60.9	81.5	542.3	24.9	-	0.8
Bigtooth aspen	-	181.0	25.8	571.2	1,001.3	27.6	-	0.2
Quaking aspen	2.2	23.5	144.0	1,093.6	1,657.9	74.9	0.9	0.7
Paper birch	1.2	10.5	62.0	355.2	229.3	233.7	-	-
River birch	-	-	-	-	-	-	-	-
Black cherry	-	71.0	57.5	551.5	49.7	-	1.9	-
Black walnut	-	72.5	11.2	17.7	-	-	-	-
Butternut	-	4.1	4.2	2.9	-	-	-	-
Yellow poplar	-	4.1	6.3	45.8	-	-	-	-
Other hardwoods	-	-	12.2	36.9	-	0.8	-	-
Total	6.9	4,087.9	2,899.4	20,949.7	4,553.0	498.4	8.7	4.7
All species	112.0	4,514.7	3,452.1	25,569.5	6,288.0	781.2	98.9	14.2

1/ International 1/4-inch rule

Table 14.--Net volume of growing stock on timberland by species group and diameter class, Michigan, 1987

(In million cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0+
Softwoods												
Jack pine	669.8	150.2	218.1	182.9	75.1	22.4	14.0	4.0	3.1	-	-	-
Red pine	1,196.8	326.4	355.8	201.7	103.7	77.4	48.4	37.2	25.6	13.0	7.1	0.5
White pine	671.1	23.5	38.9	58.7	61.4	86.5	89.0	82.7	72.4	50.6	85.7	21.7
White spruce	569.3	46.1	80.9	100.6	111.2	90.4	67.3	38.0	20.2	8.5	5.6	0.5
Black spruce	319.4	148.9	92.3	47.2	14.9	6.9	3.1	1.4	4.7	-	-	-
Balsam fir	871.0	287.5	254.6	170.1	96.0	47.0	11.4	3.6	0.6	-	0.2	-
Hemlock	555.6	17.7	40.4	55.5	72.2	88.8	84.8	70.9	45.3	33.6	40.3	6.1
Tamarack	103.3	41.7	26.1	19.2	9.2	3.8	1.8	0.7	0.4	0.3	0.1	-
Eastern redcedar	1.1	-	0.4	-	0.2	0.3	0.2	-	-	-	-	-
Northern white-cedar	1,542.3	444.6	429.0	295.8	167.7	104.0	51.7	27.0	12.0	6.0	3.9	0.6
Other softwoods	87.2	35.5	27.7	15.0	5.4	2.6	0.8	-	-	0.2	-	-
Total	6,586.9	1,522.1	1,564.2	1,146.7	717.0	530.1	372.5	265.5	184.3	112.2	142.9	29.4
Hardwoods												
Select white oak	466.1	37.5	57.0	70.8	65.8	51.6	49.5	37.9	31.9	19.1	29.2	15.8
Select red oak	1,101.0	73.3	152.1	190.4	182.8	149.2	118.7	90.0	56.1	28.9	45.4	14.1
Other red oak	195.8	11.7	22.1	40.0	42.3	26.7	17.2	12.6	10.8	4.4	7.1	0.9
Select hickory	66.1	7.5	11.2	11.8	12.0	7.8	7.7	4.5	1.6	1.0	1.0	-
Other hickory	56.1	5.8	8.7	10.6	11.8	6.3	3.7	4.3	1.4	0.4	2.1	1.0
Basswood	779.3	55.1	110.6	157.6	160.9	114.0	73.3	50.7	31.0	12.3	11.3	2.5
Beech	352.1	30.5	37.3	42.9	41.7	52.8	54.9	35.8	24.9	14.9	13.8	2.6
Yellow birch	419.8	41.7	56.4	58.5	52.0	54.5	56.6	39.0	26.1	16.1	14.6	4.3
Hard maple	2,898.1	469.1	490.3	453.4	381.8	328.7	280.8	218.5	143.4	66.6	51.3	14.2
Soft maple	2,481.0	466.6	508.3	444.2	338.9	254.4	178.4	108.3	65.5	39.6	55.2	21.6
Elm	220.1	27.1	44.5	38.8	31.2	31.8	21.9	11.3	7.4	3.3	2.2	0.6
Black ash	279.1	113.3	68.7	37.8	29.6	18.0	5.7	2.9	1.5	0.9	0.7	-
White & green ash	507.7	86.8	79.1	83.8	82.0	58.4	46.5	28.8	18.6	12.4	10.3	1.0
Sycamore	14.8	0.2	0.8	1.4	1.4	-	0.6	1.8	0.4	2.8	1.9	3.5
Cottonwood	69.7	2.0	3.9	8.1	9.2	8.8	11.8	4.5	4.5	4.6	5.6	6.7
Willow	32.1	0.6	0.2	2.5	4.1	5.4	3.5	4.4	1.7	1.5	5.4	2.8
Hackberry	0.6	0.3	-	-	-	-	0.3	-	-	-	-	-
Balsam poplar	303.6	22.3	38.4	46.1	52.8	46.8	41.3	22.7	17.9	10.4	4.9	-
Bigtooth aspen	879.4	89.9	165.9	213.1	208.2	114.2	49.7	21.6	10.2	3.5	3.1	-
Quaking aspen	1,613.9	279.1	342.2	355.1	296.0	175.1	93.2	43.5	16.6	9.6	3.5	-
Paper birch	796.4	205.7	226.4	167.1	112.8	48.5	22.2	8.5	3.2	1.1	0.9	-
River birch	0.4	0.2	-	-	-	0.2	-	-	-	-	-	-
Black cherry	350.0	68.3	79.2	72.3	51.6	34.3	24.0	7.1	5.0	5.4	2.5	0.3
Black walnut	25.8	2.9	3.4	3.3	3.6	3.7	4.6	1.5	1.4	0.6	0.9	-
Butternut	6.2	2.3	1.0	0.4	0.7	0.9	0.7	0.2	-	-	-	-
Yellow poplar	14.8	0.9	2.3	1.0	1.3	3.3	2.0	1.2	1.9	0.6	0.3	-
Other hardwoods	40.7	14.5	9.2	8.0	2.8	3.2	2.0	-	0.2	0.5	0.3	-
Total	13,970.7	2,115.1	2,519.2	2,519.0	2,177.3	1,598.6	1,170.8	761.6	483.2	260.5	273.5	91.9
All species	20,557.6	3,937.2	4,083.4	3,665.7	2,894.3	2,128.7	1,543.3	1,027.1	667.5	372.7	416.4	121.3

Table 15.--Net volume of sawtimber on timberland by species group and diameter class, Michigan, 1987

(In million board feet) 1/

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0+
Softwoods										
Jack pine	1,625.1	981.0	408.3	122.6	75.1	21.1	17.0	-	-	-
Red pine	3,005.1	1,187.9	606.4	443.6	277.0	216.5	151.0	77.0	43.1	2.6
White pine	3,252.4	241.4	309.9	443.3	466.2	445.6	404.1	290.8	511.1	140.0
White spruce	2,177.0	450.9	533.2	449.8	349.3	202.7	108.4	48.3	31.5	2.9
Black spruce	373.2	218.6	71.6	33.0	15.4	7.9	26.7	-	-	-
Balsam fir	1,501.9	767.3	436.0	220.0	55.4	18.8	3.3	-	1.1	-
Hemlock	2,226.8	187.5	304.5	418.3	406.8	326.2	211.6	154.8	188.3	28.8
Tamarack	203.6	109.8	52.9	22.4	10.2	4.2	1.8	1.7	0.6	-
Eastern redcedar	4.7	-	1.3	2.1	1.3	-	-	-	-	-
Northern white-cedar	3,515.3	1,443.8	890.7	578.9	305.4	159.9	72.7	34.3	25.4	4.2
Other softwoods	127.1	78.9	28.4	14.6	4.4	-	-	0.8	-	-
Total	18,012.2	5,667.1	3,643.2	2,748.6	1,966.5	1,402.9	996.6	607.7	801.1	178.5
Hardwoods										
Select white oak	1,475.9	-	350.3	252.0	235.2	179.0	150.3	90.6	140.2	78.3
Select red oak	3,422.6	-	916.2	735.7	583.7	447.6	282.6	147.2	235.4	74.2
Other red oak	578.8	-	198.4	127.0	80.5	60.4	52.2	21.8	34.4	4.1
Select hickory	179.4	-	64.2	40.3	36.7	20.5	7.7	5.0	5.0	-
Other hickory	154.8	-	60.9	31.5	17.3	21.1	7.3	1.7	9.8	5.2
Basswood	2,129.4	-	746.0	529.7	337.6	240.5	145.2	61.3	55.8	13.3
Beech	1,274.9	-	236.0	283.6	282.8	178.4	130.3	78.8	72.5	12.5
Yellow birch	1,341.9	-	245.8	274.5	293.9	202.9	135.5	87.1	80.0	22.2
Hard maple	7,447.4	-	1,921.4	1,640.7	1,399.4	1,083.7	723.7	336.0	266.5	76.0
Soft maple	5,601.2	-	1,979.8	1,351.6	902.4	521.8	310.2	183.4	252.8	99.2
Elm	497.1	-	146.2	145.7	96.8	50.6	32.0	14.2	9.1	2.5
Black ash	379.6	-	201.6	111.3	35.1	16.5	7.8	4.2	3.1	-
White & green ash	1,347.5	-	470.0	309.5	230.4	138.3	89.4	57.1	48.1	4.7
Sycamore	59.7	-	6.1	-	2.6	7.9	2.0	13.5	9.8	17.8
Cottonwood	238.1	-	38.4	35.2	49.0	19.3	20.1	19.5	26.3	30.3
Willow	121.6	-	16.9	22.3	14.4	18.1	7.5	6.7	23.3	12.4
Hackberry	1.4	-	-	-	1.4	-	-	-	-	-
Balsam poplar	864.3	-	220.8	202.4	181.6	102.6	83.5	49.7	23.7	-
Bigtooth aspen	1,862.7	-	921.5	520.5	231.9	104.4	50.2	18.9	15.3	-
Quaking aspen	3,196.0	-	1,419.6	890.4	485.7	235.3	92.6	52.0	20.4	-
Paper birch	1,104.6	-	612.3	273.6	133.7	51.5	20.1	7.1	6.3	-
River birch	0.8	-	-	0.8	-	-	-	-	-	-
Black cherry	750.7	-	320.5	193.6	130.9	37.8	26.2	27.5	12.5	1.7
Black walnut	101.4	-	25.4	23.9	27.3	8.3	8.0	3.4	5.1	-
Butternut	13.7	-	3.8	4.9	3.8	1.2	-	-	-	-
Yellow poplar	56.2	-	7.7	17.1	10.3	6.3	10.0	3.4	1.4	-
Other hardwoods	49.9	-	15.4	17.6	11.6	-	1.0	2.7	1.6	-
Total	34,251.6	-	11,145.2	8,035.4	5,816.0	3,754.0	2,395.4	1,292.8	1,358.4	454.4
All species	52,263.8	5,667.1	14,788.4	10,784.0	7,782.5	5,156.9	3,392.0	1,900.5	2,159.5	632.9

1/ International 1/4-inch rule

Table 16.- Annual net growth, mortality and removals of growing stock and sawtimber on timberland by softwoods and hardwoods, Michigan, 1979 and 1986

Net growth

Species group	Growing stock		Sawtimber	
	1979	1986	1979	1986
	Million cubic feet		Million board feet 1/	
Softwoods	205.5	231.8	686.9	957.0
Hardwoods	472.3	521.2	1,697.5	1,689.8
All species	677.8	753.0	2,384.4	2,646.7

Mortality

Softwoods	41.1	42.7	80.8	94.5
Hardwoods	117.1	75.7	259.4	188.2
All species	158.2	118.4	340.2	282.7

Removals

Softwoods	56.4	71.9	165.2	284.0
Hardwoods	218.2	325.7	750.3	836.0
All species	274.6	397.6	915.5	1120.0

1/ International 1/4 inch rule

Table 17.--Net volume in short-log trees on timberland by species group and diameter class, Michigan, 1987

(In million cubic feet)

Species group	All classes	Diameter class(inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0+
Softwoods										
Jack pine	5.2	2.8	0.9	1.0	0.4	0.1	-	-	-	-
Red pine	1.3	0.4	0.6	0.1	-	0.2	-	-	-	-
White pine	6.7	0.8	1.7	1.8	1.0	0.2	0.4	0.4	0.4	-
White spruce	2.2	0.2	1.0	0.4	0.4	-	0.2	-	-	-
Black spruce	0.6	0.4	0.2	-	-	-	-	-	-	-
Balsam fir	4.1	0.4	2.2	1.0	-	0.2	0.3	-	-	-
Hemlock	12.3	2.3	2.1	2.6	1.3	1.1	1.2	0.3	1.3	0.1
Tamarack	0.8	0.4	0.3	-	-	0.1	-	-	-	-
Northern white-cedar	33.7	8.9	9.8	5.7	3.5	2.3	1.5	0.8	1.0	0.2
Other softwoods	0.8	0.4	-	0.4	-	-	-	-	-	-
Total	67.7	17.0	18.8	13.0	6.6	4.2	3.6	1.5	2.7	0.3
Hardwoods										
Select white oak	6.0	-	1.5	0.9	1.1	0.1	0.2	0.9	0.7	0.6
Select red oak	14.7	-	2.1	4.2	2.3	1.9	1.6	0.4	1.4	0.8
Other red oak	2.0	-	0.4	0.9	0.5	-	-	0.1	-	0.1
Select hickory	0.6	-	0.3	-	-	-	-	0.3	-	-
Basswood	7.8	-	1.5	1.9	1.2	1.0	1.1	0.5	0.4	0.2
Beech	12.7	-	0.7	3.2	0.7	1.0	2.2	1.2	2.7	1.0
Yellow birch	22.8	-	3.6	4.4	3.8	2.3	2.9	1.7	3.2	0.9
Hard maple	49.1	-	8.2	10.6	7.8	5.2	5.2	2.9	6.4	2.8
Soft maple	35.1	-	6.2	7.8	5.4	5.4	2.9	1.7	3.7	2.0
Elm	4.2	-	1.2	1.9	0.4	0.3	0.3	-	-	0.1
Black ash	0.8	-	0.3	0.2	0.1	0.2	-	-	-	-
White & green ash	6.9	-	1.5	1.6	0.9	0.8	0.4	-	1.6	0.1
Cottonwood	0.2	-	-	-	-	-	-	-	0.2	-
Willow	2.4	-	0.3	0.3	0.8	-	0.2	-	-	0.8
Balsam poplar	1.5	-	0.5	0.4	0.2	0.1	0.2	0.1	-	-
Bigtooth aspen	10.0	-	1.0	3.2	2.4	1.8	0.7	0.3	0.6	-
Quaking aspen	20.2	-	3.0	6.5	5.6	2.8	0.8	0.9	0.6	-
Paper birch	7.9	-	2.5	2.4	1.1	0.3	1.2	0.4	-	-
Black cherry	6.1	-	1.6	1.9	1.2	0.6	0.4	0.4	-	-
Black walnut	0.3	-	-	-	-	-	-	-	-	0.3
Other hardwoods	0.7	-	-	0.7	-	-	-	-	-	-
Total	212.0	-	36.4	53.0	35.5	23.8	20.3	11.8	21.5	9.7
All species	279.7	17.0	55.2	66.0	42.1	28.0	23.9	13.3	24.2	10.0

Table 18.--Net volume in short-log trees on timberland by species group and diameter class, Michigan, 1987

(In million board feet) 1/

Species group	All classes	Diameter class(inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0+
Softwoods										
Jack pine	17.4	9.1	3.5	3.2	1.3	0.3	-	-	-	-
Red pine	5.5	1.5	2.6	0.6	-	0.8	-	-	-	-
White pine	22.9	2.3	5.4	6.3	3.4	1.0	1.6	1.6	1.3	-
White spruce	9.7	1.1	4.5	1.7	1.6	-	0.8	-	-	-
Black spruce	2.0	1.4	0.6	-	-	-	-	-	-	-
Balsam fir	11.3	1.1	6.0	2.7	-	0.5	1.0	-	-	-
Hemlock	28.8	4.0	4.0	6.0	3.4	2.8	3.5	1.1	3.6	0.4
Tamarack	3.6	1.8	1.3	-	-	0.5	-	-	-	-
Northern white-cedar	115.2	27.7	33.1	19.7	12.1	8.1	6.2	3.0	4.4	0.9
Other softwoods	3.8	2.0	-	1.8	-	-	-	-	-	-
Total	220.2	52.0	61.0	42.0	21.8	14.0	13.1	5.7	9.3	1.3
Hardwoods										
Select white oak	15.5	-	4.4	2.2	2.8	0.4	0.4	2.0	1.7	1.6
Select red oak	33.0	-	4.4	9.3	5.2	4.1	3.7	0.9	3.6	1.8
Other red oak	4.4	-	1.0	1.8	1.2	-	-	0.2	-	0.2
Select hickory	1.5	-	0.8	-	-	-	-	0.7	-	-
Basswood	16.7	-	3.2	4.1	2.6	2.3	2.3	1.0	0.8	0.4
Beech	37.0	-	2.2	9.8	2.1	3.1	6.5	3.5	7.4	2.4
Yellow birch	61.5	-	7.5	10.9	10.5	6.8	7.8	5.4	10.0	2.6
Hard maple	133.2	-	22.3	28.1	21.1	13.8	14.0	8.2	17.8	7.9
Soft maple	101.6	-	20.2	24.0	15.7	14.7	7.6	4.6	9.9	4.9
Elm	10.4	-	3.1	4.8	0.8	0.7	0.7	-	-	0.3
Black ash	2.1	-	0.8	0.6	0.3	0.4	-	-	-	-
White & green ash	16.6	-	4.1	4.0	2.2	1.7	1.1	-	3.2	0.3
Cottonwood	0.6	-	-	-	-	-	-	-	0.6	-
Willow	7.5	-	0.9	0.7	2.6	-	0.7	-	-	2.6
Balsam poplar	4.2	-	1.2	1.1	0.5	0.4	0.6	0.4	-	-
Bigtooth aspen	17.1	-	1.7	5.5	3.7	3.2	1.3	0.6	1.1	-
Quaking aspen	50.6	-	6.7	16.0	14.5	7.6	1.9	2.4	1.5	-
Paper birch	22.9	-	6.8	6.5	3.3	1.0	3.9	1.4	-	-
Black cherry	16.8	-	4.7	5.5	3.2	1.6	0.9	0.9	-	-
Black walnut	0.8	-	-	-	-	-	-	-	-	0.8
Other hardwoods	2.2	-	-	2.2	-	-	-	-	-	-
Total	556.2	-	96.0	137.1	92.3	61.8	53.4	32.2	57.6	25.8
All species	776.4	52.0	157.0	179.1	114.1	75.8	66.5	37.9	66.9	27.1

1/ International 1/4-inch rule

Table 19.--All live tree biomass on timberland
by species group and tree biomass component, Michigan, 1987

All units

Species group	All components	Component				1- to 5-inch trees	Average weight per cubic foot (including bark)
		Growing stock		Cull			
		Bole	Tops and limbs	Bole	Tops and limbs		
		Green tons					Pounds
Softwoods							
Jack pine	29,135,668	18,474,920	3,753,315	1,229,387	252,410	5,425,636	46
Red pine	44,080,850	32,820,688	6,358,041	473,292	92,203	4,336,626	46
White pine	24,229,261	18,227,989	3,176,358	907,941	171,615	1,745,358	45
White spruce	21,394,126	14,316,222	5,155,248	235,136	87,734	1,599,786	45
Black spruce	18,852,847	8,340,447	3,550,576	132,795	55,627	6,773,402	45
Balsam fir	56,020,581	24,153,300	10,369,627	664,784	270,017	20,562,853	47
Hemlock	27,597,475	17,801,289	5,713,172	1,882,422	631,191	1,569,401	51
Tamarack	6,718,088	3,345,879	732,028	340,318	74,003	2,225,860	52
Eastern redcedar	160,734	29,536	10,774	-	-	120,424	43
Northern white-cedar	73,866,303	31,894,161	14,323,924	5,823,254	2,458,446	19,366,518	36
Other softwoods	5,555,165	2,101,680	939,103	423,584	186,109	1,904,689	44
Total	307,611,098	171,506,111	54,082,166	12,112,913	4,279,355	65,630,553	43
Hardwoods							
Select white oak	27,845,526	16,981,532	6,992,591	1,068,280	422,860	2,380,263	58
Other white oak	6,129	-	-	4,003	2,126	-	58
Select red oak	63,940,926	42,731,451	16,659,603	2,311,208	888,036	1,350,628	64
Other red oak	12,080,218	7,704,269	3,116,177	738,134	328,300	193,338	64
Select hickory	3,773,321	2,494,949	1,009,548	66,778	22,981	179,065	63
Other hickory	2,971,870	1,947,995	779,883	55,224	22,226	166,542	59
Basswood	30,765,863	19,987,063	8,033,359	1,144,674	449,042	1,151,725	42
Beech	22,943,511	12,487,183	4,790,723	2,986,761	1,104,020	1,574,824	59
Yellow birch	32,834,883	16,479,188	6,624,680	5,094,567	1,887,984	2,748,464	61
Hard maple	204,447,796	114,213,364	46,680,988	10,766,058	4,165,604	28,621,782	63
Soft maple	151,657,303	85,753,185	35,564,045	8,520,506	3,308,106	18,511,461	55
Elm	15,527,011	7,515,892	3,345,490	894,239	397,277	3,374,113	55
Black ash	21,157,053	8,839,864	4,219,735	953,641	464,138	6,679,675	50
White & green ash	26,433,344	15,885,509	6,493,383	752,400	289,936	3,012,116	51
Sycamore	677,587	503,482	156,747	13,869	3,489	-	58
Cottonwood	3,279,553	2,171,257	799,215	60,979	20,124	227,978	51
Willow	1,798,378	933,320	328,936	279,796	91,472	164,854	48
Hackberry	30,635	19,316	9,095	-	-	2,224	52
Balsam poplar	15,812,691	9,919,666	3,698,999	684,902	249,873	1,259,251	53
Bigtooth aspen	42,777,459	27,370,476	8,447,747	2,655,495	790,115	3,513,626	50
Quaking aspen	92,030,605	51,997,775	17,010,526	7,838,423	2,465,687	12,718,194	50
Paper birch	49,173,256	28,373,176	12,530,558	2,566,238	1,111,641	4,591,643	55
River birch	74,910	12,482	5,909	33,527	11,319	11,673	55
Black cherry	22,237,080	10,612,462	4,494,640	2,619,735	1,139,414	3,370,829	49
Black walnut	1,375,984	929,320	362,522	41,629	13,996	28,517	54
Butternut	312,775	168,482	73,781	16,206	5,484	48,822	45
Yellow poplar	710,737	474,730	177,884	-	-	58,123	52
Other hardwoods	3,578,608	1,188,729	557,256	271,411	123,135	1,438,077	46
Noncommercial spp.	9,146,873	161,744	78,953	2,037,798	1,028,078	5,840,300	50
Total	859,401,885	487,857,861	193,042,973	54,476,481	20,806,463	103,218,107	56
All species	1,167,012,983	659,363,972	247,125,139	66,589,394	25,085,818	168,848,660	52

(Table 19 continued on next page)

(Table 19 continued)

Northern lower peninsula

Species group	All components	Component					Average weight per cubic foot (including bark)
		Growing stock		Cull		1- to 5-inch trees	
		Bole	Tops and limbs	Bole	Tops and limbs		
	Green tons						Pounds
Softwoods							
Jack pine	18,138,636	10,638,985	2,195,558	914,362	190,401	4,199,330	46
Red pine	30,405,606	22,783,609	4,449,642	306,518	60,130	2,805,707	46
White pine	8,481,891	5,927,596	1,068,440	249,357	49,084	1,187,414	45
White spruce	2,185,116	1,381,229	526,617	48,399	22,790	206,081	45
Black spruce	1,824,538	892,526	368,616	29,520	12,449	521,427	45
Balsam fir	7,064,849	3,098,204	1,343,705	89,189	41,073	2,492,678	47
Hemlock	4,044,587	2,433,899	843,442	204,613	71,759	490,874	51
Tamarack	1,825,005	798,152	172,360	132,814	29,821	691,858	52
Eastern redcedar	18,709	10,836	3,497	-	-	4,376	43
Northern white-cedar	24,242,843	10,814,034	4,979,531	1,395,061	606,375	6,447,842	36
Other softwoods	3,438,324	1,196,448	554,537	273,055	123,533	1,290,751	44
Total	101,670,104	59,975,518	16,505,945	3,642,888	1,207,415	20,338,338	43
Hardwoods							
Select white oak	13,631,077	7,685,857	3,409,487	687,744	283,475	1,564,514	58
Other white oak	6,129	-	-	4,003	2,126	-	58
Select red oak	41,131,999	26,998,959	10,764,435	1,668,717	655,291	1,044,597	64
Other red oak	7,534,412	4,588,033	1,925,520	656,273	292,361	72,225	64
Select hickory	41,429	29,362	12,067	-	-	-	63
Other hickory	144,311	72,040	32,242	-	-	40,029	59
Basswood	14,216,612	9,663,719	3,886,788	329,932	129,450	206,723	42
Beech	9,127,393	4,900,236	1,910,100	1,165,456	416,779	734,822	59
Yellow birch	2,571,772	1,317,522	573,288	302,843	126,499	251,620	61
Hard maple	49,966,122	28,219,217	11,891,400	1,769,528	673,285	7,412,692	63
Soft maple	50,420,309	29,078,883	12,237,186	1,834,905	711,231	6,558,104	55
Elm	2,109,498	803,703	365,003	196,011	98,580	646,201	54
Black ash	7,192,702	2,840,345	1,384,469	409,899	203,903	2,354,086	50
White & green ash	10,414,499	6,474,328	2,637,745	274,480	107,797	920,149	51
Sycamore	36,181	27,948	8,233	-	-	-	58
Cottonwood	445,811	312,883	116,069	12,062	4,797	-	51
Willow	450,841	217,466	78,639	30,856	10,094	113,786	48
Hackberry	-	-	-	-	-	-	-
Balsam poplar	5,655,923	3,574,661	1,288,260	289,199	103,696	400,107	53
Bigtooth aspen	31,234,436	19,569,021	6,063,487	1,897,555	565,695	3,138,678	50
Quaking aspen	36,389,484	19,533,311	6,450,650	2,478,193	803,388	7,123,942	50
Paper birch	16,229,503	9,514,347	4,243,289	729,188	314,780	1,427,899	55
River birch	14,372	9,925	4,447	-	-	-	55
Black cherry	7,525,659	3,358,229	1,416,810	1,116,003	486,328	1,148,289	49
Black walnut	10,401	7,430	2,971	-	-	-	54
Butternut	7,236	5,292	1,944	-	-	-	45
Yellow poplar	-	-	-	-	-	-	-
Other hardwoods	350,109	106,922	53,035	28,146	12,601	149,405	46
Noncommercial spp.	2,271,991	41,995	21,749	612,114	310,120	1,286,013	50
Total	309,130,211	178,951,634	70,779,313	16,493,107	6,312,276	36,593,881	55
All species	410,800,315	238,927,152	87,285,258	20,135,995	7,519,691	56,932,219	52

(Table 19 continued on next page)

(Table 19 continued)

Western upper peninsula

Species group	All components	Component					Average weight per cubic foot (including bark)
		Growing stock		Cull		1- to 5-inch trees	
		Bole	Tops and limbs	Bole	Tops and limbs		
	Green tons						Pounds
Softwoods							
Jack pine	3,592,943	2,728,717	523,413	61,924	11,387	267,502	46
Red pine	4,267,750	3,007,401	562,539	33,716	5,844	658,250	46
White pine	6,379,973	5,229,665	861,141	171,736	30,755	86,676	45
White spruce	11,864,567	8,038,980	2,854,921	119,473	40,952	810,241	45
Black spruce	7,297,454	3,419,831	1,445,107	40,317	17,512	2,374,687	45
Balsam fir	29,699,277	13,219,853	5,576,799	303,798	122,544	10,476,283	47
Hemlock	16,020,232	10,600,603	3,310,674	1,201,872	398,897	508,186	51
Tamarack	1,973,973	1,065,813	231,398	105,275	22,434	549,053	52
Eastern redcedar	4,344	3,282	1,062	-	-	-	43
Northern white-cedar	16,803,633	7,981,021	3,315,667	2,018,361	798,550	2,690,034	36
Other softwoods	39,975	9,351	3,732	-	-	26,892	44
Total	97,944,121	55,304,517	18,686,453	4,056,472	1,448,875	18,447,804	44
Hardwoods							
Select white oak	45,648	33,143	12,505	-	-	-	58
Other white oak	-	-	-	-	-	-	-
Select red oak	5,220,108	3,500,739	1,331,314	231,631	83,994	72,430	64
Other red oak	-	-	-	-	-	-	-
Select hickory	-	-	-	-	-	-	-
Other hickory	-	-	-	-	-	-	-
Basswood	10,334,451	6,421,689	2,630,748	529,821	210,794	541,399	42
Beech	18,624	5,534	1,871	7,334	2,814	1,071	59
Yellow birch	23,331,611	11,486,940	4,616,076	3,885,337	1,425,047	1,918,211	61
Hard maple	108,673,573	59,712,965	24,303,254	6,726,178	2,663,195	15,267,981	63
Soft maple	45,708,810	25,225,634	10,640,124	3,231,453	1,277,463	5,334,136	55
Elm	6,464,024	3,785,725	1,603,535	349,083	144,844	580,837	55
Black ash	6,816,740	3,225,329	1,492,350	240,351	110,109	1,748,601	50
White & green ash	2,062,867	1,247,189	509,346	71,561	28,741	206,030	51
Sycamore	-	-	-	-	-	-	-
Cottonwood	6,962	5,233	1,729	-	-	-	51
Willow	15,857	-	-	4,860	1,708	9,289	48
Hackberry	-	-	-	-	-	-	-
Balsam poplar	2,826,009	1,851,253	684,258	69,408	26,906	194,184	53
Bigtooth aspen	4,959,394	3,255,503	973,318	499,151	146,567	84,855	50
Quaking aspen	30,989,552	18,491,651	5,894,138	3,221,084	984,450	2,398,229	50
Paper birch	16,147,703	9,548,954	4,133,266	988,845	427,139	1,049,499	55
River birch	60,538	2,557	1,462	33,527	11,319	11,673	55
Black cherry	4,307,364	2,109,637	930,079	485,284	208,818	573,546	49
Black walnut	-	-	-	-	-	-	-
Butternut	-	-	-	-	-	-	-
Yellow poplar	-	-	-	-	-	-	-
Other hardwoods	18,178	2,532	981	10,343	4,322	-	46
Noncommercial spp.	2,685,058	44,273	22,294	670,272	341,153	1,607,066	50
Total	270,693,071	149,956,480	59,782,648	21,255,523	8,099,383	31,599,037	57
All species	368,637,192	205,260,997	78,469,101	25,311,995	9,548,258	50,046,841	53

(Table 19 continued on next page)

(Table 19 continued)

Eastern upper peninsula

Species group	All components	Component				1- to 5-inch trees	Average weight per cubic foot (including bark)
		Growing stock		Cull			
		Bole	Tops and limbs	Bole	Tops and limbs		
		Green tons					Pounds
Softwoods							
Jack pine	6,809,641	4,715,075	956,935	253,101	50,622	833,908	46
Red pine	7,025,929	5,219,000	999,663	19,046	3,768	784,452	46
White pine	6,299,499	4,729,168	817,871	365,526	69,246	317,688	45
White spruce	6,980,035	4,790,248	1,726,857	59,337	21,326	382,267	45
Black spruce	9,730,855	4,028,090	1,736,853	62,958	25,666	3,877,288	45
Balsam fir	19,247,695	7,828,835	3,446,771	271,797	106,400	7,593,892	47
Hemlock	7,169,623	4,503,579	1,481,819	475,937	160,535	547,753	51
Tamarack	2,661,441	1,311,535	288,853	93,689	20,175	947,189	52
Eastern redcedar	-	-	-	-	-	-	-
Northern white-cedar	32,521,798	12,985,858	5,972,894	2,383,946	1,041,445	10,137,655	36
Other softwoods	96,051	54,074	23,404	1,426	739	16,408	44
Total	98,542,567	50,165,462	17,451,920	3,986,763	1,499,922	25,438,500	42
Hardwoods							
Select white oak	26,822	11,871	4,893	4,141	1,864	4,053	58
Other white oak	-	-	-	-	-	-	-
Select red oak	1,480,130	953,405	377,562	101,349	41,453	6,361	64
Other red oak	-	-	-	-	-	-	-
Select hickory	-	-	-	-	-	-	-
Other hickory	-	-	-	-	-	-	-
Basswood	2,211,950	1,407,381	574,193	104,371	40,231	85,774	42
Beech	11,328,746	5,996,064	2,318,315	1,619,140	608,717	786,510	59
Yellow birch	6,223,692	3,356,760	1,301,796	825,946	305,541	433,649	61
Hard maple	38,127,821	21,622,642	8,755,502	1,939,255	729,268	5,081,154	63
Soft maple	32,690,203	17,873,683	7,496,329	2,150,831	893,067	4,276,293	55
Elm	1,688,962	979,742	405,623	124,540	53,835	125,222	55
Black ash	4,895,082	1,721,441	847,886	238,430	118,449	1,968,876	50
White & green ash	1,394,841	870,409	366,476	59,318	24,711	73,927	51
Sycamore	-	-	-	-	-	-	-
Cottonwood	19,475	14,363	5,112	-	-	-	51
Willow	-	-	-	-	-	-	-
Hackberry	-	-	-	-	-	-	-
Balsam poplar	6,767,075	4,106,698	1,578,564	305,089	111,764	664,960	53
Bigtooth aspen	3,015,857	2,084,662	654,512	171,217	49,894	55,572	50
Quaking aspen	19,467,818	10,942,849	3,630,159	1,941,321	610,090	2,343,399	50
Paper birch	15,298,560	8,444,299	3,758,231	813,463	354,723	1,927,844	55
River birch	-	-	-	-	-	-	-
Black cherry	3,729,754	1,599,741	681,994	590,207	266,582	591,230	49
Black walnut	-	-	-	-	-	-	-
Butternut	-	-	-	-	-	-	-
Yellow poplar	-	-	-	-	-	-	-
Other hardwoods	4,772	3,159	1,201	-	-	412	46
Noncommercial spp.	908,157	6,271	2,958	230,628	116,839	551,461	50
Total	149,279,717	81,995,440	32,761,306	11,219,246	4,327,028	18,976,697	56
All species	247,822,284	132,160,902	50,213,226	15,206,009	5,826,950	44,415,197	49

(Table 19 continued on next page)

(Table 19 continued)

Southern lower peninsula

Species group	All components	Component				1- to 5-inch trees	Average weight per cubic foot (including bark)
		Growing stock		Cull			
		Bole	Tops and limbs	Bole	Tops and limbs		
	Green tons						Pounds
Softwoods							
Jack pine	594,448	392,143	77,409	-	-	124,896	46
Red pine	2,381,565	1,810,678	346,197	114,012	22,461	88,217	46
White pine	3,067,898	2,341,560	428,906	121,322	22,530	153,580	45
White spruce	364,408	105,765	46,853	7,927	2,666	201,197	45
Black spruce	-	-	-	-	-	-	-
Balsam fir	8,760	6,408	2,352	-	-	-	47
Hemlock	363,033	263,208	77,237	-	-	22,588	51
Tamarack	257,669	170,379	39,417	8,540	1,573	37,760	52
Eastern redcedar	137,681	15,418	6,215	-	-	116,048	43
Northern white-cedar	298,029	113,248	55,832	25,886	12,076	90,987	36
Other softwoods	1,980,815	841,807	357,430	149,103	61,837	570,638	44
Total	9,454,306	6,060,614	1,437,848	426,790	123,143	1,405,911	45
Hardwoods							
Select white oak	14,141,979	9,250,661	3,565,706	376,395	137,521	811,696	58
Other white oak	-	-	-	-	-	-	-
Select red oak	16,108,689	11,278,348	4,186,292	309,511	107,298	227,240	64
Other red oak	4,545,806	3,116,236	1,190,657	81,861	35,939	121,113	64
Select hickory	3,731,892	2,465,587	997,481	66,778	22,981	179,065	63
Other hickory	2,827,559	1,875,955	747,641	55,224	22,226	126,513	59
Basswood	4,002,850	2,494,274	941,630	180,550	68,567	317,829	42
Beech	2,468,748	1,585,349	560,437	194,831	75,710	52,421	59
Yellow birch	707,808	317,966	133,520	80,441	30,897	144,984	61
Hard maple	7,680,280	4,658,540	1,730,832	331,097	99,856	859,955	63
Soft maple	22,837,981	13,574,985	5,190,406	1,303,317	426,345	2,342,928	55
Elm	5,264,527	1,946,722	971,329	224,605	100,018	2,021,853	54
Black ash	2,252,529	1,052,749	495,030	64,961	31,677	608,112	50
White & green ash	12,561,137	7,293,583	2,979,816	347,041	128,687	1,812,010	51
Sycamore	641,406	475,534	148,514	13,869	3,489	-	58
Cottonwood	2,807,305	1,838,778	676,305	48,917	15,327	227,978	51
Willow	1,331,680	715,854	250,297	244,080	79,670	41,779	48
Hackberry	30,635	19,316	9,095	-	-	2,224	52
Balsam poplar	563,684	387,054	147,917	21,206	7,507	-	53
Bigtooth aspen	3,567,772	2,461,290	756,430	87,572	27,959	234,521	50
Quaking aspen	5,183,751	3,029,964	1,035,579	197,825	67,759	852,624	50
Paper birch	1,497,490	865,576	395,772	34,742	14,999	186,401	55
River birch	-	-	-	-	-	-	-
Black cherry	6,674,303	3,544,855	1,465,757	428,241	177,686	1,057,764	49
Black walnut	1,365,583	921,890	359,551	41,629	13,996	28,517	54
Butternut	305,539	163,190	71,837	16,206	5,484	48,822	45
Yellow poplar	710,737	474,730	177,884	-	-	58,123	52
Other hardwoods	3,205,549	1,076,116	502,039	232,922	106,212	1,288,260	46
Noncommercial spp.	3,281,667	69,205	31,952	524,784	259,966	2,395,760	50
Total	130,298,886	76,954,307	29,719,706	5,508,605	2,067,776	16,048,492	55
All species	139,753,192	83,014,921	31,157,554	5,935,395	2,190,919	17,454,403	54

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Smith, W. Brad; Hahn, Jerold T. Michigan's forest statistics, 1987: an inventory update. Gen. Tech. Rep. NC-112. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1986. 44 p.

The Michigan 1987 inventory update, derived by using tree growth models, reports 17.3 million acres of timberland, a decline of less than 1 percent since 1980. Growing-stock removals have risen sharply since 1979, climbing from 275 million cubic feet annually to the current level of 398 cubic feet.

KEY WORDS: Forest area, timberland, forest inventory, land use, update.


1966-86
NORTH CENTRAL
FOREST
EXPERIMENT STATION
20th Anniversary