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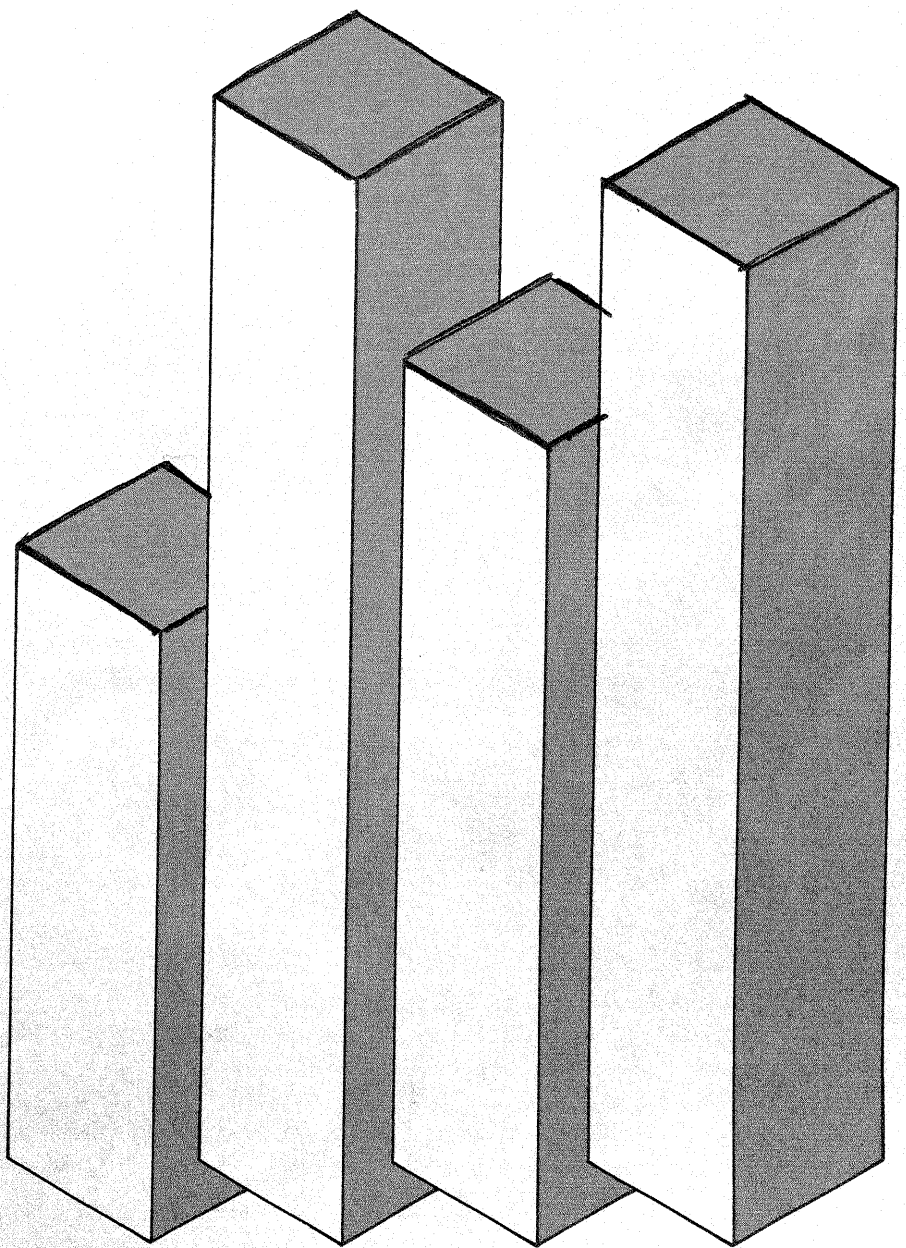
Wisconsin's Fourth Forest Inventory: Area

W. Brad Smith



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In 1983, the fourth Wisconsin forest inventory found 14.8 million acres of commercial forest land, an increase of nearly 2 percent since 1968. This bulletin analyzes findings from the inventory and presents detailed tables of forest area.

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

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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 to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Inventory and Analysis work done in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

Fieldwork for the 1983 Wisconsin forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous surveys of Wisconsin's timber resource are dated 1936, 1956, and 1968. Resource Bulletins reporting statistical highlights and detailed tables of the five Survey Units in Wisconsin are available. In addition to these statistical reports, a series of analytical reports are also available.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Department's canvass of all primary wood-using plants in the State were used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Wisconsin Forest Inventory were furnished by the Wisconsin Department of Natural Resources, the USDA Agricultural Stabilization and Conservation Service, and the national forests.

The following State organizations and personnel were instrumental in the preparation of this manuscript:

Wisconsin Department of Natural Resources
- Richard Lindberg, Forest Management Planning and Analysis
- Jim Whipple, Marketing and Utilization
- Art Doll, Recreation Policy and Procedures
- Frank Haberland, Forest Wildlife
- Lee Kernen, Fisheries
- Ron Nicotera, Endangered Resources
- Gordon Reinke, Mining
- David Weizenicker, Parks and Recreation

Wisconsin Department of Development
- Roger Nacker, Economic Development

University of Wisconsin System
- Ron Geise, Forestry Education
- Jeff Stier, Extension Forestry

HIGHLIGHTS

- Forest land increased from 14.9 to 15.4 million acres between 1968 and 1983.
- Commercial forest land climbed from 14.5 to 14.8 million acres during the same 15-year period, a gain of nearly 2 percent.
- Greatest proportional gain of commercial forest was in the Southwest Inventory Unit (31 percent), primarily from the reversion of wooded pasture.
- Noncommercial forest area increased from 409,000 to 592,000 acres between surveys, mostly from a sevenfold increase of productive-reserved forest area.
- Ninety-four percent of the land area classified as commercial forest land in 1968 is still commercial forest.
- Wind, fire, insects, and other natural causes have damaged more than 566,000 acres of commercial forest land since 1964.
- Nonindustrial private parties own 62 percent of the total commercial forest area.
- Eighty-seven percent of the commercial forest owned by nonindustrial private parties is in tracts larger than 20 acres.
- More than one-half of the nonindustrial private forest land has been owned by the same party for at least 10 years.
- At 2.2 million acres, Wisconsin ranks second only to Minnesota in total acres of commercial forest in county and municipal ownership.
- The aspen forest type continues to lose acreage with a decline of more than 400,000 acres since 1968.
- Poletimber stands account for 49 percent of the commercial forest in the northern two units, while sawtimber stands comprise 42 percent of the south.
- Forest plantations totaled 622,000 acres in 1983, 58 percent in stands less than 30 years old.
- Average site index is 64 feet, compared to a Lake States average of 60 feet.
- Eighty-one percent of the commercial forest is medium-stocked or better with trees.
- Fifty percent of the commercial forest land is within one-fourth mile of a maintained road.

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WISCONSIN'S FOURTH FOREST INVENTORY: AREA

W. Brad Smith, *Mensurationist*

HISTORICAL PERSPECTIVE

Exploration, Exploitation, Revitalization[1]

When explored by Jean Nicolet in 1634, Wisconsin was a vast forest wilderness inhabited by tribes of Indians who depended mainly on hunting, fishing, gathering wild rice, and growing small areas of corn for their livelihood. Forests covered 30 million of the 35 million acres defined by the current State boundaries. In the 200 years that followed Nicolet's first visit, little happened to disturb the vegetation he saw (fig. 1). From the pineries in the north to the oak savannahs in the south, events moved at a glacial pace. The only hints of coming change were the intrusion of fur traders and an occasional missionary.

The traffic in furs opened the first trade routes, but brought only small settlements predominantly along the major waterways. The discovery of lead in the southwestern part of the State in about 1820 brought many more settlers. Agricultural development followed but did not grow to a large scale until

[1]*Background material for the introductory text is based upon a 1956 Department of Natural Resources staff report on the history of forestry in Wisconsin.*

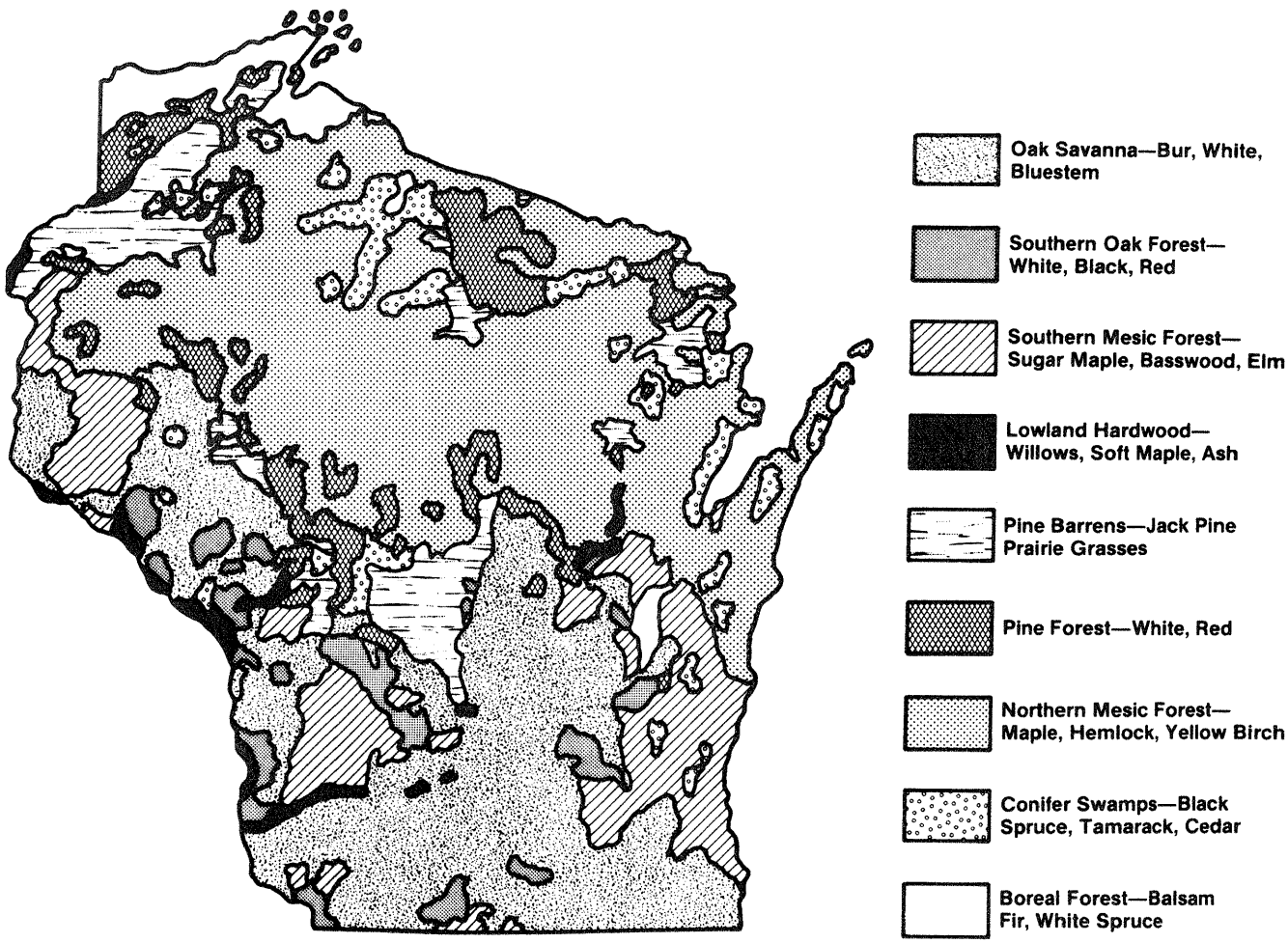

Figure 1.—*Early forest vegetation of Wisconsin.*

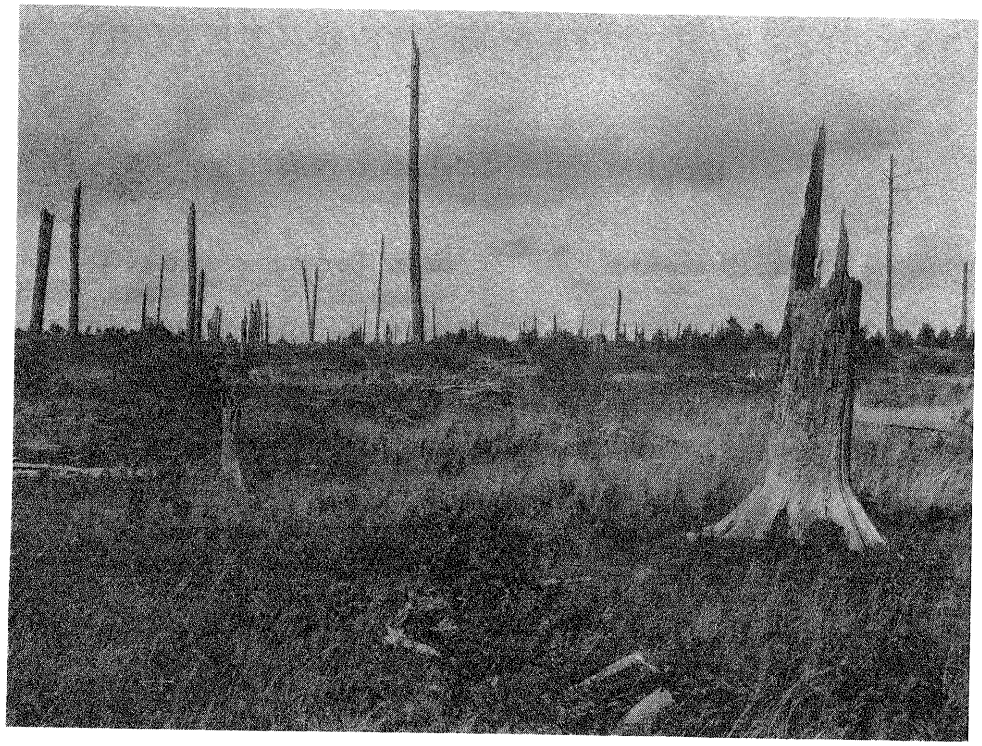

Figure 2.—*Deforested pine land in northern Wisconsin. Scattered jack pine reproduction may be seen in the background.*

the close of the Blackhawk War in 1832. From then on a steady stream of immigrants poured into the State. The pioneer farmers found trees an obstacle to clearing the land but a necessity to building their homes, barns, and first crude implements. The major assault on the forests of northern Wisconsin began shortly after the close of the Civil War. By 1870, Wisconsin mills were producing more than a billion board feet of lumber annually, and the demand for wood seemed insatiable. Steam replaced water-power, and bigger and faster mills with more efficient bandsaws were built. With ample timber for ties, bridges and fuelwood for the locomotives, logging railroads superceded the sleigh haul and river drive for transporting logs. By 1899, Wisconsin was leading the world in lumber production, sawing 3.5 billion board feet annually. The forests of Wisconsin had not only provided a wealth of lumber to the wood-starved prairies, but built the cities and transportation system of the State as well. The so-called inexhaustible forests, which most said were sufficient to supply the world for 100 years, almost disappeared in half that time (fig. 2).

Indeed, by the turn of the century, the face of the once magnificent Wisconsin forest had changed dramatically, but the bleakest days were yet to come. It was assumed that the plow would follow the ax in northern Wisconsin as it had in the south, but settlement could not keep up with the hell-bent pace of the logging companies and a bustling nation's demand for more wood. The forest was decimated and the northern land was a poor substitute for the rich agricultural land farther south.

By 1939, lumber production had dropped to one tenth of what it had been in 1899. The land was cut over and repeatedly burned over; a staggering amount was tax delinquent. The human despair of the Great Depression was perhaps a fitting culmination of what had happened to the Wisconsin landscape. The future could only be brighter. Out of the depression came federal work programs such as the Civilian Conservation Corps and the Work Projects Administration that would do much to heal the scarred land and greatly stimulate forestry work in the State.

Sound legislation, stable policies, consistent financial support, progressive leadership, and an enlightened citizenry have all contributed to the resurgence of the State's forests during the last half century. Many individuals, organizations, industries, public agencies, and educational institutions have made important contributions in this development. With few exceptions, like the Menominee Indian Reservation (fig. 3), Wisconsin's post-settlement forestry practices were not a monument to sound forest management, but today, the people of the State can be proud of their revitalized forests.

Figure 3.—*Old growth white pine on the Menominee Reservation.*

The information in this report is testimony that the efforts to rebuild and use the forest resources of Wisconsin wisely have been very successful.

FOREST AREA CLIMBS

Forest land, representing 44 percent of Wisconsin's land area, climbed from 14.9 to 15.4 million acres between 1968 and 1983. This 2.7-percent rise averages out to a gain of 27,000 acres per year. This increase is unique at a time when agricultural expansion and urbanization are swallowing up large quantities of forest land in other States. Wisconsin and Kansas are the only two States in the North Central Region to gain forest land in the last 15 years.

Commercial forest land, which accounts for 96 percent of the total forest land, rose from 14.5 to 14.8 million acres between 1968 and 1983, an increase of 1.5 percent. The average yearly gain was 15,000 acres during the 15 years between surveys. The annual rate of change, then, was (+) 0.1-percent compared to (−) 0.7-percent in Minnesota and (−) 0.5-percent in Michigan from the most recent inventories of the latter two States.

Table 1.-- Area of commercial forest land, Wisconsin, 1968 and 1983, and percent change between surveys

(In thousand acres)

Survey Unit	1968	1983	Percent change
Northeast Unit	4,062.0	3,828.5	(-) 5.8
Northwest Unit	5,246.4	5,150.8	(-) 1.8
Central Unit	2,831.8	2,950.9	(+) 4.2
Southwest Unit	1,493.1	1,920.0	(+) 28.6
Southeast Unit	903.5	909.2	(+) 0.6
All Units	14,536.8	14,759.4	(+) 1.5

The change in commercial forest land differed widely by Survey Unit (table 1). The Northeast and Northwest Units jointly showed a 3.5-percent decline in commercial forest area; the Central, Southwest, and Southeast Units jointly showed a 10.6-percent increase. Much of the decline in the north is attributable to the sharp increase in productive-reserved forest land, and much of the gain in the south stems from the reversion of wooded pasture to commercial forest land because of improved stocking levels on previously grazed land. Thus, to some extent, the increase in commercial forest land in Wisconsin is more the result of a deteriorating farm economy than an influx of young new forests. Agricultural statistics reported for Wisconsin for 1982 indicate that the number of cattle and dairy farms have declined almost 20 percent since 1973.[2]

The distribution of commercial forest by county shows the highest concentration in the northern two units, where commercial forests grow on 66 percent of the land area compared to 27 percent in the southern three units. The most heavily forested counties, all in the north, are Menominee (93 percent), Ashland (85), Forest (84), Bayfield and Iron (83), and Florence (82). The least heavily forested counties are generally found in the southern units (fig. 4). Most of these lightly forested counties are in portions of the State where the pre-settlement vegetation was dominated by prairie.

WILD AREAS SHOW SIGNIFICANT GAINS

Noncommercial forest land jumped from 409,000 to 592,000 acres between 1968 and 1983, a gain of 45 percent. Most of this increase was due to the 663-

[2]*Source: 1982 Wisconsin Agricultural Statistics, Wisconsin Department of Agriculture, Trade, and Consumer Protection.*

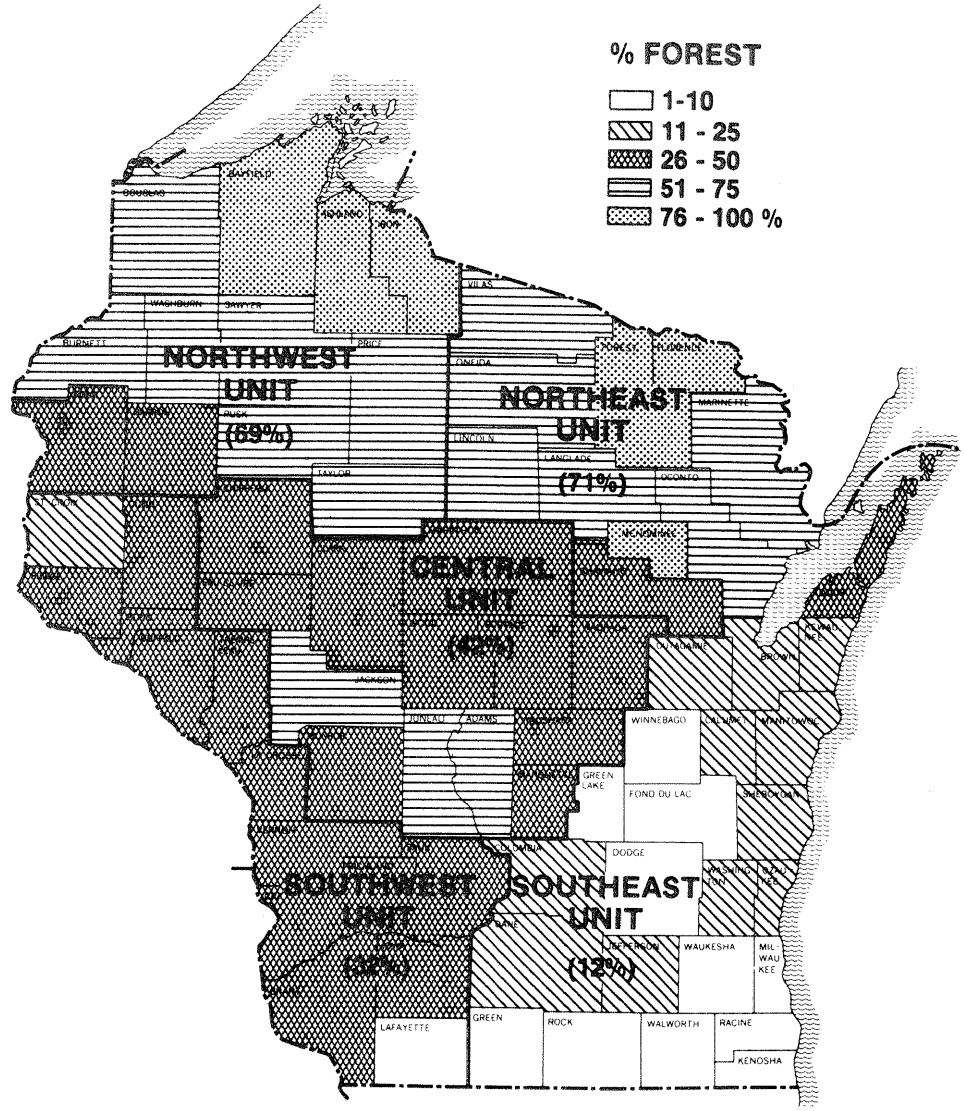

Figure 4.—*Wisconsin Forest Survey Units and percent forest cover by county, 1983.*

percent increase of productive-reserved forest land, from 34,000 to 261,000 acres. The new productive-reserved areas consist of scattered tracts throughout the State and include Rainbow Lake and Flambeau River Wilderness areas on the Chequamegon National Forest, Blackjack Springs, Whisker Lake and Headwaters Wilderness Areas on the Nicolet National Forest, the Apostle Islands National Lakeshore in Bayfield County, and the St. Croix Wild and Scenic Riverway corridor.

State-owned reserved areas include wild areas in Buckhorn and Copper Falls State Parks and the St. Croix and Brule State Forests as well as many other smaller parcels set aside since the last inventory, including small tracts purchased or leased by the State for recreation or wildlife management. Most of the larger areas were classed as commercial forest before they were designated as places where timber harvesting would be precluded and, therefore, they represent much of the reason for the commercial forest decline in the northern units between surveys.

Unproductive forest land, that incapable of growing crops of industrial wood because of adverse site conditions, declined between surveys, from 374,000 to 331,000 acres. Much of this change was the result of unproductive forest land being included in newly designated reserved areas.

MOST FOREST LAND UNCHANGED

The remeasurement of plots established during the 1968 inventory permitted an overview of land use changes on land classified as commercial forest

15 years ago. Analysis of the plots showed that 94 percent of them remained commercial forest land in 1983. Of the plots that changed land use, one-third were converted to water or marsh, often the result of beaver activity, and one-third were converted to the urban and related classification as shown in the following tabulation:

1983 land use class	Percent of remeasured commercial forest plots by land use class in 1983
Commercial forest	94.0
Urban and related	1.9
Water and marsh	1.9
Cropland	0.7
Productive-reserved forest	0.8
Unproductive forest	0.2
Pasture and range	0.5
Total	100.0

The above data refer only to land classified as commercial forest during the 1968 survey. There have also been additions to the commercial forest land base from land previously classified as noncommercial forest or nonforest. The wooded pasture situation in southwest Wisconsin described earlier is one example. Another example is the nonforest land planted to conifer plantations, an estimated 127,000 acres in the State since 1968.

EXTENSIVE ACREAGE SUFFERS DAMAGE

As they remeasure field plots, our survey crews gather information about human-caused disturbance or improvement to the timber stand in the last 20 years. They also record any damage (natural or human-caused) to the stand. The estimate of stand history that results from this information is useful in gauging the condition and utilization of the State's commercial forest.

Observable damage was recorded on 653,000 acres of commercial forest land. Most of this damage (87 percent) was due to natural causes such as disease (Dutch elm, blister rust, cankers, etc.), wind, fire (natural, accidental, or arson), and insects (budworms, borers, etc.). Although most forest fires are caused by human activity, they are classed as natural damage because less than 10 percent are deliberately set and the field crew does not attempt to determine those set. Blowdowns are also a normal occurrence in the forests of Wisconsin. The major "downburst" of July 4, 1977, in northern Wisconsin and Minnesota that claimed more than 40,000 acres of forest land was a severe example of a routine natural event in the State's forest history. Thirteen percent (87,000 acres) of the observed damage was the result of human activities such as spraying, draining, or flooding. This latter group of activities is generally the result of deliberate changes in land use management.

Between 1964 and 1983, 80 percent of the commercial forest (11.8 million acres) was undisturbed by man and suffered no major damage (table 2). The changes that did occur in this area were the result of natural processes.

Since 1964, 1.7 million acres have been harvested, 12 percent of the commercial forest. Partial cutting was observed on 72 percent of the harvested area, and clearcutting accounted for the remaining 28 percent. Although forest industry and county lands make up only 8 and 15 percent of the commercial

Table 2.--Area of commercial forest land by treatment class or damage and ownership class, Wisconsin, 1968-1983

(In thousand acres)

Treatment or damage class	Ownership class							
	All owners	Federal	State	County and municipal	Indian	Forest industry	Farmer	Misc. private
No disturbance	11,825.1	1,095.7	455.6	1,747.8	293.1	846.8	2,760.4	4,625.7
Timber stand improvement	135.3	40.9	6.2	9.0	3.6	14.4	18.6	42.6
Harvest								
Clearcut	470.6	74.3	28.3	152.4	8.8	86.8	27.3	92.7
Partial cut	1,232.2	100.4	23.4	171.5	27.0	130.6	343.2	436.1
Damage								
Natural	566.5	66.5	37.9	72.2	21.2	51.2	140.6	176.9
Human caused	86.7	1.9	6.0	6.2	--	5.3	36.0	31.3
Artificial regeneration of forest land	66.4	21.6	7.6	10.8	--	13.4	2.2	10.8
Artificial regeneration of nonforest land	60.2	10.3	--	1.8	--	5.2	7.1	35.8
Natural regeneration of nonforest land	316.4	6.9	4.4	8.1	--	2.3	178.3	116.4
All treatments	14,759.4	1,418.5	569.4	2,179.8	353.7	1,156.0	3,513.7	5,568.3

forest, respectively, these lands accounted for 13 and 19 percent of the acres harvested by all owners. Federal, State, and Indian lands had harvesting activity roughly proportional to their share of the commercial forest land base. Nonindustrial private owners were the only group to have less than their proportional share of harvesting activity.

The next most extensive treatment was timber stand improvement, performed on 0.1 million acres, 1 percent of the total commercial area. This work (mostly thinnings) was done fairly equally on both public and private forest land.

Tree planting occurred on 127,000 acres, 1 percent of the total area. About one-half of the tree planting was done on land that was nonforest during the last 20 years. Again, public and private land received the benefits of this treatment equally.

MOST COMMERCIAL FOREST LAND IN NONINDUSTRIAL PRIVATE OWNERSHIP

Private parties (other than farmers) own the largest share of the State's commercial forest, 5.6 million acres or 38 percent of the total. When combined with the 3.5 million acres owned by farmers (24 percent of the total), the resulting 9.1 million acres of nonindustrial private-owned commercial forest represents more than half of Wisconsin's total (fig. 5). Nonindustrial private owners are a diverse

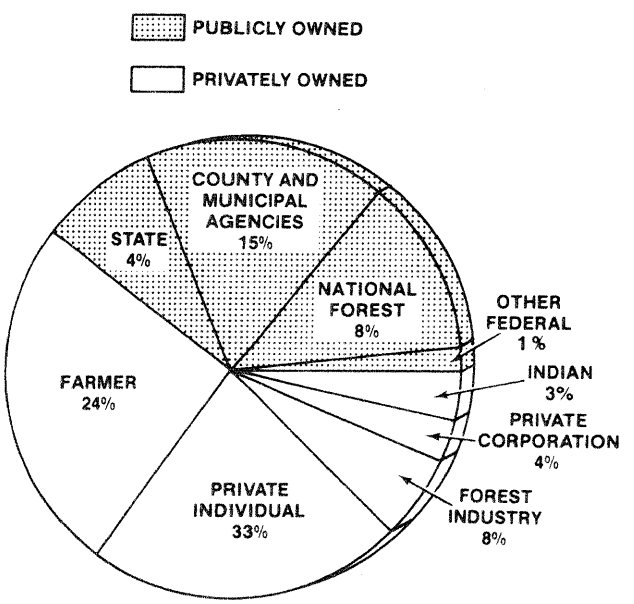

Figure 5.—*Area of commercial forest land by ownership class, Wisconsin, 1983.*

group, representing many persons with contrasting backgrounds, goals, and management strategies. The fact that this group owns 62 percent of the commercial forest and accounts for 58 percent of the acreage of management activity in the last 20 years certainly indicates that forest management opportunities are not unknown to Wisconsin's private landowners.

Nonindustrial private parties own similar acreages in the combined northern two units (4.2 million acres) and in the south (4.8 million acres). There is a sharp contrast, however, in how these areas compare to total forest land in their respective regions. Nonindustrial private owners control 84 percent of the commercial forest land in the southern units compared to only 47 percent in the north.

Fifty-nine percent of the nonindustrial private forest land is owned by parties with at least 50 acres of commercial forest land. Another 28 percent is owned by parties with 21 to 50 acres as shown in the following tabulation. These areas represent the total area owned by an individual, and may include one or more non-contiguous tracts.

Size of holding	Area owned by nonindustrial private parties	
(Acres)	(Thousand acres)	(Cumulative percent)
5,001+	119.0	1
2,501-5,000	49.7	2
501-2,500	333.9	6
101-500	2,569.0	34
51-100	2,265.2	59
21-50	2,565.3	87
11-20	683.9	95
5-10	316.0	98
1-4	180.0	100
Total	9,082.0	

More than half of the nonindustrial private forest land has been owned by the same party for 10 years or more:

Owner tenure	Area owned by nonindustrial private parties	
(Years)	(Thousand acres)	(Cumulative percent)
20+	2,333.4	26
10-19	2,731.3	56
5-9	1,976.7	78
1-4	2,040.6	100
Total	9,082.0	

COUNTY AND LOCAL GOVERNMENTS OWN 15 PERCENT OF COMMERCIAL FOREST

Wisconsin's county and local governments own 2.2 million acres of commercial forest, half of which is in the Northwest Unit. The Forest Crop Law and the County Forest Reserve Law, enacted in the late 1920's, allowed for the establishment of county forests to deal with the critical problem of tax delinquent, cut-over, and burned land. Nearly 90 percent of the county forest acreage in the State was acquired between 1930 and 1933. The largest county forest is in Douglas County (226,000 acres), and the smallest is in Monroe County (about 7,000 acres). In the Nation, Wisconsin ranks second only to Minnesota in total acres of commercial forest land in county ownership.

The Nicolet and Chequamegon National Forests, established in 1928 and 1933, respectively, comprise 1.2 million acres (8 percent) of commercial forest and owe much of their beginnings to the same conditions that gave birth to the county forests. All the national forest land is in the northern two units. State forests comprise 0.6 million acres (4 percent). Wisconsin has the lowest acreage of State-owned forest land in the Lake States[3]; Minnesota has 2.7 million acres and Michigan has 3.6 million acres of commercial forest land in State ownership.

Industry also holds 1.2 million acres of commercial forest with 88 percent of this land in the northern units. Practically all (93 percent) forest industry land is owned by companies with holdings of more than 5,000 acres. Fifty-three percent of forest industry land has been held by the same owner for at least 20 years. Another 29 percent has been held for at least 10 years.

The remaining 0.5 million acres of commercial forest are in miscellaneous federal agency and Indian ownership (accounting for 1 and 2 percent, respectively).

MAPLE-BIRCH AND OAK-HICKORY TYPES GAIN REGIONALLY

Maple-birch stands are increasing their dominance in Wisconsin's forests. The 4.0 million acres in the maple-birch forest type in 1983 represent 27 percent of the commercial forest, compared to the 3.5 million acres in 1968 comprising 24 percent of the total. The maple-birch type is most extensive in the northern two units where it amounts to nearly one-third of the region's commercial forest area. This increase is expected to continue as older aspen and birch stands mature and succeed to northern hardwoods. In the southern units, 2.3 million acres of oak-hickory represent the dominant forest type accounting for 40 percent of commercial forest area in that region, a 7-percent increase since 1968.

Twice as many forest types gained area between surveys as did types that lost area, as seen in table 3. The largest area increase was the 475,000 acres gained by the maple-birch type, but the greatest proportional increase was the 54-percent jump made by the red pine type. Other large gains occurred in oak-hickory (194,000 acres) and paper birch (87,000 acres). The largest area loss was the 403,000-acre decline registered by the aspen type. However, the 57-percent reduction in nonstocked area between surveys was the highest proportional loss. Other large losses were taken by the jack pine type (181,000 acres) and balsam fir (133,000 acres).

A few examples will help explain how to use table 3. If you wish to know what became of the 727,600 acres of jack pine found during the 1968 survey, simply read across the jack pine row in table 3 and observe that 433,400 acres are still jack pine, 41,000 acres are now typed red pine, 126,900 acres are typed oak-hickory, 70,000 acres are now aspen type, 5,900 acres are nonstocked, and 50,400 acres are no longer commercial forest. To determine the source of the current jack pine acreage, read down the jack pine column. This shows that 433,400 acres of jack pine have been retained in the type, 8,900 of the current jack pine acreage came from the red pine type, 5,400 acres from the tamarack type, 33,400 acres from the aspen type, 65,400 acres came from land that was not classified as commercial forest in 1968, and the current total acreage of jack pine type is 546,500 acres. The change recorded for jack pine was a decline from 727,600 acres to 546,500 acres or a 24.9-percent loss.

ASPEN ACREAGE CONTINUES TO DECLINE

The second largest forest type Statewide is aspen with 3.3 million acres or 22 percent of the total commercial area. Unlike the maple-birch type, the aspen type declined in area between inventories—from 3.7 million acres in 1968. Aspen is a pioneer species, and stands that are predominantly aspen live about 40 to

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

Table 3.-- Forest land classification changes in Wisconsin, 1968-1983

(In thousand acres)

1968 land classification	1968[2/] area	1983 land classification[1/]														
		Commercial forest land - forest type														
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack	Oak-hickory	Elm-ash soft maple	Maple-birch	Aspen	Paper birch	Exotic	Nonstocked	Noncommercial forest and nonforest land
Commercial Forest																
Jack pine	727.6	433.4	41.0	--	--	--	--	--	--	126.9	--	--	70.0	--	--	5.9	50.4
Red pine	310.2	8.9	256.5	22.4	--	--	--	--	--	1.3	--	--	13.7	--	--	--	7.4
White pine	177.6	--	7.7	122.5	--	--	--	--	--	7.9	7.6	25.0	--	--	--	--	6.9
Spruce-fir	628.0	--	8.2	--	296.2	34.3	8.8	40.8	--	--	23.8	60.9	113.2	19.4	--	--	22.4
Black spruce	235.9	--	--	5.4	11.7	--	177.0	5.6	17.4	--	5.8	--	--	--	--	--	13.0
Northern white-cedar	302.4	--	--	--	23.1	--	6.3	207.0	--	--	29.5	7.2	--	12.8	--	--	16.5
Tamarack	222.2	5.4	--	--	10.7	7.8	9.4	--	177.4	--	5.5	--	--	--	--	--	6.0
Oak-hickory	2,664.9	--	27.0	--	--	--	--	--	--	1,959.3	25.7	327.7	118.4	24.6	--	--	182.2
Elm-ash-soft maple	1,157.6	--	--	--	13.6	--	--	22.8	--	20.3	699.8	182.5	68.2	21.1	--	8.1	121.2
Maple-birch	3,521.5	--	--	21.5	7.6	--	7.0	11.2	--	158.3	161.6	2,870.7	160.7	14.8	--	--	108.1
Aspen	3,664.6	33.4	49.9	38.1	48.2	--	13.3	--	7.8	123.0	137.3	367.1	2,521.4	102.3	--	25.3	197.5
Paper birch	554.5	--	7.8	--	8.2	--	--	9.0	7.7	33.0	34.1	92.5	59.9	285.4	--	--	16.9
Nonstocked	369.7	--	--	8.3	--	--	--	--	--	103.2	27.5	62.4	17.4	8.3	--	17.2	125.4
Noncommercial forest and nonforest land	20,296.1	65.4	80.1	7.4	0.1	19.3	51.2	74.3	12.4	325.5	82.4	.9	118.6	152.9	2.2	103.9	19,199.5
All land classes	34,832.8	546.5	478.2	225.6	419.4	61.4	273.0	370.7	222.7	2,858.7	1,240.6	3,996.9	3,261.5	641.6	2.2	160.4	20,073.4
Percent net change (1968-1983)		(-24.9)	(+54.2)	(+26.8)	(-23.4)		(+15.7)	(+22.6)	(0.0)	(+7.2)	(+7.2)	(+13.2)	(-11.0)	(+15.7)	(--)	(-56.6)	(-1.0)

[1/] Read across rows to determine dispersion of 1968 classes to 1983 classes. Read down columns to determine origin of 1983 classes.

[2/] Total land area adjusted to conform to 1980 census figures.

60 years before beginning to deteriorate and to be replaced by a new stand, not always aspen. Therefore, aspen stands older than 60 years are prime candidates for conversion to other types, especially those with understories that are not aspen. In Wisconsin, 268,000 acres of the aspen type (8 per cent of the type area) are more than 60 years old.

Much of the gain of the maple-birch type from 1968 to 1983 came at the expense of the aspen type as mature aspen stands gave way to their more tolerant understories, some of which were made up of species associated with the maple-birch type.

More than one-fourth of the aspen type (861,000 acres) also supports a natural coniferous understory. If these stands are not managed to favor aspen in the future, some of them will convert to a conifer type, primarily balsam fir. Clearcutting aspen tends to bring about pure aspen stands on the same site. As more aspen stands are harvested, the steady decline of area in the aspen type between 1936 and 1983 may slow and reverse. The large acreage in stands aged 1-20 years (1.1 million acres) suggests that this process may have begun.

The aspen type is most widespread in the northern two units where it comprises 28 percent of the forest area.

Survey year	Area of aspen type (Thousand acres)
1936[4]	5,117
1956[4]	4,161
1968	3,665
1983	3,262

POLETIMBER AND SAWTIMBER DOMINATE REGIONALLY

The distribution of timber by stand-size class is not uniform throughout the State. In the northern two units 4.4 million acres (49 percent) of the stands are poletimber, while in the south 2.4 million acres (42 percent) of the stands are in the sawtimber size class.

Poletimber stands in Wisconsin account for the largest area by stand-size class—6.2 million acres or 42 percent of the total. This compares to a national average for the proportion of poletimber stands of 38 percent. The Lake States is the only region of the country where sawtimber stands do not predominate. This reflects the continual rebuilding and maturation of stands from the cutover and burned over conditions in the late 19th and early 20th centuries. It also reflects the domination of pole and small sawtimber size material for timber products as the primary objective of management on several million acres of forest land.

Sawtimber stands make up 32 percent of the State's commercial forest area, more than in the other two Lake States, but substantially lower than the national average of 45 percent. In 1968 sawtimber stands represented 21 percent of the State total (fig. 6).

The largest area of sawtimber stands is in the maple-birch and oak-hickory forest types (1.5 million acres each), but the highest proportion within any forest type is 70 percent in the white pine type.

OAK-HICKORY AND JACK PINE ON WIDEST RANGE OF SITES

Although not the most abundant type in Wisconsin, jack pine is one of the most likely forest types to be found across the entire range of physiographic classes. Physiographic class is a measure of soil and water conditions on a site that affect tree growth. The five classes are a continuum, ranging from exceptionally wet sites (hydric) to very dry sites (xeric). Jack pine, which tends to be a dry site type, was found on 156,500 acres of mesic to hydric sites. This constitutes 29 percent of the total jack pine type found in the recent inventory. Oak-hickory, also generally considered a dry site type, was found on 97,300 acres of hydromesic and hydric sites (3 percent of the total oak-hickory type). Bur oak was the dominant species on the latter sites along with elm and red maple.

The mid-point of the physiographic classes contains sites where conditions are most favorable for growth for most species (mesic). Sixty-five percent of Wisconsin's commercial forest land occupies mesic sites, including 92 percent of the maple-birch type, at least 75 percent of the oak-hickory and paper birch types, and more than 70 percent of the white spruce, aspen, and white pine types.

In general, forest types found on drier sites in Wisconsin are jack pine, red pine, upland oak-hickory, and exotic conifers. Wet site types include black spruce, northern white-cedar, tamarack, and elm-ash-soft maple. Figure 7 shows the distribution of

[4]*Estimated from inventory data for combined aspen-birch type.*

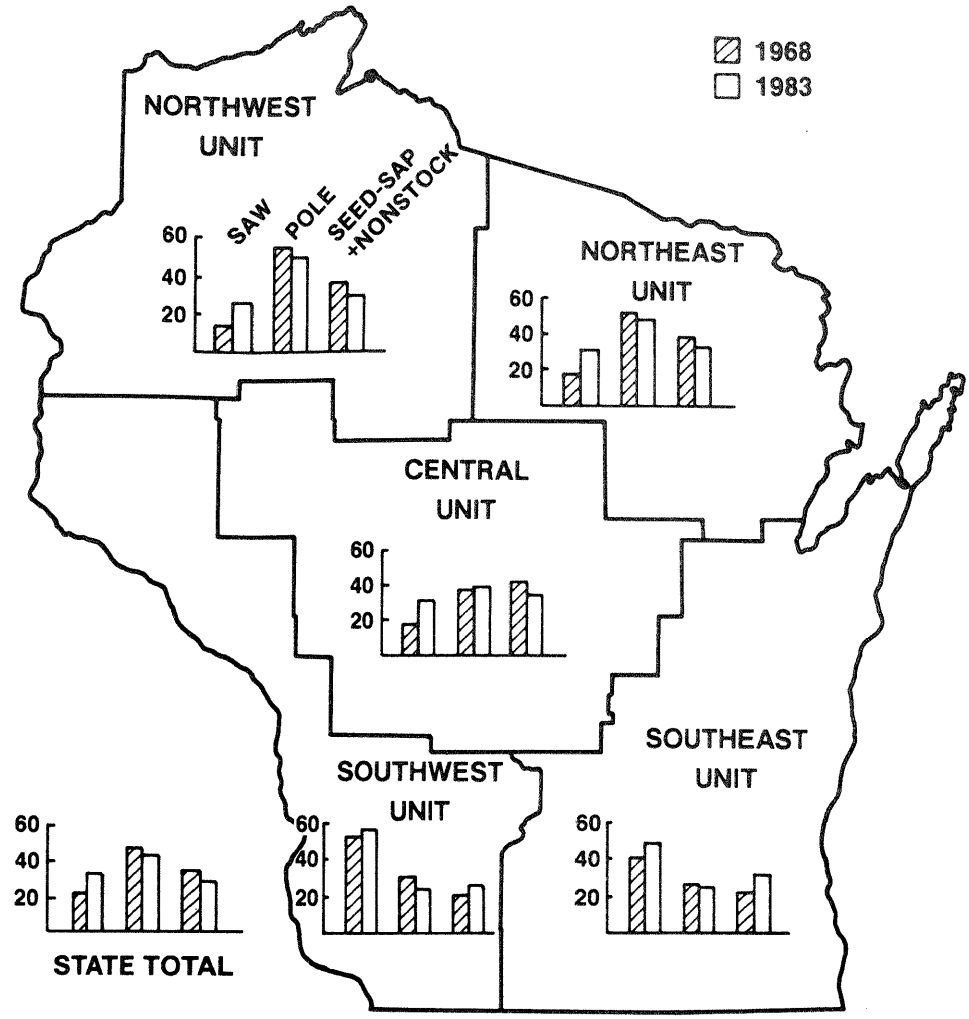

Figure 6.—*Distribution of commercial forest land by Survey Unit, survey year, and stand-size class.*

acreage within each forest type by physiographic class.

AVERAGE SITE INDEX IS 64 FEET

Site index provides another perspective of forest site quality by classifying forest land in terms of the height growth made by dominant or codominant trees of selected species at 50 years of age. Eighty-four percent of the State's commercial forest (12.4 million acres) grows trees taller than 51 feet at age 50, and 11 percent of the total area grows trees taller than 81 feet (fig. 8). Site index values fluctuate by forest type. A site index in the high range for one type may be considered average for another type. If a forest type is converted to another type, the new site index for that site may bear little resemblance to the old one.

The weighted average site index for all types in Wisconsin is 64 feet, compared to the Lake States average[5] of 60 feet. The highest weighted average of any forest type in the State is 70 feet for the aspen type, followed by red pine (69 feet), maple-birch (67 feet), paper birch (66 feet), white pine (64 feet), oak-hickory (63 feet), jack pine and white spruce (62 feet), and elm-ash-soft maple (61 feet). The lowest average is 39 feet for the northern white-cedar and black spruce types.

SITE CLASS—ANOTHER WAY OF LOOKING AT SITE QUALITY

Another indicator by which the quality of a forest site can be judged is site class. Site class is a means

[5]*Based on 1983 data for Wisconsin, 1980 data for Michigan, and 1977 data for Minnesota.*

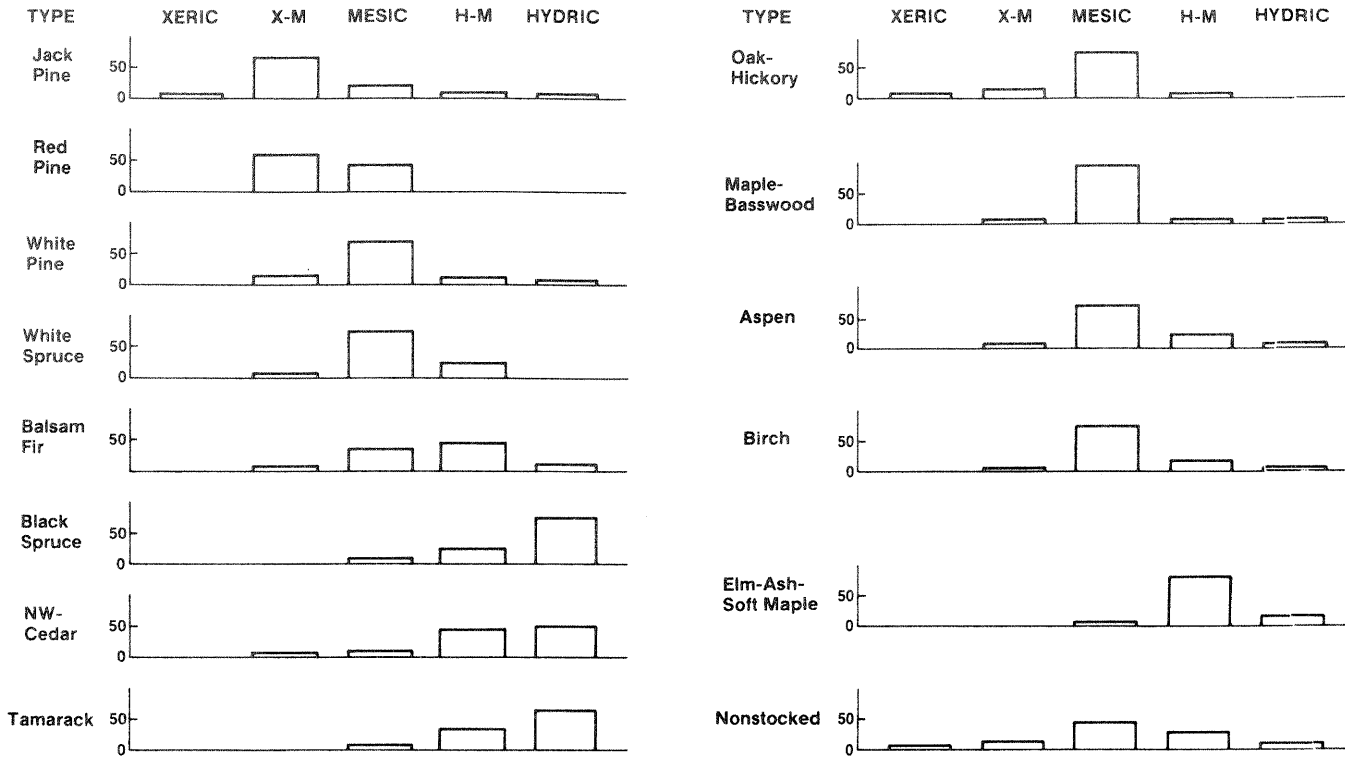

Figure 7.—*Distribution of commercial forest land by forest type and physiographic class, Wisconsin, 1983.*

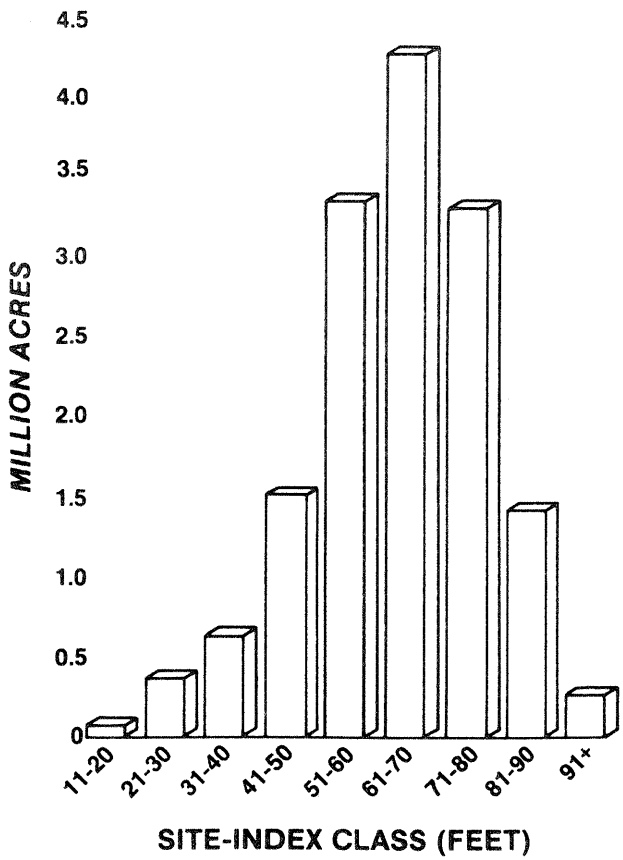

Figure 8.—*Area of commercial forest land by site-index class, Wisconsin, 1983.*

of describing forest land in terms of its inherent capacity to grow wood based on the culmination of mean annual increment[6] for fully stocked natural stands. Site class values are the cubic feet of growth per acre per year that might be expected if the above conditions are met.

The weighted average site class for Wisconsin is 67 cubic feet of growth per acre per year, compared to the Lake States average of 64. The highest average among types in the State is the 103 cubic feet per acre per year of the red pine type, followed by the balsam fir type (99 cubic feet), white pine (90 cubic feet), white spruce (80 cubic feet), and aspen (79 cubic feet). The most dominant forest type in terms of area, maple-birch, has an average productivity of 65 cubic feet per acre per year.

MOST PLANTATIONS LESS THAN 30 YEARS OLD

Forest plantations were classed into forest types according to intended dominant land use. Therefore,

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

a field plot that fell in a red pine plantation beneath an overstory of species associated with the maple-birch type would be typed red pine if there was clear indication that the plantation was to be the dominant land use. The type assigned to a plantation always corresponds to the species planted.

Forest plantations totaled 622,000 acres in 1983. Fifty-eight percent of the plantations are under 30 years of age, having been planted from 1953 to 1982. This recent surge reflects the State's aggressive forest management policies and partially explains the increase in forest land since the last inventory. Some of the heaviest plantation activity occurred in the Central Unit where more than 65 percent of the plantations are less than 30 years old. Plantation establishment has sharply declined in the last 10 years, however; establishment rates are about half that of the previous two decades.

Plantations are more prominent in the northern units, but significant acres are found in the south:

Survey unit	Area of plantations (Thousand acres)	Percent of total
Northeast Unit	162.1	26
Northwest Unit	192.9	31
Central Unit	179.9	29
Southwest Unit	55.9	9
Southeast Unit	31.5	5
All Units	622.3	100

Plantations in the red pine type are the most extensive with 378,000 acres, 61 percent of the total plantation area. Jack pine is the second largest plantation type with 139,000 acres (22 percent of the total), followed by white pine with 55,000 acres (9 percent), white spruce with 40,000 acres (6 percent), and other species and nonstocked with 10,000 acres (2 percent).

STOCKING OF GROWING-STOCK TREES IS GOOD

Eighty-one percent of the commercial forest (12.0 million acres) is at least 61 percent stocked with growing-stock trees (medium stocking or better). Of this area, 1.0 million acres is overstocked with trees (134 percent stocked or more).

Although these figures indicate that the level of stocking of forests in the State is not a major problem, the seedling-sapling and sawtimber stands are stocked more sparsely than those in the poletimber stand-size class. More than one-fifth of seedling-sapling and sawtimber stands are poorly stocked (16.7 to 60.9 percent stocked), compared to 13 percent of poletimber stands. Many of the sawtimber stands are poorly stocked because of past grazing (fig. 9).

ONE-HALF OF FOREST WITHIN 1/4 MILE OF ROAD

The proximity of stands to maintained roads is an indicator of potential use by man—whether for timber harvesting, recreation, or other use. In Wisconsin, 50 percent of the commercial forest is within one-fourth mile of a maintained road (one graded at least once a year), and 97 percent of it is within 1 mile of a maintained road:

Distance to road	Area of commercial forest land	
(Miles)	(Thousand acres)	(Cumulative percent)
0 - 1/8	4,035.3	27
1/8 - 1/4	3,276.3	50
1/4 - 1	6,959.2	97
1 - 2 1/2	481.5	100
2 1/2 - 5	7.1	100
Total	14,759.4	

MOST OF FOREST WITHIN 1 MILE OF WATER

The nearness of a forest stand to a body of open water may have an impact on its recreational potential or its operability if a watershed is threatened. Fifty-six percent of the State's commercial forest is within one-fourth mile of water—a river, stream, lake, farm pond, swamp, or bog. Thirty-nine percent is within one-eighth of a mile of water:

Distance to water	Area of commercial forest land	
(Miles)	(Thousand acres)	(Cumulative percent)
0 - 1/8	5,738.6	39
1/8 - 1/4	2,594.9	56
1/4 - 1	5,209.7	92
1 - 2 1/2	1,011.5	99
2 1/2 - 5	195.4	100
5 - 10	9.3	100
Total	14,759.4	

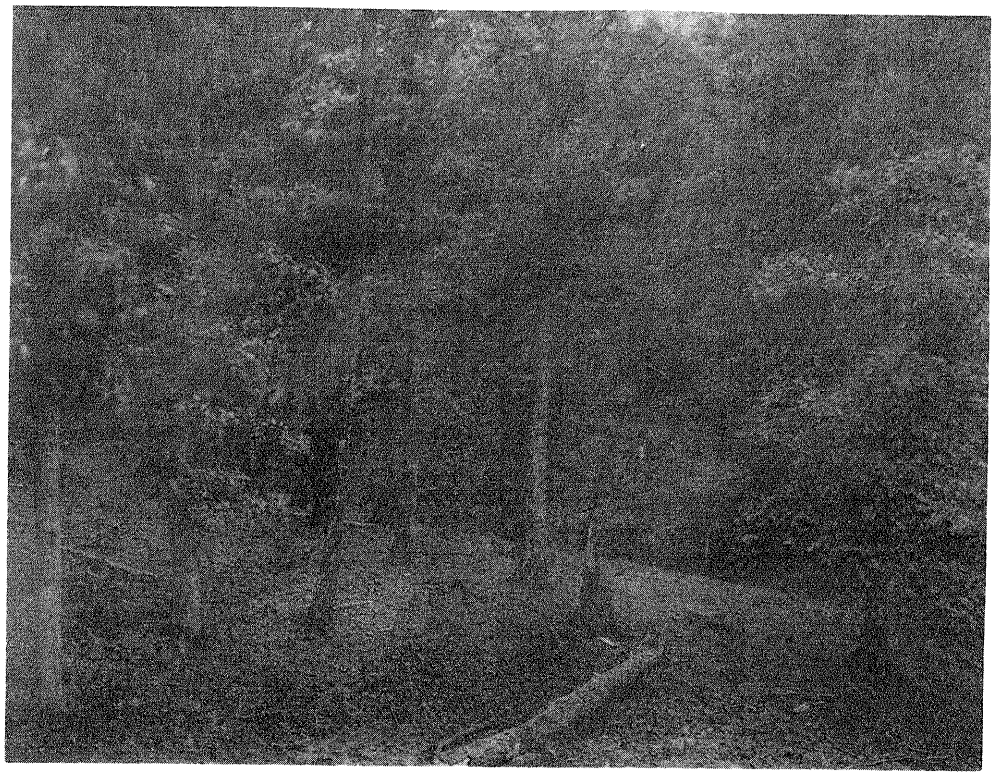

Figure 9.—*Oak forest in southern Wisconsin where pasturing has eliminated most reproduction.*

NONFOREST LAND WITH TREES—AN ADDITIONAL RESOURCE

Besides commercial and noncommercial forest land, trees grow on some nonforest land too—many trees in some cases. To be classed as nonforest land with trees, an area must contain at least one tree per acre that is at least 5 inches in diameter at breast height (d.b.h.). Such areas amount to 1.2 million acres in Wisconsin.

Improved pasture constitutes the largest portion of this area with 322,300 acres, as shown in the following tabulation. In general, nonforest land with trees offers some opportunities for management and harvest, particularly for fuelwood. However, the small areas involved and the scattered frequency of the trees often impose economic constraints on the harvest of other timber products.

Land use	Area of nonforest land with trees (Thousand acres)
Improved pasture	322.3
Marsh	312.6
Urban and other	244.3
Wooded pasture	112.1
Idle farmland	110.5
Cropland	54.1
Wooded strips	45.0
Windbreaks	40.8
Total	1,241.7

FOREST-RELATED NONTIMBER RESOURCES[7]

Geology and Soils

The basic underlying geological material in Wisconsin is of precambrian origins. These ancient rocks appear at or near the surface in the northern one-third of the State and plunge to nearly 3,000 feet below the surface in the south. Much of the mineral wealth of the State is associated with these rocks. After their formation came layers of sedimentary rocks such as dolomite limestone, sandstone, and shale covering the southern two-thirds of the State.

The advancing and receding continental ice sheets or glaciers played the final role in developing most of the topography of current day Wisconsin. The grinding and scouring action of the ice leveled hills and filled valleys, leaving an unsorted mixture of boulders, gravel, sand, silt, and clay materials. As the ice receded, it left many water-formed deposits of outwash and ice-contact drift such as eskers and lacustrine sediments.

Glacial "drift" or "till" covers more than three-fourths of the State, ranging in depth from a few feet to several hundred feet. Only one portion of the State, the southwest corner, was not overcome by the ice sheets. This area is called the "Driftless Area" (lacking glacial drift) and is defined basically by those counties in the Southwest Survey Unit (fig. 4) south of Pepin County. Although the driftless area was not in direct contact with the ice sheet, it was invaded by outwash and covered with windblown loess after glacial activity in surrounding areas. The topography of this region has been completely shaped by the erosive forces of water. Thus the effect of water, either as liquid or solid, has been the dominant artisan in sculpting and defining the topography upon which the current flora and fauna of Wisconsin reside.

Minerals

Wisconsin has a variety of metallic and non-metallic mineral resources that play an important role in the State's economy. Some of the earliest settlements in Wisconsin centered around shallow lead and zinc deposits in the southwestern portion of the State. In fact, this area was the most important lead producing area in the nation from 1830 to 1871. Other metallic ores found in measurable quantities in the State include copper and iron. There is currently no metallic mining in progress in Wisconsin. The taconite mine in Jackson County and the zinc mine at Shullsburg have recently closed, and the copper-zinc mine in Forest County is only in the developmental stage. These various ore deposits are still substantial, however, and given the right economic circumstances they will again be mined.

Non-metallic mineral mining includes sand and gravel, crushed stone (dolomite, granite, taprock, sandstone, and quartzite), dimension or building stone (dolomite, granite, sandstone), clay, peat, and natural abrasives (silica sand). This type of mining is generally on the surface, occurs throughout the State, and is tied directly to the construction industry.

Extracting these resources can have serious consequences for the forest if not carefully planned and implemented. Proper land use management, esthetics and water quality are all valid areas of concern. These, along with many other considerations are the foundation of the complex regulations that have evolved to ensure that a conscious effort will be made to protect the environment to the greatest degree possible without putting the public at risk. No known threatened or endangered species have been adversely affected by mining or drilling operations in Wisconsin to date.

Wisconsin legislation requires close supervision by the DNR to ensure protection of the environment and requires environmental impact statements, reclamation plans, mining permits, and public hearings. State and local agencies, as well as private landowners and environmental interest groups, act as "watchdogs" on the entire mine development process. Mining on federal land where the federal government retains the mineral rights also needs federal permits and impact statements filed with the Department of Interior Bureau of Land Management. Chapters NR130, 131, and 132 of the Wisconsin Administrative Code can be referenced for procedures and standards relating to metallic mineral exploration, prospecting, and mining. Wisconsin currently has no comprehensive laws regarding the mining of non-metallic resources.

[7]*The text on nontimber and related resources is based on information from Wisconsin's Soil, Water, and Related Natural Resources: An Appraisal prepared by the Wisconsin State Board of Soil and Water Conservation Districts, February, 1980.*

Fish and Wildlife

Fishing is a popular pastime in Wisconsin as evidenced by the catch of nearly 116 million fish in 1977. Bass, perch, and panfish were the most abundant catch followed by trout, walleye, northern pike, salmon, and muskellunge. For many reasons, these fish may be thought of as a forest resource. The forest helps provide the high-quality silt-free water that is essential to basic fish habitat. By shading streambanks and lakeshores, the forest may help to maintain lower water temperatures that are essential to fish species such as trout. In 1977, more than 157 million fish were released in Wisconsin lakes, rivers, streams, and adjacent Great Lakes by the Wisconsin DNR. In additon to stocking, the State also provides assistance in fish management to landowners with programs such as the Trout Stream Habitat Management Program, funded by the sale of annual trout stamps.

Water pollution, including sedimentation, industrial wastes, non-point-source pollutants from agricultural land and roads, and possibly acid rain pose the greatest threats to fish habitat. To date there is little evidence that forest management practices are threatening water quality in the State.

Wildlife species are abundant in Wisconsin and can be generally divided into two broad groups—game and nongame species. Most attention is focused on game animals, but the nongame group is receiving increased consideration. In 1978, concern and awareness of nonconsumptive uses of wildlife prompted the Wisconsin Legislature to begin appropriating general revenues for endangered and nongame species.

Songbirds and raptors are perhaps the best known nongame animals because of their easy viewing during the day. Woodpeckers, warblers, wrens, herons, falcons, hawks, and eagles are a few of the hundreds of species enjoyed by birdwatchers throughout the State. Other nongame animals include shrews, moles, mice, rats, and other small nocturnal animals that are rarely seen.

Game animals are those harvested by hunting or trapping. Public involvement in providing quality hunting began in 1927 with acquisition of Horicon Marsh in Dodge County. Today nearly 700,000 acres of State purchased or leased land are available to the public for hunting and fishing. This land, managed by the Wisconsin DNR, consists of nearly 300 separate parcels in 69 counties throughout the State. Emphasis has been placed on acquiring areas in the southern portion of the State where public land is not as plentiful as in the northern counties.

The most widely hunted forest game animals are rabbit, squirrel, ruffed grouse, and whitetail deer. Because of hunting pressures, these species are often the focus of habitat management and research.

The structure and condition of the forest is usually a key ingredient in proper management of these species. The success of ruffed grouse, for example, is closely related to the condition of the aspen forests. To flourish, the grouse need three broad age classes of aspen. Broods of ruffed grouse do best in aspen stands less than 10 years old because the dense young trees provide protection from raptors, the primary predator of ruffed grouse. Stands of aspen between 10 and 30 years old are preferred cover for adult birds, and mature stands of aspen are the source of male aspen flowers, which are a primary food source for these game birds.

Whitetail deer are abundant in the forests of Wisconsin; although populations differ from area to area, the overall average for the State is roughly 65 deer per thousand acres of forest land. Much of the success of the deer population in Wisconsin can be attributed to logging pressure created by forest industry. The demand for industrial roundwood, particularly aspen, which is harvested by clearcutting, provides substantial areas of new growth for deer browse throughout the northern portion of the State. The extensive conifer forests of this region also provide excellent winter cover.

In the southern portion of the State, where mature oak forests generally provide little food and cover, intensive management techniques must be employed to preserve viable populations of animals. Much of this activity is focused on land purchased or leased by the State for wildlife purposes.

Other species closely linked with the forest are raccoon, mink, beaver, fox, and bear. Bears, once on their way to extinction in the State, are now plentiful enough to have a limited hunting season each year.

The key ingredients in the management of diverse wildlife habitats are protection and manipulation. Protection means setting aside and saving certain habitats that are unique, rare, or endangered, and blocks of forest that can be arranged for wildlife. Habitat manipulation is used to provide a variety of habitats within a forested area or between a forested and nonforested area. Consideration is given to the amount of interspersion and edge as well as the plant species composition, vertical structure, and the

size and type of openings. Important techniques in developing and maintaining of diversified habitats are harvesting timber to encourage young desirable vegetation or enhance vertical structure; planting more desirable tree, shrub, or herbaceous species for browse or cover; installing shallow impoundments to trap water; or conducting other operations that might alter patterns of diversity to meet specific habitat requirements. One simple, but often overlooked, management practice is the retention of snags when harvesting timber. These trees provide excellent nest and perch areas for birds as well as small mammals. Although most wildlife species respond favorably to the increased edge provided by traditional timber management activity, some species such as bear and wolf need larger areas of continuous forest and are thus area dependent or require a certain amount of old growth forest. For these species, traditional management practices may have to be modified to adequately address habitat needs.

Whether the use of wildlife is consumptive or not, the key to the enjoyment of this resource is accessability. Public land is easily accessible as a rule, as is industry land with some restrictions. Nonindustrial private owners, however, account for 62 percent of the commercial forest in the State and fully 84 percent of the forests in the southern part of the State. In collecting information on land access during the Wisconsin inventory, we found that access restrictions were greater (33 percent) in the more populated south than in the north (14 percent). The State has acknowledged this disparity and has concentrated its efforts to provide wildlife access in this part of the State to ensure opportunities to share and enjoy the State's wildlife heritage.

Survey unit	Total area of nonindustrial private commercial forest land	Area of nonindustrial private commercial forest land with restricted access	Percent with restricted access
	----- *(Thousand acres)* -----		
Northeast Unit	1,695.4	513.8	30
Northwest Unit	2,539.6	507.8	20
Central Unit	2,193.8	858.0	39
Southwest Unit	1,844.5	582.3	32
Southeast Unit	808.7	314.2	39
All units	9,082.0	2,776.1	31

Outdoor Recreation

Wisconsin's natural resources provide a wide range of quality recreational experiences. The State has 27,000 miles of rivers, 820 miles of shoreline on two Great Lakes, 14,927 inland lakes, 55 State Parks, 340 miles of State Park Trails, 3 State Recreation Areas, 9 State Forests, 28 County Forests, and hundreds of municipal parks and forests. Additionally, there are two national forests, a national lakeshore, and numerous miles of Wild and Scenic Riverway corridors.

The State Parks provide facilities for intensive recreation along with preservation of the natural resource (fig. 10). Recreation activities include cross-country skiing, skating, camping, swimming, and picnicking. Because of limited forest recreation access, the State forests in the southern part of Wisconsin are managed primarily for recreation. Privately managed recreation and resort areas also provide intensively managed recreation opportunities throughout the State. The public and private forests of the State that are classified as commercial forest land tend to be more involved in dispersed recreation activities such as hiking, primitive camping, cross-country skiing, and hunting. Intensive and dispersed recreation areas are often intermingled and offer the recreationist much diversity of recreational opportunities within a limited area.

Public and private recreation interests in the State are guided by a plan that is part of a continuing process to determine, promote, and implement a Statewide coordinated program that will provide high-quality recreation opportunities for residents and non-residents. The plan serves as a priority guide for acquiring, developing, and managing recreation areas and meets the requirements of eligibility for the federal Land and Water Conservation Fund Act of 1965. The official title of this periodically updated document is the State Comprehensive Outdoor Recreation Plan (SCORP).

Recreation opportunities often center on natural settings or lack of evidence of human alterations to the natural landscape. The fourth inventory of Wisconsin attempted to classify the State's commercial forest land along a gradient from primitive, where there is little evidence of human activity, to urban surroundings. Most of Wisconsin's forests were classified as a rural or roaded natural setting (83 percent) in which human modification of the landscape is obvious and the forest is generally within one-half mile of a maintained road. Nearly 17 percent of the State forests are classified as primitive or semi-primitive where evidence of buildings or other man-made structures are infrequent. Less than 1 percent of the State's commercial forest land is in an urban setting.

Figure 10.—*State and federal outdoor recreation opportunities in Wisconsin.*

Setting	Area of commercial forest land (Thousand acres)	Percent of Total
Primitive	16.3	0.1
Semi-primitive, motor	433.9	2.9
Semi-primitive, non-motor	2,032.8	13.8
Roaded natural	7,849.0	53.2
Rural	4,362.3	29.6
Urban	65.1	0.4
All settings	14,759.4	100.0

APPENDIX

ACCURACY OF SURVEY

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

For example, the estimated commercial forest area in Wisconsin in 1983, 14,759.4 thousand acres, has a sampling error of ±0.22 percent (±32.5 thousand acres). Therefore, the commercial forest area from a 100-percent inventory, would have a two in three chance of falling between 14,726.9 and 14,791.9 thousand acres.

As survey data are broken down into sections smaller than State or Survey Unit totals, the sampling error increases. The smaller the breakdown, the larger the sampling error. For example, the sampling error for commercial forest area in a particular unit or county is higher than that for total commercial forest area in the State (table 30 shows the sampling errors for estimates smaller than State totals).

SURVEY PROCEDURES

The 1983 Wisconsin survey used a two-phase sampling design. This sampling scheme and associated estimators are similar to sampling with partial replacement (SPR) in that a set of randomly located plots is available for remeasurement and a random set of new plots are established and measured. Major enhancements in the new Wisconsin design are stratification for disturbance on the old sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used in the Wisconsin survey design was the Stand and Tree Evaluation and Modeling System (STEMS).[8]

The major steps in the new survey design were as follows:

1. The first phase of the design is aerial photo interpretation. In this phase, two sets of random points were located on current aerial photography. The first is a set of new photo points and the second is a set of relocated old photo points (ground plot locations from the previous inventory).

A total of 195,220 1-acre points, including old ground sample locations, was systematically distributed across aerial photos of the entire State, except the Chequamegon and Nicolet National Forests (table 4). These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, a total of 89,420 of these points was stereoclassified as to stand-size class and density. Finally, 15,535 points were examined to correct the preliminary area estimate for errors in photo classification and for actual changes in land use since the photos were taken.

2. The second phase of the design was a ground sample. The plot selection and measurement procedures of phase two of the new Wisconsin survey design are outlined in figure 11.

From the new photo points, a random sample of ground plots was established and measures of land use, volume, mortality, and cutting were recorded.

[8]*For more information on STEMS, see: Belcher, D. L.; Holdaway, M. R.; Brand, G. J. STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981. 18 p.*

Table 4.--Number of photo points observed and ground plots visited by land use class, Wisconsin, 1983

Land class	Photo points classified	Photo points stereoclassified	Inventory plots checked
Forest land	85,183	85,183	6,999
Unproductive/reserved forest land	1,321	1,321	156
Nonforest land	102,312	2,916	7,914
Water	6,404	0	466
Total	195,220	89,420	15,535

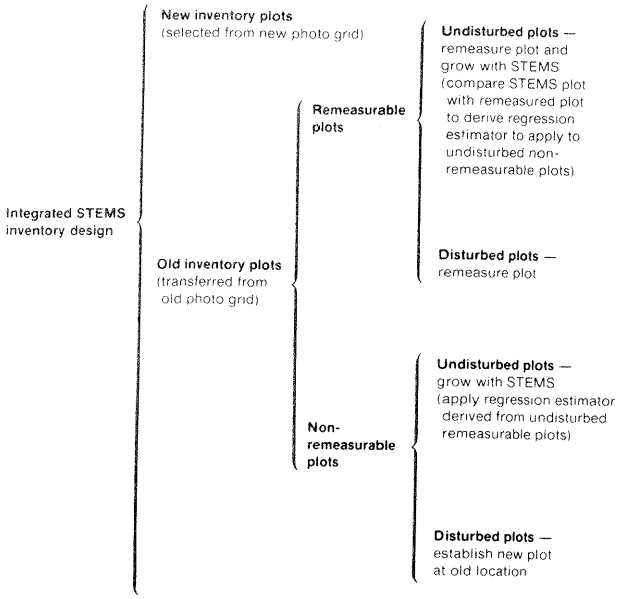

Figure 11.—*Logic structure for the 1983 Wisconsin sampling design.*

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

The procedure for the old inventory photo points (old plot locations) was somewhat different. Old plots were classed as remeasurable (monumented) or nonremeasurable (not monumented and thus difficult to relocate in the field). Within both of these groups, old plots can additionally be identified as undisturbed or disturbed. The remeasurable old inventory photo points that were classified as forest undisturbed were remeasured on the ground to obtain measurements of current land use, volume, growth, and removals. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS, which yields projected estimates of current volume and growth. Comparing the projected and observed values for these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory. Disturbance as used here refers to any change that can be detected on aerial photos and that the STEMS growth processor cannot predict, such as catastrophic mortality, cutting, seedling stands, and land use change.

The nonremeasurable forest points are those that were not monumented during the 1968 inventory but play a crucial role in the new survey design. These points were carefully examined, comparing past and current aerial photography to determine which plots were undisturbed and had conditions that could be simulated by STEMS. For those plots that could be updated, past and current photography was examined to determine that only normal growth had occurred. STEMS was then used to "grow" the old plot and tree data to produce an estimate of current data. Thus these points became ground plots even though the information was obtained without actually visiting the plot. The plot record for each updated plot was sent to the field for verification of current ownership information. For points classified as disturbed, a new ground plot was established as close to the old location as possible. In this way, information about land use trend can be recorded even though the old plot cannot be exactly located for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other coming from the old photo points that are remeasured or updated. A more detailed description of the sampling design is available in a separate publication.

3. Under an agreement with the Forest Service Region 9, North Central crews established 10-point variable radius plots on the Chequamegon and Nicolet National Forests when they established other plots in the Northwest and Northeast Survey Units. Each national forest provided the Station with data on the area of commercial forest land by forest type, stand-size class, and density for the Forest. The Station then computed volume, growth, and mortality statistics. Area and volume tables for the forests were approved by each national forest and Regional Office staff before publication.

4. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fencepost output was based on a sample of public and private land owners to determine their production of fuelwood and fenceposts, and on a canvass of industrial and public timber owners. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wiscon-

sin primary wood-using plants. Timber cut for products by ownership class was determined by a canvass of public and industrial timber owners. The portion of timber cut unaccounted for by the latter owners was grouped under "farmer and other owners."

5. A total of 2,568 felled trees on 133 active logging operations was measured throughout the State during 1981-1982 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

6. Field data were sent to St. Paul, Minnesota, for processing and analysis.

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

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

IDENTIFYING AND CORRECTING DEFINITIONAL OR PROCEDURAL CHANGES

Some procedural changes were made between the 1968 and 1983 inventories of Wisconsin. The major change affecting area estimates was the separation of the old spruce-fir forest type into two distinct new types—white spruce and balsam fir. Comparisons with old data may be made by adding the two new types together. Changes in ownership class definitions between the two surveys also affect area comparisons. A new definition of Indian ownership shifted a large area of commercial forest land, 213,100 acres, out of industry ownership and into Indian ownership in the Northeast Unit. Industry numbers are comparable if this area is subtracted from the 1968 report. Other definitional changes for farmer ownership have caused some land previously classed as farmer owned to be currently classed as miscellaneous private ownership. With these exceptions the area figures presented in the two inventories may be compared directly.

Other reports will describe changes in definitions and procedures that may affect comparisons of volume, growth, and mortality.

FOREST MANAGEMENT ASSISTANCE

Wisconsin's Forest Crop Law (FCL) was enacted in 1927 to encourage land owners to grow timber as a continuous crop. The regular taxation system, which taxed land and timber annually, encouraged premature cutting and discouraged long-term forestry investments. The FCL places an annual per acre tax on the land, but the value of the timber is taxed only at time of harvest. The value of this tax is adjusted by statutory formula every 10 years. This defers taxes on the timber crop until there is income to the owner. Currently more than 1.4 million acres in 69 counties are enrolled in the program. The Woodland Tax Law (WTL) was enacted in 1954 for owners of small tracts of forest land (less than full 40-acre descriptions). The WTL is similar in function to the FCL, but does not require a tax at the time of harvest. Approximately 0.5 million acres are enrolled under the WTL.

Professional foresters, technicians, associations, tax guides, lending agencies, and industrial experts are available to help the private owner of forest land. A partial list of assistance organizations follows:

Wisconsin Woodland Owners Association
Box 188, Madison, Wisconsin 53701

An organization of small woodland owners that seeks to improve conditions related to managing, harvesting, and marketing on private woodlands. The association has informal meetings and a quarterly newsletter.

Wisconsin Tree Farm Committee
Box 250, Madison, Wisconsin 53701

Advice and assistance from industry foresters to private forest owners wanting to protect and manage their forest resources.

Private Forestry Consultants
Various Locations

More than 30 professional forestry firms offer forestry services on a fee basis, including surveying, appraisal, timber sale administration, general management planning, litigation, expert testimony, and

Christmas tree management. The scope of their services is much broader than those provided by DNR foresters.

North Central Forest Experiment Station
1992 Folwell Ave., St. Paul, Minnesota 55108

This USDA Forest Service research station is responsible for forestry research and inventory in seven states—Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, and Wisconsin—and also has inventory responsibilities in Kansas, Nebraska, North Dakota, and South Dakota. Research information is available on timber management, Christmas tree pest management, logging technology, forest genetics, forest inventory techniques, and other fields. Individual consulting is limited and fees are sometimes charged for special request information. The Forest Service Northeastern Area State and Private Forestry also has offices at the North Central Station. State and Private Forestry works through and with various State, private, and federal organizations to relieve the pressure on public land through increased management and utilization of private forest land.

Soil Conservation Service
County SCS Office (generally in courthouse)

County conservationists provide technical assistance to forest land owners primarily for soil conservation and watershed protection. Some cost-sharing is available forforest improvement.

Wisconsin Department of Natural Resources
(sub-area office addresses listed below)

DNR foresters provide on-the-ground technical services for landowners interested in establishing new forests or improving existing ones. The DNR is the first contact for most public financial assistance programs for forest land improvement and for entries under the forest tax laws. Programs other than the forest tax laws include the Forestry Incentives Program (FIP) and the Agricultural Conservation Program (ACP), which are funded by the USDA Forest Service, and the Agricultural Stabilization and Conservation Service, respectively. They provide payments that cover a portion of the costs for timber improvement and tree planting.

The Rural Forestry Assistance program (RFA) is co-funded by the DNR and the Forest Service to provide technical assistance to private forest landowners. Nearly every county in Wisconsin has a DNR RFA forester. In addition to administering financial assistance, the RFA forester also assists with timber sales, insect and disease control and education programs.

Wisconsin DNR District Offices

SOUTHERN DISTRICT

Dodgeville Area (Richland, Sauk, Iowa, Grant, and Lafayette Counties)

DNR Area Supervisor
Hwy 23, Route 1, Box 10
Dodgeville, WI 53533

Madison Area (Dane, Jefferson, Green, and Rock Counties)

DNR Area Supervisor
3911 Fish Hatchery Road
Madison, WI 53711

Horicon Area (Columbia, Dodge, Fond du Lac, Green Lake, and Marquette Counties)

DNR Area Supervisor
Box D
Horicon, WI 53032

WEST CENTRAL DISTRICT

Eau Claire Area (Eau Claire, Chippewa, Pepin, Dunn, Pierce, and St. Croix Counties)

DNR Area Supervisor
1621 Westgate Road
Eau Claire, WI 54701

Black River Falls Area (Buffalo, Trempealeau, Clark, and Jackson Counties)

DNR Area Supervisor
Route 4, Box 5
Black River Falls, WI 54615

La Crosse Area (La Crosse, Vernon, Crawford, and Monroe Counties)

DNR Area Supervisor
3550 Mormon Coulee Road
Room 108, SOB
La Crosse, WI 54601

NORTH CENTRAL DISTRICT

Antigo Area (Landglade, Lincoln, and Marathon Counties)

DNR Area Supervisor
1635 Neva Road
Box 310
Antigo, WI 54409

Woodruff Area (Vilas, Oneida, and Forest Counties)

DNR Area Director
Box 440
Woodruff, WI 54568

Wisconsin Rapids Area (Wood, Portage, Adams, and Juneau Counties)

DNR Area Director
1681 2nd Avenue South
Room 118
Wisconsin Rapids, WI 54494

NORTHWEST DISTRICT

Brule Area (Douglas, Bayfield, Ashland, and Iron Counties)

DNR Area Director
Box 125
Brule, WI 54820

Cumberland Area (Burnett, Washburn, Barron, and Polk Counties)

DNR Area Director
1341 2nd Avenue
Box 397
Cumberland, WI 54829

Park Falls Area (Price, Taylor, Rusk, and Sawyer Counties)

DNR Area Director
Box 220
Park Falls, WI 54552

LAKE MICHIGAN DISTRICT

Green Bay Area (Brown, Kewaunee, Manitowoc, and Door Counties)

DNR Area Director
200 North Jefferson
Suite 511
Green Bay, WI 54301

Marinette Area (Florence, Marinette, Oconto, Menominee, and Shawano Counties)

DNR Area Director
Industrial Parkway
Box 16
Marinette, WI 54143

Oshkosh Area (Waupaca, Outagamie, Waushara, Winnebago, and Calumet Counties)

DNR Area Director
Box 2565
Oshkosh, WI 54903

SOUTHEAST DISTRICT

(Sheboygan, Washington, Ozaukee, Waukesha, Racine, Milwaukee, Walworth, and Kenosha Counties)

DNR Area Supervisor
Box 12436
Milwaukee, WI 53212

TREE SPECIES GROUPS IN WISCONSIN[9]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Eastern redcedar ..... *Juniperus virginiana*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oak
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oak
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Pignut hickory ..... *Carya glabra*
  - Bitternut hickory ..... *Carya cordiformis*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maple
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Elm
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*

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

Rock elm ..... *Ulmus thomasii*
Black ash ..... *Fraxinus nigra*
White and green ash
White ash ..... *Fraxinus americana*
Green ash ..... *Fraxinus pennsylvanica*
Eastern cottonwood ..... *Populus deltoides*
Black willow ..... *Salix nigra*
Hackberry ..... *Celtis occidentalis*
Balsam poplar ..... *Populus balsamifera*
Bigtooth aspen ..... *Populus grandidentata*
Quaking aspen ..... *Populus tremuloides*
Paper birch ..... *Betula papyrifera*
River birch ..... *Betula nigra*
Black cherry ..... *Prunus serotina*
Black walnut ..... *Juglans nigra*
Butternut ..... *Juglans cinerea*
Other hardwoods
Boxelder ..... *Acer negundo*
Black locust ..... *Robinia pseudoacacia*
Honeylocust ..... *Gleditsia triacanthos*
Red mulberry ..... *Morus rubra*
Northern catalpa ..... *Catalpa speciosa*
Noncommercial species
Mountain maple ..... *Acer spicatum*
Eastern hophornbeam ..... *Ostrya virginiana*
Peachleaf willow ..... *Salix amygdaloides*
American hornbeam .... *Carpinus caroliniana*
Hawthorn ..... *Crataegus* spp.
Striped maple ..... *Acer pensylvanicum*
Mountain-ash ..... *Sorbus* spp.
Pin cherry ..... *Prunus pensylvanica*
Chokecherry ..... *Prunus virginiana*

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.
1 pound = 0.454 kilograms.
1 ton = 0.907 metric tons.

DEFINITION OF TERMS

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

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land 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 industrial wood in the foreseeable future.)

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.

Farm.—Any place from which $1,000 or more of Agricultural products were produced and sold during the year.

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

Forest 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, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

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

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

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 balsam fir, 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 balsam fir, 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, balsam fir, 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, elm, and maple.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include birch, aspen, 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 oak, pines, 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 Wisconsin 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.)

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

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

Improved pasture.—Land currently improved for grazing by 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.

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.

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

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

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

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

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

Noncommercial forest land.—(a) Unproductive forest land and (b) productive-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.)

Nonforest land without trees.—Nonforest land with no live trees at least 5 inches d.b.h. present.

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

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

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

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

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

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.

Productive-deferred forest land.—Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration 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.)

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.

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.

Setting class.—A classification of the physical aspects of the forest stand in relation to the surrounding natural environment. The setting classes are:

Primitive.—An area 3 or more miles from *all* maintained roads or railroads and which has an unmodified natural environment. There can be evidence of foot trails or recreational use. Structures in use are rare. Contact with humans is rare and chances of seeing wildlife are good. Example: Boundary Waters Canoe Area, Minnesota.

Semi-primitive nonmotorized.—An area 1/2 to 3 miles from *all* maintained roads or railroads, but which can be close to primitive roads or trails occasionally used. Modifications to the environment are evident, such as old stumps from logging, but are not apparent to the casual observer. Structures in use are rare. Human contact is low and chances of seeing wildlife are good. Example: Recently undisturbed State lands.

Semi-primitive motorized.—An area 1/2 to 3 miles from *all* maintained roads or railroads, but 1/2 mile or less from primitive roads or trails used by motorized vehicles. Modifications to the environment, human contact and chances of seeing wildlife are the same as code 2. Example: State lands with snowmobile trails.

Roaded natural.—An area less than 1/2 mile from maintained roads or railroads. Modifications to the environment may be obvious, and buildings are occasionally seen. Chances of seeing wildlife are diminished by evidence of increased human contact. Example: Private hunting lands.

Rural.—An area close to maintained roads, but not limited by distance, and in a setting which has been substantially altered by man. Structures and houses are obvious and/or visible, and human contact is frequent. Wildlife can be present, but sightings are rare. Example: Farm woodlot.

Urban.—An area close to maintained roads, but not limited by distance and surrounded by an urban-suburban setting. Substantial modifications to the environment may be apparent and buildings or structures can usually be seen. Human contact is quite frequent and wildlife sightings are rare. Example: Home development areas.

Shrub.—A woody, perennial plant differing from a perennial herb in its persistent and woody stem(s), and less definitely from a tree in its lower stature and/or the general absence of a well-defined main stem. For this report shrubs were separated somewhat arbitrarily into tall and low shrubs as follows:

Tall shrubs.—Shrubs normally taller than 1.6 to 3.2 feet (0.5 to 1.0 meter).

Low shrubs.—Shrubs normally shorter than 1.6 to 3.2 feet (0.5 to 1.0 meter). (Woody perennial vines, such as grape, were included with low shrubs.)

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 growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries; roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified 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 commercial forest land except that it is less than 120 feet wide.

TABLES

Table 5.--Area of land by land class, Wisconsin, 1968 and 1983

(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	727.6	546.5
Red pine	310.2	478.2
White pine	177.6	225.6
Balsam fir	552.8	419.4
White spruce	75.2	61.4
Black spruce	235.9	273.0
Northern white-cedar	302.4	370.7
Tamarack	222.2	222.7
Oak-hickory	2,664.9	2,858.7
Elm-ash-soft maple	1,157.6	1,240.6
Maple-birch	3,521.6	3,996.9
Aspen	3,664.6	3,261.5
Paper birch	554.4	641.6
Exotic	--	2.2
Nonstocked	369.8	160.4
Subtotal	14,536.8	14,759.4
Noncommercial forest land		
Unproductive	374.4	331.0
Productive-reserved	34.2	260.9
Subtotal	408.6	591.9
Total	14,945.4	15,351.3
Nonforest land		
Cropland	12,043.3	12,712.4
Pasture and range	1,845.1	2,128.7
Other	6,024.7	4,640.4
Total	19,913.1	19,481.5
Total land	34,858.5	34,832.8
Water (Bureau of the Census)	1,080.1[1/]	1,115.6[2/]
Total land and water	35,938.6[1/]	35,948.4[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.
[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 6.--Area of land by land use class and Forest Survey Unit, Wisconsin, 1983

(In thousand acres)

Land use class	All Units	Forest Survey Unit				
		Northeast	Northwest	Central	Southwest	Southeast
Forest land						
Commercial forest	14,759.4	3,828.5	5,150.8	2,950.9	1,920.0	909.2
Unproductive forest	331.0	140.8	165.8	21.5	--	2.9
Productive reserved	260.9	52.0	114.6	30.1	38.8	25.4
Total	15,351.3	4,021.3	5,431.2	3,002.5	1,958.8	937.5
Nonforest land						
Nonforest with trees						
Cropland with trees	54.1	3.9	12.6	9.9	7.4	20.3
Improved pasture with trees	322.3	34.7	60.1	99.4	115.9	12.2
Wooded strips	45.0	5.8	8.1	20.9	10.2	--
Idle farmland with trees	110.5	21.5	16.0	60.5	12.5	--
Marsh with trees	312.6	40.1	90.6	149.4	12.7	19.8
Urban and other with trees	244.3	56.4	56.9	69.1	8.7	53.2
Windbreaks	40.8	5.0	10.6	2.6	12.2	10.4
Wooded pasture	112.1	--	30.3	32.0	47.4	2.4
Subtotal	1,241.7	167.4	285.2	443.8	227.0	118.3
Nonforest without trees						
Cropland without trees	12,658.3	744.7	1,259.7	2,431.1	2,895.2	5,327.6
Improved pasture without trees	1,694.3	174.6	255.0	407.3	549.2	308.2
Idle farm without trees	195.2	55.8	14.6	60.3	20.5	44.0
Marsh without trees	1,206.0	215.2	374.2	259.6	55.1	301.9
Other farm-farmstead	364.2	36.4	23.2	88.8	66.0	149.8
Urban and other	2,028.7	244.9	269.2	449.4	372.1	693.1
Noncensus water	93.1	39.9	13.1	27.4	6.6	6.1
Subtotal	18,239.8	1,511.5	2,209.0	3,723.9	3,964.7	6,830.7
Total	19,481.5	1,678.9	2,494.2	4,167.7	4,191.7	6,949.0
Total land	34,832.8	5,700.2	7,925.4	7,170.2	6,150.5	7,886.5
Water (Bureau of the Census)[1/]	1,115.6	262.8	290.3	114.6	136.6	311.3
Total land and water[1/]	35,948.4	5,963.0	8,215.7	7,284.8	6,287.1	8,197.8

Table 7.--Area of commercial forest land by ownership class and Forest Survey Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All Units	Forest Survey Unit				
		Northeast	Northwest	Central	Southwest	Southeast
National Forest	1,242.3	548.8	693.5	--	--	--
Miscellaneous federal	176.2	3.9	7.3	130.6	29.8	4.6
State	569.4	193.7	176.8	96.6	34.8	67.5
County and municipal	2,179.8	646.9	1,109.8	399.3	10.9	12.9
Indian	353.7	254.5	94.6	4.6	--	--
Forest industry	1,156.0	485.3	529.2	126.0	--	15.5
Farmer	3,513.7	381.6	450.2	996.7	1,255.9	429.3
Misc. private-corp.	665.9	163.1	224.0	129.5	92.8	56.5
Misc. private-indiv.	4,902.4	1,150.7	1,865.4	1,067.6	495.8	322.9
All owners	14,759.4	3,828.5	5,150.8	2,950.9	1,920.0	909.2

Table 8.--Area of land and forest land by county, Wisconsin, 1983

County	All land[1]	Forest land[2]			Commercial forest as a percent of land area	All forest as a percent of land area	Sampling error for commercial forest land (percent)
		All forest	Noncommercial[3]	Commercial[4]			
NORTHEAST UNIT							
Florence	310.8	254.2	10.2	244.0	79	82	1.74
Forest	647.1	543.9	51.2	492.7	76	84	1.22
Langlade	559.0	391.7	17.2	374.5	67	70	1.40
Lincoln	567.1	411.2	17.4	393.8	69	73	1.37
Menominee	229.7	213.1	--	213.1	93	93	1.86
Marinette	893.1	661.0	21.3	639.7	72	74	1.07
Oconto	641.4	357.4	10.3	347.1	54	56	1.46
Oneida	723.2	531.1	34.0	497.1	69	73	1.22
Shawano	574.0	259.2	4.0	255.2	45	45	1.70
Vilas	554.8	398.5	27.2	371.3	67	72	1.41
All counties	5,700.2	4,021.3	192.8	3,828.5	67	71	0.44
NORTHWEST UNIT							
Ashland	670.9	569.1	65.3	503.8	75	85	1.16
Barron	553.4	165.7	7.0	158.7	29	30	2.07
Bayfield	935.8	780.1	39.6	740.5	79	83	0.96
Burnett	523.3	335.9	18.8	317.1	61	64	1.46
Douglas	835.5	640.3	12.4	627.9	75	77	1.04
Iron	481.0	400.1	22.2	377.9	79	83	1.34
Polk	588.4	230.0	9.2	220.8	38	39	1.75
Price	803.8	598.4	47.6	550.8	69	74	1.11
Rusk	584.4	373.2	10.1	363.1	62	64	1.37
Sawyer	803.3	638.9	31.2	607.7	76	80	1.06
Taylor	624.2	368.0	13.6	354.4	57	59	1.38
Washburn	521.4	331.5	3.4	328.1	63	64	1.44
All counties	7,925.4	5,431.2	280.4	5,150.8	65	69	0.36
CENTRAL UNIT							
Adams	414.7	236.7	2.4	234.3	57	57	1.24
Chippewa	650.9	232.4	6.7	225.7	35	36	1.26
Clark	779.6	316.1	--	316.1	41	41	1.07
Eau Claire	408.3	156.3	1.8	154.5	38	38	1.53
Jackson	638.6	378.9	7.5	371.4	58	59	0.98
Juneau	495.5	256.0	3.9	252.1	51	52	1.19
Marathon	997.9	365.4	6.9	358.5	36	37	1.00
Marquette	290.9	94.3	--	94.3	32	32	1.95
Monroe	578.3	247.3	2.3	245.0	42	43	1.21
Portage	518.5	174.3	--	174.3	34	34	1.44
Waupaca	482.8	181.1	8.5	172.6	36	38	1.44
Waushara	401.7	157.2	11.6	145.6	36	39	1.57
Wood	512.5	206.5	--	206.5	40	40	1.32
All counties	7,170.2	3,002.5	51.6	2,950.9	41	42	0.35

(Table 8 continued on next page)

[1] 1980 Bureau of the Census estimates.

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

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

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

(Table 8 continued)

County	All land[1]	Forest land[2]			Commercial forest as a percent of land area	All forest as a percent of land area	Sampling error for commercial forest land (percent)
		All forest	Noncommercial[3]	Commercial[4]			
SOUTHWEST UNIT							
Buffalo	447.6	193.4	5.5	187.9	42	43	1.26
Crawford	362.1	168.8	1.0	167.8	46	47	1.34
Dunn	546.2	171.1	1.1	170.0	31	31	1.33
Grant	732.2	186.4	1.9	184.5	25	26	1.27
Iowa	486.5	140.7	4.7	136.0	28	29	1.48
La Crosse	292.6	121.6	--	121.6	42	42	1.57
Lafayette	405.9	38.2	0.6	37.6	9	9	2.82
Pepin	147.8	53.9	0.5	53.4	36	37	2.37
Pierce	369.0	102.1	1.5	100.6	27	28	1.72
Richland	374.1	159.4	0.7	158.7	42	43	1.37
St.Croix	462.5	77.7	4.8	72.9	16	17	2.03
Sauk	536.2	192.0	10.3	181.7	34	36	1.28
Tempealeau	470.9	151.1	4.1	147.0	31	32	1.43
Vernon	516.9	202.4	2.1	200.3	39	39	1.22
All counties	6,150.5	1,958.8	38.8	1,920.0	31	32	0.39
SOUTHEAST UNIT							
Brown	335.5	49.1	1.7	47.4	14	15	1.83
Calumet	208.9	25.1	0.4	24.7	12	12	2.54
Columbia	493.5	84.4	0.2	84.2	17	17	1.37
Dane	770.9	91.1	0.9	90.2	12	12	1.32
Dodge	567.9	27.8	0.2	27.6	5	5	2.39
Door	314.5	120.0	13.7	106.3	34	38	1.22
Fond du Lac	463.8	35.1	1.2	33.9	7	8	2.16
Green	373.3	30.9	--	30.9	8	8	2.26
Green Lake	228.2	21.0	--	21.0	9	9	2.74
Jefferson	359.6	29.3	0.3	29.0	8	8	2.34
Kenosha	174.5	11.7	0.9	10.8	6	7	3.83
Kewaunee	219.5	36.8	--	36.8	17	17	2.07
Manitowoc	380.1	57.4	0.9	56.5	15	15	1.67
Milwaukee	154.6	5/	--	--	--	--	--
Outagamie	411.0	70.7	--	70.7	17	17	1.49
Ozaukee	150.3	16.3	--	16.3	11	11	3.12
Racine	214.1	17.7	0.8	16.9	8	8	3.06
Rock	463.0	28.1	1.2	26.9	6	6	2.43
Sheboygan	329.8	52.6	1.1	51.5	16	16	1.74
Walworth	355.6	35.8	0.2	35.6	10	10	2.10
Washington	275.5	45.8	0.1	45.7	17	17	1.85
Waukesha	354.8	36.6	4.5	32.1	9	10	2.22
Winnebago	287.6	14.2	--	14.2	5	5	3.34
All counties	7,886.5	937.5	28.3	909.2	12	12	0.42
State total	34,832.8	15,351.3	591.9	14,759.4	42	44	0.22

1/ 1980 Bureau of the Census estimates.

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

3/ Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber production through statute or administrative regulation.

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

5/ All of Milwaukee County was classified as nonforest urban land.

Table 9.--Area of commercial forest land by forest type and physiographic class, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Physiographic class				
		Xeric	Xeromesic	Mesic	Hydromesic	Hydric
Jack pine	546.5	29.0	361.0	114.0	39.1	3.4
Red pine	478.2	1.9	271.8	204.5	--	--
White pine	225.6	--	35.0	161.2	23.7	5.7
Balsam fir	419.4	--	6.8	143.2	188.2	81.2
White spruce	61.4	--	2.5	44.8	14.1	--
Black spruce	273.0	--	--	13.6	61.6	197.8
Northern white-cedar	370.7	--	1.8	22.5	164.6	181.8
Tamarack	222.7	--	--	6.8	76.0	139.9
Oak-hickory	2,858.7	20.2	546.5	2,194.7	93.6	3.7
Elm-ash-soft maple	1,240.6	--	4.4	77.5	985.0	173.7
Maple-birch	3,996.9	3.2	54.0	3,695.4	236.9	7.4
Aspen	3,261.5	--	159.0	2,314.5	741.3	46.7
Paper birch	641.6	--	16.6	487.2	117.6	20.2
Exotic	2.2	--	2.2	--	--	--
Nonstocked	160.4	1.8	24.2	68.7	44.4	21.3
All types	14,759.4	56.1	1,485.8	9,548.6	2,786.1	882.8

Table 10.--Area of commercial forest land by ownership class and site class, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	1,242.3	--	--	65.2	376.9	575.0	225.2
Miscellaneous federal	176.2	--	--	--	32.9	70.6	72.7
State	569.4	--	--	17.4	98.1	241.1	212.8
County and municipal	2,179.8	--	--	41.0	434.1	1,029.9	674.8
Indian	353.7	--	--	10.9	81.6	190.7	70.5
Forest industry	1,156.0	--	--	24.9	229.2	486.9	415.0
Farmer	3,513.7	--	--	117.4	833.3	1,450.1	1,112.9
Misc. private-corp.	665.9	--	2.2	15.6	136.8	295.4	215.9
Misc. private-indiv.	4,902.4	--	4.2	161.9	1,042.7	2,166.3	1,527.3
All owners	14,759.4	--	6.4	454.3	3,265.6	6,506.0	4,527.1

Table 11.--Area of commercial forest land by ownership class and stand-volume class, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/])		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	1,242.3	480.3	599.3	162.7
Miscellaneous federal	176.2	104.9	52.4	18.9
State	569.4	275.3	216.5	77.6
County and municipal	2,179.8	1,187.7	812.2	179.9
Indian	353.7	71.7	118.7	163.3
Forest industry	1,156.0	538.2	422.9	194.9
Farmer	3,513.7	1,406.4	1,468.8	638.5
Misc. private-corp.	665.9	284.4	301.7	79.8
Misc. private-indiv.	4,902.4	2,338.1	1,938.8	625.5
All owners	14,759.4	6,687.0	5,931.3	2,141.1

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

Table 12.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Wisconsin, 1983

(In thousand acres)

Ownership class and owner tenure class	All sizes	Size of holding (acres) 1-4	5-10	11-20	21-50	51-100	101-500	501-1,500	2,501-5,000	5,001+
Forest Industry										
1-4 years	78.6	--	--	--	--	3.5	1.9	11.2	1.8	60.2
5-9 years	134.1	--	--	--	--	4.2	2.0	9.2	1.7	117.0
10-19 years	331.1	--	--	--	5.0	--	2.0	14.4	7.1	302.6
20+ years	612.2	--	--	--	--	2.3	2.3	3.6	5.3	598.7
All classes	1,156.0	--	--	--	5.0	10.0	8.2	38.4	15.9	1,078.5
Farmer										
1-4 years	644.3	2.5	11.1	69.6	156.8	171.2	219.7	10.2	3.2	--
5-9 years	688.5	15.8	16.3	71.0	186.3	184.5	200.7	13.9	--	--
10-19 years	1,141.2	17.2	33.5	103.1	294.1	309.6	369.2	12.7	1.8	--
20+ years	1,039.7	16.6	40.5	103.6	264.4	289.2	312.6	11.1	1.7	--
All classes	3,513.7	52.1	101.4	347.3	901.6	954.5	1,102.2	47.9	6.7	--
Miscellaneous private corporation										
1-4 years	135.7	3.2	2.4	--	33.7	22.9	37.8	11.2	1.8	22.7
5-9 years	101.7	--	--	--	16.9	16.5	35.5	18.9	4.1	9.8
10-19 years	155.9	2.5	4.8	--	14.8	34.4	44.6	32.0	7.0	15.8
20+ years	272.6	--	--	3.9	15.1	21.6	62.9	78.3	24.9	65.9
All classes	665.9	5.7	7.2	3.9	80.5	95.4	180.8	140.4	37.8	114.2
Miscellaneous private individual										
1-4 years	1,260.6	30.3	60.3	98.7	452.7	314.3	286.9	13.7	1.8	1.9
5-9 years	1,186.5	38.0	66.2	96.9	389.1	293.8	279.9	22.6	--	--
10-19 years	1,434.2	37.3	58.3	82.6	438.4	340.9	411.7	61.6	3.4	--
20+ years	1,021.1	16.6	22.6	54.5	303.0	266.3	307.5	47.7	--	2.9
All classes	4,902.4	122.2	207.4	332.7	1,583.2	1,215.3	1,286.0	145.6	5.2	4.8
All private owners										
1-4 years	2,119.2	36.0	73.8	168.3	643.2	511.9	546.3	46.3	8.6	84.8
5-9 years	2,110.8	53.8	82.5	167.9	592.3	499.0	518.1	64.6	5.8	126.8
10-19 years	3,062.4	57.0	96.6	185.7	752.3	684.9	827.5	120.7	19.3	318.4
20+ years	2,945.6	33.2	63.1	162.0	582.5	579.4	685.3	140.7	31.9	667.5
All classes	10,238.0	180.0	316.0	683.9	2,570.3	2,275.2	2,577.2	372.3	65.6	1,197.5

Table 13.--Area of commercial forest land by forest type, stand-size class, and ownership class, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class: National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	93.9	5.2	4.3	3.5	20.0	4.0	9.1	14.5	4.2	29.1
Poletimber	281.0	44.6	8.9	12.1	73.4	1.6	35.0	21.2	6.5	77.7
Sapling & seedling	171.6	0.5	11.4	17.8	43.8	--	25.0	8.9	10.2	54.0
All stands	546.5	50.3	24.6	33.4	137.2	5.6	69.1	44.6	20.9	160.8
Red pine										
Sawtimber	159.2	70.6	2.1	14.6	18.2	5.4	5.4	9.8	5.9	27.2
Poletimber	193.9	9.3	--	10.9	39.2	3.5	13.6	23.5	17.3	76.6
Sapling & seedling	125.1	23.5	6.9	3.6	23.4	--	30.7	1.9	7.2	27.9
All stands	478.2	103.4	9.0	29.1	80.8	8.9	49.7	35.2	30.4	131.7
White pine										
Sawtimber	157.6	15.2	2.2	4.0	20.5	15.6	11.8	37.2	9.7	41.4
Poletimber	43.9	--	2.2	3.4	1.7	1.8	1.7	5.0	5.3	22.8
Sapling & seedling	24.1	--	2.5	2.2	2.2	--	3.4	6.8	--	7.0
All stands	225.6	15.2	6.9	9.6	24.4	17.4	16.9	49.0	15.0	71.2
Balsam fir										
Sawtimber	116.9	20.9	--	5.4	19.9	2.0	15.9	11.2	2.3	39.3
Poletimber	184.4	38.6	--	10.9	35.2	2.1	10.6	5.8	9.0	72.2
Sapling & seedling	118.1	6.5	--	5.4	16.5	--	15.6	18.6	5.5	50.0
All stands	419.4	66.0	--	21.7	71.6	4.1	42.1	35.6	16.8	161.5
White spruce										
Sawtimber	23.0	19.3	--	--	--	--	2.0	--	--	1.7
Poletimber	20.2	8.7	--	--	--	--	1.7	--	2.1	7.7
Sapling & seedling	18.2	3.2	--	1.7	1.8	--	2.0	--	--	9.5
All stands	61.4	31.2	--	1.7	1.8	--	5.7	--	2.1	18.9
Black spruce										
Sawtimber	7.3	--	--	1.7	3.8	--	--	--	--	1.8
Poletimber	82.0	15.7	--	8.4	18.2	3.6	10.6	2.0	--	23.5
Sapling & seedling	183.7	20.8	2.2	18.0	36.9	--	27.7	17.2	5.3	55.6
All stands	273.0	36.5	2.2	28.1	58.9	3.6	38.3	19.2	5.3	80.9
Northern white-cedar										
Sawtimber	115.3	9.0	--	13.5	17.7	5.3	21.6	7.8	4.4	36.0
Poletimber	206.9	52.9	--	5.4	21.3	10.8	12.9	33.2	5.8	64.6
Sapling & seedling	48.5	3.7	--	--	7.2	1.7	3.5	16.7	1.8	13.9
All stands	370.7	65.6	--	18.9	46.2	17.8	38.0	57.7	12.0	114.5

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All owners	Ownership class: National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	15.3	--	--	2.1	--	--	3.7	4.0	1.8	3.7
Poletimber	89.0	15.5	--	5.4	10.2	--	5.4	11.1	1.7	39.7
Sapling & seedling	118.4	1.4	--	14.7	11.3	1.6	7.1	26.3	10.2	45.8
All stands	222.7	16.9	--	22.2	21.5	1.6	16.2	41.4	13.7	89.2
Oak-hickory										
Sawtimber	1,526.5	--	8.8	31.6	29.5	17.9	14.5	877.8	80.6	465.8
Poletimber	841.8	42.9	22.4	19.9	127.4	3.4	17.2	266.8	44.7	297.1
Sapling & seedling	490.4	2.3	15.4	17.4	67.6	1.8	46.4	118.0	21.3	200.2
All stands	2,858.7	45.2	46.6	68.9	224.5	23.1	78.1	1,262.6	146.6	963.1
Elm-ash-soft maple										
Sawtimber	415.4	1.8	19.3	23.7	50.6	9.2	24.4	142.1	21.8	122.5
Poletimber	524.8	19.8	5.6	18.4	87.8	3.9	40.1	135.2	16.1	197.9
Sapling & seedling	300.4	3.7	2.8	18.2	31.2	1.8	22.3	80.3	21.3	118.8
All stands	1,240.6	25.3	27.7	60.3	169.6	14.9	86.8	357.6	59.2	439.2
Maple-birch										
Sawtimber	1,543.8	112.0	5.2	51.4	114.2	120.1	193.9	449.0	62.0	436.0
Poletimber	1,749.4	316.3	--	36.7	271.6	41.0	195.9	251.4	79.7	556.8
Sapling & seedling	703.7	3.8	2.2	21.8	81.3	3.4	50.8	257.7	13.7	269.0
All stands	3,996.9	432.1	7.4	109.9	467.1	164.5	440.6	958.1	155.4	1,261.8
Aspen										
Sawtimber	401.6	14.5	6.4	20.1	62.2	14.8	27.0	84.2	14.6	157.8
Poletimber	1,585.9	149.3	17.6	50.5	358.4	49.4	88.3	231.5	74.1	566.8
Sapling & seedling	1,274.0	152.1	16.2	69.4	323.2	18.8	107.1	157.3	55.9	374.0
All stands	3,261.5	315.9	40.2	140.0	743.8	83.0	222.4	473.0	144.6	1,098.6
Paper birch										
Sawtimber	78.9	0.6	--	1.6	6.2	--	1.9	28.5	1.7	38.4
Poletimber	420.2	32.8	3.8	16.9	82.2	5.4	35.9	63.3	34.5	145.4
Sapling & seedling	142.5	5.3	2.3	1.8	27.7	--	1.8	51.4	2.4	49.8
All stands	641.6	38.7	6.1	20.3	116.1	5.4	39.6	143.2	38.6	233.6
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	--	2.2
All stands	2.2	--	--	--	--	--	--	--	--	2.2
Nonstocked	160.4	--	5.5	5.3	16.3	3.8	12.5	36.5	5.3	75.2
All types										
Sawtimber	4,654.7	269.1	48.3	173.2	362.8	194.3	331.2	1,666.1	209.0	1,400.7
Poletimber	6,223.4	746.4	60.5	198.9	1,126.6	126.5	468.9	1,050.0	296.8	2,148.8
Sapling & seedling	3,720.9	226.8	61.9	192.0	674.1	29.1	343.4	761.1	154.8	1,277.7
Nonstocked	160.4	--	5.5	5.3	16.3	3.8	12.5	36.5	5.3	75.2
All stands	14,759.4	1,242.3	176.2	569.4	2,179.8	353.7	1,156.0	3,513.7	665.9	4,902.4

Table 14.--Area of commercial forest land by forest type and Forest Survey Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All Units	Forest Survey Unit: Northeast	Northwest	Central	Southwest	Southeast
Jack pine	546.5	81.7	247.8	203.1	11.2	2.7
Red pine	478.2	157.8	132.6	135.5	40.1	12.2
White pine	225.6	81.1	36.5	77.9	13.7	16.4
Balsam fir	419.4	187.9	219.6	11.9	--	--
White spruce	61.4	19.8	31.9	2.2	2.5	5.0
Black spruce	273.0	147.5	111.2	11.6	--	2.7
Northern white-cedar	370.7	186.0	107.8	23.3	--	53.6
Tamarack	222.7	63.0	111.5	39.0	--	9.2
Oak-hickory	2,858.7	149.3	415.6	937.6	1,063.4	292.8
Elm-ash-soft maple	1,240.6	235.9	414.9	271.5	117.8	200.5
Maple-birch	3,996.9	1,280.2	1,478.7	506.2	497.9	233.9
Aspen	3,261.5	1,026.7	1,508.3	577.5	85.7	63.3
Paper birch	641.6	191.5	268.8	118.6	54.4	8.3
Exotic	2.2	--	--	2.2	--	--
Nonstocked	160.4	20.1	65.6	32.8	33.3	8.6
All types	14,759.4	3,828.5	5,150.8	2,950.9	1,920.0	909.2

Table 15.--Area of commercial forest land by county, stand-size class, and Forest Survey Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class: Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
NORTHEAST UNIT					
Florence	244.0	83.3	111.9	45.2	3.6
Forest	492.7	149.7	258.4	84.6	--
Langlade	374.5	85.8	215.8	72.9	--
Lincoln	393.8	61.1	195.8	135.0	1.9
Menominee	213.1	145.0	54.0	12.3	1.8
Marinette	639.7	136.0	309.5	192.4	1.8
Oconto	347.1	84.5	184.9	72.1	5.6
Oneida	497.1	93.9	211.3	188.5	3.4
Shawano	255.2	98.0	115.9	39.3	2.0
Vilas	371.3	115.5	166.8	89.0	--
All counties	3,828.5	1,052.8	1,824.3	931.3	20.1
NORTHWEST UNIT					
Ashland	503.8	135.9	263.6	104.3	--
Barron	158.7	57.5	64.4	34.5	2.3
Bayfield	740.5	144.0	407.2	187.5	1.8
Burnett	317.1	74.5	133.3	101.7	7.6
Douglas	627.9	106.5	301.7	210.3	9.4
Iron	377.9	108.5	192.0	77.4	--
Polk	220.8	64.7	98.4	57.7	--
Price	550.8	97.9	256.6	183.8	12.5
Rusk	363.1	103.0	192.4	63.7	4.0
Sawyer	607.7	162.1	312.9	117.2	15.5
Taylor	354.4	52.0	179.4	112.2	10.8
Washburn	328.1	45.9	183.6	96.9	1.7
All counties	5,150.8	1,152.5	2,585.5	1,347.2	65.6
CENTRAL UNIT					
Adams	234.3	47.2	82.1	100.2	4.8
Chippewa	225.7	66.0	84.1	68.1	7.5
Clark	316.1	71.1	129.1	113.5	2.4
Eau Clarie	154.5	35.7	90.5	28.3	--
Jackson	371.4	92.3	155.8	123.3	--
Juneau	252.1	81.8	105.7	64.6	--
Marathon	358.5	114.5	143.5	93.6	6.9
Marquette	94.3	38.1	22.6	31.4	2.2
Monroe	245.0	99.5	88.8	52.1	4.6
Portage	174.3	50.3	65.6	56.2	2.2
Waupaca	172.6	95.6	51.3	25.7	--
Waushara	145.6	38.1	64.8	40.5	2.2
Wood	206.5	52.3	68.2	86.0	--
All counties	2,950.9	882.5	1,152.1	883.5	32.8

(Table 15 continued on next page)

(Table 15 continued)

County	All stands	Stand-size class: Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
SOUTHWEST UNIT					
Buffalo	187.9	127.1	38.5	19.5	2.8
Crawford	167.8	98.0	30.7	33.5	5.6
Dunn	170.0	75.9	57.6	36.5	--
Grant	184.5	133.2	30.1	21.2	--
Iowa	136.0	65.5	38.1	29.7	2.7
La Crosse	121.6	86.0	19.9	15.7	--
Lafayette	37.6	23.5	2.4	11.7	--
Pepin	53.4	30.9	11.2	11.3	--
Pierce	100.6	46.7	21.8	26.9	5.2
Richland	158.7	75.1	36.2	47.4	--
St. Croix	72.9	11.2	31.4	21.7	8.6
Sauk	181.7	74.5	42.4	62.3	2.5
Trempealeau	147.0	76.2	36.6	31.5	2.7
Vernon	200.3	150.6	25.0	21.5	3.2
All counties	1,920.0	1,074.4	421.9	390.4	33.3
SOUTHEAST UNIT					
Brown	47.4	27.4	10.0	10.0	--
Calumet	24.7	9.9	9.9	4.9	--
Columbia	84.2	37.1	29.8	17.3	--
Dane	90.2	73.8	11.0	5.4	--
Dodge	27.6	16.0	4.6	7.0	--
Door	106.3	37.9	30.1	35.5	2.8
Fond du Lac	33.9	21.2	4.2	8.5	--
Green	30.9	26.1	4.8	--	--
Green Lake	21.0	9.4	11.6	--	--
Jefferson	29.0	23.8	2.6	2.6	--
Kenosha	10.8	5.4	5.4	--	--
Kewaunee	36.8	23.7	13.1	--	--
Manitowoc	56.5	32.4	16.1	8.0	--
Milwaukee	--	--	--	--	--
Outagamie	70.7	27.9	25.0	15.3	2.5
Ozaukee	16.3	3.2	6.6	6.5	--
Racine	16.9	6.8	--	10.1	--
Rock	26.9	19.5	4.9	2.5	--
Sheboygan	51.5	13.6	24.5	13.4	--
Walworth	35.6	35.6	--	--	--
Washington	45.7	12.9	19.6	9.9	3.3
Waukesha	32.1	20.3	3.0	8.8	--
Winnebago	14.2	8.6	2.8	2.8	--
All counties	909.2	492.5	239.6	168.5	8.6
State total	14,759.4	4,654.7	6,223.4	3,720.9	160.4

Table 16.--Area of commercial forest land by forest type, stand-size class, and site class, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	93.9	--	--	--	7.0	51.7	35.2
Poletimber	281.0	--	--	--	20.6	153.1	107.3
Sapling & seedling	171.6	--	--	1.9	9.8	69.9	90.0
All stands	546.5	--	--	1.9	37.4	274.7	232.5
Red pine							
Sawtimber	159.2	--	--	45.5	69.6	39.9	4.2
Poletimber	193.9	--	4.4	72.1	102.8	13.0	1.6
Sapling & seedling	125.1	--	--	12.3	42.8	55.1	14.9
All stands	478.2	--	4.4	129.9	215.2	108.0	20.7
White pine							
Sawtimber	157.6	--	--	25.4	66.7	43.9	21.6
Poletimber	43.9	--	--	13.6	10.7	11.8	7.8
Sapling & seedling	24.1	--	--	1.8	11.4	10.9	--
All stands	225.6	--	--	40.8	88.8	66.6	29.4
Balsam fir							
Sawtimber	116.9	--	--	52.5	35.7	19.8	8.9
Poletimber	184.4	--	--	50.9	73.1	38.1	22.3
Sapling & seedling	118.1	--	2.0	31.1	37.2	22.8	25.0
All stands	419.4	--	2.0	134.5	146.0	80.7	56.2
White spruce							
Sawtimber	23.0	--	--	--	16.4	6.6	--
Poletimber	20.2	--	--	--	10.9	9.3	--
Sapling & seedling	18.2	--	--	--	3.8	6.1	8.3
All stands	61.4	--	--	--	31.1	22.0	8.3
Black spruce							
Sawtimber	7.3	--	--	--	--	1.8	5.5
Poletimber	82.0	--	--	--	6.8	9.6	65.6
Sapling & seedling	183.7	--	--	--	8.2	12.2	163.3
All stands	273.0	--	--	--	15.0	23.6	234.4
Northern white-cedar							
Sawtimber	115.3	--	--	--	4.6	32.7	78.0
Poletimber	206.9	--	--	--	--	48.4	158.5
Sapling & seedling	48.5	--	--	--	--	9.7	38.8
All stands	370.7	--	--	--	4.6	90.8	275.3

(Table 16 continued on next page)

(Table 16 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year) 225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	15.3	--	--	--	1.9	5.7	7.7
Poletimber	89.0	--	--	--	4.1	43.7	41.2
Sapling & seedling	118.4	--	--	--	4.1	44.3	70.0
All stands	222.7	--	--	--	10.1	93.7	118.9
Oak-hickory							
Sawtimber	1,526.5	--	--	10.0	294.8	745.5	476.2
Poletimber	841.8	--	--	--	137.4	473.0	231.4
Sapling & seedling	490.4	--	--	2.5	74.0	234.3	179.6
All stands	2,858.7	--	--	12.5	506.2	1,452.8	887.2
Elm-ash-soft maple							
Sawtimber	415.4	--	--	--	52.4	121.8	241.2
Poletimber	524.8	--	--	--	56.8	137.9	330.1
Sapling & seedling	300.4	--	--	--	13.4	74.2	212.8
All stands	1,240.6	--	--	--	122.6	333.9	784.1
Maple-birch							
Sawtimber	1,543.8	--	--	16.5	266.2	792.7	468.4
Poletimber	1,749.4	--	--	18.9	342.8	941.2	446.5
Sapling & seedling	703.7	--	--	16.0	100.9	318.7	268.1
All stands	3,996.9	--	--	51.4	709.9	2,052.6	1,183.0
Aspen							
Sawtimber	401.6	--	--	19.0	192.6	169.3	20.7
Poletimber	1,585.9	--	--	35.6	686.2	744.4	119.7
Sapling & seedling	1,274.0	--	--	16.7	415.3	634.8	207.2
All stands	3,261.5	--	--	71.3	1,294.1	1,548.5	347.6
Paper birch							
Sawtimber	78.9	--	--	5.1	15.0	31.6	27.2
Poletimber	420.2	--	--	5.2	34.0	212.2	168.8
Sapling & seedling	142.5	--	--	--	17.6	53.2	71.7
All stands	641.6	--	--	10.3	66.6	297.0	267.7
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	2.2	--	--
All stands	2.2	--	--	--	2.2	--	--
Nonstocked	160.4	--	--	1.7	15.8	61.1	81.8
All types							
Sawtimber	4,654.7	--	--	174.0	1,022.9	2,063.0	1,394.8
Poletimber	6,223.4	--	4.4	196.3	1,486.2	2,835.7	1,700.8
Sapling & seedling	3,720.9	--	2.0	82.3	740.7	1,546.2	1,349.7
Nonstocked	160.4	--	--	1.7	15.8	61.1	81.8
All stands	14,759.4	--	6.4	454.3	3,265.6	6,506.0	4,527.1

Table 17.--Area of commercial forest land by forest type and stand-age class, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	546.5	34.2	98.6	73.7	116.9	145.2	57.4	9.4	9.2	1.9	--	--	--	--
Red pine	478.2	53.9	104.4	108.3	97.3	54.6	23.9	7.3	7.8	7.0	10.5	3.2	--	--
White pine	225.6	12.6	18.6	10.8	18.3	22.5	22.3	24.7	30.6	31.0	4.3	10.1	8.1	11.7
White spruce	419.4	48.9	30.7	44.6	48.4	49.5	100.8	51.6	14.1	12.9	3.5	7.5	5.0	1.9
Balsam fir	61.4	7.1	12.7	10.7	13.9	6.5	8.5	2.0	--	--	--	--	--	--
Black spruce	273.0	29.1	41.9	71.1	35.7	27.6	14.3	14.3	24.7	8.8	3.6	--	1.9	--
Northern white-cedar	370.7	9.8	14.5	18.4	7.7	47.9	33.0	38.6	29.8	37.7	57.8	30.8	21.5	23.2
Tamarack	222.7	20.7	50.4	40.2	13.6	21.5	17.1	19.4	15.8	14.9	1.7	3.8	1.8	1.8
Oak-hickory	2,858.7	297.3	149.0	98.2	123.6	337.6	423.5	274.8	283.1	223.8	203.0	208.9	145.8	90.1
Elm-ash-soft maple	1,240.6	132.0	117.9	86.0	118.9	160.6	123.6	133.1	129.7	89.2	59.9	50.2	28.7	10.8
Maple-birch	3,996.9	304.0	273.6	232.7	258.1	612.3	681.9	479.6	241.5	239.1	201.9	215.9	128.0	128.3
Aspen	3,261.5	651.3	451.0	312.4	471.1	702.5	404.9	154.2	71.6	37.4	5.1	--	--	--
Paper birch	641.6	56.9	53.5	59.5	95.3	148.7	130.4	76.0	15.3	1.9	0.3	3.8	--	--
Exotic	2.2	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	160.4	160.4	--	--	--	--	--	--	--	--	--	--	--	--
All types	14,759.4	1,818.2	1,419.0	1,166.6	1,418.8	2,337.0	2,041.6	1,285.0	873.2	705.6	551.6	534.2	340.8	267.8

Table 18.--Area of commercial forest land by forest type, site-index class, and Forest Survey Unit, Wisconsin, 1983

(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	546.5	--	1.7	8.2	72.8	174.3	202.9	74.2	10.5	1.9
Red pine	478.2	--	--	8.6	7.6	78.9	161.8	154.3	62.6	4.4
White pine	225.6	--	--	6.4	25.7	61.7	71.1	35.0	23.1	2.6
Balsam fir	419.4	3.2	7.0	46.0	111.7	115.0	103.6	22.1	8.8	2.0
White spruce	61.4	--	--	2.8	11.8	12.1	10.7	24.0	--	--
Black spruce	273.0	--	72.1	96.2	66.1	23.6	11.6	3.4	--	--
Northern white-cedar	370.7	6.9	116.2	97.6	73.8	42.5	29.1	2.7	1.9	--
Tamarack	222.7	--	20.0	46.3	52.6	51.4	42.3	6.0	4.1	--
Oak-hickory	2,858.7	--	--	127.3	392.2	795.2	745.1	513.4	221.8	63.7
Elm-ash-soft maple	1,240.6	--	7.2	75.8	192.2	355.4	300.8	186.6	101.6	21.0
Maple-birch	3,996.9	--	--	40.0	252.2	890.8	1,316.4	994.1	416.3	87.1
Aspen	3,261.5	--	--	19.1	162.4	502.5	955.1	1,099.1	452.0	71.3
Paper birch	641.6	--	--	8.0	48.9	153.0	213.5	141.3	66.6	10.3
Exotic	2.2	--	--	--	--	--	--	2.2	--	--
Nonstocked	160.4	--	3.8	17.4	28.0	46.8	31.2	25.8	4.7	2.7
All types	14,759.4	10.1	228.0	599.7	1,498.0	3,303.2	4,195.2	3,284.2	1,374.0	267.0
NORTHEAST UNIT										
Jack pine	81.7	--	1.7	1.6	8.8	23.0	25.7	17.5	3.4	--
Red pine	157.8	--	--	--	3.6	29.3	53.7	51.3	19.9	--
White pine	81.1	--	--	1.7	10.3	19.6	26.7	12.2	10.6	--
Balsam fir	187.9	--	5.3	27.3	44.2	50.4	47.7	11.0	2.0	--
White spruce	19.8	--	--	--	5.4	8.3	--	6.1	--	--
Black spruce	147.5	--	38.3	46.6	37.2	15.2	6.8	3.4	--	--
Northern white-cedar	186.0	3.4	65.9	58.2	24.9	22.7	9.0	--	1.9	--
Tamarack	63.0	--	7.1	18.1	10.8	25.3	1.7	--	--	--
Oak-hickory	149.3	--	--	--	5.3	34.0	39.2	41.7	23.4	5.7
Elm-ash-soft maple	235.9	--	--	24.1	39.5	77.1	58.3	18.6	18.3	--
Maple-birch	1,280.2	--	--	11.3	73.3	255.9	446.1	362.1	114.6	16.9
Aspen	1,026.7	--	--	9.3	58.2	178.7	305.0	343.3	119.5	12.7
Paper birch	191.5	--	--	--	12.5	44.4	77.2	50.0	7.4	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	20.1	--	2.0	1.8	5.4	5.6	1.9	3.4	--	--
All types	3,828.5	3.4	120.3	200.0	339.4	789.5	1,099.0	920.6	321.0	35.3
NORTHWEST UNIT										
Jack pine	247.8	--	--	1.9	36.9	76.8	104.6	21.0	4.7	1.9
Red pine	132.6	--	--	1.8	1.8	30.3	57.1	33.3	8.3	--
White pine	36.5	--	--	--	3.7	20.3	9.1	--	3.4	--
Balsam fir	219.6	3.2	1.7	18.7	60.4	62.2	53.5	11.1	6.8	2.0
White spruce	31.9	--	--	--	1.7	3.8	10.7	15.7	--	--
Black spruce	111.2	--	33.8	47.2	21.6	3.8	4.8	--	--	--
Northern white-cedar	107.8	3.5	32.8	13.9	36.3	8.5	12.8	--	--	--
Tamarack	111.5	--	12.9	23.7	30.6	14.5	24.5	3.6	1.7	--
Oak-hickory	415.6	--	--	12.6	41.6	136.3	115.7	92.0	17.4	--
Elm-ash-soft maple	414.9	--	1.8	33.1	99.5	140.0	75.2	43.8	21.5	--
Maple-birch	1,478.7	--	--	12.5	88.4	346.4	528.9	356.8	129.4	16.3
Aspen	1,508.3	--	--	4.3	54.1	190.3	437.7	550.0	247.1	24.8
Paper birch	268.8	--	--	5.7	20.2	69.5	91.3	52.3	27.9	1.9
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	65.6	--	1.8	5.6	14.5	18.5	14.4	8.9	1.9	--
All types	5,150.8	6.7	84.8	181.0	511.3	1,121.2	1,540.3	1,188.5	470.1	46.9

(Table 18 continued on next page)

(Table 18 continued)

CENTRAL UNIT

Forest type	All classes	Site-index class (feet) 11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	203.1	--	--	4.7	24.6	63.1	72.6	35.7	2.4	--
Red pine	135.5	--	--	6.8	2.2	19.3	35.9	46.3	20.6	4.4
White pine	77.9	--	--	2.3	11.7	16.4	27.2	13.6	6.7	--
Balsam fir	11.9	--	--	--	7.1	2.4	2.4	--	--	--
White spruce	2.2	--	--	--	2.2	--	--	--	--	--
Black spruce	11.6	--	--	2.4	4.6	4.6	--	--	--	--
Northern white-cedar	23.3	--	6.9	9.4	4.6	--	2.4	--	--	--
Tamarack	39.0	--	--	4.5	11.2	11.6	6.9	2.4	2.4	--
Oak-hickory	937.6	--	--	54.6	131.8	277.5	267.5	123.7	71.3	11.2
Elm-ash-soft maple	271.5	--	--	2.2	23.2	78.8	94.3	47.3	25.7	--
Maple-birch	506.2	--	--	4.8	26.7	118.2	176.1	106.3	60.2	13.9
Aspen	577.5	--	--	--	35.2	122.8	188.2	147.2	60.8	23.3
Paper birch	118.6	--	--	2.3	13.7	25.3	28.7	25.5	20.8	2.3
Exotic	2.2	--	--	--	--	--	--	2.2	--	--
Nonstocked	32.8	--	--	4.5	2.3	11.9	9.2	4.9	--	--
All types	2,950.9	--	6.9	98.5	301.1	751.9	911.4	555.1	270.9	55.1

SOUTHWEST UNIT

Jack pine	11.2	--	--	--	2.5	8.7	--	--	--	--
Red pine	40.1	--	--	--	--	--	12.9	13.4	13.8	--
White pine	13.7	--	--	--	--	2.6	5.9	2.6	--	2.6
Balsam fir	--	--	--	--	--	--	--	--	--	--
White spruce	2.5	--	--	--	2.5	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--
Oak-hickory	1,063.4	--	--	35.6	148.7	272.0	257.9	217.5	89.9	41.8
Elm-ash-soft maple	117.8	--	--	5.3	5.6	25.1	37.1	22.8	13.2	8.7
Maple-birch	497.9	--	--	8.9	51.4	113.5	104.1	116.6	81.1	22.3
Aspen	85.7	--	--	2.7	11.5	2.8	8.2	33.1	19.4	8.0
Paper birch	54.4	--	--	--	--	13.8	10.5	13.5	10.5	6.1
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	--	--	5.5	2.5	5.5	5.7	8.6	2.8	2.7
All types	1,920.0	--	--	58.0	224.7	444.0	442.3	428.1	230.7	92.2

SOUTHEAST UNIT

Jack pine	2.7	--	--	--	--	2.7	--	--	--	--
Red pine	12.2	--	--	--	--	--	2.2	10.0	--	--
White pine	16.4	--	--	2.4	--	2.8	2.2	6.6	2.4	--
Balsam fir	--	--	--	--	--	--	--	--	--	--
White spruce	5.0	--	--	2.8	--	--	--	2.2	--	--
Black spruce	2.7	--	--	--	2.7	--	--	--	--	--
Northern white-cedar	53.6	--	10.6	16.1	8.0	11.3	4.9	2.7	--	--
Tamarack	9.2	--	--	--	--	--	9.2	--	--	--
Oak-hickroy	292.8	--	--	24.5	64.8	75.4	64.8	38.5	19.8	5.0
Elm-ash-soft maple	200.5	--	5.4	11.1	24.4	34.4	35.9	54.1	22.9	12.3
Maple-birch	233.9	--	--	2.5	12.4	56.8	61.2	52.3	31.0	17.7
Aspen	63.3	--	--	2.8	3.4	7.9	16.0	25.5	5.2	2.5
Paper birch	8.3	--	--	--	2.5	--	5.8	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	--	--	--	3.3	5.3	--	--	--	--
All types	909.2	--	16.0	62.2	121.5	196.6	202.2	191.9	81.3	37.5

Table 19.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	93.9	--	--	--	7.9	3.6	9.8	9.5	12.8	16.1	8.0	17.2	7.2	1.8	--
Poletimber	281.0	--	--	--	4.2	10.0	22.4	22.6	51.1	44.7	64.9	38.5	18.5	1.9	2.2
Sapling & seedling	171.6	21.0	6.8	24.7	16.7	20.4	16.1	20.6	39.7	3.8	1.8	--	--	--	--
All stands	546.5	21.0	6.8	24.7	28.8	34.0	48.3	52.7	103.6	64.6	74.7	55.7	25.7	3.7	2.2
Red pine															
Sawtimber	159.2	--	--	--	2.8	2.0	1.9	--	7.3	9.4	11.4	46.8	43.4	27.0	7.2
Poletimber	193.9	--	--	--	--	3.4	6.1	6.5	8.5	19.9	6.8	42.3	42.0	22.4	36.0
Sapling & seedling	125.1	55.5	10.7	8.6	6.0	4.6	15.8	--	5.7	9.9	1.6	4.2	2.5	--	--
All stands	478.2	55.5	10.7	8.6	8.8	10.0	23.8	6.5	21.5	39.2	19.8	93.3	87.9	49.4	43.2
White pine															
Sawtimber	157.6	--	2.5	1.9	7.6	1.7	7.6	1.7	8.8	13.5	11.9	41.2	33.5	16.8	8.9
Poletimber	43.9	--	--	--	--	1.7	2.2	--	5.2	6.0	5.8	13.0	5.4	4.6	--
Sapling & seedling	24.1	5.4	5.1	--	--	2.2	5.7	--	5.7	--	--	--	--	--	--
All stands	225.6	5.4	7.6	1.9	7.6	5.6	15.5	1.7	19.7	19.5	17.7	54.2	38.9	21.4	8.9
Balsam fir															
Sawtimber	116.9	--	--	--	--	8.2	19.7	5.5	10.0	7.3	8.5	21.6	26.8	3.7	5.6
Poletimber	184.4	--	--	1.8	--	3.5	14.6	12.1	7.5	18.7	7.3	36.6	47.8	22.0	12.5
Sapling & seedling	118.1	11.0	10.6	13.7	7.3	13.2	13.8	17.1	17.0	1.9	5.6	3.3	1.9	1.7	--
All stands	419.4	11.0	10.6	15.5	7.3	24.9	48.1	34.7	34.5	27.9	21.4	61.5	76.5	27.4	18.1
White spruce															
Sawtimber	23.0	--	--	--	--	--	--	2.7	--	--	--	--	--	10.3	10.0
Poletimber	20.2	--	--	--	--	--	--	--	--	3.8	2.2	1.7	8.7	3.8	--
Sapling & seedling	18.2	4.2	2.8	1.8	--	3.6	3.6	--	2.2	--	--	--	--	--	--
All stands	61.4	4.2	2.8	1.8	--	3.6	3.6	2.7	2.2	3.8	2.2	1.7	8.7	14.1	10.0
Black spruce															
Sawtimber	7.3	--	1.9	--	--	--	--	3.6	--	--	--	--	1.8	--	--
Poletimber	82.0	--	--	3.6	--	--	9.3	7.5	13.0	8.7	17.5	7.8	12.8	1.8	--
Sapling & seedling	183.7	11.3	11.1	35.7	9.2	40.5	12.7	18.1	20.4	10.8	3.7	5.9	4.3	--	--
All stands	273.0	11.3	13.0	39.3	9.2	40.5	22.0	29.2	33.4	19.5	21.2	13.7	18.9	1.8	--
Northern white-cedar															
Sawtimber	115.3	--	--	--	--	5.3	2.0	5.3	8.6	7.5	3.5	7.6	24.9	24.9	25.7
Poletimber	206.9	--	--	--	--	--	1.8	--	8.9	11.4	1.6	43.1	30.1	61.0	49.0
Sapling & seedling	48.5	1.8	2.9	7.0	2.7	5.3	3.5	--	8.4	2.7	--	8.9	--	5.3	--
All stands	370.7	1.8	2.9	7.0	2.7	10.6	7.3	5.3	25.9	21.6	5.1	59.6	55.0	91.2	74.7

(Table 19 continued on next page)

(Table 19 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	15.3	--	1.8	4.3	--	1.8	3.7	1.8	--	--	--	1.9	--	--	--
Poletimber	89.0	--	1.9	3.7	2.4	11.5	11.1	15.1	1.9	21.7	8.6	9.3	1.8	--	--
Sapling & seedling	118.4	24.3	11.8	13.4	12.6	15.7	16.6	5.8	11.0	1.8	5.4	--	--	--	--
All stands	222.7	24.3	15.5	21.4	15.0	29.0	31.4	22.7	12.9	23.5	14.0	11.2	1.8	--	--
Oak-hickory															
Sawtimber	1,526.5	--	2.4	15.4	26.8	65.4	86.5	114.3	169.7	214.5	144.2	371.4	247.7	59.3	8.9
Poletimber	841.8	--	--	3.5	7.6	8.6	77.6	47.2	100.4	122.9	109.6	178.3	134.3	46.7	5.1
Sapling & seedling	490.4	52.0	48.1	89.5	60.4	73.3	74.9	26.8	18.9	17.0	11.0	13.1	5.4	--	--
All stands	2,858.7	52.0	50.5	108.4	94.8	147.3	239.0	188.3	289.0	354.4	264.8	562.8	387.4	106.0	14.0
Elm-ash-soft maple															
Sawtimber	415.4	--	4.7	15.0	18.2	20.9	38.6	16.4	30.5	43.9	37.6	71.9	74.6	33.0	10.1
Poletimber	524.8	--	10.1	21.9	23.3	36.1	50.2	37.1	67.6	66.3	37.6	64.5	77.6	28.1	4.4
Sapling & seedling	300.4	31.8	44.3	39.3	42.5	40.0	40.6	17.5	16.7	11.7	9.1	2.4	4.5	--	--
All stands	1,240.6	31.8	59.1	76.2	84.0	97.0	129.4	71.0	114.8	121.9	84.3	138.8	156.7	61.1	14.5
Maple-birch															
Sawtimber	1,543.8	--	--	8.9	7.7	44.9	66.5	61.5	137.2	148.3	128.5	336.0	417.8	151.0	35.5
Poletimber	1,749.4	--	--	4.9	19.0	37.8	77.1	81.6	156.5	244.9	155.2	422.7	386.7	140.1	22.9
Sapling & seedling	703.7	49.5	83.2	87.2	62.5	96.2	91.5	49.8	54.5	46.8	19.6	46.1	11.2	5.6	--
All stands	3,996.9	49.5	83.2	101.0	89.2	178.9	235.1	192.9	348.2	440.0	303.3	804.8	815.7	296.7	58.4
Aspen															
Sawtimber	401.6	--	2.3	7.3	13.1	19.7	33.9	22.7	33.5	56.0	35.1	64.7	88.4	15.4	9.5
Poletimber	1,585.9	--	9.1	29.5	30.7	102.0	142.0	147.7	170.5	227.5	147.6	250.4	241.0	71.4	16.5
Sapling & seedling	1,274.0	176.5	191.2	174.1	142.6	193.0	139.3	82.7	84.6	49.2	20.1	17.1	1.8	1.8	--
All stands	3,261.5	176.5	202.6	210.9	186.4	314.7	315.2	253.1	288.6	332.7	202.8	332.2	331.2	88.6	26.0
Paper birch															
Sawtimber	78.9	--	--	1.8	--	5.6	2.6	10.1	8.7	11.5	3.6	14.5	12.2	5.5	2.8
Poletimber	420.2	--	--	1.9	7.8	18.2	35.2	13.4	35.9	33.6	36.1	82.7	112.2	37.7	5.5
Sapling & seedling	142.5	9.9	22.9	14.6	13.4	23.0	19.8	12.6	5.4	6.1	5.5	7.6	1.7	--	--
All stands	641.6	9.9	22.9	18.3	21.2	46.8	57.6	36.1	50.0	51.2	45.2	104.8	126.1	43.2	8.3
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--
All stands	2.2	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--
Nonstocked	160.4	78.4	26.4	9.2	9.8	3.5	9.2	4.4	5.6	--	8.8	2.7	2.4	--	--
All types															
Sawtimber	4,654.7	--	15.6	54.6	84.1	179.1	272.8	255.1	427.1	528.0	392.3	994.8	978.3	348.7	124.2
Poletimber	6,223.4	--	21.1	70.8	95.0	232.8	449.6	390.8	627.0	830.1	600.8	1,190.9	1,118.9	441.5	154.1
Sapling & seedling	3,720.9	454.2	451.5	509.6	375.9	531.0	453.9	251.0	292.4	161.7	83.4	108.6	33.3	14.4	--
Nonstocked	160.4	78.4	26.4	9.2	9.8	3.5	9.2	4.4	5.6	--	8.8	2.7	2.4	--	--
All stands	14,759.4	532.6	514.6	644.2	564.8	946.4	1,185.5	901.3	1,352.1	1,519.8	1,085.3	2,297.0	2,132.9	804.6	278.3

Table 20.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	160.4	--	--	--	160.4
16.7 to 60.9	2,633.4	1,027.2	806.1	800.1	--
61.0 to 100.9	6,087.2	1,971.3	2,837.9	1,278.0	--
101.0 to 133.9	4,829.8	1,401.9	2,243.6	1,184.3	--
134.0+	1,048.6	254.3	335.8	458.5	--
All classes	14,759.4	4,654.7	6,223.4	3,720.9	160.4

Table 21.--Area of commercial forest land by stocking class based on selected stand components, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	Stocking classified in terms of		
	All live trees	Growing-stock trees	Rough and rotten trees
0-10	30.6	54.0	7,344.6
11-20	55.7	155.8	3,762.8
21-30	138.9	357.2	1,873.4
31-40	237.0	487.8	960.1
41-50	364.5	666.2	459.9
51-60	433.2	960.0	208.8
61-70	652.8	1,278.3	103.2
71-80	945.2	1,384.8	17.6
81-90	1,309.4	1,638.1	20.9
91-100	1,824.2	1,758.5	2.1
101-110	1,951.2	1,698.5	4.1
111-120	2,130.5	1,607.3	1.9
121-130	1,954.9	1,328.1	--
131-140	1,454.7	759.0	--
141-150	885.0	413.2	--
151-160	304.4	159.1	--
161+	87.2	53.5	--
All classes	14,759.4	14,759.4	14,759.4

Table 22.--Area of plantations by forest type and stand-age class, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Stand-age class (years)									
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	138.5	5.7	26.3	20.1	33.4	24.6	22.0	4.2	2.2	--	--
Red pine	377.9	52.2	96.7	103.9	71.4	47.5	4.2	2.0	--	--	--
White pine	55.0	7.6	13.9	5.9	6.3	13.4	3.9	2.3	1.7	--	--
White spruce	40.5	4.3	11.0	2.0	12.2	4.4	6.6	--	--	--	--
Black spruce	2.7	--	2.7	--	--	--	--	--	--	--	--
Exotic	2.2	--	2.2	--	--	--	--	--	--	--	--
Nonstocked	5.5	5.5	--	--	--	--	--	--	--	--	--
All types	622.3	75.3	152.8	131.9	123.3	89.9	36.7	8.5	3.9	--	--

Table 23.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species									
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Eastern redcedar	Other softwoods
Jack pine	256.4	13.0	45.5	185.4	8.6	--	1.7	--	--	--	2.2
Red pine	177.2	18.3	74.0	8.7	62.9	11.7	1.6	--	--	--	--
White pine	121.3	86.9	1.7	--	30.9	--	--	1.8	--	--	--
Balsam fir	232.4	--	--	--	230.7	--	1.7	--	--	--	--
White spruce	12.0	2.8	--	--	1.7	7.5	--	--	--	--	--
Black spruce	181.3	--	--	--	47.3	--	128.2	--	--	--	5.8
Northern white-cedar	204.9	--	--	--	127.5	2.2	--	--	73.4	--	1.8
Tamarack	159.1	--	--	--	31.5	--	40.9	--	6.1	--	80.6
Oak-hickory	429.6	153.6	30.5	141.4	32.1	2.2	--	3.5	2.7	59.0	4.6
Elm-ash-soft maple	274.2	22.4	--	--	196.3	4.6	6.6	10.0	29.7	2.8	1.8
Maple-birch	879.2	122.8	15.4	11.0	582.8	27.6	1.9	87.0	8.5	18.2	4.0
Aspen	860.7	137.2	28.3	38.9	583.5	20.5	30.9	5.9	7.5	2.5	5.5
Paper birch	153.4	17.4	4.0	--	106.7	3.3	5.8	1.8	9.3	2.8	2.3
Exotic	2.2	--	--	--	--	2.2	--	--	--	--	--
Nonstocked	18.0	5.5	4.6	--	5.4	--	--	--	--	2.5	--
All types	3,961.9	579.9	204.0	385.4	2,047.9	81.8	219.3	110.0	137.2	87.8	108.6

Table 24.--Area of commercial forest land by class of water and distance to water, Wisconsin, 1983

(In thousand acres)

Class of water and width or size	All distances	Distance to water (miles)						
		0-.125	.125-.25	.25-1.0	1.0-2.5	2.5-5.0	5.0-10.0	10.0+
Streams								
1-16 feet	816.6	395.9	121.7	233.3	63.2	2.5	--	--
17-33 feet	3,867.3	1,337.1	774.1	1,545.7	196.4	12.0	2.0	--
34-66 feet	1,452.3	391.3	250.1	655.4	131.5	24.0	--	--
67+ feet	943.2	279.1	142.7	373.8	123.1	21.8	2.7	--
All widths	7,079.4	2,403.4	1,288.6	2,808.2	514.2	60.3	4.7	--
Lakes								
1-25 acres	1,584.2	338.0	295.3	722.4	178.5	48.1	1.9	--
26-100 acres	623.4	137.8	88.5	327.0	59.8	10.3	--	--
101-500 acres	374.7	88.6	69.0	173.7	37.1	6.3	--	--
501+ acres	461.7	81.8	54.8	175.9	115.6	30.9	2.7	--
All sizes	3,044.0	646.2	507.6	1,399.0	391.0	95.6	4.6	--
Swamps								
1-10 acres	1,505.8	883.1	277.8	286.0	29.3	29.6	--	--
11-25 acres	540.1	340.8	109.5	83.4	4.0	2.4	--	--
26-100 acres	1,287.5	794.6	220.0	250.5	22.4	--	--	--
101+ acres	762.2	552.9	110.0	95.8	3.5	--	--	--
All sizes	4,095.6	2,571.4	717.3	715.7	59.2	32.0	--	--
Farm ponds								
1-2 acres	397.6	90.9	64.0	215.3	27.4	--	--	--
3-5 acres	83.4	12.2	13.4	45.5	12.3	--	--	--
6+ acres	59.4	14.5	4.0	26.0	7.4	7.5	--	--
All sizes	540.4	117.6	81.4	286.8	47.1	7.5	--	--
All widths and sizes	14,759.4	5,738.6	2,594.9	5,209.7	1,011.5	195.4	9.3	--

Table 25.--Area of commercial forest land by Forest Survey Unit, distance to maintained road, and type of road, Wisconsin, 1983

(In thousand acres)

Type of road and distance to road (miles)	All Units	Forest Survey Unit				
		Northeast	Northwest	Central	Southwest	Southeast
Paved-4 lane						
0-.125	53.5	5.1	15.9	9.1	2.5	20.9
.125-.25	36.5	5.1	11.5	4.5	2.5	12.9
.25-1.0	64.6	14.2	28.7	11.4	2.9	7.4
1.0-2.5	2.5	--	--	--	--	2.5
2.5-5.0	--	--	--	--	--	--
5+	--	--	--	--	--	--
Total	157.1	24.4	56.1	25.0	7.9	43.7
Paved-2 lane						
0-.125	1,476.1	394.1	296.9	428.2	212.2	144.7
.125-.25	1,368.4	256.7	300.8	420.2	230.7	160.0
.25-1.0	2,760.8	744.5	704.3	655.3	418.2	238.5
1.0-2.5	143.9	63.0	59.5	11.5	5.3	4.6
2.5-5.0	--	--	--	--	--	--
5+	--	--	--	--	--	--
Total	5,749.2	1,458.3	1,361.5	1,515.2	866.4	547.8
Improved-gravel						
0-.125	2,502.4	712.4	955.5	440.2	282.9	111.4
.125-.25	1,871.4	451.2	723.7	348.2	292.3	56.0
.25-1.0	4,133.8	1,038.8	1,868.3	605.9	470.5	150.3
1.0-2.5	335.1	136.5	182.2	16.4	--	--
2.5-5.0	7.1	3.6	3.5	--	--	--
5+	--	--	--	--	--	--
Total	8,849.8	2,342.5	3,733.2	1,410.7	1,045.7	317.7
All types of road						
0-.125	4,035.3	1,114.9	1,268.3	877.5	497.6	277.0
.125-.25	3,276.3	713.0	1,036.0	772.9	525.5	228.9
.25-1.0	6,959.2	1,797.5	2,601.3	1,272.6	891.6	396.2
1.0-2.5	481.5	199.5	241.7	27.9	5.3	7.1
2.5-5.0	7.1	3.6	3.5	--	--	--
5+	--	--	--	--	--	--
Total	14,759.4	3,828.5	5,150.8	2,950.9	1,920.0	909.2

Table 26.--Area of commercial forest land by Forest Survey Unit, posting, and setting class, Wisconsin, 1983

(In thousand acres)

Unit and posting	All classes	Setting class					
		Primitive	Semi-primitive nonmotor	Semi-primitive motor	Roaded natural	Rural	Urban
Northeast							
Not posted	3,170.4	3.5	87.1	688.3	1,988.0	392.7	10.8
Locked gate	127.6	--	1.9	28.1	90.4	5.5	1.7
No trespassing	274.6	1.8	1.7	40.6	159.1	69.7	1.7
No hunting	14.4	--	--	3.6	3.7	7.1	--
Other posted signs	34.7	--	--	8.9	22.2	3.6	--
Other evidence	206.8	--	3.5	10.3	84.7	108.3	--
Total	3,828.5	5.3	94.2	779.8	2,348.1	586.9	14.2
Northwest							
Not posted	4,536.1	5.6	252.7	873.7	2,606.3	778.9	18.9
Locked gate	69.1	--	2.6	26.1	36.7	3.7	--
No trespassing	329.4	--	18.6	52.2	164.3	94.3	--
No hunting	29.9	--	--	--	21.9	8.0	--
Other posted signs	40.8	--	4.1	5.4	22.0	9.3	--
Other evidence	145.5	--	2.0	--	47.4	96.1	--
Total	5,150.8	5.6	280.0	957.4	2,898.6	990.3	18.9
Central							
Not posted	1,995.6	2.4	36.6	121.5	1,198.6	631.9	4.6
Locked gate	66.8	--	--	25.3	20.4	21.1	--
No trespassing	480.4	--	4.5	23.5	331.7	120.7	--
No hunting	41.4	--	--	--	36.8	4.6	--
Other posted signs	39.9	--	--	4.2	24.4	11.3	--
Other evidence	326.8	--	--	4.8	127.2	194.8	--
Total	2,950.9	2.4	41.1	179.3	1,739.1	984.4	4.6
Southwest							
Not posted	1,308.9	--	2.8	10.8	329.2	960.0	6.1
Locked gate	54.6	--	--	2.6	16.0	36.0	--
No trespassing	160.1	--	--	8.3	71.6	80.2	--
No hunting	8.7	--	2.8	--	5.9	--	--
Other posted signs	11.2	--	--	--	11.2	--	--
Other evidence	376.5	--	--	11.5	94.2	270.8	--
Total	1,920.0	--	5.6	33.2	528.1	1,347.0	6.1
Southeast							
Not posted	573.3	3.0	13.0	80.6	236.1	230.0	10.6
Locked gate	2.2	--	--	--	--	2.2	--
No trespassing	126.6	--	--	--	52.9	66.2	7.5
No hunting	5.4	--	--	--	2.7	2.7	--
Other posted signs	18.7	--	--	2.5	2.7	13.5	--
Other evidence	183.0	--	--	--	40.7	139.1	3.2
Total	909.2	3.0	13.0	83.1	335.1	453.7	21.3
All Units							
Not posted	11,584.3	14.5	392.2	1,774.9	6,358.2	2,993.5	51.0
Locked gate	320.3	--	4.5	82.1	163.5	68.5	1.7
No trespassing	1,371.1	1.8	24.8	124.6	779.6	431.1	9.2
No hunting	99.8	--	2.8	3.6	71.0	22.4	--
Other posted signs	145.3	--	4.1	21.0	82.5	37.7	--
Other evidence	1,238.6	--	5.5	26.6	394.2	809.1	3.2
Total	14,759.4	16.3	433.9	2,032.8	7,849.0	4,362.3	65.1

Table 27.--Area of noncommercial forest land by ownership class, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Unproductive areas	Productive-reserved areas
National Forest	147.4	94.9	52.5[1/]
Miscellaneous federal	54.9	2.3	52.6
State	137.8	31.9	105.9
County and municipal	60.4	44.9	15.5
Indian	3.8	2.2	1.6
Forest industry	17.5	17.5	--
Farmer	59.8	52.5	7.3
Misc. private-corp.	14.2	5.4	8.8
Misc. private-indiv.	96.1	79.4	16.7
Total	591.9	331.0	260.9

[1/] Includes 33.8 thousand acres of productive-deferred areas.

Table 28.--Area of noncommercial forest land by forest type, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Unproductive areas	Productive-reserved areas[1/]
Jack pine	4.6	2.0	2.6
Red pine	17.1	--	17.1
White pine	2.7	--	2.7
Balsam fir	14.9	14.0	.9
White spruce	1.8	--	1.8
Black spruce	190.5	183.6	6.9
Northern white-cedar	20.7	17.2	3.5
Tamarack	20.5	20.5	--
Oak-hickory	56.6	26.5	30.1
Elm-ash-soft maple	98.6	45.1	53.5
Maple-birch	60.9	2.5	58.4
Aspen	77.7	5.7	72.0
Paper birch	4.2	2.3	1.9
Exotic	9.5	--	9.5
Nonstocked	11.6	11.6	--
All types	591.9	331.0	260.9

[1/] Includes 33.8 thousand acres of productive-deferred areas.

Table 29.--Area of nonforest land with trees by forest type and land use, Wisconsin 1983

(In thousand acres)

Forest type	All uses	Land use							
		Cropland	Improved pasture	Wooded strips	Idle farmland	Marsh	Wind-breaks	Urban and other[1/]	Wooded pasture
Jack pine	14.2	--	4.7	--	4.4	5.1	--	--	--
Red pine	8.5	--	1.3	2.3	--	--	4.9	--	--
White pine	10.3	--	2.3	2.2	--	5.8	--	--	--
Balsam fir	7.3	--	--	--	--	7.3	--	--	--
White spruce	2.0	--	--	--	2.0	--	--	--	--
Black spruce	9.5	--	--	1.8	--	7.7	--	--	--
Northern white-cedar	1.2	--	1.2	--	--	--	--	--	--
Tamarack	30.6	--	--	--	4.2	26.4	--	--	--
Oak-hickory	213.9	16.4	103.2	12.4	21.0	8.4	15.7	--	36.8
Elm-ash-soft maple	269.1	9.2	67.7	9.4	21.7	140.8	4.2	--	16.1
Maple-birch	200.9	16.5	80.7	8.8	21.7	11.5	11.6	--	50.1
Aspen	165.2	6.9	39.2	8.1	33.4	68.0	4.4	--	5.2
Paper birch	28.6	--	--	--	--	24.7	--	--	3.9
Exotic	2.4	--	--	--	--	2.4	--	--	--
Nonstocked	33.7	5.1	22.0	--	2.1	4.5	--	--	--
Not typed	244.3	--	--	--	--	--	--	244.3	--
All types	1,241.7	54.1	322.3	45.0	110.5	312.6	40.8	244.3	112.1

[1/] Forest type was not recorded on plots classified as urban and other land with trees.

Table 30.--Sampling errors[1/] for estimates of commercial forest area smaller than State totals, Wisconsin, 1983

Sampling error	Commercial forest area
percent	thousand acres
1	744.0
2	186.0
3	82.7
4	46.5
5	29.8
10	7.4
15	3.3
20	1.9
25	1.2
50	0.3
100	0.1

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