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# Biomass Statistics for the Northern United States

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## Abstract

The USDA Forest Service now estimates biomass during periodic resource inventories. Such biomass estimates quantify more of the forest resource than do traditional volume inventories that concentrate on tree boles. More than 48 percent of the aboveground tree biomass in the northern United States can be found in woody material outside of the boles. Tree biomass in the Northeastern and North Central regions of the United States is compared by state.

## The Northeastern States

In the New England section, 58 percent of the total tree biomass is in Maine. Of its 1.4 billion green tons, almost half is material that is in tree boles. The remaining 0.7 billion green tons is from unconventional sources of fiber including tree tops, trees less than 5.0 inches dbh, and cull trees.

The biomass in tops consistently averages about 17 percent of the total biomass in the New England section; the proportion of biomass in cull trees differs considerably. Only in Rhode Island and Vermont are cull trees a significant proportion, representing about a quarter of the total biomass in each of these two states.

In the Middle Atlantic section, Pennsylvania, New York, and West Virginia account for nearly 89 percent of the total tree biomass. While Pennsylvania's 1.5 billion green tons represent the greatest amount, only 0.6 billion green tons come from unconventional sources. This is only 39 percent of the total biomass in the State—lower than every Middle Atlantic State except Delaware.

The proportion of biomass in tree tops is lower in the Middle Atlantic States than in New England by 2 percent. Even so, as much as 1.9 billion green tons, or 46 percent of the section's biomass, are from unconventional sources and theoretically are available for fiber-based products.

Forests today must supply more than wood for conventional products such as sawlogs and pulpwood. Constraints placed upon the economy in the 1980's will force the forest products industry to use more of the available supply of timber to increase production and decrease costs. Already, timber harvesters are responding by producing whole-tree chips that may be converted to energy, pulp and paper products, reconstituted wood products, or agricultural uses.

The use of all woody material above the ground is becoming a common practice. Wood from the tops of trees and from poorly formed, rotten, and small trees once considered unusable is now removed. This increased use of our forest resource has created a need to determine the total supply of wood fiber.

In response, the USDA Forest Service (1981) has estimated the sup-

ply of live, aboveground biomass on timberland in the United States. The Northeastern and North Central Forest Experiment Stations cooperated in this national effort to evaluate the net green weight of woody material in all live trees above the ground (excluding foliage). We found that almost a third of the nation's tree biomass is located in the northern United States.

## Northern Biomass

More than 11.6 billion green tons of biomass grow on timberland in the four sections of the North (Table 1). The largest amount, 4.0 billion green tons, is in the Middle Atlantic section. The remainder is evenly distributed between the New England, Lake States, and Central States. Six of the states—Maine, New York, Pennsylvania, West Virginia, Michigan, and Kentucky—each contain more than 1 billion green tons.

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**Table 1.—Total green weight of aboveground tree biomass on commercial forest land in the North by class of timber, section, and state<sup>a</sup>**  
(Million green tons)

| Section and state      | Tree bole <sup>b</sup> | Tree tops <sup>c</sup> | Cull trees <sup>d</sup> | Small trees <sup>e</sup> | Total biomass   |
|------------------------|------------------------|------------------------|-------------------------|--------------------------|-----------------|
| <b>New England</b>     |                        |                        |                         |                          |                 |
| Connecticut            | 63.2                   | 17.1                   | 7.7                     | 12.5                     | 100.5           |
| Maine                  | 685.2                  | 249.2                  | 233.8                   | 252.1                    | 1,420.3         |
| Massachusetts          | 101.1                  | 29.9                   | 20.4                    | 23.5                     | 174.9           |
| New Hampshire          | 192.0                  | 61.7                   | 58.6                    | 62.0                     | 374.3           |
| Rhode Island           | 10.3                   | 2.9                    | 4.4                     | 2.9                      | 20.5            |
| Vermont                | 174.2                  | 50.6                   | 98.0                    | 43.4                     | 366.2           |
| <b>Total</b>           | <b>1,226.0</b>         | <b>411.4</b>           | <b>422.9</b>            | <b>396.4</b>             | <b>2,456.7</b>  |
| <b>Middle Atlantic</b> |                        |                        |                         |                          |                 |
| Delaware               | 25.9                   | 5.9                    | 2.8                     | 5.9                      | 40.5            |
| Maryland               | 156.1                  | 40.9                   | 59.8                    | 24.8                     | 281.6           |
| New Jersey             | 72.9                   | 19.1                   | 11.4                    | 24.2                     | 127.6           |
| New York               | 426.1                  | 132.5                  | 251.1                   | 191.0                    | 1,000.7         |
| Pennsylvania           | 912.1                  | 269.7                  | 118.2                   | 196.7                    | 1,496.7         |
| West Virginia          | 581.7                  | 143.7                  | 218.3                   | 157.1                    | 1,100.8         |
| <b>Total</b>           | <b>2,174.8</b>         | <b>611.8</b>           | <b>661.6</b>            | <b>599.7</b>             | <b>4,047.9</b>  |
| <b>Lake States</b>     |                        |                        |                         |                          |                 |
| Michigan               | 515.6                  | 239.6                  | 93.5                    | 181.7                    | 1,030.4         |
| Minnesota              | 302.7                  | 147.2                  | 76.8                    | 135.6                    | 662.3           |
| North Dakota           | 6.1                    | 2.8                    | 4.3                     | 2.7                      | 15.9            |
| South Dakota (East)    | 4.9                    | 2.4                    | 3.6                     | 0.7                      | 11.6            |
| Wisconsin              | 338.5                  | 154.6                  | 105.5                   | 95.5                     | 694.1           |
| <b>Total</b>           | <b>1,167.8</b>         | <b>546.6</b>           | <b>283.7</b>            | <b>416.2</b>             | <b>2,414.3</b>  |
| <b>Central States</b>  |                        |                        |                         |                          |                 |
| Illinois               | 90.8                   | 41.6                   | 19.5                    | 15.5                     | 167.4           |
| Indiana                | 112.5                  | 51.8                   | 24.5                    | 27.0                     | 215.8           |
| Iowa                   | 34.3                   | 15.7                   | 17.0                    | 9.0                      | 76.0            |
| Kansas                 | 17.8                   | 8.3                    | 26.5                    | 5.6                      | 58.2            |
| Kentucky               | 632.7                  | 161.6                  | 126.7                   | 90.6                     | 1,011.6         |
| Missouri               | 228.3                  | 101.8                  | 154.3                   | 105.7                    | 590.1           |
| Nebraska               | 17.7                   | 8.8                    | 10.9                    | 1.3                      | 38.7            |
| Ohio                   | 317.9                  | 99.4                   | 56.7                    | 89.0                     | 563.0           |
| <b>Total</b>           | <b>1,452.0</b>         | <b>489.0</b>           | <b>436.1</b>            | <b>343.7</b>             | <b>2,720.8</b>  |
| <b>Total, North</b>    | <b>6,020.6</b>         | <b>2,058.8</b>         | <b>1,804.3</b>          | <b>1,756.0</b>           | <b>11,639.7</b> |

<sup>a</sup>Based upon the year in which the most recent inventory was made.

<sup>b</sup>The main stem of all trees, except cull trees and small trees, between the ground and 4-inch top diameter outside the bark.

<sup>c</sup>The tops of all trees, except cull trees and small trees, above a 4-inch top diameter excluding the foliage.

<sup>d</sup>The bole and tops of cull trees above the ground.

<sup>e</sup>Above the ground, and between 1 and 5 inches in diameter at breast height (d.b.h.).

In contrast, only 1.2 billion green tons are available in New England. Yet, this material from both sections represents almost 48 percent of the total biomass in the Northeast.

### The North Central States

Michigan, Wisconsin, and Minnesota account for 99 percent of the 2.4 billion green tons of total tree biomass in the Lake States section. Michigan has the greatest percentage of the total at 43 percent, Wisconsin has 29 percent, and Minnesota accounts for 27 percent. Forty-eight percent of the total tree biomass for these three states is from tree boles. Only 12 percent of the biomass is in cull trees, while 17 percent is in small trees. North and South Dakota combined comprise only 1 percent of the Lake States' total biomass, and have high percentages of biomass in cull trees. Twenty-three percent of the biomass in the Lake States is in tree tops. This is a greater proportion than that in any other section in the North.

The highest percentage of biomass in the Central States section is in Kentucky, which has 37 percent of the total. Ohio and Missouri also contain high percentages of the section's total biomass, 21 and 22 percent of the total, respectively. An average of 16 percent of the section's total biomass is in cull trees. In contrast to the Lake States, only 13 percent of the Central States' biomass is in small trees, and only 18 percent of the total tree biomass in the Central States is in tops.

### Prospective Biomass Estimates

Estimates of the total wood fiber supply can provide valuable information to policymakers at the national and regional levels. Admittedly, this information is broad in nature and may be of limited value to local resource planners. We must provide detailed biomass statistics at a local level if such statistics are to become a useful tool. Already, such procedures are being incorporated into inventory processes.

Biomass information for state and geographic units is now being published as a part of the timber resource bulletins as each state is inventoried. For more information write to Forest Inventory and Analysis staff at the Northeastern Forest Experiment Station, 370 Reed Road, Broomall, PA 19008, or the North Central Forest Experiment Station, 1992 Folwell Avenue, St. Paul, MN 55108.

### Literature Cited

USDA Forest Service. **Tree biomass—a state-of-the-art compilation.** Gen. Tech. Rep. WO-33. Washington, DC: U.S. Department of Agriculture, Forest Service; 1981. 34 p.

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