



# Forests of North Dakota, 2014

This resource update provides an overview of forest resources in North Dakota based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program at the Northern Research Station in cooperation with the North Dakota Forest Service. Estimates are based on field data collected using the FIA annualized sample design and are updated yearly. The estimates presented in this update are for the measurement year 2014 with comparisons made to data reported in 2009. In the 2014 inventory, NRS-FIA is now measuring 1/7th (14.3 percent) of the plots annually and plans to continue this, reaching a 7-year cycle in the 2020 inventory. The complete set of plots is being retained. All inventory estimates (both current and change) will continue being based on the most recent measurements taken on these plots.

As the 7-year cycle is phased in the difference between the report year and average date of the recent data will increase from 2 to 3 years. The difference between the report year and the average midpoint year for change will increase from 4.5 to 6.5 years. For the 2014 report, these differences are 2.3 and 4.8 years, respectively.

## Overview

Total land area of North Dakota is 44.1 million acres of which 1.8 percent or 796,900 acres are forested (Table 1). The number of live trees on North Dakota’s forest land in 2014 was estimated at 360 million trees, an increase of about 8 percent from 2009. Net volume experienced an increase of about 11 percent between 2009 and 2014. Live tree biomass (above ground) is estimated at 19 million oven-dry tons. Net growth and annual mortality showed increases on forest land in 2014, while removals by harvest of live trees decreased.

**Table 1.—North Dakota forest statistics, change between 2009 and 2014**

|  | 2009 Estimate | Sampling error (percent) | 2014 Estimate | Sampling error (percent) | Percent change since 2009 |
|--|---------------|--------------------------|---------------|--------------------------|---------------------------|
| <b>Forest Land</b>   |               |                          |               |                          |                           |
| Area (thousand acres)  | 741.8         | 6.2                      | 796.9         | 5.8                      | 7.4                       |
| Number of live trees ≥1 in diameter (million trees)                          | 333.3         | 9.6                      | 360.4         | 9.4                      | 8.1                       |
| Net volume live trees ≥ 5 in diameter (million ft <sup>3</sup> /yr)          | 678.7         | 10.1                     | 750.0         | 9.6                      | 10.5                      |
| Live tree aboveground biomass (thousand oven-dry tons)                       | 17,744.1      | 8.5                      | 19,151.3      | 8.3                      | 7.9                       |
| Net growth live trees ≥5 in (thousand ft <sup>3</sup> /yr)                   | 10,565.9      | 34.8                     | 12,640.4      | 37.5                     | 19.6                      |
| Harvest removals of live trees ≥5 in (thousand ft <sup>3</sup> /yr)          | 1,240.5       | 82.9                     | 403.8         | 69.0                     | -67.4                     |
| Annual mortality of live trees ≥5 in (thousand ft <sup>3</sup> /yr)          | 12,977.0      | 23.4                     | 17,637.2      | 25.4                     | 35.9                      |
| <b>Timberland</b>  |               |                          |               |                          |                           |
| Area (thousand acres)  | 475.3         | 8.4                      | 482.8         | 8.5                      | 1.6                       |
| Number of live trees ≥1 in diameter (million trees)                          | 208.9         | 12.6                     | 216.4         | 12.2                     | 3.6                       |
| Net volume live trees ≥5 in diameter (million ft <sup>3</sup> /yr)           | 539.8         | 12.5                     | 590.8         | 12.3                     | 9.4                       |
| Live tree aboveground biomass (thousand oven-dry tons)                       | 13,626.2      | 11.0                     | 14,548.0      | 11.0                     | 6.8                       |
| Net growth of growing-stock trees ≥5 in (thousand ft <sup>3</sup> /yr)       | 6,273.7       | 28.9                     | 4,188.4       | 97.0                     | -33.2                     |
| Harvest removals of growing-stock trees ≥5 in (thousand ft <sup>3</sup> /yr) | 591.7         | 96.4                     | 84.7          | 97.1                     | -85.7                     |
| Annual mortality of growing-stock trees ≥5 in (thousand ft <sup>3</sup> /yr) | 4,349.0       | 26.1                     | 8,755.4       | 45.8                     | 101.3                     |



# Forest Area

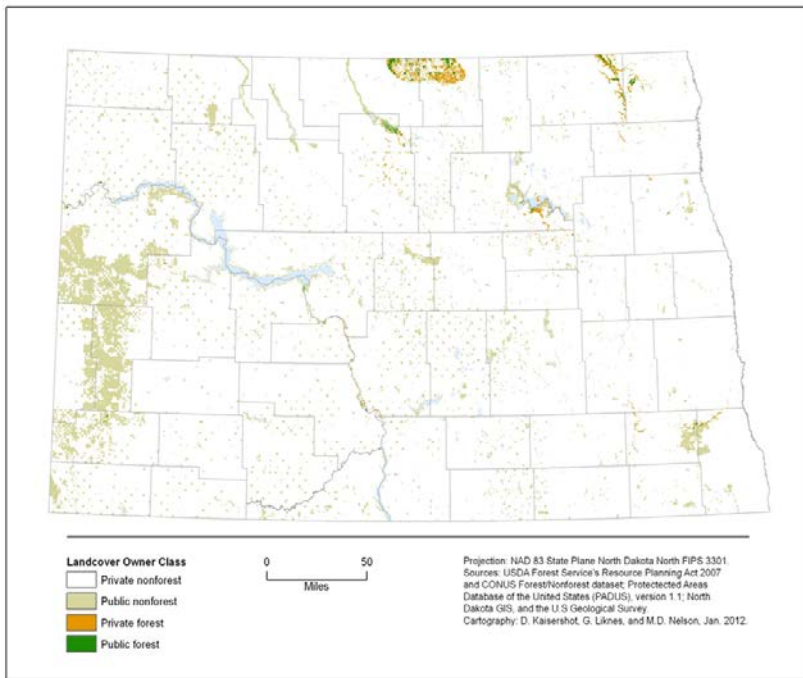


Figure 1.—North Dakota land cover by ownership class.

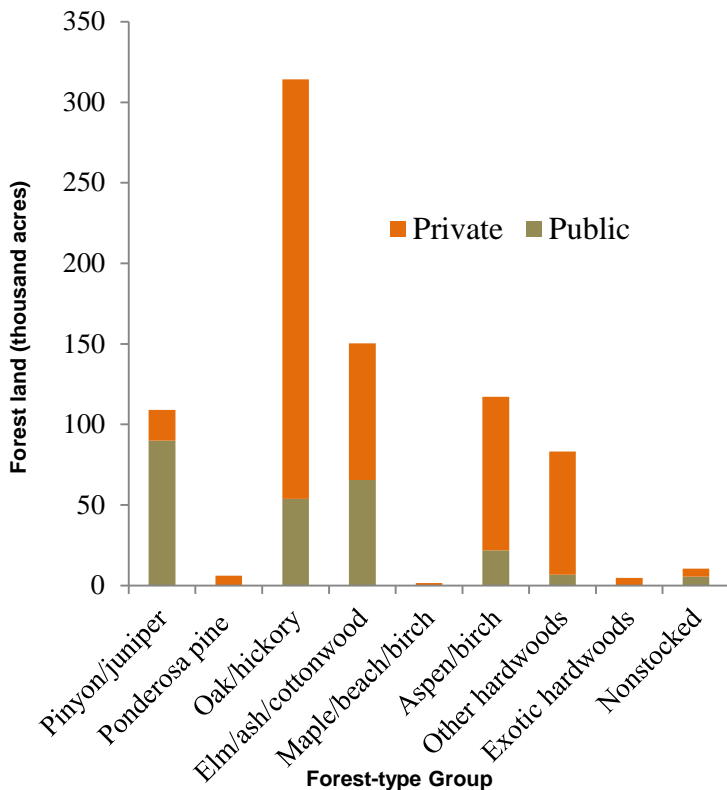


Figure 2.—Area of forest land, in thousand acres, by forest-type group, and ownership class.

Sixty-nine percent or 553,200 acres of forest land is privately owned. Public agencies hold the remaining forest land area (Figure 1). Although forests cover less than 2 percent of the State’s land area, they are an important resource. North Dakota’s forests provide watershed protection, wildlife habitat, recreational opportunities, and protect crops, soil and livestock. In 2014, 84 percent of the forest land area was dominated by hardwood forest types while conifer types accounted for 15 percent, with the remaining 1 percent falling into the nonstocked category (Fig. 2). Of the eight major forest-type groups in the State, the oak/hickory, elm/ash/cottonwood, and aspen/birch groups account for 73 percent or 581,600 acres of forest land. The pinyon/juniper forest-type group occupies about 109,100 acres of forest land area, most of it scattered in the western part of the State.

Timberland, a component of forest land, had been increasing steadily since 1980s (Fig. 3). In 2014, there was an estimated 482,800 acres of timberland in North Dakota compared to an estimated 475,300 acres in 2009, a increase of 1.5 percent. Roughly 95 percent of trees on timberland areas in North Dakota are of natural origin with an estimated 23,800 acres of timberland area planted.

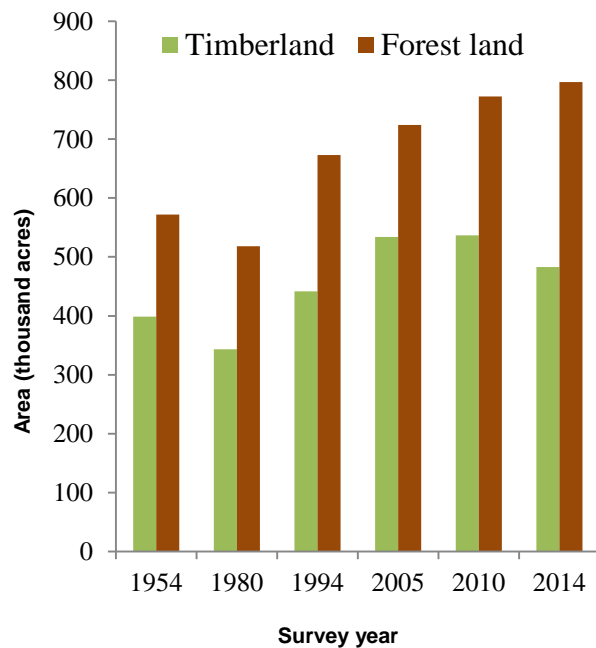


Figure 3—Area of timberland and forest land by year.

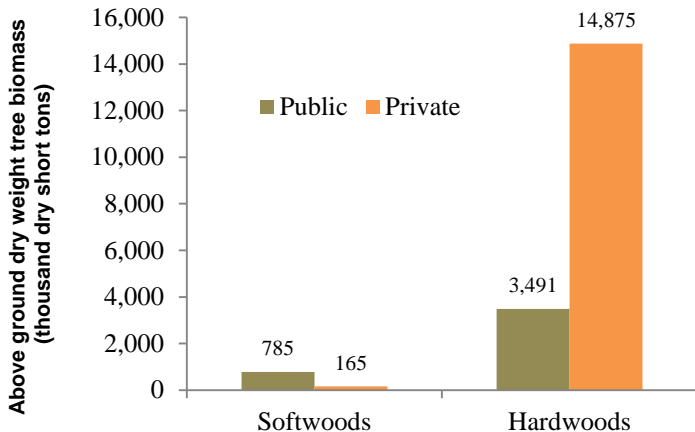
## Volume, Biomass, and Trends

Twenty-eight different tree species were recorded on North Dakota forest land in 2014. Green ash (*Fraxinus pennsylvanica*), quaking aspen (*Populus tremuloides*), bur oak (*Quercus macrocarpa*), Rocky Mountain juniper (*Juniperus scopulorum*), and American elm (*Ulmus americana*) are the most numerous species in North Dakota (Table 2, Fig. 4).

The cottonwood species accounts for 23 percent of North Dakota’s live tree volume found on forest land across the state. Hardwood species accounted for 92 percent of North Dakota’s 750 million cubic feet of live tree volume. Rocky Mountain juniper accounted for over 7 percent of all softwood volume found in state. North Dakota has 19.3 million dry tons of live-tree biomass on forest land across the state (Fig. 5).

**Table 2.—Number and volume on forest land, by select species**

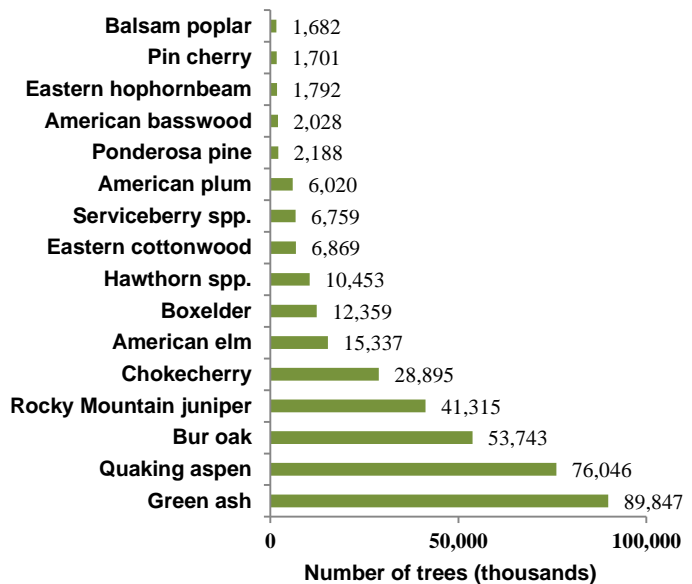
|                        | Number of all live trees (thousand) | Volume of all live trees (million ft <sup>3</sup> ) |
|------------------------|-------------------------------------|---|
| Cottonwood             | 6,869                               | 174.3   |
| Bur oak                | 53,742                              | 172.2   |
| Green ash              | 89,846                              | 138.6   |
| Quaking aspen          | 76,045                              | 89.9  |
| Rocky Mountain juniper | 41,315                              | 56.4  |
| Boxelder               | 12,358                              | 50.0  |
| American elm           | 15,336                              | 25.0  |
| American basswood      | 2,028                               | 20.3  |
| Balsam poplar          | 1,682                               | 7.0   |
| Peachleaf willow       | 725                                 | 5.5   |



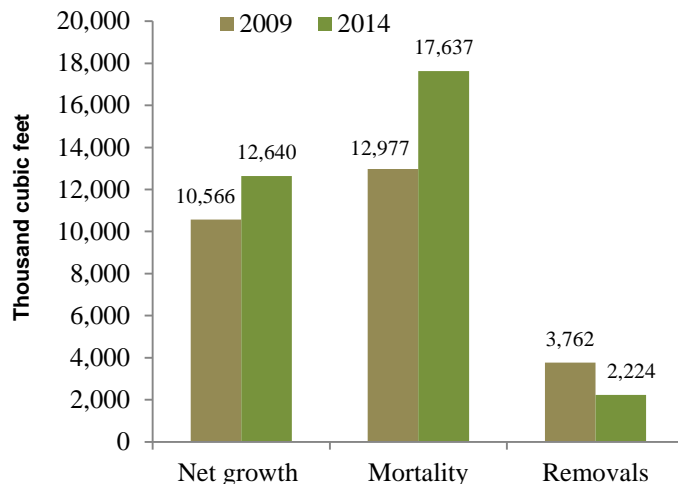
**Figure 5.—Aboveground dry weight of live trees in thousand dry short tons, on forest land by ownership class, and major species group.**

That equates to about 9.2 million tons of carbon. Only 22 percent of that biomass is on public land, and emphasizes the importance of private landowners in the management of North Dakota’s forest resource.

In 2014, average annual net growth of all live trees on forest land was 12.6 million cubic feet (Fig. 6). Mortality was 17.6 million cubic feet on average, annually. Removals were 2.2 million cubic feet, for a growth to removal ratio of about 6:1. North Dakota annual mortality is roughly 2 percent of the total standing volume per year. Over half of the removals are from green ash. Removal by harvesting for all species was down to 403.8 thousand cubic feet in 2014.



**Figure 4.—Number of all live trees on forest land, by select species.**



**Figure 6.—Average annual net growth, mortality, and removals of growing stock on forest land.**

# Green Ash Resource in North Dakota

More than 89 million green ash trees were estimated to be growing on North Dakota forest land during the 2014 survey cycle—or one in every four trees on forest land. Among the 28 species of trees measured in North Dakota, green ash ranked first in terms of number of trees (Fig. 4), third in terms of volume (Table 2), and first in terms of tree growth (Fig. 7). If emerald ash borer (EAB) gets established in the State, it represents a very real threat to the forested and urban ash tree resource. EAB can cause extensive damage and mortality and in turn would have significant negative impacts on water quality, wildlife habitat, and recreational opportunities. Continued monitoring for EAB will help to identify possible outbreaks if and when they occur.

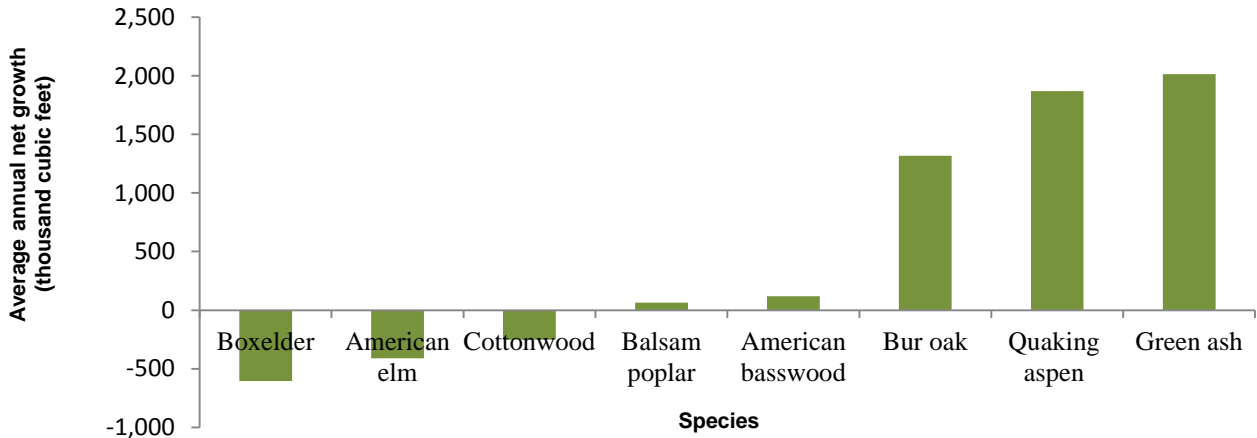


Figure 7.—Average annual net growth of select growing-stock trees on timberland, North Dakota 2014.

## Additional Inventory Information

Haugen, David E.; Harsel, Robert; Bergdahl, Aaron; Claeys, Tom; Woodall, Christopher W.; et al. 2012. **North Dakota’s forests 2010**. Resour. Bull. NRS-76 Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 52 p.

Haugen, D.E.; Harsel, R.A. 2013. **North Dakota timber industry—an assessment of timber product output and use, 2009**. Resour. Bull. NRS-77. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 33 p.

Haugen, David E.; Kangas, Michael; Crocker, Susan J.; Perry, Charles H.; Woodall, Christopher W.; et al. 2009. **North Dakota’s forests 2005**. Resour. Bull. NRS-31 Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 82 p.



Figure 8.—Green ash (*Fraxinus pennsylvanica*). Photographs by Karan A. Rawlins, University of Georgia, via Bugwood.org.

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