USDA
United States Department of Agriculture

RESOURCE UPDATE FS-4

Forests of North Dakota, 2013

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 2013 with comparisons made to data reported in 2008. The sample plot population in North Dakota consists of 7,622 plots, collected across a period of 5 years (about 1,524 plots, or about 20 percent of the data per year). The estimates for 2008 and 2013 consist of 5 years of data collected using the annualized sampling and estimation procedures. The data used in this publication were accessed from the FIA Database on February 2014.

Overview

Total land area of North Dakota is 44.1 million acres of which 1.7 percent or 763 thousand acres are forested (Table 1). The number of live trees on North Dakota's forest land in 2013 was estimated at 352 million trees, an increase of 6 percent from 2008. Net volume experienced an increase of about 14 percent between 2008 and 2013. Live tree biomass (above ground) is estimated at 19 million oven-dry tons. Both net growth and harvest removals of live trees increased, while annual mortality showed a decrease in 2013.

Table 1.—North Dakota forest statistics, change between 2008 and 2013

	2008 Estimate	Sampling error (percent)	2013 Estimate	Sampling error (percent)	Percent change since 2008
Forest Land					
Area (thousand acres)	714.5	6.5	763.6	6.2	6.9
Number of live trees ≥1 in diameter (million trees)	331.4	10.8	352.2	9.3	6.3
Net volume live trees ≥ 5 in diameter (million ft^3/yr)	664.8	10.7	755.8	9.9	13.7
Live tree aboveground biomass (thousand oven-dry tons)	17,059	9.1	19,395.7	8.4	13.7
Net growth live trees ≥5 in (thousand ft^3/yr)	6,921.2	67.5	18,164.8	17.2	162.5
Harvest removals of live trees ≥5 in (thousand ft^3/yr)	229.1	77.8	1,228.5	70.7	436.2
Annual mortality of live trees ≥5 in (thousand ft^3/yr)	13,614.6	32.9	12,460.7	17.4	-8.5
Timberland					
Area (thousand acres)	486.5	8.3	479.5	8.3	-1.4
Number of live trees ≥1 in diameter (million trees)	229.5	14.1	216.5	11.6	-5.7
Net volume live trees ≥5 in diameter (million ft^3/yr)	542.4	13.0	599.9	12.4	10.6
Live tree aboveground biomass (thousand oven-dry tons)	13,557.1	11.3	14,820.3	10.9	9.3
Net growth of growing-stock trees ≥5 in (thousand ft^3/yr)	5,581.4	36.1	7,994.6	26.3	43.2
Harvest removals of growing-stock trees ≥5 in (thousand ft^3/yr)	33.5	99.9	553.1	84.8	1,551.0
Annual mortality of growing-stock trees ≥5 in (thousand ft^3/yr)	4,527.8	32.4	5,190.7	29.2	14.6

Forest Area

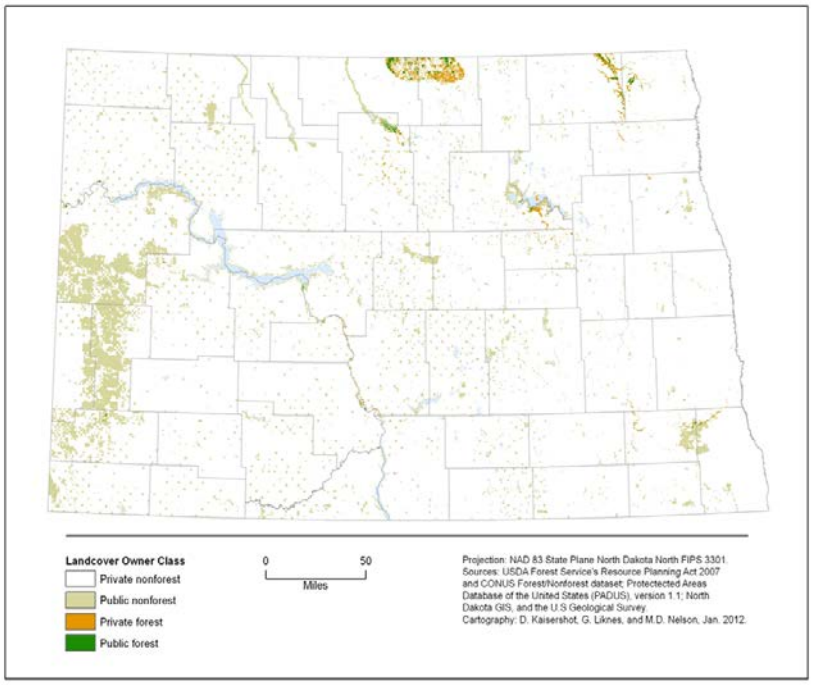

Figure 1.—North Dakota land cover by ownership class.

Sixty-eight percent of forest land area 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 crop, soil and livestock protection. In 2013, 86 percent of the forest land area was dominated by hardwood forest types while conifer types accounted for 13 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 75 percent or 577,000 acres of forest land. The pinyon/juniper forest-type group occupies about 93,000 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 2013, there was an estimated 479,000 acres of timberland in North Dakota compared to an estimated 486,000 acres in 2008, a decrease of 1 percent. Roughly 95 percent of trees on timberland areas in North Dakota are of natural origin with an estimated 22,000 acres of timberland area planted.

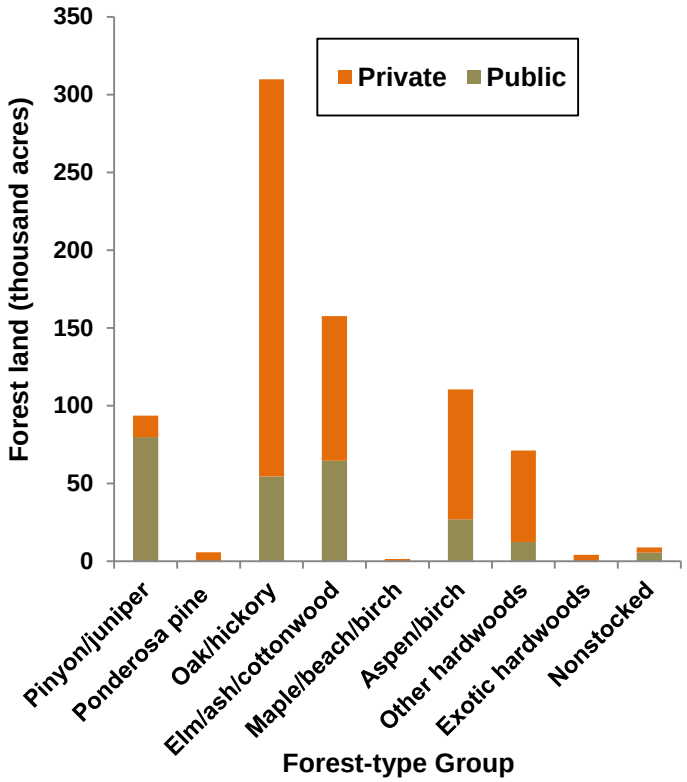

Figure 2.—Area of forest land, in thousand acres, by forest-type group, and ownership class.

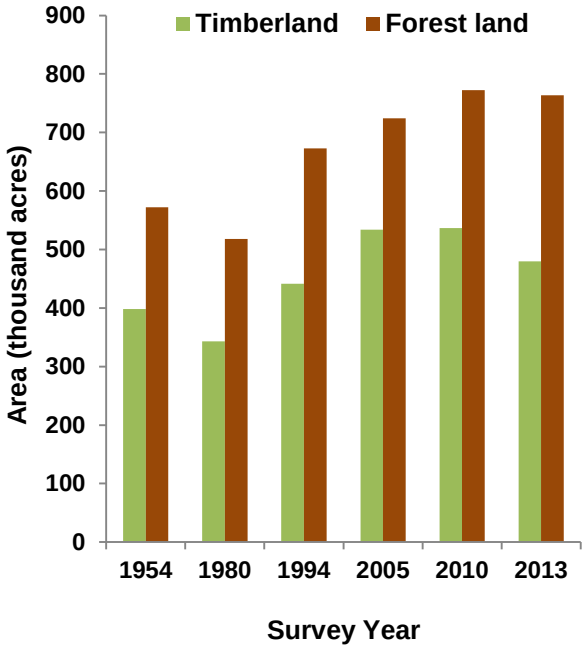

Figure 3—Area of timberland and forest land by year.

Volume, Biomass, and Trends

Twenty-eight different tree species were recorded on North Dakota forest land in 2013. 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 24 percent of North Dakota's live tree volume found on forest land across the state. Hardwood species accounted for 93 percent of North Dakota's 755 million cubic feet of live tree volume. Rocky Mountain juniper accounted for 6 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 ft³)
Cottonwood	6,980	184.4
Bur oak	56,755	178.9
Green ash	87,348	136.8
Quaking aspen	71,881	84.0
Boxelder	15,197	53.1
Rocky Mountain juniper	36,512	48.8
American elm	15,077	27.7
American basswood	2,229	19.6
Balsam poplar	1,511	6.2
Peachleaf willow	756	5.8

That equates to about 9.2 million tons of carbon. Roughly 23 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 2013, average annual net growth on timberland was 7.9 million cubic feet (Fig. 6). Mortality was 5.1 million cubic feet on average, annually. Removals were 1.3 million cubic feet, for a growth to removal ratio of 6:1, suggesting North Dakota is growing more trees than are being removed through conversion or harvest. North Dakota's removals are, on average, less then 1 percent of the total standing volume per year. Over half of the removals are from green ash.

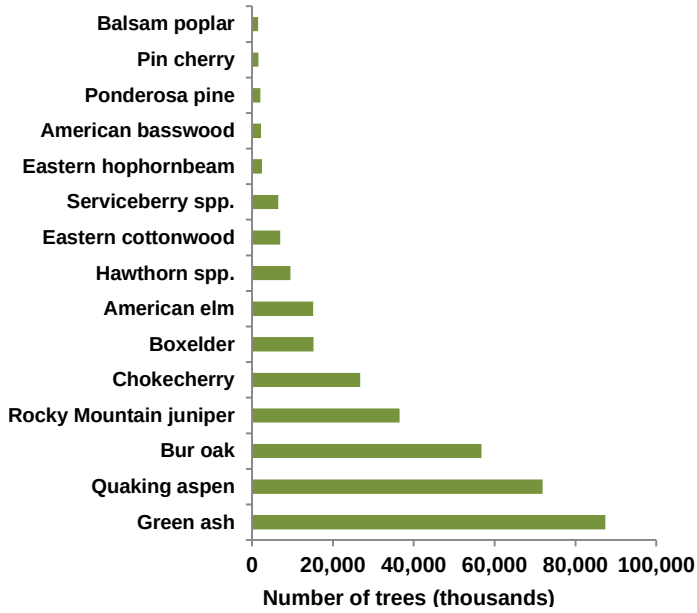

Figure 4.—Number of all live trees on forest land, by select species.

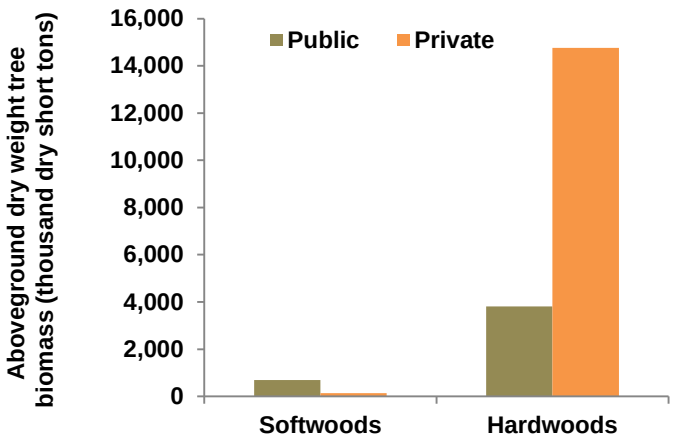

Figure 5.—Aboveground dry weight of live trees in thousand dry short tons, on forest land by ownership class, and major species group.

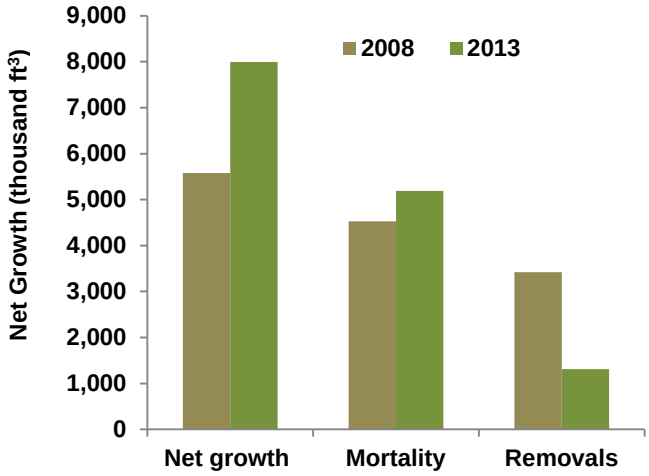

Figure 6.—Average annual net growth, mortality, and removals of growing stock on timberland

North Dakota's Biomass

Measures of total biomass and its allocation among stand components (e.g., small-diameter trees, limbs, stumps), help us understand the components of a forest stand and the resources available for different uses (e.g., biofuels, wildlife habitat, carbon sequestration).

Live aboveground tree biomass is estimated at 19.3 million dry short tons, an average of about 25 dry short tons/acre of forest area (Fig. 7). Total aboveground tree biomass on forest land increased by 2.3 million dry short tons between 2008 and 2013. The bole (main stem) of trees accounts for 6 of every 10 dry tons of above ground tree biomass in the state (Fig. 8). Stumps, tops, and limbs account for 24 percent of above ground biomass and small trees (1-5 inches d.b.h.) account for the remaining twelve percent. Nearly 77 percent of aboveground biomass (trees) is found on privately owned forest lands. Only forest lands owned by county and local government have per-acre biomass tonnage greater than privately held forest lands (Fig. 8).

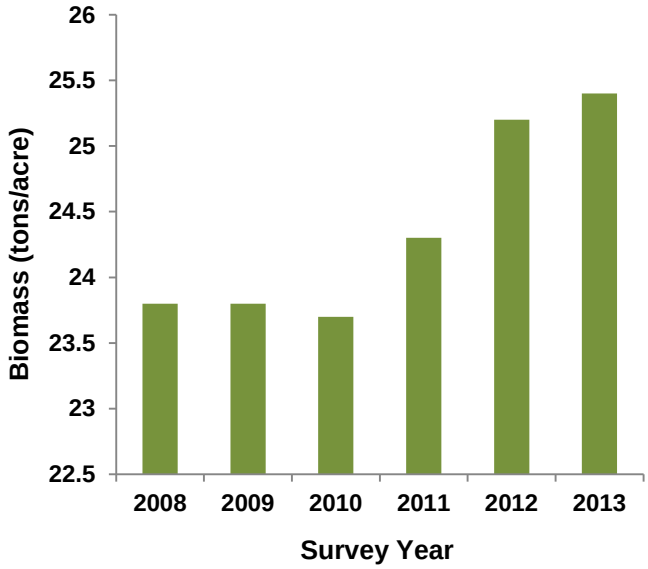

Figure 7.— Per acre above ground dry weight of all live-tree biomass on forest land by survey year.

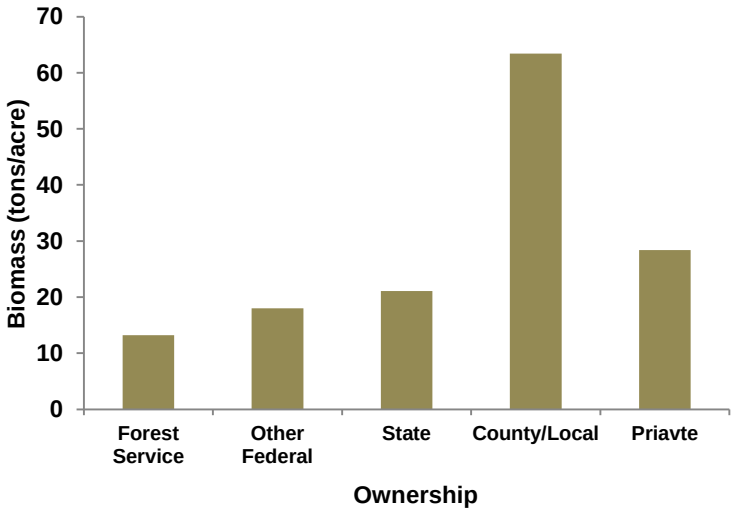

Figure 8.—Per acre above ground dry weight of all live-tree biomass on forest land by owner group.

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.

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