



Forests of South Dakota, 2016

This publication provides an overview of forest resources in South Dakota based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program at the Northern Research Station (NRS) in cooperation with the South Dakota Department of Agriculture, Resource Conservation and Forestry Division. Estimates are based on field data collected using the FIA annualized sample design and are updated yearly. For the 2016 inventory, estimates for current variables such as area, volume, and biomass are based on 8,275 plot samples collected from 2011-2016. Change variables, such as net growth, removals, and mortality are based on 8,260 samples collected in 2006-2011 and resampled in 2011-2016. See Bechtold and Patterson (2005), O’Connell et al. (2014), and Gormanson et al. (2017) for definitions and technical details.

Overview

South Dakota is home to 1.96 million acres of forest land. Forested area has increased by about 2.6 percent since 2011 (Table 1). The number of live trees on South Dakota’s forest land in 2016 was estimated at greater than 577.0 million, an increase of 4.9 percent from 2011. However, both net volume of live trees (≥ 5 inches diameter) and aboveground biomass of live trees (≥ 1 inch diameter) decreased, with volume decreasing 2.7 percent and biomass decreasing 2.4 percent. Average annual net growth decreased 73.8 percent compared to the 2011 estimate, while average annual mortality increased by 52.8 percent. Average annual harvest removals also declined compared to 2011, decreasing by 11 percent and (Table 1).

Table 1.—South Dakota forest estimates, change between 2011 and 2016. Sampling errors and error bars shown in tables and figures in this report represent 68 percent confidence intervals.

	2016 Estimate	Sampling error (percent)	2011 Estimate	Sampling error (percent)	Change since 2011 (percent)
Forest Land					
Area (thousand acres)	1,961.3	2.8	1,910.9	2.9	+2.6
Number of live trees ≥ 1 inch diameter (million trees)	577.0	5.9	549.9	6.0	+4.9
Live tree (≥ 1 inch diameter) aboveground biomass (million oven-dry tons)	44.7	4.4	45.8	4.3	-2.4
Net volume of live trees ≥ 5 inches diameter (million ft ³)	2,229.9	4.4	2,292.8	4.2	-2.7
Annual net growth of live trees ≥ 5 inches (million ft ³ /yr)	8.8	87.7	33.7	21.5	-73.8
Annual harvest removals of live trees ≥ 5 inches (million ft ³ /yr)	30.9	24.5	34.7	21.2	-11.0
Annual mortality of live trees ≥ 5 inches (million ft ³ /yr)	47.4	13.5	31.0	15.2	+52.8
Timberland					
Area (thousand acres)	1,812.5	3.0	1,777.2	3.0	+2.0
Number of live trees ≥ 1 inch diameter (million trees)	540.2	6.2	516.3	6.2	+4.6
Live tree (≥ 1 inch diameter) aboveground biomass (million oven-dry tons)	41.7	4.7	42.9	4.5	-2.8
Net volume of live trees ≥ 5 inches diameter (million ft ³)	2,097.1	4.7	2,166.5	4.5	-3.2
Net volume of growing-stock trees (million ft ³)	1,752.0	5.0	1,848.8	4.7	-5.2
Annual net growth of growing-stock trees (million ft ³ /yr)	7.7	81.7	33.2	22.9	-76.7
Annual harvest removals of growing-stock trees (million ft ³ /yr)	29.1	25.4	32.8	22.1	-11.1
Annual mortality of growing-stock trees (million ft ³ /yr)	33.3	15.8	22.6	17.7	+47.4



Forest Area

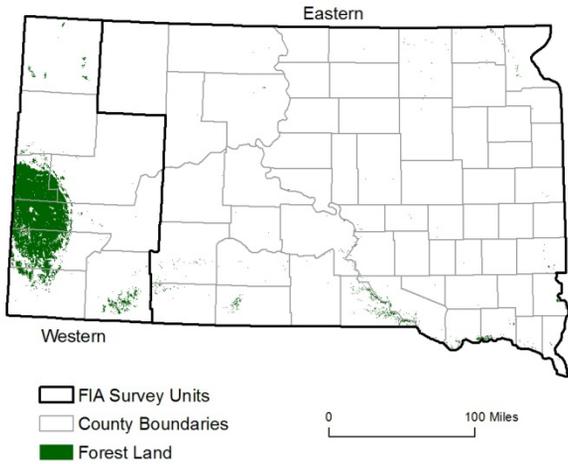


Figure 1.—FIA survey units and area of forest land, South Dakota.

Statewide forest land area is 1.96 million acres, roughly 4 percent of total land area in the State. The Western survey unit, home to the Black Hills, supports most forest land area in South Dakota (about 1.52 million acres), and is 13.7 percent forested (Fig. 1). The Eastern survey unit has considerably less forest land (about 440,500 acres) and is just 1.2 percent forested.

Area of South Dakota forest land and timberland, which is a subset of forest land that is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation, has remained relatively stable, with modest increases every year since 2012, after seeing larger increases in the early 2000s (Fig. 2).

The ponderosa pine forest type occupies the largest proportion of forest land in South Dakota at 1.13 million acres (Fig. 3). The next most common forest types are sugarberry/hackberry/elm/green ash at 97,400 acres, bur oak at 93,900 acres, and Rocky Mountain juniper at 74,300 acres.

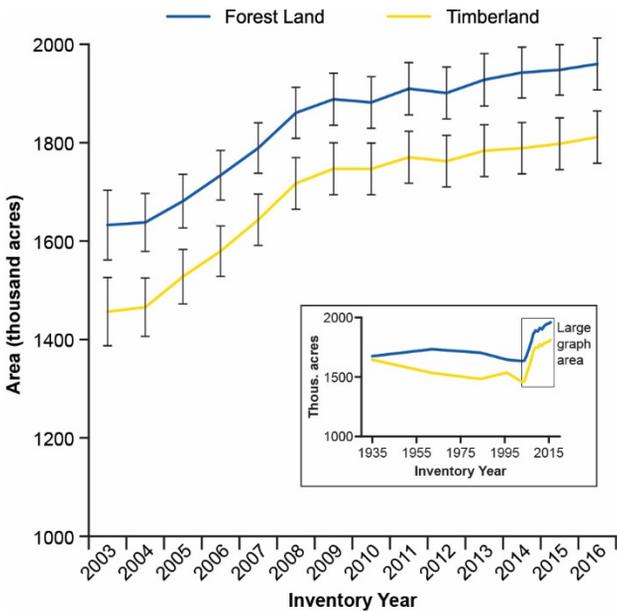


Figure 2.—Area of forest land and timberland by year, South Dakota. Error bars represent 68 percent confidence intervals.

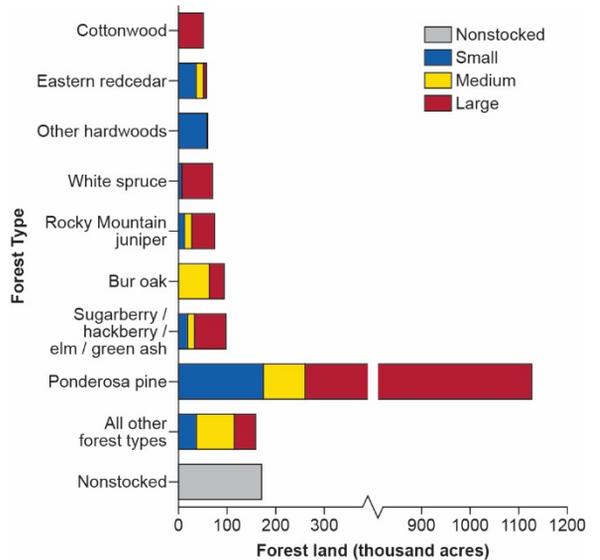


Figure 3.—Area of forest land by forest type and stand size class, 2016. Note: Large diameter trees are at least 11.0 inches diameter for hardwoods and at least 9.0 inches diameter for softwoods. Medium diameter trees are at least 5.0 inches diameter but not as large as large diameter trees. Small diameter trees are less than 5.0 inches diameter.

Volume, Biomass, and Trends

Twenty-nine species (including unknown species of trees collected to the genus level) were recorded on South Dakota forest land in 2016. Ponderosa pine, white spruce, bur oak, and green ash are species that have both large numbers of live trees and a large amount of live tree volume (Table 2). With over 29 million trees, Eastern hophornbeam (*Ostrya virginiana*) is a common species found in South Dakota forests but accounts for very little live tree volume, while eastern cottonwood is an example of a species with few trees and a large amount of volume.

Ponderosa pine continues to rank first for live tree volume on forest land with 1.63 billion cubic feet (Table 2), a decrease of about 2.7 percent from the 2011 inventory. This species accounts for 73 percent of South Dakota’s live tree volume. Most ponderosa pine volume occurs on Black Hills National Forest lands, however, roughly 28 percent of volume is on other ownerships including privately owned land, other Federal agencies, the State of South Dakota, and county or municipal governments (Fig. 4). This diversity in ownership stresses the important roles that both public land managers at all levels of government and private landowners have in the management and protection of South Dakota’s largest forest resource.

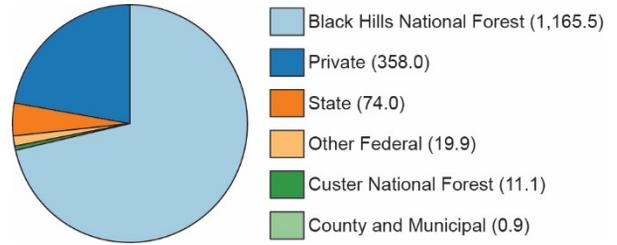


Figure 4.—Net volume of ponderosa pine, in million cubic feet, by ownership, South Dakota, 2016.

In 2016, average annual net growth on forest land was 8.8 million cubic feet (Table 1). Mortality was 47.4 million cubic feet on average, annually. Harvest removals were 30.9 million cubic feet, for a net growth to removal ratio of 0.28. South Dakota’s removals are, on average, about 1.4 percent of the total standing volume per year. Most removals are ponderosa pine (Table 2).

South Dakota has more than 44.7 million oven-dry tons of biomass on forest land. Ponderosa pine accounts for most biomass at 68 percent of the total. The 44.7 million dry tons of biomass equates to 22.4 million tons of carbon in South Dakota’s forests.

Table 2.—Number, volume, biomass, growth, mortality, and removals of live trees on forest land by species of the top 12 tree species by net volume, South Dakota, 2016

Common Name	Latin name	Number of trees ^a (millions)	Net volume ^b (million ft ³)	Aboveground biomass ^a (thousand dry tons)	Average Annual net growth ^b (thousand ft ³)	Average annual mortality ^b (thousand ft ³)	Average annual harvest removals ^b (thousand ft ³)
Ponderosa pine	<i>Pinus ponderosa</i>	350.1	1,629.4	30,188.1	-1,929.0	36,689.7	29,278.8
Bur oak	<i>Quercus macrocarpa</i>	31.2	116.9	3,609.2	1,344.7	639.7	--
Eastern cottonwood	<i>Populus deltoides</i>	1.8	107.5	1,949.4	1,429.1	1,643.4	--
White spruce	<i>Picea glauca</i>	31.2	92.1	1,656.1	1,482.0	1,310.9	477.8
Green ash	<i>Fraxinus pennsylvanica</i>	29.0	84.9	2,533.5	1,190.9	1,827.0	--
Rocky Mountain juniper	<i>Juniperus scopulorum</i>	21.0	36.1	565.8	1,090.8	281.2	--
Boxelder	<i>Acer negundo</i>	8.0	32.5	746.0	1,825.3	207.6	626.2
American elm	<i>Ulmus americana</i>	5.6	32.4	743.8	-1,007.6	2,195.4	213.6
Eastern redcedar	<i>Juniperus virginiana</i>	19.2	24.7	585.1	1,650.9	--	--
Siberian elm	<i>Ulmus pumila</i>	2.9	23.6	594.1	2,336.3	160.9	191.9
Quaking aspen	<i>Populus tremuloides</i>	18.4	16.4	380.1	-559.4	1,263.6	96.9
Hackberry	<i>Celtis occidentalis</i>	1.8	6.9	179.0	344.3	117.6	--

^a Trees ≥1 inch diameter

^b Trees ≥5 inches diameter

Note: Table cells without observation are indicated by --. A value of 0.0 is due to rounding of a small value.

The Components of Net Growth

Net growth is the change in volume of trees (diameter ≥ 5 inches) between two plot measurements accounting for gains in volume from growth and losses from mortality. Net growth has been on a steady decline in South Dakota (Fig. 5). While mortality has been increasing, it does not tell the whole story. To help understand this change in net growth, we need to look at the components of net growth and the increase in forest land area. FIA identifies several components of net growth (Bechtold and Paterson 2005). They include:

Survivor growth – growth of trees tallied during the previous inventory that survived into the current inventory on land identified as forest in both inventories

Ingrowth – volume of trees that grew across the minimum diameter threshold (5 inches)

Cut growth – increase in volume of live trees on forest land that were cut (removed) before the current inventory

Reversion – volume of trees on land that went from a nonforest to a forest land use in the current inventory

Diversion – increase in volume of live trees that went from a forest to a nonforest land use in the current inventory

Mortality – volume of trees from the previous inventory that have died before the current inventory on forest land

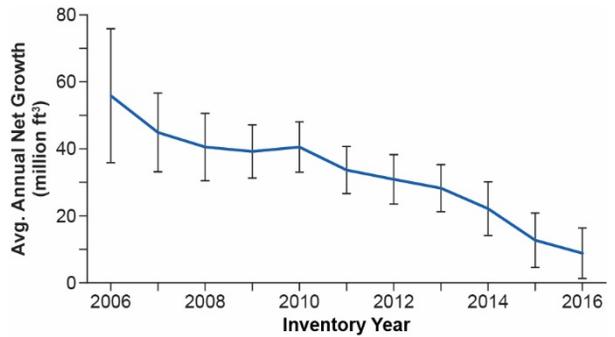


Figure 5.—Average annual net growth by year, South Dakota. Error bars represent 68 percent confidence intervals.

The main driver in the decrease of average annual net growth is the decrease in the reversion component over time. In 2005, FIA began to use newer aerial imagery with a finer resolution, improving the accuracy with which forest land was identified in the office, thus increasing the number of plots which were sent to the field for ground measurement and subsequently increasing the overall estimate of forest land. The contributions from reversion to net growth has decreased over time as the set of plots from the first annual inventory in the early 2000s began to be remeasured in newer inventories (Fig. 6).

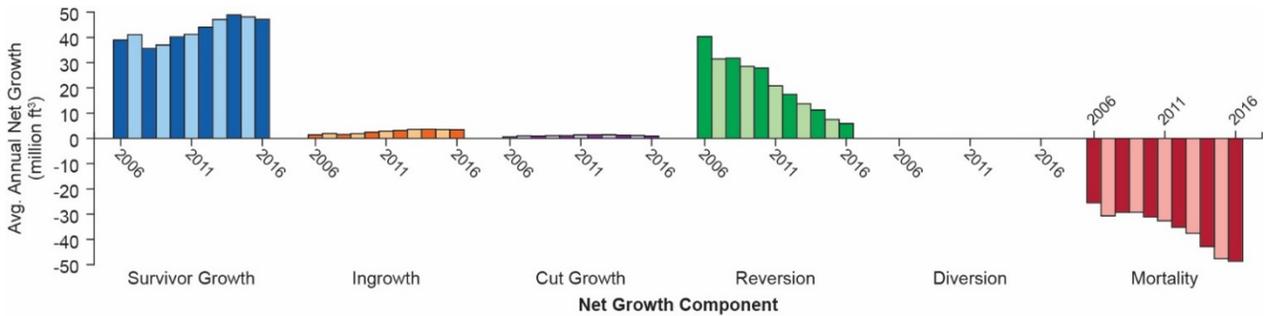


Figure 6.—Components of average annual net growth by year, South Dakota.

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How to Cite This Publication

Walters, Brian F. 2017. Forests of South Dakota, 2016. Resource Update FS-110. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

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