



Forests of South Dakota, 2018

This publication provides an overview of forest resources in South Dakota based on an inventory conducted by the USDA 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. Information about the national and regional FIA program is available at <http://fia.fs.fed.us>. For the 2018 inventory, estimates for current variables such as area, volume, and biomass are based on 8,496 samples (577 forested) collected from 2012–2018. Change variables, such as net growth, removals, and mortality are based on 8,261 samples (392 forested) collected in 2009–2013 and resampled in 2012–2018.

Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005), O’Connell et al. (2014), and Gormanson et al. (2018) for definitions and technical details. A complete set of inventory tables is available at <https://doi.org/10.2737/FS-RU-199>.

Overview

South Dakota is home to 1.95 million acres of forest land. Forest area has remained stable since 2013 (Table 1). The number of live trees on South Dakota’s forest land in 2018 was estimated at 601 million, an increase from 2013. However, estimates of net volume, biomass, net growth, and harvest removals have decreased while mortality increased. The increase in number of trees along with a decrease in volume is due to a large increase in small-diameter trees (i.e., <5 inches diameter at breast height [d.b.h.] that do not contribute to the volume estimate.

Table 1.—South Dakota forest estimates and changes between 2013 and 2018. Sampling errors represent a 68 percent confidence interval around the estimate.

Forest Land	2018 estimate	Sampling error (%)	2013 estimate	Sampling error (%)	Percent change since 2013
Area (thousand acres)	1,954	2.7	1,929	2.8	1.3
Number of live trees ≥1 inch diameter (million trees)	601	5.4	561	6.2	7.1
Net volume live trees ≥ 5 inches diameter (million ft ³ /yr)	2,141	4.1	2,215	4.5	-3.3
Live tree ≥1 inch diameter aboveground biomass (thousand oven-dry tons)	43,367	4.1	44,557	4.5	-2.7
Net growth live trees ≥5 inches (thousand ft ³ /yr)	566	1,566.3	28,743	25.1	-98.0
Gross growth live trees ≥5 inches (thousand ft ³ /yr)	60,752	4.6	69,015	5.6	-12.0
Annual mortality of live trees ≥5 inches (thousand ft ³ /yr)	60,186	14.1	40,272	15.1	49.4
Harvest removals of live trees ≥5 inches (thousand ft ³ /yr)	22,982	24.9	43,487	19.8	-47.2
Timberland	2018 estimate	Sampling error (%)	2013 estimate	Sampling error (%)	Percent change since 2013
Area (thousand acres)	1,802	2.9	1,796	3.0	0.3
Number of live trees ≥1 inch diameter (million trees)	558	5.7	533	6.4	4.8
Net volume live trees ≥5 inches diameter (million ft ³ /yr)	2,033	4.3	2,122	4.7	-4.2
Live tree aboveground biomass (thousand oven-dry tons)	40,780	4.4	42,258	4.7	-3.5
Net volume growing-stock trees ≥5 inches diameter (million ft ³ /yr)	1,662	4.5	1,762	5.0	-5.7
Net growth of growing-stock trees ≥5 inches (thousand ft ³ /yr)	-3,522	-226.6	21,612	27.3	-116.3
Gross growth live trees ≥5 inches (thousand ft ³ /yr)	58,154	4.8	66,014	5.9	-11.9
Annual mortality of growing-stock trees ≥5 inches (thousand ft ³ /yr)	47,635	16.0	29,980	17.2	58.9
Harvest removals of growing-stock trees ≥5 inches (thousand ft ³ /yr)	21,494	25.9	42,224	20.1	-49.1

Forest Area

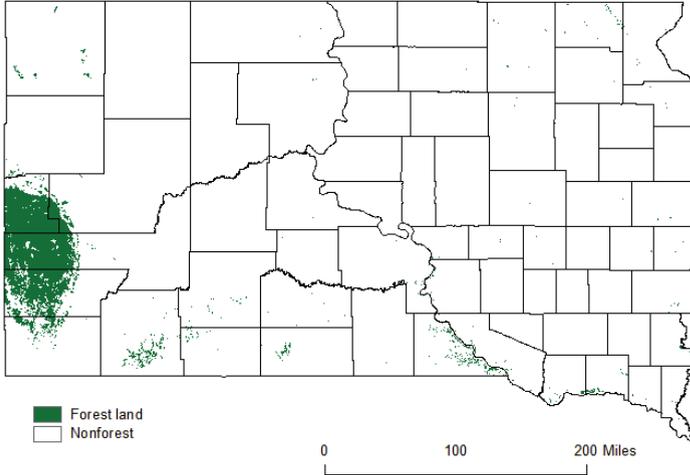


Figure 1.—Area of forest land, South Dakota.

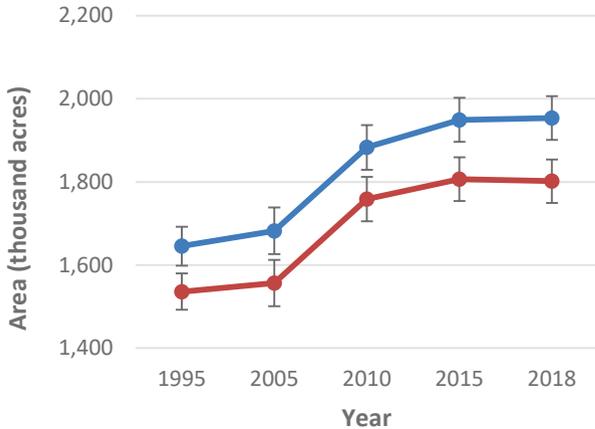


Figure 2.—Area of forest land and timberland by year, South Dakota. Error bars represent 68 percent confidence intervals.

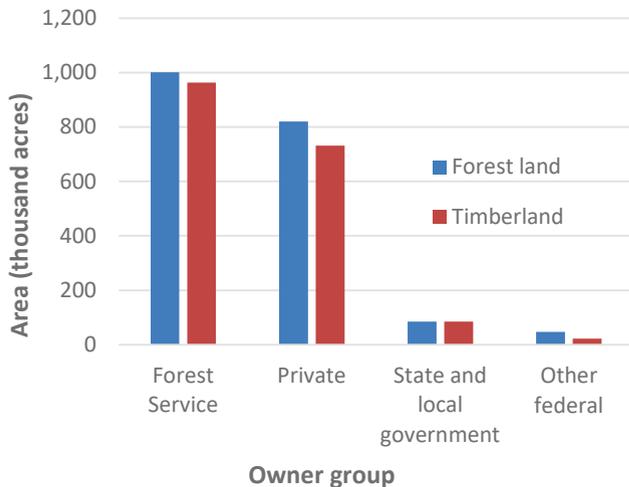


Figure 3.—Area of forest land and timberland by owner group, South Dakota, 2018.

South Dakota’s forest land area is 1.95 million acres, roughly 4 percent of total land area in the state. Most forest land can be found in the Black Hills, located in the western part of the State (Fig. 1). Forest land and timberland areas have remained steady since 2015 (Fig. 2).

The USDA Forest Service is the largest owner of forest land in South Dakota with just over 1 million acres (Fig. 3). Forty-two percent is privately owned. State and local governments, as well as other Federal agencies, own the remaining forest land. Ponderosa pine is the most common forest type; it accounts for 54 percent of all forest land.

Sixty-five percent of South Dakota’s forest lands experienced some sort of disturbance according to the 2018 inventory. Domestic animals, by far, are the most common source of disturbance (72%), followed by insects (12%), and wild animals (6%) (Fig. 4). Disease, weather, fires, humans, and other causes are responsible for the remaining 10 percent of forested areas with disturbance. For example, the Legion Lake Fire that occurred in late 2017 burned more than 50,000 acres. Sixty-four percent of ponderosa pine forest lands were impacted by disturbance, most of which (81%) was caused by domestic animals (70%) and insects (11%).

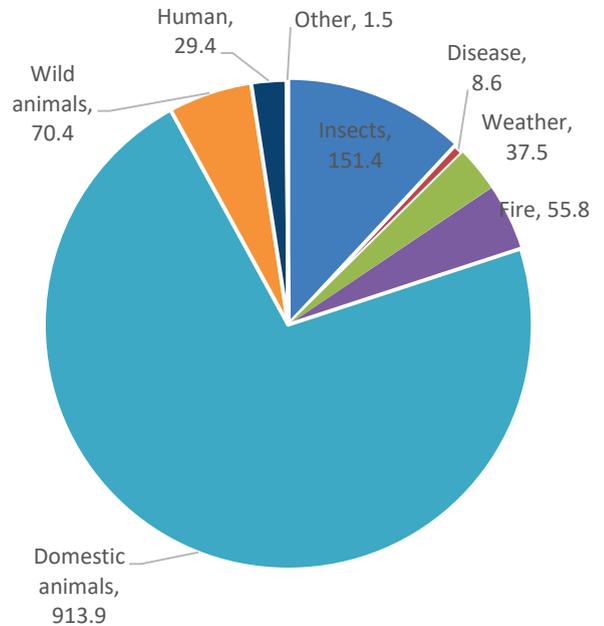


Figure 4.—Area of forest land, in thousand acres, by disturbance class, South Dakota, 2018.

Volume, Biomass, and Trends

There are an estimated 601 million live trees on South Dakota’s forest lands. Ponderosa pine (*see Table 2 for species Latin names*) is the most numerous species with nearly 353 million trees at least 1.0 inch d.b.h. or larger. The number of ponderosa pine trees less than 5.0 inches d.b.h. has increased by more than 41 million since 2013. Bur oak has the largest number of stems for hardwood species.

Ponderosa pine greatly exceeds all other tree species in terms of number of trees, live volume, and biomass on forest land in South Dakota (Table 2). It makes up 86 percent of the net sawlog volume in the state. White spruce now outranks green ash in net volume. Softwood species accounted for 80 percent of live tree volume on timberland and 86 percent of salvable dead tree volume.

South Dakota has about 43.4 million oven-dry tons of biomass on its forest lands. More than half (25.1 million dry tons, or 58 percent) of the total biomass is on publicly owned forest land, and most of this biomass (92 percent) is made up of softwood species. Privately owned forest lands contain 42 percent of the state’s biomass and hardwood species make up more than half (10.2 million dry tons, or 56 percent) of this biomass. Ponderosa pine makes up most (90 percent) of the softwood biomass, followed by white spruce (6 percent). Sixty-nine percent of hardwood biomass is composed of three species: bur oak (31 percent), green ash (21 percent), and eastern cottonwood (17 percent).

In 2018, the average annual mortality of net volume was 60.2 million cubic feet per year (Fig. 5). This was almost equivalent to the average annual gross growth volume on forest land (60.8 million cubic feet per year). This results in a net growth estimate of 0.6 million cubic feet per year. So, according to the 2018 inventory, mortality is consuming nearly all of the accumulated gross growth on live trees. When removals are factored in, the result is a negative net change in the remaining live-tree inventory volume. Insect activity has subsided and mountain pine beetle returned to an endemic population in 2016. As inventory remeasurements continue, we expect to see an increase in the live-tree inventory in the future.

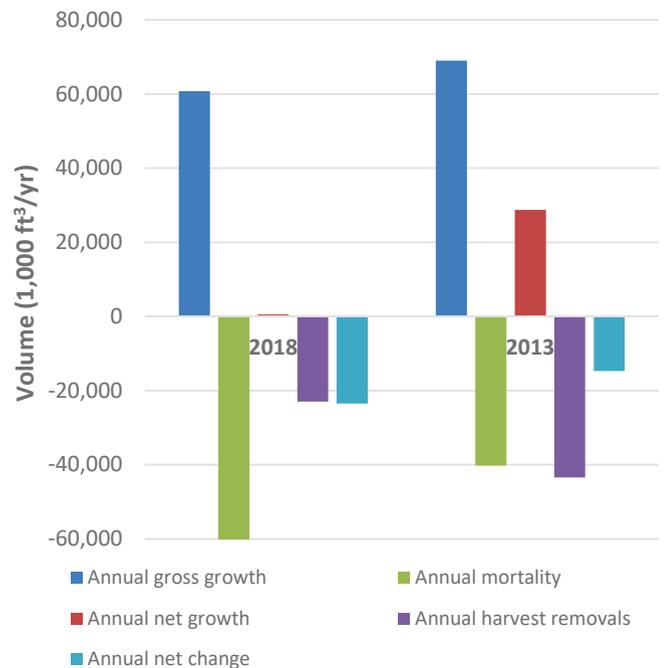


Figure 5.—Average annual gross growth, mortality, net growth, harvest removals and net change of live trees ≥5 inches diameter at breast height (d.b.h.) on forest land, South Dakota, 2013 and 2018.

Table 2.—Number, volume, biomass, growth, mortality, and removals of live trees on forest land by species of the top 10 tree species by net volume, South Dakota, 2018.

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>	352.9	1,502.1	27,927.9	-10,140.5	48,885.6	21,289.1
Bur oak	<i>Quercus macrocarpa</i>	39.7	122.1	3,816.1	1,269.1	935.5	0.0
Eastern cottonwood	<i>Populus deltoides</i>	1.7	111.3	2,021.4	1,431.7	1,471.8	0.0
White spruce	<i>Picea glauca</i>	35.0	100.3	1,823.2	1,039.5	1,869.9	596.6
Green ash	<i>Fraxinus pennsylvanica</i>	26.7	87.1	2,578.6	1,672.2	1,681.1	--
Rocky Mountain juniper	<i>Juniperus scopulorum</i>	29.5	42.2	683.4	820.9	812.2	--
Boxelder	<i>Acer negundo</i>	7.3	34.6	768.8	1,291.4	205.4	596.4
American elm	<i>Ulmus americana</i>	5.6	33.2	764.0	232.1	1,958.7	203.4
Eastern redcedar	<i>Juniperus virginiana</i>	19.1	28.4	644.2	1,523.3	0.0	--
Siberian elm	<i>Ulmus pumila</i>	2.6	25.0	629.5	1,313.1	132.8	182.8

^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.

Ponderosa Pine Resource Update

Ponderosa pine is an important commercial tree species in South Dakota, particularly in the western part of the State. Increased insect activity, climate-related events, such as drought, and wildfire are interrelated factors that have impacted the ponderosa pine resource. Here we examine the current status of growth and mortality at the state level and for the South Dakota portion of the Black Hills National Forest (BHNF).

The current estimate of net live-tree volume (≥ 5.0 inches d.b.h.) on timberland in South Dakota is 2.03 billion cubic feet. Ponderosa pine makes up 72 percent (1.47 billion cubic feet) of the total volume and most (1.0 billion cubic feet) is found on the BHNF. Fifty-eight percent of the ponderosa pine volume is contained in the 9- to 15-inch diameter classes (Fig. 6). Net growth of trees at least 5.0

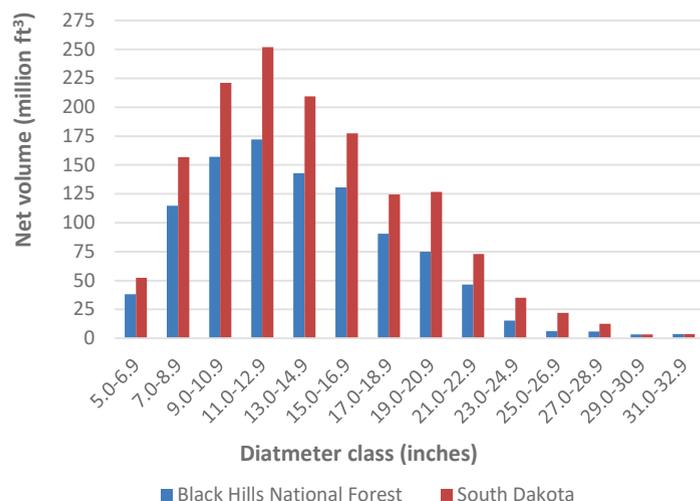


Figure 6.—Net volume of live ponderosa pine (at least 5 inches d.b.h.) on timberland, South Dakota, 2018.

inches d.b.h. is determined by deducting losses in volume due to mortality or damage, rot, etc., from gross growth. Mortality estimates are higher than those of any previous year and net growth is negative at the State level as well as on the BHNF (Fig. 7). However, this trend will likely reverse because mountain pine beetle activity decreased to endemic levels in 2016, which should result in less mortality and greater net growth in the future.

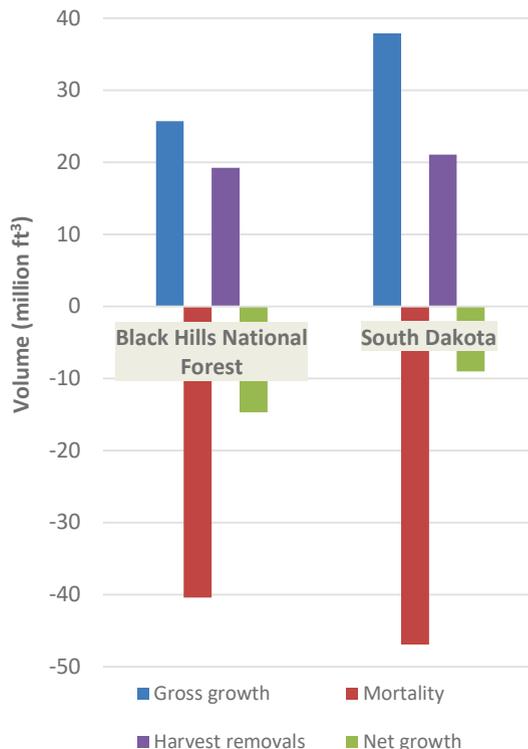


Figure 7.—Gross growth, mortality, harvest removals, and net growth volume of ponderosa pine (at least 5 inches d.b.h.) on timberland, South Dakota, 2018.

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