USDA
United States Department of Agriculture

RESOURCE UPDATE FS-41

Forests of South Dakota, 2014

This resource update 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. In 2014, NRS-FIA changed from a 5- to a 7-year inventory cycle, wherein one-seventh, or 14.3 percent, of plots will be measured annually until cycle completion. To ensure that all plots are transitioned to the new cycle length, estimates reported for 2014 include data collected from 2009-2014, with comparisons made to data reported in 2009 (collected from 2005-2009).

Overview

South Dakota is home to 1.94 million acres of forest land. Forested area has increased by about 2.9 percent since 2009 (Table 1). The number of live trees on South Dakota's forest land in 2014 was estimated at greater than 536 million, an increase of 4.7 percent from 2009. Both net volume of live trees (≥5 inches diameter) and aboveground biomass of live trees (≥1 inches diameter) changed slightly with volume increasing 0.2 percent and biomass decreasing 0.6 percent. Average annual net growth decreased 44.3 percent compared to the 2009 estimate, while average annual harvest removals increased by 25.5 percent and mortality increased by 47.6 percent (Table 1).

Table 1.—South Dakota forest estimates, change between 2009 and 2014

	2009 Estimate	Sampling error (percent)	2014 Estimate	Sampling error (percent)	Change since 2009 (percent)
Forest Land					
Area (thousand acres)	1,889.5	2.9	1,943.7	2.7	+ 2.9
Number of live trees ≥1 in diameter (million trees)	536.3	5.9	561.3	5.8	+ 4.7
Live tree (≥1 in diameter) aboveground biomass (million oven-dry tons)	45.2	4.2	45.3	4.2	+ 0.2
Net volume of live trees ≥5 in diameter (million ft^3)	2,273.5	4.1	2,259.8	4.2	- 0.6
Annual net growth of live trees ≥5 in (million ft^3/yr)	39.2	20.8	21.8	37.5	- 44.3
Annual harvest removals of live trees ≥5 in (million ft^3/yr)	28.0	23.3	35.1	22.6	+ 25.5
Annual mortality of live trees ≥5 in (million ft^3/yr)	27.9	15.2	41.2	15.5	+ 47.6
Timberland					
Area (thousand acres)	1,748.0	3.1	1,789.8	3.0	+ 2.4
Number of live trees ≥1 in diameter (million trees)	501.5	6.2	525.4	6.1	+ 4.8
Live tree (≥1 in diameter) aboveground biomass (million oven-dry tons)	42.0	4.4	42.4	4.4	+ 1.2
Net volume of live trees ≥5 in diameter (million ft^3)	2,132.3	4.4	2,134.8	4.4	+ 0.1
Net volume of growing-stock trees (million ft^3)	1,895.0	4.6	1,776.2	4.7	- 6.3
Annual net growth of growing-stock trees (million ft^3/yr)	40.2	22.2	17.2	39.5	- 57.3
Annual harvest removals of growing-stock trees (million ft^3/yr)	25.9	24.8	34.1	23.0	+ 31.8
Annual mortality of growing-stock trees (million ft^3/yr)	20.7	16.9	29.8	18.3	+ 44.0

Forest Area

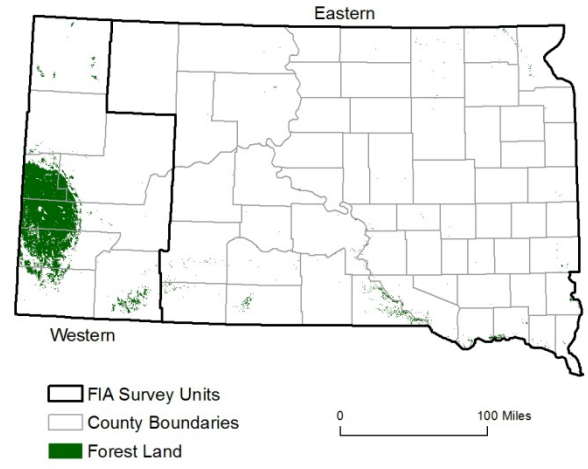

Figure 1.—FIA survey units and area of forest land, South Dakota.

South Dakota is divided into two survey units (Fig. 1). Statewide forest land area is 1.94 million acres ± 53,000 acres, roughly 3.9 percent of total land area in the State. The Western survey unit, home to the Black Hills, supports most of the forest land area in South Dakota (about 1.52 million acres), and is 13.6 percent forested. The Eastern survey unit has considerably less forest land (about 426,000 acres) and is just 1.1 percent forested.

Area of South Dakota forest land and timberland has remained relatively stable, with modest increases and decreases, over the last few years after a steady increase in the early 2000s (Fig. 2).

The ponderosa pine forest type occupies the largest proportion of forest land in South Dakota at 1.14 million acres (Fig. 3). The next most common forest types are sugarberry/hackberry/elm/green ash at 92,500 acres, bur oak at 91,500 acres, and Rocky Mountain juniper at 66,000 acres.

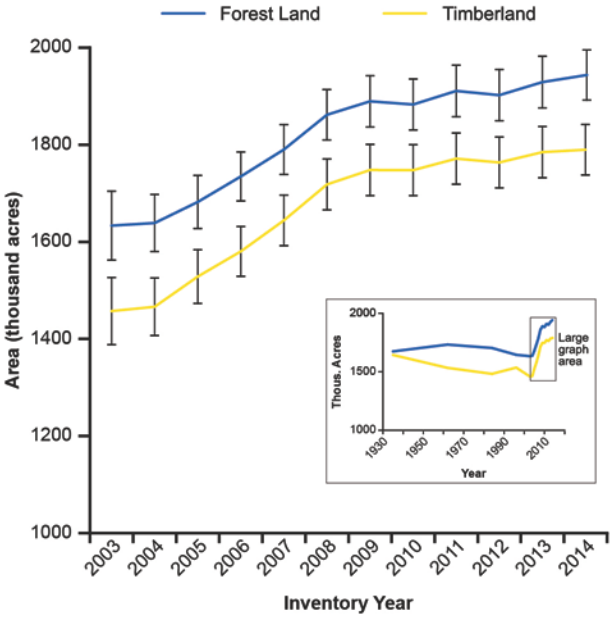

Figure 2.—Area of forest land and timberland by year, South Dakota. Sampling errors and error bars shown in the tables and figures in this report represent 68% confidence intervals for the estimated values.

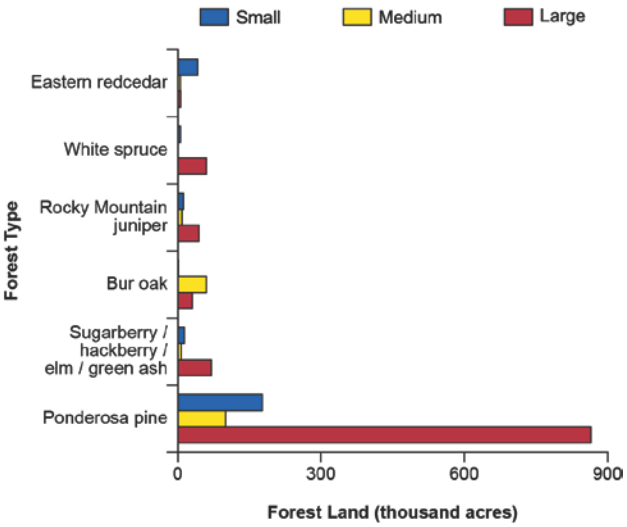

Figure 3.—Area of forest land by top six forest types and stand size class, 2014. Note: Large diameter trees are at least 11.0 inches diameter for hardwoods and at least 9.0 inches diameter for softwoods. Medium diameter trees are at least 5.0 inches diameter but not as large as large diameter trees. Small diameter trees are less than 5.0 inches diameter.

Volume, Biomass, and Trends

Twenty-seven tree species (including unknowns collected to the genus level) were recorded on South Dakota forest land in 2014. Ponderosa pine, bur oak, green ash, white spruce, and Rocky Mountain juniper are the most numerous species by number of live trees (Table 2). Eastern hophornbeam (*Ostrya virginiana*) is also a common species found in South Dakota forests with over 29 million trees, making it the third most plentiful species by number of trees; however, it accounts for very little live-tree volume.

Ponderosa pine continued to rank first for live tree volume on forest land with 1.67 billion cubic feet (Table 2), a decrease of about 3 percent from the 2009 inventory. This species accounted for 74 percent of South Dakota's live-tree volume. Bur oak and eastern cottonwood each accounted for about 5 percent of the live-tree volume on forest land.

In 2014, average annual net growth on forest land was 21.8 million cubic feet (Table 1). Mortality was 41.2 million cubic feet on average, annually. Removals were 35.1 million cubic feet, for a growth to removal ratio of 0.62.

South Dakota's removals are, on average, about 1.5 percent of the total standing volume per year. The vast majority of removals are ponderosa pine (Table 2). An epidemic of mountain pine beetle (MPB) is currently affecting ponderosa pine trees in the Black Hills. A key management strategy to slow the spread of MPB is felling infested trees, cutting the trunks into short logs, and leaving them in place on the ground, which can significantly reduce the number of beetles emerging compared to standing infested trees (Ball and Taecker 2013). Had infested trees not been treated this way, the estimates may have shown higher mortality and lower removals in ponderosa pine.

South Dakota had more than 45.3 million oven-dry tons of biomass on forest land. Ponderosa pine again accounted for the vast majority of that at 68 percent of the total. The 45.3 million dry tons of biomass equates to 22.6 million tons of carbon in South Dakota's forests. About 61 percent of that is on public land and 39 percent on private land, stressing the important roles that both public land management agencies and private landowners have in the management and protection of South Dakota's forest resource.

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, 2014.

Common Name	Latin Name	Million Trees[a]	Net Volume[b] (million ft³)	Aboveground Biomass[a] (thousand dry tons)	Average Annual Net Growth[b] (thousand ft³)	Average Annual Mortality[b] (thousand ft³)	Average Annual Harvest Removals[b] (thousand ft³)
Ponderosa pine	*Pinus ponderosa*	342.26	1,673.17	30,988.56	5,743.17	32,612.96	33,434.31
Bur oak	*Quercus macrocarpa*	30.82	115.02	3,617.54	1,682.48	685.44	--
Eastern cottonwood	*Populus deltoides*	1.90	107.24	1,945.86	3,162.87	846.27	0.00
White spruce	*Picea glauca*	26.50	89.97	1,589.32	1,474.46	1,502.47	1,403.09
Green ash	*Fraxinus pennsylvanica*	28.01	82.66	2,450.72	2,988.45	1,057.73	12.82
American elm	*Ulmus americana*	5.96	41.97	937.73	742.17	1,868.96	68.92
Boxelder	*Acer negundo*	8.57	32.18	759.12	1,434.40	458.38	49.21
Rocky Mountain juniper	*Juniperus scopulorum*	19.15	30.95	490.67	696.78	278.66	--
Eastern redcedar	*Juniperus virginiana*	18.98	20.94	514.06	1,505.12	0.00	--
Quaking aspen	*Populus tremuloides*	18.19	16.48	381.15	-639.68	1,360.39	110.86
Siberian elm	*Ulmus pumila*	2.72	15.72	406.67	914.58	73.75	0.00
Hackberry	*Celtis occidentalis*	1.76	6.40	162.29	258.07	175.51	--

[a] *Trees ≥1 in diameter*
[b] *Trees ≥5 in diameter*
Note: Table cells without observation are indicated by --. A value of 0.00 is due to rounding of a small value.

Status of South Dakota's Bottomland Hardwood Forests

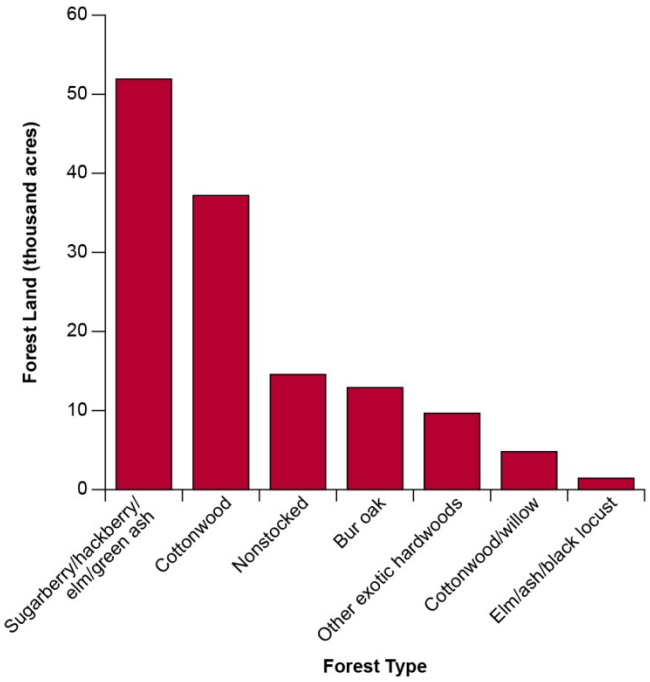

Figure 4.—Area of bottomland/floodplain forest land by forest type, 2014.

Bottomland/floodplain forests that have hardwood dominated forest types make up about 7 percent of the forest land in South Dakota. These forests serve important functions such as improving water quality, reducing stream sedimentation, and providing flood control. The two major bottomland hardwood forest types are cottonwood and sugarberry/hackberry/elm/ green ash, which combine for two-thirds of the total (Fig. 4).

An area of concern for these forests is the lack of regeneration of cottonwood trees. There were no eastern cottonwood saplings or seedlings recorded on plots within the cottonwood and cottonwood/willow forest types (Fig. 5). If regeneration does not keep pace with the loss of cottonwood, areas of cottonwood forests may slowly change to the sugarberry/hackberry/elm/green ash or even eastern redcedar forest types.

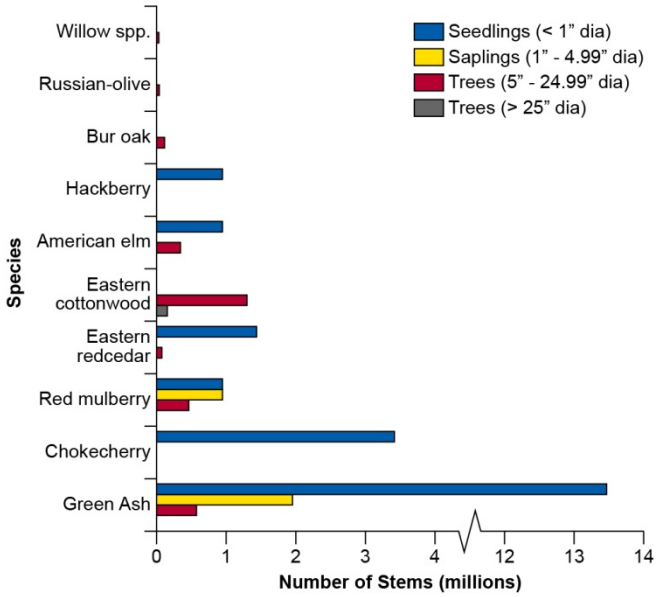

Figure 5.—Number of trees/saplings/seedlings, by species and size, on bottomland/floodplain forest land in the cottonwood and cottonwood/willow forest types, 2014.

Literature Cited

Ball, J.J.; Taecker, C.A. 2013. **The survival of mountain pine beetle in unpeeled logs**. Western Journal of Applied Forestry. 28(4): 154-157.

Additional Inventory Resources

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Piva, R.J.; Walters, B.F.; Haugan, D.D.; Josten, G.J.; Butler, B.J.;[et al.]. 2013. **South Dakota's Forests 2010**. Resour. Bull. NRS-81. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 60 p.

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