USDA United States Department of Agriculture

RESOURCE UPDATE FS-172

Forests of Kansas, 2017

This resource update provides an overview of forest resources in Kansas based on inventories conducted by the USDA Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. For annual inventory years 2001–2013, the cycle length was equal to 5 years. Beginning in 2014, the cycle length was changed to 7 years. For the 2017 inventory, estimates for current variables such as area, volume, and biomass are based on 8,715 field plot samples (593 forested) collected from 2011–2017. Change variables, such as net growth, removals, and mortality, are based on 8,661 (554 forested) samples collected in 2006–2011 and resampled in 2011–2017. 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. (2017) for definitions and technical details. Sampling errors and error bars shown in tables and figures in this report represent 68 percent confidence intervals. A complete set of inventory tables is available at https://doi.org/10.2737/FS-RU-172.

Overview

Kansas is home to about 2.5 million acres of forest land, which is a slight decrease from the 2012 estimate of nearly 2.6 million acres (Table 1). The increase in other removals of live trees suggests that some areas of forest land are being converted to nonforest land uses, such as agriculture or development. Timberland accounts for 94 percent of all forest land, while the remaining 6 percent of forest land is reserved or unproductive. Mortality has increased while the area of forest land, number of live trees, and net growth of live trees has decreased since 2012. This could be a concern if this trend continues.

Table 1.—Kansas forest statistics, 2012 and 2017.

	2012 Estimate	Sampling error (percent)	2017 estimate	Sampling error (percent)	Change since 2012 (percent)
Forest Land					
Area (thousand acres)	2,582.5	2.9	2,494.6	2.8	-3.4
Number of live trees ≥1 inch diameter (million trees)	854.1	4.6	833.4	4.3	-2.4
Net volume of live trees ≥5 inches diameter (million ft³)	3,270.5	4.6	3,312.4	4.1	1.3
Live-tree aboveground biomass (thousand oven-dry tons)	87,302.4	4.0	89,073.8	3.6	2.0
Net growth of live trees ≥5 inches (thousand ft³/yr)	105,033.0	7.7	88,072.3	11.3	-16.1
Annual harvest removals of live trees ≥5 inches (thousand ft³/yr)	21,404.6	26.4	17,420.5	22.8	-18.6
Annual other removals of live trees ≥5 inches (thousand ft³/yr)	3,216.9	46.1	8,895.9	29.0	176.5
Annual mortality of live trees ≥5 inches (thousand ft³/yr)	40,362.3	9.9	45,846.0	9.9	13.6
Timberland					
Area (thousand acres)	2,465.9	3.1	2,352.4	3.0	-4.6
Number of live trees ≥1 inch diameter (million trees)	810.8	4.7	787.0	4.4	-2.9
Net volume of live trees ≥5 inches diameter (million ft³)	3,176.8	4.7	3,219.3	4.2	1.3
Net volume of growing-stock trees ≥5 inches diameter (million ft³)	1,428.5	7.0	1,274.9	7.2	-10.8
Live-tree aboveground biomass (thousand oven-dry tons)	84,441.4	4.1	86,218.8	3.8	2.1
Net growth of growing-stock trees (thousand ft³/yr)	42,234.2	10.0	29,593.5	24.1	-29.9
Annual harvest removals of growing-stock trees (thousand ft³/yr)	9,572.9	35.0	5,061.0	32.9	-47.1
Annual other removals of growing-stock trees (thousand ft³/yr)	2,774.4	72.7	3,092.4	42.1	11.5
Annual mortality of growing-stock trees (thousand ft³/yr)	12,730.4	16.2	17,658.1	18.8	38.7

Forest Area

Generally, forest land in Kansas has increased since the earliest inventory and peaked in 2013 but has decreased slightly since then (Fig. 1). Forest land is dominated by hardwood forest types (93 percent); only 2 percent of all forested lands are nonstocked. Ninety-three percent of forest land is privately owned and also is dominated by hardwood forest types (93 percent), followed by softwoods (5 percent), and nonstocked areas. Publicly owned forest lands follow a very similar pattern with hardwoods occupying 92 percent of the area while softwoods and nonstocked areas each make up 4 percent.

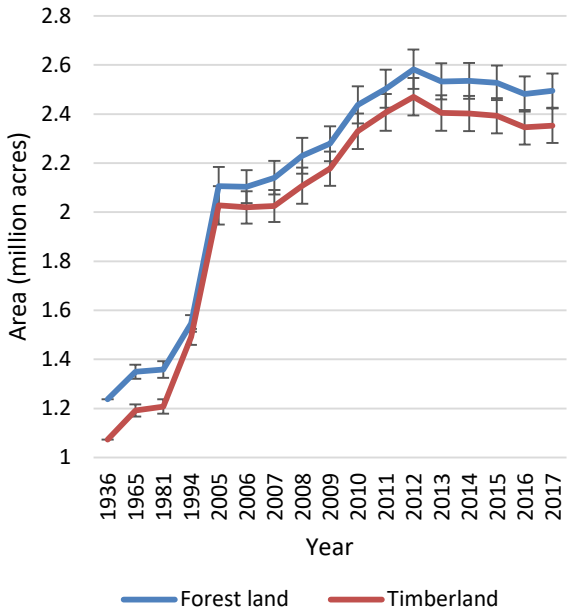

Figure 1.—Area of timberland and forest land by year, Kansas, 1936-2017.

In terms of stand-size class, large diameter stands comprise just over half (51 percent) of all forest land area, while medium and small stands occupy 27 and 20 percent of forest land area, respectively. The six most frequently occurring forest types (Fig. 2) occupy 73 percent of all forest land; 43 percent of forest land is composed of one of two forest types: elm/ash/black locust and sugarberry/hackberry/elm/green ash forest types.

The eastern redcedar forest type is the only type with most of its area composed of small diameter trees. Given the ability of eastern redcedar to outcompete most native tree species, this may impact future forest composition.

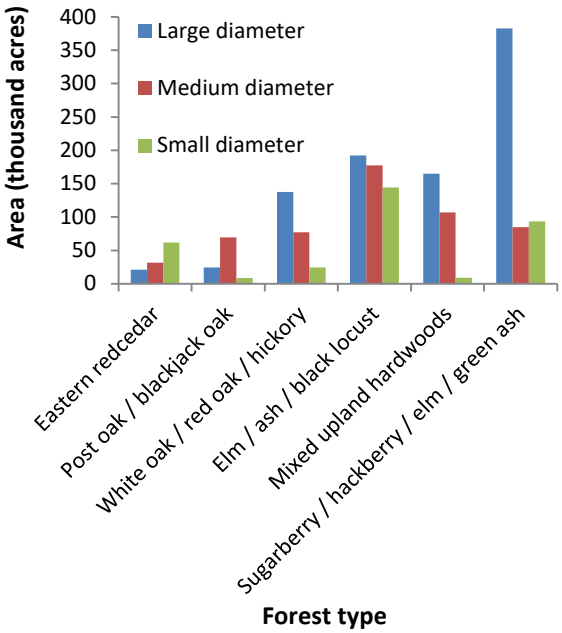

Figure 2.—Forest land by stand-size class for the top six forest types by acreage, Kansas, 2017.

Physiographic class code describes the general effect of land form, topographical position, and soil moisture available to trees. Kansas forest land consists mostly of rolling uplands and floodplains/bottomlands (Fig. 3). The elm/ash/black locust and mixed upland forest types make up 46 percent of the rolling uplands area, while the sugarberry/hackberry/elm/green ash forest type makes up 46 percent of the narrow and broad floodplains/bottomlands area. Dry tops and slopes are dominated by oak and eastern redcedar forest types, which can be found on 69 percent of these forest lands.

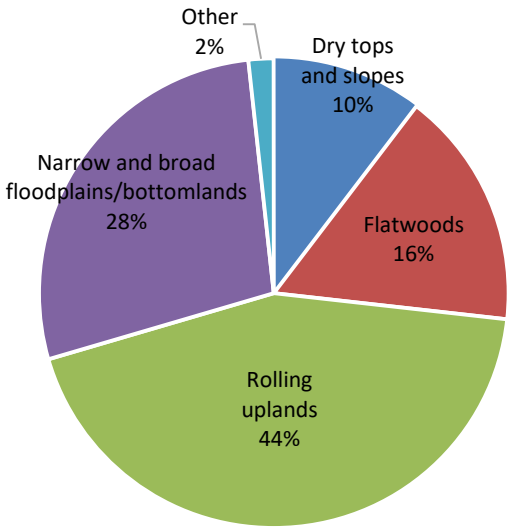

Figure 3.—Distribution of forest land by broad physiographic class, Kansas 2017.

Forest Composition

Kansas forests currently contain approximately 833 million live trees (≥1 inch diameter), or about 334 trees per acre of forest land. Eighty-nine percent of all trees are hardwood species. More than half (53 percent) of trees are comprised of five species: hackberry, American elm, Osage-orange, eastern redcedar, and green ash. Hackberry is the most numerous species, followed by American elm and eastern redcedar.

Hardwood species make up most (96 percent) of the total net live-tree volume and nearly all (99 percent) of the sawtimber volume on forest land. The five most voluminous species (hackberry, cottonwood, American elm, green ash, and Osage-orange) contain about 48 percent of all volume (Table 2). Historically, cottonwood had been the most voluminous species in the state but now ranks second behind hackberry; however, it remains first in terms of sawtimber volume. In fact, it was the only species in the top ten that increased in sawtimber volume since 2012.

There are 89 million oven-dry tons of biomass in Kansas forests, most of which is contained in non-growing-stock trees (60 percent), followed by growing-stock trees (34 percent) and live trees 1 to 5 inches diameter (6 percent). Most (94 percent) of the total biomass is comprised of hardwood species. Three species (hackberry, Osage-orange, and American elm) make up thirty-two percent of all biomass. American elm recently surpassed green ash in terms of biomass.

Table 2.—Net volume and percent change in net volume on forest land; net sawtimber volume and percent change on timberland, Kansas, 2017 (top 10 species by volume).

Rank	Species	Volume of live trees (million ft³)	Sampling error (%)	Change since 2012 (%)	Volume of sawtimber trees (million board ft)	Sampling error (%)	Change since 2012 (%)
1	Hackberry *Celtis occidentalis*	456.1	10.2	1.0	904.1	16	-4.6
2	Cottonwood *Populus deltoides*	347.4	20.5	-13.6	1,224.3	26	8.4
3	American elm *Ulmus americana*	273.7	9.5	5.8	157.8	25.8	-23.8
4	Green ash *Fraxinus pennsylvanica*	251.7	12.0	2.2	394.2	20	-4.1
5	Osage-orange *Maclura pomifera*	250.7	11.0	5.4	--	--	--
6	Black walnut *Juglans nigra*	200.3	9.7	-4.5	383.2	14.0	-10.8
7	Red mulberry *Morus rubra*	166.0	14.9	1.9	8.8	57.5	-76.3
8	Bur oak *Quercus macrocarpa*	152.2	18.9	0.8	281.8	27.9	-14.9
9	Honeylocust *Gleditsia triacanthos*	137.4	15.2	-0.4	27.0	48.1	-54.8
10	Northern red oak *Quercus rubra*	117.8	22.4	9.1	383.8	24.9	-8.3
	Other softwood species	123.7	12.9	4.0	46.0	42.6	-32.9
	Other hardwood species	835.5	6.8	6.4	1,259.4	12.6	-10.4
	All species	**3,312.4**	**4.1**	**1.3**	**5,070.4**	**8.5**	**-6.9**

Streamside Forestry

Areas of tree cover must be at least 1 acre in size and 120 feet wide to meet FIA's definition of forest land. Much of the tree cover in the Great Plains, however, is configured in a way (e.g., narrow strips) that does not meet these requirements. Nevertheless, these trees are a critical resource and offer a wide range of ecological and economical benefits. For example, trees that line stream and rivers help stabilize the banks and protect water quality. Recently, a partnership between the USDA Forest Service's Norther Research Station-FIA program and the Kansas Forest Service has resulted in the development of the first ever statewide 1-meter map of tree and other cover for Kansas (e.g., Fig. 4) (Paull et al. 2017). Such detailed spatial information about tree cover has important implications for streamside forestry applications.

Consider the following example for Barton County, KS. FIA data tells us that there are approximately 6,100 acres of forest land in the county, all of which is classified as broad floodplains/bottomlands. However, we do not know the location of this forest land. Now consider the previously referenced dataset (Paull et al. 2017). We combine it with detailed stream data (Phillips et al. 2006 [this example uses stream orders 3-9]), create 300-foot buffers, and summarize the land cover within those buffers. We get information about the total area, percentage, and locations of each type of land cover within those streamside buffers. This allows managers to focus on those with low (or no) percentages of tree cover (e.g., Goose Creek in Table 3). The resulting maps can show exactly where there is no tree cover along streams and rivers and identify target areas for establishing desired streamside forestry management practices.

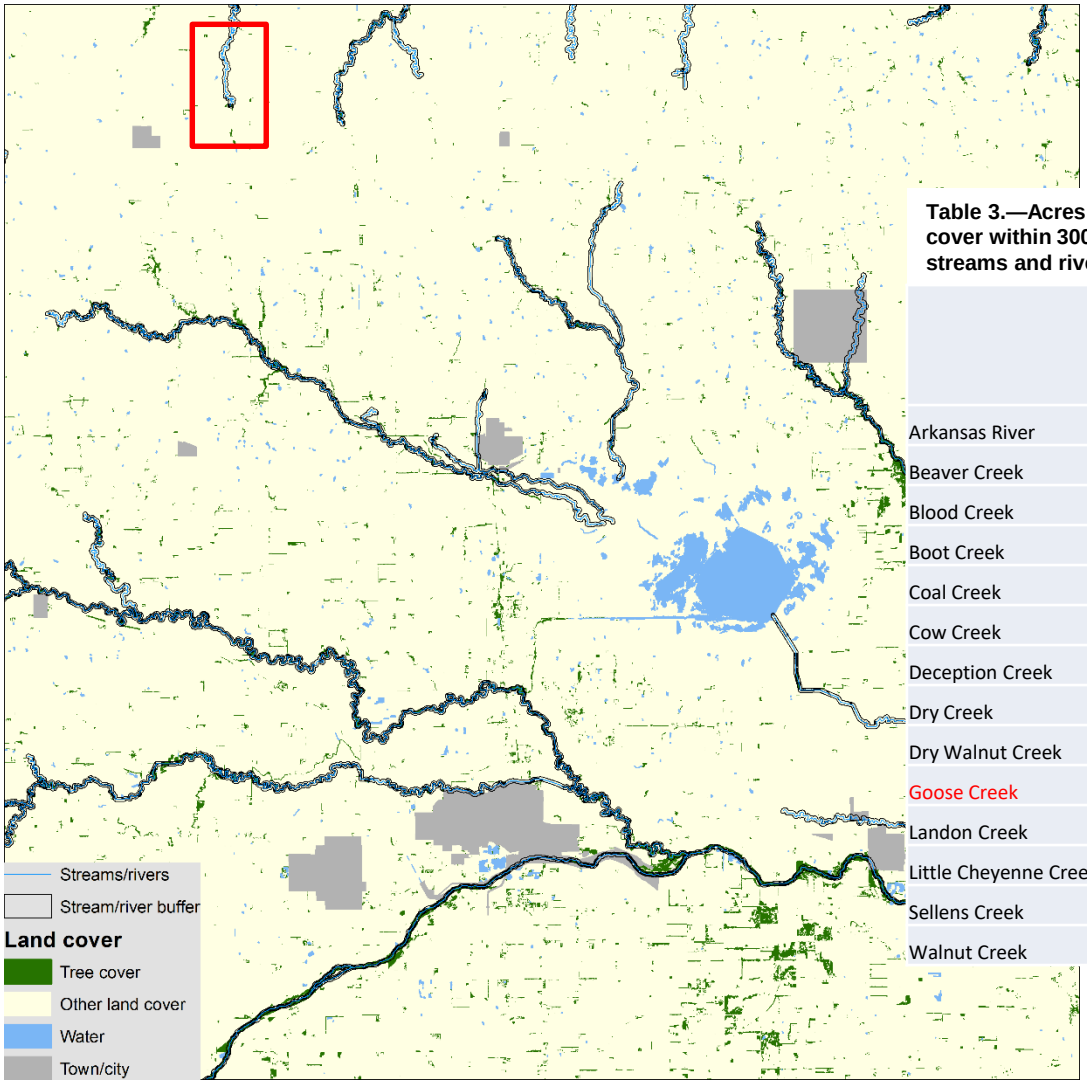

Table 3.—Acres and percentage of tree cover within 300-foot buffers around streams and rivers, Barton County, KS.

	Tree cover	
	acres	% of stream buffer area
Arkansas River	1,316	54
Beaver Creek	4	2
Blood Creek	586	28
Boot Creek	70	16
Coal Creek	27	41
Cow Creek	657	38
Deception Creek	195	23
Dry Creek	28	33
Dry Walnut Creek	563	27
Goose Creek	0	0
Landon Creek	21	6
Little Cheyenne Creek	42	4
Sellens Creek	132	25
Walnut Creek	1,257	39

Figure 4.—Land cover, stream/rivers with 300-foot buffers. Goose Creek is in the red rectangle. Barton County, KS.

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FIA online glossary: https://www.nrs.fs.fed.us/fia/data-tools/state-reports/glossary/

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