USDA
United States Department of Agriculture

RESOURCE UPDATE FS-42

Forests of Kansas, 2014

This resource update provides an overview of forest resource attributes for Kansas based on annual inventories conducted by the Forest Inventory and Analysis (FIA) program of the Northern Research Station (NRS) of the U.S. Forest Service. The estimates presented in this update are based on field data collected in 2010-2014 with comparisons made to data collected from 2005-2009. These estimates, along with web-posted core tables, are updated annually. For more information, please refer to inventory citations on page 5 of this report.

Overview

Kansas is home to 2.5 million acres of forest land, a gain of 11 percent since 2009 (Table 1). Timberland accounts for 95 percent of all forest land, while the remaining 5 percent of forest land is reserved or unproductive. Mortality has decreased since 2009 while forest land area, number of trees, volume, biomass, net growth, and removals (on forest land only) have experienced gains.

Note: when comparing estimates on forest land versus timberland, please note that timberland estimates are often for growing-stock trees, which are live trees (5-inches diameter at breast height [d.b.h.] or larger) of commercial species and are not rough or rotten trees. As such, they are a subset of all live trees and the estimates will likely be smaller. See page 5 for more definitions.

Table 1.—Kansas forest statistics, 2014

	2014 estimate	Sampling error (%)	Change since 2009 (%)
Forest Land			
Area (thousand acres)	2,535	3	11
Number of live trees ≥1 in diameter (million trees)	846	4	10
Live-tree and sapling aboveground biomass (thousand oven-dry tons)	89,503	4	13
Net volume of live trees ≥5 in diameter (million ft^3)	3,365	5	14
Net growth of live trees ≥5 in (thousand ft^3/yr)	112,196	9	65
Annual mortality of live trees ≥5 in (thousand ft^3/yr)	39,390	10	-22
Annual harvest removals of live trees ≥5 in (thousand ft^3/yr)	20,886	24	15
Annual other removals of live trees ≥5 in (thousand ft^3/yr)	5,882	36	33
Timberland			
Area (thousand acres)	2,402	3	11
Number of live trees ≥1 in diameter (million trees)	794	4	10
Live-tree aboveground biomass (thousand oven-dry tons)	86,396	4	13
Net volume of live trees ≥5 in diameter (million ft^3)	3,268	5	14
Net volume of growing-stock trees ≥5 in diameter (million ft^3)	1,444	7	1
Net growth of growing-stock trees ≥5 in (thousand ft^3/yr)	43,587	16	26
Annual mortality of growing-stock trees ≥5 in (thousand ft^3/yr)	12,029	17	-29
Annual harvest removals of growing-stock trees ≥5 in (thousand ft^3/yr)	8,184	29	-12
Annual other removals of growing-stock trees ≥5 in (thousand ft^3/yr)	2,069	38	-62

Forest Area

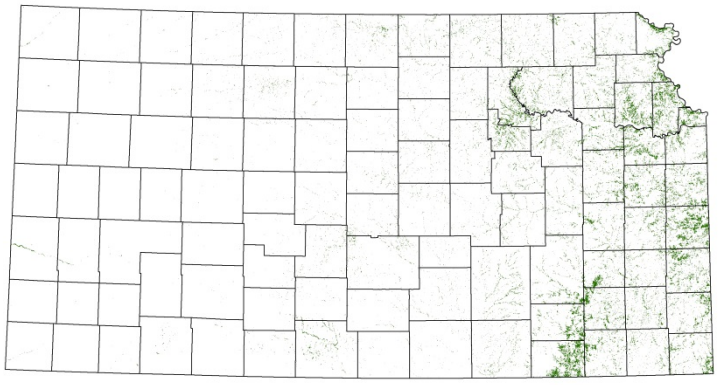

Figure 1.—Kansas forest land.

Generally, forest land in Kansas (Fig. 1) has increased since the earliest inventory and currently is showing signs of plateauing (Fig. 2). Ninety-three percent of forest land is privately owned and occupied by hardwood forest types; nearly 3 percent of forested lands are nonstocked. In terms of stand-size class, sawtimber stands comprise half of all timberland area while poletimber and sapling-seedling stands occupy 29 and 19 percent of timberland area, respectively. The top 10 most frequently occurring forest types (Fig. 3) occupy 86 percent of all forest land; half of which is comprised of the elm/ash/black locust and sugarberry/hackberry/elm/green ash forest types alone.

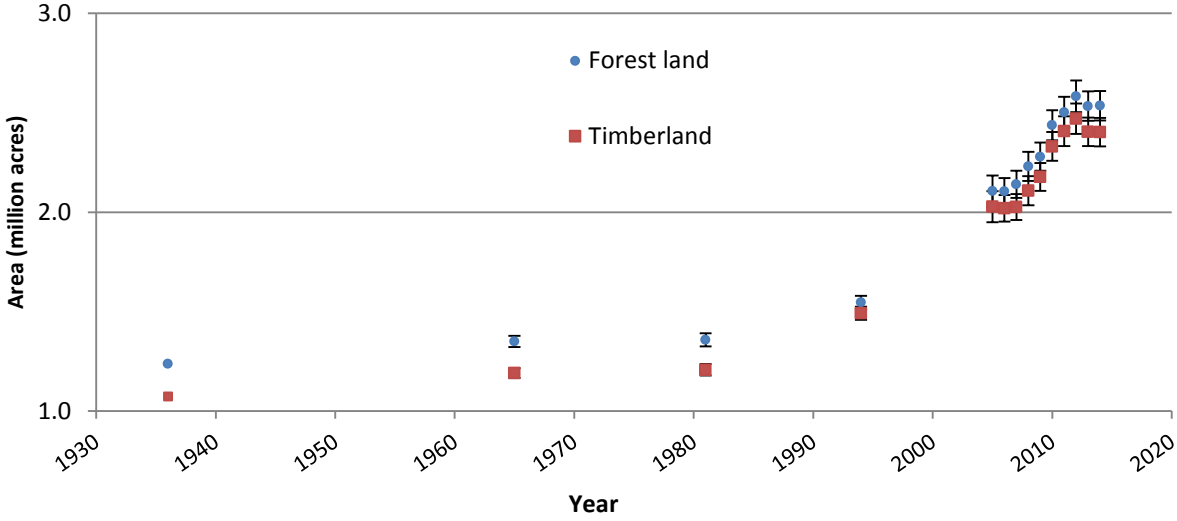

Figure 2.—Area of timberland and forest land by year, Kansas, 1936-2014. Error bars represent 68 percent confidence interval around the estimated mean.

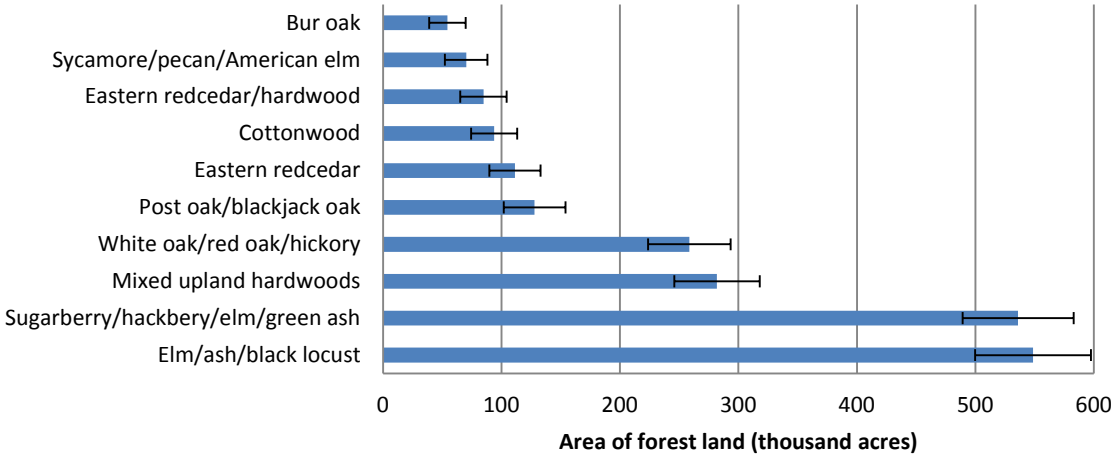

Figure 3.—Area of forest land for the 10 most common forest types, Kansas, 2014. Error bars represent 68 percent confidence interval around the estimated mean.

Volume, Biomass, and Trends

Kansas' forests contain approximately 846 million live trees (≥1-inch diameter) and nearly 3.4 billion cubic feet of net volume (live trees ≥5-inches diameter). The five most numerous species are hackberry, American elm, eastern redcedar, Osage-orange, and green ash (Table 2); together, they make up 51 percent of all trees. The five most voluminous species contain nearly half (49%) of total net volume, and of the five species previously listed, four are in the top five for volume as well: hackberry, green ash, American elm, and Osage-orange. Eastern cottonwood is the most voluminous species in the state but ranks 9th in terms of number of trees, and while eastern redcedar is 3rd in terms of number of trees, it ranks 11th in volume.

There are nearly 90 million oven-dry tons of biomass in Kansas forests; most of which is contained in non-growing-stock trees (56%), followed by growing-stock trees (38%) and live trees 1- to 5-inches diameter (6%). Nearly one-third of all biomass is found in three species: hackberry, Osage-orange, and cottonwood. Osage-orange now ranks second in biomass, surpassing eastern cottonwood.

Overall, the growth rate of Kansas' trees remains positive, with eastern cottonwood, hackberry, and American elm having the highest growth rates, followed closely by Osage-orange and black walnut. Harvest removal rate of black walnut has decreased since the previous inventory. American elm continues to have the highest rate of mortality followed by green ash instead of eastern cottonwood as seen in the previous inventory. Despite the high rate of mortality, American elm has one of the highest net growth rates and is the second most numerous species in the state.

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, Kansas, 2010-2014

Common name	Latin name	Number of trees[a] (millions)	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)
Eastern cottonwood	*Populus deltoides*	9.5	461.9	8,306.5	13,835.1	3,793.3	--
Hackberry	*Celtis occidentalis*	110.4	441.4	10,868.2	14,869.0	3,623.7	2,185.8
Green ash	*Fraxinus pennsylvanica*	44.4	256.0	6,927.3	5,894.0	4,644.8	173.7
American elm	*Ulmus americana*	108.9	251.1	6,460.9	10,770.4	5,333.8	1,912.0
Osage-orange	*Maclura pomifera*	83.9	237.7	9,487.9	9,576.7	1,056.9	2,148.1
Black walnut	*Juglans nigra*	23.7	204.4	4,870.0	9,266.7	1,832.4	1,258.1
Red mulberry	*Morus rubra*	35.8	162.3	4,681.8	7,490.0	2,190.1	459.9
Bur oak	*Quercus macrocarpa*	8.1	149.0	4,017.3	2,604.4	985.5	1,644.7
Honeylocust	*Gleditsia triacanthos*	30.3	131.1	4,121.7	6,952.6	2,236.1	853.6
Northern red oak	*Quercus rubra*	8.0	115.4	3,271.1	3,128.2	293.3	1,062.9
Eastern redcedar	*Juniperus virginiana*	84.0	105.2	2,424.0	5,648.0	931.8	527.2
American sycamore	*Platanus occidentalis*	4.4	98.5	2,020.5	1,261.6	243.6	1,481.2

[a] *Trees ≥1-inch diameter* [b] *Trees ≥5-inches diameter* *Note: Table cells without data are indicated by --*

Emerald Ash Borer in Kansas

Emerald ash borer (*Agrilus planipennis*; EAB), an exotic wood-boring beetle, was first detected in North America near Detroit, Michigan, in 2002 (Poland and McCullough 2006). Ten years later, EAB was found in Wyandotte county, Kansas and since that time has also been found in Johnson and Leavenworth counties (as of February 2015) (Fig. 4). EAB is a pest of all North American ash (*Fraxinus* spp.) and has recently been found to colonize white fringetree (*Chionanthus virginicus*) (Cipollini 2015, Poland and McCullough 2006,).

Kansas' forest land contains 52.5 million ash trees (≥1-inch diameter), or an average of almost 21 trees per acre of forest land. Ash trees account for nearly 275 million ft^3 of volume, or 8 percent of total net volume of live trees (≥ 5-inches diameter) on forest land. Most of the ash resource (93%) is located on privately owned forest lands and is distributed primarily in the central and eastern parts of the state; the heaviest concentrations of ash are in the northeastern corner and along the eastern boundary (Fig. 4). Mortality of ash has been fairly consistent since 1994 and currently totals 1.9 million ft^3 per year. Continued monitoring will help to identify the long term impacts of EAB on Kansas' forest resource.

EAB mortality. Photo by Bill McNee, WI DNR, Bugwood.org.

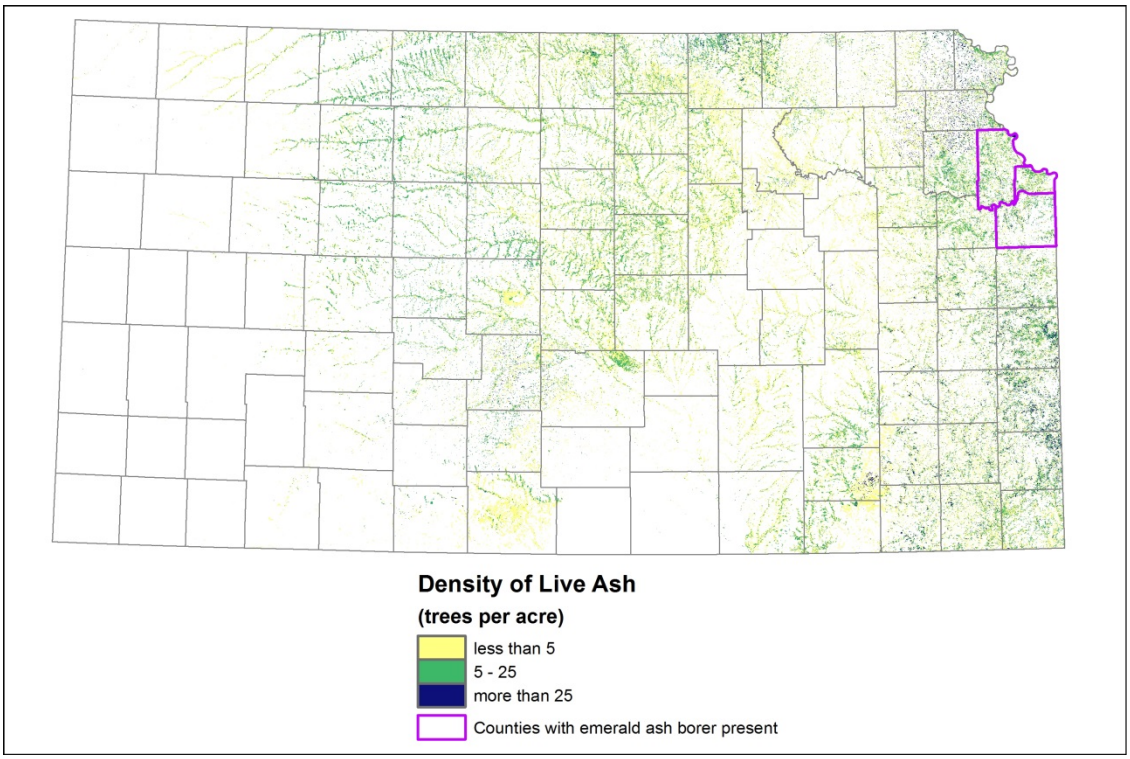

Figure 4.—Density of live ash trees in Kansas.

Literature Cited

Cipollini, D. 2015. **White fringetree as a novel larval host for emerald ash borer**. Journal of Economic Entomology. 108(1): 370-375.

Poland, T.M.; McCullough, D.G. 2006. **Emerald ash borer: invasion of the urban forest and the threat to North America's ash resource**. Journal of Forestry. 104(3): 118-124.

Definitions

Average annual mortality — The average cubic foot volume of sound wood in growing-stock trees that died in 1year.

Average annual removals— The average net growing-stock volume in growing-stock trees removed annually for roundwood forest products, in addition to the volume of logging residues and the volume of other removals.

Biomass— The aboveground weight of wood and bark in live trees 1.0 inch (2.5 cm) d.b.h. and larger from the ground to the tip of the tree, excluding all foliage. The weight of wood and bark in lateral limbs, secondary limbs, and twigs under 0.5 inch (1.3 cm) in diameter at the point of occurrence on sampling-size trees is included but is excluded on poletimber and sawtimber-size trees. Biomass is typically expressed as green or oven-dry weight and the units are tons.

Forest land — Land that has at least 10 percent canopy cover of live trees of any size or formerly having had such tree cover and is not currently developed for nonforest uses. The area with trees must be at least 1 acre and at least 120 feet wide.

Forest type — A classification of forest land based upon and named for the tree species that forms the plurality of live-tree stocking. A forest type classification for a field location indicates the predominant live-tree species cover for the field location; hardwoods and softwoods are the first group to be determine predominant group, and forest type is selected from the predominant group.

Net annual growth — The average annual net increase in the volume of trees during the period between inventories. Components include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became cull trees during the year.

Net volume in cubic feet — The gross volume in cubic feet less deductions for rot, roughness, and poor form. Volume is computed for the central stem from a 1-foot stump to a minimum 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs.

Nonstocked —Land that currently has less than 10 percent stocking but formerly met the definition of forest land. Forest conditions meeting this definition have few, if any, trees sampled.

Physiographic class — A measure of soil and water conditions that affect tree growth on a site.

Reserved forest land — Land permanently reserved from wood products utilization through statute or administrative designation. Examples include national forest wilderness areas and national parks and monuments.

Timberland — Forest land that is producing or is capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands and is not withdrawn from timber utilization by statute or administrative regulation.

Additional Inventory Sources

Bechtold, W.A.; Patterson, P.L., eds. 2005. **The enhanced Forest Inventory and Analysis program: national sampling design and estimation procedures.** Gen. Tech. Rep. SRS-80. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 85 p.

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