

Forests of Nebraska, 2014

This resource update provides an overview of forest resource attributes for Nebraska based on annual inventories conducted by the Forest Inventory and Analysis (FIA) Program of the Northern Research Station (NRS), 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. In the 2014 inventory, NRS-FIA is now measuring 1/7th (14.3 percent) of the plots annually and plans to continue this, completing a 7-year cycle in the 2020 inventory. The complete set of plots is being retained. All inventory estimates (both current and change) will continue being based on the most recent measurements taken on these plots. As the 7-year cycle is phased in, the difference between the report year and average date of the recent data will increase from 2 to 3 years. The difference between the report year and the average midpoint year for change will increase from 4.5 to 6.5 years. For the 2014

report, these differences are 2.3 and 4.8 years, respectively.

Overview

Nebraska is home to nearly 1.6 million acres of forest land, a gain of 4 percent since 2009 (Table 1). Timberland accounts for 92 percent of all forest land, while the remaining 8 percent of forest land is reserved or unproductive. The area of forest land, the number of trees, and the net volume of live trees increased since 2009; however, net growth has decreased as a result of increased mortality. The recent increase in mortality is mainly attributed to severe weather events, such as flooding and drought, as well as disease and fire. Disease primarily affected American elm and slippery elm while fire was responsible for 73 percent of the ponderosa pine mortality.

Table 1.—Nebraska’s forest statistics, change between 2009 and 2014

	2009 Estimate	Sampling error (percent)	2014 estimate	Sampling error (percent)	Change since 2009 (percent)
Forest Land					
Area (1,000 acres)	1,498	4.3	1,560	4.0	4.1
Number of live trees ≥1 in diameter (million trees)	391	6.5	417	6.7	6.7
Net volume of live trees ≥5 in diameter (million ft ³)	2,011	7.1	2,142	6.5	6.5
Live-tree aboveground biomass (thousand oven-dry tons)	44,170	6.5	47,749	5.8	8.1
Net growth of live trees ≥5 in (thousand ft ³ /yr)	58,427	16.6	38,345	24.3	-34.4
Annual harvest removals of live trees ≥5 in (thousand ft ³ /yr)	11,430	43.3	14,870	49.9	30.1
Annual other removals of live trees ≥5 in (thousand ft ³ /yr)	2,741	51.7	1,218	96.7	-55.6
Annual mortality of live trees ≥5 in (thousand ft ³ /yr)	26,586	18.3	43,566	16.6	63.9
Timberland					
Area (thousand acres)	1,385	4.5	1,429	4.3	3.1
Number of live trees ≥1 in diameter (million trees)	361	6.8	383	7.2	6.0
Net volume of live trees ≥5 in diameter (million ft ³)	1,900	7.4	2,015	6.9	6.1
Net volume of growing-stock trees ≥5 in diameter (million ft ³)	1,142	10.4	932	11.5	-18.4
Live-tree aboveground biomass (thousand oven-dry tons)	41,478	6.7	44,700	6.2	7.8
Net growth of growing-stock trees (thousand ft ³ /yr)	20,143	28.6	4,029	177.1	-80.0
Annual harvest removals of growing-stock trees (thousand ft ³ /yr)	6,725	58.9	10,560	66.3	57.0
Annual other removals of growing-stock trees (thousand ft ³ /yr)	3,034	48.5	215	94.8	-92.9
Annual mortality of growing-stock trees (thousand ft ³ /yr)	14,665	27.5	24,336	25.7	65.9



Forest Area

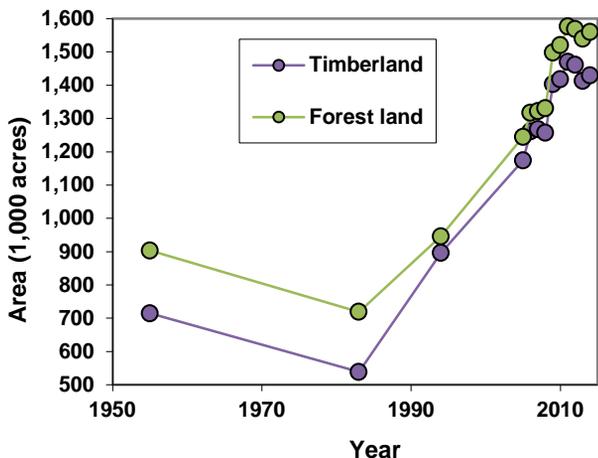


Figure 1.—Area of timberland and forest land by year, Nebraska.

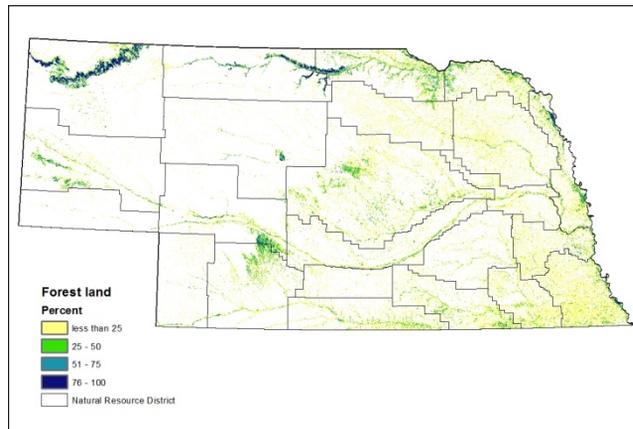


Figure 2.—Distribution of forest land, Nebraska.

Forest land in Nebraska had increased steadily since the 1980s but recently has fluctuated (Fig. 1). Most forest land is associated with riparian systems (Fig. 2). Hardwoods are more common in the eastern half of the State while ponderosa pine forests are dominant in the west. Overall, hardwood forest types occupy 60 percent of all forest land while softwoods comprise 32 percent; the remaining 8 percent is nonstocked. Eighty-nine percent, or nearly 1.4 million acres of forest land is privately owned. Private forest lands are dominated by hardwoods (61 percent) while publicly-owned forest land is more evenly distributed amongst hardwoods (50 percent) and softwoods (41 percent); the remaining areas are nonstocked.

Eastern redcedar is the most prevalent forest type in Nebraska (Fig. 3) and when combined with the eastern redcedar/hardwood, these two forest types occupy nearly one-fourth (23%) of all forest land area. Most forest land is made up of medium- and large-diameter trees. Only half of the top 10 forest types have any area in the small-diameter stand-size class, most of which is the eastern redcedar forest type. Furthermore, eastern redcedar is the only softwood forest type with any area dominated by small-diameter trees (i.e., those less than 5.0 inches d.b.h.). The top hardwood forest types in terms of regeneration are the sugarberry/hackberry/elm/green ash (nearly 13,000 acres) and the elm/ash/black locust and willow types with nearly 11,000 acres each in the small-diameter class.

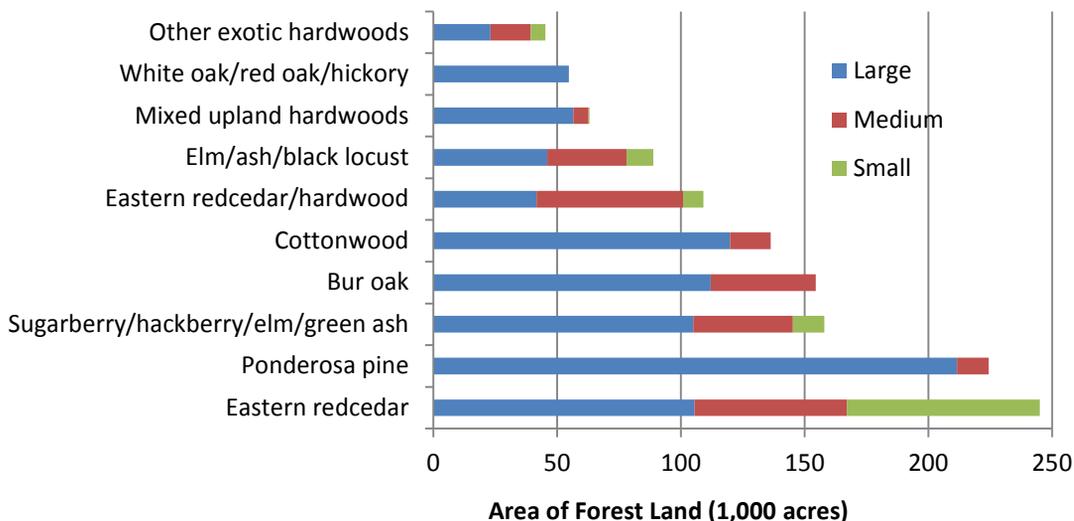


Figure 3.—Area of forest land by stand-size class by forest type, Nebraska, 2014.

Volume, Biomass, and Trends

Nebraska's forests contain approximately 417 million live trees according to the 2014 inventory, or an average of 267 trees per acre of forest land. Forty percent of this live-tree resource are eastern redcedar trees, an increase of about 2percent since 2013.

The top five species (Table 2) in terms of volume are cottonwood, bur oak, ponderosa pine, eastern redcedar, and green ash; collectively, they make up 73 percent of net volume of live trees (≥ 5 inches d.b.h) on forest land. Cottonwood remains at the top for volume and biomass, comprising more than one-fourth (28 percent) of total net volume and nearly one-fourth (23 percent) of aboveground biomass, which is about the same amount of biomass as ponderosa pine and eastern redcedar combined. Ponderosa pine contains 93 percent of the total net volume of softwood sawtimber trees on timberland. The remaining volume is found in eastern redcedar (5 percent) and jack pine (2 percent). Cottonwood and bur oak make up nearly three-fourths of the total net volume of hardwood sawtimber trees at 63 and 10 percent, respectively.

Eastern redcedar has the highest net growth rate and has low mortality and removal rates. Ponderosa pine continues to have negative net growth and has the highest rate of mortality which was nearly equivalent to that of cottonwood. Cottonwood had the highest rate of removals in 2014 followed by ponderosa pine and American basswood.

Table 2.—Number, volume, biomass, growth, mortality, and removals of live trees on forest land for the top 12 tree species by net volume, Nebraska, 2010-2014.

Common name	Latin name	Million trees ^a	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)
Eastern redcedar	<i>Juniperus virginiana</i>	165.02	223.21	5108.73	13061.17	648.4	339.74
Ponderosa pine	<i>Pinus ponderosa</i>	53.95	288.63	5323.08	-10254.54	11141.76	2344.91
Green ash	<i>Fraxinus pennsylvanica</i>	35.73	126.99	3625.03	736.65	4019.42	534.58
Hackberry	<i>Celtis occidentalis</i>	30.94	80.06	2039.88	4538.55	1086.85	349.2
Bur oak	<i>Quercus macrocarpa</i>	25.45	317.38	8834.41	7913.55	2745.53	486.15
Red mulberry	<i>Morus rubra</i>	25.42	85.43	2547.31	4421.83	887.65	117.62
American elm	<i>Ulmus americana</i>	15.35	70.82	1634.69	3506.56	2000.18	63.75
Eastern cottonwood	<i>Populus deltoides</i>	9.69	602.59	10812.42	6112.23	11051.71	7602.49
Siberian elm	<i>Ulmus pumila</i>	6.78	47.02	1220.42	3297.16	218.77	--
Honeylocust	<i>Gleditsia triacanthos</i>	5.17	28.89	902.35	673.06	249.70	--
American basswood	<i>Tilia americana</i>	3.62	87.87	1323.89	1174.9	1041.47	1108.78
Black walnut	<i>Juglans nigra</i>	1.76	29.21	670.46	1462.23	978.38	755.28

^a Trees ≥ 1 -inch diameter

^b Trees ≥ 5 -inches diameter

Note: Table cells without data are indicated by --

Emerald Ash Borer and the Ash Resource in Nebraska

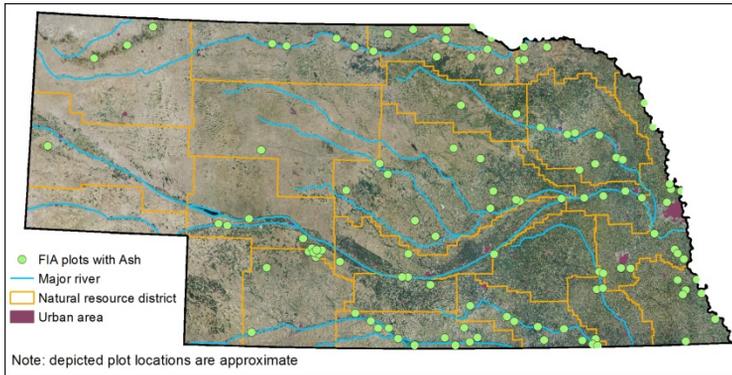


Figure 4.—FIA field plots with ash trees present, Nebraska 2014. Depicted plot locations are approximate.

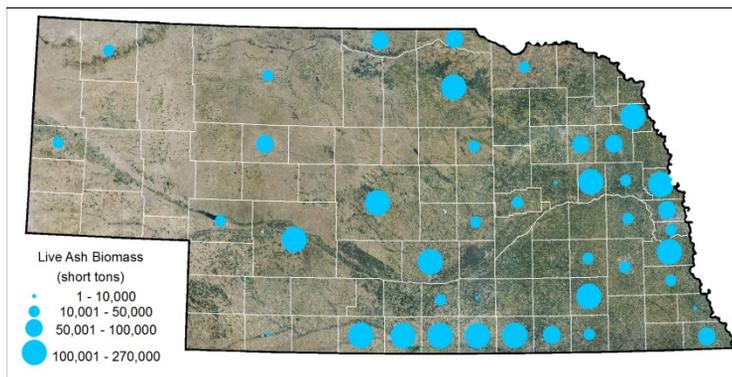


Figure 5.—Aboveground live biomass of ash on forest land by county, Nebraska, 2014.

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). Since then it has been found in nearly every state in the eastern half of the U.S. and also in the Canadian provinces of Ontario and Quebec. This nonnative insect has been found in Nebraska's neighbors of Iowa, Missouri, Kansas, and Colorado. EAB is a pest of all North American ash (*Fraxinus* spp.) and has recently been found to colonize white fringetree (*Chionanthus virginicus*) (Poland and McCullough 2006; Cipollini 2015).

Overall, Nebraska's forests contain nearly 36 million ash trees (≥ 1 -inch diameter), or an average of 23 trees per acre of forest land, and 38 percent of those trees are 5-inches diameter or larger, which is an average density of 9 trees per acre of forest land. Ash accounts for nearly 127 million ft³ of volume, or 6 percent of total net volume of live trees (≥ 5 -inches diameter) on forest land. Most of the ash resource (82 percent) is located on privately owned forest lands and is distributed mainly in the eastern and southern portions of the state (Figs. 4 and 5).

In addition to forest land, trees are often found in nonforest settings, such as agroforestry plantings and in municipal areas. A special inventory known as the Great Plains Tree and Forest Invasives Initiative, or GPI, was conducted in 2008-2009 to gather data about this additional tree resource to prepare for the spread of EAB. According to the GPI data for Nebraska, there are nearly 12 million additional ash trees outside forested areas, most of which (91 percent) are found on rural lands and are often present in windbreaks. The remaining 9 percent (approximately 1 million trees) are located in urban areas.

Average annual mortality of ash has increased from about 1.6 million cubic feet per year to 4 million cubic feet per year. Despite this, the ash resource still is still growing at an average rate of approximately 737,000 cubic feet per year. The average annual rate of mortality across all species has increased by 67 percent since 2010. Green ash, ponderosa pine, and cottonwood all had similar increases in mortality rates. An examination of plot records revealed that weather events, such as severe winds, flooding, and drought, were responsible for nearly three-fourths of all recent green ash mortality. Disease was recorded as the cause of mortality for about 8 percent of ash mortality; this should be monitored continuously.

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 1 year.

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 in size 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.

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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