



Forests of Nebraska, 2017

This resource update provides an overview of forest resources in Nebraska 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 sample 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 8,248 field plot samples (317 forested) collected from 2011–2017. Change variables, such as net growth, removals, and mortality, are based on 8,223 samples (299 forested) collected in 2007–2012 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.

Overview

Nebraska is home to nearly 1.5 million acres of forest land (Table 1). Timberland accounts for about 92 percent of all forest land, while the remaining 8 percent of forest land is reserved or unproductive. The area of forest land, number of trees, biomass, removals, and net volume of live trees decreased since 2012 while mortality has increased. The recent increase in mortality is mainly attributed to severe weather events, fire, and insects. Disease primarily affected American elm and green ash while fire was the leading cause of mortality for ponderosa pine, eastern redcedar, and bur oak. Ponderosa pine in particular has been heavily impacted by severe wildfires.

A complete set of inventory tables is available at <https://doi.org/10.2737/FS-RU-155>.

Table 1.—Nebraska forest statistics, 2012 and 2017. Estimates for growing-stock trees are impacted by changes in tree class (e.g., form) and, therefore, have comparatively higher sampling errors than estimates for all live trees. Sampling errors and error bars shown in this report represent 68 percent confidence intervals.

Forest Land	2012 Estimate	Sampling error (percent)	2017 estimate	Sampling error (percent)	Change since 2012 (percent)
Area (thousand acres)	1,569.2	4.2	1,474.6	4.1	-6.0
Number of live trees ≥1 inch diameter (million trees)	414.3	6.6	377.5	6.7	-8.9
Net volume of live trees ≥5 inches diameter (million ft ³)	2,091.3	6.6	2,062.4	6.7	-1.4
Live-tree aboveground biomass (thousand oven-dry tons)	46,527.8	6.0	46,072.1	6.1	-1.0
Net growth of live trees ≥5 inches (thousand ft ³ /yr)	47,821.4	19.5	16,872.7	46.4	-64.7
Annual harvest removals of live trees ≥5 inches (thousand ft ³ /yr)	13,728.2	48.6	8,115.0	30.8	-40.9
Annual mortality of live trees ≥5 inches (thousand ft ³ /yr)	41,187.0	17.3	49,449.3	15.8	20.1
Timberland					
Area (thousand acres)	1,441.6	4.4	1,353.9	4.4	-6.1
Number of live trees ≥1 inch diameter (million trees)	380.6	7.0	345.1	7.2	-9.3
Net volume of live trees ≥5 inches diameter (million ft ³)	1,969.4	6.9	1,934.6	7.2	-1.8
Net volume of growing-stock trees ≥5 inches diameter (million ft ³)	1,019.9	10.6	877.8	11.1	-13.9
Live-tree aboveground biomass (thousand oven-dry tons)	43,570.4	6.3	42,972.2	6.5	-1.4
Net growth of growing-stock trees (thousand ft ³ /yr)	11,307.8	61.4	444.0	1,221.4	-96.1
Annual harvest removals of growing-stock trees (thousand ft ³ /yr)	7,555.9	81.5	3,881.1	48.2	-48.6
Annual mortality of growing-stock trees (thousand ft ³ /yr)	21,133.5	27.6	24,817.7	23.3	17.4

Forest Area

After increasing steadily since the 1980s, the area of forest land in Nebraska is beginning to show signs of decreasing area (Fig. 1). Changing land uses impact forest land area. Forest land gains have been offset by losses, thus resulting in a net decrease in total forest area since 2012 (Fig. 2). Most forest land area is associated with riparian systems.

Hardwoods are more common in the eastern half of the State while ponderosa pine forests are dominant in the west. Hardwood forest types, such as bur oak and eastern cottonwood, occupy 54 percent of all forested lands. Softwoods, primarily the eastern redcedar and ponderosa pine forest types, make up 32 percent of all forest land while the eastern redcedar/hardwood forest type covers 6 percent. Eight percent of forest land is classified as nonstocked.

Eighty-nine percent, or 1.3 million acres, of forest land is privately owned. Fifty-four percent of private forest lands are occupied by hardwoods, followed by softwoods (38 percent) and nonstocked areas (7 percent). Hardwoods make up half of publicly owned forest lands while softwoods and nonstocked areas comprise 40 and 10 percent, respectively.

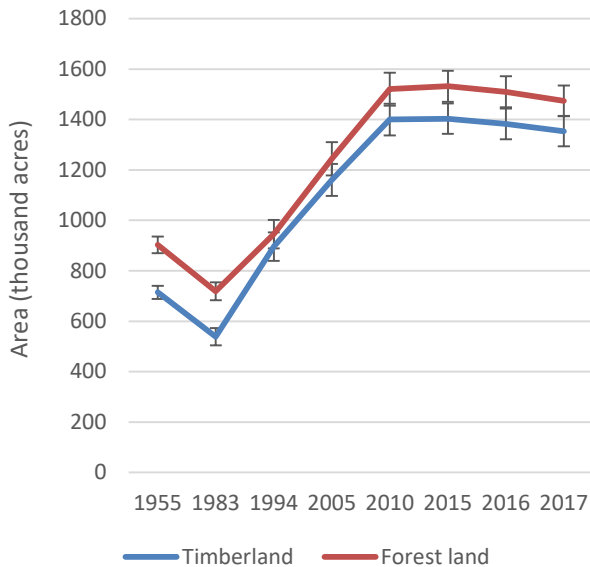


Figure 1.—Area of timberland and forest land by year, Nebraska.

Sixty percent of forest land is occupied by large-diameter trees while most of the remaining forest land is comprised of medium and small-diameter trees, 20 and 10 percent, respectively. The top five forest types by acreage make up 60 percent of total forest land area (Fig. 3). Eastern redcedar has surpassed ponderosa pine as the most prevalent forest type in Nebraska and has the most acreage in the small diameter class.

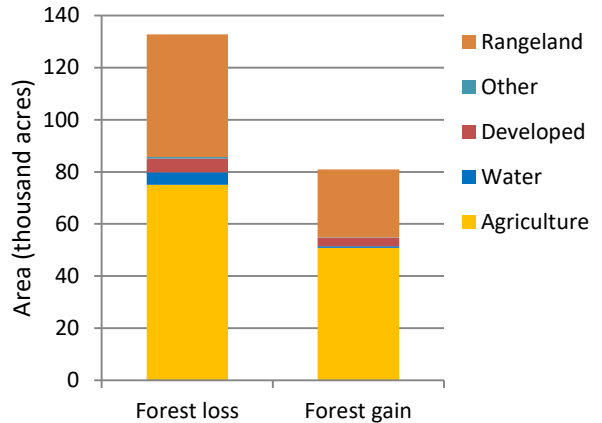


Figure 2.—Area of forest loss to other land uses, and gain from other land uses, Nebraska, 2012–2017.

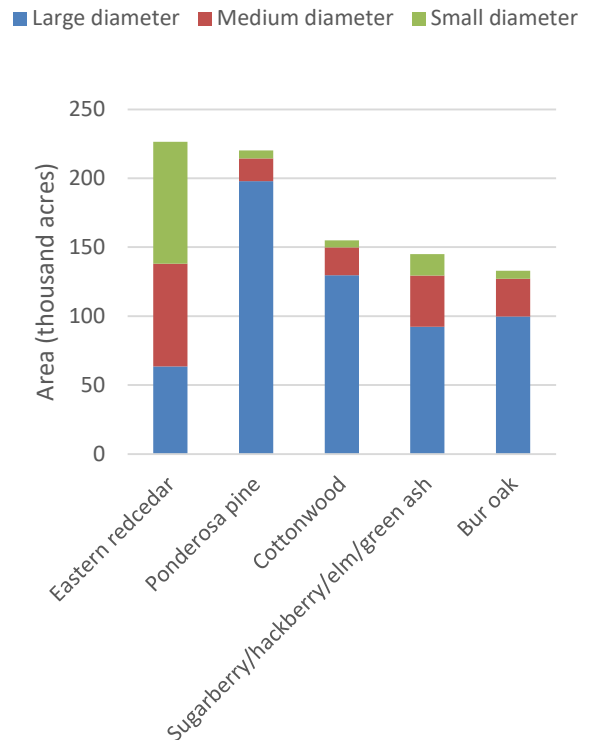


Figure 3.—Forest land by stand-size class for the top five forest types by acreage, Nebraska, 2017.

Volume, Biomass, and Trends

Nebraska’s forests contain approximately 377.5 million live trees according to the 2017 inventory, which is a decrease of more than 36 million trees compared to the estimate from the 2012 inventory. Green ash had the largest decrease (12.7 million) in number of trees followed by Ponderosa pine (8.8 million) since the 2012 inventory. Eastern redcedar remains the most numerous tree species by far, comprising 41 percent of the total of live-tree resource in Nebraska, compared to 37 percent in 2012.

The top five species (Table 2) in terms of volume are eastern cottonwood, bur oak, ponderosa pine, eastern redcedar, and green ash; they make up 73 percent of net volume of live trees (≥5 inches diameter at breast height [d.b.h.]) on forest land. Eastern cottonwood

remains at the top for volume and biomass, comprising 28 percent of total net volume and 23 percent of aboveground biomass. Eastern redcedar has surpassed ponderosa pine in terms of biomass and now ranks third.

Eastern redcedar has the largest number of trees and highest rate of net growth. Eastern cottonwood has the greatest mortality; it is much greater than that of Ponderosa pine. These two species are ranked first and second in terms of negative net growth. Most eastern cottonwood deaths were weather related, such as drought. Ponderosa pine has the greatest rate of harvest removals, followed by eastern redcedar and eastern cottonwood, respectively. Net growth of green ash was also negative; the most commonly recorded causes of death were disease and weather.

Table 2.—Number, volume, biomass, growth, mortality, and removals of live trees on forest land for the top 12 tree species by number, Nebraska, 2012-2017

Common Name	Latin Name	Million trees ^a	Net volume ^b (million ft ³)	Aboveground biomass ^a (thousand dry tons)	Average net growth ^b (thousand ft ³ /yr)	Average mortality ^b (thousand ft ³ /yr)	Average harvest removals ^b (thousand ft ³ /yr)
Eastern redcedar	<i>Juniperus virginiana</i>	155.0	221.9	5,048.3	9,624.4	1,974.0	1,817.8
Ponderosa pine	<i>Pinus ponderosa</i>	45.5	259.8	4,787.7	-4,220.3	8,338.0	3,284.3
Green ash	<i>Fraxinus pennsylvanica</i>	29.3	123.4	3,522.6	-714.5	4,130.7	584.6
Hackberry	<i>Celtis occidentalis</i>	29.3	87.5	2,207.8	2,813.3	1,256.6	105.5
Bur oak	<i>Quercus macrocarpa</i>	22.6	305.9	8,487.3	2,871.6	3,978.67	195.6
Red mulberry	<i>Morus rubra</i>	21.2	86.5	2,526.8	3,071.2	1,144.3	287.8
American elm	<i>Ulmus americana</i>	17.9	73.9	1,731.9	3,181.1	2,161.9	55.5
Eastern cottonwood	<i>Populus deltoides</i>	9.8	585.4	10,507.4	-4,991.7	18,351.7	1,106.1
Siberian elm	<i>Ulmus pumila</i>	6.1	42.7	1,106.6	2,450.9	193.5	26.6
Honeylocust	<i>Gleditsia triacanthos</i>	5.5	27.5	862.7	665.3	244.0	--
American basswood	<i>Tilia americana</i>	3.1	69.9	1,054.1	933.3	865.3	--
Black walnut	<i>Juglans nigra</i>	2.3	31.3	717.7	1,307.8	890.8	479.1

^a Trees ≥1-inch diameter ^b Trees ≥5-inches diameter

Note: Table cells without data are indicated by --

Eastern redcedar

Eastern redcedar (ERC) is a native conifer that has been widely planted in the Great Plains as a windbreak species due to its hardy nature and ability to grow under extreme climatic conditions. This ability has allowed it to expand rapidly and widely. The wood can be utilized for various products so knowing where and how much ERC is present in the state is helpful for utilization efforts.

The total net sawlog volume of sawtimber trees on timberland in Nebraska is estimated at more than 706 million cubic feet while the eastern redcedar estimate is about 11 million cubic feet, or 1.6 percent of the total volume. ERC sawtimber volume is distributed among seven forest types (Fig. 4). Of these, ERC is most prevalent in the eastern redcedar and eastern redcedar/hardwood forest types, making up 54 and 46 percent of the sawtimber volume, respectively. ERC

comprises less than 5% of the sawtimber volume in the remaining forest types. The map below (Fig. 5) depicts the approximate locations of plots where ERC trees (at least 9.0 inches d.b.h.) have been observed, including sawtimber and non-sawtimber quality trees, and their associated forest types. Most of these larger ERC trees are found in the eastern redcedar and eastern redcedar/hardwood forest types.

The estimate of total net merchantable bole volume of live trees (at least 5 inches d.b.h.) on forest land is more than 2 billion cubic feet and ERC makes up 11 percent of that volume, or nearly 222 million cubic feet. Thirty-nine percent of the ERC live-tree volume is made up of trees in the 5- and 7-inch diameter classes while 61 percent of the volume is contained in trees 9.0 inches d.b.h. or larger (Fig. 6).

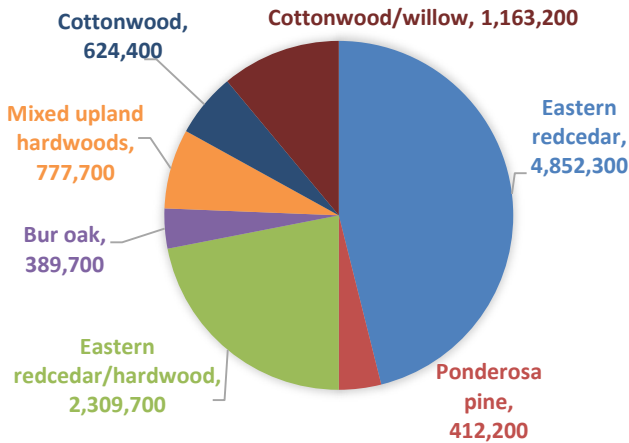


Figure 4.—Eastern redcedar sawtimber volume (ft³) by forest type, Nebraska, 2017.

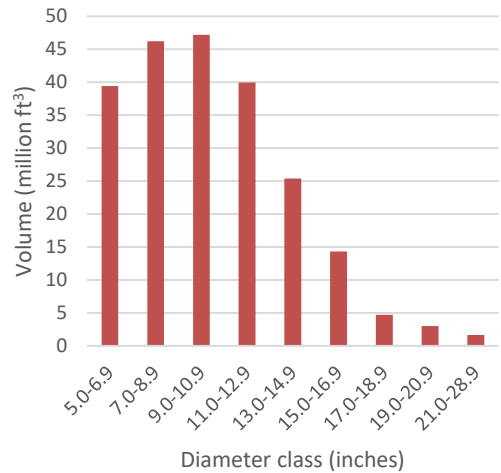


Figure 6.—Eastern redcedar live-tree (≥5.0 inches d.b.h.) volume by diameter class, Nebraska, 2017.

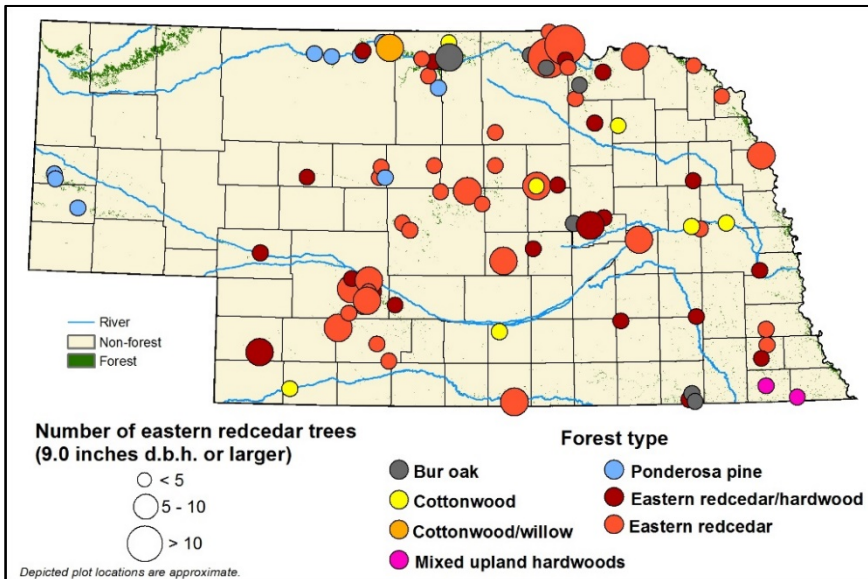


Figure 5.—FIA field plots with eastern redcedar trees (≥9.0 inches d.b.h.) present by forest type, Nebraska.

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.

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.

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