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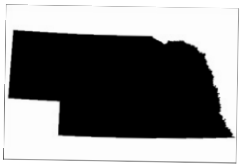
RESOURCE UPDATE FS-11



Forests of Nebraska, 2013

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) of the U.S. Forest Service. The estimates presented in this update are based on field data collected in 2009-2013 with comparisons made to data collected from 2004-2008. 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

Nebraska is home to 1.5 million acres of forest land, a gain of 16 percent since 2008 (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, number of trees, and net volume increased since 2008; however, net growth decreased due in part to higher mortality. Ponderosa pine had the highest mortality rate as a result of wildfires that have occurred in recent years.

Table 1.—Nebraska's forest statistics, 2013

	2013 estimate	Sampling error (%)	Change since 2008 (%)
Forest Land			
Area (thousand acres)	1,539	4.2	16
Number of live trees ≥1 in diameter (million trees)	399	7	15
Net volume of live trees ≥5 in diameter (million ft^3)	2,088	6.7	15
Live-tree aboveground biomass (thousand oven-dry tons)	46,331	6.2	16
Net growth of live trees ≥5 in (thousand ft^3/yr)	38,601	23.4	-23
Annual harvest removals of live trees ≥5 in (thousand ft^3/yr)	14,320	47.2	62
Annual other removals of live trees ≥5 in (thousand ft^3/yr)	37	102.5	-99
Annual mortality of live trees ≥5 in (thousand ft^3/yr)	42,678	16.7	71
Timberland			
Area (thousand acres)	1,413	4.5	15
Number of live trees ≥1 in diameter (million trees)	365	7.4	14
Net volume of live trees ≥5 in diameter (million ft^3)	1,975	7.1	16
Net volume of growing-stock trees ≥5 in diameter (million ft^3)	988	11	2.5
Live-tree aboveground biomass (thousand oven-dry tons)	43,580	6.5	17
Net growth of growing-stock trees ≥5 in (thousand ft^3/yr)	9,262	73	-32
Annual harvest removals of growing-stock trees ≥5 in (thousand ft^3/yr)	8,914	70.6	77
Annual other removals of growing-stock trees ≥5 in (thousand ft^3/yr)	11	102.5	-98
Annual mortality of growing-stock trees ≥5 in (thousand ft^3/yr)	20,615	28.1	31

Forest Area

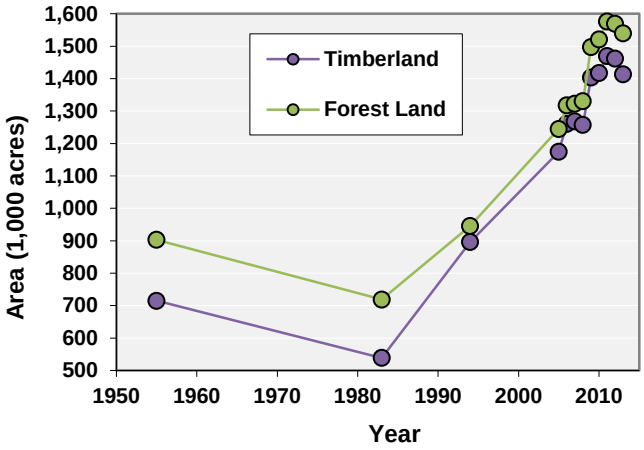


Figure 1.—Area of timberland and forest land by year, Nebraska, 1955-2013.

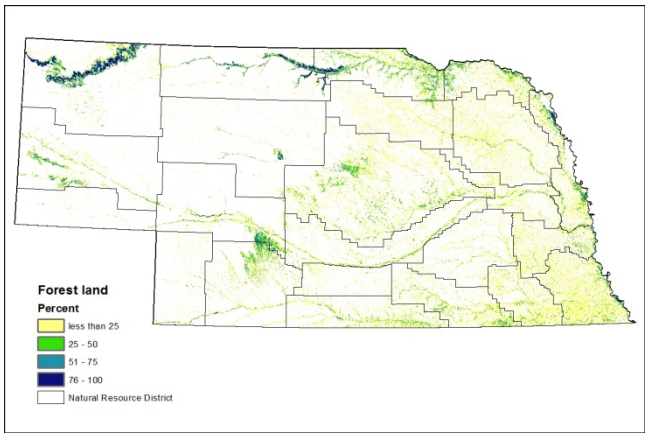


Figure 2.—Distribution of forest land, Nebraska, 2013.

Forest land in Nebraska had increased steadily since the 1980s but recently is showing signs of decreasing area (Fig. 1). Most forest land area 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 timberland 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.

Eastern redcedar (see Table 2 for scientific name of species) is the dominant forest type in Nebraska, gaining nearly 80,000 acres since 2008 (Fig. 3). Ponderosa pine occupies a similar amount of area, but this type experienced a decrease in area over the same time period. An assessment by stand-size class indicates that softwood regeneration is dominated by eastern redcedar with 68,000 acres of the eastern redcedar forest type classified as the sapling-seedling class. In fact, it is the only softwood forest type with any area classified as such. As for the hardwood forest types, 'other hardwoods' had the most area (~28,000 acres) classified as sapling-seedling; however, this forest type is a "catch-all" group for minor hardwood species. The other top hardwood forest types in terms of regeneration are the sugarberry/hackberry/elm/green ash and the eastern redcedar/hardwood types with nearly 18,000 and 15,000 acres in the sapling-seedling class, respectively. These four forest types were the top four in 2008 as well.

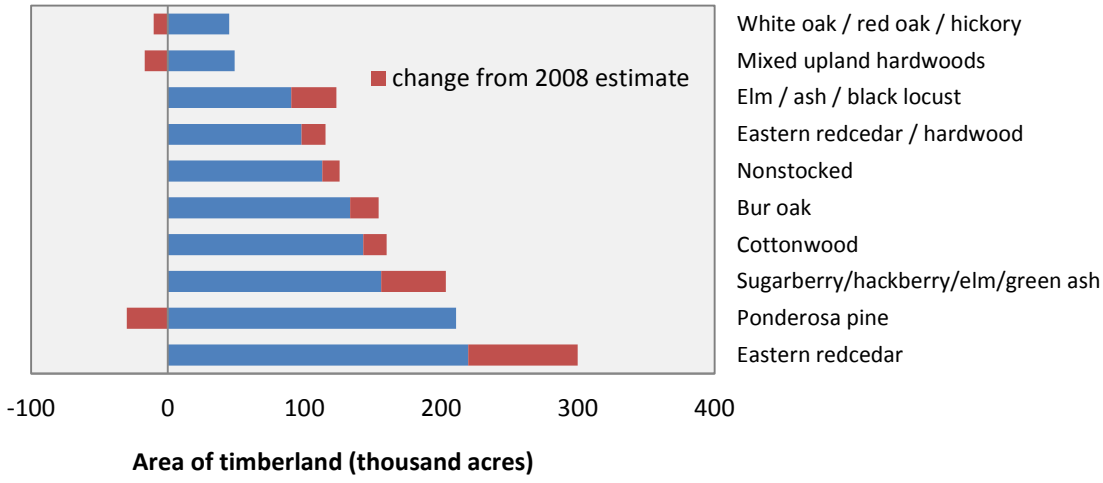


Figure 3.—Change in area of timberland by forest type, Nebraska, 2008-2013. The red portion of the bar indicates the amount of area gained or lost since 2008.

Volume, Biomass, and Trends

Nebraska's forests contain approximately 399 million live trees according to the 2013 inventory, about 51 percent of which are eastern redcedar and ponderosa pine. Although they are the most numerous, eastern redcedar and ponderosa pine comprise less than one-fourth of total aboveground biomass. Eastern redcedar is the most numerous tree by a large margin and comprises 38 percent of all live trees and ranks fourth in terms of volume and first in growth (Table 2). Ponderosa pine is the second most common tree species in Nebraska but wildfires have caused increased mortality, thus contributing to the negative net growth. It also had the second highest rate of harvest removals likely due to thinning operations.

Green ash, hackberry, red mulberry, and bur oak are the most common hardwood species and make up 30 percent of all live trees. While hackberry and red mulberry are many in terms of number of trees, they have relatively small volume, indicating that many of these trees are likely younger and smaller in size. Bur oak and eastern cottonwood together comprise forty-four percent of all net volume and forty two percent of all aboveground biomass. Eastern cottonwood, however, is an aging resource with the highest rates of mortality and harvest removals, and while these rates are lower for bur oak, it has an increased rate of mortality and decreased net growth rate compared to the 2008 estimates.

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, Nebraska, 2009-2013

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)
Eastern redcedar	*Juniperus virginiana*	152.0	211.5	4,843.8	12,947.6	586.9	547.1
Ponderosa pine	*Pinus ponderosa*	52.3	294.1	5,428.5	-7,469.8	9,098.8	1,838.9
Green ash	*Fraxinus pennsylvanica*	34.0	125.4	3,547.5	2,160.5	3,518.5	569.5
Hackberry	*Celtis occidentalis*	30.6	78.8	1,999.3	4,574.3	1,164.1	410.8
Red mulberry	*Morus rubra*	28.2	80.4	2,426.2	4,449.8	709.5	174.6
Bur oak	*Quercus macrocarpa*	25.5	306.9	8,538.5	6,784.7	3,260.8	431.0
American elm	*Ulmus americana*	14.9	62.8	1,468.6	2,374.3	2,789.3	58.5
Eastern cottonwood	*Populus deltoides*	10.0	609.4	10,938.7	4,110.9	12,583.7	6,287.0
Siberian elm	*Ulmus pumila*	7.2	48.0	1,249.7	3,643.9	240.6	--
Honeylocust	*Gleditsia triacanthos*	5.1	25.4	796.1	779.8	232.0	600.8
American basswood	*Tilia americana*	3.0	81.6	1,219.7	1,950.9	227.9	1,130.4
Black walnut	*Juglans nigra*	1.7	27.7	636.7	1,939.8	52.0	780.9

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

Tree Scene Investigation (TSI): Nebraska

Several tree species in Nebraska have experienced increased mortality in recent years due to extreme weather events and other environmental factors. Changes in tree species composition on FIA plots can lead to changes in forest type classification, a description of the main tree(s) species present in an area. According to the 2013 data, there have been some recent shifts in the various forest types present in Nebraska as well as a large loss of timberland. However, it is important to note here that the recent change in FIA's definition of 'reserved land' has resulted in a decrease in the estimated area of timberland and an increase in reserved lands. So, while it appears that Nebraska has lost about 48,000 acres of timberland since 2012, the actual loss is only around 28,000 acres; some of the timberland was simply reclassified as reserved land.

An assessment of field plot data collected from 2009 to 2013 reveals some noteworthy losses for several tree species and changes in forest type classification. Records for trees that were alive prior to 2013 were examined to gain information about what is causing mortality of Nebraska's trees. Examining the agent (i.e., cause of death) and disturbance codes on FIA plots can provide important information regarding the environmental and biological factors affecting particular tree species and help identify potentially serious issues and threats to Nebraska's forest resources.

Overall, silvicultural and/or land clearing activities were responsible for 43 percent of tree deaths and the species most affected were ponderosa pine, green ash, American elm, and bur oak. The next most common causes of death were harvest removals and unknown causes. The most commonly harvested species were eastern redcedar, red mulberry, green ash, and black walnut. American elm was the most affected by disease followed by bur oak and ponderosa pine. The most common cause of death for ponderosa pine was fire and is the leading cause of the high mortality rate for this species. Weather was responsible for nine percent of all tree deaths, most of which were due to flooding and affected a variety of hardwood species.

As for changes in forest types, the most commonly observed shifts occurred between 1) bur oak, eastern redcedar, and eastern redcedar/hardwood; 2) eastern redcedar and ponderosa pine; and 3) eastern redcedar and elm/ash/black locust. Losses in the bur oak forest type are likely due in part to some plots being reclassified as eastern redcedar and eastern redcedar/hardwood forest types. Forest types that shifted to the eastern redcedar type often occurred on plots classified as 'dry slopes' and 'deep sands' in terms physiographic class while shifts to the bur oak forest type occurred on 'rolling uplands.'

Definitions

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

Meneguzzo, D.M.; Crocker, S.J.; Nelson, M.D.; Barnett, C.J.; Butler, B.J.; Domke, G.M.; Hansen, M.H.; Hatfield, M.A.; Liknes, G.C.; Lister, A.J.; Lister, T.W.; Piva, R.J.; Wilson, B.T.; Woodall, C.W. 2012. **Nebraska's forests 2010**. Resour. Bull. NRS-68. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 47 p.

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Northern FIA: http://nrs.fs.fed.us/fia/
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