USDA
United States Department of Agriculture

RESOURCE UPDATE FS-93

Forests of West Virginia, 2015

Overview

This publication provides an overview of forest resources in West Virginia based on inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. For annual inventory years 2002-2013, the sample length was equal to 5 years. Beginning in 2014, the cycle length was changed to 7 years. For the 2015 inventory, estimates for current variables such as area, volume, and biomass are based on 2,398 plot samples collected from 2010-2015. Change variables, such as net growth, removals, and mortality, are based on 1,997 samples collected in 2006-2010 and resampled in 2010-2015. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005) and O'Connell et al. (2014) for definitions and technical details.

Currently, West Virginia is home to over 12 million acres of forest land (Table 1). Since the 1989 inventory, the estimate of forest land has been relatively stable (Fig. 1). However, the volume and biomass of trees has risen (Table 1). Average annual net growth, mortality, and removals have higher sampling errors, indicating higher uncertainty in trend estimates; however, the latest inventory shows a notable 21 percent decrease in average annual harvest removals on forest land since 2010 which highlights the impacts of the economic recession on timber harvesting (Table 1). During that same period, average annual mortality on forest land increased by 35 percent while average annual net growth decreased by 27 percent.

Table 1.—West Virginia forest statistics, 2015 and 2010. Volumes are for trees 5.0 inches and larger in diameter. Number of trees and biomass are for trees 1.0 inch and larger in diameter. Sampling errors and error bars shown in tables and figures in this report represent 68 percent confidence intervals.

	2015 Estimate	Sampling error (percent)	2010 Estimate	Sampling error (percent)	Change since 2010 (percent)
Forest Land					
Area (thousand acres)	12,078	0.6	12,135	0.7	-0.5
Number of live trees (million trees)	6,229	1.6	6,305	1.7	-1.2
Aboveground biomass of live trees (thousand oven-dry tons)	829,537	1.1	799,546	1.1	3.8
Net volume of live trees (million ft^3)	28,700	1.1	27,581	1.2	4.1
Annual net growth of live trees (thousand ft^3/yr)	497,794	4.2	684,193	5.8	-27.2
Annual mortality of trees (thousand ft^3/yr)	294,860	4.9	218,522	9.5	34.9
Annual harvest removals of live trees (thousand ft^3/yr)	196,265	12.2	247,269	19	-20.6
Timberland					
Area (thousand acres)	11,707	0.7	11,769	0.8	-0.5
Number of live trees (million trees)	6,026	1.7	6,097	1.7	-1.2
Aboveground biomass of live trees (thousand oven-dry tons)	799,807	1.2	771,881	1.2	3.6
Net volume of live trees (million ft^3)	27,609	1.2	26,593	1.3	3.8
Net volume of growing stock trees (million ft^3)	25,560	1.3	25,074	1.3	1.9
Annual net growth of growing stock trees (thousand ft^3/yr)	452,645	3.7	614,082	5.4	-26.3
Annual mortality of growing stock trees (thousand ft^3/yr)	213,657	5.5	158,790	11	34.6
Annual harvest removals of growing stock trees (thousand ft^3/yr)	165,913	12.4	210,660	19.2	-21.2

Forest Area

West Virginia's area of forest land has been relatively stable since the late 1980s (Fig. 1). Timberland accounts for 97 percent of this forest land or 11.7 million acres. Less than 3 percent of forest land is reserved from timber production and less than 0.1 percent is other forest land identified as not being able to meet minimum productivity standards. West Virginia's total area is 15.5 million acres.

The State is subdivided into four FIA inventory units. The Northeastern Unit has the highest area of forest land at 4.3 million acres, and all units have a proportion of land in forest over 74 percent (Fig. 2). The Northeastern Unit has more than triple the proportion of forest land in public ownership (24 percent) than the Southern Unit (8 percent) and more than six times than the Northwestern Unit (4 percent).

Oak/hickory is the dominant forest-type group, covering 74 percent of the forest land (Fig. 3). In fact, the oak/hickory type group makes up over 50 percent of the forest land area in all but five counties in the State.

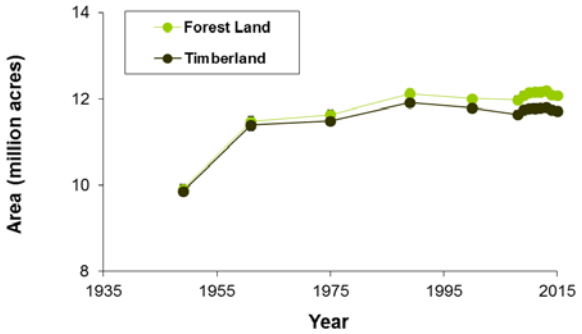

Figure 1.—Forest land and timberland by year, West Virginia.

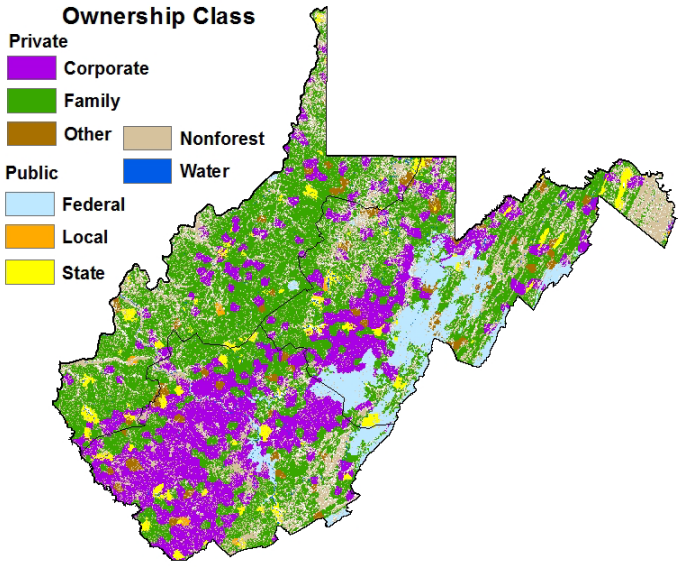

Figure 2.—FIA unit boundary and distribution of forest land by owner class, West Virginia.

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Pitch/Virginia pine is the most abundant softwood forest-type group. It accounts for nearly 2 percent of the forest land in the State.

The maple/beech/birch forest-type group, which is more widely distributed in the Northeastern Unit, has the highest proportion of area in public ownership of all major forest-type groups. Families and individuals, corporations, and other private entities own most of forest land (52, 34, and 1 percent, respectively). The U.S. Forest Service, state of West Virginia, and other public entities own the remainder (9, 3, and 2 percent, respectively).

West Virginia's forests have been maturing as illustrated in the distribution of timberland by stand-size classes (Fig. 4). Since the 1975 inventory, the acreage of large diameter stands has been steadily increasing. The acreage of small and medium diameter stands has been declining since the 1989 inventory.

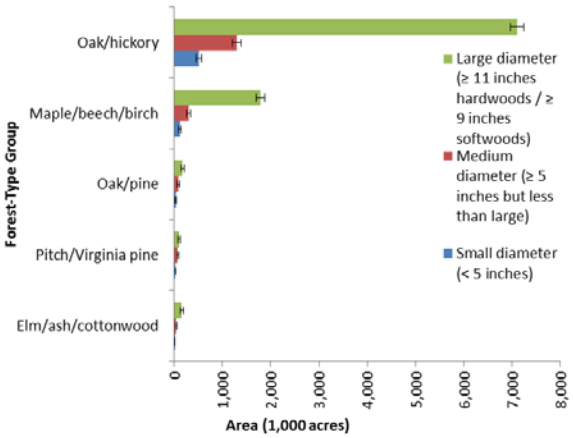

Figure 3.—Forest land by stand-size class for top five forest-type groups by acres, West Virginia, 2015.

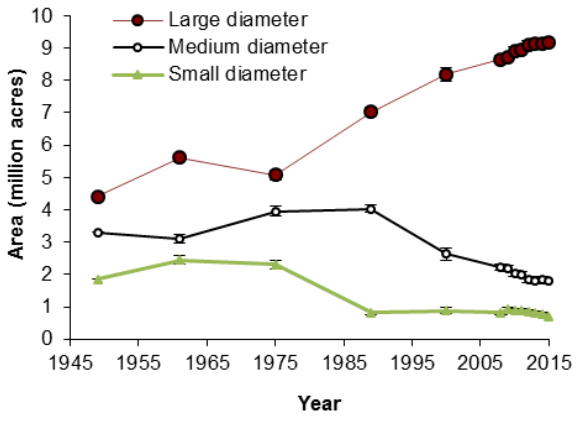

Figure 4.—Timberland by stand-size class and year, West Virginia.

Volume, Biomass, and Trends

Increases in volume, biomass, and number of large-diameter trees have accompanied the increase in area of large-diameter stands in West Virginia. Volume increased 4.1 percent and biomass increased by 3.8 percent since the 2010 inventory (Table 1).

The impact of the emerald ash borer (*Agrilus planipennis*) on ash trees in the State is beginning to show up in the mortality numbers for ash species. Average annual mortality has exceeded average annual net growth for ash species (Table 2).

In terms of volume, yellow-poplar (*Liriodendron tulipifera*) has increased nearly tenfold since 1949. It is currently well distributed across most of West Virginia, but it occurs at the highest densities in the Cumberland and Allegheny Mountain regions (Fig. 5).

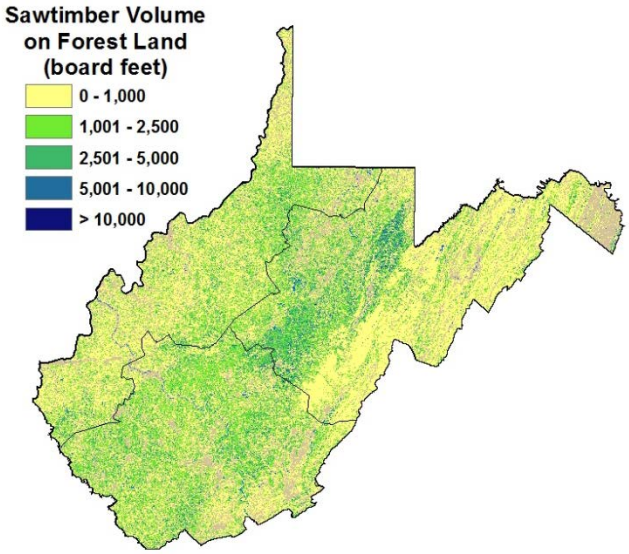

Figure 5.—Per-acre sawtimber volume of yellow-poplar for trees at least 5-inches d.b.h., West Virginia, 2009.

The proportion of hardwood volume in West Virginia that is yellow-poplar has increased from 8 percent to 17 percent since 1949. Due to the fast growth rate and tall, straight form exhibited by yellow-poplar, the increase in the proportion of hardwood sawtimber that is yellow-poplar is even more striking (Fig. 6). These volume increases have occurred despite the fact that yellow-poplar accounts for over one-quarter of industrial roundwood harvest in the State (Morin et al. 2016).

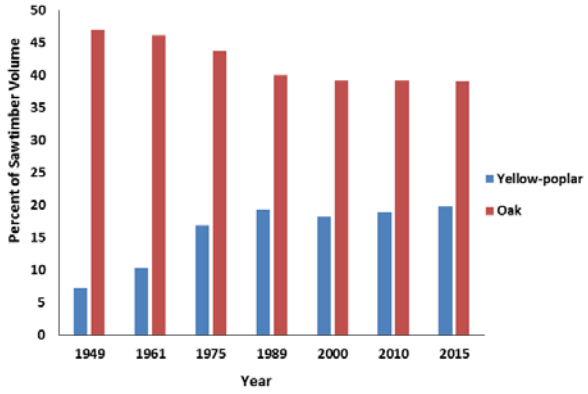

Figure 6.—Percent of hardwood sawtimber volume in yellow-poplar and oak species by year, West Virginia.

Yellow-poplar flower. Photo by Randall Morin, U.S. Forest Service.

Table 2.—Number, net volume, oven-dry biomass, net growth, mortality, harvest removals, and growth-to-harvest removals ratio of trees on forest land, West Virginia, 2015 (selected prominent species)

Species	Trees[a] (millions)	Net volume[a] (million ft^3)	Aboveground biomass[b] (thousand tons)	Net growth[a] (thousand ft^3/yr)	Mortality[a] (thousand ft^3/yr)	Harvest removals[a] (thousand ft^3/yr)	Growth/ harvest removals ratio
Red maple	239	2,692	75,590	62,209	15,218	13,416	4.6
Sugar maple	165	2,018	67,712	49,873	15,975	17,538	2.8
Chestnut oak	151	2,714	87,907	45,372	14,003	12,635	3.6
Yellow-poplar	149	4,302	89,537	109,831	23,933	37,815	2.9
White oak	117	2,378	76,677	38,890	19,662	17,192	2.3
Hickory spp.	127	2,343	64,414	35,223	13,022	8,418	4.2
American beech	74	1,028	33,254	-2,482	18,193	5,444	-0.5
Northern red oak	70	2,294	73,271	46,506	22,485	16,276	2.9
Black cherry	59	1,204	30,648	28,341	6,102	7,201	3.9
Black birch	50	506	17,267	5,929	6,432	3,851	1.5
Ash spp.	45	782	23,416	11,130	11,600	1,687	6.6

[a] Trees at least 5 inches in diameter. [b] Trees at least 1 inch in diameter.

Yellow-Poplar Weevil

The yellow-poplar weevil is a native pest that generally doesn't have major impacts. However, when populations reach outbreak levels, the weevils can destroy leaves and buds and even defoliate entire trees. Growth, form, and vigor of trees can be impacted, and if combined with other factors, such as drought, trees can be vulnerable to other insects or diseases (Burns 1971).

During the summer of 2015 yellow-poplar weevil (*Odontopus calceatus*) defoliated trees across much of West Virginia. Nearly 600,000 acres of yellow-poplar weevil defoliation were mapped during insect and disease surveys conducted by the West Virginia Department of Agriculture (Fig. 7).

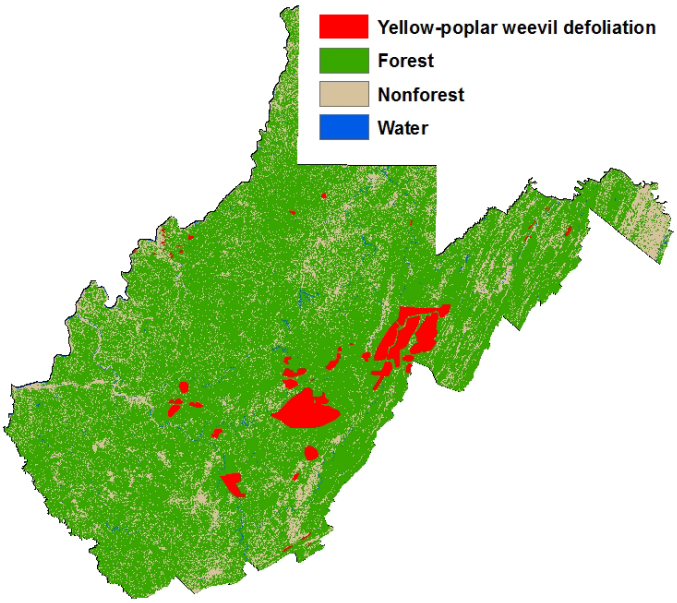

Figure 7.—Yellow-poplar weevil defoliation, 2015. Data source: west Virginia Department of Agriculture.

It remains to be seen whether the recent outbreak of yellow-poplar weevil will have a negative impact on the health of yellow-poplar trees in the State. According to current estimates, the annual mortality rate for yellow-poplar is lower than the rate for all species (Fig. 8). Mortality rates are similar on public and private land. The status of this important species needs continued monitoring.

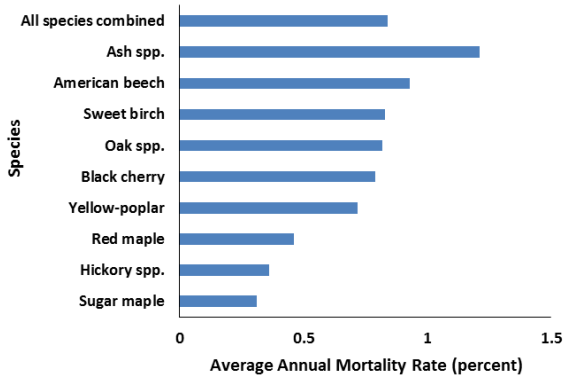

Figure 8.—Average annual mortality rate for select species (computed as the proportion of annual mortality trees to live trees), West Virginia, 2015.

Yellow-poplar weevil adult. Photo by West Virginia Department of Commerce, used with permission.

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