USDA
United States Department of Agriculture

RESOURCE UPDATE FS-22

Forests of West Virginia, 2013

This publication provides an overview of the forest resources in West Virginia based upon inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. Information about the FIA program is available online at http://fia.fs.fed.us. Since 2004, FIA has implemented an annual inventory in West Virginia. For the 2013 inventory, estimates for current variables, such as forest area, volume, and biomass, are based on 2,370 plots (both forested and nonforest) inventoried from 2009-2013. Change variables, such as net growth, removals, and mortality, are based on 2,096 plots collected in 2004-2008 and resampled in 2009-2013. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005) and O'Connell et al. (2013) for definitions and technical details.

Overview

West Virginias's forest land area totals 12.2 million acres and occupies 79 percent of the State's land area (Table 1). Since 2008, there has been a 1.8 percent increase in forest land. Ninety-six percent of West Virginia's forest land, 11.8 million acres, is classified as timberland, 304,000 acres is classified as reserved, and 74,000 acres as forest land low in productivity. The most recent inventory shows that the net volume of trees continued to increase, and the annual net growth in volume continued to outpace annual removals. Average annual removals on timberland over the current 5-year period decreased by nearly a third from the previous 5-year average, reflecting the downturn in the economy that occurred after 2008.

Table 1.—West Virginia forest statistics, 2013 and 2008. Volumes are for 5-inch and larger diameter trees. Numbers of trees and biomass are for 1-inch and larger diameter trees. Sampling errors and error bars shown in tables and figures in this report represent 68 percent confidence intervals.

	2013 Estimate	Sampling error (percent)	2008 Estimate	Sampling error (percent)	Change since 2008 (percent)
Forest Land					
Area (thousand acres)	12,186	0.6	11,974	0.7	1.8
Number of live trees (million trees)	6,315	1.6	6,196	1.6	1.9
Aboveground biomass of live trees (thousand oven-dry tons)	823,829	1.1	785,496	1.1	4.9
Net volume of live trees (million ft^3)	28,434	1.1	27,103	1.2	4.9
Annual net growth of live trees (thousand ft^3/yr)	578,102	3.8	693,366	2.4	-16.6
Annual mortality of live trees (thousand ft^3/yr)	263,065	5.1	219,451	4.5	19.9
Annual harvest removals of live trees (thousand ft^3/yr)	226,540	12.1	332,203	8.5	-31.8
Annual other removals of live trees (thousand ft^3/yr)	13,421	41.5	13,906	27.2	-3.5
Timberland		0.0	0	0.0	0.0
Area (thousand acres)	11,807	0.7	11,626	0.8	1.6
Number of live trees (million trees)	6,107	1.6	6,001	1.7	1.8
Aboveground biomass of live trees (thousand oven-dry tons)	793,627	1.1	758,805	1.2	4.6
Net volume of live trees (million ft^3)	27,330	1.2	26,150	1.3	4.5
Net volume of growing-stock trees (million ft^3)	25,404	1.3	24,799	1.3	2.4
Annual net growth of growing-stock (thousand ft^3/yr)	518,651	3.5	602,252	2.3	-13.9
Annual mortality of growing-stock trees (thousand ft^3/yr)	190,502	5.8	166,528	4.8	14.4
Annual harvest removals of growing-stock trees (thousand ft^3/yr)	193,202	12.2	283,459	8.6	-31.8
Annual other removals of growing-stock trees (thousand ft^3/yr)	48,121	24.7	55,285	21.4	-13.0

Forest Area

Successive annual inventories have shown forest land area increasing, although since 1989 there has been only a slight increase in forest land (Fig.1). Across the State, losses of forest land due to development have been more than offset by gains in forest land because of abandoned farmland and reclaimed surface mines reverting to forest. Because of ongoing development and a slowing in farmland losses, recent changes in total forest land have been small. These trends may indicate that the area of forest land in West Virginia is near a peak. Future changes in forest land will depend on the pace of land development and to a great extent on the economics of farming and mining. Because forests cover much of the State, much of the development that does occur is likely to affect forest land area.

Eighty-seven percent of West Virginia's forests are privately owned (10.6 million acres; Fig. 2). These ownerships include families and individuals, corporations, and other private entities. The remaining 13 percent (1.6 million acres) is in public ownership. The largest public ownership is National Forest which holds over 1 million acres of forest land, followed by the State and local government with 369,000 acres.

West Virginia's forests have been maturing as can be seen in the distribution of timberland by stand-size classes (Fig. 3). Since the 1975 inventory, acreage of large-diameter stands has been increasing while the area of small and medium diameter stands has been decreasing. Acreage in large diameter stands now accounts for 78 percent of timberland whereas the area in medium diameter is 15 percent and small diameter stands is 7 percent.

Oak/hickory is the most the abundant forest-type group, occupying 74 percent of forest land (Fig. 4). Since the 2008 inventory, the proportions of forest land occupied by the oak/hickory and maple/beech/birch forest-type groups by the oak/hickory and maple/beech/birch forest-type groups have changed by less than 1 percent.

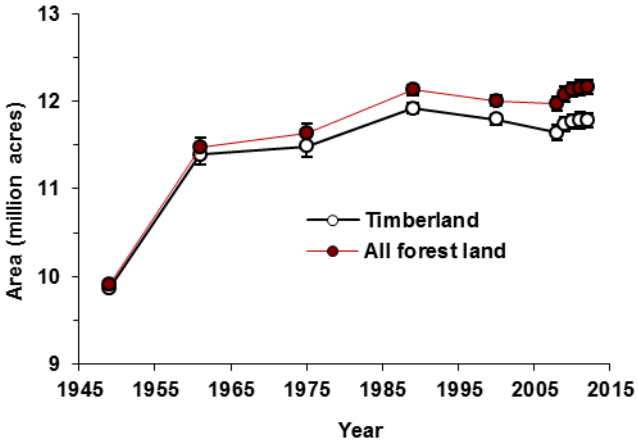

Figure 1.—Forest land and timberland by year, West Virginia

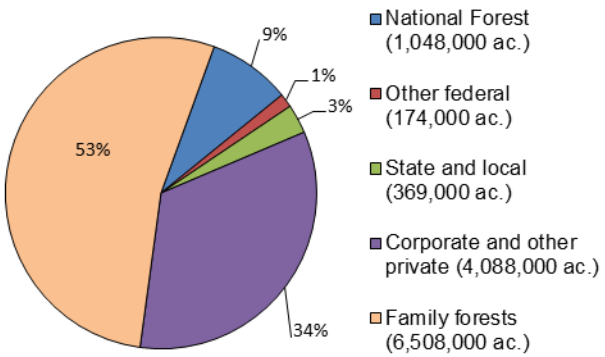

Figure 2.—Forest land ownership, West Virginia, 2013

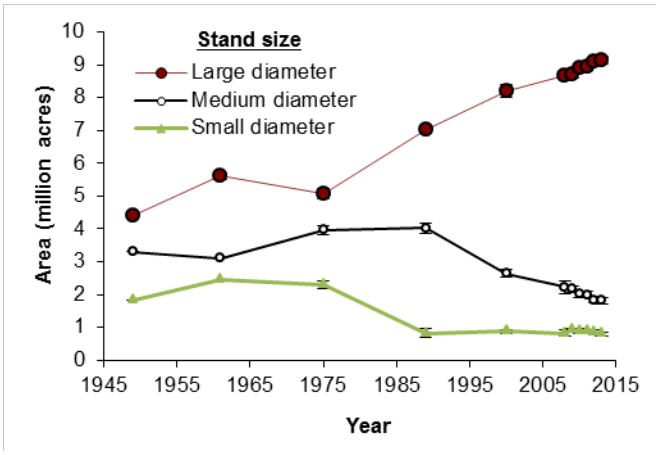

Figure 3.—Timberland area by stand-size class and year, West Virginia. Error bars represent 68-percent confidence intervals.

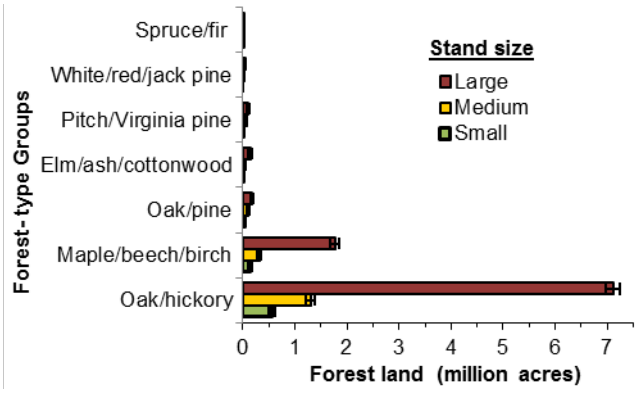

Figure 4.—Forest land area by stand-size class (based on small, medium, and large trees) for the top seven forest-type groups by acres, West Virginia, 2013.

Volume, Biomass, and Trends

Across all forest land, the net volume of trees increased by 4.9 percent since 2008, to 28.4 billion cubic feet. Yellow-poplar continued to be the most voluminous species followed by chestnut oak, red maple, and white oak (Table 2). Changes in volume since 2008 differed between species. The top three species exhibited increases in net volume larger than the average increase for all species. Chestnut oak, red maple, and yellow-poplar, increased by 9.6, 8.0, and 6.7 percent respectively; while beech increased by only 0.9 percent and black oak decreased by 0.4 percent.

Sawtimber volume on timberland increased by 5.9 percent to 92.2 billion board feet. Yellow-poplar is the leading sawtimber species by volume, followed by northern red oak, white oak, and chestnut oak. Since 2008, sawtimber volume of chestnut oak, black cherry, and red maple, increased by 13.2, 12.8 and 10.8 percent, respectively.

There was 824 million dry tons of aboveground biomass of live tress on forest. This was a 4.9 percent increase since 2008. Seventy-one percent of the live tree biomass is in the merchantable boles of timber species trees on timberland. Aboveground biomass on timberland averaged 67 dry tons per acre.

In terms of average annual growth and removals on timberland, yellow-poplar and red maple experienced the largest annual growth in volume since 2008, and yellow-poplar followed by white oak had the largest removals (Fig. 5). Yellow-poplar alone accounts for 21 percent of the growth and 22 percent of removals.

Annual growth outpaced total removals by a ratio of 2.1:1 from 2008 to 2013 Ratios varied considerably between species: red maple and ash species had a growth to removals ratio of 4.5:1, whereas the ratio for white oak was 1.6:1 and black/scarlet oak 0.8:1. As a percentage of current volume, annual mortality averaged 0.9 percent on timberland. Black/scarlet oak and beech had the highest mortality rates, averaging 1.6 and 1.3 percent per year; red maple, chestnut oak, and yellow-poplar had low rates of mortality, each averaging 0.5 percent per year.

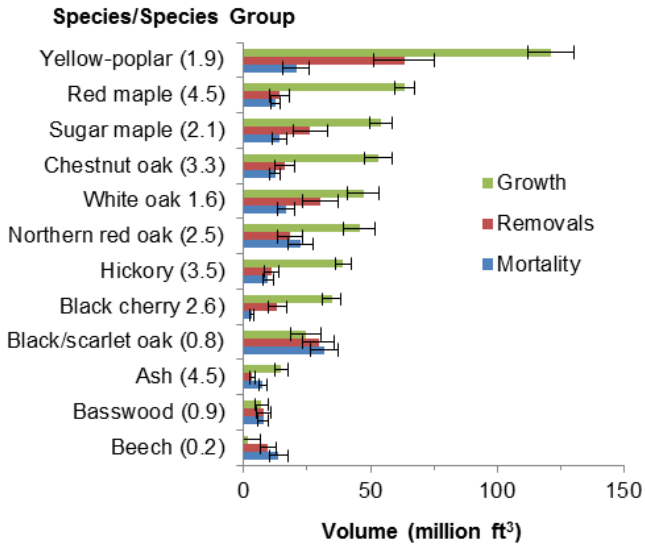

Figure 5.—Average annual net growth, removals, and mortality of net sound volume on timberland, and growth-to-removals ratio (G/R), West Virginia, 2008-2013. Error bars represent 68-percent confidence intervals.

Table 2.—Net volume, and percent change in net volume on forest land; sawtimber volume and percent change on timberland, and biomass on forest land, West Virginia, 2013, (top ten species by net volume).

Species	Volume of live trees on forest land (million ft^3)	Sampling error (percent)	Percent change since 2008	Volume of sawtimber trees on timberland (million bd.ft.)	Sampling error (percent)	Percent change since 2008	Aboveground biomass on forest land (million tons)	Sampling error (percent)
Yellow-poplar	4,156	4.2	6.7	16,846	4.8	7.1	87	4.1
Chestnut oak	2,639	4.5	9.6	8,497	5.3	13.2	85	4.5
Red maple	2,637	3.6	8.0	6,387	5.0	10.8	74	3.3
White oak	2,377	4.6	1.2	8,771	5.5	3.5	77	4.6
Northern red oak	2,242	4.9	4.7	9,667	5.8	6.4	72	4.9
Sugar maple	2,012	4.4	6.3	5,316	6.2	4.9	68	4.2
Black oak	1,195	5.8	-4.2	4,713	7.1	-6.3	37	5.8
Black cherry	1,142	7.3	11.7	3,589	9.8	12.8	29	7.0
American beech	1,072	6.4	0.9	3,427	8.8	0.2	34	6.0
Pignut hickory	831	6.0	5.4	2,541	7.6	8.5	30	5.9
Softwood species	1,539	5.9	8.8	4,378	7.7	6.2	31	5.7
Other hardwoods	6,591	2.3	2.3	18,070	3.4	4.2	201	2.2
All species	28,434	1.1	4.9	92,201	1.7	5.9	824	1.1

Characteristics of West Virginia's Family Forest Owners

The National Woodland Owner Survey (NWOS), conducted by the USDA Forest Service's Forest Inventory and Analysis program, studies private forest landowners' attitudes, management objectives, and concerns (Butler 2008). The NWOS has most recently focused on family forest owners with 10 acres or more of forest land. The NWOS (2011-2013) found that there are an estimated 101,000 family forest owners holding 10 acres or more of forest land, totaling 6.1 million acres of forest land in West Virginia. This represents 58 percent of privately owned forest land in the State. Focusing on these 101,000 family forest ownerships with 10+ acres, the NWOS found they have the following characteristics listed in Table 3. The low priority given by landowners to timber production does not mean that landowners will not harvest trees. The relatively high number of owners that actually harvest trees means that when conditions are right, many landowners will harvest trees, although the low priority and lack of written management plans suggests that these harvests are not part of a long-term management plan. Owners tended to be fairly old and many have owned their land for decades.

Because over half of West Virginia's forest land is held by thousands of private landowners, decisions by these owners will have a great influence on West Virginia's future forest. More information on the NWOS can be found at: http://www.fia.fs.fed.us/nwos/

Table 3.—Summary of responses to the National Woodland Owner Survey, family forest land ownerships with 10+ acres in West Virginia, 2011-2012

Owner:	Owners (percent)	Acres (percent)
Uses woodland property as primary residence.	62	57
Is retired.	57	58
Is 55 years old or older.	78	82
Is 65 years old or older.	46	50
Has owned land for more than 25 years.	42	49
Has an annual income below $100,000.	82	76
Receives no annual income from woodland owned.	91	81
Has posted land to restrict public access.	61	72
Plans to improve wildlife habitat in next 5 years.	40	48
Wants their wooded land to stay wooded.	79	81
Is likely or extremely likely to give away land in the next 5 years. *	12	14
Felt getting advice on how to transfer land to next generation would be helpful or very helpful .*	42	44
Felt that timber production was an important or very important reason for owning forest land.*	24	32
Has cut trees for commercial reasons.	38	48
Has cut trees for personal use.	51	55
Has cut or removed trees for sale in past 5 years.	10	20
Has cut or removed trees for own use in past 5 years.	35	35
Plans to cut trees for sale in next 5 years.	13	21
Plans to cut trees for own use in next 5 years.	39	38
Has not received forest management advice.	88	82
Has a written management plan.	13	20
Is not familiar with cost share programs.	76	67
Is not familiar with forestry related tax programs.	86	76
Felt getting advice on woodland management would be helpful or very helpful. *	46	45
Felt getting advice on more favorable tax policies would be helpful or very helpful.*	59	62

*includes two highest responses on a five-point Likert scale.

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How to Cite This Publication

Widmann, Richard H. 2014. **Forests of West Virginia, 2013**. Resource Update FS-22. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.
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