

Pennsylvania's Forest Resources, 2011

Research Note NRS-157

This publication provides an overview of forest resource attributes for Pennsylvania based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) program at the Northern Research Station of the U.S. Forest Service. These annual estimates, along with web-posted core tables, will be updated annually. For more information please refer to page 4 of this report.

Table 1.—Annual estimates, uncertainty, and change.

	Estimate (2011)	Sampling error (%)	Change(%) since 2006
Forest Land Estimates			
Area (1,000 acres)	16,782	0.7	1.1
Number of live trees > 1-inch diameter (million trees)	8,166	1.7	-3.2
Dry biomass of live trees > 1-inch diameter (1,000 tons)	1,044,899	1.0	4.9
Net volume of live trees > 5-inch diameter (million ft ³)	36,587	1.1	5.3
Annual net growth of live trees > 5-inch diameter (1,000 ft ³ /year)	872,877	3.0	2.1
Annual mortality of live trees (1,000 ft ³ /year)	335,341	4.1	11.5
Annual harvest removals of live trees (1,000 ft ³ /year)	398,856	7.2	-1.6
Annual other removals of live trees (1,000 ft ³ /year)	11,565	28.7	-66.9
Timberland Estimates			
Area (1,000 acres)	16,241	0.8	1.0
Number of growing-stock trees > 5-inch diameter (million trees)	7,955	1.7	-3.5
Dry Biomass of live trees > 1-inch diameter (1,000 tons)	1,009,147	1.1	4.6
Net volume of live trees > 5-inch diameter (million ft ³)	35,320	1.2	4.9
Net volume of growing-stock trees (million ft ³)	32,431	1.2	2.0
Annual net growth of growing-stock trees (1,000 ft ³ /year)	752,639	3.1	-2.0
Annual mortality of growing-stock trees (1,000 ft ³ /year)	247,629	4.6	14.7
Annual harvest removals of growing-stock trees (1,000)	340,253	7.2	0.2
Annual other removals of growing-stock trees (1,000 ft ³ /year)	37,230	27.2	-52.3

Note: When available, sampling errors and bars provided in the figures and tables represent a 68 percent confidence interval.

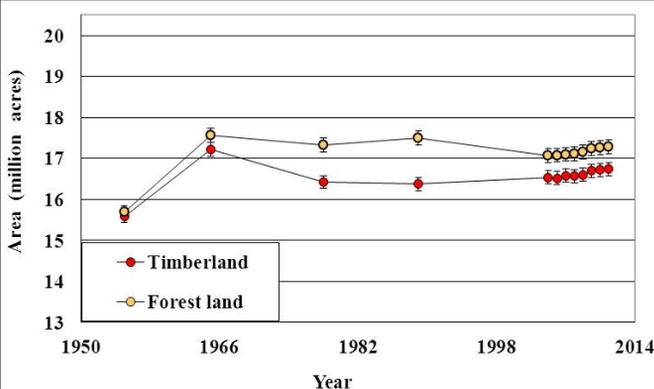


Figure 1.—Area of forest land and timberland by year.

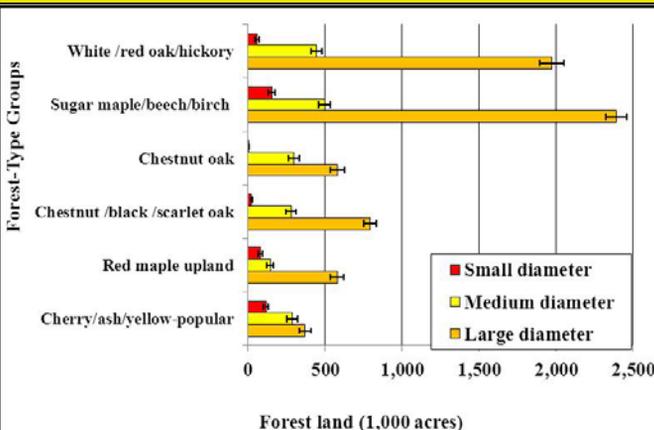


Figure 2.—Area of forest land by size class and top six forest types.

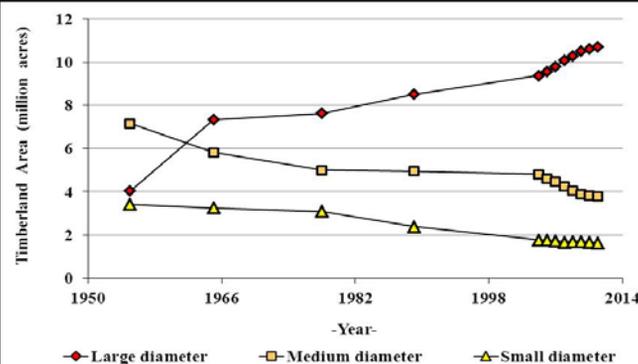


Figure 3.—Area of timberland by stand size class and year.



Table 2.—Top 10 species by statewide volume estimates 2011.

Rank	Species	Volume of live trees on forest land (million ft ³)	Sampling error (%)	Change (%) since 2006	Volume of sawtimber trees on timberland (million bdf)	Sampling error (%)	Change (%) since 2006
1	Red maple	6,696.8	2.6	3.3	16,331.4	3.8	10.4
2	Black cherry	3,980.0	4.0	10.2	12,615.0	5.3	13.2
3	Northern red oak	3,550.7	3.9	6.2	14,085.7	4.5	10.4
4	Sugar maple	2,660.8	4.8	6.7	7,935.7	6.0	14.5
5	Chestnut oak	2,539.5	4.3	-1.7	6,852.0	5.2	2.9
6	Eastern hemlock	1,845.6	5.8	4.7	5,302.9	6.7	6.4
7	White ash	1,727.7	5.1	4.9	5,237.2	6.8	3.0
8	Yellow-poplar	1,709.2	7.8	11.6	7,400.4	8.7	18.7
9	White oak	1,625.8	5.3	2.2	5,426.9	6.6	5.9
10	Sweet birch	1,541.5	4.6	7.7	2,880.3	6.6	10.2
	Other hardwoods	1,648.5	6.6	6.5	5,297.5	7.6	9.3
	Other softwoods	7,060.7	2.3	4.9	19,324.2	3.3	10.7
	All species	36,586.8	1.1	5.3	108,689.0	1.6	10.2

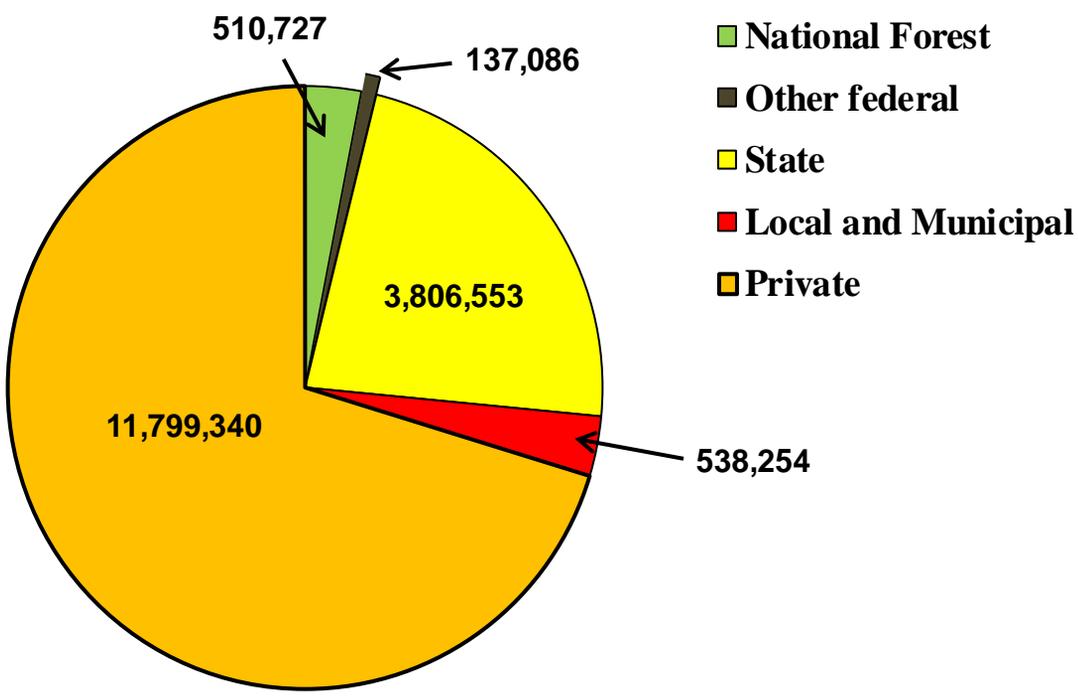
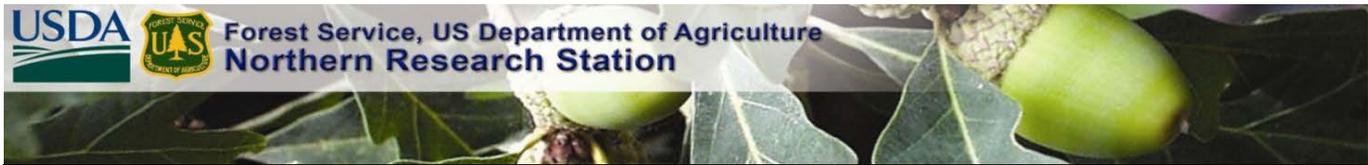


Figure 4.—Area of forest land (acres) by major owner group, 2011.



Chestnut Oak Dynamics

Chestnut oak (*Quercus prinus*) is the second most prominent oak in Pennsylvania containing 2.54 billion cubic feet. The species grows on mesic rolling uplands and on drier slopes and ridges. It can out-compete the other oaks on the more xeric ridge tops (Collins and Carson 2004). The species is commonly found with scarlet oak and black oak on the drier rockier ridge tops; and with red oak, white oak, and pignut hickory on the more mesic sites (Iverson et al. 2008). The species stocking is primarily concentrated in the chestnut oak, and the chestnut oak-black oak-scarlet oak, forest types. Lower concentrations are found in the white oak-red oak-hickory, white oak, and the yellow-popular-white oak-northern red oak, forest types.

In comparison to the other associate oak species, chestnut oak has a higher level of mortality while being exposed to many of the same stressors (Table 3).

Table 3. Chestnut versus other oaks in volume, net growth, and mortality (cubic feet) for all live trees ≥ 5 inches diameter at breast height (d.b.h.) in Pennsylvania, 2011.

Attribute	Northern red oak	Chestnut oak	White oak	Black oak	Scarlet oak
Volume (ft ³)	3,550,735,661	2,539,497,258	1,625,832,328	951,565,112	457,881,672
Net growth (ft ³)	98,601,843	29,507,390	33,981,833	27,635,606	12,692,290
Mortality(ft ³)	22,119,154	29,976,492	11,835,018	6,682,783	5,631,641
Net growth / volume (%)	2.8	1.2	2.1	2.9	2.8
Mortality / volume (%)	0.6	1.2	0.7	0.7	1.2
Mortality / Net growth (%)	22.4	101.6	34.8	24.2	44.4

One of the common stressors to the oaks is the gypsy moth (*Lymantria dispar* L.), an introduced defoliator of oak forests. Gypsy moths has the ability to change the stand composition away from oak dominance (Rieske 2002). During the 2005-2009 period, gypsy moth defoliation coupled with drought and attacks by two secondary pests, two-lined chestnut borer and Armillaria root rot, had major impacts. Research needs to be conducted to determine if this insect prefers chestnut oak over the other oak species; or is this mortality due to a combination of stressors including forces of succession?

There are treatments which benefit oaks while inhibiting gypsy moth. Prescribed fire can be an effective tool at reducing the insect's effects while improving oak regeneration. Midstory thinnings can also improve stand regeneration on less rocky sites (Iverson et al. 2008).



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FIA Program Information

Bechtold, W.A.; Patterson, P.L. 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.

Marquis, David A., ed. 1994. **Quantitative silviculture for hardwood forests of the Alleghenies**. Gen. Tech. Rep. NE-183. Radnor, PA: U.S. Department of Agriculture Forest Service, Northeastern Forest Experiment Station. 143 p.

Smith, W.B. 2002. **Forest inventory and analysis: a national inventory and monitoring program**. Environmental Pollution. 116: 233-242.

USDA Forest Service. 2009. **Forest inventory and analysis national core field guide, Vol. 1, field data collection procedures for Phase 2 plots, Ver. 5.0**. Available at www.fia.fs.fed.us/library/field-guides-methods-proc (verified July 2009).

Additional Pennsylvania Inventory Information

Alerich, Carol A. 1993. **Forest statistics for Pennsylvania--1978 and 1989**. Res. Bull. NE-126. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 244 p.

Widmann, Richard H. 1995. **Forest Resources of Pennsylvania**. Res. Bull. NE-131. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 41 p.

McWilliams, William H.; Cassell, Seth P.; Alerich, Carol L.; Butler, Brett J.; Hoppus, Michael L.; et al. 2007. **Pennsylvania's Forest, 2004**. Resour. Bull. NRS-20. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 86 p.

Additional Information

Collins, R.J.; Carson, W.P. 2004. **The effects of environment and life stage on *Quercus* abundance in the eastern deciduous forest, USA: are sapling densities most responsive to environmental gradients?** Forest Ecology and Management. 201:241-258.

Iverson, L.R.; Hutchinson, T.F.; Prasad, A.M.; Peters, M.P. 2008. **Thinning, fire, and oak regeneration across a heterogeneous landscape in the eastern U.S.: 7-Year results**. Forest Ecology and Management. 255: 3035-3050.

Rieske, L.K. 2002. **Wildfire alters oak growth, foliar chemistry, and herbivory**. Forest Ecology and Management. 168: 91-99.

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