



Vermont's Forest Resources, 2006

Research Note NRS-16

This publication provides an overview of forest resource attributes for Vermont 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 regarding past inventory reports for this state, inventory program information, and sampling/estimation procedures, please refer to the citations at the end of this report.

Table 1 - Annual estimates, uncertainty, and change

	Estimate	Sampling error (%)	Change since 2005 (%)
Forest Land Estimates			
Area (1,000 acres)	4,570.7	1.2	-0.2
Number of live trees 1 inch diameter or larger (million trees)	3,498.1	3.1	1.9
Dry biomass of live trees 1 inch diameter or larger (1,000 tons)	298,383.0	1.9	2.1
Net volume of live trees (1,000,000 ft ³)	8,569.2	2.3	-1.1
Net volume of growing stock trees (1,000,000 ft ³)	7,835.3	2.5	-0.3
Annual net growth of live trees (1,000 ft ³ /year)	127,687.0	10.0	NA
Annual mortality of live trees (1,000 ft ³ /year)	106,053.0	7.0	NA
Annual removals of live trees (1,000 ft ³ /year)	124,503.0	15.0	NA
Timberland Estimates			
Area (1,000 acres)	4,479.7	1.3	-0.3
Number of live trees 1 inch diameter or larger (million trees)	3,416.7	3.1	1.4
Dry biomass of live trees 1 inch diameter or larger (1,000 tons)	294,008.4	2.0	1.9
Net volume of live trees (1,000,000 ft ³)	8,463.7	2.4	-1.4
Net volume of growing stock trees (1,000,000 ft ³)	7,736.0	2.5	-0.6
Annual net growth of growing stock trees (1,000 ft ³ /year)	136,995.0	8.0	NA
Annual mortality of growing stock trees (1,000 ft ³ /year)	76,440.0	8.0	NA
Annual removals of growing stock trees (1,000 ft ³ /year)	104,796.0	15.0	NA

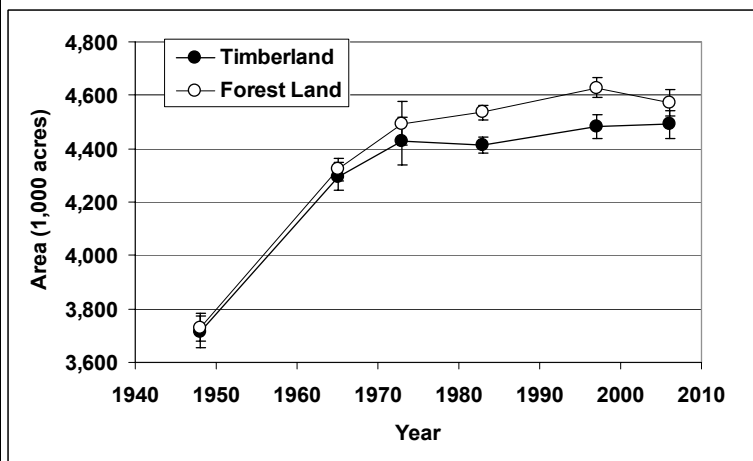


Figure 1 - Area of timberland and forest land by year

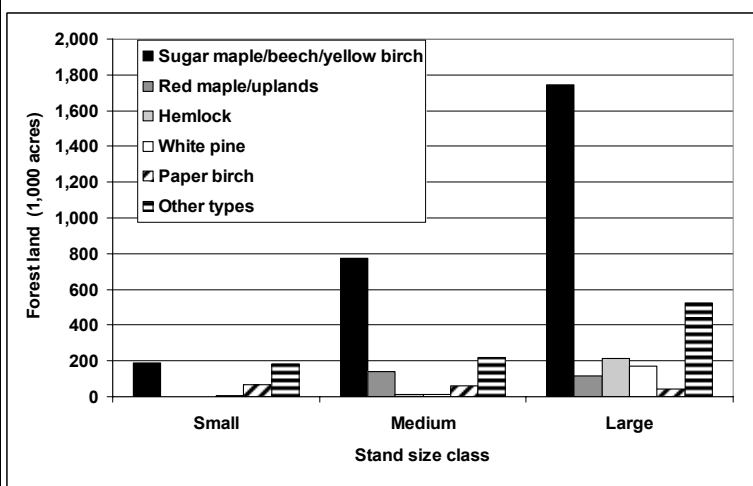


Figure 2 - Area of forest land for top six forest types by stand size class



Table 2 - Top 10 species by statewide volume estimates

Rank	Species	Volume of live trees on timberland (1,000,000 ft ³)	Sampling error (%)	Change since 2005 (%)	Volume of sawtimber trees on timberland (1,000,000 bdf)	Sampling error (%)	Change since 2005 (%)
1	Sugar maple	1,850.2	5.8	-5.60	4,946.3	7.6	-0.50
2	Red maple	1,079.8	7.2	-6.50	2,450.1	9.8	-4.90
3	Eastern hemlock	904.4	10.6	4.10	2,204.7	12.5	9.20
4	Eastern white pine	886.1	11.5	8.90	3,475.0	12.8	16.30
5	Red spruce	489.0	10.1	-6.90	1,361.9	12.7	-1.90
6	American beech	485.8	8.7	7.30	992.0	12.7	11.70
7	Yellow birch	476.7	7.6	-10.40	1,132.2	9.9	-12.00
8	Balsam fir	389.4	10.3	-9.20	764.7	12.3	-1.10
9	Paper birch	381.0	10.1	-3.50	742.9	12.6	-8.20
10	White ash	372.7	9.5	-3.40	1,074.9	14.1	-8.30
	Other softwoods	217.1	17.9	-20.20	534.2	22.7	-22.00
	Other hardwoods	931.5	7.0	146.10	2,544.5	10.1	199.80
	All species	8,463.7	2.4	-1.40	22,223.4	3.5	3.00

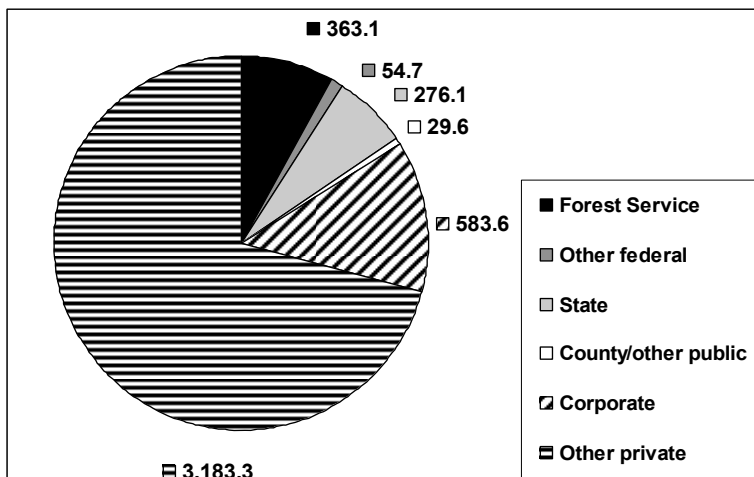


Figure 3 - Area of forest land (1,000 acres) by ownership group

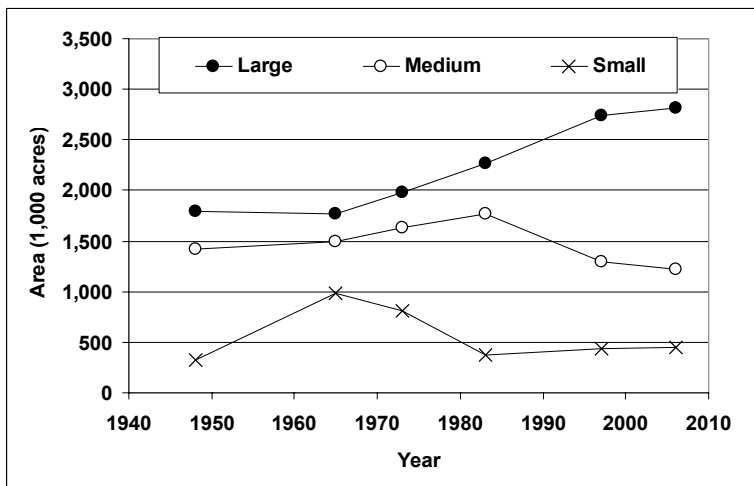


Figure 4 - Area of timberland by stand-size class and year



Vermont Issue Update – Recalculation of 1997 Inventory

Initial results from the first annual inventory of Vermont (2006) indicate a decrease of nearly 900 million ft³ in net volume of live trees on timberland since the 1997 periodic inventory. Given the consistent level of timber harvesting in Vermont during this period and the consistent timberland base between inventories, this disparity was not expected. FIA personnel put much effort into identifying the source of this difference. These checks included analyzing the FIA grid for bias, the plot data for differences between field crews, and the computation software for errors. No bias or errors were discovered through these checks.

The next step was to look at the remeasured plots. The 289 forested, remeasured plots showed a negative net change, including reduced ingrowth and increased mortality and removals. Given the maturity of Vermont's forest, this reduction in ingrowth is not surprising and the increase in mortality could be related to the ice storm of the late 1990s. By contrast, the increase in removals is not supported by Vermont harvest records. Several plots were clearcut between inventories which may have skewed the removals estimate.

The 2006 inventory results showed a decrease in number of trees that was consistent with the change components (Fig. 5). This holds true across nearly all diameter classes. This trend toward fewer trees points towards real biological change. However, in a comparison of average bole heights and cull percentages by diameter class between the 1997 and 2006 inventories, a measurement inconsistency was discovered. Bole heights were generally higher in 1997 and percent cull was generally lower in 1997. These two factors both contributed to average volume per tree by diameter class being higher in 1997. To correct this, the 1997 inventory volume was recalculated using the average bole height and cull percentages by diameter class from the 2006 inventory. The result of the recalculation is the volume decrease is reduced from almost 900 million ft³ to about 400 million ft³ (Fig. 6). Some possible causes of the portion of the difference in volume that can be attributed to real change are ice storm damage, harvesting, mortality, and lack of ingrowth.

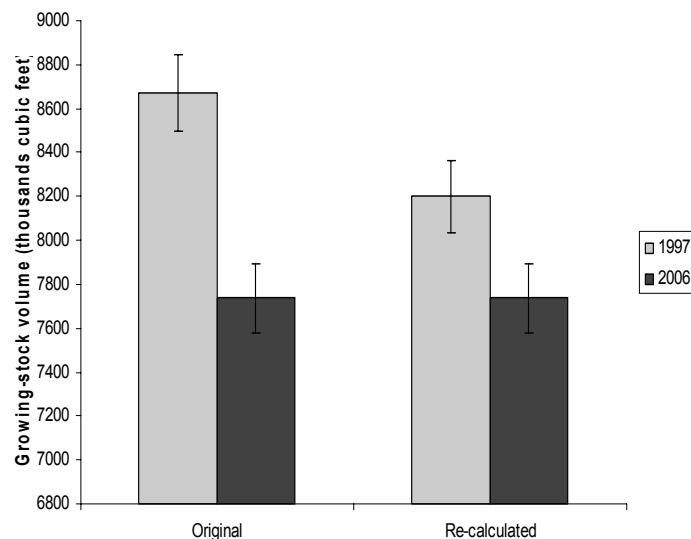
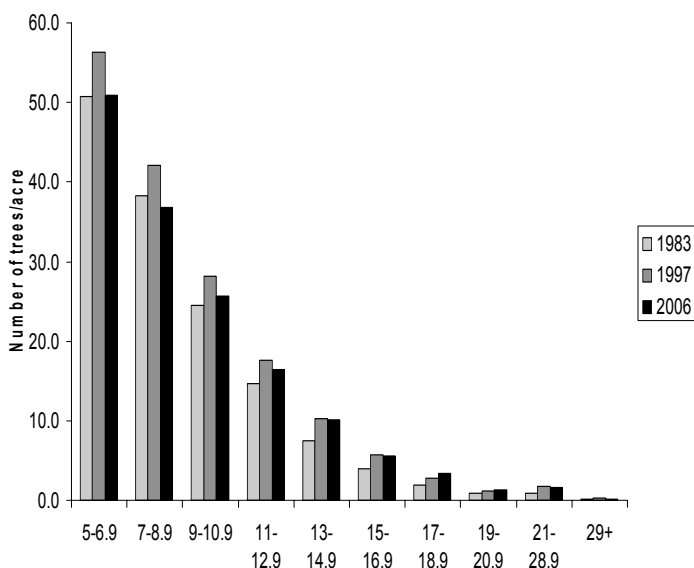


Figure 5 - Number of growing stock trees per acre of timberland

Figure 6 - Volume of growing stock trees before and after recalculation



Citation for this Publication

Morin, R.S.; De Geus, R. 2008. Vermont's forest resources, 2006. Res. Note NRS-16. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

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.

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

USDA Forest Service. 2004. Forest inventory and analysis national core field guide, Vol. 1, field data collection procedures for phase 2 plots, Ver. 2.0. Available at www.fia.fs.fed.us/library/field-guides-methods-proc (verified 15 Apr 2005).

Additional Vermont Inventory Information

Frieswyk, T.S.; Malley, A.M. 1985. Forest statistics for Vermont, 1973 and 1983. Res. Bull. NE-87. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 102 p.

Frieswyk, T.; Widmann, R. 2000. Forest statistics for Vermont, 1983 and 1997. Res. Bull. NE-145. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 130 p.

Kingsley, N.P. 1977. The forest resources of Vermont. Res. Bull. NE-46. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 58 p.

Kingsley, N.P.; Barnard, J.E. 1968. The timber resources of Vermont. Res. Bull. NE-12. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 117 p.

McGuire, J.R.; Wray, R.D. 1952. Forest statistics for Vermont. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 47 p.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternate means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410, or call (800)795-3272 (voice) or (202)720-6382 (TDD). USDA is an equal opportunity provider and employer.