

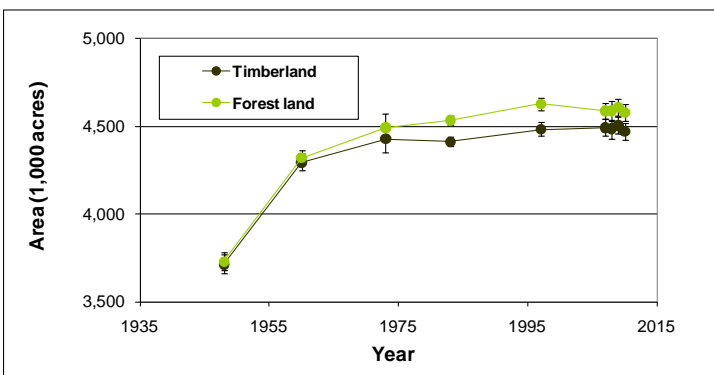
# Vermont's Forest Resources, 2010

Research Note NRS-105

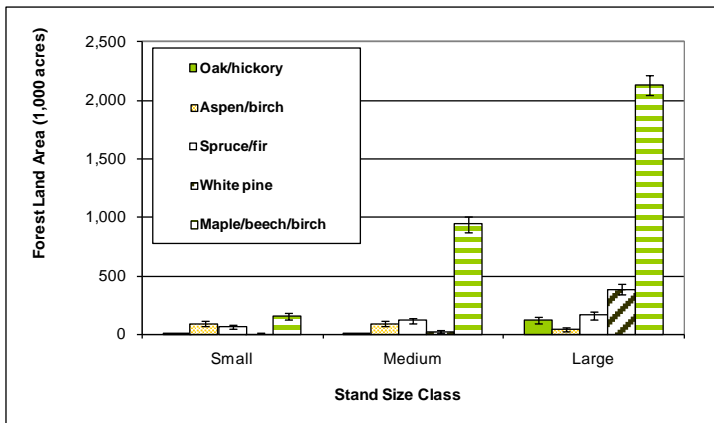
This publication provides an overview of forest resource attributes for Vermont based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) program at the Northern Research Station of the U.S. Forest Service. These estimates, along with web-posted core tables, will be updated annually.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

**Table 1. – Annual estimates and uncertainty**

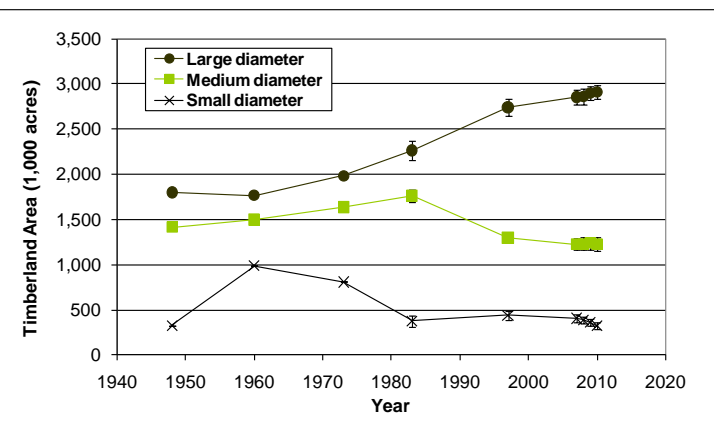
	2010 estimate	Sampling error (%)
<b>Forest Land Estimates</b>		
Area (1,000 acres)	4,580	1
Number of live trees 1-inch diameter or larger (1,000,000 trees)	3,514	2.7
Biomass of live trees 1-inch diameter or larger (1,000 tons)	280,019	1.6
Net volume in live trees 5-inch diameter or larger (1,000,000 ft <sup>3</sup> )	10,370	1.8
Annual net growth of live trees 5-inch diameter or larger (1,000 ft <sup>3</sup> /year)	195,436	7.1
Annual mortality of live trees 5-inch diameter or larger (1,000 ft <sup>3</sup> /year)	103,693	7.3
Annual harvest removals of live trees 5-inch diameter or larger (1,000 ft <sup>3</sup> /year)	86,731	18.3
Annual other removals of live trees 5-inch diameter or larger (1,000 ft <sup>3</sup> /year)	264	110.9
<b>Timberland Estimates</b>		
Area (1,000 acres)	4,471	1.1
Number of live trees 1-inch diameter or larger (1,000,000 trees)	3,437	2.8
Biomass of live trees 1-inch diameter or larger (1,000 tons)	274,155	1.7
Net volume in live trees 5-inch diameter or larger (1,000,000 ft <sup>3</sup> )	10,160	1.9
Net volume of growing-stock trees (1,000,000 ft <sup>3</sup> )	9,128	2
Annual net growth of growing-stock trees (1,000 ft <sup>3</sup> /year)	194,991	5.3
Annual mortality of growing-stock trees (1,000 ft <sup>3</sup> /year)	63,212	8.5
Annual harvest removals of growing-stock trees (1,000 ft <sup>3</sup> /year)	75,802	18.1
Annual other removals of growing-stock trees (1,000 ft <sup>3</sup> /year)	26,334	47.7



**Figure 1. – Area of timberland and forest land by year.**



**Figure 2. – Area of forest land by top six forest types and stand size class, 2006-2010.**



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

Note: When available, sampling errors/bars provided in figures and tables represent 68 percent confidence intervals

Table 2. – Top 10 tree species by statewide volume estimates (5-inch diameter and larger), 2006-2010

Rank	Species	Volume of live trees on forest land (1,000,000 ft <sup>3</sup> )	Sampling error (%)	Volume of sawtimber trees on timberland (1,000,000 bdf <sup>t</sup> )	Sampling error (%)
1	Sugar maple	2,429	4.8	6,806	6.4
2	Red maple	1,286	5.7	2,943	7.8
3	Eastern hemlock	1,110	8.7	3,180	10.0
4	Eastern white pine	954	9.8	4,004	10.5
5	Yellow birch	748	6.2	1,809	8.9
6	American beech	602	7.1	1,094	11.7
7	White ash	529	8.5	1,562	11.0
8	Red spruce	505	8.8	1,404	10.7
9	Paper birch	422	8.9	852	12.2
10	Balsam fir	380	9.6	709	11.3
	Other softwoods	245	15.1	615	18.7
	Other hardwoods	1,161	6.1	3,318	8.7
	<b>All Species</b>	<b>10,370</b>	<b>1.8</b>	<b>28,294</b>	<b>2.7</b>

## Standing Dead Trees

Specific features, like nesting cavities in standing dead trees, provide critical habitat components for many forest-associated wildlife species, with standing dead trees containing significantly more cavities than occur in live trees (Fan et al. 2003). Standing dead trees serve as important indicators not only of wildlife habitat, but also for past mortality events and carbon storage. The standing dead tree resource across Vermont’s forests is defined by the number and density by decay classes, species, and sizes.

Between 2006 and 2010, FIA collected data on standing dead trees of numerous species and sizes in varying stages of decay. According to the current inventory data, almost 100 million standing dead trees are present on Vermont forest land, with a density of 21.1 per acre of forest land.

Twelve species groups each contributed more than 1 million standing dead trees, with the top group, spruce and balsam fir, at 19.6 million (Fig. 4). Tree species are grouped into species groups which are defined in FIA’s database documentation (Woudenberg et al. 2010).

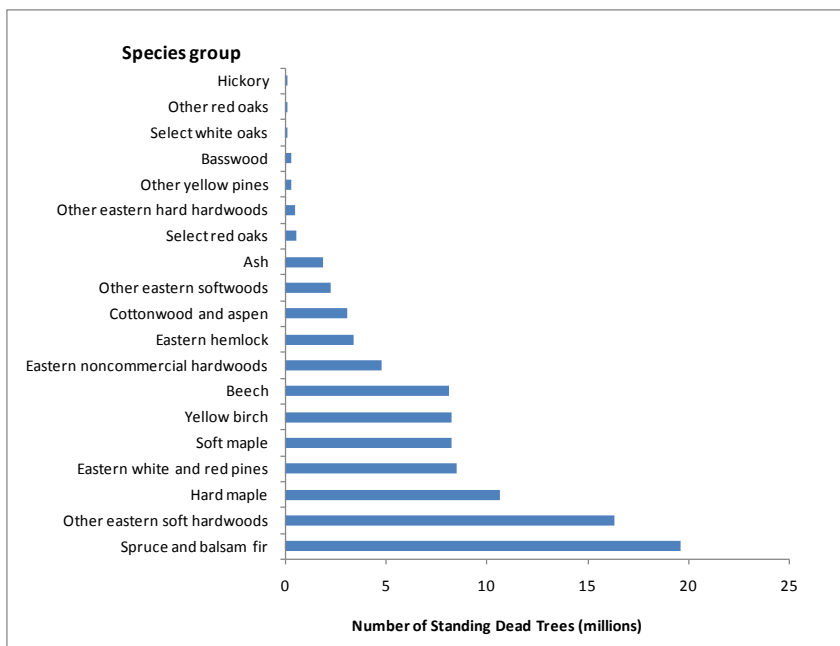
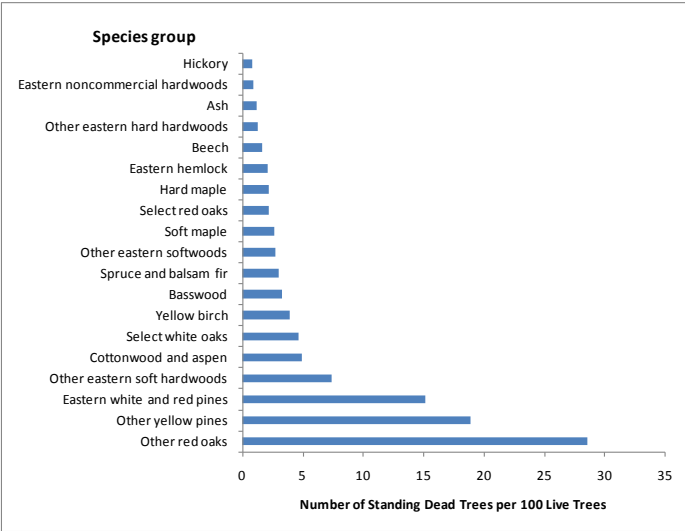


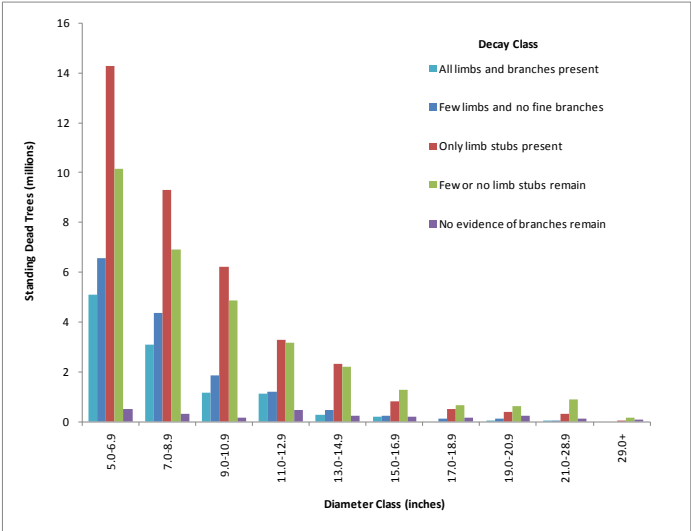
Figure 4. – Number of standing dead trees by species group, Vermont, 2006-2010.

# Standing Dead Trees

Relative to the total number of live trees in each species group, three species groups exceeded 15 standing dead trees per 100 live trees, with 'other red oaks' leading all groups with 28.6 standing dead trees per 100 live trees (Fig. 5). Almost 38 percent of standing dead trees are smaller than 7.0 inches d.b.h., with the great majority (77 percent) smaller than 11 inches d.b.h. (Fig. 6). The greatest number of standing dead trees was estimated for the three intermediate decay classes, with the fewest number in the class of most decay. This pattern was consistent across most decay classes (Fig. 6).



**Figure 5. – Number of standing dead trees per 100 live trees by species group, Vermont, 2006-2010.**



**Figure 6. – Distribution of standing dead trees by decay and diameter classes, Vermont, 2006-2010.**

Standing dead trees result from a variety of potential causes, including diseases and insects, weather damage, fire, flooding, drought, and competition, and other factors. The spruce and balsam fir species group had the highest total number of standing dead trees. Within this group, balsam fir comprises the majority of both all live and standing dead trees. The 'other red oaks' species group had the highest density of standing dead trees per 100 live trees, attributable entirely to black oak. These standing dead trees provide areas for foraging, nesting, roosting, hunting perches, and cavity excavation for wildlife, from primary colonizers such as insects, bacteria, and fungi to birds, mammals, and reptiles. Most cavity nesting birds are insectivores which help to control insect populations. However, the size distribution suggests that many standing dead trees may be too small to support nesting or roosting for those species requiring larger cavities. Providing a variety of forest structural stages and retaining specific features, such as standing dead trees on both private and public lands, are ways that forest managers maintain the abundance and quality of habitat for forest-associated wildlife species in Vermont.

### Citation for this Publication

Morin, R.S.; Nelson, M.; De Geus, R. 2011. **Vermont's forest resources, 2010**. Res. Note. NRS-105. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

### FIA Program Information

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.

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

USDA Forest Service. 2007. **Forest inventory and analysis national core field guide, Vol. 1, field data collection procedures for phase 2 plots, Ver. 4.0**. Washington, DC: U.S. Department of Agriculture, Forest Service. Available at <http://www.fia.fs.fed.us/library/field-guides-methods-proc/> (verified Apr. 21, 2011).

Woudenberg, S.W.; Conkling, B.L.; O'Connell, B.M.; LaPoint, E.B.; Turner, J.A.; Waddell, K.L. 2010. **The Forest Inventory and Analysis database: Database description and users manual version 4.0 for Phase 2**. Gen. Tech. Rep. RMRS-GTR-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 339 p.

### Additional Information

Fan, Z.; Shifley, S.R.; Spetch, M.A.; Thompson, F.R., III.; Larsen, D.R. 2003. **Distribution of cavity trees in midwestern old-growth and second-growth forests**. Canadian Journal of Forest Research. 33: 1481-1494.

### Additional Vermont Inventory Information

Frieswyk, T.S.; Malley, A.M. 1985. **Forest statistics for Vermont, 1973 and 1983**. Resour. 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**. Resour. Bull. NE-145. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 130 p.

Morin, R.S.; Barnett, C.J.; Brand, G.J.; Butler, B.J.; De Geus, R.; Hansen, M.H.; Hatfield, M.A.; Kurtz, C.M.; Moser, W.K.; Perry, C.H.; Piva, R.; Riemann, R.; Widmann, R.; Wilmot, S.; Woodall, C. In press. Vermont's Forests 2007. Resour. Bull. NRS-. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

### Contact Information

Lead analyst: Randall Morin, (610) 557-4054, [rsmorin@fs.fed.us](mailto:rsmorin@fs.fed.us)  
 Data processing/access: Carol Alerich, (610) 557-4068, [calerich@fs.fed.us](mailto:calerich@fs.fed.us); Charles Barnett, (610) 557-4031, [cjbarnett@fs.fed.us](mailto:cjbarnett@fs.fed.us); Barbara O'Connell, (610) 557-4037, [boconnell@fs.fed.us](mailto:boconnell@fs.fed.us)  
 Field data collection: Aaron Clark, (412) 849-6651, [aaronclark@fs.fed.us](mailto:aaronclark@fs.fed.us); Robert Gregory, (412) 965-3119, [rgregory@fs.fed.us](mailto:rgregory@fs.fed.us); John Higham, (412) 523-1466, [jhigham@fs.fed.us](mailto:jhigham@fs.fed.us); Jason Morrison, (603) 868-7681, [jwmorrison@fs.fed.us](mailto:jwmorrison@fs.fed.us); Bryan Tirrell, (413) 534-7862, [btirrell@fs.fed.us](mailto:btirrell@fs.fed.us); Ashley Zickefoose, (412) 527-3182, [azickefoose@fs.fed.us](mailto:azickefoose@fs.fed.us)  
 Estimates, tabular data, and maps from this report may be generated at: [fiatools.fs.fed.us](http://fiatools.fs.fed.us)

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.