

Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Michigan's Forest Resources, 2010

Research Note NRS-106

This publication provides an overview of forest resource attributes for Michigan based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) program of the Northern Research Station, U.S. Forest Service. These estimates, along with web-posted core tables, are updated annually. For more information please refer to page 4 of this report or visit our website: <http://www.fia.fs.fed.us/>.

Table 1. – Annual estimates, sampling error, and change
Note: Volumes are for 5-inch and larger diameter trees

	Estimate	Sampling error (%)	Change since 2005 (%)
Forest land estimates			
Area (1,000 acres)	20,003	0.4	3.4
Number of live trees 1-inch diameter or larger (1,000,000 trees)	13,966	1.0	0.8
Dry biomass of live trees 1-inch diameter or larger (1,000 tons)	819,323	0.8	6.2
Net volume in live trees (1,000,000 ft ³)	32,488	0.8	6.4
Annual net growth of live trees (1,000 ft ³ /year)	760,242	2.0	-4.8
Annual mortality of live trees (1,000 ft ³ /year)	348,591	2.4	0.8
Annual harvest removals of live trees (1,000 ft ³ /year)	363,519	4.9	19.1
Annual other removals of live trees (1,000 ft ³ /year)	12,140	24.4	-62.9
Timberland estimates			
Area (1,000 acres)	19,386	0.5	3.3
Number of live trees 1-inch diameter or larger (1,000,000 trees)	13,538	1.1	0.5
Dry biomass of live trees 1-inch diameter or larger (1,000 tons)	795,493	0.8	6.4
Net volume in live trees (1,000,000 ft ³)	31,515	0.9	6.6
Net volume of growing-stock trees (1,000,000 ft ³)	29,040	0.9	5.7
Annual net growth of growing-stock trees (1,000 ft ³ /year)	695,150	1.9	-11.7
Annual mortality of growing-stock trees (1,000 ft ³ /year)	272,277	2.6	-1.8
Annual harvest removals of growing-stock trees (1,000 ft ³ /year)	319,802	5.0	17.8
Annual other removals of growing-stock trees (1,000 ft ³ /year)	17,679	23.0	-56.5

Note that changes in inventory design and definitions make it inappropriate to directly compare some previously published estimates with these current estimates. Sampling errors and error bars represent 68% confidence intervals.

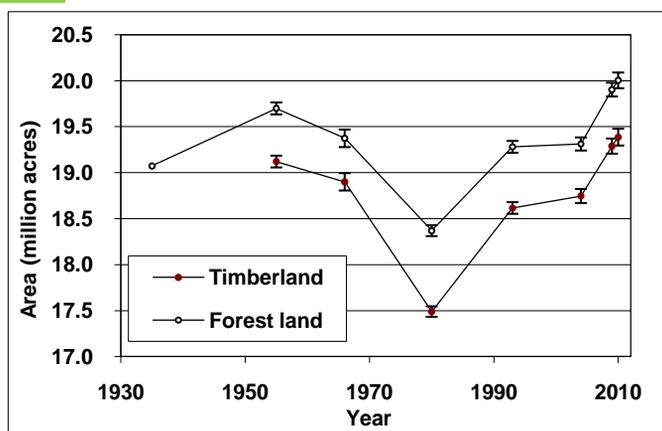


Figure 1. – Area of timberland and forest land by year.

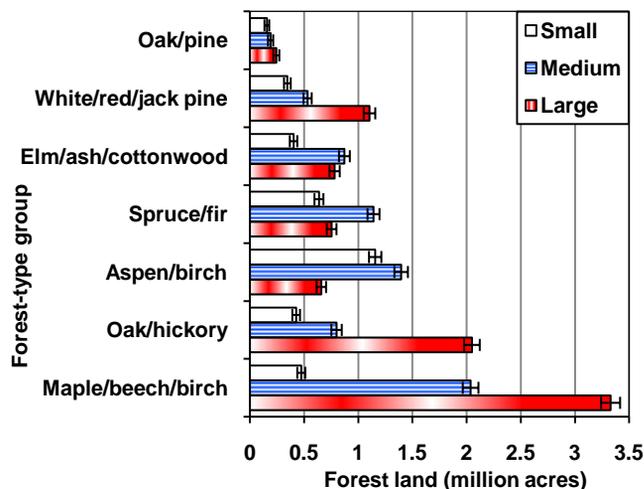


Figure 2. – Area of forest land for top seven forest-type groups by stand-size class (based on tree size), Michigan, 2010.

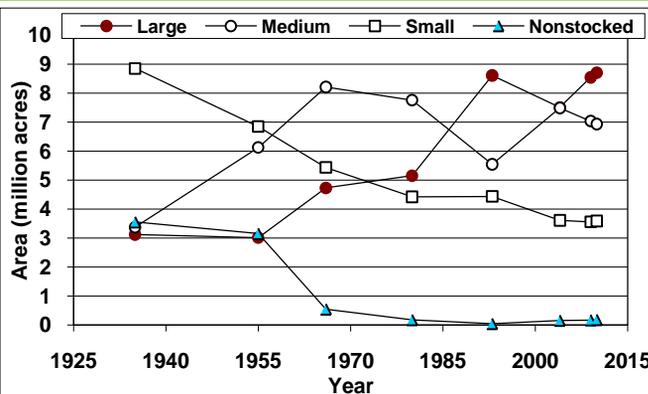


Figure 3. – Area of timberland by stand-size class (based on tree size) and year.

Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Table 2. – Top 10 species by statewide volume estimates, 2010.

Rank	Species	Volume of live trees 5-inch diameter and larger on forest land (1,000,000 ft ³)	Sampling error (%)	Change since 2005 (%)	Volume of sawtimber trees on timberland (1,000,000 board feet)	Sampling error (%)	Change since 2005 (%)
1	Sugar maple	4,779	2.6	4.0	11,530	3.5	11.9
2	Red maple	4,229	2.4	14.6	9,053	3.6	22.6
3	Northern white-cedar	2,645	3.9	0.6	6,969	4.8	-3.2
4	Red pine	2,174	4.9	11.4	8,560	5.3	16.5
5	Quaking aspen	1,658	3.6	3.1	3,627	5.2	7.8
6	Northern red oak	1,633	4.6	12.4	5,776	5.3	20.0
7	Eastern white pine	1,440	5.1	11.0	6,094	5.8	12.4
8	Bigtooth aspen	1,271	5.3	2.6	3,448	7.0	10.0
9	Eastern hemlock	963	5.9	4.2	3,926	6.7	0.7
10	Black cherry	843	4.9	8.6	1,783	7.7	14.4
	Other softwoods	2,732	2.6	0.8	5,877	3.6	-0.3
	Other hardwoods	8,122	1.8	6.1	21,484	2.6	10.7
	All Species	32,488	0.8	6.4	88,125	1.3	10.5

Table 3. – Area and percent of forest and timberland by owner, Michigan, 2010. Change in forest and timberland by owner, Michigan, 2005 to 2010. State includes state-owned forest and timberland. Corporate includes real estate investment trusts and timber management organizations. Other private includes nongovernmental conservation and natural resource organizations; unincorporated local partnerships, associations, and clubs; and Native Americans. Other federal includes U.S. Fish and Wildlife Service, U.S. Department of Defense, U.S. Department of Energy, and other federal agencies. Nonfederal public includes local governments such as counties or townships. All National Park Service forestland is reserved by law prohibiting management for the production of wood products.

Forest land estimates	Estimate (1,000 acres)	Percent	Error (%)	Change since 2005 (%)
Owner				
Family or individual	9,060	45.3	1.2	3.2
State	4,200	21.0	1.3	2.0
Corporate	2,802	14.0	2.8	4.8
U.S. Forest Service	2,688	13.4	0.8	0.6
Other private	546	2.7	7.9	12.5
Nonfederal public	388	1.9	9.0	17.0
National Park Service	226	1.1	11.1	4.7
Other federal	95	0.5	18.2	37.1
Total	20,003	100.0	0.4	3.4
Timberland estimates				
Owner				
Family or individual	8,988	46.4	1.2	3.1
State	4,078	21.0	1.3	1.7
Corporate	2,777	14.3	2.8	5.1
U.S. Forest Service	2,536	13.1	1.1	0.0
Other private	546	2.8	7.9	13.1
Nonfederal public	385	2.0	9.1	19.0
National Park Service	NA	NA	NA	NA
Other federal	77	0.4	20.3	27.1
Total	19,386	100.0	0.5	3.3

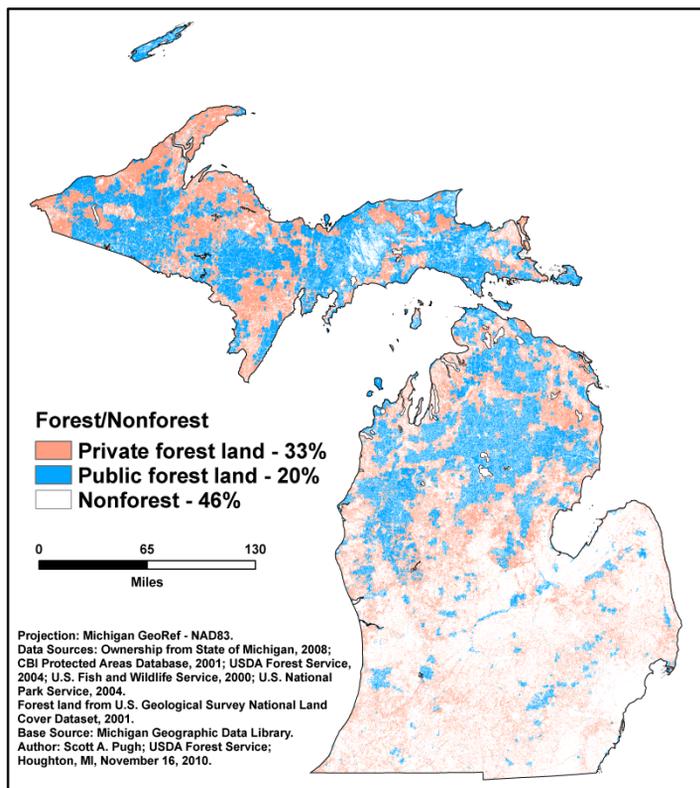


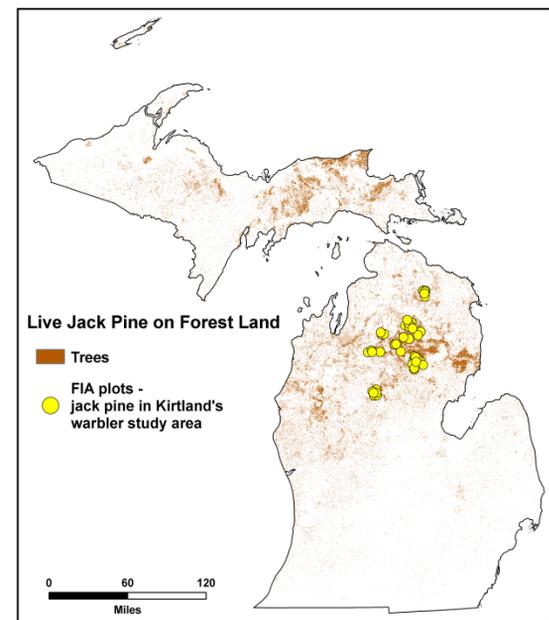
Figure 4. – Area of forest/nonforest with forest identified by major ownership group, Michigan, 2010.

Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

Issue Update – Management Synergy with Jack Pine and Kirtland’s Warbler

Kirtland’s warbler (*Dendroica kirtlandii*) and jack pine (*Pinus banksiana*) have been faced with a number of threats but management appears to be making a difference for both species in some areas. The Kirtland’s warbler was listed as an endangered species in 1973 when its numbers drastically declined. Currently, the warbler is known to nest in the northern Lower Peninsula, Upper Peninsula, Wisconsin, and the province of Ontario. It requires young jack pine stands for nesting. Historically, fire maintained a young jack pine resource for nesting but fire has mostly been suppressed. The warbler has also been parasitized by the brown-headed cowbird which contributed to low fledgling rates prior to the 1970s (Michigan Department of Natural Resources 2011). Today, a portion of Michigan’s jack pine is in relatively old stands subject to jack pine budworm (*Choristoneura pinus*) defoliation and higher than normal amounts of mortality. Since 1980, the area of jack pine stands has decreased approximately 20 percent and the numbers of pole and sawtimber-size trees have dropped by 45 and 12 percent, respectively.

Ongoing efforts by the U.S. Forest Service, Michigan Department of Natural Resources (MI DNR), U.S. Fish and Wildlife Service (USFWS) and other groups are improving conditions for the Kirtland’s warbler. Since the 1970s, the U.S. Forest Service and MI DNR have managed jack pine stands with logging, burning, seeding, and replanting to continually provide approximately 38,000 acres of productive nesting habitat (MI DNR 2011). In collaboration with the MI DNR and U.S. Forest Service, the USFWS has been removing thousands of cowbirds annually from breeding areas. Since its lowest count of 167 singing males in 1987, Kirtland’s warbler has been increasing. Close to a record 1,747 singing males were counted in Michigan for 2010 (USFWS 2010). Jack pine has benefited from the management of Kirtland’s warbler habitat.



We analyzed jack pine stands in a mostly state-owned (94 percent) Kirtland’s warbler management area (KW study area, over 85,000 acres of jack pine forest type) (Fig. 5). The study area was compared to the remaining jack pine in the State (603 thousand acres). Up to 21 percent of the remaining 603 thousand acres of jack pine stands is managed for Kirtland’s warbler by the U.S. Forest Service and USFWS. In KW management areas, a portion of jack pine are maintained at younger ages to benefit nesting. The warbler nests in stands approximately 5 to 20 feet tall with estimated ages from 5 to 20 years. Thirty-six percent of the stands in the study area are less than 21 years of age compared to 20 percent in the remaining jack pine stands throughout the State. Around age 45 jack pine stands growing on low-quality sites are more vulnerable to jack pine budworm. About 80 percent of the jack pine stands in the study area are younger than 45 years versus 57 percent in remaining areas. Average annual net growth to current volume (3.8 percent) is high and average annual mortality to current volume (0.8 percent) is low in the study area (Fig. 6). Net growth is more than double and mortality is about half compared to estimates observed for the remaining area of jack pine. Future studies will differentiate all managed areas and results are expected to show greater differences. Management is making a difference for jack pine and Kirtland’s warbler.

Figure 5. Live jack pine trees (at least 1 inch d.b.h.) on forest land and FIA plots (jack pine stands) in Kirtland’s warbler study area. Note: National Land Cover Database used to delineate forest and jack pine trees estimated from 2005 FIA data. Plot locations are only approximate.



Male Kirtland’s warbler on jack pine in the Huron Manistee National Forest. Photo by Ron Austing. https://www.notes.fs.fed.us/wo/wfrp/find_a_photo.nsf

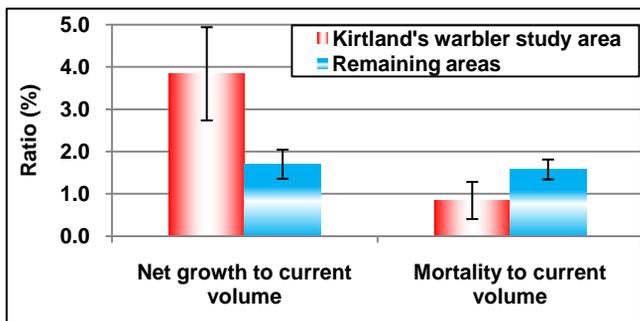


Figure 6. – Comparison of average annual mortality and net growth to current volume (percent) for jack pine trees (at least 5 inches d.b.h.) in Kirtland’s warbler study area versus remaining jack pine stands in Michigan (2010).



Image credit: Terry Spivey, USDA Forest Service, Bugwood.org

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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, N.C: 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: <http://www.fia.fs.fed.us/library/field-guides-methods-proc/>. (Accessed Oct. 26, 2010.)

Special Issue

Michigan Department of Natural Resources 2011. Kirtland's warbler (*Dendroica kirtlandii*). Lansing, MI: Michigan Department of Natural Resources. Available: http://www.michigan.gov/dnr/0,1607,7-153-10370_12145_12202-32591--,00.html. (Accessed April 14, 2011.)

USDA Forest Service 2011. Kirtland's warbler. Milwaukee, WI: U.S. Department of Agriculture, Forest Service, Eastern Region. Available: http://www.fs.usda.gov/wps/portal/fsinternet/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_Al8zPyhQoY6BdkOyoCAGixyPg!/?ss=110904&navtype=BROWSEBYSUBJECT&cid=STELPRDB5107436&navid=09100000000000&position=SubFeature*&tttype=detail&pname=Huron-Manistee%20National%20Forests-%20Home. (Accessed April 14, 2011.)

U.S. Fish and Wildlife Service 2011. Kirtland's warbler. Washington, DC: U.S. Department of Interior, Fish and Wildlife Service. Available: <http://www.fws.gov/midwest/endangered/birds/Kirtland/kiwa-nest-sum.html>. (Accessed April 15, 2011.)

Additional Michigan Inventory Information

Butler, B.J. 2008. Family forest owners of the United States, 2006. Gen. Tech. Rep. NRS-27. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 72 p.

Michigan Department of Natural Resources 2010. 2009 Michigan forest health highlights. Lansing, MI: Michigan Department of Natural Resources. 17 p. Available: http://fhm.fs.fed.us/fhh/fhh_09/mi_fhh_09.pdf. (Accessed Oct. 26, 2010.)

Piva, R.J. 2007. Pulpwood production in the north-central region, 2005. Resource Bull. NRS-21. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 55 p.

Pugh, Scott A.; Hansen, Mark H.; Pedersen, Lawrence D.; Heym, Douglas C.; Butler, Brett J.; Crocker, Susan J.; Meneguzo, Dacia; Perry, Charles H.; Haugen, David E.; Woodall, Christopher; Jepsen, Ed. 2009. Michigan's forests 2004. Resour. Bull. NRS-34. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 210 p.

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