

USDA Forest Service, Forest Inventory & Analysis (FIA) Program

Red Pine and Northern Hardwoods Analyses & New Regeneration Indicator Overview MI SAF Fall Conference

by
Scott Pugh, FIA MI Analyst
October 2014



Scott Pugh Houghton, MI
spugh@fs.fed.us Forestry Sciences Lab

FIA Tools, Data, Documentation, & Service

USDA Forest Service

<http://www.fs.fed.us/>

USDA Forest Service, Northern Research Station

<http://www.nrs.fs.fed.us/>

Northern Research Station FIA

<http://www.nrs.fs.fed.us/fia/>

Annual and 5-year reports with standard tables

<http://www.nrs.fs.fed.us/fia/data-tools/state-reports/default.asp>

FIA Tools, Data, etc.

<http://www.fia.fs.fed.us/tools-data/>

FIDO (Forest Inventory Data Online)

<http://apps.fs.fed.us/fia/fido/index.html>

Evalidator

<http://apps.fs.fed.us/Evalidator/evalidator.jsp>

FIA Data Mart

<http://apps.fs.fed.us/fiadb-downloads/datamart.html>

Other Tools (NWOS Table Maker, TPO Tools, etc)

<http://www.fia.fs.fed.us/tools-data/other/default.asp>

Tutorials and Training Materials

http://www.fia.fs.fed.us/tools-data/tutorials_training/default.asp

Customer Service

<http://www.fia.fs.fed.us/tools-data/customer-service/default.asp>

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FIA Tools, Data, Documentation, & Service continued

FIA Library

<http://www.fia.fs.fed.us/library/>

Database Documentation

<http://www.fia.fs.fed.us/library/database-documentation/>

Field Guides, Methods, and Procedures

<http://www.fia.fs.fed.us/library/field-guides-methods-proc/>

Sampling & Estimation Documentation

<http://www.fia.fs.fed.us/library/sampling/>

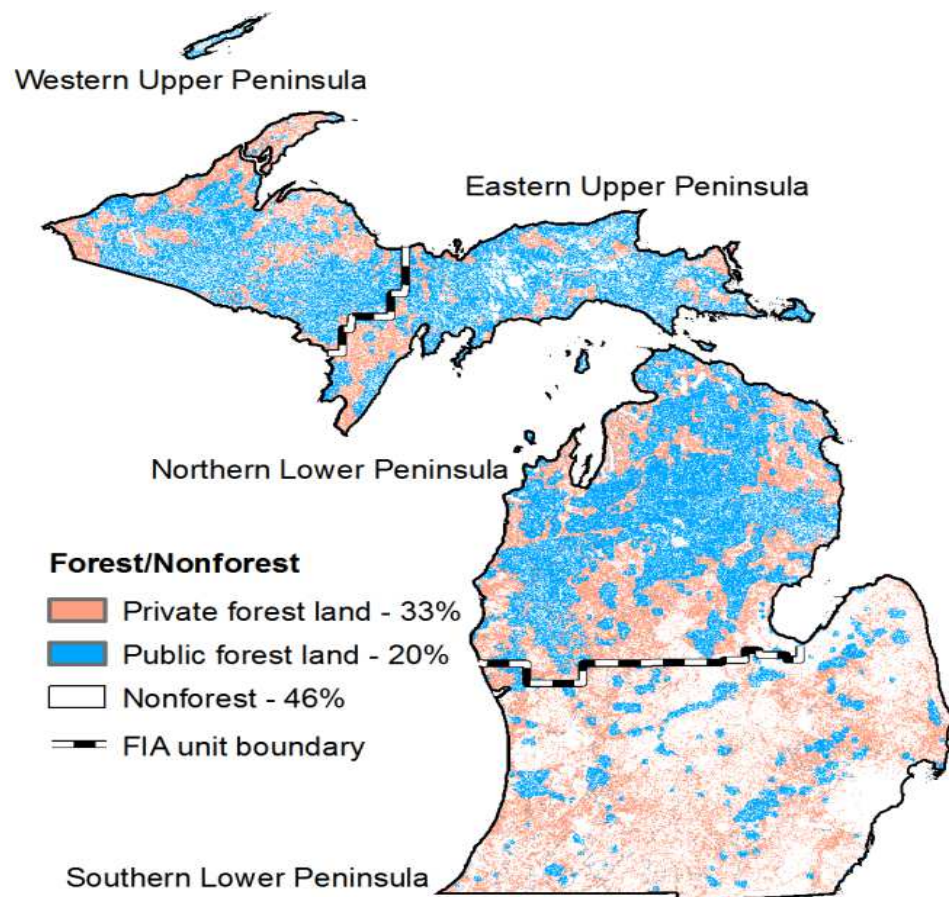
Etc.

State Level Statistics, MI 2013 and 2008

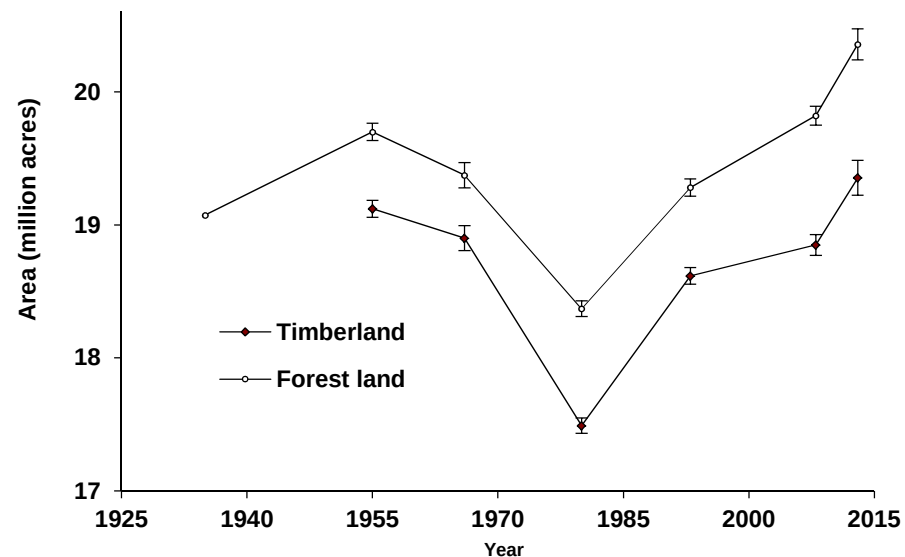
Michigan forest statistics, 2013 and 2008. Volumes are for 5-inch and larger diameter trees. Number of trees and biomass are for 1-inch and larger diameter trees. Sampling errors and error bars shown in tables and figures represent 68 percent confidence intervals.

	2013 Estimate	Sampling error (percent)	2008 Estimate	Sampling error (percent)	Change since 2008 (percent)
Forest Land					
Area (thousand acres)	20,357	0.6	19,821	0.4	2.7
Number of live trees (million trees)	14,240	1.4	14,028	0.9	1.5
Aboveground biomass of live trees (thousand oven-dry tons)	866,200	1.0	796,130	0.7	8.8
Net volume of live trees (million ft ³)	34,654	1.1	31,553	0.7	9.8
Annual net growth of live trees (thousand ft ³ /yr)	747,664	2.8	764,884	2.1	-2.3
Annual mortality of trees (thousand ft ³ /yr)	394,313	3.7	340,453	2.3	15.8
Annual harvest removals of live trees (thousand ft ³ /yr)	339,794	6.6	358,149	4.9	-5.1
Annual other removals of live trees (thousand ft ³ /yr)	12,435	31.2	14,068	20.6	-11.6
Timberland					
Area (thousand acres)	19,354	0.7	18,849	0.4	2.7
Number of live trees (million trees)	13,526	1.5	13,353	0.9	1.3
Aboveground biomass of live trees (thousand oven-dry tons)	820,107	1.1	756,718	0.7	8.4
Net volume of live trees (million ft ³)	32,781	1.2	29,921	0.8	9.6
Net volume of growing stock trees (million ft ³)	30,145	1.2	27,703	0.8	8.8
Annual net growth of growing stock trees (thousand ft ³ /yr)	675,345	2.7	690,454	2.0	-2.2
Annual mortality of growing stock trees (thousand ft ³ /yr)	301,511	4.1	263,048	2.6	14.6
Annual harvest removals of growing stock trees (thousand ft ³ /yr)	298,216	6.7	316,887	5.0	-5.9
Annual other removals of growing stock trees (thousand ft ³ /yr)	15,108	28.2	22,941	17.8	-34.1

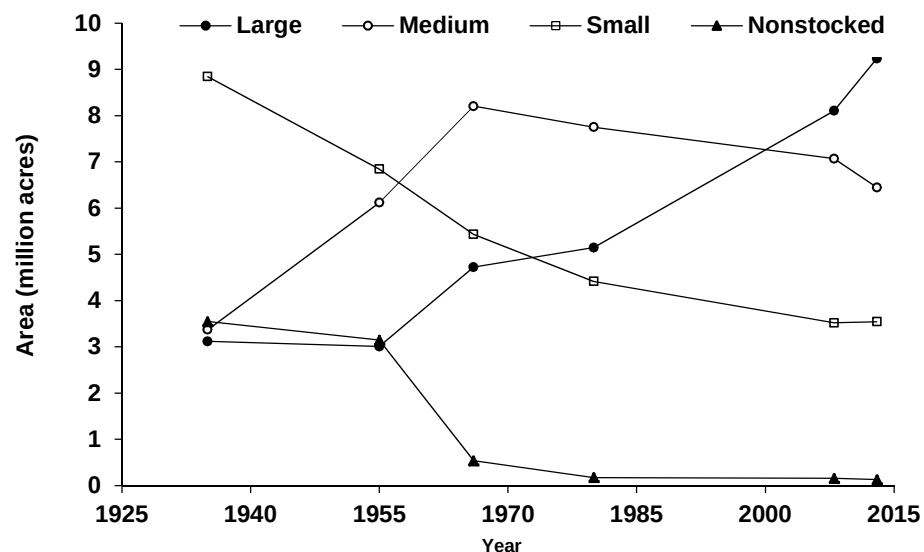
Forest and Timberland Area, MI



FIA unit boundaries and area of forest/nonforest with forest identified by major ownership group, Michigan 2013.



Forest land and timberland by year, Michigan.



Timberland by stand-size class and year, Michigan.

Forest and Timberland Ownership, MI, 2012

Area and percent of forest and timberland by owner, Michigan, 2012. Change in forest and timberland by owner, Michigan, 2007 to 2012.

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 public includes local governments such as counties or townships and other federal such as U.S. Fish and Wildlife Service, U.S. Department of Defense, and U.S. Department of Energy. All National Park Service forest land is reserved by law prohibiting management for the production of wood products.

Forest land estimates	Estimate (1,000 acres)	Estimate (%)	Sampling error (%)	Change since 2007 (%)
Owner				
Family or individual	9,246	45.6	1.6	2.3
State	4,235	20.9	1.7	1.9
U.S. Forest Service	2,723	13.4	0.8	2.1
Corporate	2,685	13.2	3.9	-1.8
Other private	659	3.2	9.7	32.1
Other public	530	2.6	10.4	26.1
National Park Service	218	1.1	15.2	12.2
Total	20,296	100.0	0.6	3.0
Timberland estimates				
Owner				
Family or individual	9,169	46.6	1.6	2.2
State	4,132	21.0	1.8	1.9
Corporate	2,657	13.5	3.9	-1.3
U.S. Forest Service	2,564	13.0	1.2	2.4
Other private	659	3.3	9.7	32.1
Other public	505	2.6	10.6	26.6
National Park Service	NA	NA	NA	NA
Total	19,685	100.0	0.6	3.0

Species Level Statistics, MI 2013

Number, net volume, oven-dry biomass, net growth, mortality, and harvest removals of live trees on forest land, Michigan 2013 (selected prominent species).

Species	Trees ^a (million trees)	Net volume ^a (million ft ³)	Aboveground biomass ^b (thousand tons)	Net growth ^a (thousand ft ³ /yr)	Mortality ^a (thousand ft ³ /yr)	Harvest removals ^a (thousand ft ³ /yr)
Sugar maple	447	5,079	157,747	105,077	18,103	49,088
Red maple	476	4,706	127,232	124,075	19,197	43,900
Northern white-cedar	463	2,898	46,551	41,654	11,271	7,467
Red pine	218	2,384	43,094	77,664	5,744	38,257
Northern red oak	97	1,742	53,154	54,487	2,995	11,841
Eastern white pine	101	1,673	28,649	60,522	6,685	3,467
Quaking aspen	182	1,627	36,622	28,433	50,387	31,551
Bigtooth aspen	116	1,271	27,637	29,641	24,919	20,906
Eastern hemlock	74	1,076	20,771	18,635	4,797	3,432
Black cherry	89	1,042	26,859	30,361	10,673	9,595
Green ash	66	587	17,823	-19,966	46,443	4,896
American beech	39	569	16,921	-210	10,904	11,175
White ash	32	452	13,241	-6,529	24,125	3,985
Black ash	64	332	11,433	2,411	8,570	1,434

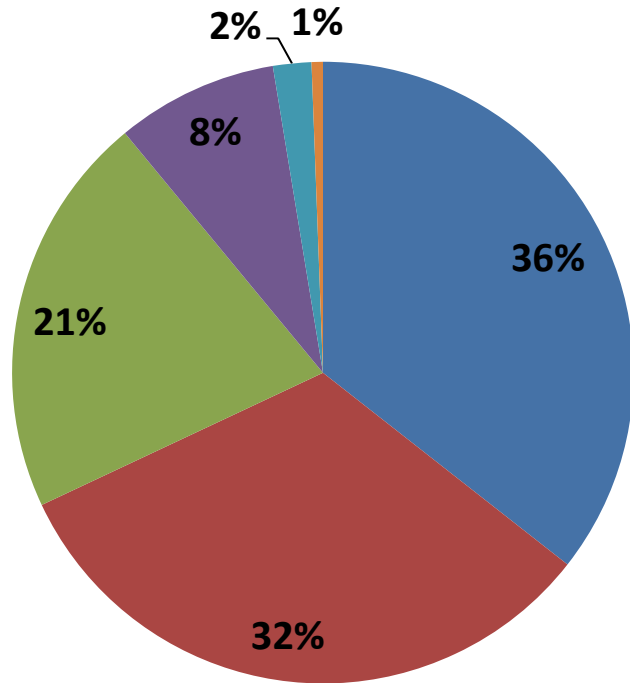
Reserve Status – Improved Implementation, MI, 2012

Comparison of timberland estimates calculated using previous and improved reserve status implementations, Michigan 2012. Volumes are for 5-inch and larger diameter trees.

	2012 Estimate improved	2012 Estimate previous	Difference	Difference (percent)
Timberland				
Area (thousand acres)	19,298	19,685	-388	-2.0
Number of live trees ≥ 1 in diameter (million trees)	13,366	13,641	-275	-2.0
Aboveground biomass of live trees ≥ 1 in (thousand oven-dry tons)	809,601	829,103	-19,502	-2.4
Net volume of live trees (million ft ³)	32,305	33,106	-801	-2.4
Net volume of growing stock trees (million ft ³)	29,748	30,482	-735	-2.4
Annual net growth of growing stock trees (thousand ft ³ /yr)	667,881	677,832	-9,951	-1.5
Annual mortality of growing stock trees (thousand ft ³ /yr)	284,522	293,369	-8,847	-3.0
Annual harvest removals of growing stock trees (thousand ft ³ /yr)	309,034	309,034	0	0.0
Annual other removals of growing stock trees (thousand ft ³ /yr)	15,861	13,626	2,235	16.4

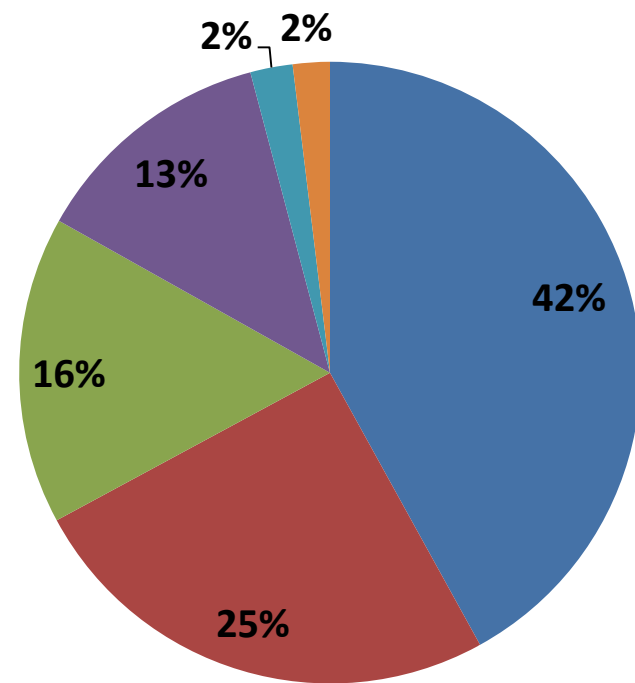
Red Pine and Northern Hardwood Forest Ownership, MI, 2013

Red pine



■ Forest_Service ■ State_Local
■ Family ■ Corporate
■ Other_Private ■ Other_federal

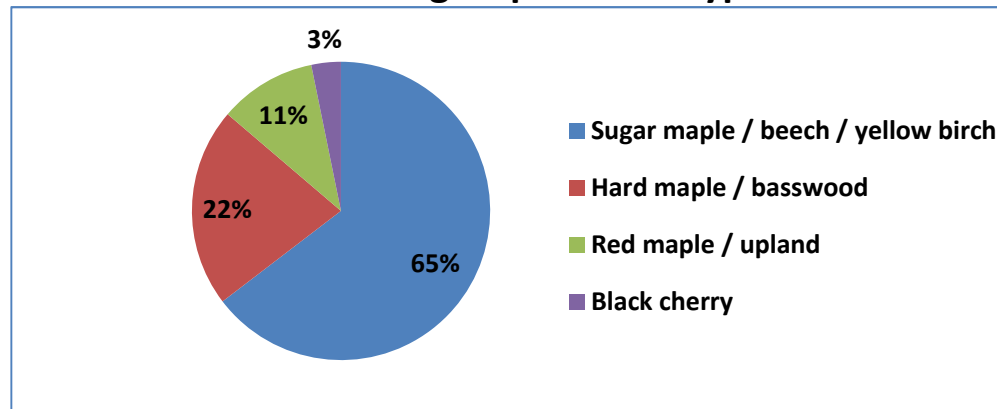
Northern hardwood



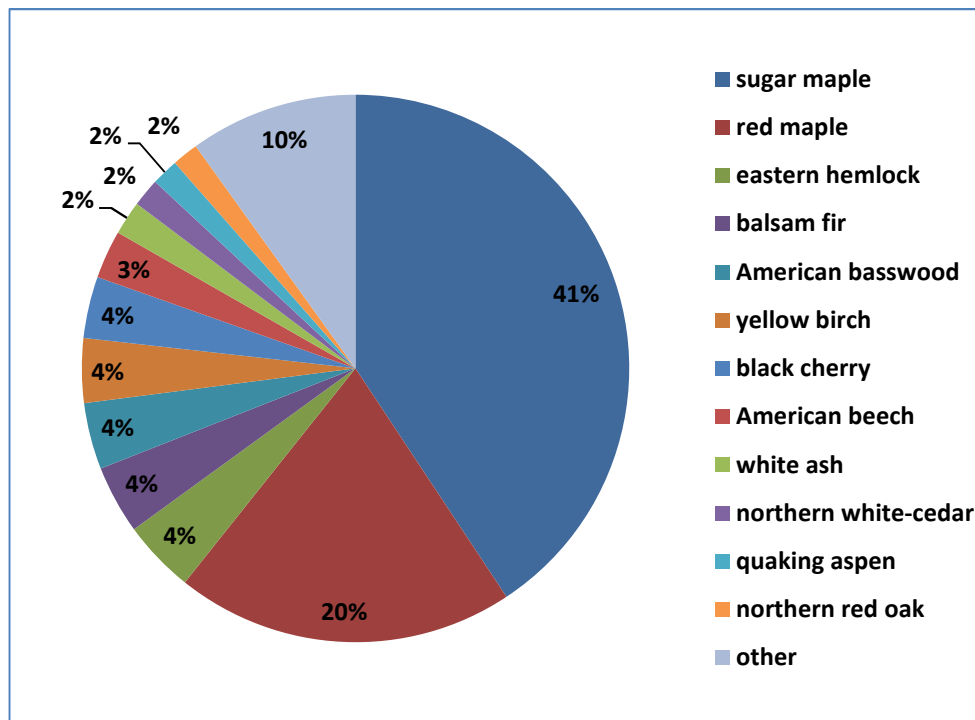
■ Family ■ Corporate
■ State_Local ■ Forest_Service
■ Other_Private ■ Other_federal

Northern Hardwood Timberland -- Forest Type Distribution and Species Composition by # Trees, MI, 2013

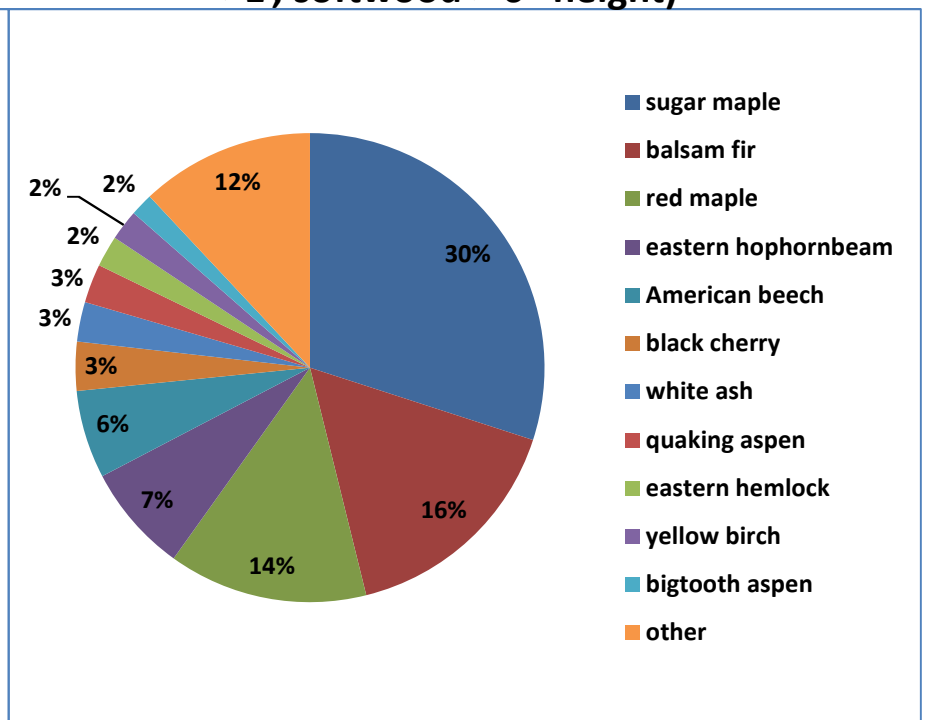
Northern hardwood group – forest type distribution



Species composition, trees $\geq 5''$ dbh



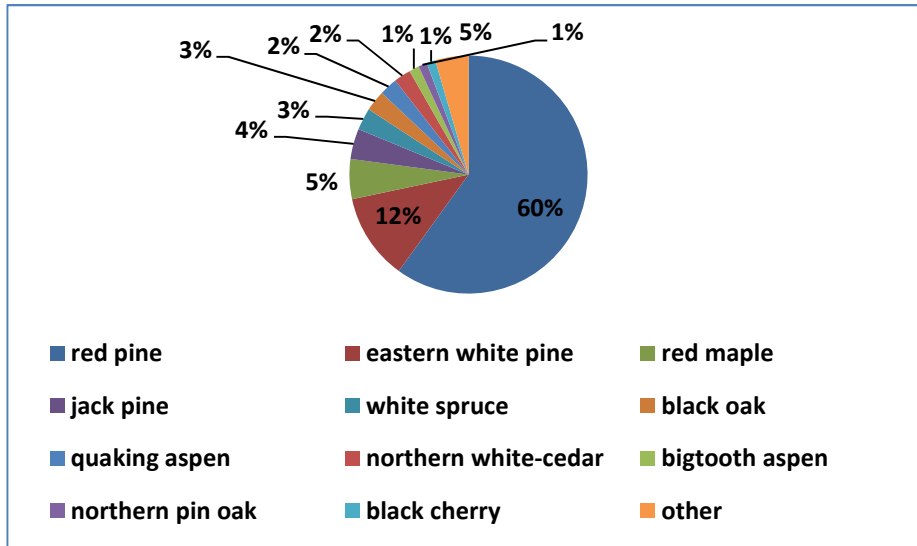
Species composition, saplings, $< 1''$ dbh (hardwood $> 1'$, softwood $> 6''$ height)



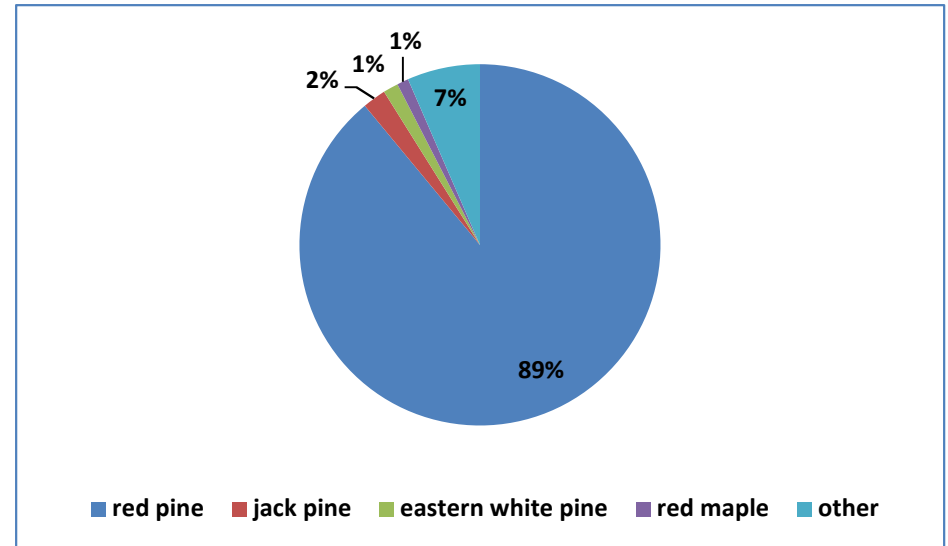
Red Pine Timberland -- Species Composition by # Trees, MI, 2013

Artificial Regeneration Stands 7% in 1980 and 74% in 2000s – change in methods?

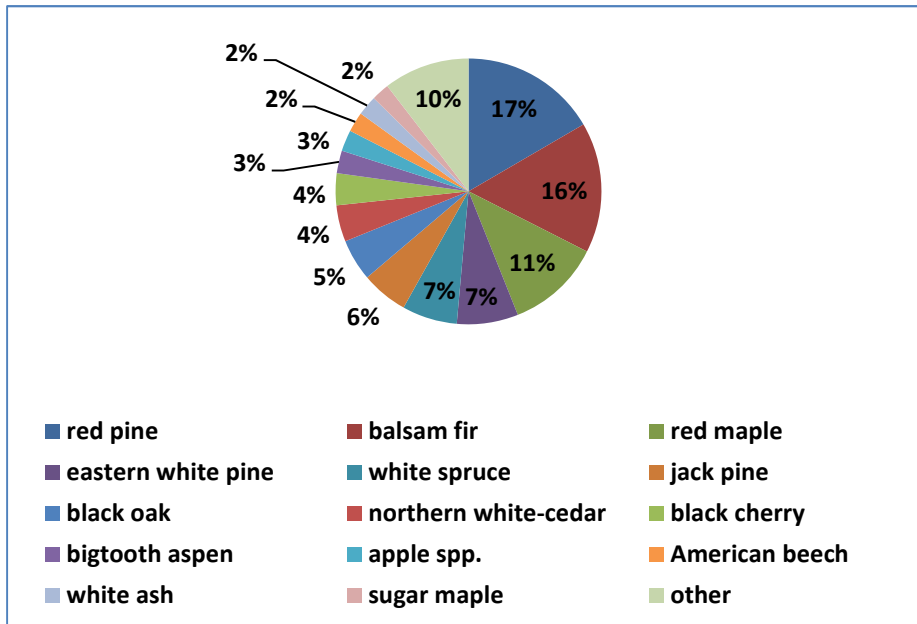
Natural stands, trees $\geq 5''$ dbh



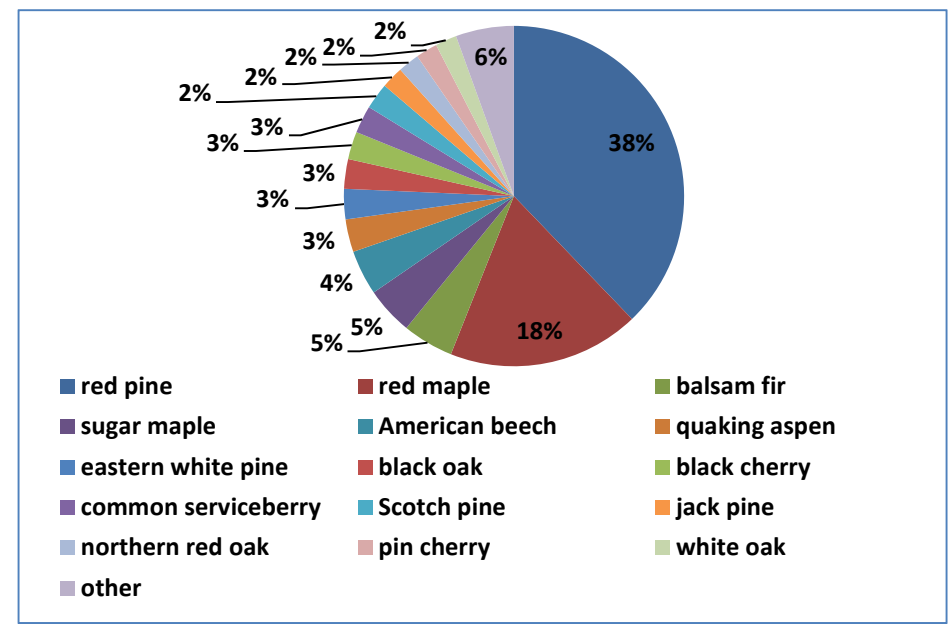
Art. regen. stands, trees $\geq 5''$ dbh



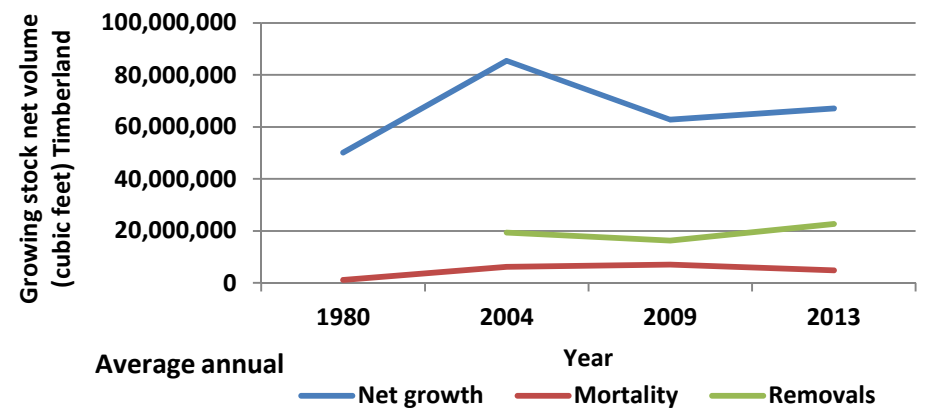
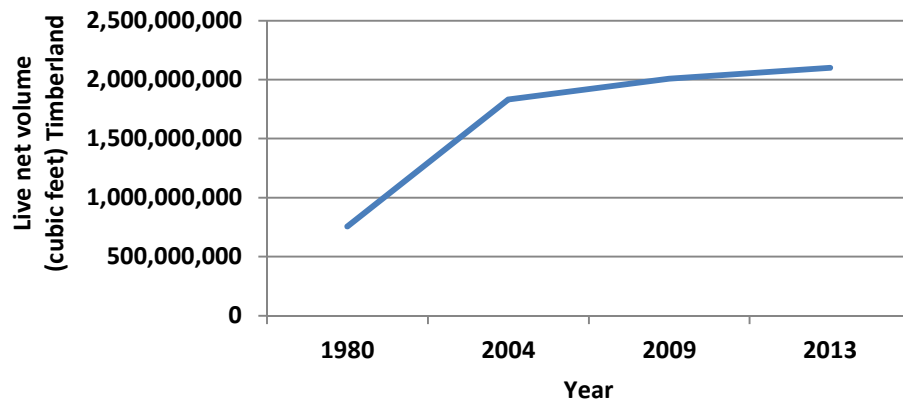
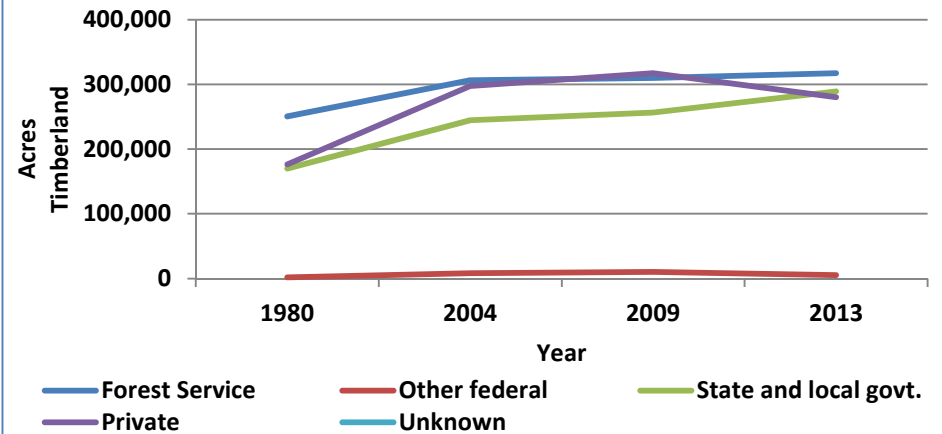
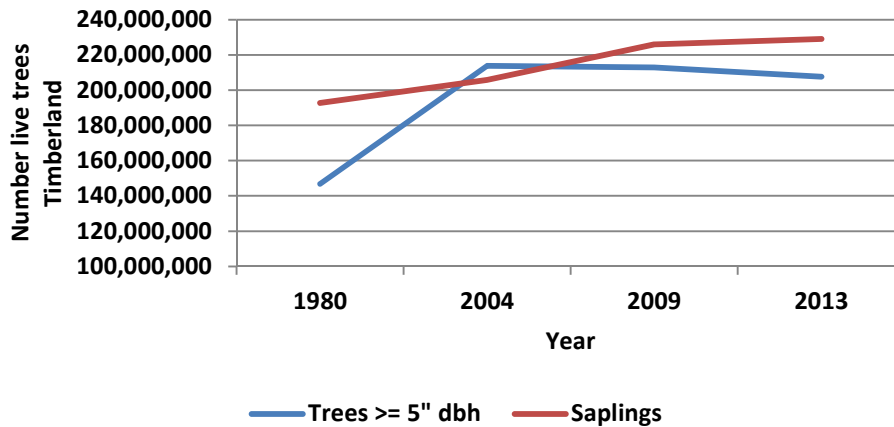
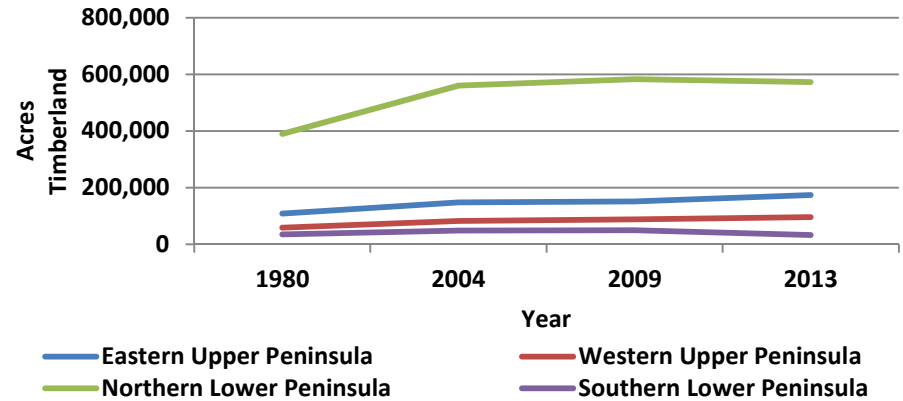
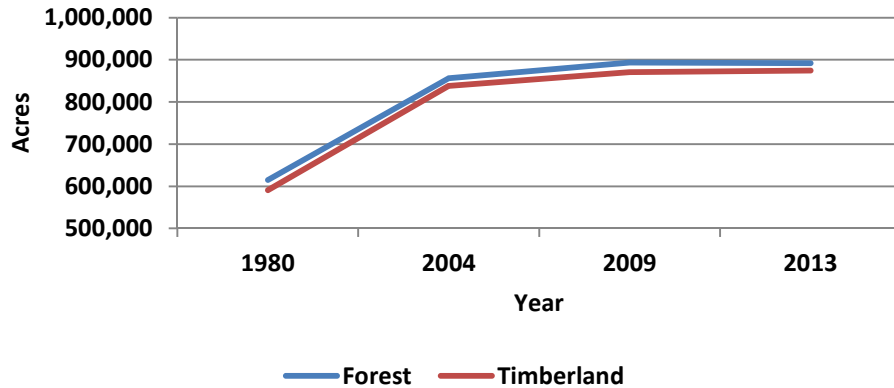
Natural stands, saplings



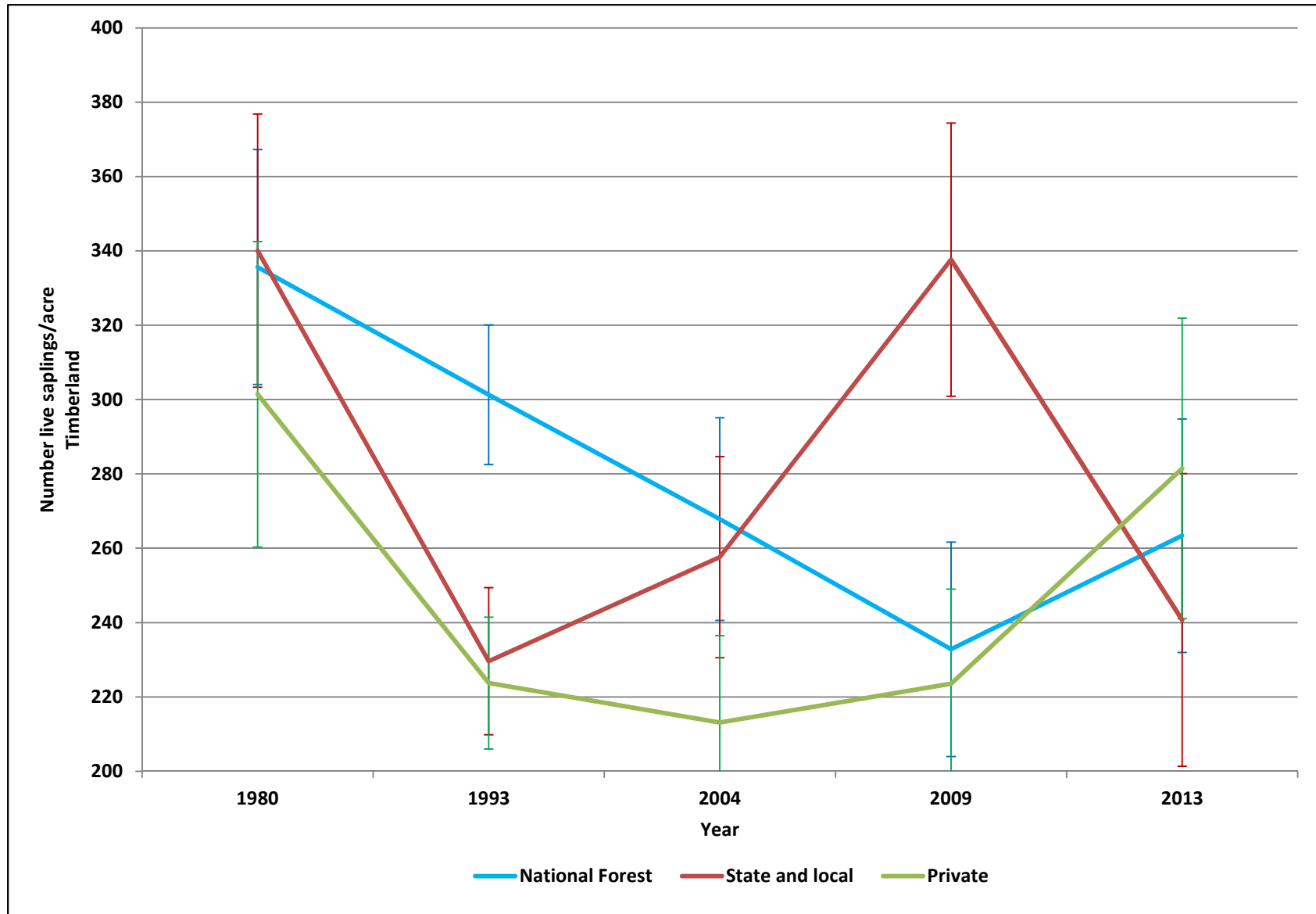
Art. regen. stands, saplings



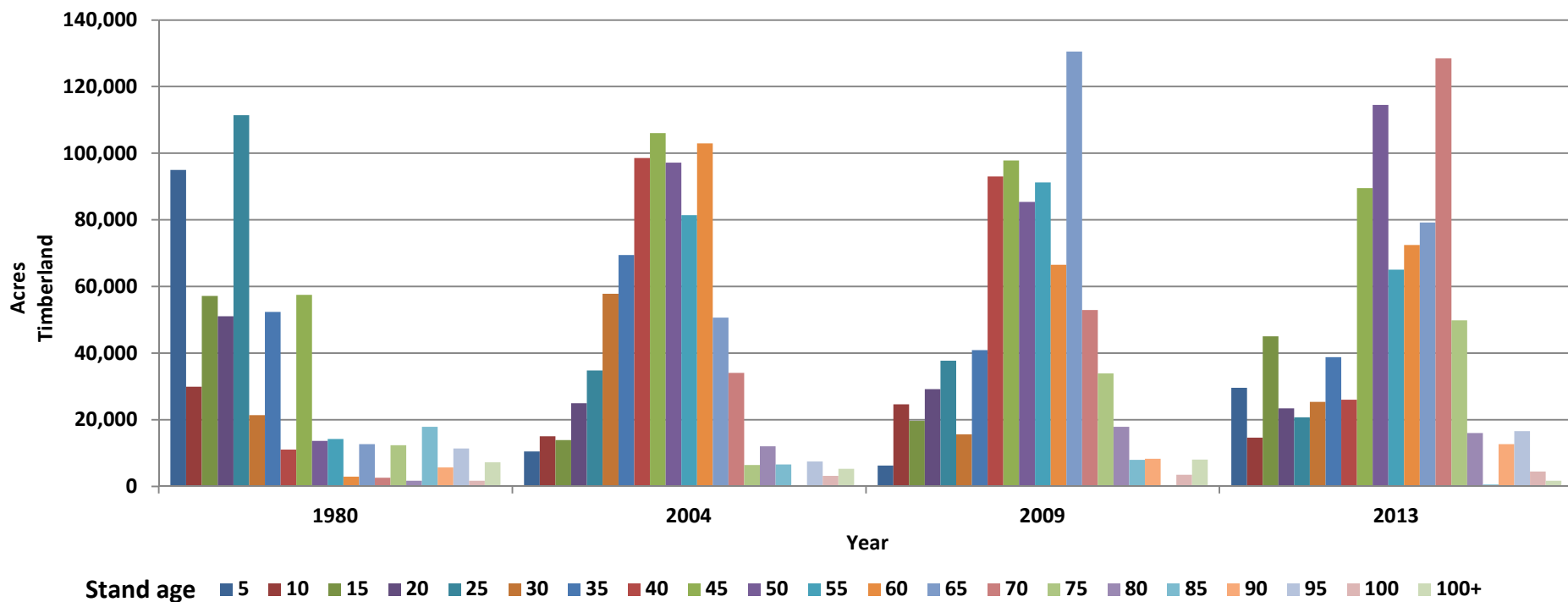
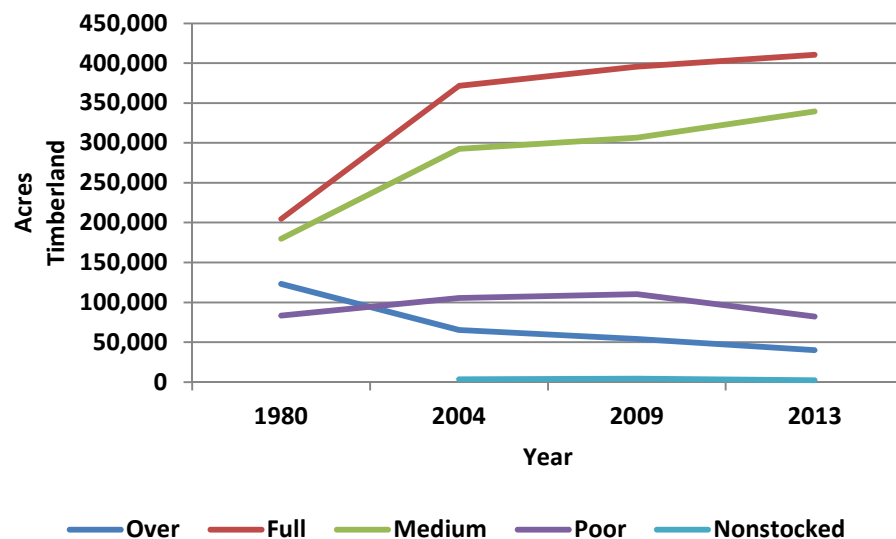
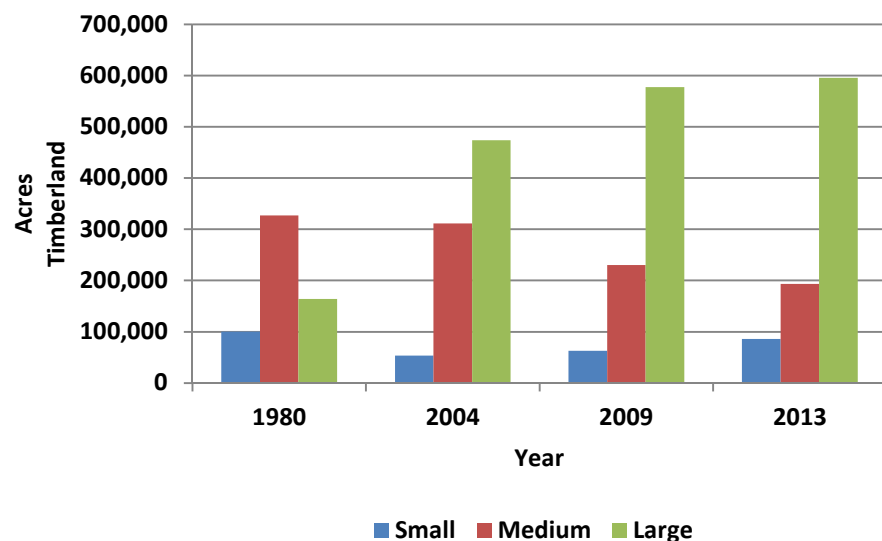
Red Pine Forest and Timberland, MI



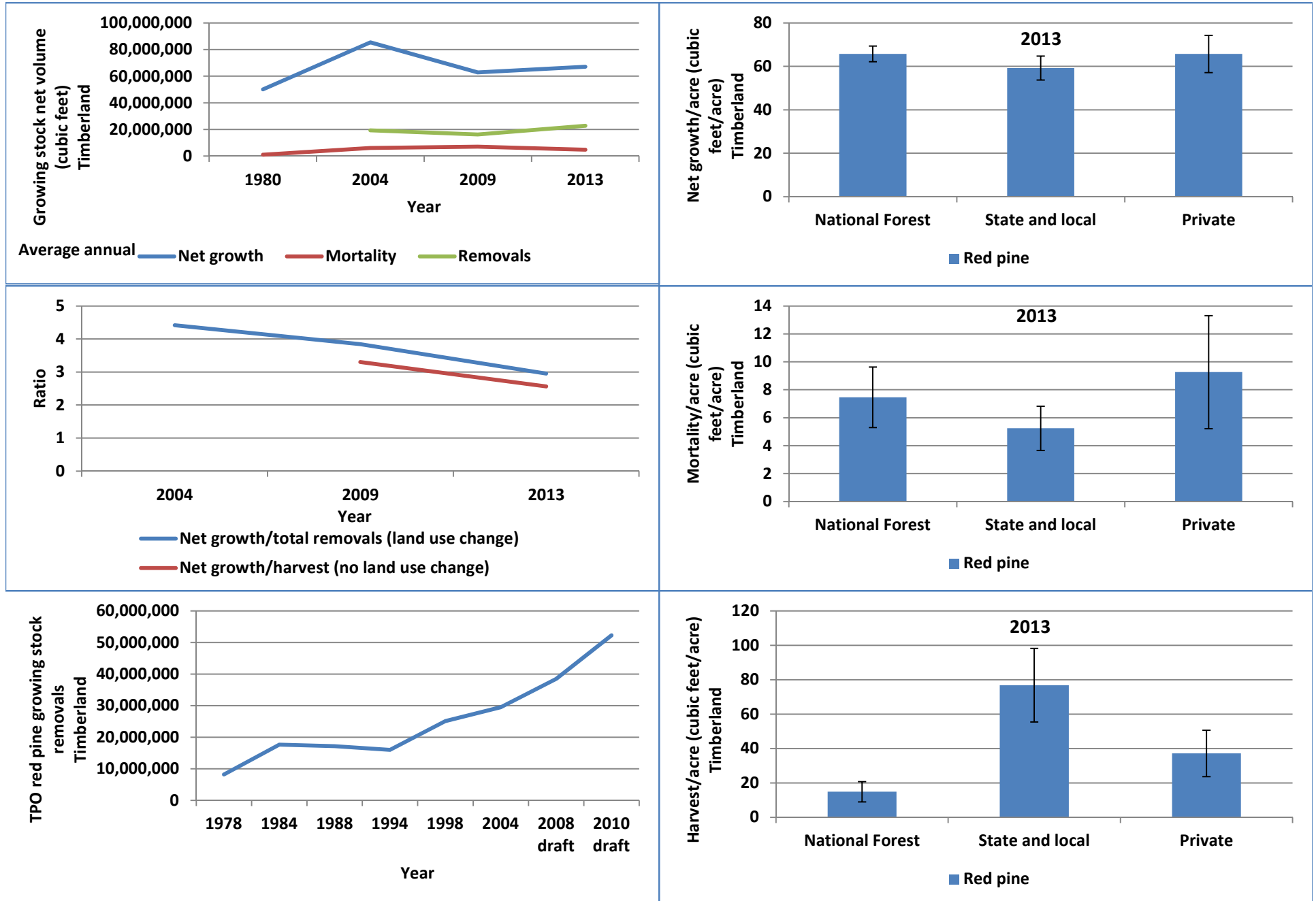
Red Pine Timberland – Saplings/acre, MI



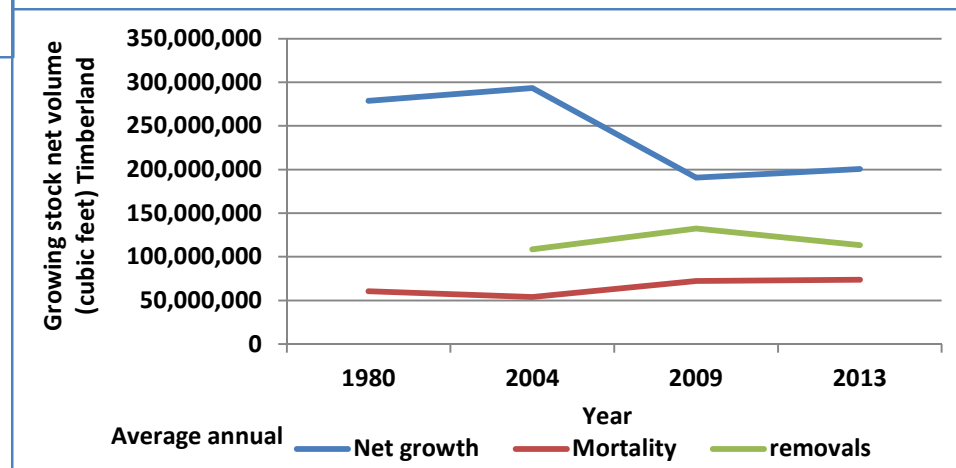
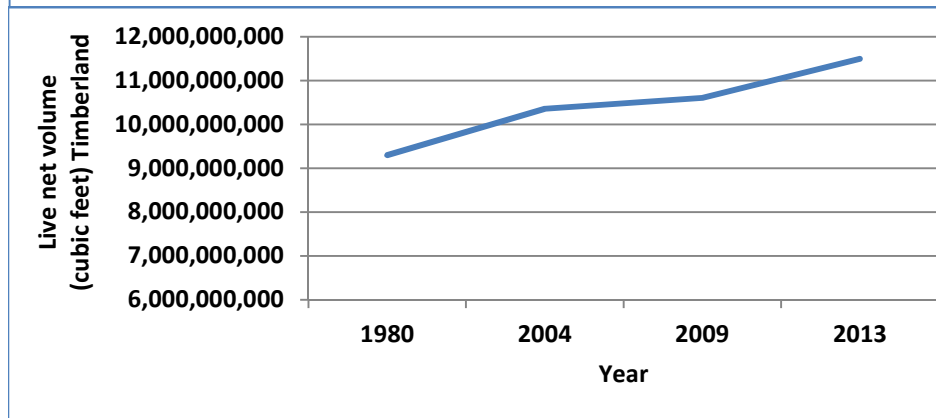
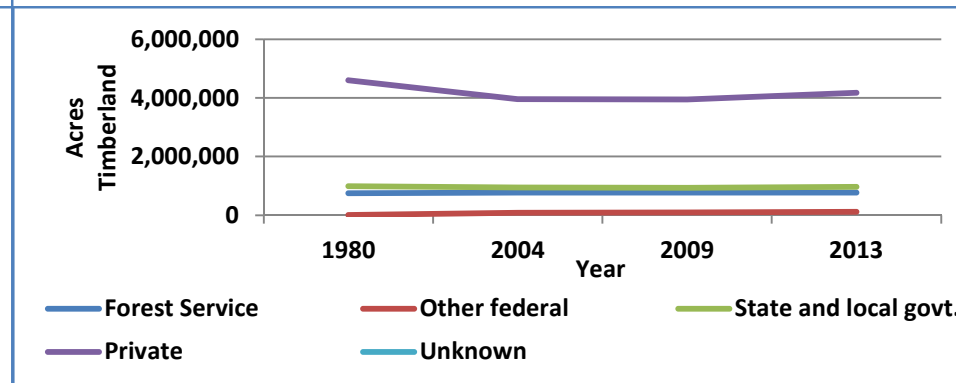
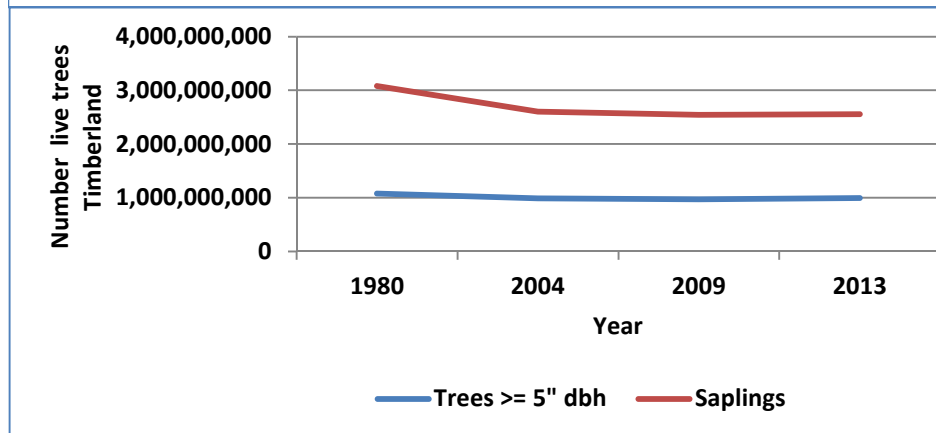
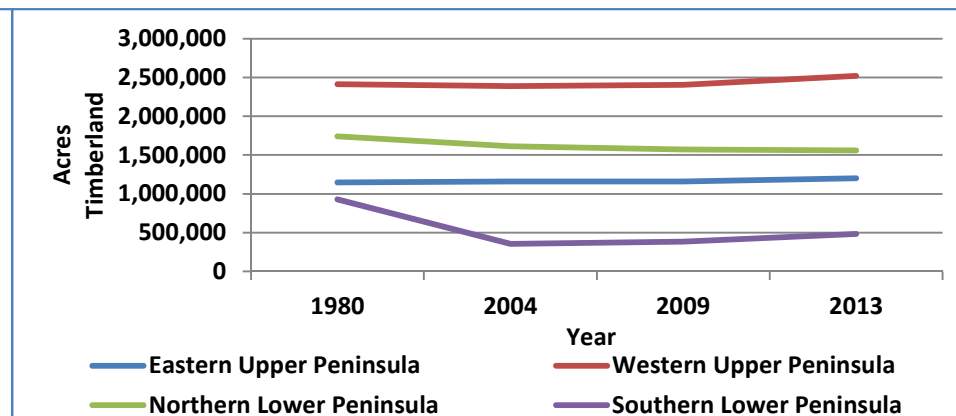
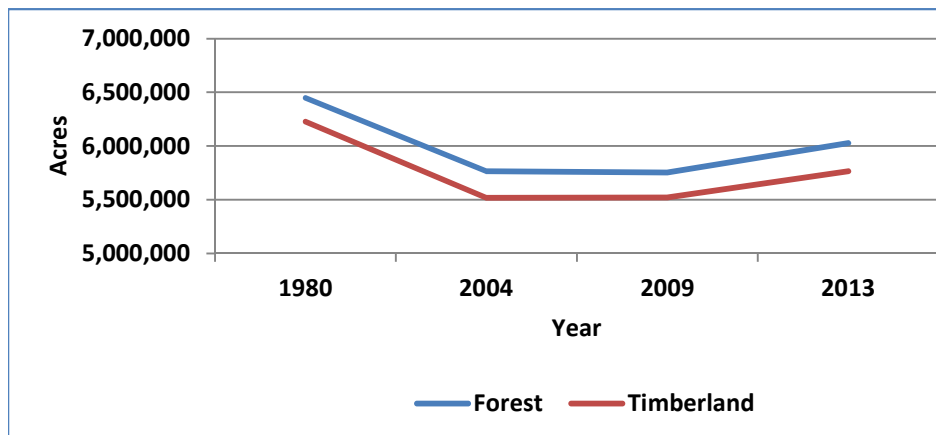
Red Pine Timberland Stand Size, Stocking, and Age, MI



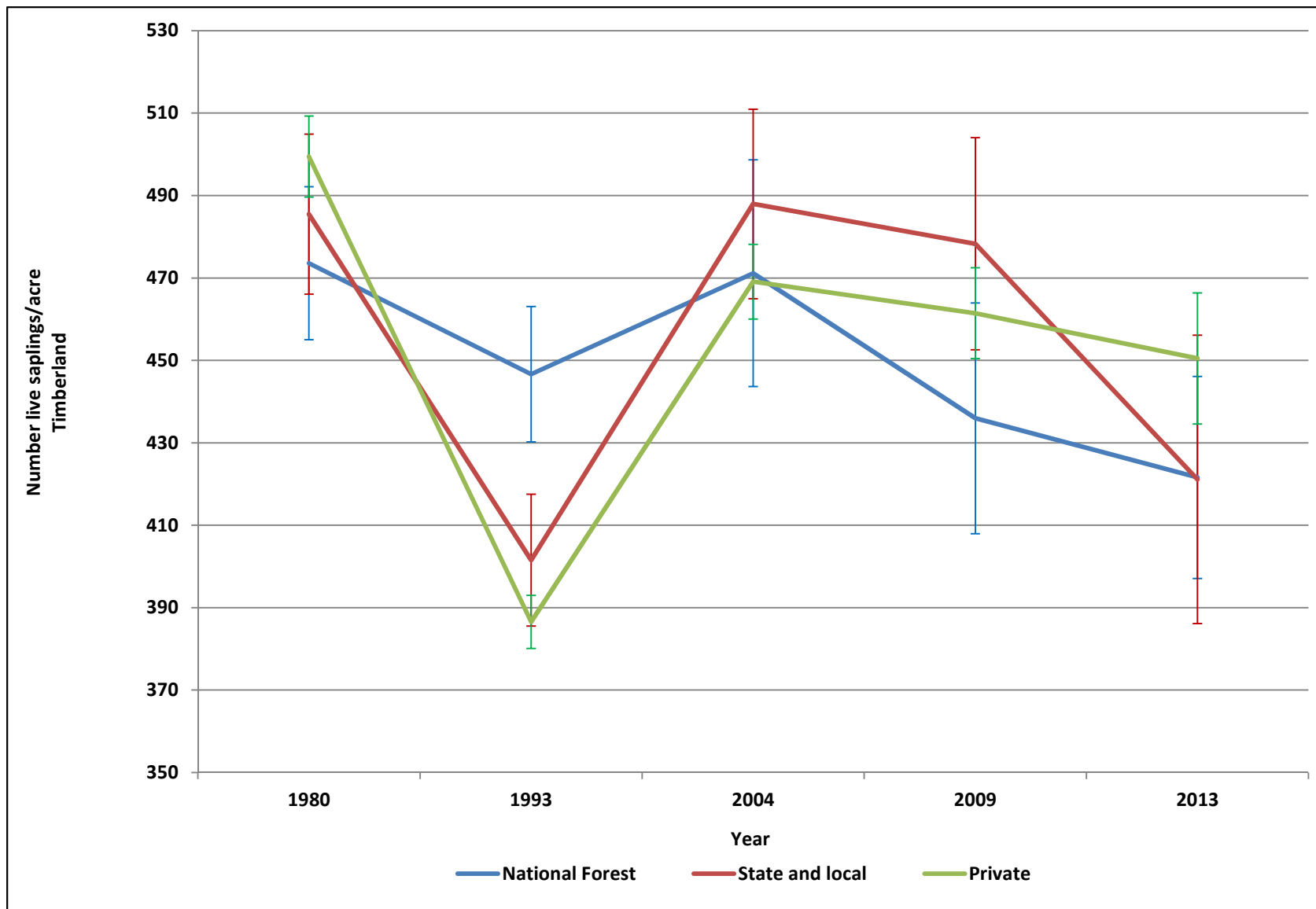
Red Pine Timberland Net Growth, Mortality, and Removals, MI



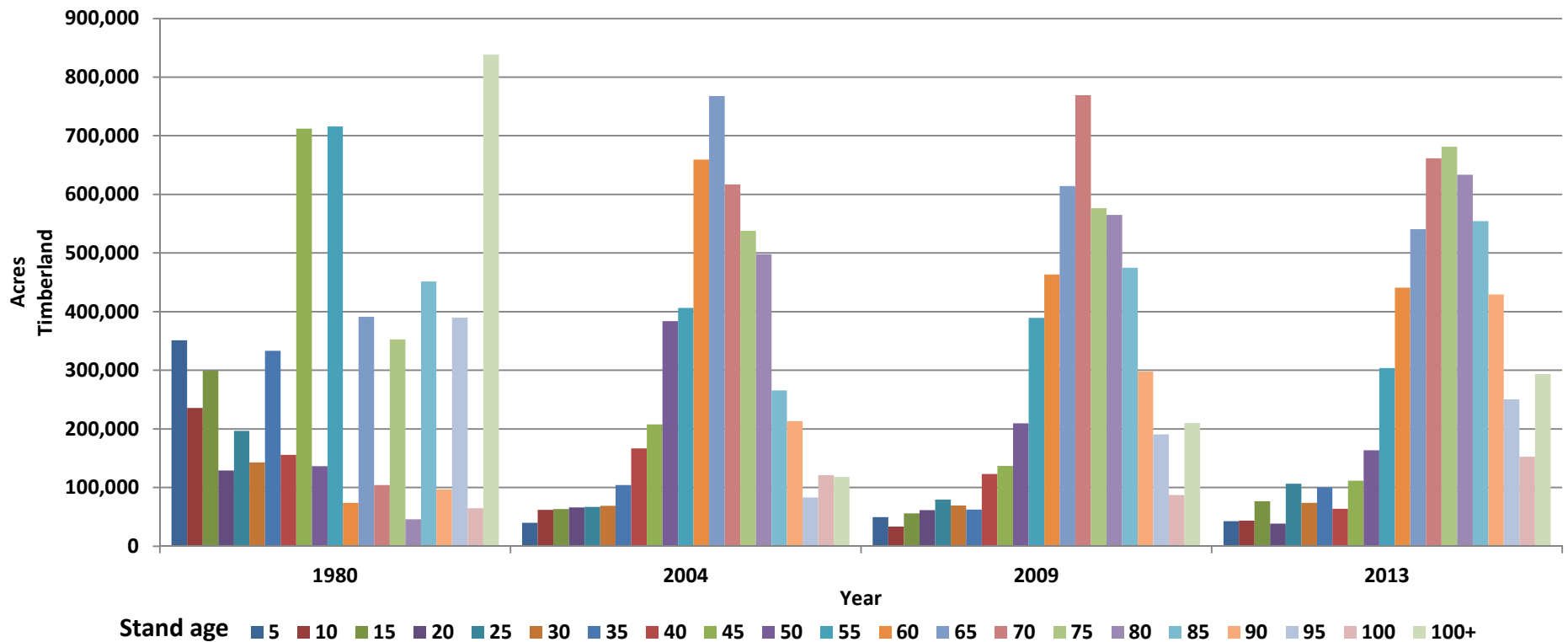
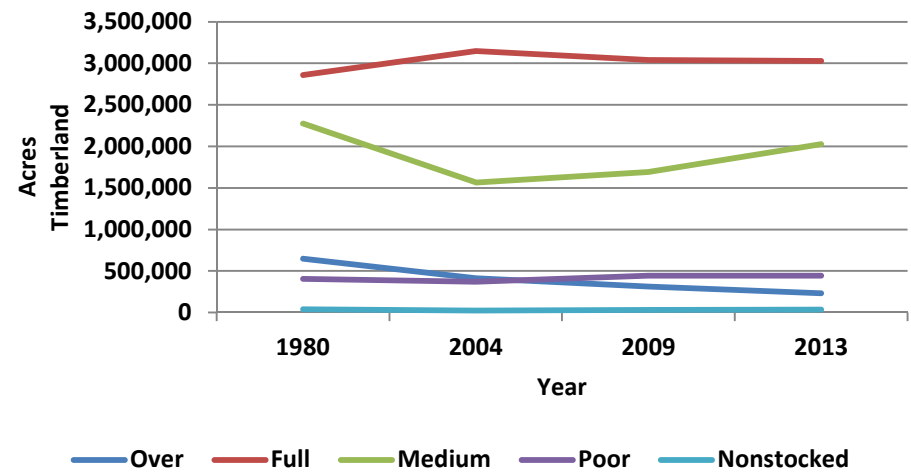
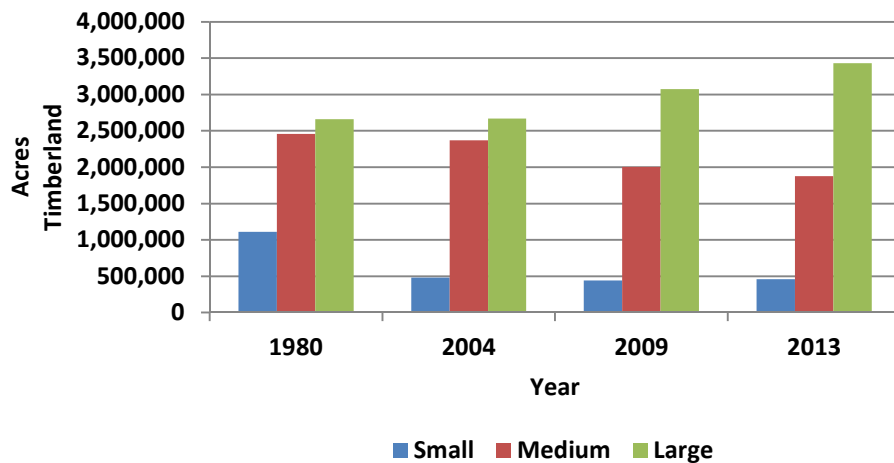
Northern Hardwood Forest and Timberland, MI



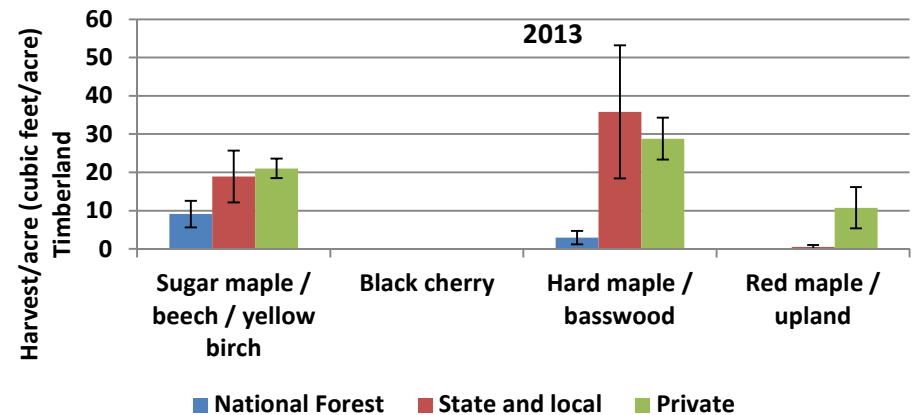
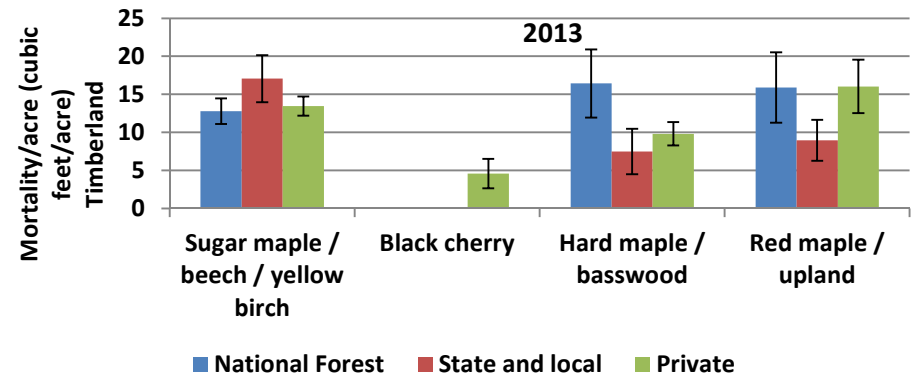
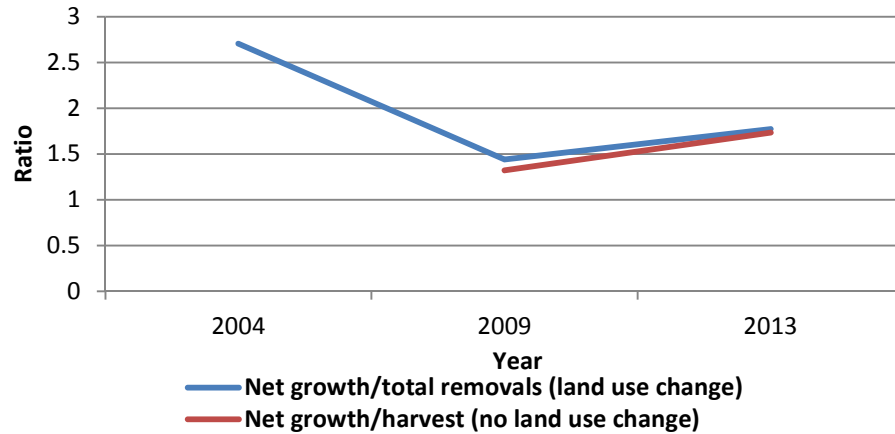
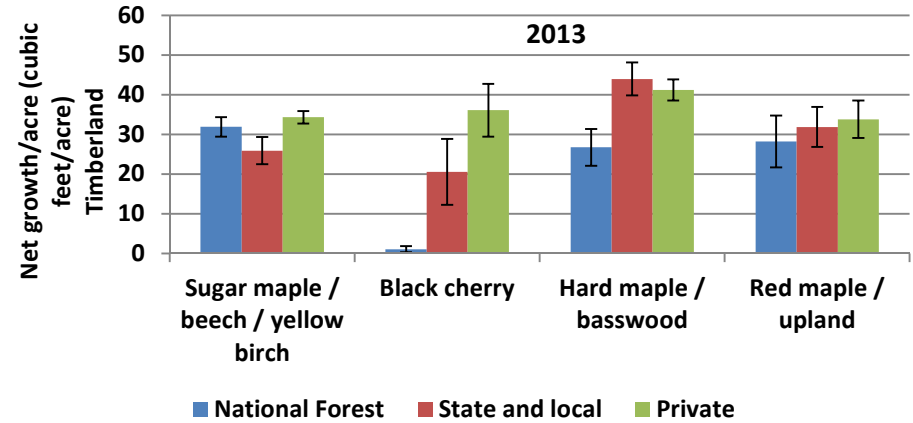
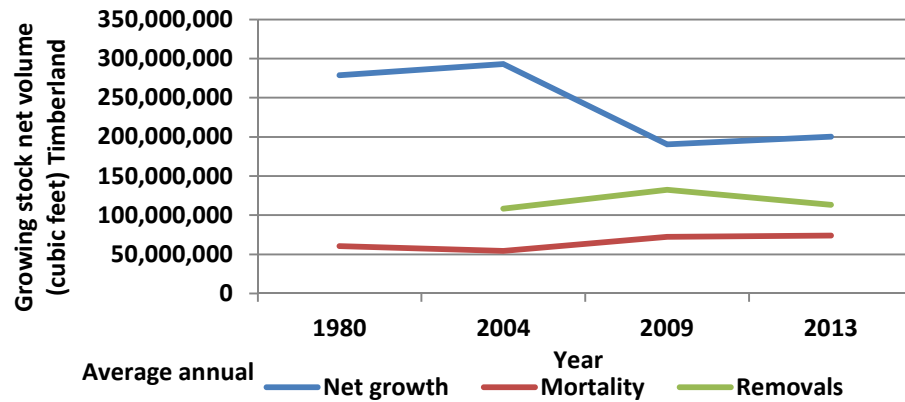
Northern Hardwood Timberland – Saplings/acre, MI



Northern Hardwood Timberland Stand Size, Stocking, and Age, MI



Northern Hardwood Timberland Net Growth, Mortality, and Removals, MI

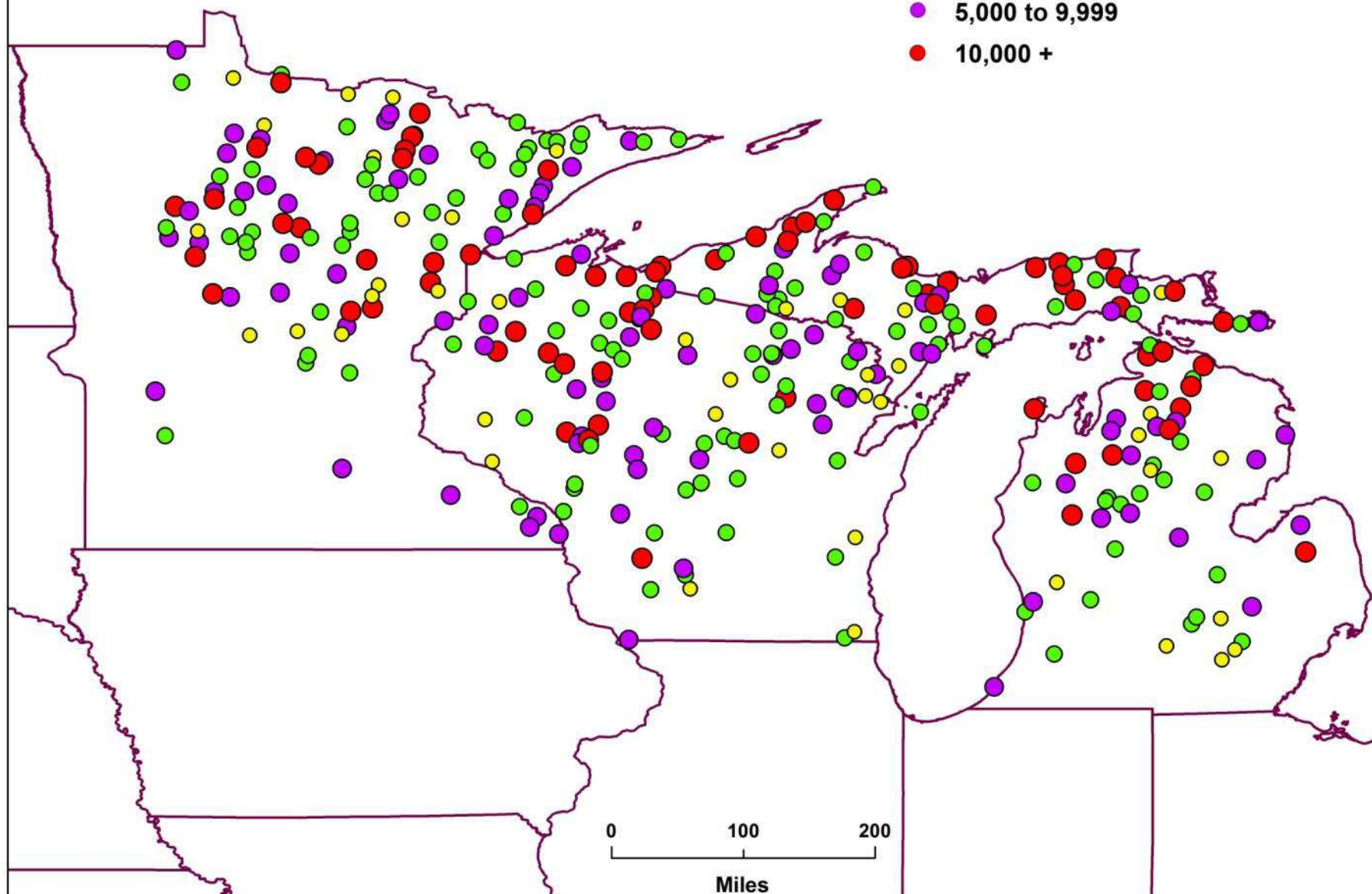




Forest Regeneration; MI, WI, and MN, 2012-2013

Seedlings/acre by plot

- Less than 1,000
- 1,000 to 4,999
- 5,000 to 9,999
- 10,000 +

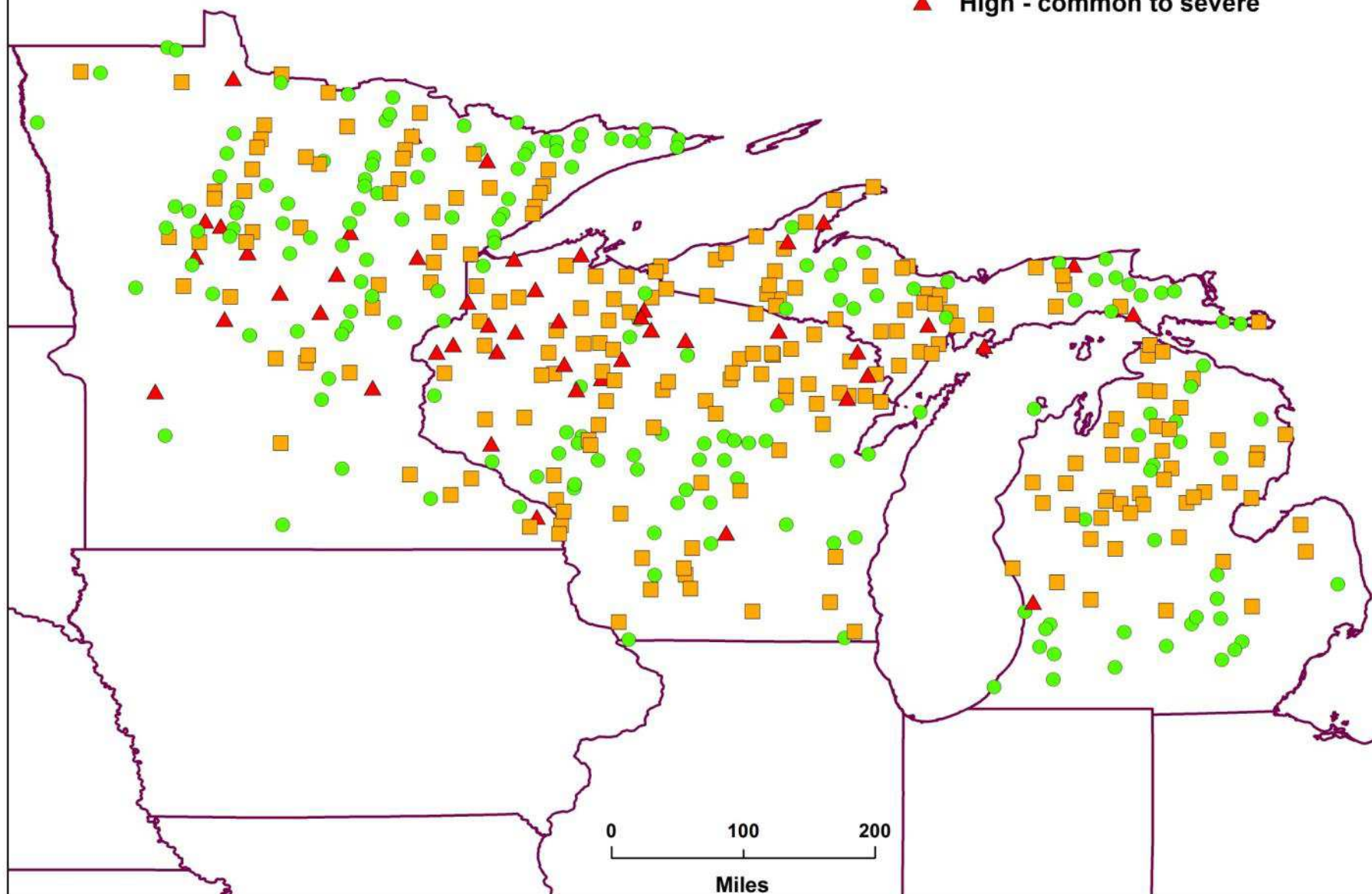




Forest Browse Impact; MI, WI, and MN, 2012-2013

Browse impact - plot level

- Low - not evident
- Medium - evident
- ▲ High - common to severe

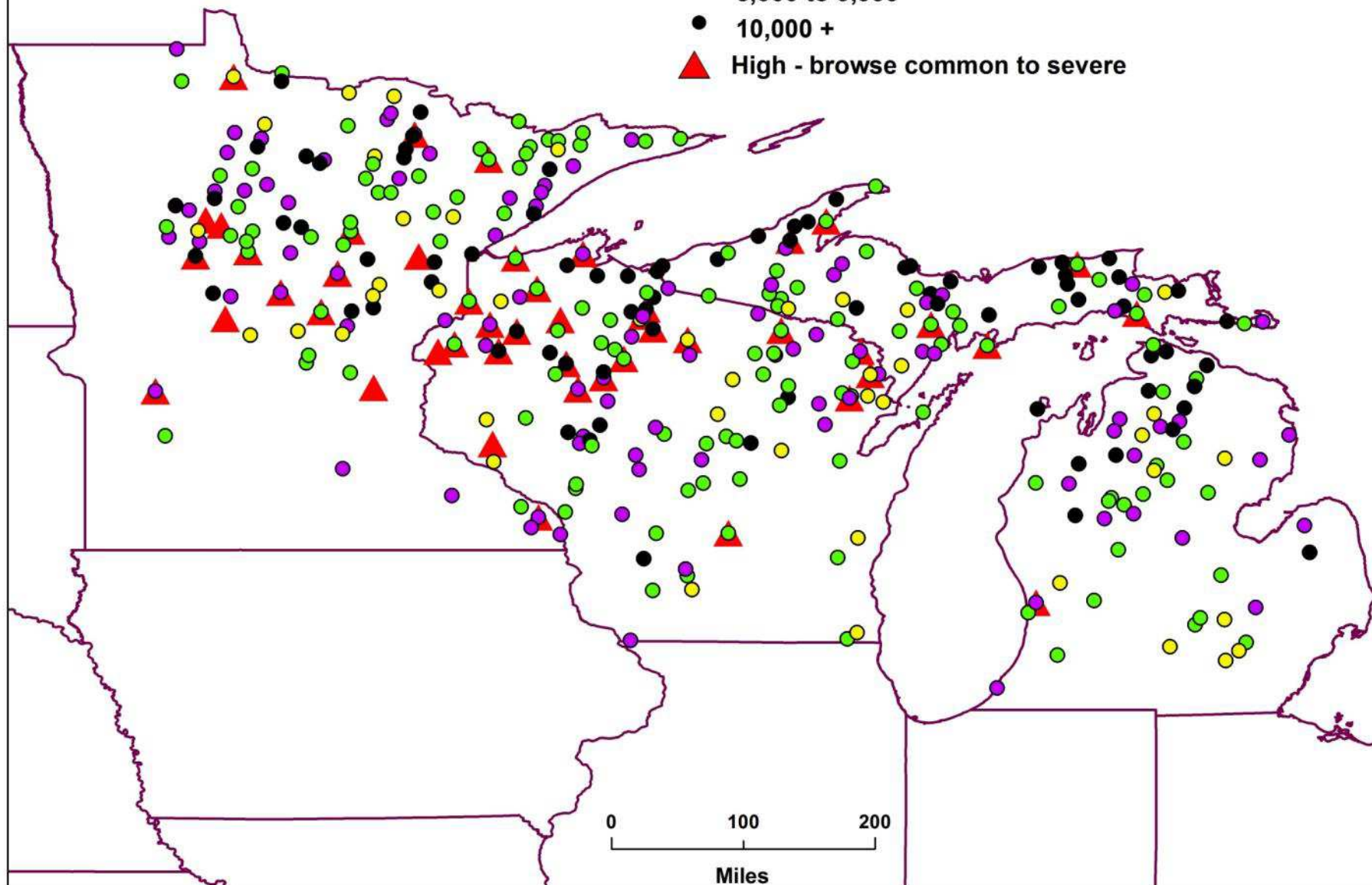




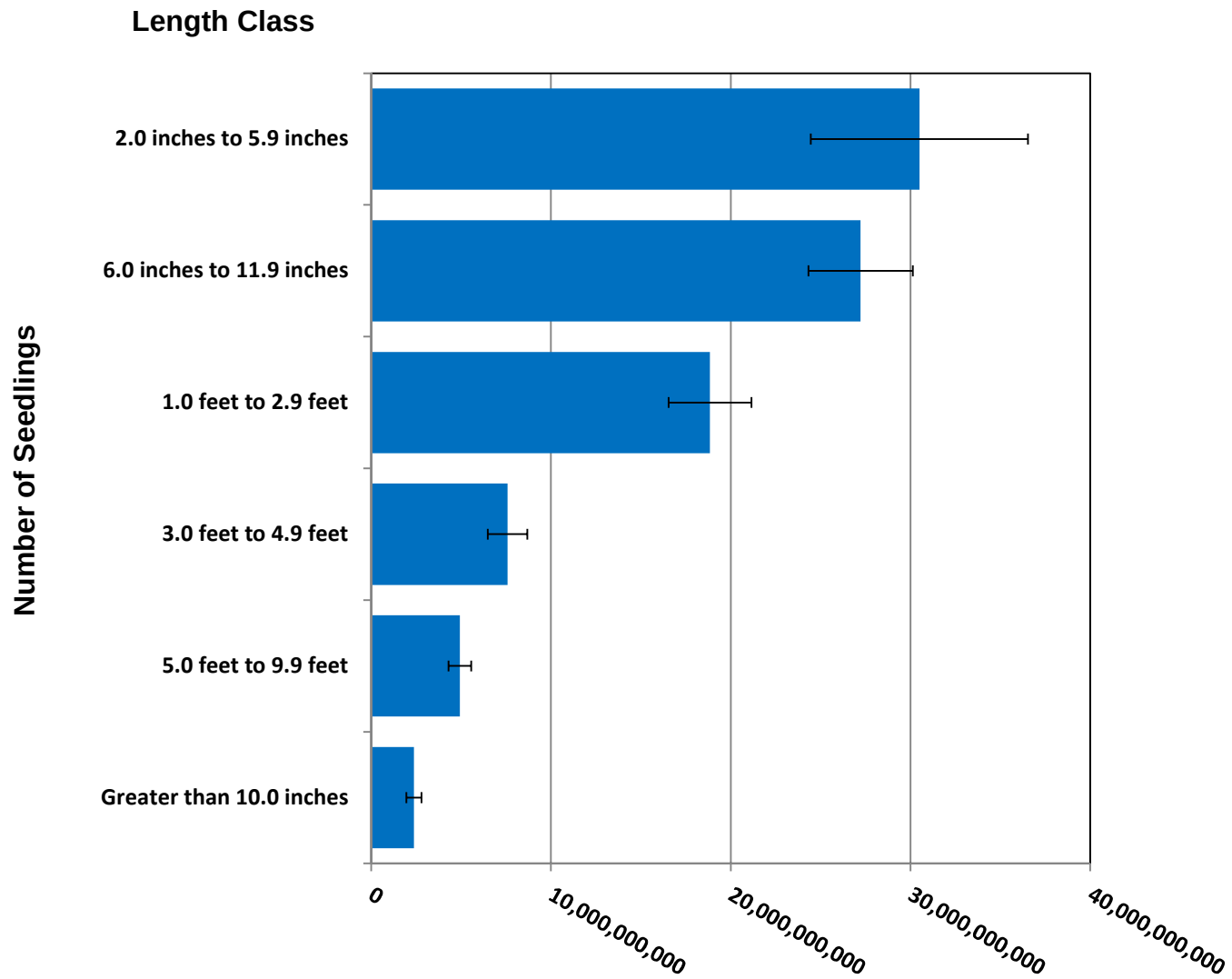
Forest Regeneration and High Browse; MI, WI, and MN 2012-2013

Seedling/acre and high browse impact

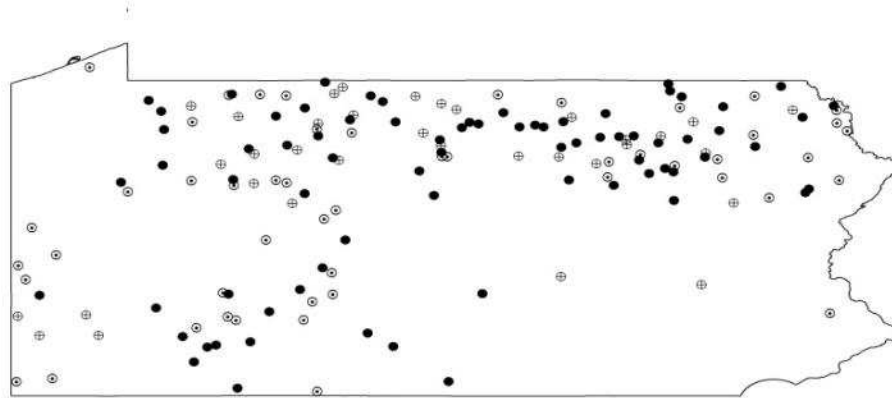
- Less than 1,000
- 1,000 to 4,999
- 5,000 to 9,999
- 10,000 +
- ▲ High - browse common to severe



Number of Seedlings by Length Class, WI, 2012-2013.



Distribution of Adequate Advance Regeneration, PA, 2012 - 2013



- Proportion of microplots adequate greater than .70
- ⊕ Proportion of microplots adequate from .50 to .69
- ⊙ Proportion of microplots adequate less than .50

↑ North

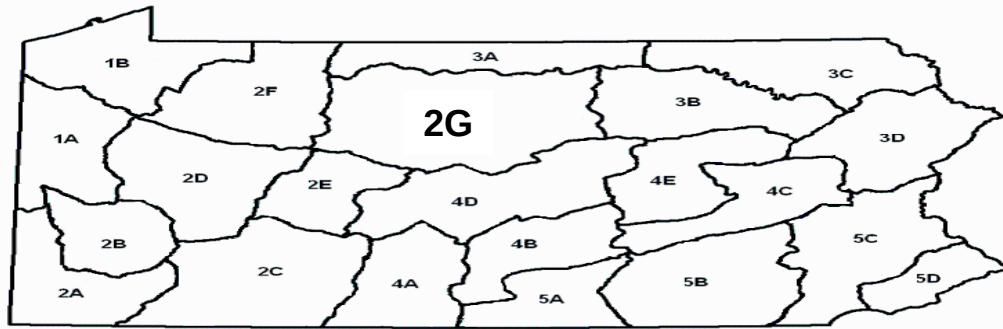
Number of conditions sampled = 159

Number of microplots sampled = 579

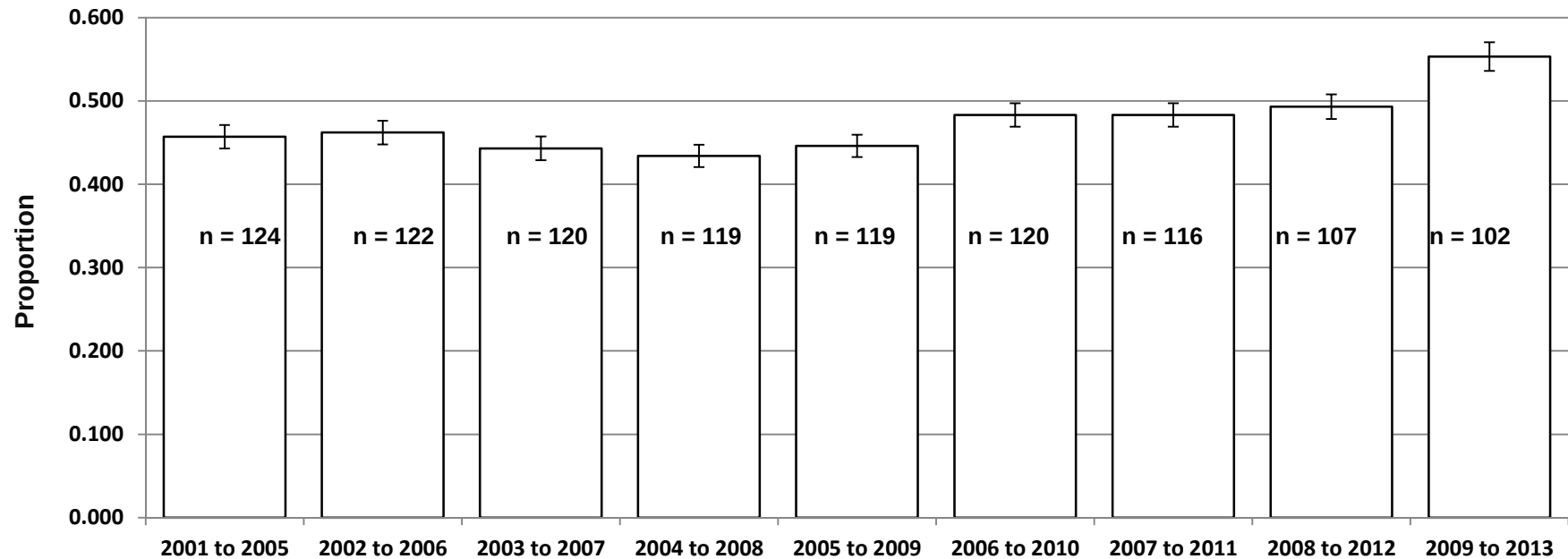
Average proportion of conditions sampled = .56

Distribution of samples on forest land classified as the Northern Hardwood forest-type group and 40- to 75-percent stocked with live trees by proportion of microplots with adequate advance regeneration of canopy replacement species, Pennsylvania, 2012 and 2013. Sample locations are approximate.

Change in Adequate Regeneration for Unit 2G, PA, 2001-2005 to 2007-2011



Pennsylvania Wildlife Management Units



Pennsylvania Wildlife Management Units (WMU) and proportion of samples adequately stocked with advance tree seedling and sapling regeneration for canopy replacement species and samples 40- to 75-percent stocked with trees, Wildlife Management Unit 2G, Pennsylvania, 2001-2005 to 2007-2011. Sampling errors (SE) are shown for the 68-percent confidence level. Number of samples is shown for each estimate.

