The Regeneration Indicator: Data and Uses

Why Is It Important?
What Is It?
What Does It tell Us?
Update/Discussion

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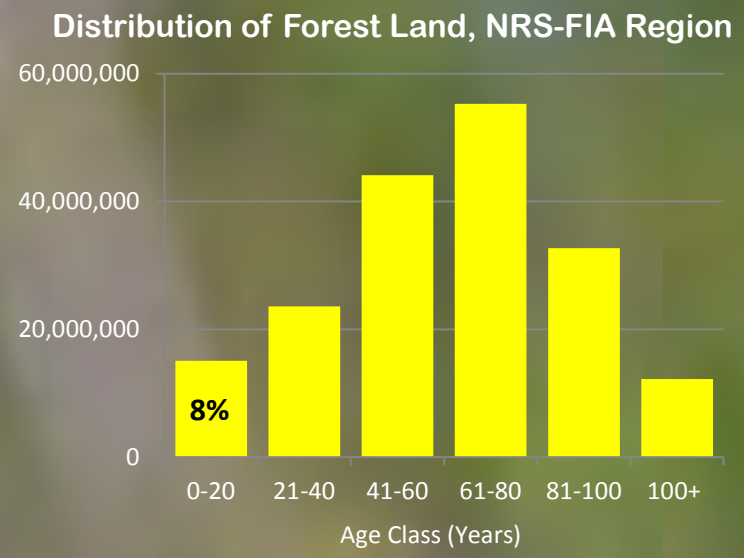
Regeneration Indicator

Why Important?

Because Aging Forests Will Eventually Need Replaced !

Regeneration Indicator

Why Important?



Healthy Young Forests Are Important!

Rare Across the Landscape

Support Unique Wildlife Species

Contribute to Biodiversity

Regeneration Drives Young Forest Habitat Quality

Young Forest Habitat Quality Drives Forest Sustainability

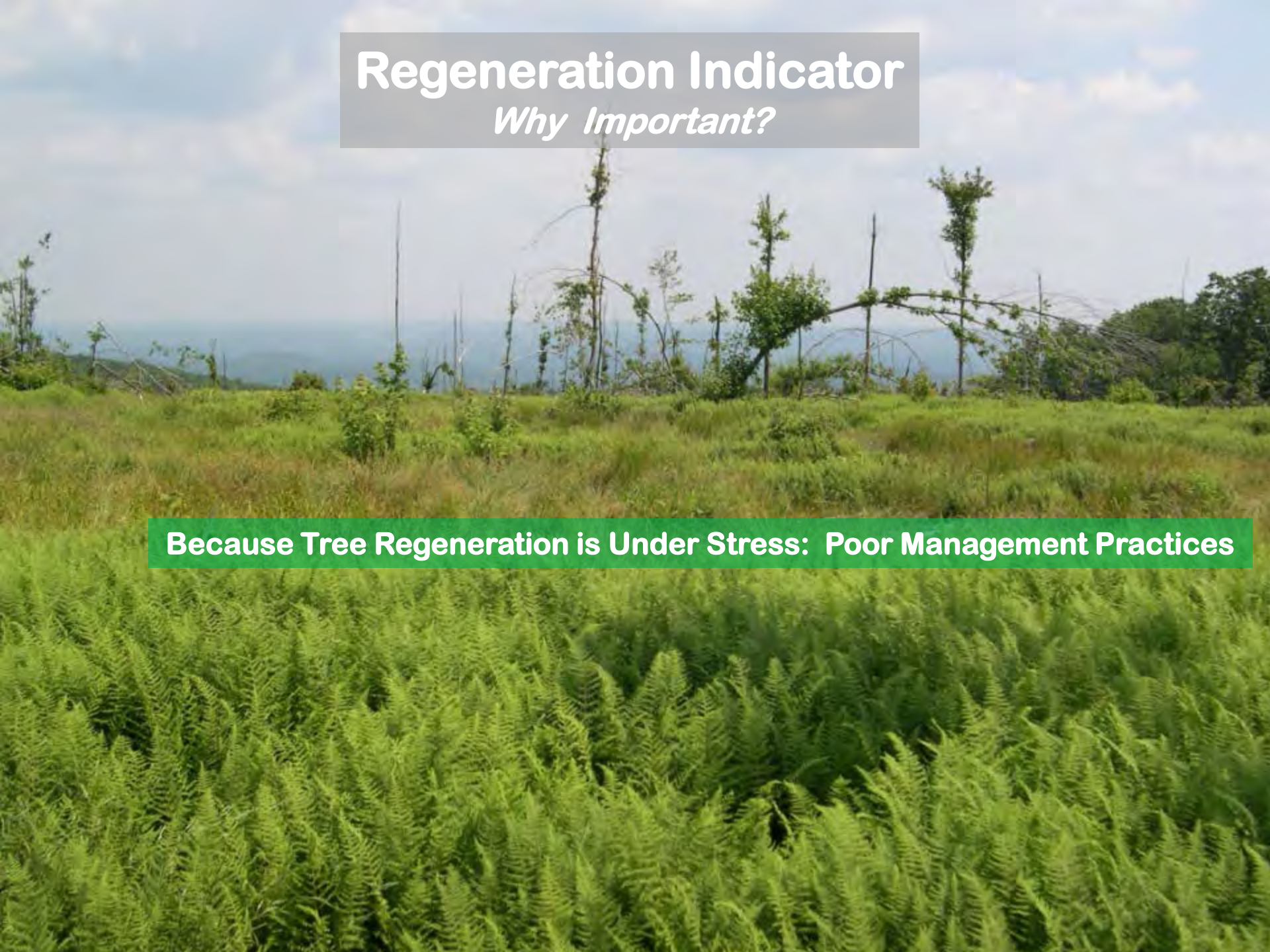
Golden-Winged Warbler (*Vermivora chrysoptera*)
Photo by Cristian Artuso

Regeneration Indicator
Why Important?
Because Tree Regeneration is Under Stress: Non-Native Invasive Plants

Regeneration Indicator
Why Important?
Because Tree Regeneration is Under Stress: Native Plants

Regeneration Indicator

Why Important?



Because Tree Regeneration is Under Stress: Poor Management Practices

Regeneration Indicator

Why Important?

Because Tree Regeneration is Under Stress: Browse Pressure

Photo by Scott Bauer, Bugwood.org

Regeneration Indicator

Why Important?

Because Tree Regeneration is Under Stress:

Climate Change
Soil Chemistry
Local Weather Conditions
Poor Seed Production
Native and Non-Native Insects and Diseases
Fire Exclusion
Owner Objectives
Forest Fragmentation
Multiple Stress Interactions!

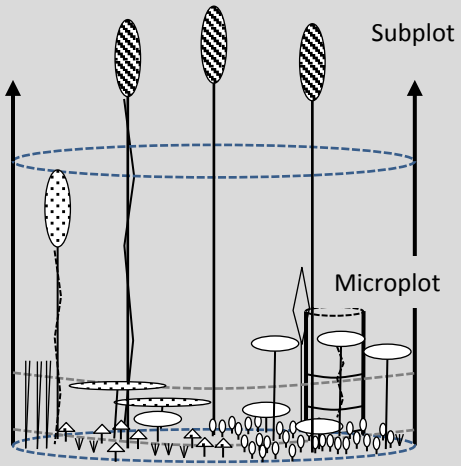
Regeneration Indicator

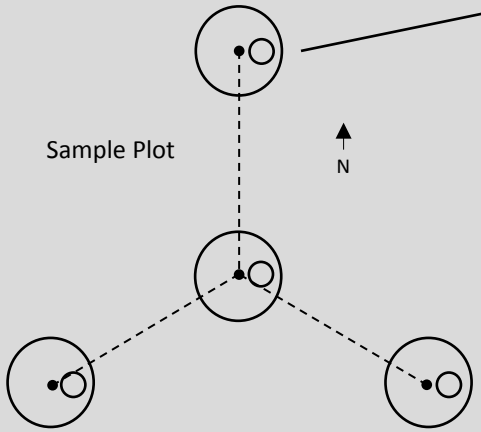
What Is It?

1. All Samples (Phase 2)

Tree Damage
Species Composition
Forest Structure
Timber Volume
Woody Biomass

Carbon Stocks/Fluxes
Climate Change Impacts
Forest Land Status and Trends
Many Others





2. Summer Samples (Phase 2-plus)

Down Woody Material
Tree Crown Condition
Soils

1. Vegetation Profile
2. Invasive Plants Survey
3. Regeneration Survey

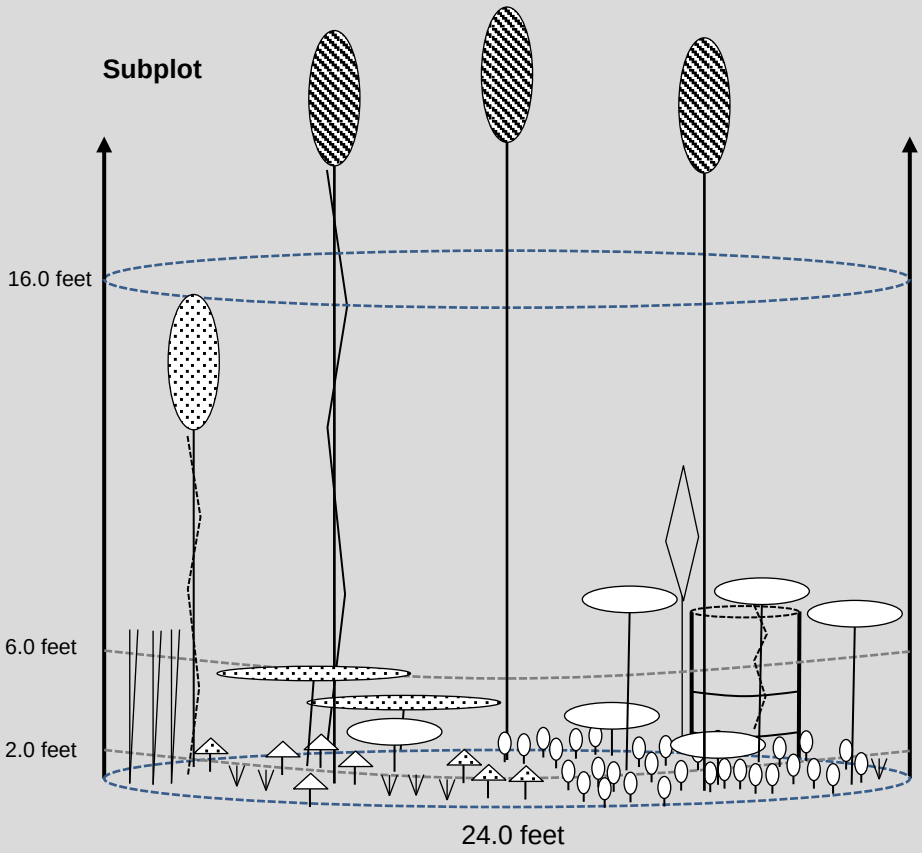
3. Urban Forest (under development)

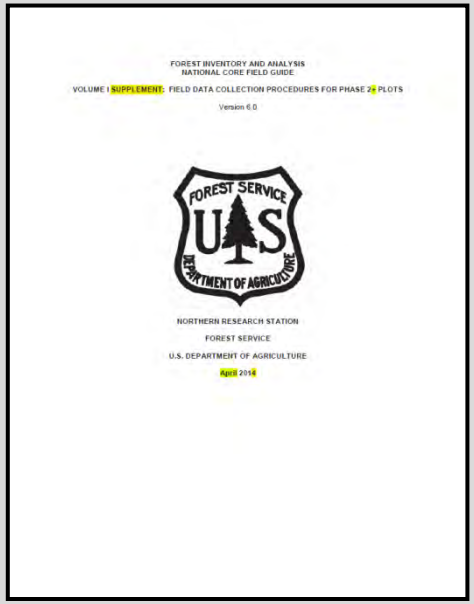
4. Non-Forest with Trees (coming soon)

Regeneration Indicator

What Is It?

1. Vegetation Profile: Percent Cover by Growth Habit




FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE

VOLUME I SUPPLEMENT: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2+ PLOTS

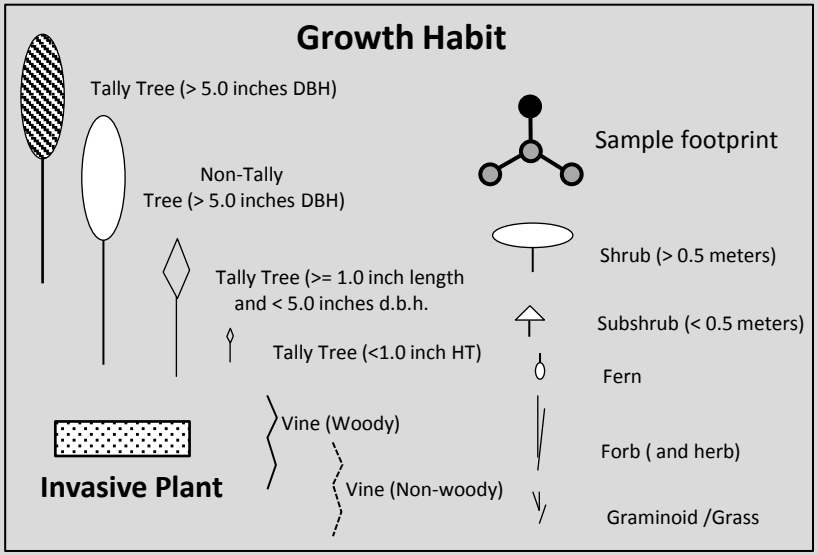
Version 6.0

NORTHERN RESEARCH STATION

FOREST SERVICE

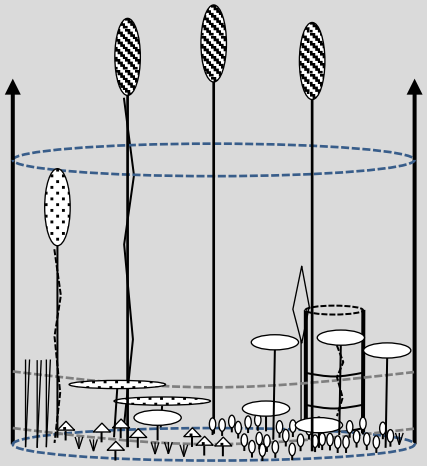
U.S. DEPARTMENT OF AGRICULTURE

April 2018

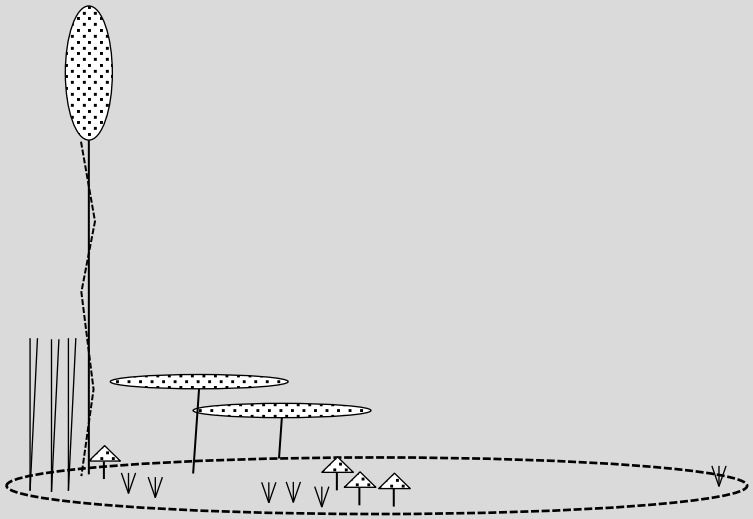


Regeneration Indicator

What Is It?



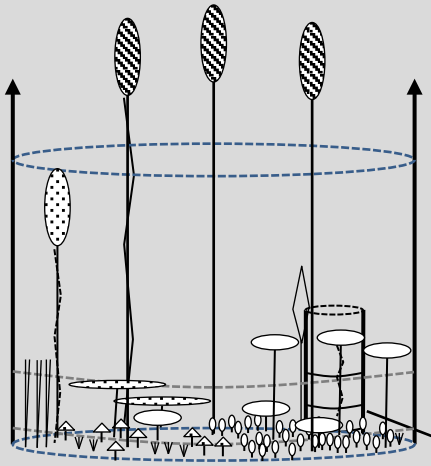
2. Invasive Plant Survey: Cover Percent for 43 Select Species



Common name	Scientific name	Common name	Scientific name
Tree:		**Grass**:	
Black locust	*Robinia pseudoacacia*	Common reed	*Phragmites australi*
Chinaberry	*Melia azedarach*	Japanese stiltgrass	*Microstegium vimineum*
Norway maple	*Acer platanoides*	Reed canarygrass	*Phalaris arundinacea*
Princesstree	*Paulownia tomentosa*		
Punktree	*Melaleuca quinquenrvia*	**Herbaceous**:	
Russian olive	*Elaeagnus angustifolia*	Bohemian knotweed	*Polygonum bohemica*
Saltcedar	*Tamrix ramosissima*	Bull thistle	*Cirsium vulgare*
Siberian elm	*Ulmus pumila*	Canada thistle	*Cirsium arvense*
Silktree	*Albizia julibrissin*	Creeping jenny	*Lysimachia nummulari*
Tallow tree	*Triadica sebifera*	Dames rocket	*Hesperis matronalis*
Tree-of-heaven	*Ailanthus altissima*	European Swallow-wort	*Cynanchum rossicum*
		Garlic mustard	*Alliaria petiolata*
Woody shrub:		Giant knotweed	*Polygonum sachalinense*
Amur honeysuckle	*Lonicera maackii*	Japanese knotweed	*Polygonum cuspidatum*
Autumn olive	*Elaeagnus umbellatea*	Leafy spurge	*Euphorbia esula*
Common barberry	*Berberis vulgaris*	Louise's swallow-wort	*Cynanchum louis*
Common buckthorn	*Rhamus cathartica*	Purple loosestrife	*Lythrum salicaria*
European cranberry bush	*Viburnum opulus*	Spotted knapweed	*Centaurea stoebe*
European privet	*Ligustrum vulgare*		
Glossy buckthorn	*Frangula alnus*		
Japanese barberry	*Berberis thunbergii*		
Japanese meadowsweet	*Spirea japonica*		
Morrow's honeysuckle	*Lonicera morrowii*		
Multiflora rose	*Rosa multiflora*		
Showy fly honeysuckle	*Lonicera* x *bella*		
Tatarian honeysuckle	*Lonicera tatarica*		
Woody vine:			
English ivy	*Hedera helix*		
Japanese honeysuckle	*Lonicera japonica*		
Oriental bittersweet	*Celastrus orbiculatus*		

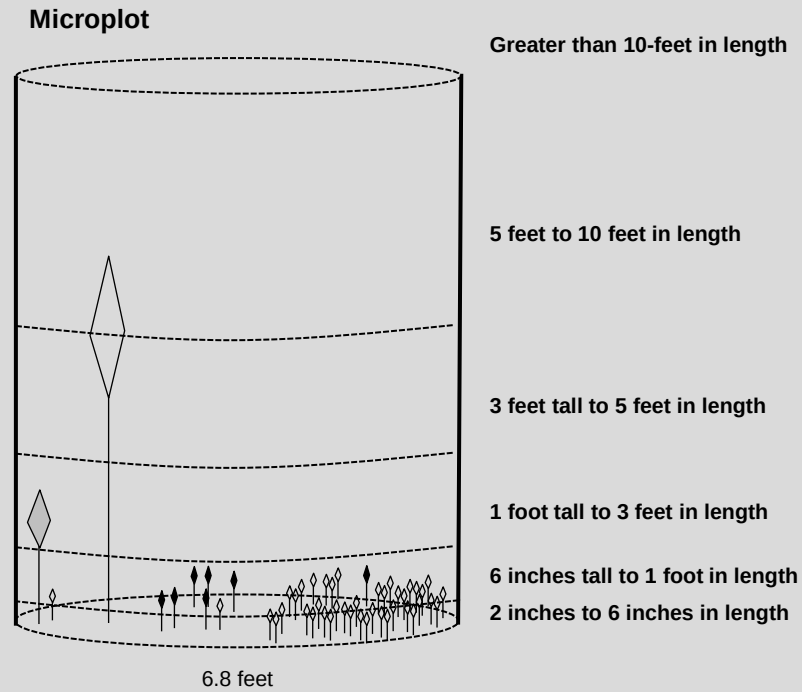
Regeneration Indicator

What Is It?



3. Tree Regeneration

(Tree Seedlings and <u>Saplings</u>)



All Established Seedlings >= 2-inches Tall

Check Root-Collar-Diameter for Large-Seeded Species (e.g. Oaks)

Tally by Six Length (Height) Classes

Average Time is 15 Minutes Per Microplot

Regeneration Indicator

What Is It?

BROWSE IMPACT refers to the consumption of tender shoots, twigs, and leaves of trees and shrubs used by animals for food. Estimate the amount of browsing pressure exerted on regeneration [typically by, but not limited to, deer, elk, feral hogs, livestock, moose, (other)].

Record the browse impact on the area within the accessible forest land portion of the four subplots.

1 Very Low - Plot is inside a well-maintained exclosure.

2 Low - No browsing observed or vigorous seedlings present (no exclosure present).

3 Medium - Browsing evidence observed but not common, seedlings common.

4 High - Browsing evidence common.

5 Very High - Browsing evidence omnipresent OR severe browse line.

Regeneration Indicator

What Does It Tell Us?

Regeneration Indicator Questions

Tree-Seedling Composition/Abundance?
Future Composition and Structure?
Regeneration Adequacy?
Tree-species Migration?
Stem Recruitment?
Regeneration Models?
Forest Projection Models (FVS, eco-process, …)?
Forest Policy (e.g., restoration)?
Wildlife Policy (e.g. deer harvest)?
Temporal and Spatial Trends?

Regeneration Indicator

What Does It Tell Us?

Vegetation Indicator Questions

Understory Carbon Stocks and Fluxes?
Climate Change Impacts?
Woody Biomass Fuels?
Biodiversity?
Pristineness?
Young Forest Character?
Impact of Competing Vegetation?
Wildlife Food and Cover?
Wildfire Risk?

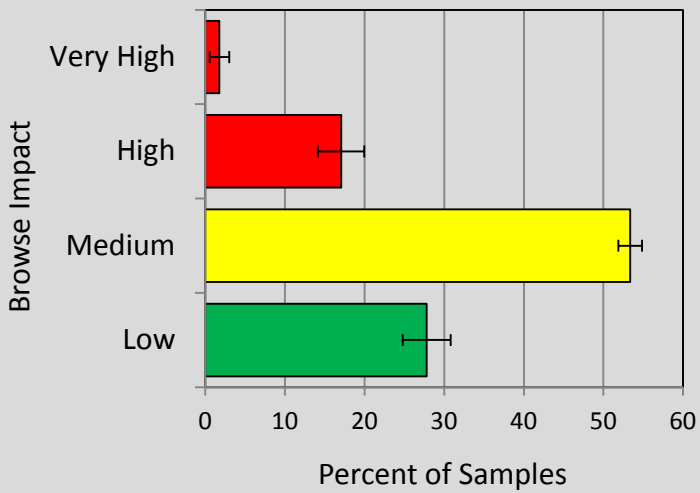
Temporal and Spatial Trends?

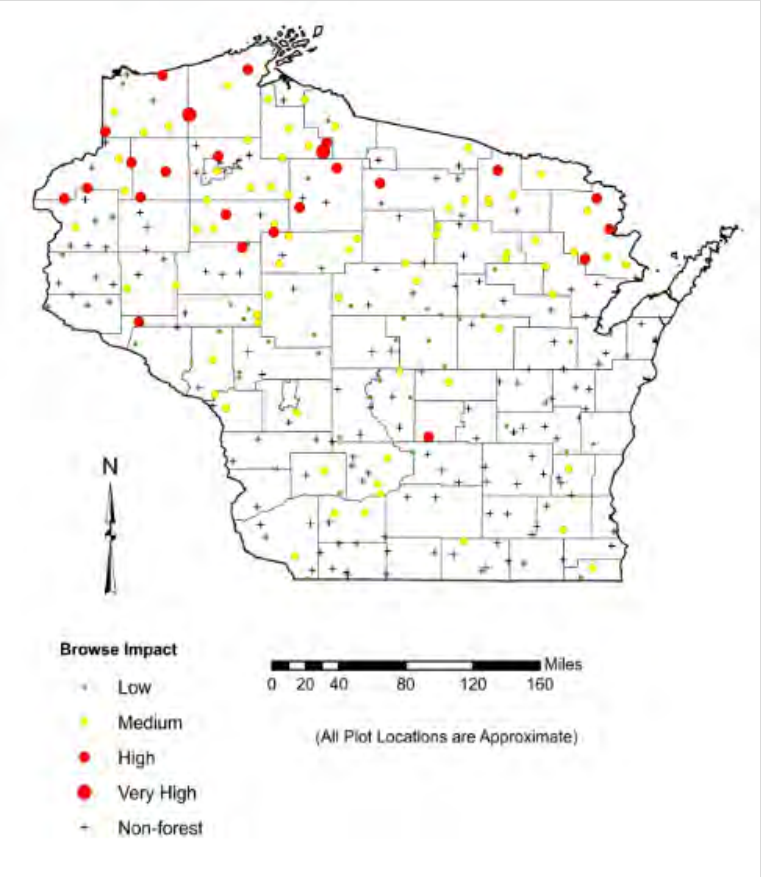
Regeneration Indicator

What Does It Tell Us?

Browse Impact

Wisconsin, 2012 and 2013



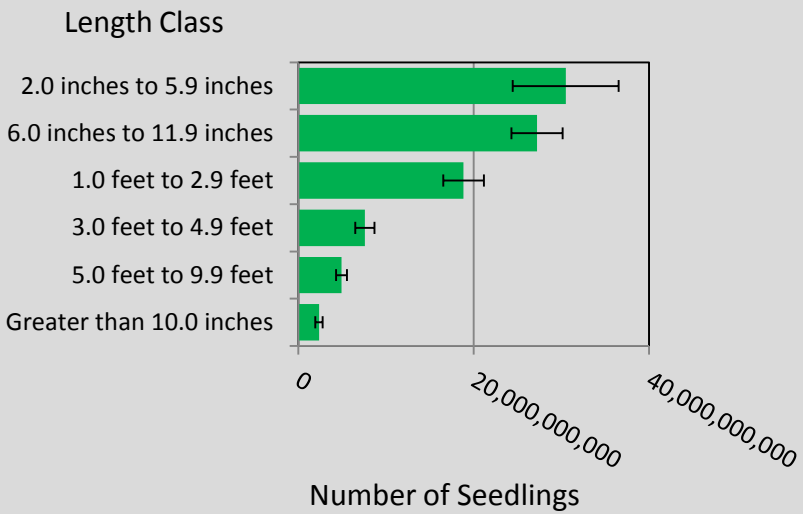


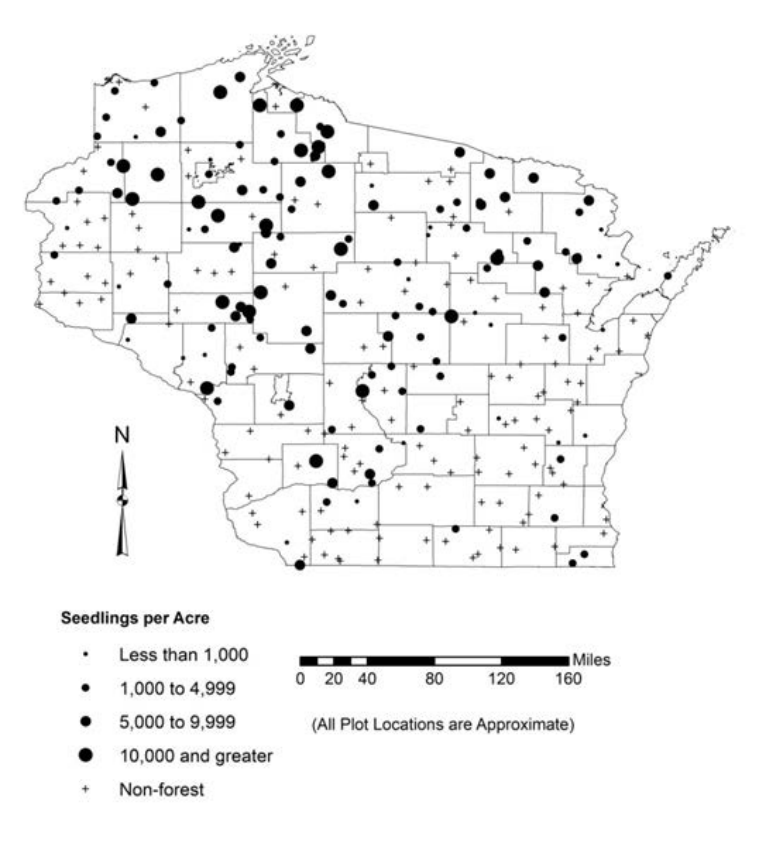
Regeneration Indicator

What Does It Tell Us?

Seedling Abundance

Wisconsin, 2012 and 2013



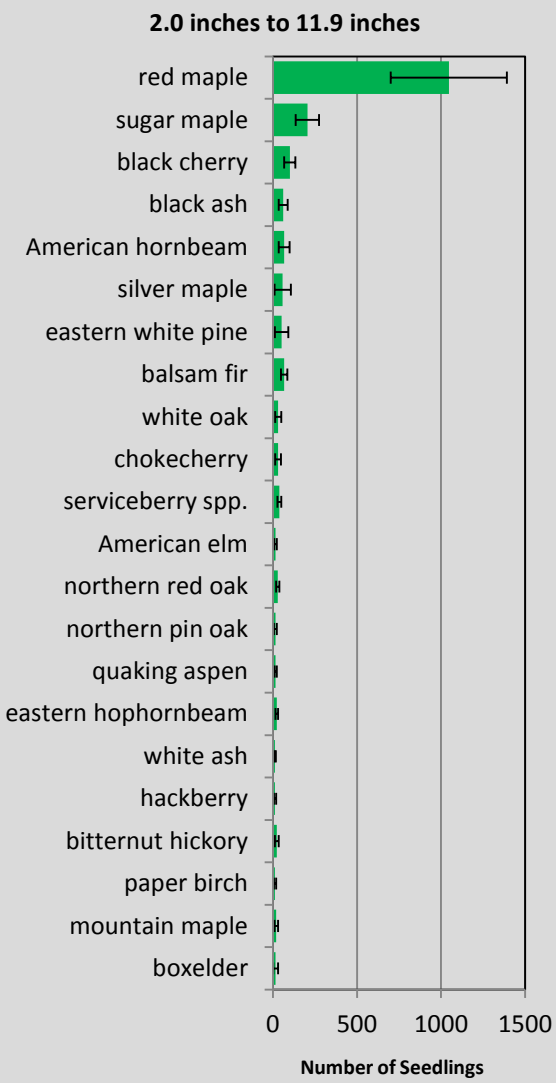


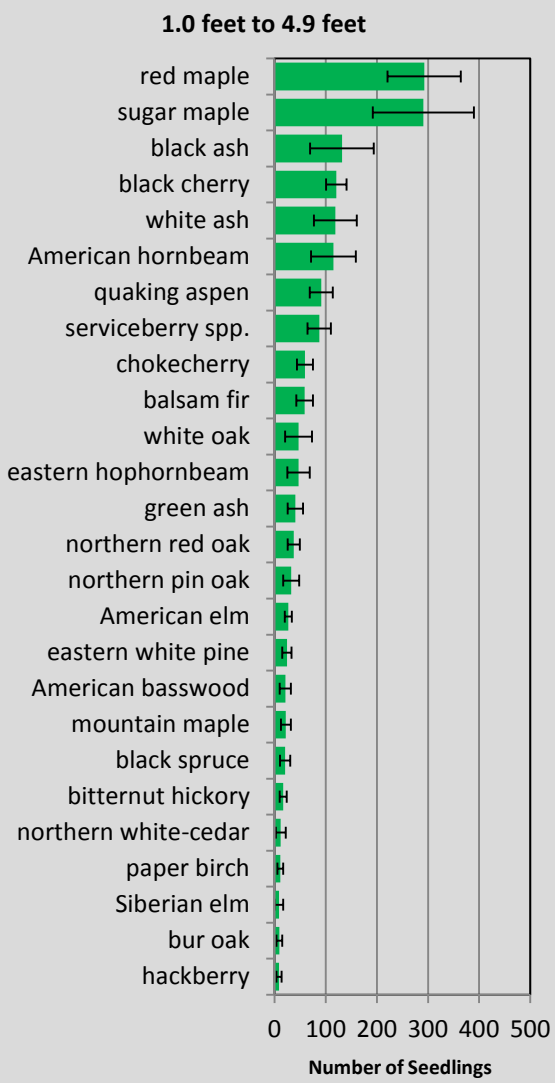
Regeneration Indicator

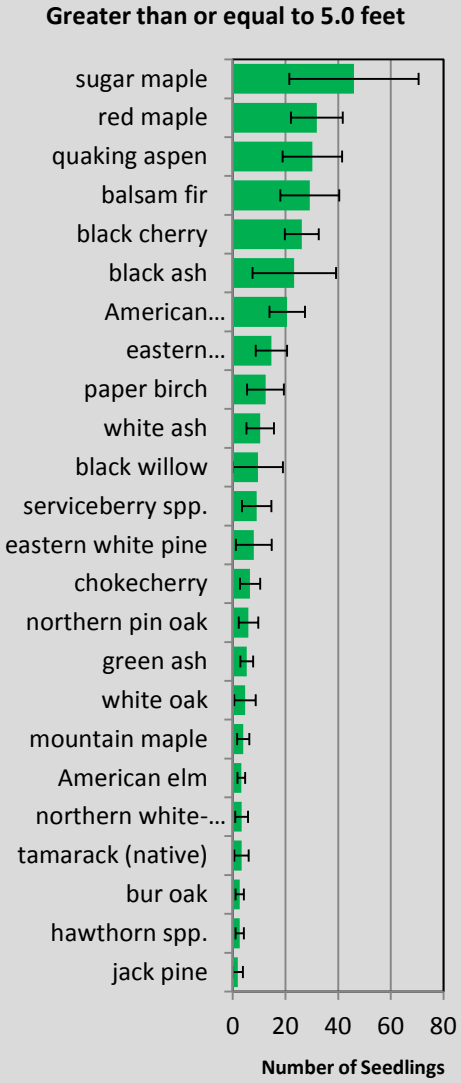
What Does It Tell Us?

Wisconsin, 2012 and 2013

Seedling Profiles





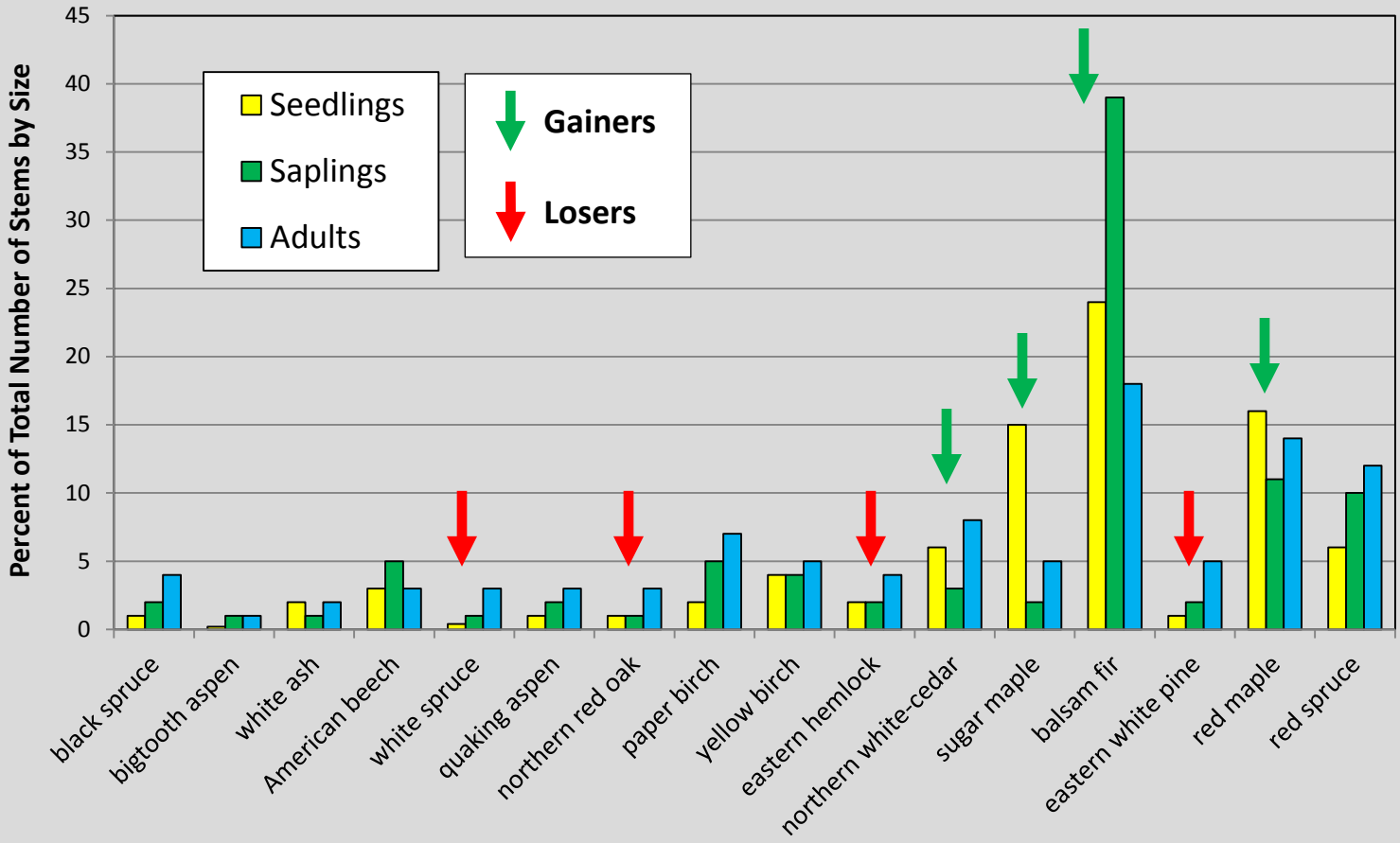


Regeneration Indicator

What Does It Tell Us?

Full Forest Profiles and Future Composition

Maine, 2012 and 2013

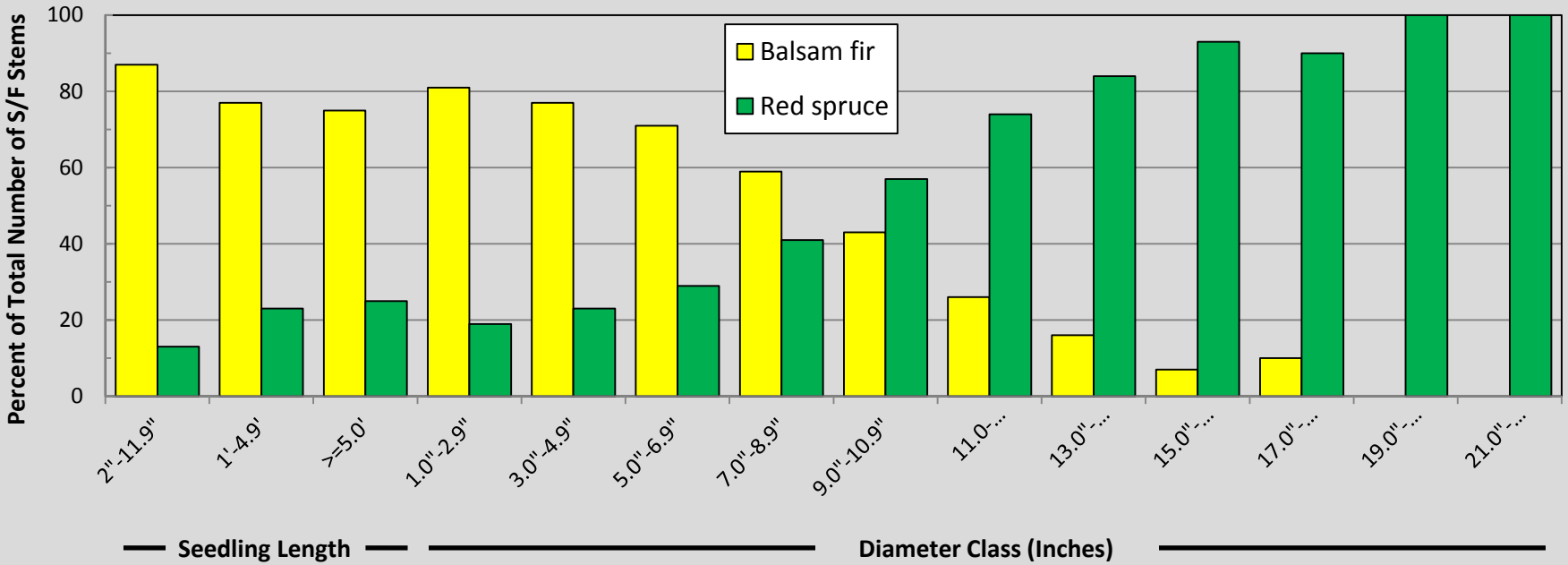


Regeneration Indicator

What Does It Tell Us?

Special Issues

Maine, 2012 and 2013: Balsam Fir and Red Spruce Structure

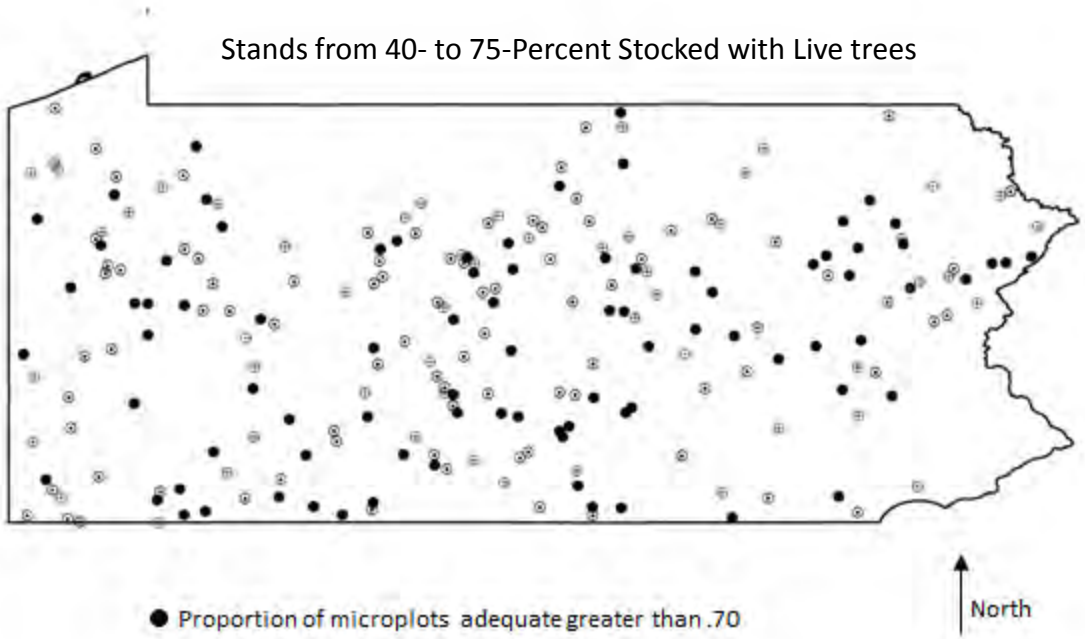


Regeneration Indicator

What Does It Tell Us?

Special Issues

Pennsylvania Regeneration Adequacy (2008 to 2012): Oak/Hickory



● Proportion of microplots adequate greater than .70

⊕ Proportion of microplots adequate from .50 to .69

⊙ Proportion of microplots adequate less than .50

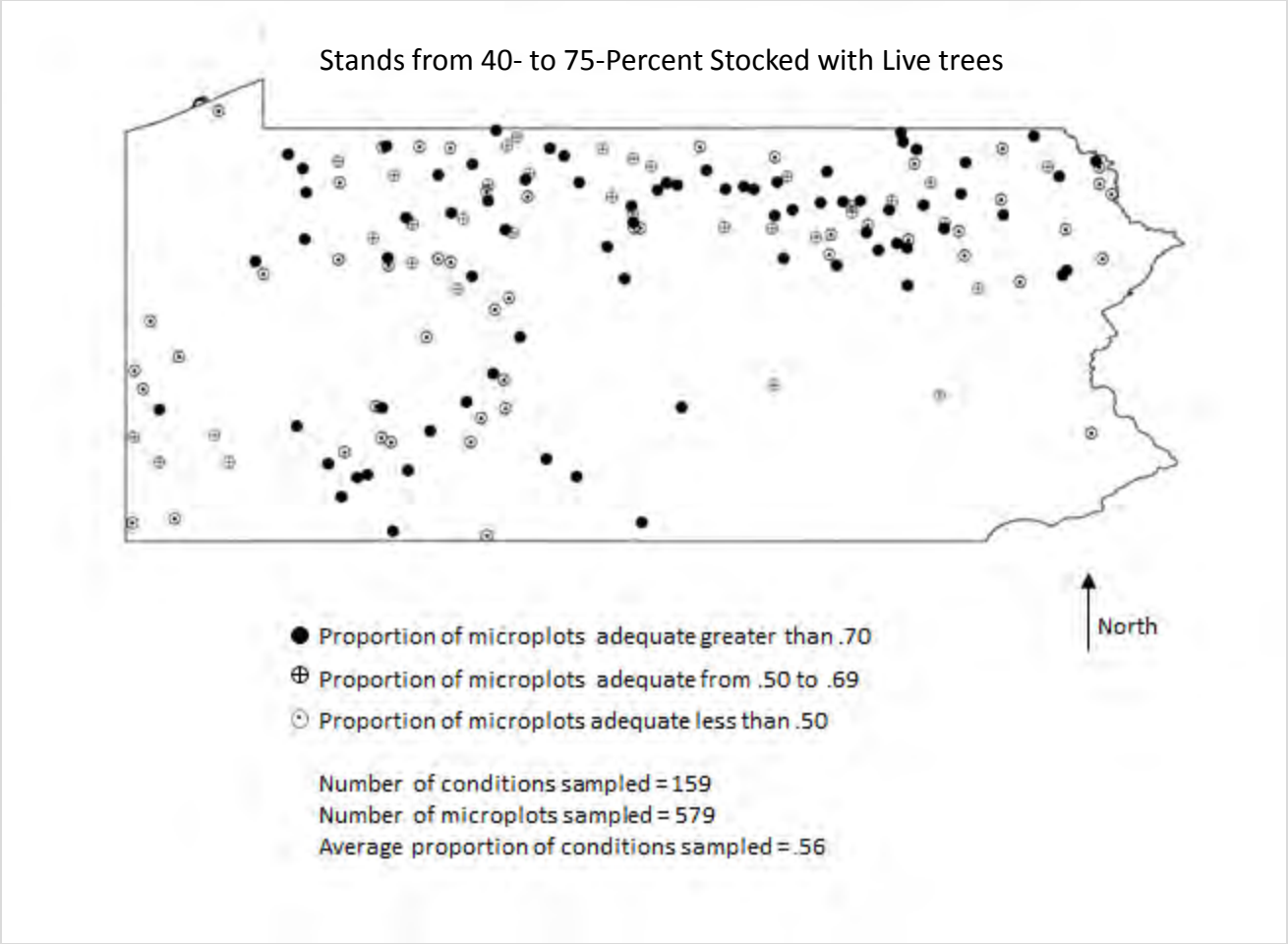
Number of conditions sampled = 224
Number of microplots sampled = 814
Average proportion of conditions sampled = .51

Regeneration Indicator

What Does It Tell Us?

Special Issues

Pennsylvania Regeneration Adequacy (2008 to 2012): Maple/Beech/Birch



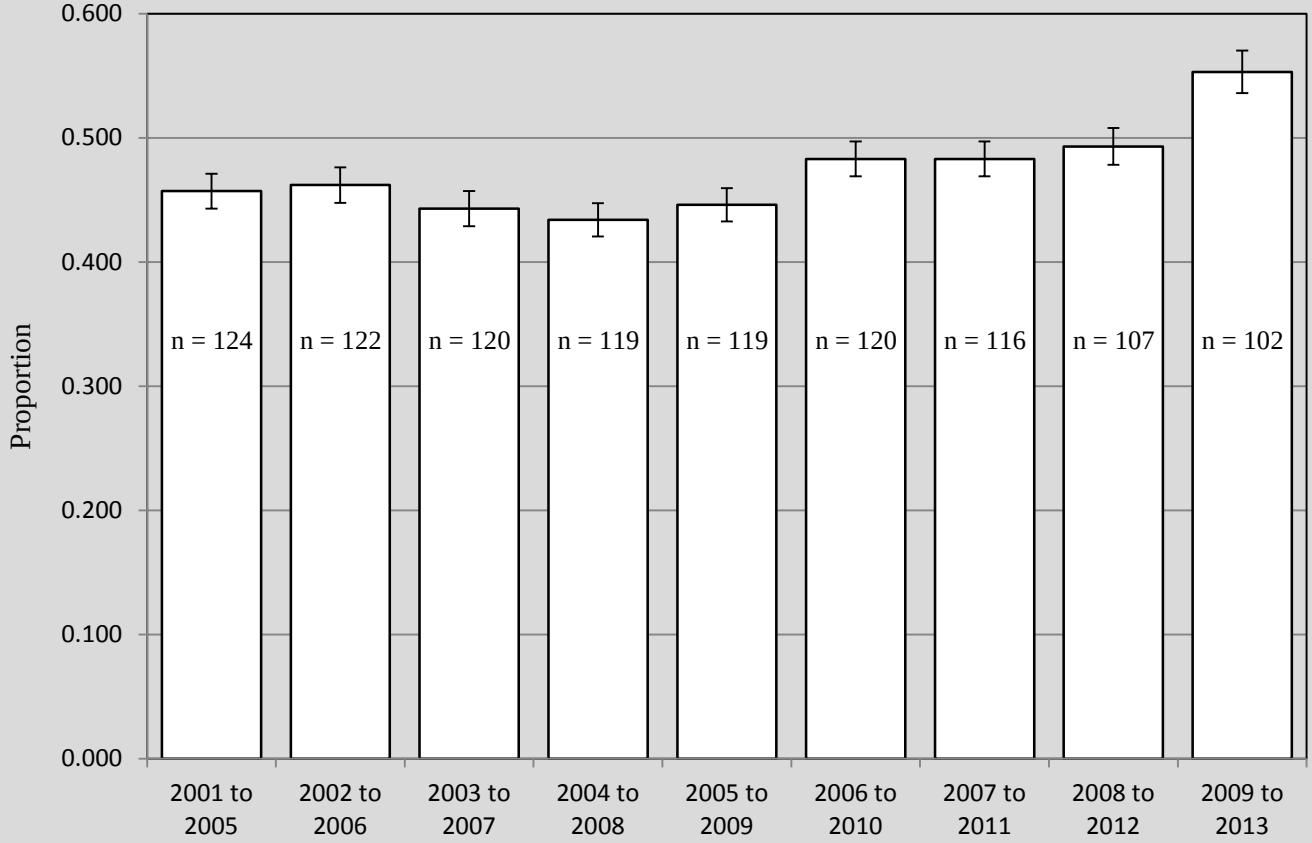
Regeneration Indicator

What Does It Tell Us?

Special Issues

Wildlife Management Units

Pennsylvania Regeneration Adequacy: Trend Analysis



The Pennsylvania Regeneration Study (PRS) is the primary indicator used to determine the number of deer permits to issued in PA by Wildlife Management Unit (WMU)

This chart shows that regeneration has improved in WMU 2G!

http://www.portal.state.pa.us/portal/server.pt?open=514&objID=1745350&mode=2

Update and Discussion

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Painted Trillium(Trillium undulatum)
Photo by Dr. Thomas G. Barnes