



Forest Regeneration Monitoring (FRM)

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Today's Discussion

- Goals of FRM
- Status of data collection & reporting
- Use of FRM data
 - Site-level
 - Landscape-level
 - Other uses
- Program structure



Goals of FRM

- Assess status of naturally regenerating forests in WI
- Evaluate success of silviculture prescriptions and management practices
- Provide data on impact of deer on forest regeneration to inform Wisconsin's deer population goal setting process



Why is This Information Important?

Increases understanding of:

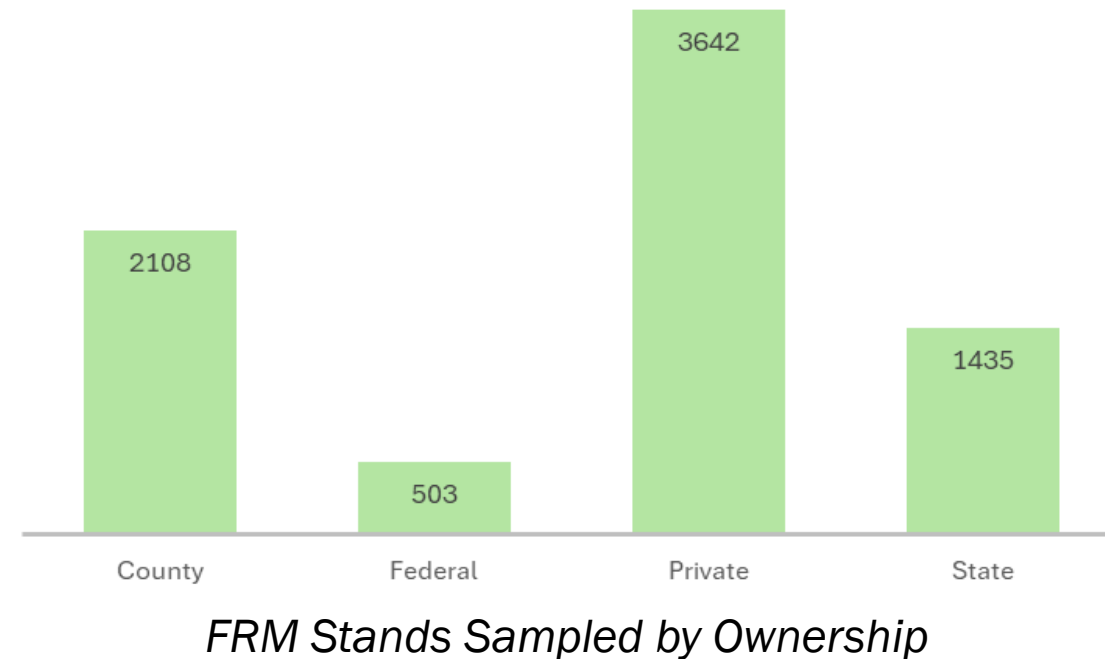
- Current forest composition, structure, and regeneration
- Trends in forest conditions
- Silvicultural and other forest management practices
- Interconnections between forests, deer and other stressors

Informs:

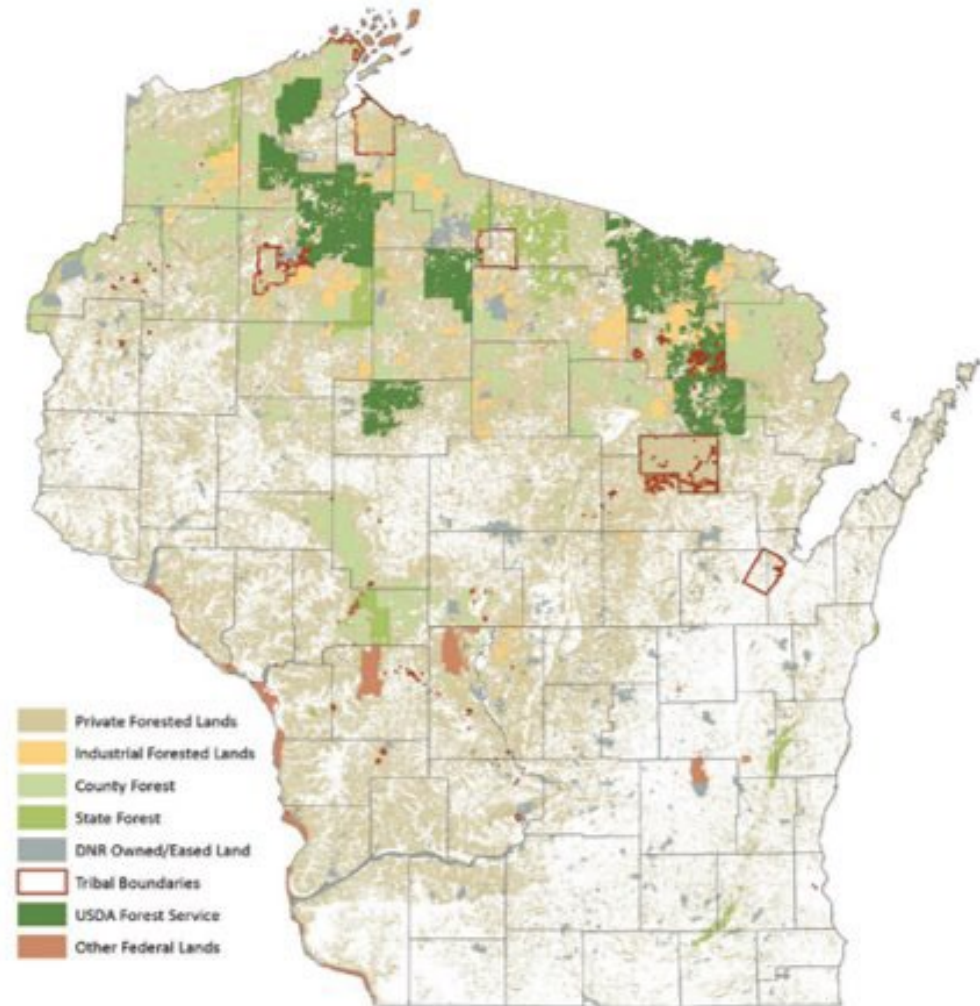
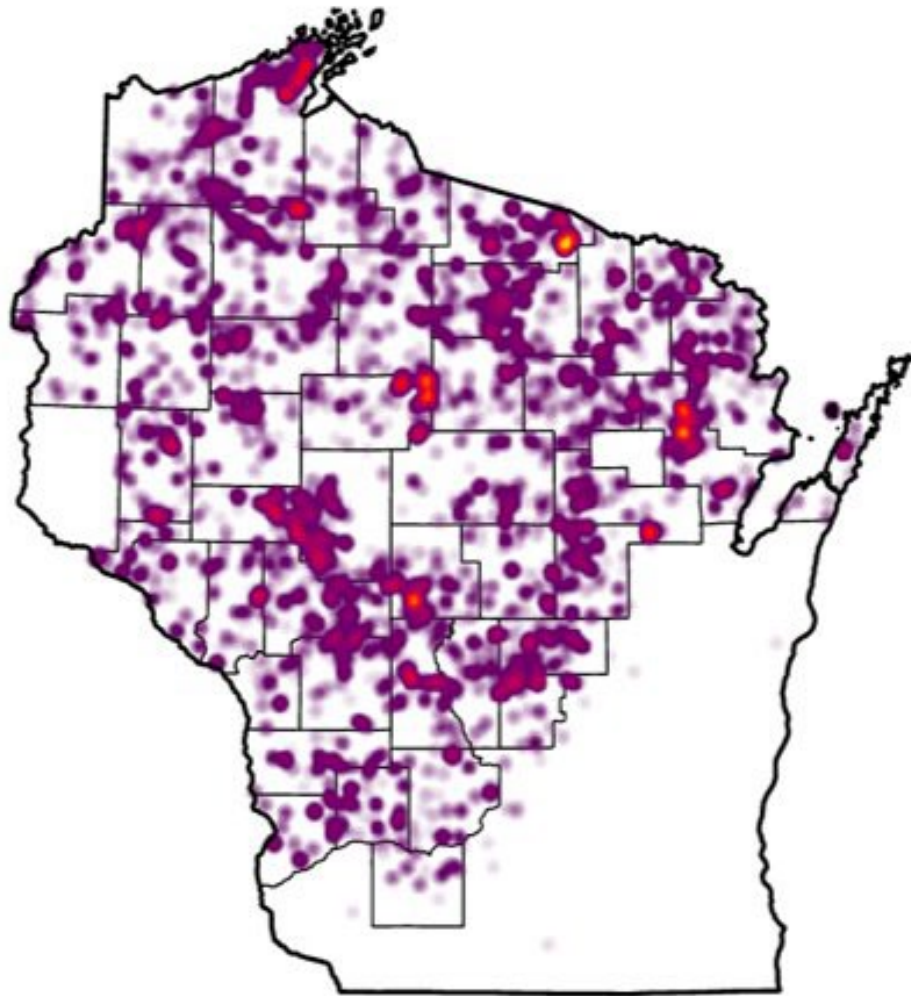
- Short-term and long-term forest management decisions
- Adjustments to management strategies based on regeneration successes or challenges
- Refinements to guidelines

Site Selection

- Counties with >30% forest cover
- Ownerships within each county
- Sampling needs based on common forest types among those ownerships within the county
 - *Most FRM sampling occurs on northern hardwoods, central hardwoods, oak, and white/red/jack pine forest types*
- Management objective must be **natural regeneration**
 - *No plantations*
- Site visit requests from foresters and landowners

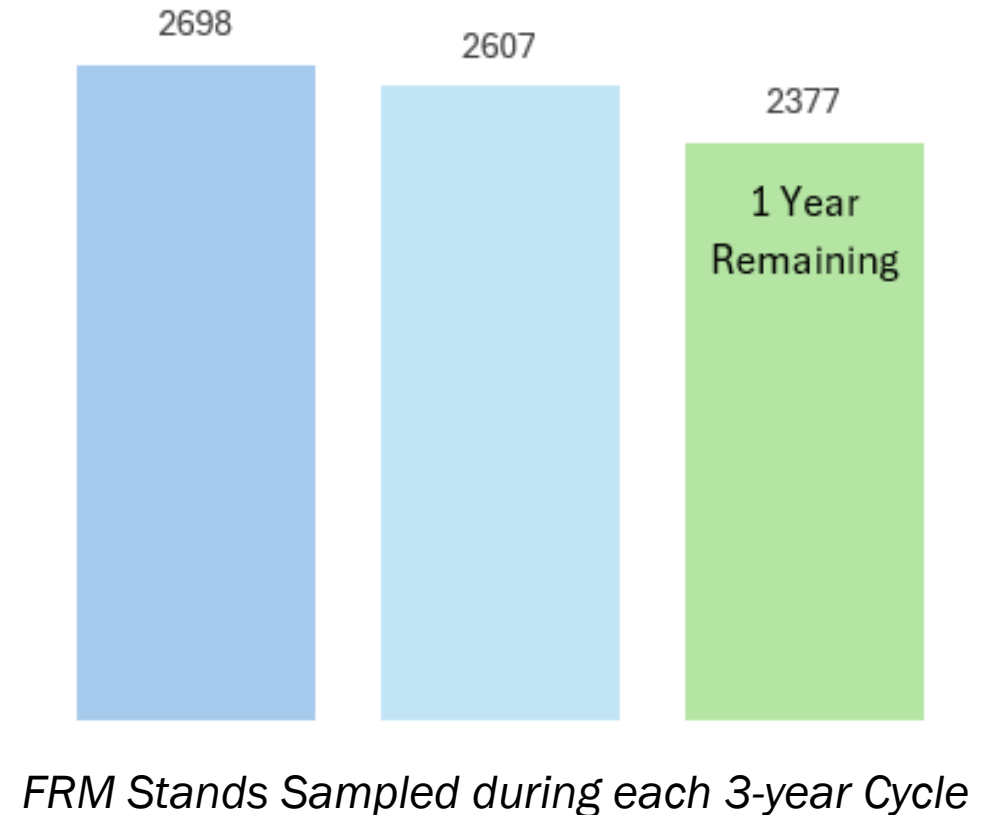


Regional Sampling 2018-2025



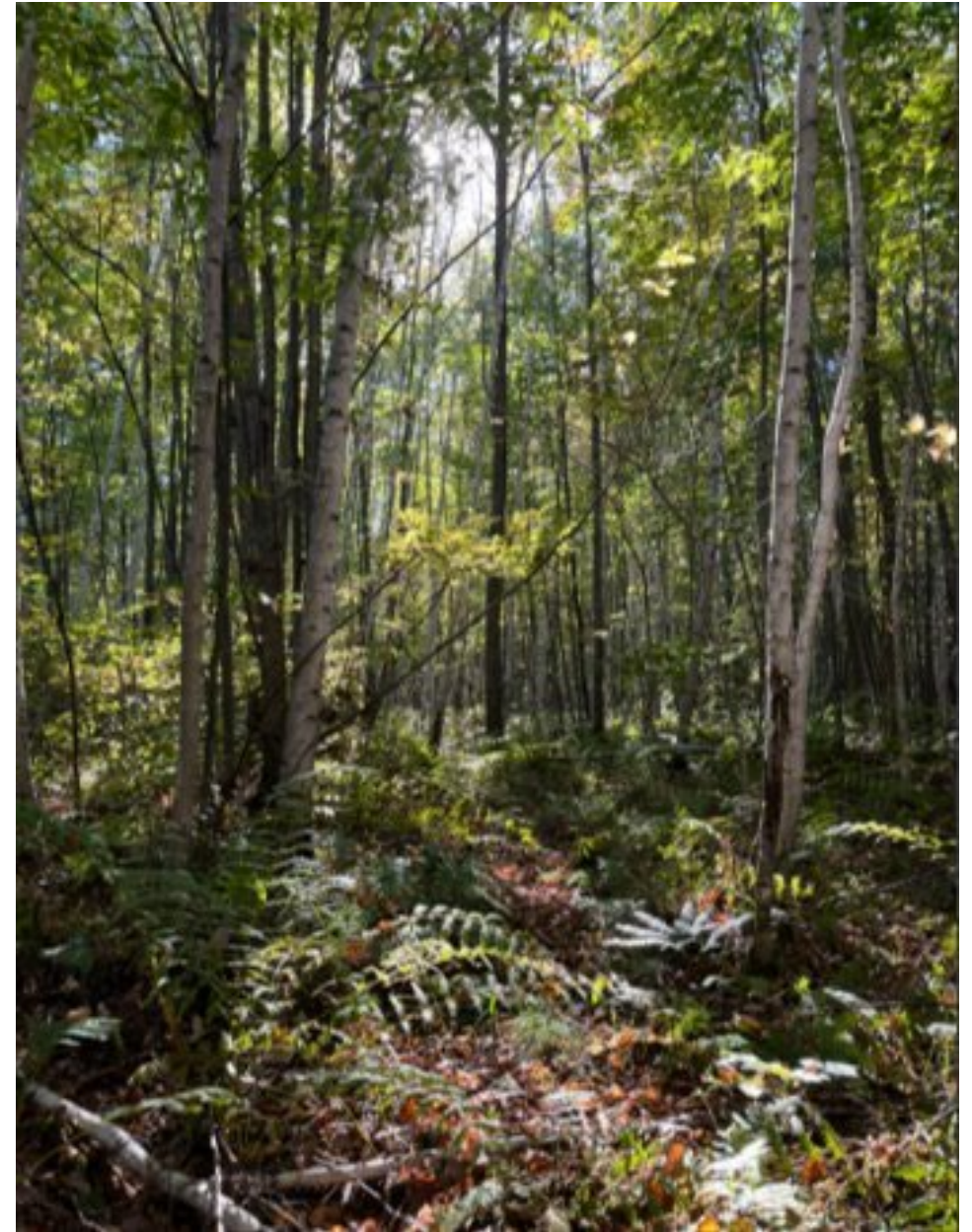
Revisit Cycle

- FRM Functions on three-year cycles
 - Cycle 1: 2018-2020: Initial stand sampling
 - Cycle 2: 2021-2023: First revisits, continued site inclusion
 - Cycle 3: 2024-2026: Second revisits, continued site inclusion
 - Establishment of trend data



When to Stop Sampling

- Free to grow
- Stands with many stems escaping the sapling category
- Assess benchmarks to cease sampling for the beginning of our fourth cycle (2027)



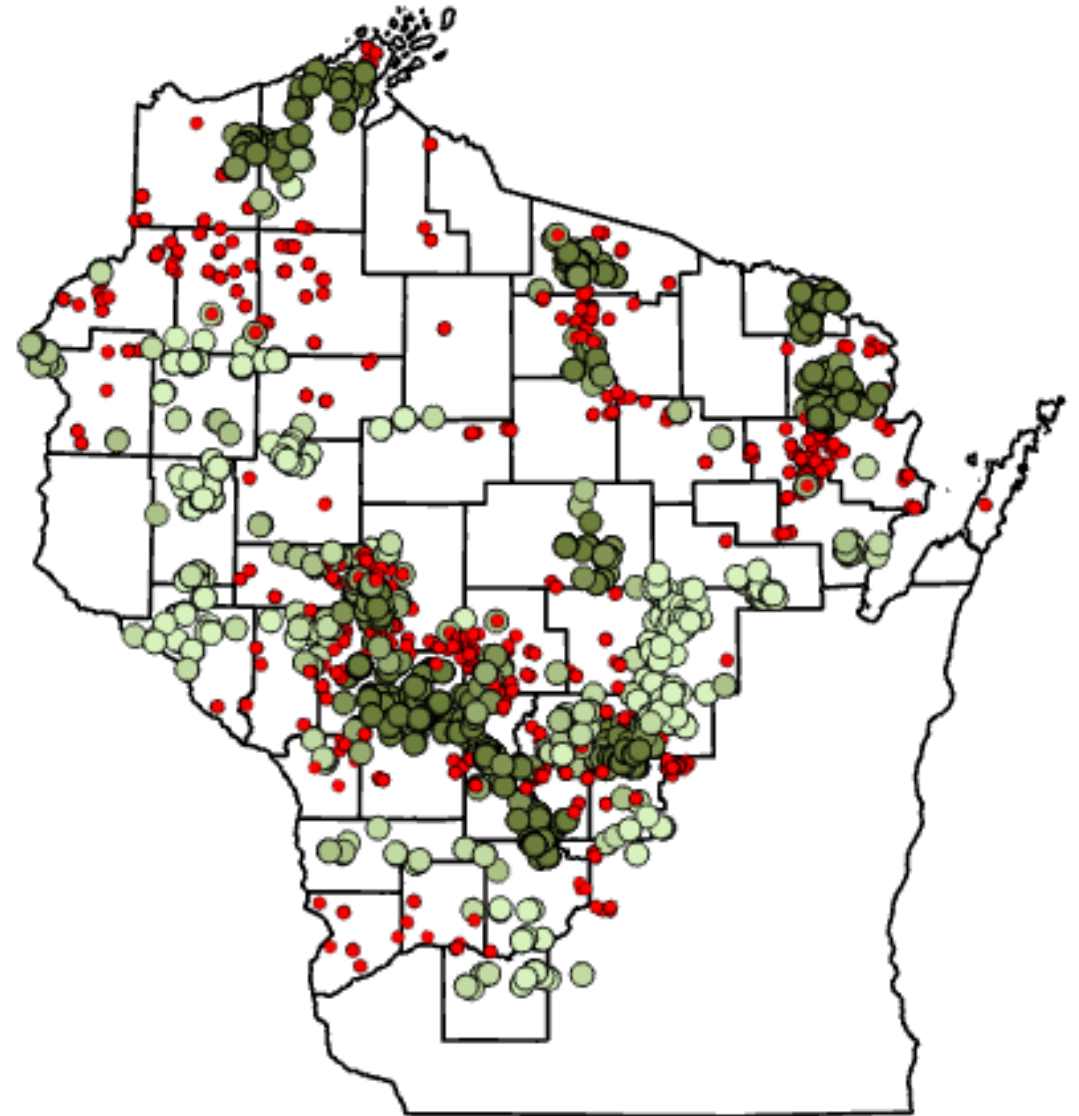
Challenges of FRM Data Collection

- Irregular harvesting
 - Good for forest, potentially adds noise to FRM data
- Natural year to year variability
 - Browse % and other estimates
 - Value of data coming from a single team trained together
- Stand boundaries redrawn, properties change hands
- Invasive species



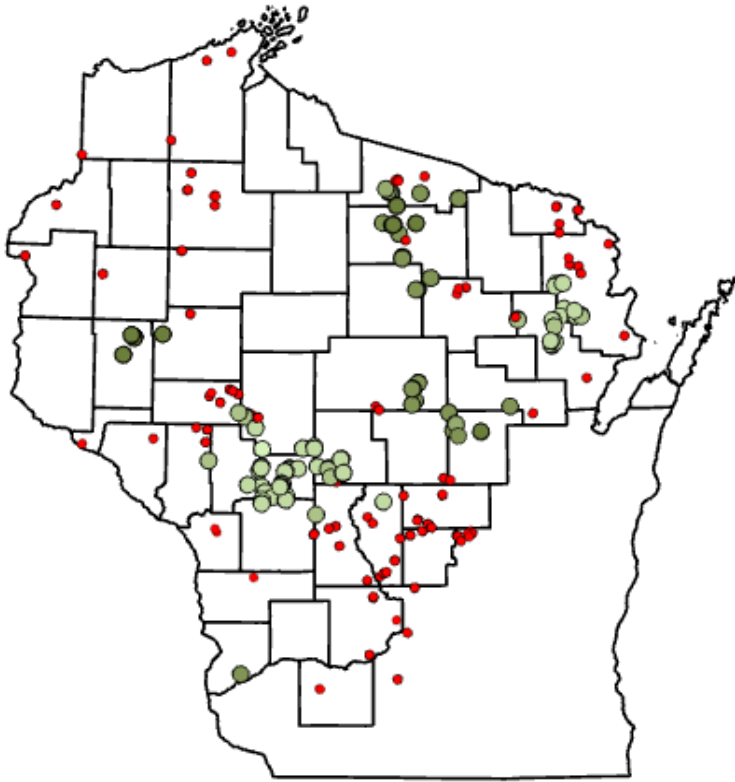
Data Interpretation

- Of Wisconsin's forests being managed for **oak**, what regions may be succeeding in regenerating this cover type?
 - Deeper green: relatively high oak regeneration
 - Red dot: oak regeneration lacking or localized

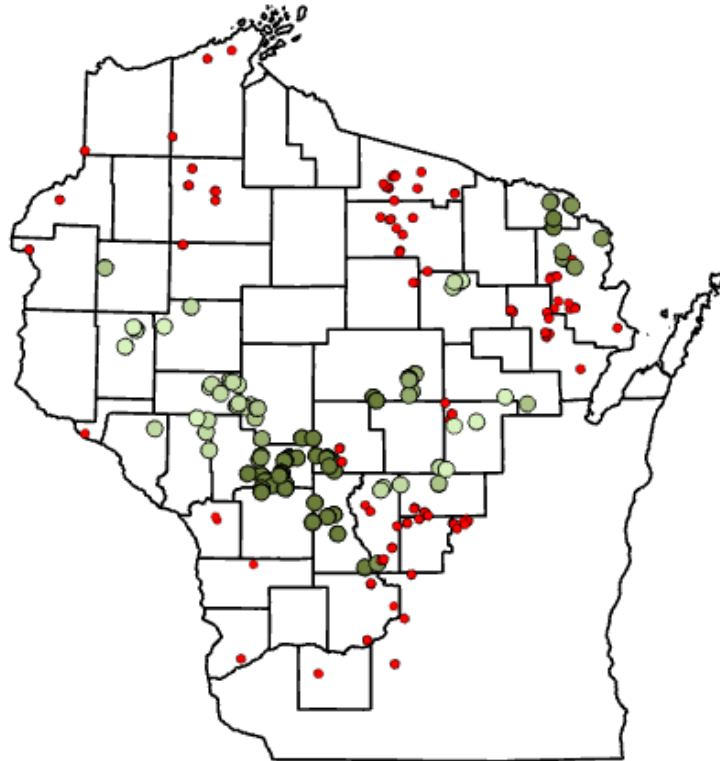


FRM-sampled oak stands <15 years from harvest

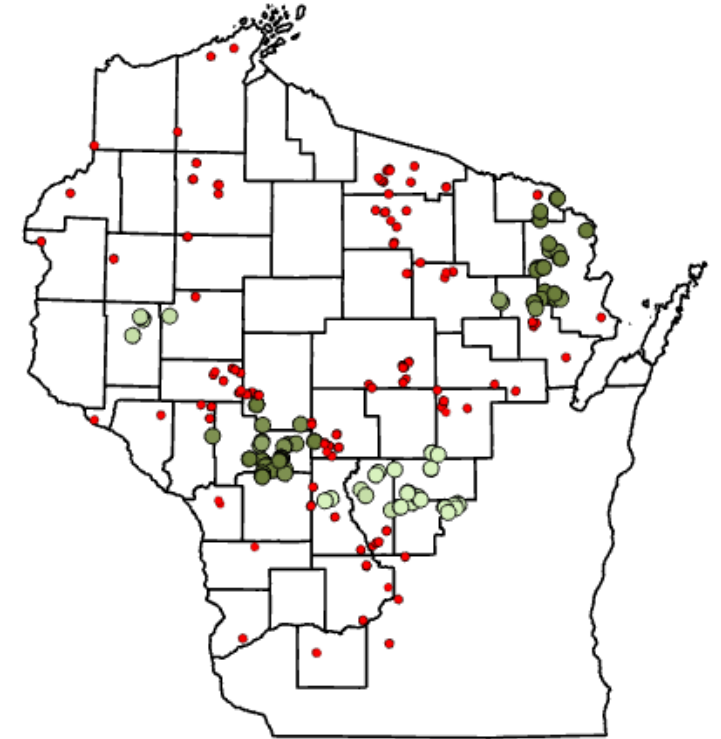
Asking Specific Questions from FRM Data



Oak regen. 2" to 1'



Oak regen. 1' to 5'

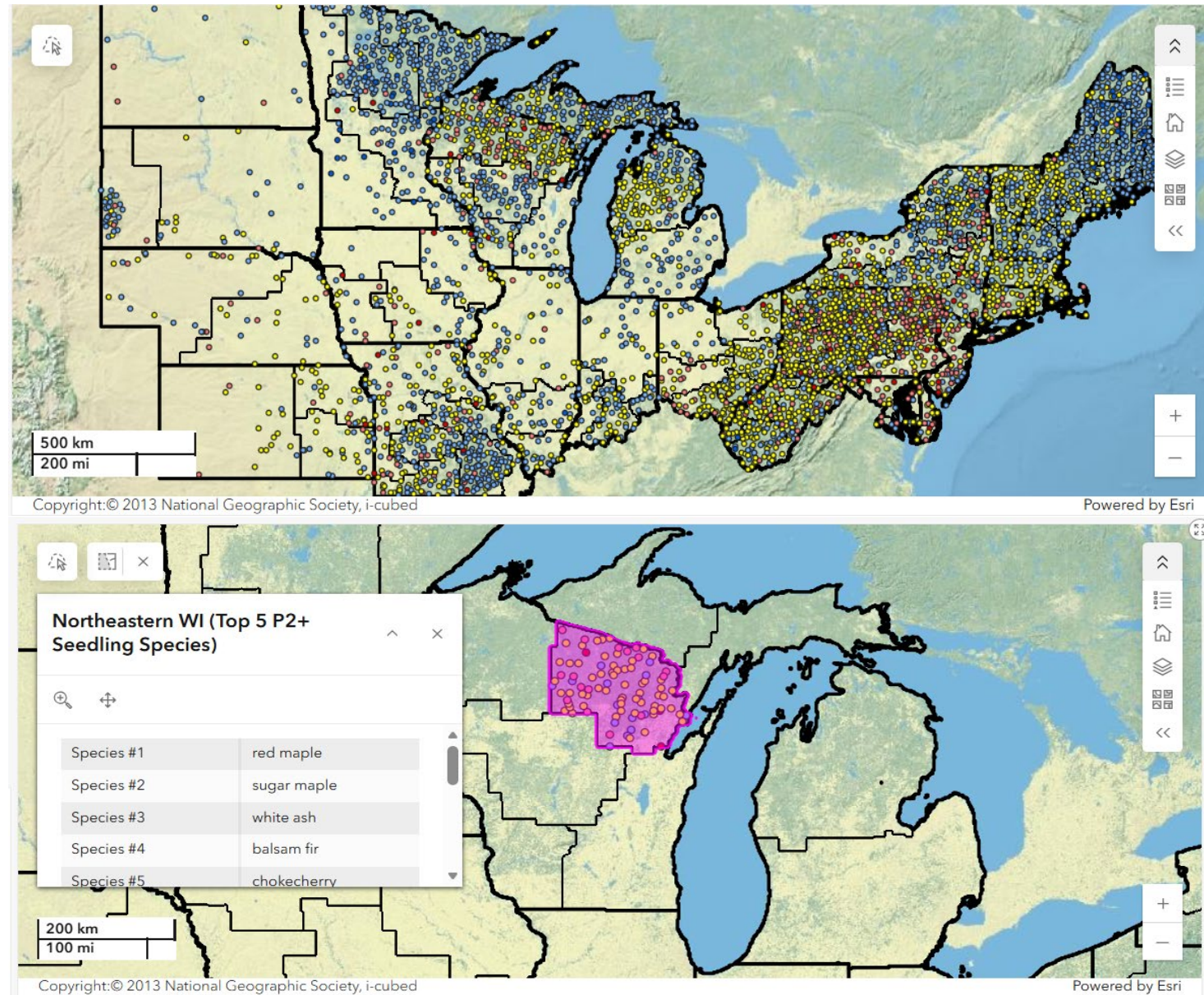


Oak regen. 5' and taller

Pictured: All FRM stands with an objective cover type of oak (at least 50% oak cover) sampled 3-5 years from a regeneration harvest. Deeper shade of green: relatively high density of oak regeneration.

Current Goals

- Development of an ArcGIS Online (AGOL) Dashboard
 - Inspiration from [NRS 2019 Regeneration Dashboard](#)
 - Ability to freely explore and answer specific questions about forest regeneration trends across the state
 - FRM data allows us to be *much* more specific than FIA data for the state



Images taken from the USFS NRS-FIA Regeneration Dashboard, 2019

How can FRM results be used?

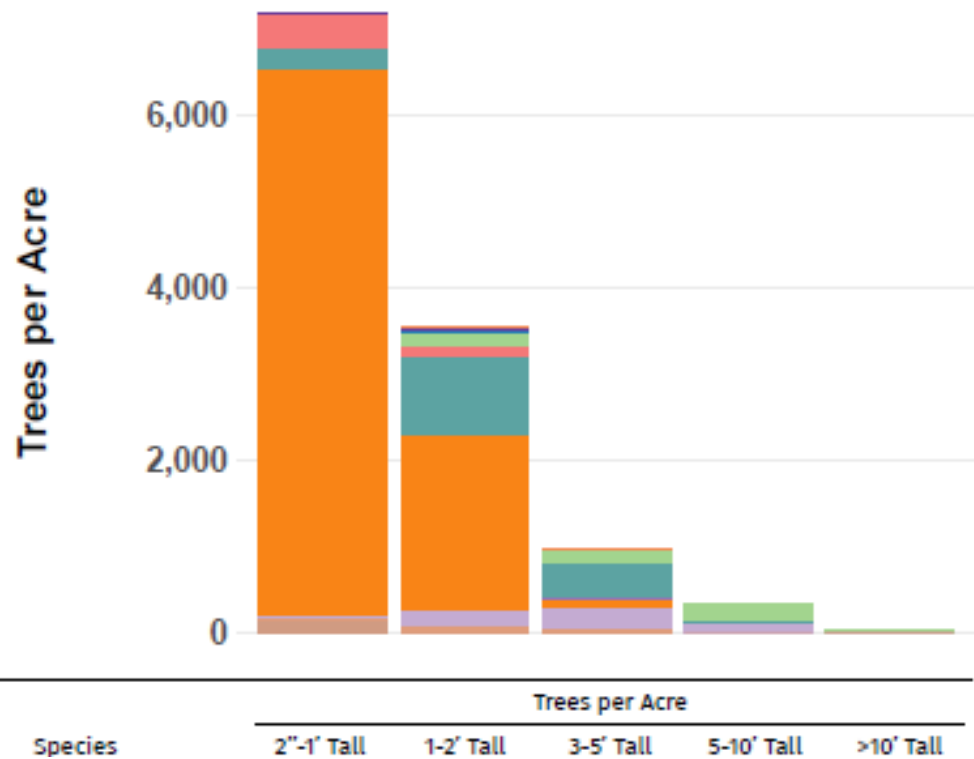
FRM results are useful at multiple scales for multiple purposes:

1. Stand and Property: On the ground management decisions
 - a. Assists with both what practices are practicable and where they should be employed
2. Landscape level: Recognition of issues and trends
 - a. Ex. Citizen Deer Advisory Councils (CDACs)
3. Research and Field Trials
 - a. Ex. Avon Bottoms Ash Replacement Trial



FRM at the Local Level

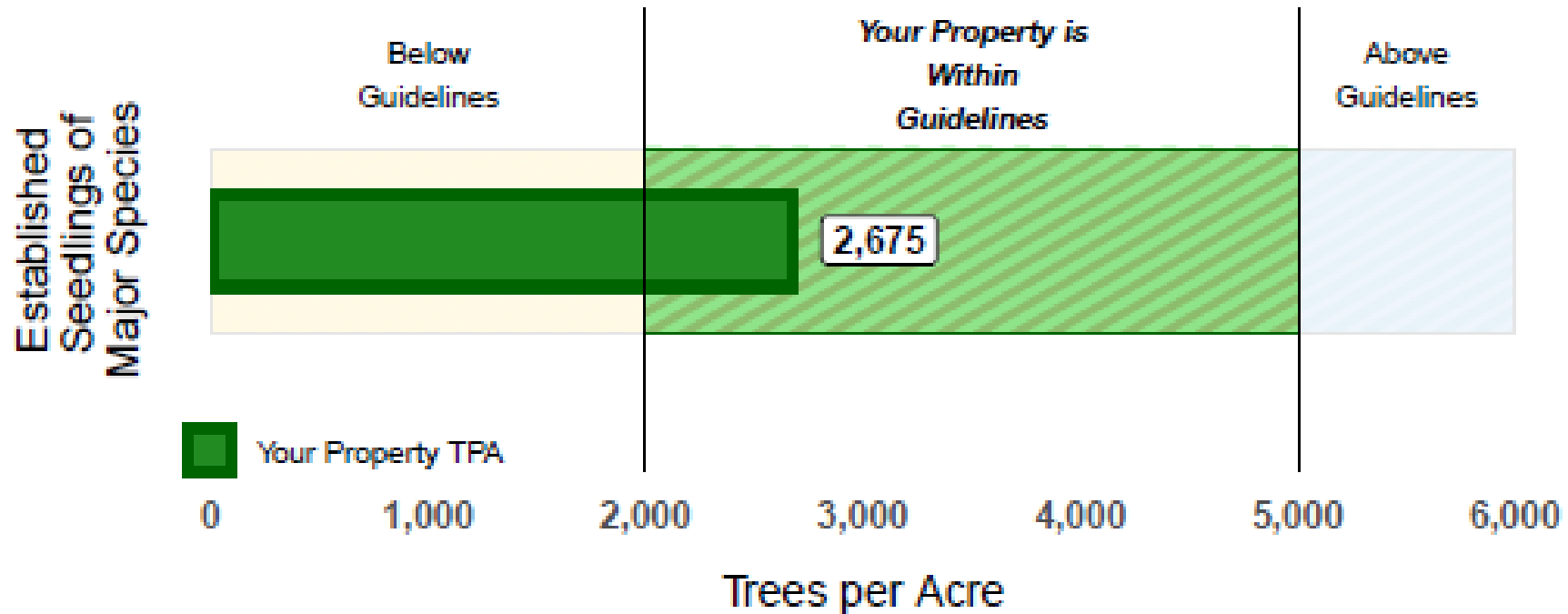
Stand & Property Level: Species by Height Class



| Species | Trees per Acre | | | | |
|-----------------|----------------|-----------|-----------|------------|-----------|
| | 2''-1' Tall | 1-2' Tall | 3-5' Tall | 5-10' Tall | >10' Tall |
| Balsam Fir | 0 | 25 | 25 | 0 | 0 |
| Basswood | 25 | 50 | 0 | 0 | 0 |
| Big-Tooth Aspen | 0 | 25 | 0 | 0 | 0 |
| Ironwood | 0 | 150 | 150 | 225 | 25 |
| Red Maple | 375 | 125 | 0 | 0 | 0 |
| Red Oak | 250 | 900 | 400 | 25 | 0 |
| Red Pine | 0 | 0 | 25 | 0 | 0 |
| Sugar Maple | 6,350 | 2,050 | 100 | 0 | 0 |
| White Ash | 25 | 175 | 225 | 75 | 0 |
| White Birch | 25 | 50 | 25 | 0 | 0 |
| White Pine | 125 | 0 | 0 | 0 | 0 |

FRM at the Local Level

Stand & Property Level: Relative Regeneration Stocking



FRM at the Local Level

Stand & Property Level: Herbivore Browse

| Species | Trees per Acre | | | | | Total | Browse Severity Index |
|-----------------|----------------|--------------|------------|------------|-----------|---------------|----------------------------------|
| | 2in-1ft | 1ft-3ft | 3ft-5ft | 5ft-10ft | >10ft | | |
| Balsam Fir | 0 | 25 | 25 | 0 | 0 | 50 | None (0% Stems Browsed) |
| Basswood | 25 | 50 | 0 | 0 | 0 | 75 | None (0% Stems Browsed) |
| Big-Tooth Aspen | 0 | 25 | 0 | 0 | 0 | 25 | High (51-75% Stems Browsed) |
| Ironwood | 0 | 150 | 150 | 225 | 25 | 550 | None (0% Stems Browsed) |
| Red Maple | 375 | 125 | 0 | 0 | 0 | 500 | Low (1-25% Stems Browsed) |
| Red Oak | 250 | 900 | 400 | 25 | 0 | 1,575 | Low (1-25% Stems Browsed) |
| Red Pine | 0 | 0 | 25 | 0 | 0 | 25 | None (0% Stems Browsed) |
| Sugar Maple | 6,350 | 2,050 | 100 | 0 | 0 | 8,500 | Low (1-25% Stems Browsed) |
| White Ash | 25 | 175 | 225 | 75 | 0 | 500 | Low (1-25% Stems Browsed) |
| White Birch | 25 | 50 | 25 | 0 | 0 | 100 | None (0% Stems Browsed) |
| White Pine | 125 | 0 | 0 | 0 | 0 | 125 | None (0% Stems Browsed) |
| Total | 7,175 | 3,550 | 950 | 325 | 25 | 12,025 | Low (1-25% Stems Browsed) |



FRM at the Landscape Level

CDAC Forest Regeneration Reports

<https://dnr.wisconsin.gov/topic/forestmanagement/regenmonitoringreports>

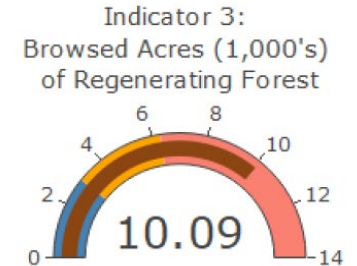
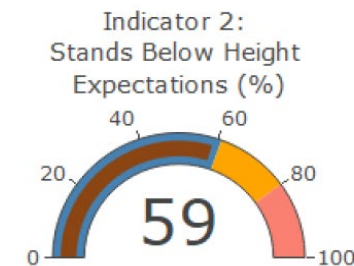
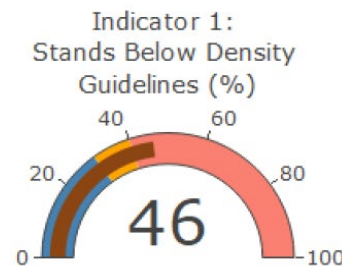
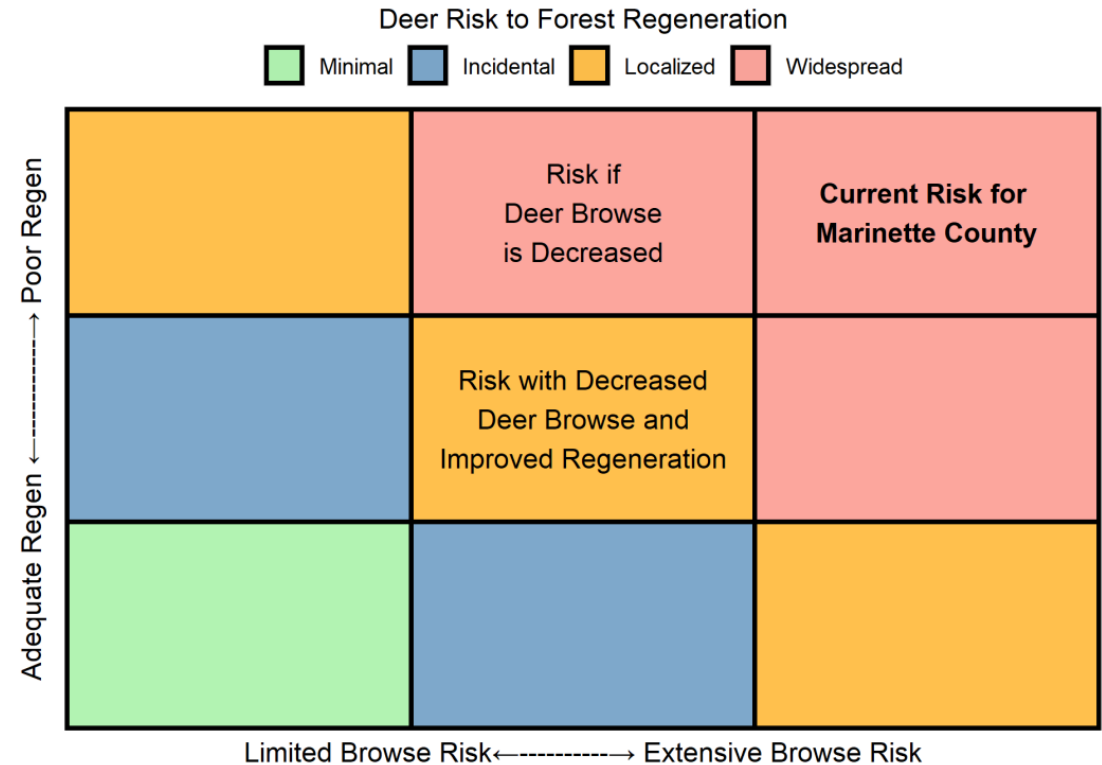
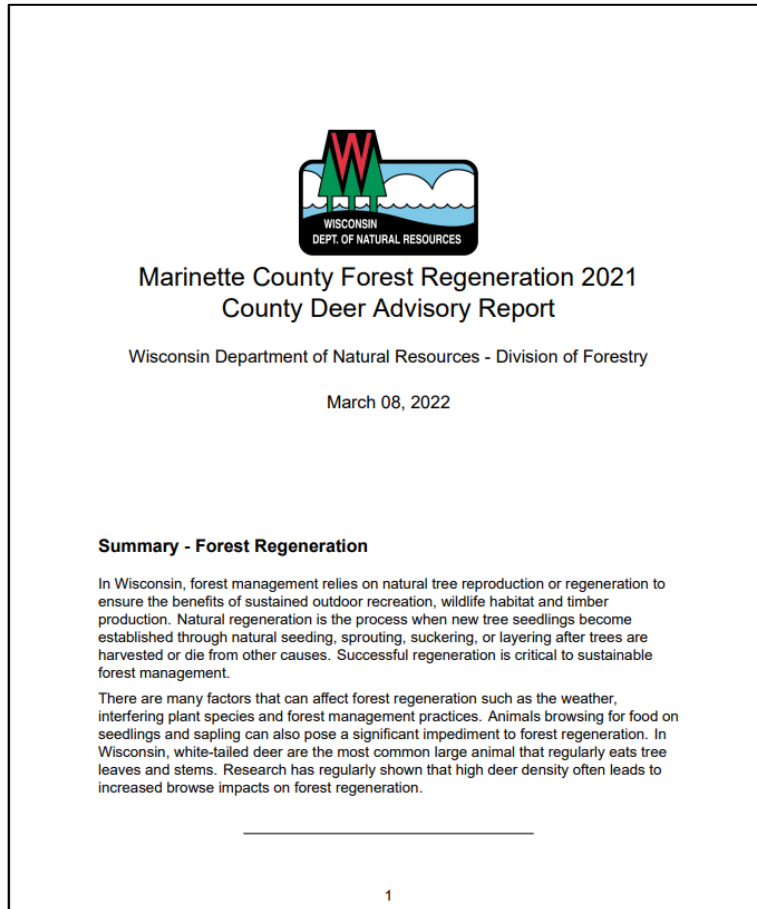
Summary

- Deer Risk to Forest Regeneration Risk Table
- Forest Risk Metrics Dashboard
 - Indicator 1: Stands Below Density Guidelines (%)
 - Indicator 2: Stands Below Height Expectations (%)
 - Indicator 3: 1000 Acres Browsed Forest Disturbance

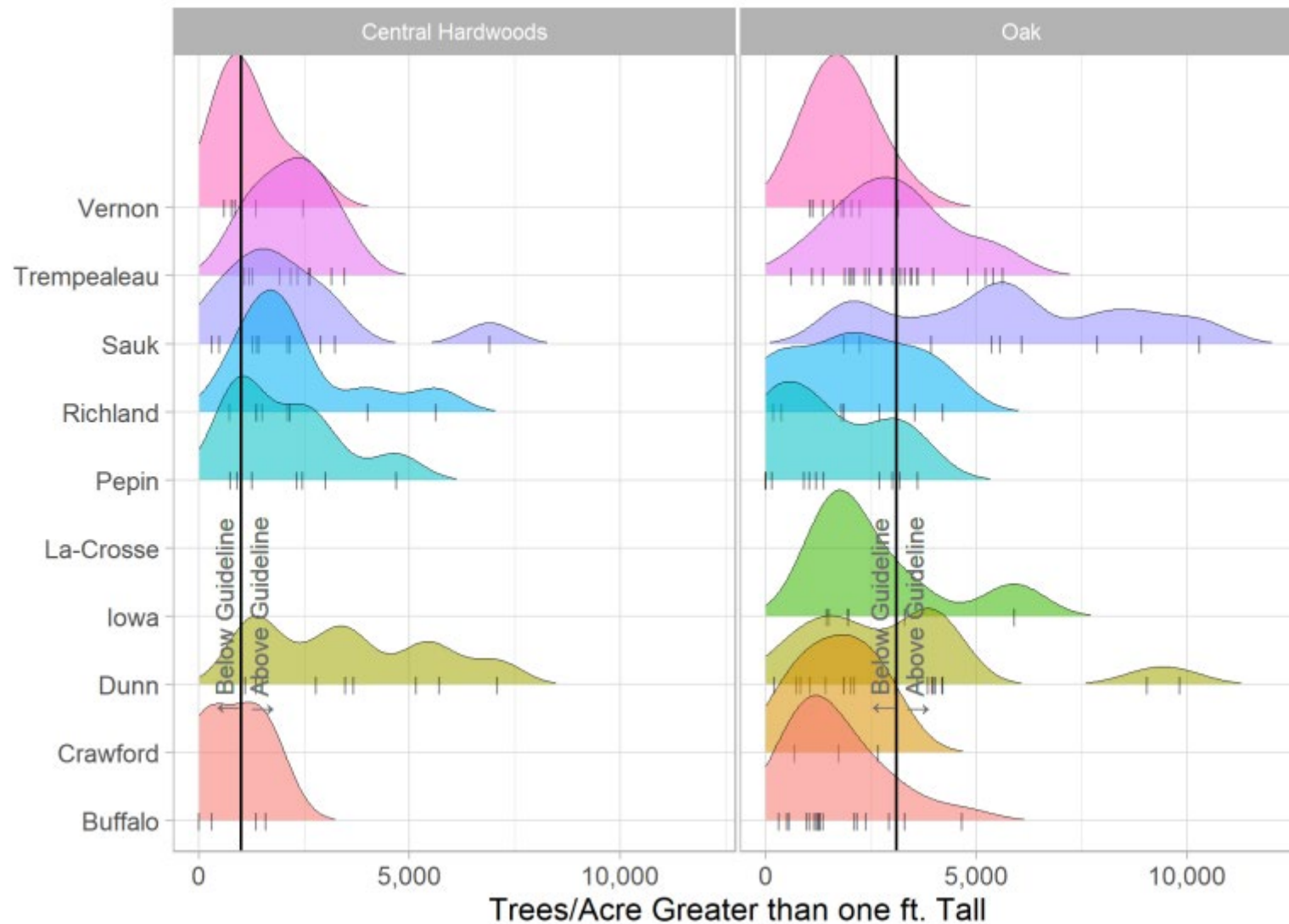
Report Detail

- Deer Density and Stand Regeneration
- Forest Regeneration by Forest Cover Type Compared to Region
- Seedling/Sapling Height by Stand Age and Forest Type

Marinette County Forest Regeneration Metric 2021



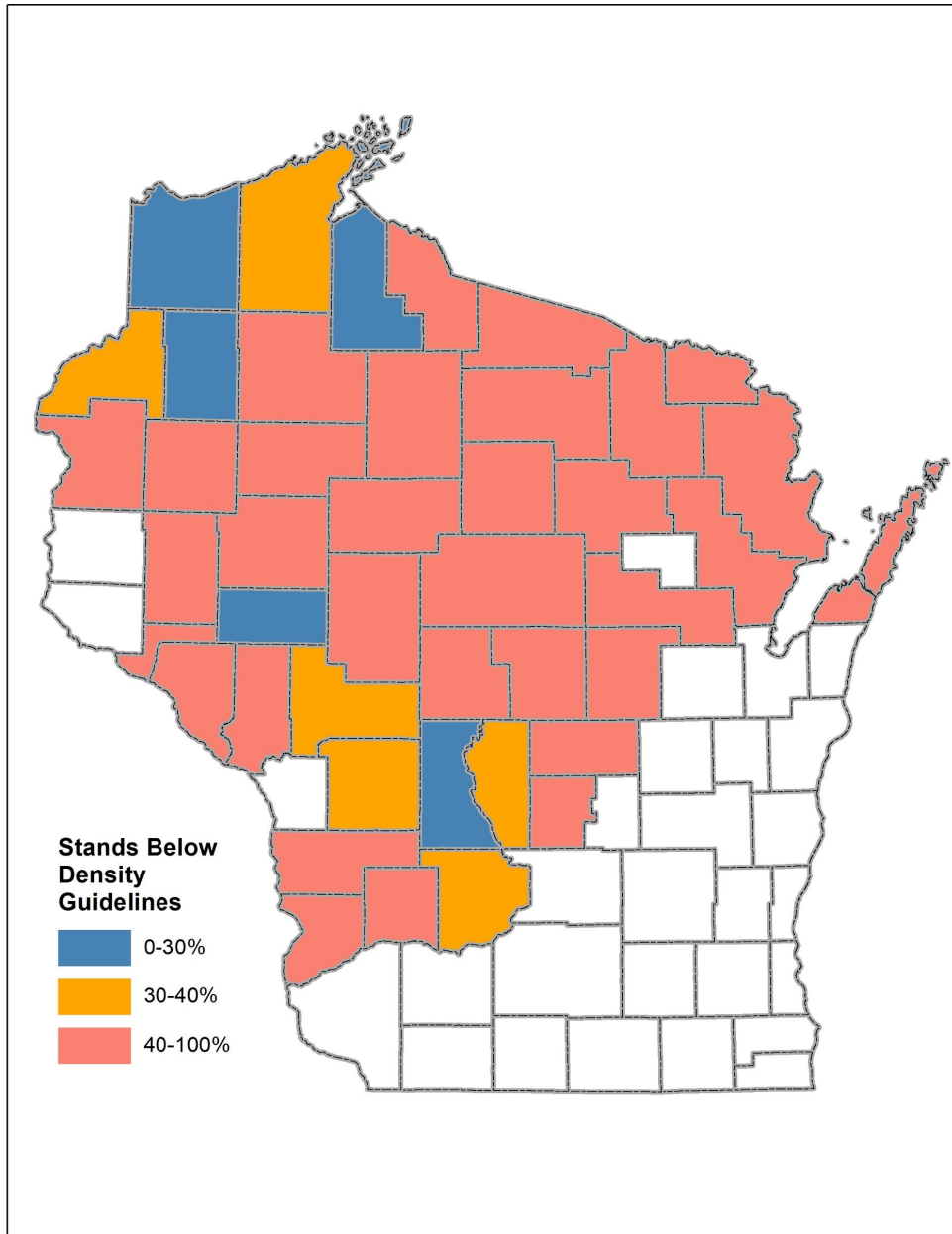
FRM at the Landscape Level: Relative Regen. Stocking



Stands Below Density Guidelines

of counties where average stand density is above/below Wisconsin Silviculture Guide cover type density guidelines

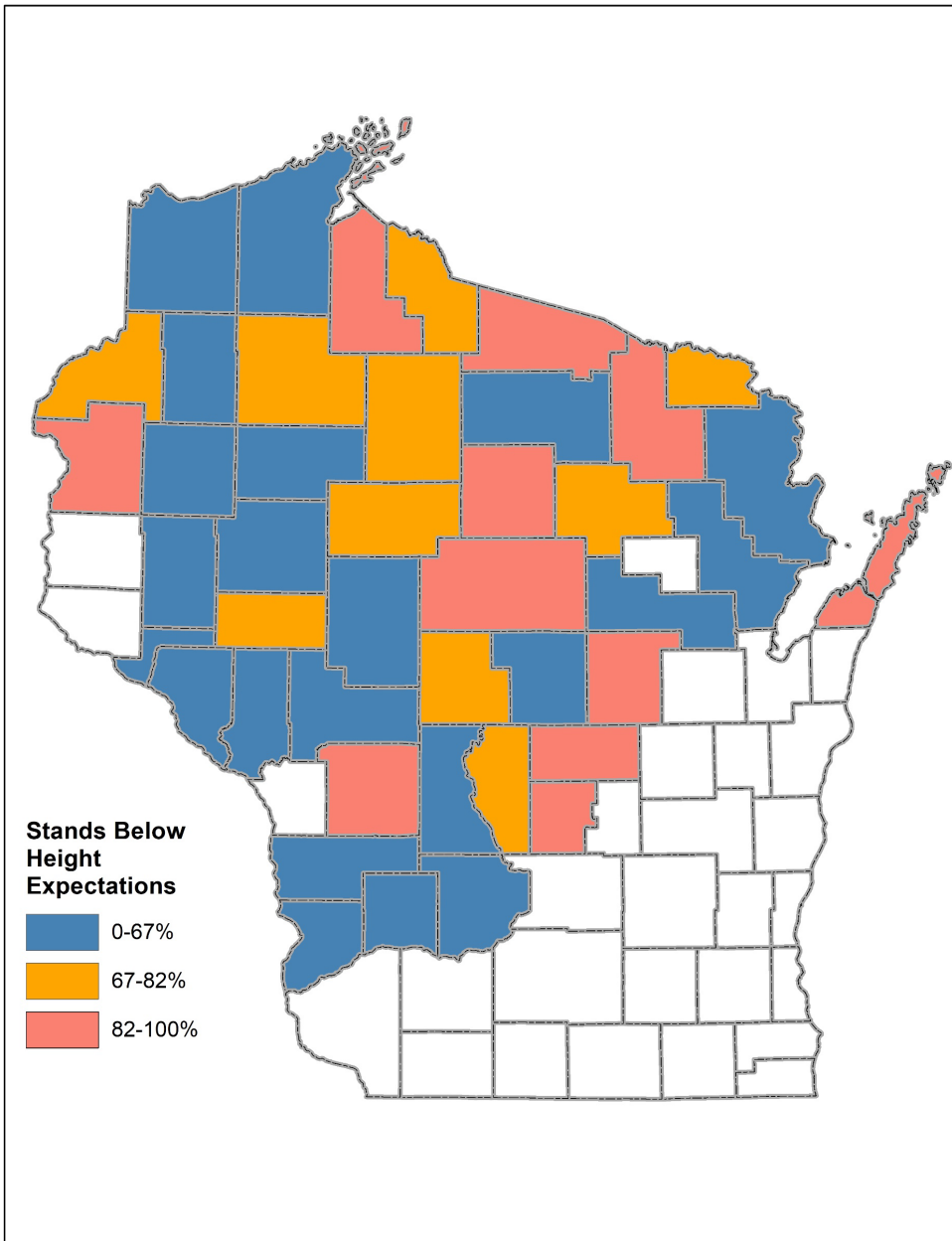
- **5** counties have <30% of stands below guidelines
- **6** counties have between 30% and 40% of stands below guidelines
- **32** counties have >40% of stands below guidelines



Stands Below Height Expectations

of counties where average seedling height is above or below the statewide average by cover type

- **22** counties have less than 67% of stands below height expectations
- **10** counties have 67% to 82% of stands below height expectations
- **11** counties have more than 82% of stands below height expectations



FRM and Research / Field Trials

WDNR Study / Field Trial

- Sandhill WA Deer Density Study
- White Pine Uneven-Aged Management Study
- Blue Mounds Direct Seeded Oak Trial
- Avon Bottoms Enrichment / Assisted Migration Tree Planting Trial
- Radley Creek EAB Enrichment / Assisted Migration Tree Planting Trial
- Forest Exploration Center Climate Change Trials
- HRD Study
- GNA Oak Scarification Trial
- Driftless Area Adaptive Silviculture for Climate Change (ASCC) Study
- Lake Kegonsa SDP Black Locust Control Trial
- Hartman Creek Uneven-Aged White Pine Mgmt. Trial
- Brule River SF Goat Efficacy Trial





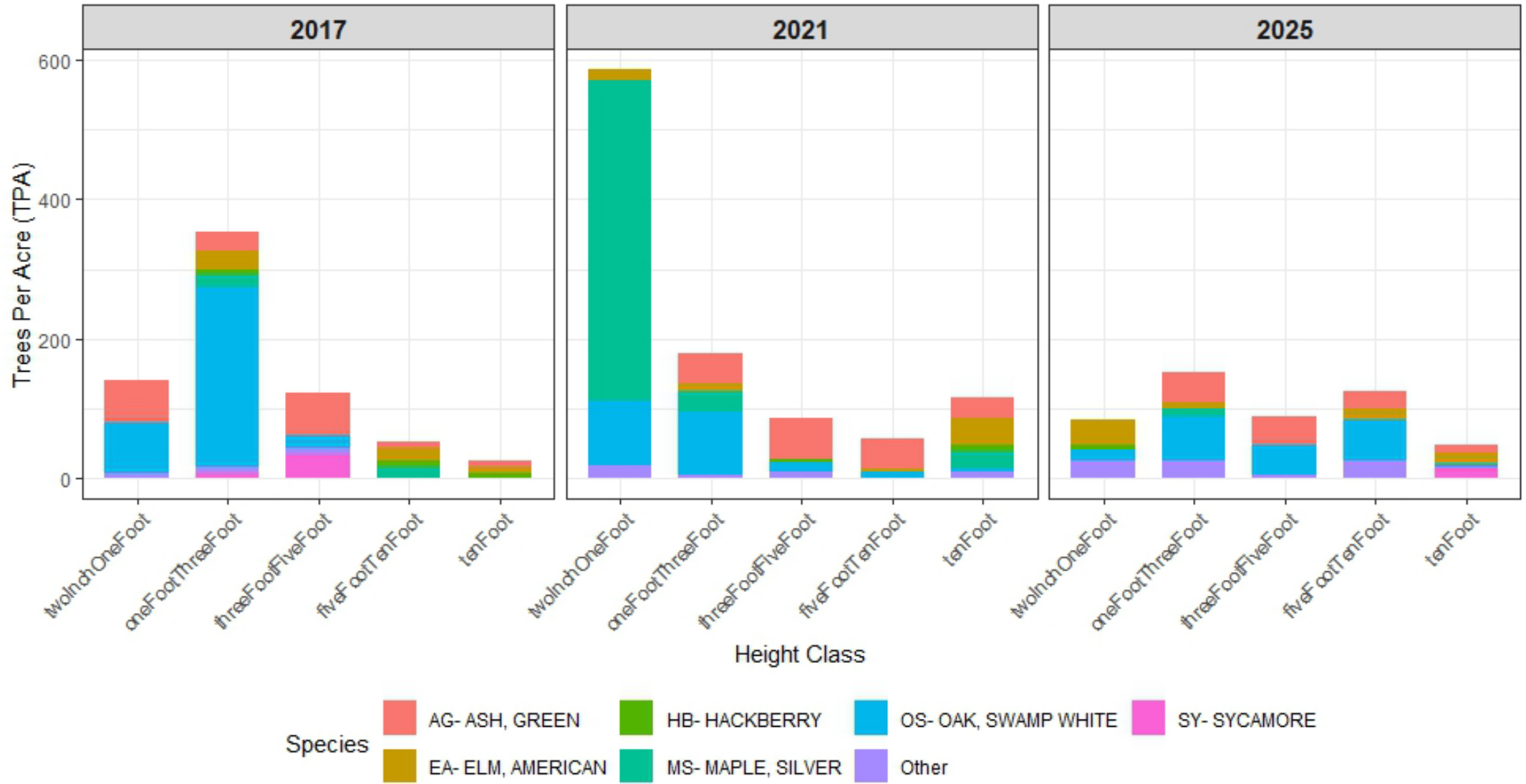
2017



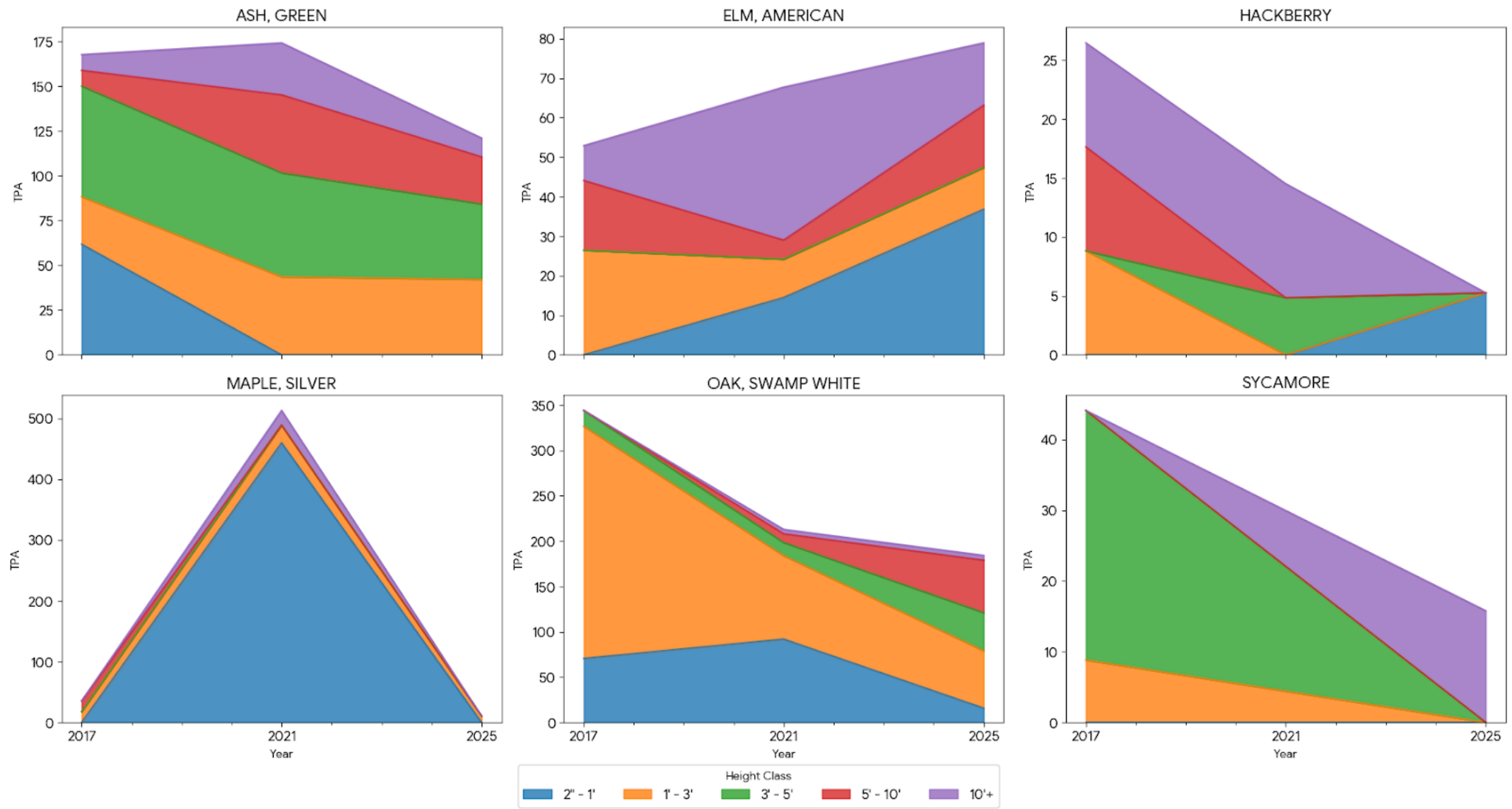
2025

Trees Per Acre by Height Class and Species

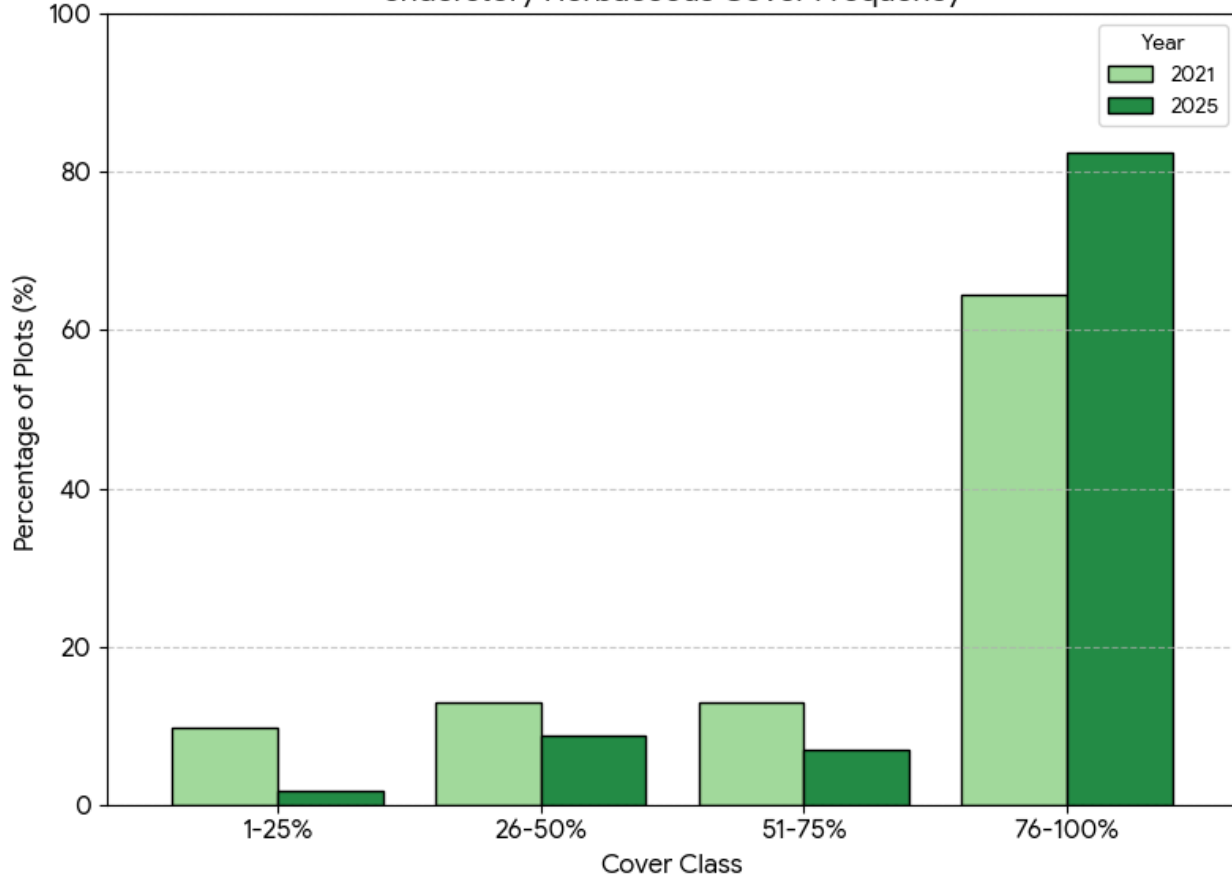
Separated by Year (2017, 2021, 2025)



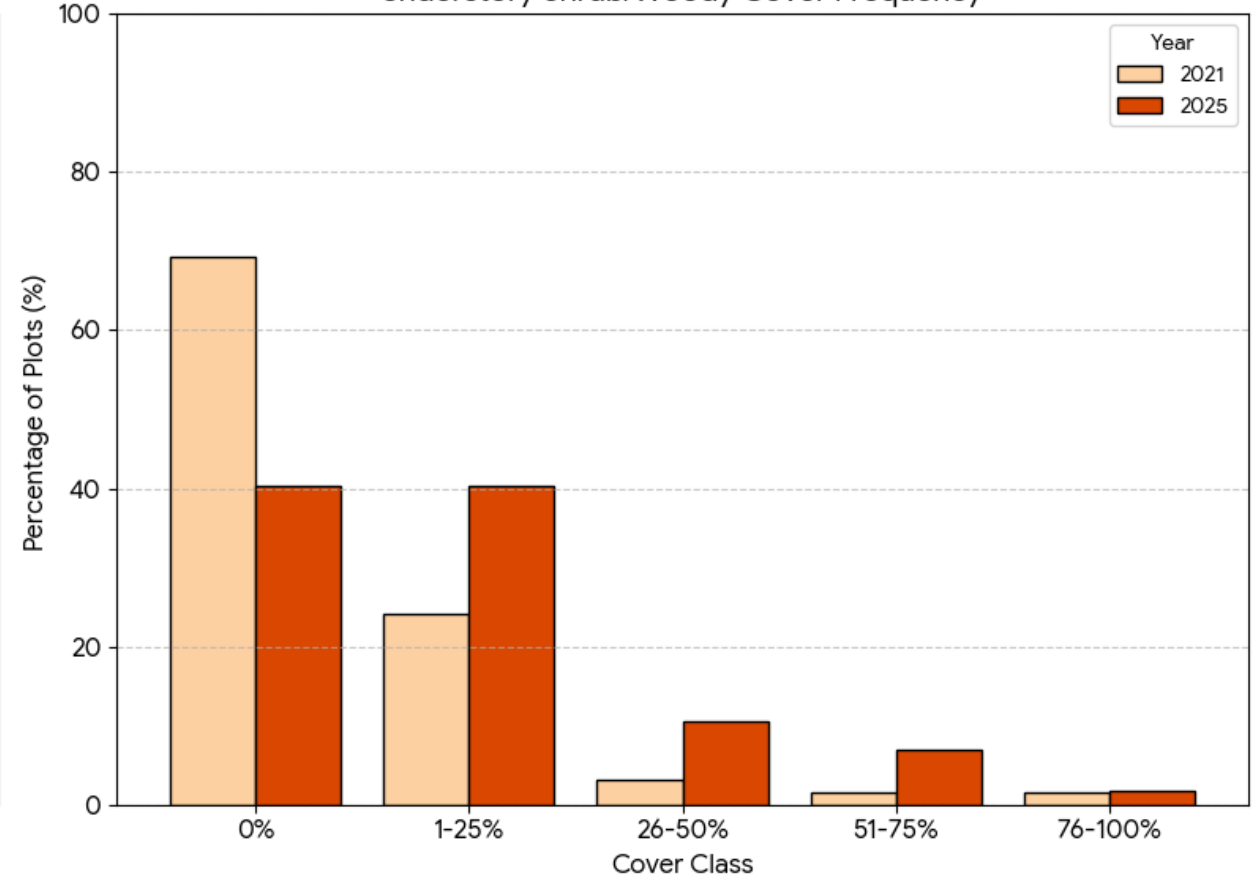
Forest Structure Trends: Stacked Area TPA over time



Understory Herbaceous Cover Frequency



Understory Shrub/Woody Cover Frequency



Program Structure

A little history...

- 2014: NRB requested Division provide county-level forest regeneration data to assist CDACs with deer population goals
- 2016: FRM concept presented to NRB
- 2017: Forestry and FWP Divisions finalize sampling protocols & funding mechanisms
- 2018: Sampling began



Program Structure

Funding

- \$213,000 from USFWS Pittman-Robertson funds
- \$40,000 - \$100,000 from Division of Forestry funds

Staffing

- 1 dual appointment LTE FRM Coordinator
- 10 - 12 seasonal FRM Technicians



Program Success Depends on...



- Cooperation and assistance from foresters
- Permission from landowners
- Reliable funding
- Continued improvements in data collection, analysis, and reporting
- Utilization of results to inform decision-making

CONNECT WITH US

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"WILD WISCONSIN:
OFF THE RECORD"