Forest Regeneration Monitoring in Wisconsin

Introduction

Forest regeneration, the process of renewing tree cover by establishing young trees, is one of the fundamental and most important elements of sustainable forest management. Successful regeneration is crucial to developing healthy, productive forests that can provide sustainable economic and ecological functions. It is critically important that forest regrowth patterns are well understood to sustainably manage Wisconsin's forest resources.

The Forest Regeneration Monitoring program helps foresters, wildlife managers and other decision-makers understand the status of forest regeneration and its dynamics. As a tool, it is important to note that forest regeneration monitoring results comprise only one deer herd metric among many in the WDNR Deer Metrics System.

Forest Regeneration Monitoring Overview

The Forest Regeneration Monitoring program was initiated in 2018 to better assess the status and progression of naturally regenerating forests across the state and to further provide data reflecting forest regeneration success or failure to inform Wisconsin's deer population goal setting process.

Figure 1. Counties currently sampled by the Forest Regeneration Monitoring Program.

Summaries of monitoring results are provided to County Deer Advisory Councils (CDACs) annually. The Forest Regeneration Monitoring program data is also used in other research and assessment projects (more below). The program utilizes a newly developed monitoring tool, the Forest Regeneration Metric (FRM), to assess the regrowth of seedling and sapling trees after a harvest.
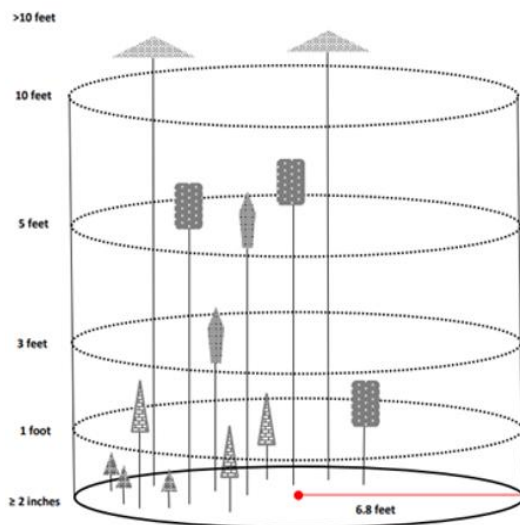
Figure 2. The Forest Regeneration Metric.

Currently, the inventory covers Wisconsin's 46 counties with more than 30% forested area (Figure 1). Efforts have primarily focused on oak-hickory, northern hardwoods, and pine forest type groups with a smaller emphasis on fir-spruce, bottomland hardwoods, and aspen-birch forest types.

FRM is a plot-based assessment using $1/300^{th}$ acre sample areas at a density of 1 plot per every 5 acres on recently harvested sites. These sites are assessed for densities of tree species by height class, level of deer browse, overstory shading and plant competition. Stands are remeasured every three years to track regeneration. This process occurs until a to-be-determined point in time when stands either age out of remeasurement or achieve adequate stocking above deer browse height.

Progress To Date And Initial Results

The first three-year data collection cycle was completed in 2020, and the second three-year data collection cycle was started in 2021. Through 2020, FRM data has been collected in 2,725 stands, totaling over 16,000 plots on both public and private lands throughout the state. Partnerships with County Forests, the US Forest Service, Ft. McCoy, the DNR Deer Management Assistance Program (DMAP), and private landowners and resource managers have aided in collecting a robust dataset.

After the first cycle of measurements:

- Most counties have regeneration numbers below recommended levels with 33 of 46 counties have 40% or more of stands below regeneration density guidelines (Figure 3)
- Only 5 of 46 counties had 70% or more of stands meeting regeneration density guidelines
- When broken down by geographical region and forest type, swamp hardwood, hemlock hardwood, northern hardwoods and oak, particularly in the northeast, central and southwest portions of the state, face the most regeneration challenges. Pine and fir-spruce forest types display the greatest amount of regeneration success in all regions sampled (see figure 4 on last page)
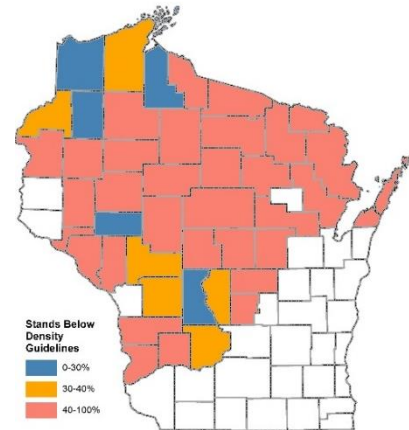

Figure 3. Percentage of stands below density guidelines by county.

FRM – Its Role As A Deer Metric

The Forest Regeneration Monitoring program provided its first reporting to CDACs in the winter of 2020/2021. Since deer management units are individual counties, regeneration reports were produced for each county (county specific reports can be found here). While these reports provide an accurate summary of current regeneration in recently harvested or disturbed stands, the regeneration numbers are just one data point in a suite of metrics that each committee uses to inform deer management. With other key data inputs such as deer densities and health, data from the Forest Regeneration Monitoring program can help inform deer population goals.

Limitations

The first three-year cycle was completed from 2018-2020. Stands first measured in 2018 were remeasured in 2021, along with additional recently harvested stands to add to the dataset. Data collected during the first cycle provided a snapshot of county-level and statewide regeneration composition and success across forested lands.

Subsequent data collection cycles will provide time-series data that will provide insight into how regeneration progresses over time and strengthen the understanding of succession in forest regeneration and the potential impacts of deer browse on stand progression. While the snapshot is an excellent opportunity to compare regeneration density to established silvicultural standards, the key to the success of the Forest Regeneration Monitoring program is the repeated measurements in stands over time.

The deer browse data collected is one way to measure the effects of deer on forest regeneration. In-depth analysis of deer browse and its correlation with variables such as species composition and preference of deer, proximity to other food sources such as agricultural lands, and carrying capacity of various forest and habitat types will be key to understanding the interaction between deer and forest regeneration. Deer browse is currently used to measure risk to regeneration as reported in yearly CDAC reports. Further study of time-series data is needed to understand how deer browse impacts regeneration on a finer scale.

Long-Term Outcomes

Information gathered from FRM allows better tracking of long-term changes to our forests and will help create forestry policies and guidelines to ensure the long-term sustainability of the forest resource. The data from the program also will aid in the development of other key products that may further improve forest management in Wisconsin. A few of these key outputs are:

- Keep the public informed on the status of Wisconsin's forests
- Assist in the development of Wisconsin-specific regeneration standards by forest type group
- Monitor long-term changes in the composition of Wisconsin's forests
- Assess the sustainability and effectiveness of our forest policy and regeneration methods.
- Provide a metric for landowners and resource managers to assess stand-level regeneration and effectiveness of management strategies more comprehensively
- Forecast trends to help stakeholders form economically and ecologically sustainable business plans
- Understand how spatial landscape factors affect deer browse and regeneration (i.e. proximity to agriculture, Ecological Landscape, etc.)
- Utilize browse data to understand deer browse species preferences and whether browse data interacts with other variables (i.e. forest type, habitat type, etc.) to affect regeneration pattern

Contacts

FRM is a collaborative program involving many staff both in the field and in the office. If you have questions regarding any aspect of the program, please contact one of the following Division of Forestry staff.

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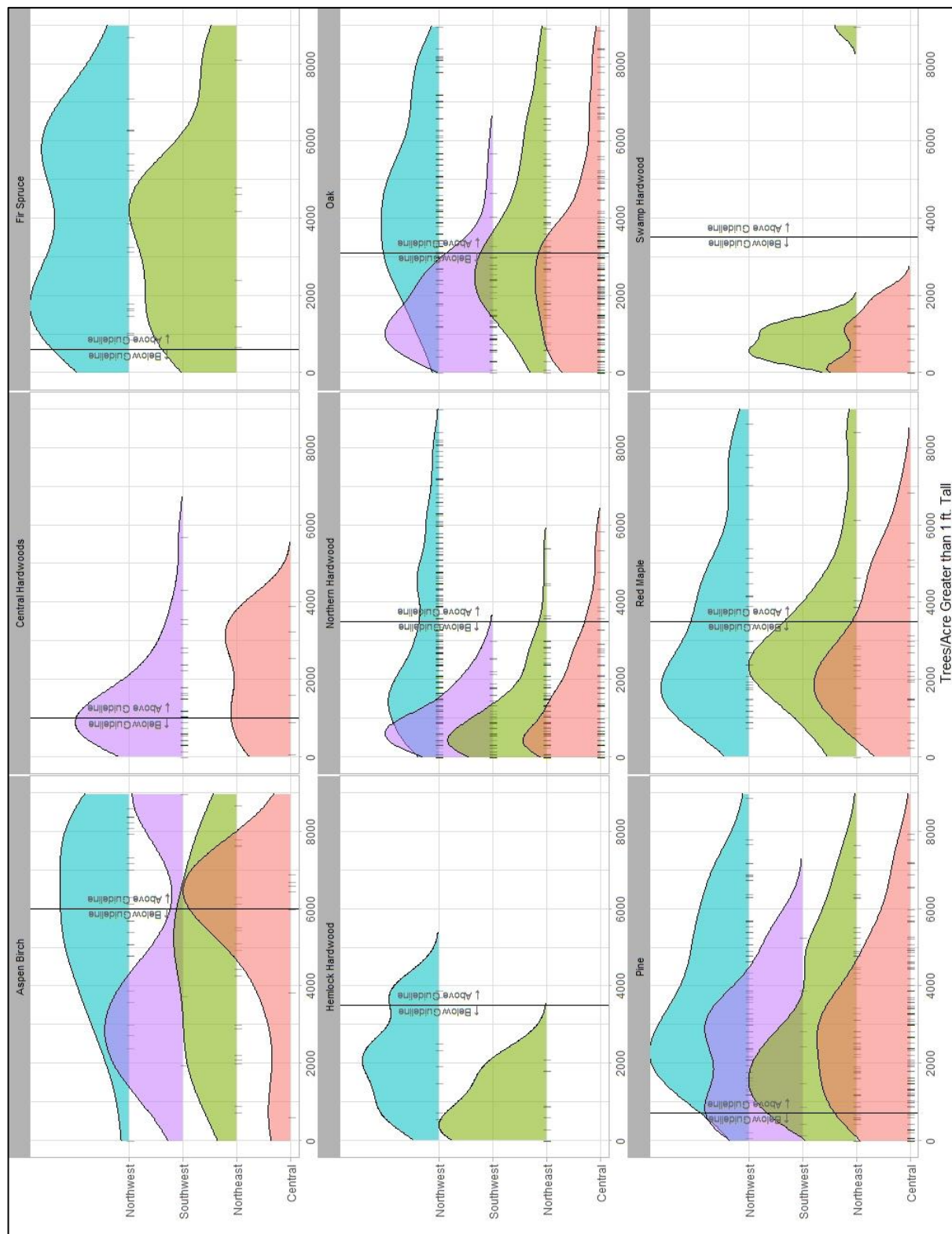608-574-5642
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Figure 4. Regeneration density of stands by forest type and region.