

Regional Expansion of the Forest Health Monitoring Program at FEMC: Insights from 2021



Matthias Sirch^{1,2}; Benjamin Porter^{1,2}; Elissa Schuett^{1,2}; Hanson Menzies^{2,3}

¹University of Vermont Rubenstein School of Environment and Natural Resources, ²Forest Ecosystem Monitoring Cooperative, ³ ECO Americorp Program - Vermont Department of Environmental Conservation



After successfully establishing and conducting annual assessments on Forest Health Monitoring (FHM) plots in Vermont for almost three decades, the FEMC has begun its expansion of the FHM program into surrounding states to yield a more complete picture of forest health across the Northeast.

Introduction

In 1991, the Forest Ecosystem Monitoring Cooperative (FEMC), then the Vermont Monitoring Cooperative (VMC), and the Vermont Department of Forests, Parks and Recreation (FPR) created a Forest Health Monitoring (FHM) network located in study sites on Mt. Mansfield that were surveyed annually (Figure 2). By 2018, the network had grown to include 49 plots in Vermont. After successfully conducting annual assessments on FHM plots in Vermont for almost three decades, the FEMC began to expand its FHM program into surrounding states to yield a more complete picture of forest health across the region. By the 2021 field season, FEMC worked with state partners to establish plots in Connecticut (15 plots), Maine (35), Massachusetts (25), New Hampshire (30), and Rhode Island (7), with New York (35) completing the 7-state expansion effort in 2022. These new sites were primarily co-located at established, long-term forest health monitoring plot locations, representing the major forest types and geographies on public lands in each state.

At each plot, FEMC FHM crews assess seedling and sapling regeneration, and record tree height, tree diameter at breast height (DBH), as well as vigor, dieback, transparency, defoliation, and discoloration of the tree's canopy. Lastly, crews note pest and pathogen damages for each tree, invasive species presence within the plot, and degree of browse pressure observed.

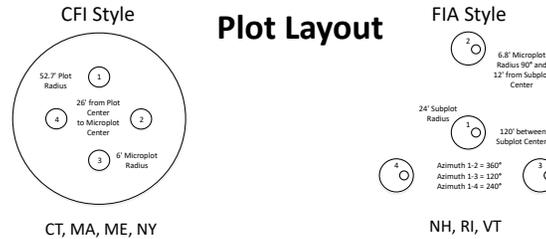


Figure 1. The two plot layouts adopted by the FEMC Forest Health Monitoring program accommodates plot layouts from each state's historical forest health monitoring efforts. Our CFI-Style FHM plots (left) show the overstory plot (large circle) and four regeneration microplots (small circles at cardinal directions), based upon the MA style CFI plot network. Our FIA-Style FHM plots (right) show the 4 subplots and four regeneration microplots within each, based upon the USFS FIA style plot network.

Results

From the 6,594 trees (≥5 inch DBH) measured across FEMC's 154-plot network, average live overstory tree density in 2021 was 183 stems per acre (SPA) and 123 ft²/ac basal area. Regeneration assessments show sapling densities of 493 live SPA with balsam fir and American beech (*Fagus grandifolia*) representing the most abundant sapling species. Red maple was the most abundant seedling tallied in 2021 (24% composition, 5,709 SPA), followed by sugar maple (22%, 5,317 SPA), and balsam fir (12%, 2,794 SPA).

Damage related to beech bark disease (BBD) was the most common damage agent recorded, with 38% of the plots (58) impacted and approximately 73% of live American beech trees showing symptoms of the disease. Asian longhorned beetle, emerald ash borer, hemlock woolly adelgid, and sapsucker damage was observed on <1% of trees assessed.

While there are a wide range of stressors and vulnerabilities impacting Northeastern forests, data from the 2021 season suggest that the region's forests are overall diverse, vigorous, and healthy. We will monitor these threats as our program expands into New York in 2022 and continues to collect valuable forest health data year after year.

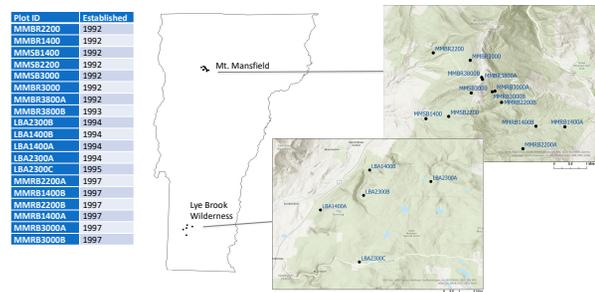


Figure 2. Original Vermont Monitoring Cooperative (VMC) Forest Health Monitoring plot network established between 1992 and 1997 on Mount Mansfield and within the Lye Brook Wilderness area.

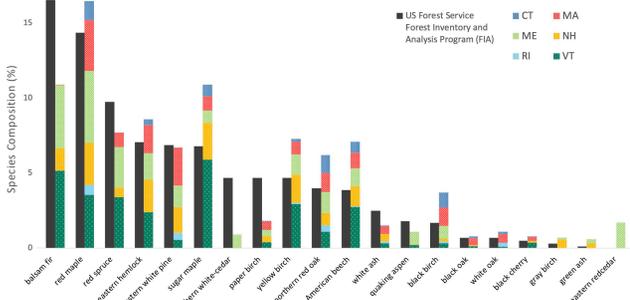


Figure 3. Percent live species composition for CT, MA, ME, NH, RI, and VT from the FEMC Forest Health Monitoring 2021 season alongside FIA estimates of live growing stock (≥5 inch DBH; USFS 2019).

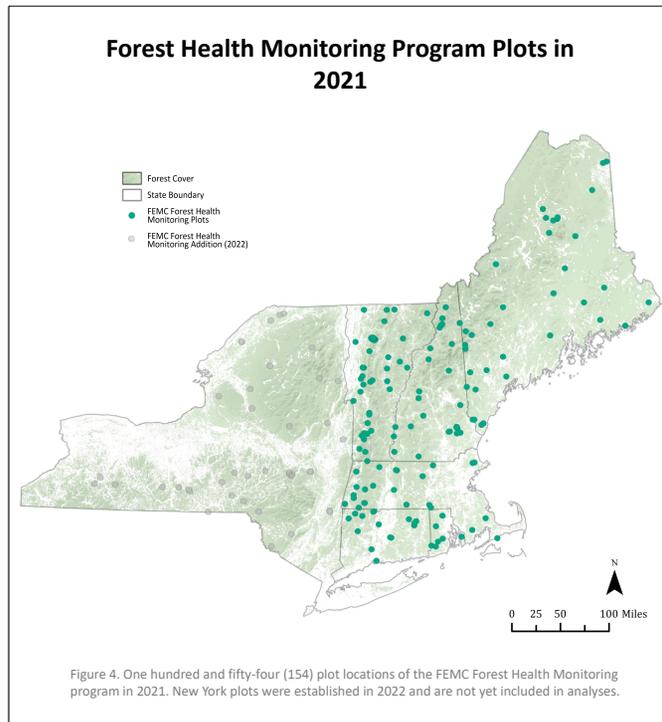


Figure 4. One hundred and fifty-four (154) plot locations of the FEMC Forest Health Monitoring program in 2021. New York plots were established in 2022 and are not yet included in analyses.

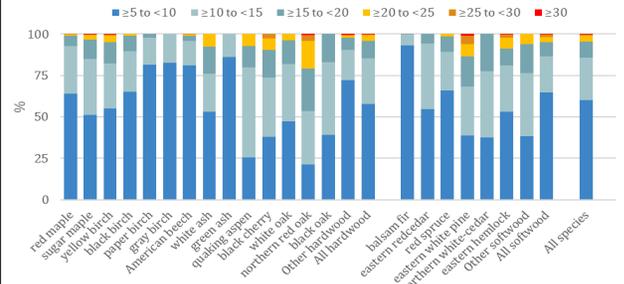


Figure 5. Size classes of live trees by diameter at breast height (DBH; inches) across the FEMC FHM plot network in 2021.

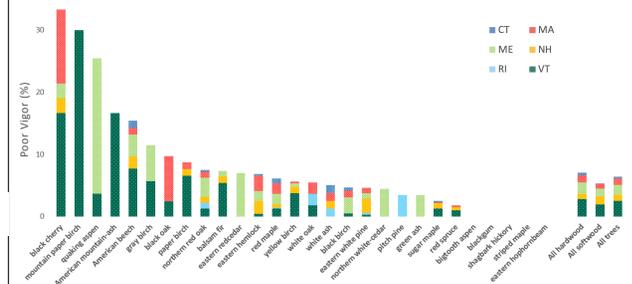


Figure 6. Percentage of trees with a 'poor vigor rating' sampled in 2021 across the six states in the FEMC FHM network. Percent poor vigor is the proportion of trees per species that were classified to be 'in decline' (vigor ratings of 3 or 4).