

A Snapshot of FEMC's Regional Forest Health Monitoring Network. Insights from 2024

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Through long-term forest health monitoring in seven (7) northeastern states, the Forest Health Monitoring (FHM) program has observed and analyzed relatively stable health conditions throughout the northeastern forest. However, due to specific damages and diseases, certain species should be continued to be closely monitored and managed, such as American beech, white oak, and white ash.

Introduction

The FHM program of the FEMC has previously conducted long-term monitoring assessments of forest health throughout Vermont since 1990. Expansion in 2022 allowed FEMC to established 194 total plots throughout Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont (Fig. 4). These new sites were primarily co-located at established long-term forest health monitoring plot locations (FIA and CFI), representing the major forest types and geographies on public lands. 2024 marks the third year of monitoring on all plots within our regional 7-state network.

During the 2024 field season, the FEMC FHM crews assessed seedling regeneration, sapling survivorship, and overstory health. Forest health metrics included tree heights, tree diameter at breast height (DBH), vigor, dieback, transparency, defoliation, and discoloration of the forest canopy. Lastly, crews documented special damages for each tree, along with invasive species presence and the degree of browse pressure observed within each plot.

Our primary analyses were focused on several different metrics: Percentage of trees with ‘poor vigor’ ratings by species in each state (Fig. 2), a temporal analysis of seedling density by species (Fig. 3), the average percent of vigor for each overstory tree species (Fig. 5), and the average dieback for each tree species, categorized by state (Fig. 6).

Plot Layout

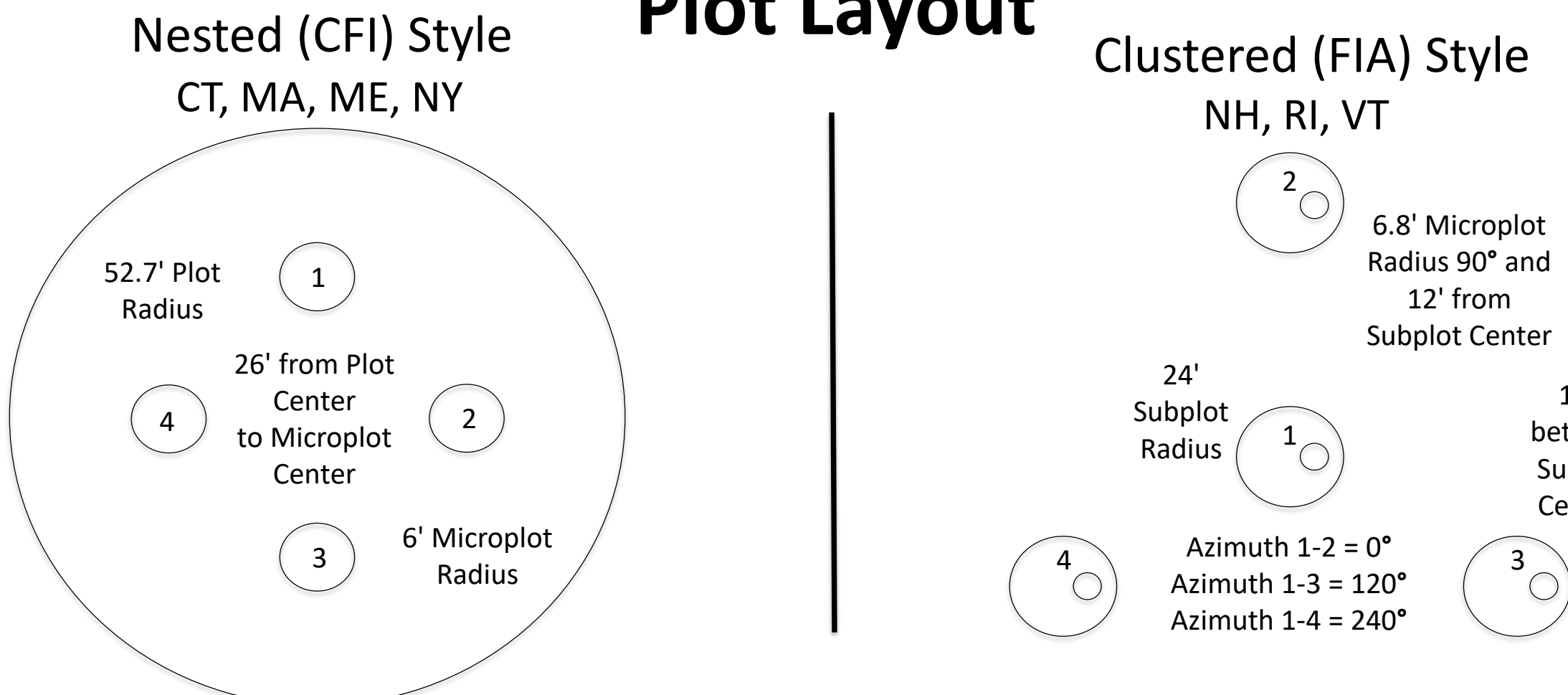


Figure 1. Our nested (CFI-style) (left) and clustered (FIA-style) (right) FHM plots are shown. Our FHM program adopted these to accommodate plot layouts from each state's historical FHM efforts. The nested plots contain an overstory plot (large circle) and four regeneration microplots (small circles at cardinal directions), while the clustered plots contain four subplots and four regeneration microplots, based upon the USFS FIA style plot network.

Results

- While there are a wide range of stressors and vulnerabilities impacting Northeastern forests, data from the 2024 season suggest that the region's forests are overall diverse, vigorous, and healthy. However, there are notable exceptions that we should continue to monitor.
- From the 2024 crown health assessments, we determined white oak (*Quercus alba*), American beech (*Fagus Americana*), and black cherry (*Prunus serotina*) as species of concern. Average vigor ratings for these species were 1.8, 2.1, and 2, respectively (where 1 is healthy and 4 is severe decline) and defoliation ratings were 1.5, 0.6, and 0.9 (where 0 is 0 to trace defoliation, 1 is less than 30% crown defoliation, and 2 is 30-60% defoliation).
- Of live trees measured throughout the plot network, we found that 5,838 trees (92.1%) had vigor ratings corresponding to “healthy” and “light decline” (vigor 1 and 2, respectively) and 499 trees (7.9%) were in “moderate” to “severe decline” (vigor 3 and 4, respectively).
- The overstory trees with the highest average rates of moderate or severe decline were American beech (13.4%), green ash (*Fraxinus pennsylvani*; 8%), white ash (*Fraxinus americana*; 7.6%), and white oak (5.1%). Across all species, <3% of total live stems surveyed were determined to be in severe decline.
- Across all live trees, the average fine-twig dieback was 10.7%. American beech had the highest mean dieback at 20.2%, while white ash and Norway spruce had 17.5% and 15.3% mean dieback, respectively (Figure 6).

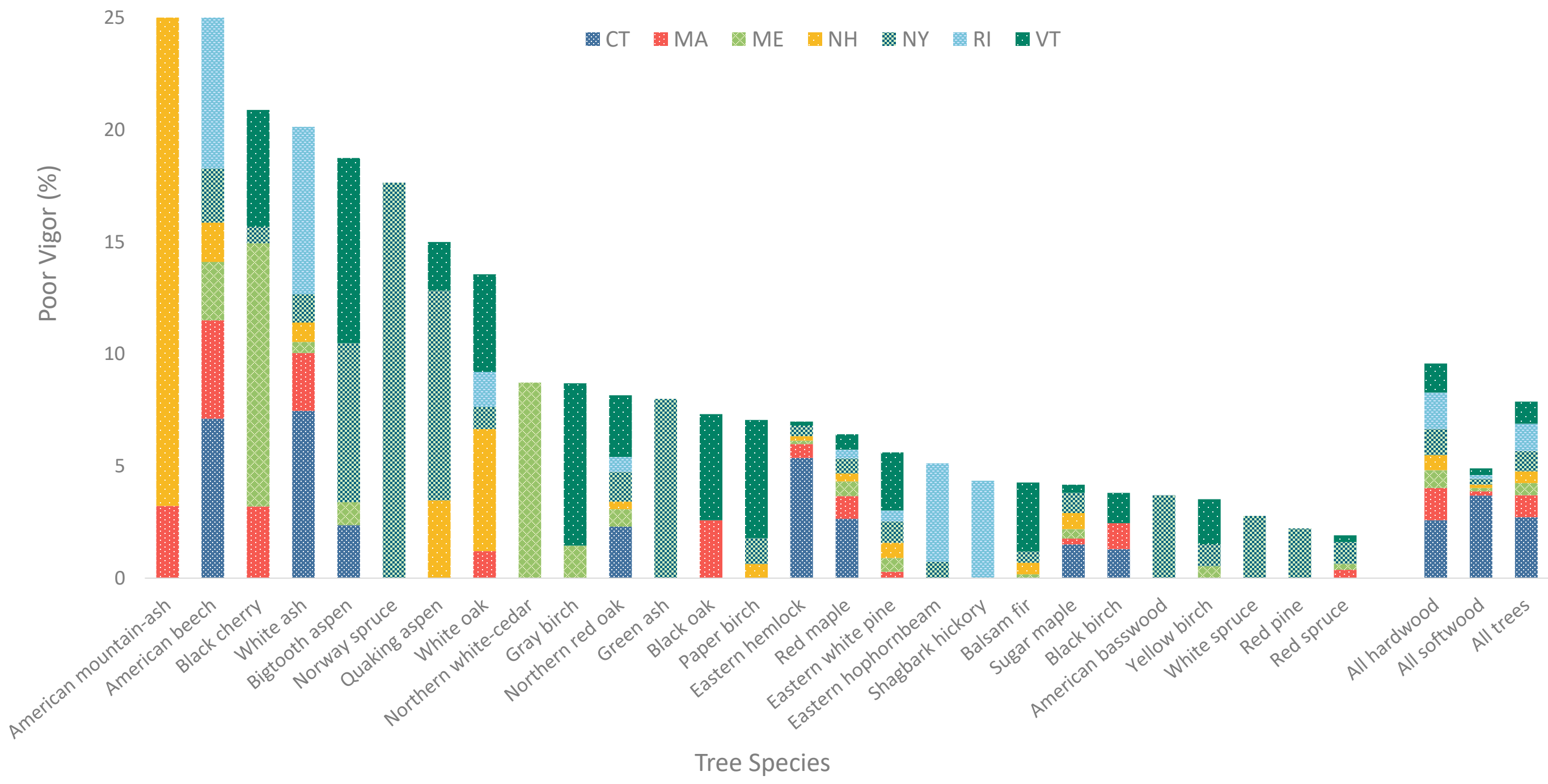


Figure 2. Percentage of trees with a ‘poor vigor rating’ sampled in 2024 across the seven states in FEMC Forest Health Monitoring plot network where at least 10 individuals of each species were measured. Percent poor vigor is the proportion of live trees per species that were classified to be ‘in decline’ (vigor ratings of 3 or 4).

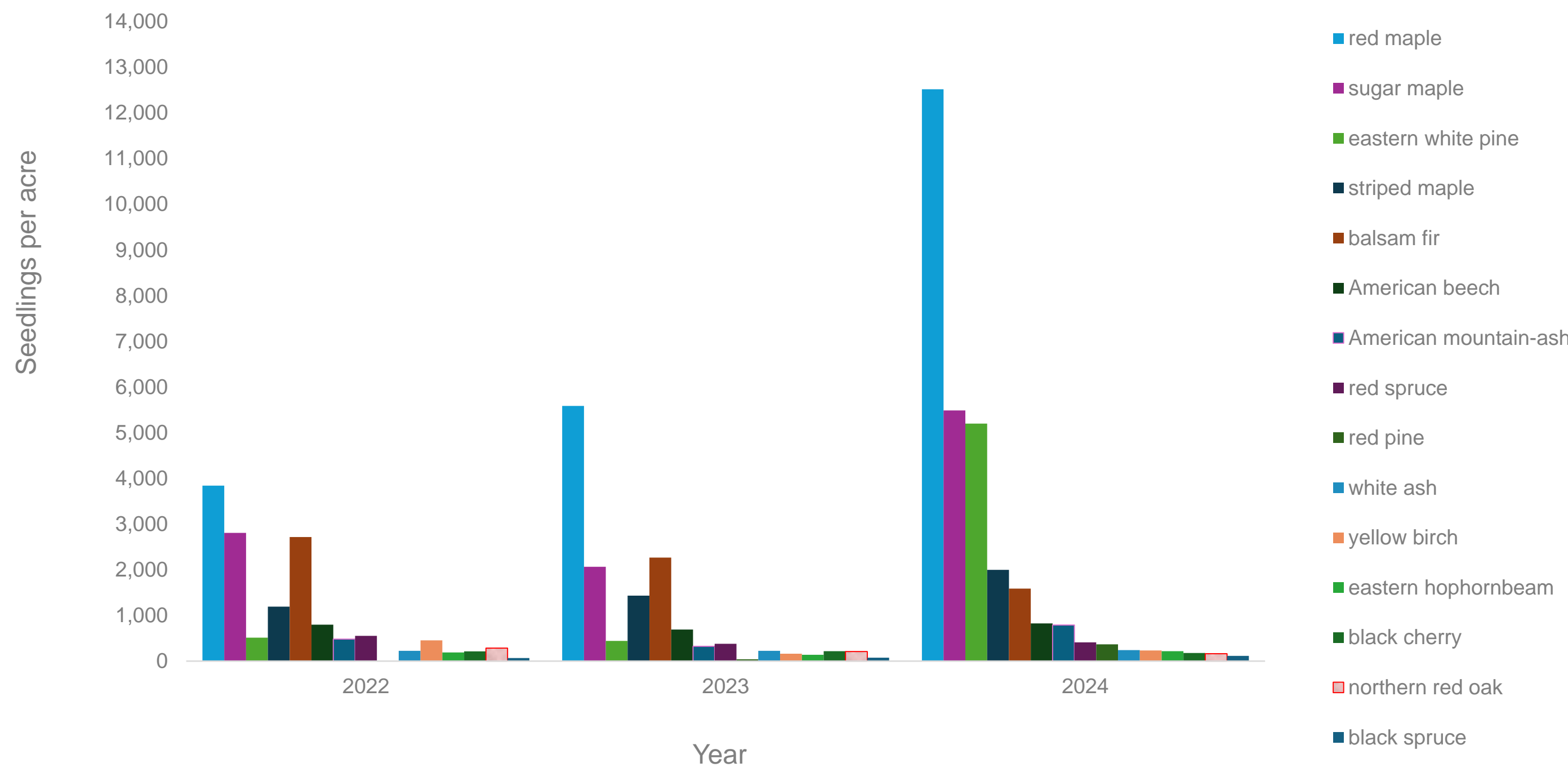


Figure 3. A temporal analysis of the mean seedling density (counts per acre) for each species between 2022 and 2024. Plots consistently visited since 2022 (189 plots) were used in the analysis. Masting by select species could be the cause of large seedling discrepancies.

FHM Program Plots in 2024

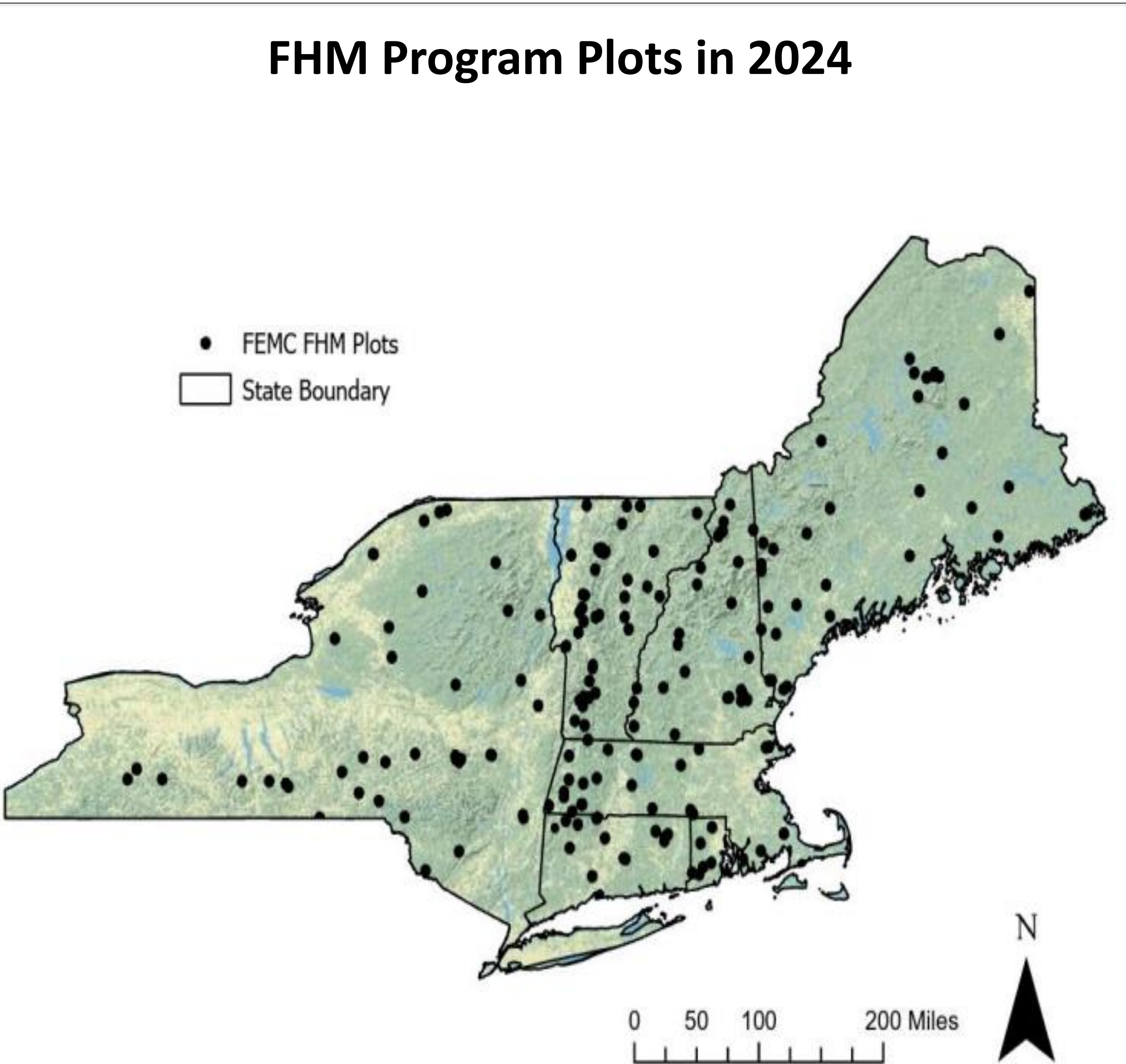


Figure 4. One hundred and ninety-four (194) plot locations were included in the total FHM analysis. As of 2022, our regional states include Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

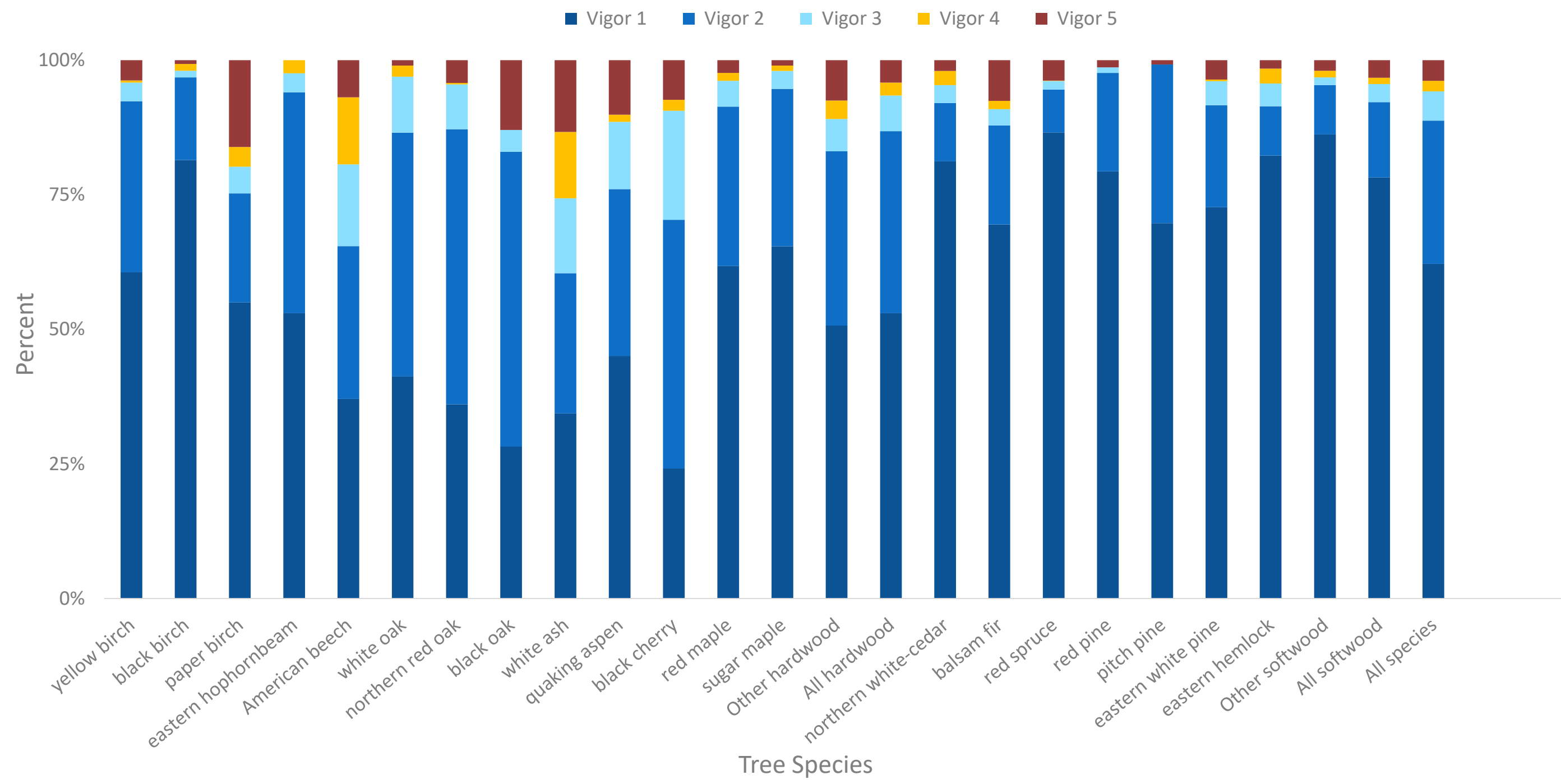


Figure 5. Average basal area (%) of each vigor category (1 is healthiest, 2-4 is increasing decline, 5 is dead and standing) for each overstory tree species. Tree species with relatively high importance (abundance) values were included and only standing trees were included.

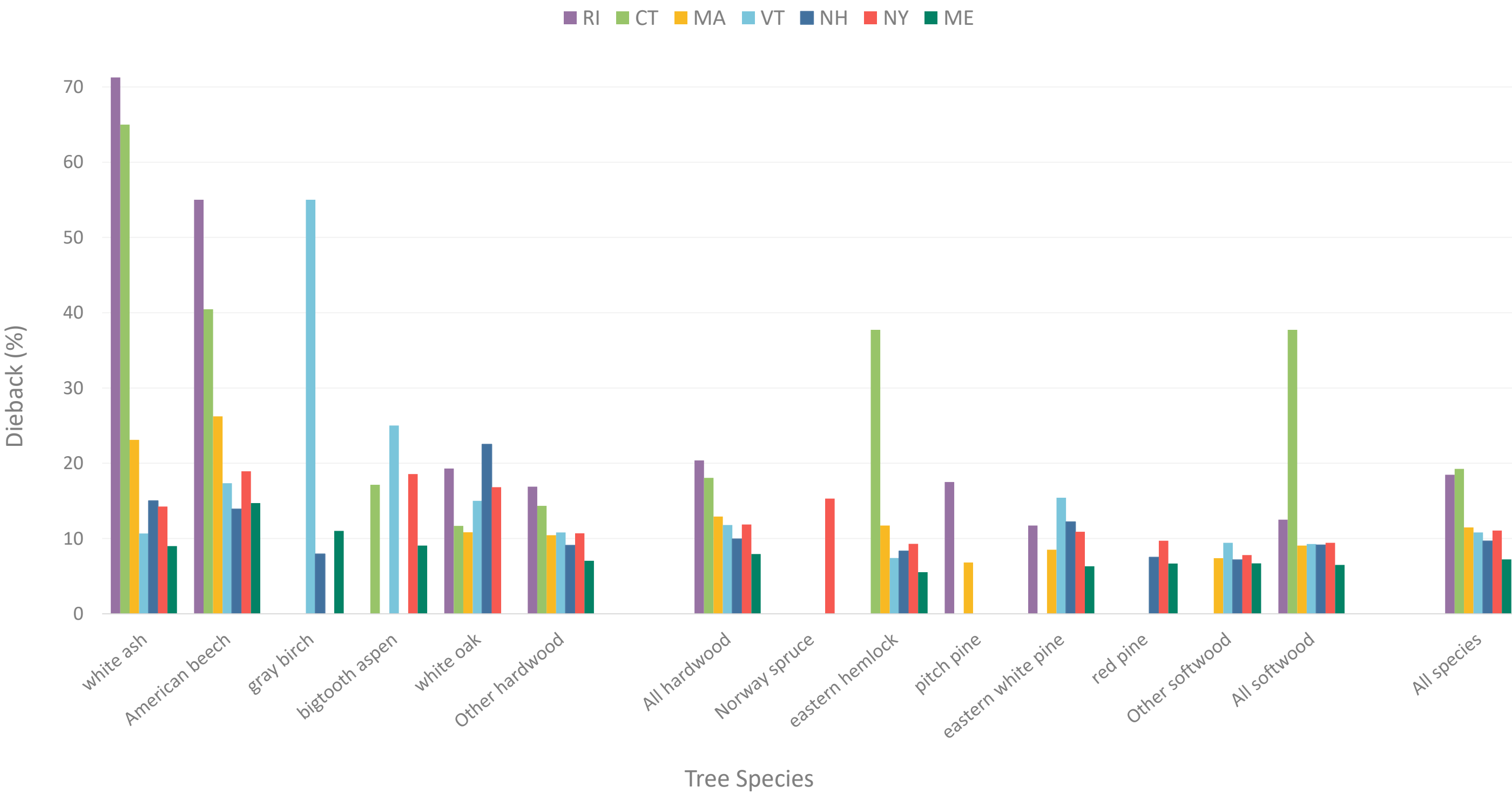


Figure 6. Species with the greatest average crown dieback (%) across seven (7) regional states. Crown dieback is identified as the percent of fine twig dieback and is rated from 0-100% (0% indicating no find twig dieback, 100% indicating complete fine twig dieback). Tree species were included if at least 10 individuals were measured.