United States
Department of
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Forest Service

Northeastern
Research Station

NE-INF-145-02

Forest Health Monitoring in Maine

1996 - 1999

MAINE

The National Forest Health Monitoring (FHM) program monitors the long-term status, changes and trends in the health of forest ecosystems and is conducted in cooperation with individual states.

In Maine, 137 FHM plots were established in 1990 (Fig. 1). Each point in Figure 1 represents the status and approximate location of one FHM plot. Each plot is a set of four fixed-area circular plots. Most tree measurements are made on four 1/24-acre subplots. Seedling and sapling measurements are made on four 1/300-acre microplots, located within the subplots.

All plots were visited at least once between 1996 and 1999, with 42 to 60 plots sampled each year. In 1996 and 1997, about one-third of all plots were sampled. In response to a widespread ice storm that occurred in January 1998, sampling of affected areas was done in addition to the scheduled one-third sample. In 1999, Maine implemented an annual forest inventory on a 5-year rotating system and plots were added to the FHM network. This analysis summarizes the most recent conditions on the original plots.

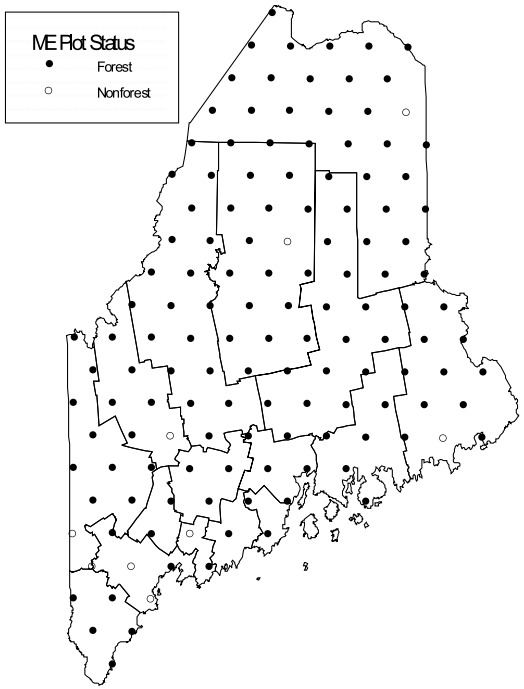

Figure 1. Current status and approximate locations of Forest Health Monitoring (FHM) plots in Maine.

Plot Characteristics

- 128 of the 137 plots were at least partially forested.
- 89 percent of the 137-plot area was forested.
- 51 percent of the forested areas were in the spruce-fir forest types; the second most common group was the maple-beech-birch forest type, accounting for about 34 percent of the forested areas**.**
- 40 percent of the forested areas were in sawtimber-size stands; 44 percent of the areas in poletimber-size stands; and the remaining areas were in stands dominated by seedlings and saplings.
- 44 percent of the forested areas were in stands more than 60 years old; 34 percent were in stands 41 to 60 years old; and 12 percent were in stands 21 to 40 years old.

Plot Structure (Table 1)

Seedlings

- Balsam fir seedlings (12 inches tall, less than 1 inch diameter) were most abundant, accounting for about 29 percent of the 6,764 seedlings counted.
- The five most abundant species groups collectively accounted for 69 percent of the seedlings. They were balsam fir, red maple, other maple, sugar maple, and paper birch.

Saplings

- Balsam fir saplings (1 to 4.9 inches d.b.h.) were the most abundant, accounting for over 33 percent of the 1,457 saplings counted.
- The five most abundant species groups collectively accounted for 67 percent of the saplings. They were balsam fir, red spruce, red maple, paper birch, and white and black spruce.

Trees

- Red spruce trees (5 inches d.b.h. or greater) were the most abundant, accounting for 15 percent of the 3,393 trees counted.
- The five most common species groups collectively accounted for 62 percent of the trees. They were red spruce, red maple, balsam fir, northern white cedar, and eastern white pine

Table 1. Numbers of trees by size class and species groups, Maine, 1996-99.

Rankings of species quantity appear as superscripts beside numbers.

Species	Size Class		
	Seedlings	Saplings	Trees
Northern white cedar	220	27	323[4]
Balsam fir	1,954[1]	489[1]	468[3]
Eastern hemlock	132	35	186
Eastern white pine	29	21	279[5]
Red spruce	364	162[2]	522[1]
White/black spruce	125	90[5]	84
Paper birch	473[5]	97[4]	188
Sugar maple	543[4]	40	170
Red maple	933[2]	144[3]	514[2]
Other maple	742[3]	81	6
All softwoods	2,860	837	1,907
All hardwoods	3,904	620	1,486
All species	6,764	1,457	3,393

Tree Condition

Crown Dieback (Table 2; Fig. 2)

Crown dieback refers to recent mortality of branches with fine twigs and is measured as a percentage of the tree crown. Low dieback ratings (5 percent or less) are considered to be an indicator of good health. High dieback ratings indicate poor health.

- 81 percent of the trees had low dieback ratings; average plot dieback was 7 percent.
- 3 percent of all trees had high dieback ratings (more than 20 percent affected crown); 16 percent had moderate dieback ratings (6 to 20 percent affected crown).
- 5 percent of red maple had high dieback ratings; 24 percent of red maple had moderate dieback ratings.

Table 2. Mean plot values and percentage of trees with ratings of specified values, by crown variable, Maine, 1996-99. (plot means based on 128 forested plots, percentage of trees based on 3,393 live trees 5 in. or more in d.b.h.)

	Value
Crown Dieback	
Plot Mean	6.9
Trees with ≤5% dieback	81
Foliage Transparency	
Plot Mean	16.7
Trees with ≤30% transparency	99
Crown Density	
Plot Mean	48.5
Trees with >30% density	91

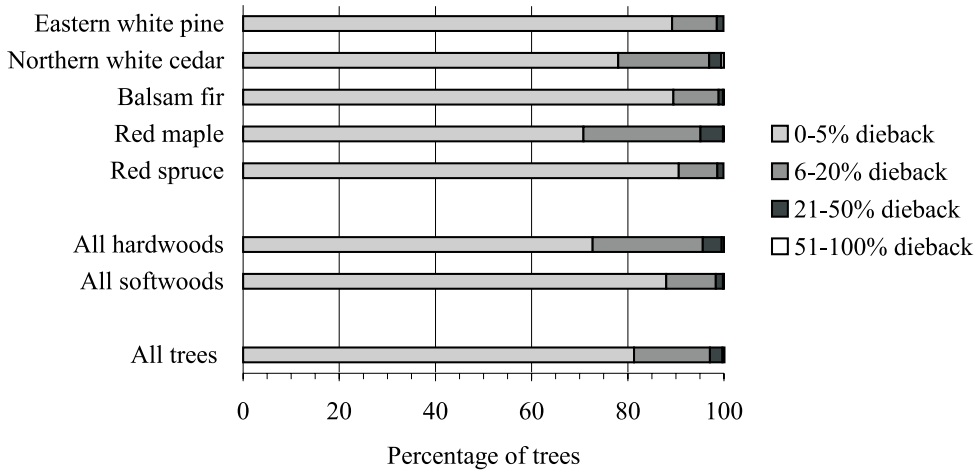

Figure 2. Distribution of crown dieback ratings for trees in Maine, 1966-99.

Foliage Transparency (Table 2; Fig. 3)

Foliage transparency is the amount of skylight visible through the live, normally foliated portion of the crown. Foliage transparency estimates the crown condition in relation to a typical tree for the site where it is found. Low transparency ratings (little visible skylight) indicate a full and generally healthy, crown; high transparency ratings indicate a sparse crown. Transparency ratings of 30 percent or less are considered normal for most trees.

- 99 percent of all trees had normal transparency ratings; average plot transparency was 17 percent.

Crown Density (Table 2; Fig. 4)

Crown density is the percentage of crown area where sunlight is blocked by crown branches, foliage, and reproductive structures. Crown density estimates crown condition relative to a typical tree for the site. Density also serves as an indicator of future growth. High density ratings (greater than 30 percent) indicate a full, healthy, crown.

- 91 percent of trees had high density ratings; 9 percent had low density ratings; average plot density was about 48 percent.
- 12 percent of northern white cedar and 15 percent of eastern white pine had low density ratings.

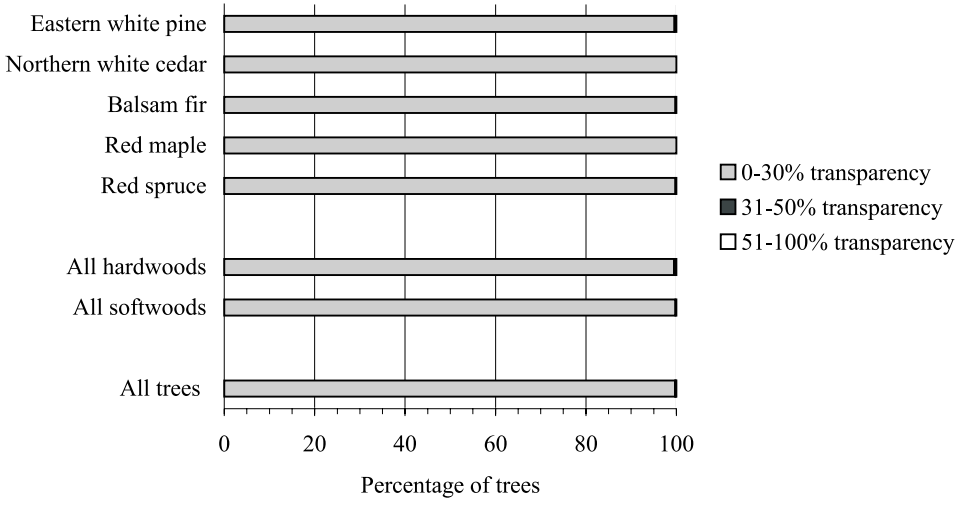

Figure 3. Distribution of foliage transparency ratings for trees in Maine, 1996-99.

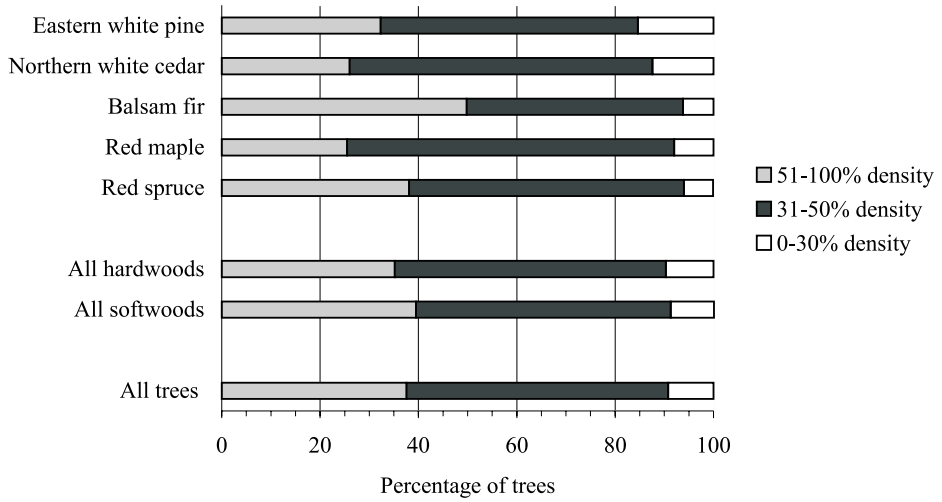

Figure 4. Distribution of crown density ratings for trees in Maine, 1996-99.

Tree Damage

Signs and symptoms of damage were recorded if the damage could kill the tree or affect its long-term survival. The 11 categories of damage used in this report were: cankers and galls, decay, open wounds, resinosis and gummosis, cracks and seams, vines, dead or broken tops, broken branches, other bole and root damage, other crown damage, and other damage (not otherwise defined).

- 81 percent of trees had no damage, 15 percent had one damage, and 4 percent of the trees had two or more damages.
- 51 percent of 786 damages were decay; 22 percent were dead or broken tops; 10 percent were dead or broken branches; and 8 percent were open wounds.
- 6 percent of red spruce had one or more damage with 21 percent of the damages being cracks and seams, compared to 2 percent for all other species.
- 33 percent of northern white cedar had one or more damages, with more than three-quarters of the damages related to decay.
- 14 percent of eastern white pine had one or more damages; 44 percent of the damages were dead or broken tops, and 29 percent were dead or broken branches.

Summary

Maine has mixed-age forests dominated by softwood species. Most of the trees are healthy, with full crowns (low transparency, high density), little dieback and little damage. Red maple had higher amounts of dieback but seemed to maintain crown fullness. Eastern white pine and northern white cedar had lower densities as well as higher rates of damage.

For more information regarding the FHM program, contact: Chuck Barnett, Northeastern Research Station, USDA Forest Service, 11 Campus Blvd, Suite 200, Newtown Square, PA 19073, 610-557-4031; cjbarnett@fs.fed.us or visit the National FHM website: www.na.fs.fed.us/spfo/fhm

Acknowledgment

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