United States
Department of
Agriculture

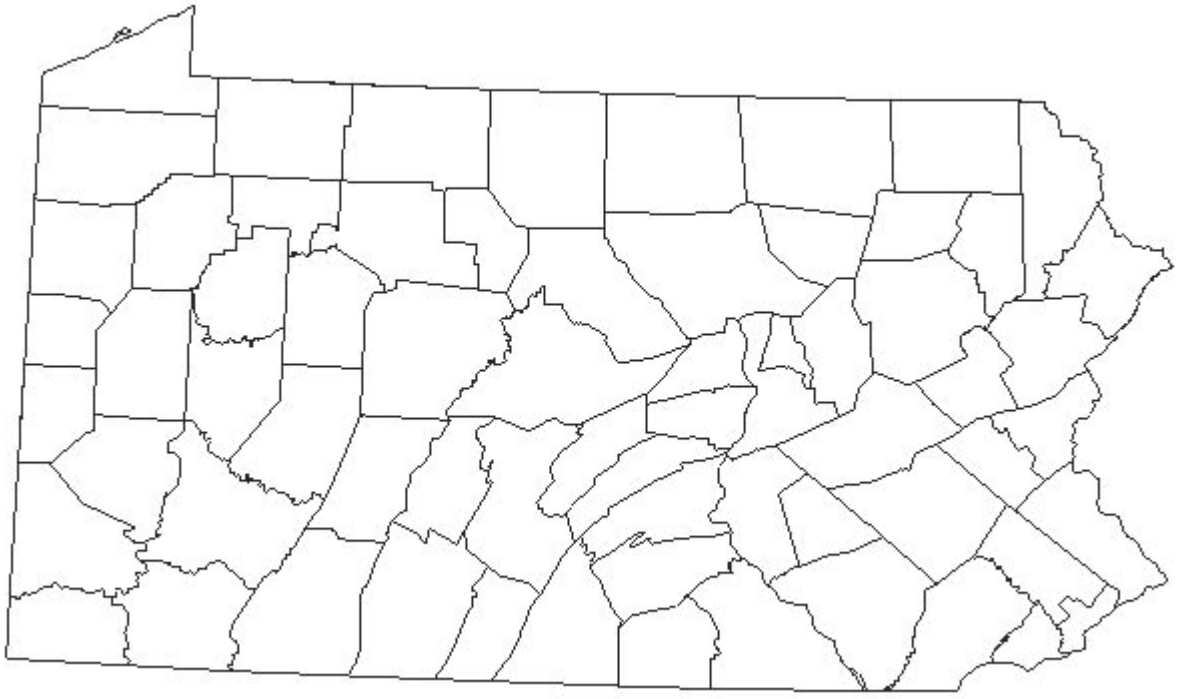
Forest Service

**Northeastern
Research Station**

NE-INF-158-02

Forest Health Monitoring in Pennsylvania

1998-1999



PENNSYLVANIA

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 Pennsylvania, 181 FHM plots were established in 1998 and about one-third of the plots were remeasured in 1999 (Fig. 1). Each point in Figure 1 represents the status and approximate locations 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. This report summarizes the most recent conditions.

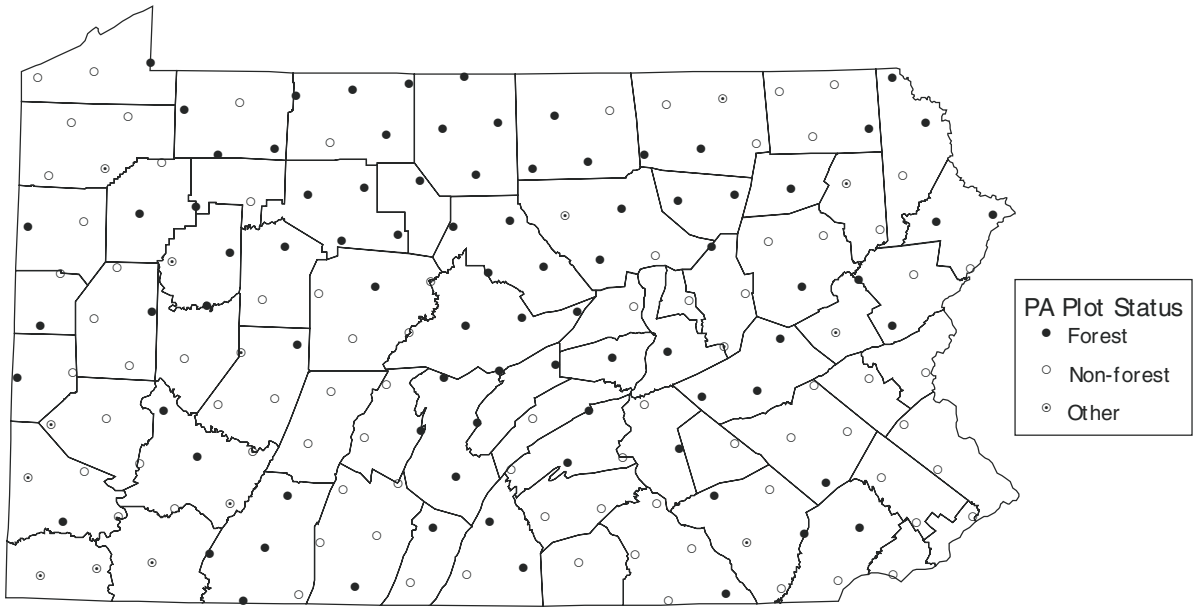


Figure 1. – Current status approximate locations of Forest Health Monitoring (FHM) plots in Pennsylvania.

Plot Characteristics

- 84 of the 181 plots were at least partially forested. There was no data for 17 plots due to lack of access.
- 42 percent of the 181-plot area was forested.
- 51 percent of the forested areas were of the maple-beech-birch forest types; the second most common group was the oak-hickory forest type, accounting for about 39 percent of the forested areas.
- 69 percent of the forested areas were in sawtimber-size stands; 22 percent of the forested areas were in poletimber-size stands.
- 65 percent of the forested areas were in stands that were more than 60 years old; 17 percent were in stands that were 41 to 60 years old, and 10 percent were in stands that were 21 to 40 years old.

Plot Structure (Table 1)

Seedlings

- American beech seedlings (12 inches tall, less than 1 inch diameter) were most abundant, accounting for 18 percent of the 1,244 seedlings counted.
- The five most abundant species groups collectively accounted for 66 percent of the seedlings. They were American beech, black cherry, red maple, other birch, and white and green ash.

Saplings

- Red maple saplings 1 to 4.9 inches diameter at breast height (d.b.h.) were the most abundant, accounting for 25 percent of the 266 saplings counted.
- The five most abundant species groups collectively accounted for 63 percent of the saplings. They were red maple, other birch, black cherry, tupelo/blackgum, and American beech.

Trees

- Red maple trees (5 inches d.b.h. or greater) were the most abundant, accounting for 28 percent of the 1,977 trees counted.
- The five most common species groups collectively accounted for 59 percent of the trees. They were red maple, black cherry, other (non-select) white oak, sugar maple, and select red oak.

Table 1. -- Number of trees by size class, and species groups, Pennsylvania, 1998-99. Rankings of species quantity appear as superscripts beside numbers.

Species	Size Class		
	Seedlings	Saplings	Trees
White/green ash	120 [5]	5	36
American beech	227 [1]	21 [5]	93
Other birch	134 [4]	29 [2]	93
Black cherry	189 [2]	27 [3]	216 [2]
Sugar maple	31	5	120 [4]
Red maple	148 [3]	68 [1]	560 [1]
Select red oak	59	4	109 [5]
Other white oak	24	1	161 [3]
Tupelo/Blackgum	15	22 [4]	48
All softwoods	21	3	176
All hardwoods	1,223	263	1,801
All trees	1,244	266	1,977

Table 2. -- Mean plot values and percentage of trees with ratings of specified values, by crown variable, Pennsylvania, 1998-99. (Plot means based on 84 forested plots; percentage of trees based on 1,977 live trees 5 in. or more in d.b.h.)

	Value
Crown Dieback	
Plot Mean	2.7%
Trees with ≤5% dieback	94
Foliage Transparency	
Plot Mean	16.7%
Trees with ≤30% transparency	99
Crown Density	
Plot Mean	49.1%
Trees with >30% density	95

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.

- 94 percent of the trees had low dieback ratings; average dieback was 3 percent.
- Less than 1 percent of all trees had high dieback ratings (more than 20 percent affected crown).

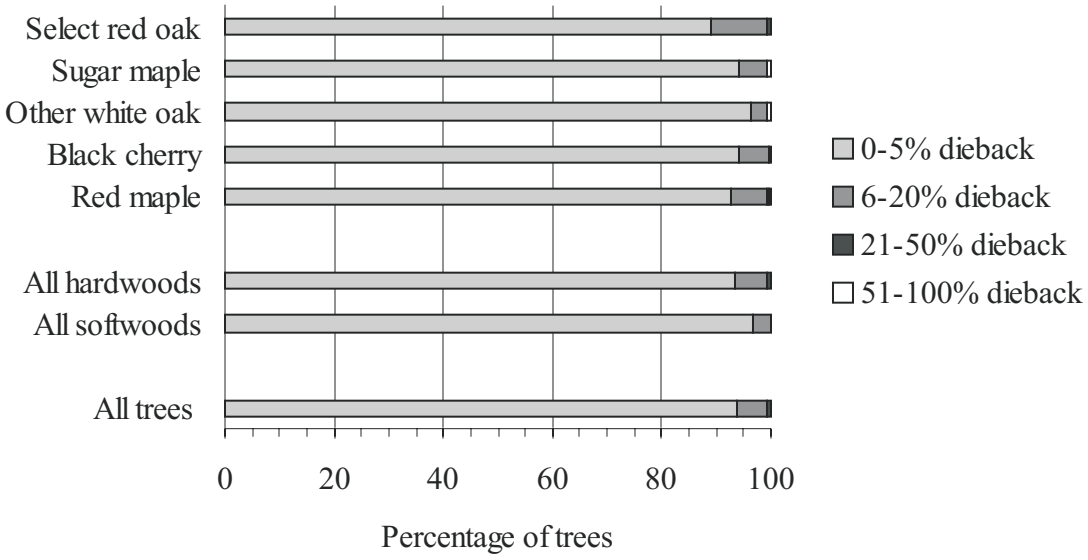


Figure 2.--Distribution of crown dieback ratings for trees in Pennsylvania, 1998-1999

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.

- Virtually all of the trees had normal transparency ratings; average transparency was 17 percent.

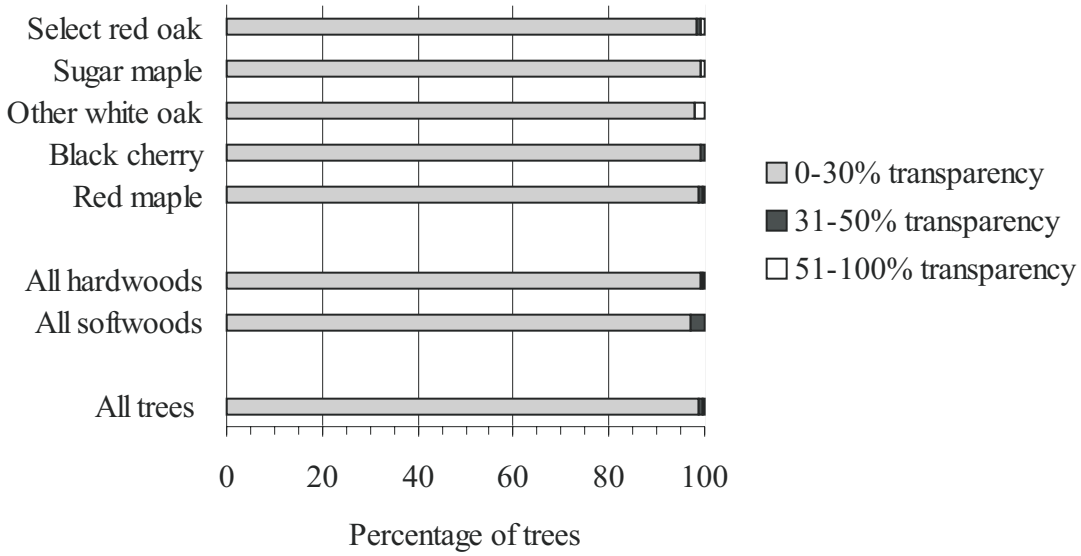


Figure 3. – Distribution of foliage transparency ratings for trees in Pennsylvania, 1998-1999.

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.

- 95 percent of trees had high density ratings; average crown density was 49 percent.

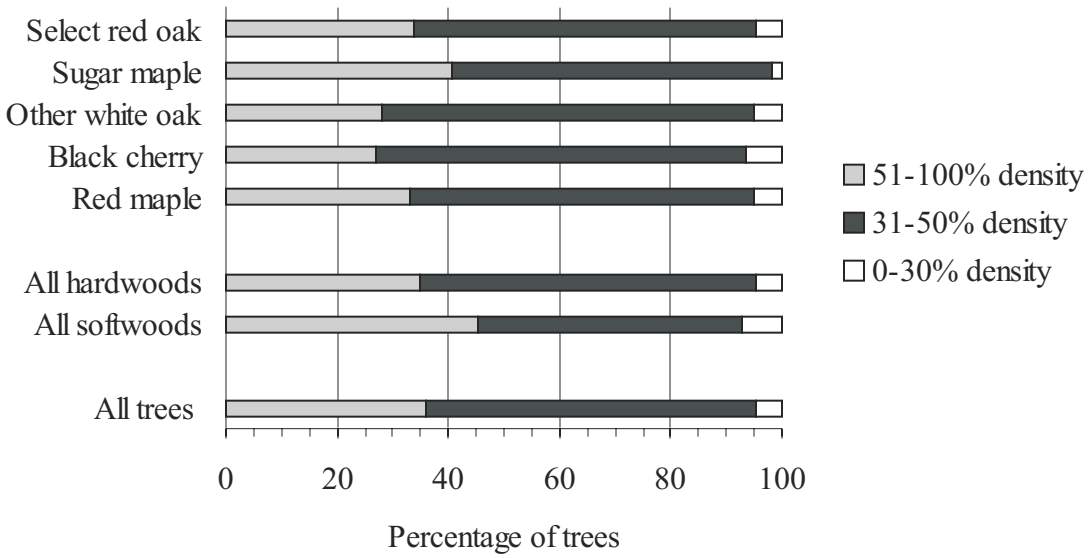


Figure 4. – Distribution of crown density ratings for trees in Pennsylvania, 1998-1999.

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 significant damage, 17 percent had one damage, and 2 percent of the trees had two or more damages.
- 48 percent of 423 damages were decay; 14 percent were open wounds; and 8 percent were dead or broken branches. Cankers and galls, vines, and dead or broken tops each accounted for about 7 percent of the damages.
- Decay was 69 percent of the damage on select red oak.

Summary

Based on the FHM plots, Pennsylvania has mature forests dominated by hardwood species. Red maple was common in all size classes. Most trees are healthy, with full crowns (low transparency, high density), little dieback, and little 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

Acknowledgments

The FHM program thanks the landowners of Pennsylvania and the Pennsylvania Bureau of Forestry for their cooperation and assistance.