



Project Summary

Forest Health Monitoring 1992 Annual Statistical Summary

S.A. Alexander

In 1990, the United States Department of Agriculture (USDA), Forest Service (FS) and the United States Environmental Protection Agency (EPA), initiated a cooperative national program to monitor the condition of the nation's forests. This multi-agency effort, within the framework of the EPA's Environmental Monitoring and Assessment Program (EMAP), is called the Forest Health Monitoring (FHM) program. The FHM program is jointly managed and largely funded by the FS and EPA in cooperation with other program participants. FHM partners provide additional financial and personnel support and include participating State Forestry agencies, United States Department of the Interior (USDI), Bureau of Land Management, the Tennessee Valley Authority (TVA), and the USDA Soil Conservation Service (SCS). Other Cooperators include universities, and three USDI agencies—U.S. Fish and Wildlife Service, U.S. Geological Survey, and the National Park Service. The National Association of State Foresters provides essential program support, guidance, and assistance.

Data analysis results for the following indicators are presented in the report: tree species and stand density (mensuration), tree crown condition, tree species diversity, and air pollution bioindicator plants. The cumulative distribution function methods used in the analysis provide a statistical summary of most measurements. Tabular summaries were also prepared in some cases. Where possible, indices have been used in the CDF analysis.

This Project Summary was developed by EPA's Environmental Monitoring and Assessment Program, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

On FHM Detection Monitoring plots, a set of indicators is used to classify forest health status. These indicators collectively represent many components of forest health and are generally responsive to many types of stresses. The indicators are measured at various sites which are selected statistically so that regional forest populations are represented.

The Project Report summarizes the data that were collected as a result of the Detection Monitoring activities. Chapter two of the report provides a brief overview of forest health monitoring. The remaining chapters summarize the data for tree species and stand density, tree crown condition, tree species diversity, and air pollution bioindicator plants. An overview of indicator development, the plot network, plot design, and data analysis procedures are presented in several appendices.

Procedure

In 1992, Detection Monitoring activities were conducted in twelve eastern states: Alabama, Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Rhode Island, Vermont, and Virginia (Figure 1). Detection Monitoring was also conducted in California and Colorado. Those data will be

included in the 1993 Annual Statistical Summary as part of the western data analysis.

The cumulative distribution function (CDF) methods used in the analyses provide a statistical summary of most measurements. Tabular summaries were also prepared in some cases. Where possible, indices have been used in the CDF analysis.

Results and Recommendations

Mensuration

- Standard Federal Regions 1 and 2 combined have more dead trees (on a per-area basis) than either Federal Region 3 or Federal Region 4.
- This is apparently due to a noticeably larger number of dead trees (per area) across the major forest type groupings of spruce-fir forests and maple/beech/birch forests.
- It would be premature to assume that this reflects significantly increased mortality and reduced regeneration in these major forest type groupings without additional information on changes over time.
- Basal area per hectare shows roughly the same distribution across all three Standard Federal Regions.

Crown Assessments

- The defoliation of tree crowns was examined through analysis of 3 ecological groups (species, forest types, and crown groups) that were found on 45 or more plots within any of the four geographical regions (SFRs 1 and 2 combined, 3, 4, and 1-4 combined).
- The crown variables dieback and transparency were aggregated into a plot-level indicator that evaluated the defoliation of the outer and inner portions of the tree crowns.
- Less than 10 percent of any population for any ecological group fell within the subnominal category, and less than 3 percent of any subnominal population proportion was found in the poor category.
- The only ecological groups that deserve a cursory investigation due to the low proportions of populations in a subnominal or poor condition are one species (White ash) and two crown groups (Cedar-Juniper; miscellaneous).
- No forest types had any significant proportions of the population in the subnominal or poor condition.

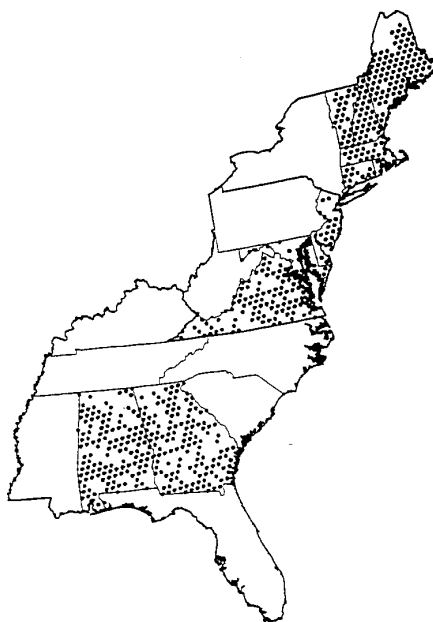


Figure 1. Sites in which detection monitoring occurred in 1982.

Species Diversity of Trees and Saplings

- Species density was used as a measure of species diversity of trees and saplings in Standard Federal Regions 1 and 2 combined, Federal Region 3, and Federal Region 4. Two species per unit area was used as a preliminary subnominal threshold.
- Standard Federal Region 4 had a significantly higher proportion of plots with subnominal tree species density than Federal Region 3. Federal Regions 1 and 2 combined and Federal Region 3 did not differ significantly for these proportions.
- Standard Federal Regions 1 and 2 combined had a significantly higher proportion of plots with subnominal sapling species density than either Federal Region 3 or Federal Region 4.

Air pollution Bioindicator Plants

- Field crews established biomonitoring sites, for determining the presence or absence of ozone injury conditions, at 39 of the 212 forested plots in New England.
- Based on data from 39 biomonitoring sites, an estimated $27\% \pm 13\%$ of the forested population covered by these sites showed foliar symptoms indicating the presence of ozone injury.

- Most of the plots rated positive for ozone injury were located in rural areas that are known to be contaminated by air masses moving into the region from urban-industrial areas to the south of New England.

The information in this document has been funded in part by the U.S. Environmental Protection Agency under Interagency Agreement number DW12935103-01 with the USDA Forest Service and Interagency Agreement number DW-14935509-01 with the USDI Bureau of Land Management. It has been subject to the Agency's peer and administrative review, and it has been approved for publication as an EPA document.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

The report represents data from one year of EMAP. Because the probability-based scientific design used by the EMAP necessitates multiple years of sampling, there is uncertainty associated with these data. This uncertainty will decrease as the full power of the approach is realized. Similarly, temporal changes and trends cannot be reported, as these require multiple years of observation. Please note that this report contains data from demonstration studies in four Standard Federal Regions. Appropriate precautions should be exercised when using this information for policy, regulatory or legislative purposes.

Samuel A. Alexander (also the EPA Project Officer, see below) is with the Environmental Monitoring and Assessment Program, Research Triangle Park, NC 27709.

The complete report, entitled "Forest Health Monitoring—1992 Annual Statistical Summary," (Order No. PB94-205416/AS; Cost: \$19.50; subject to change) will be available only from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650

The EPA Project Officer can be contacted at:

Environmental Monitoring and Assessment Program—EMAP Center
U.S. Environmental Protection Agency
Research Triangle Park, NC 27709

United States
Environmental Protection Agency
Center for Environmental Research Information
Cincinnati, OH 45268

Official Business
Penalty for Private Use \$300

EPA/620/SR-94/010

BULK RATE
POSTAGE & FEES PAID
EPA
PERMIT No. G-35