USING FOREST SERVICE INVENTORY DATA TO ASSESS THE HEALTH OF NEW YORK'S FOREST

By Douglas C. Allen

Introduction

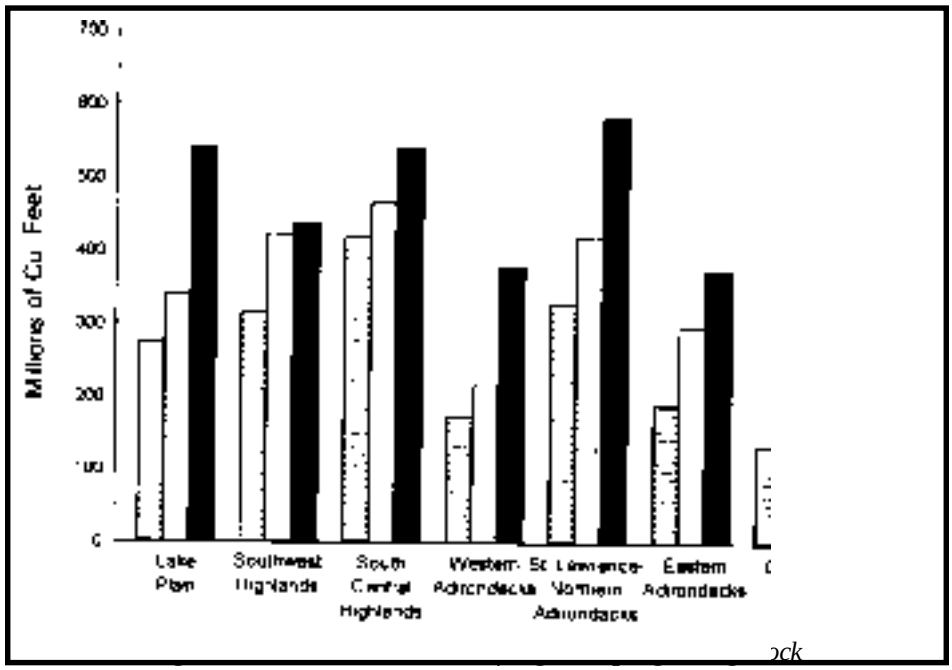
The U.S. Forest Service, in cooperation with the NYS Department of Environmental Conservation and forest landowners, periodically inventories New York's forest resources. The fourth, and most recent, inventory was completed in 1993. The final report includes summary statistics on such things as ownership pattern, amount and geographic distribution of forest land by forest type and tree size classes, growing stock volume by species, and annual net growth. Recently, I reviewed results from New York's latest inventory to see what they might suggest relative to forest health.

I propose that we think of a healthy condition, in general, as a situation where abiotic and biotic influences; i) do not threaten their ability to recover from natural or human-related stresses like insect defoliation, fire, disease, or air pollution and ii) do not imperil ownership objectives presently or in the future. The objective of this article leads me to a more focused definition that interprets health in terms of susceptibility to pest outbreaks and (or) vulnerability to damage. Any assessment or decision about forest health, however, requires that we compare present conditions (e.g., species composition, growth, crown condition, level of mortality, pest activity) to conditions that we normally might expect to encounter for a given set of site conditions, stage of forest development and geographic location.

The concept that damage has both economic and ecological components embraces concern for a wide range of commodity and non-commodity values. This view is evident in a common definition of "pest" as any agent (or combination of agents) that can prevent a landowner from optimizing values of interest or that is capable of eroding ecological conditions. In other words, we do not assume that wood products are the prime objective for, or even are of interest to, every forest landowner.

Application & Interpretation of FIA Data

In its present form, information derived from the U.S.Forest Service Forest Inventory and Analysis (FIA) provides insight into some aspects of forest health. Useful interpretation in the context of forest pest problems, however, depends in large measure on the degree to which we understand a forest pest's life system and how the pest interacts with its host(s) and the forest community of which it is a part.



on timberland in New York's forest regions.

Recently a U.S.Forest Service scientist used FIA data on tree species composition and species abundance to improve our ability for estimating the likelihood that forest stands in south-central Pennsylvania will be defoliated by gypsy moth. Similarly, the Maine Forest Service has utilized FIA information on species composition, stand location and stand age to design damage surveys and to estimate the impact of specific agents that can threaten forest health; such as spruce budworm, hemlock looper and brown ash dieback.

Hazard Rating

One of the most useful forest pest management tools is based on a concept known as hazard rating. The ability to describe forest conditions that are most susceptible to a specific pest problem or most vulnerable to damage allows the landowner or forest manager to apply limited resources for survey, control and (or) preventative measures to those stands where there is a high probability that damage will occur. This tool builds, in part, on a knowledge of pest ecology in relation to forest conditions such as the relative abundance of tree species, tree density and the occurrence and distribution of different age (size) classes.

In many instances we know very little about how changing the character of a forest will influence pest populations. Nonetheless, even for those poorly understood situations data currently provided by FIA may reveal potentially troublesome situations.

Changes in Species Composition

The most recent inventory, for example, indicates a substantial increase in sugar maple (Fig. 1) and red maple (Fig. 2) growing stock in each of New York's eight forest regions since 1980. A similar, though less dramatic, pattern also is evident when one compares data from the 1968 inventory to that of 1980.

Undoubtedly, several events have influenced this trend. To begin with, even though the amount of timberland has remained about the same since the last inventory, the area occupied by northern hardwood groups (i.e., forest types that typically contain maple) has increased by approximately 500,000 acres. A legacy of selective cutting that discriminated against economically more valuable species, such as ash, birch and black cherry, also has contributed to shifts in species composition. Additionally, red maple seedlings readily establish on many sites following a disturbance, and red maple stumps sprout prolifically. Both characteristics often give this species a competitive advantage. In many regions over the past three decades most of the large beech was removed from northern hardwood stands by beech bark disease, and the relative dominance (basal area) of this tree has been reduced even

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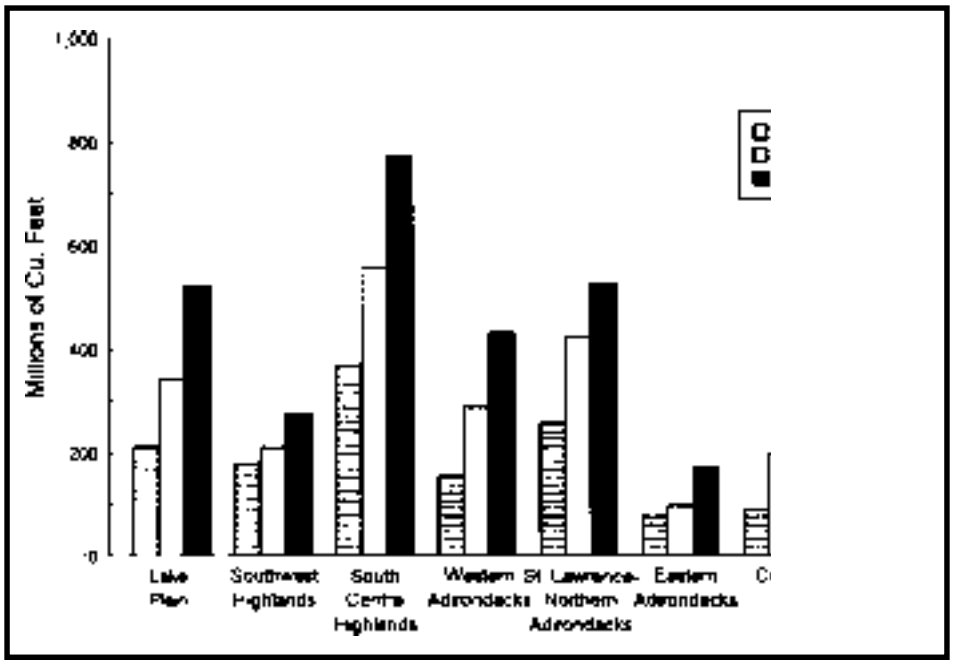

*Figure 2. Trends in net volume of **red maple** growing stock on timberland in New York's forest regions.*

though it remains well represented in smaller diameter classes. Whatever the cause or causes, the continuing increase in maple abundance revealed by current FIA data suggests to me that future outbreaks of pests associated with sugar and red maple may be more frequent and (or) more damaging.

Experience with a variety of forest insects over the past several decades indicates that whenever one tree species or age class dominates a forest or landscape, there is a higher probability of more frequent or more damaging pest problems compared to conditions characterized by a mixture of species or more diverse structure.

One must be careful, however, when interpreting the significance of changing stand composition or shifts in the relative abundance of species. Whether or not these changes are significant from a forest health perspective depends on what is expected for a given time, site, geographic location, and forest type. The mere fact that a species is "gaining or loosing ground" in terms of relative stocking does not necessarily signify a health concern. Such a change may, in fact, be a normal response to changing stand and/or site conditions.

Stand Density

With the exception of beech and yellow birch in four of New York's nine forest regions and in a single region where ash and black cherry growing stock has decreased slightly since the 1980 inventory, the growing stock of all other major species associated with maple also has increased. This suggests that many stands are fully stocked and soon may be overstocked. Persistent overstocking encourages insects and disease-causing organisms that favor weakened or stressed trees.

Shift in Balance of Age Classes

The most recent FIA report indicates that in all of New York's forest units there is substantially less area of hardwood timberland in the sapling/seedling size classes compared to the 1980 survey. Accompanying this change is an increase in the area occupied by the sawtimber class (trees 11" or larger in diam.) in all units and an increased area of poletimber (trees greater than 5" but less than 11" in diam.) for five of eight units. This implies, of course, that the forest landscape is aging but also suggests that our northern hardwood forests are becoming more homogeneous structurally. As mentioned above, homogeneity in any form is thought to increase the probability of forest pest problems. An imbalance in the relative abundance of age classes also can have significance in the context of aesthetics, wildlife or timber.

Conclusions

FIA was designed primarily to sample timber resources, but it is utilized frequently to evaluate other resource issues. From a forest health perspective, changes in stand stocking, density, distribution, age, and species composition may foreshadow potential forest pest problems. An example is the increasing abundance of red and sugar maple in New York's forests, which could set the stage for more frequent outbreaks of pests associated with these species.

What does this mean to the forest owner? Two things come to mind: i) whenever possible, a forest owner should take deliberate silvicultural steps to encourage species and/or age class diversity in their northern hardwood stands and ii) it will be prudent for forest owners to become familiar with potential maple pests in order to facilitate early detection of problems that can threaten owner objectives. To accomplish the latter, I recommend the following references:

Houston, D. R., D. C. Allen and D. Lachance. 1990. Sugarbush Management: a Guide to Maintaining Tree Health. USDA Forest Service. Gen. Tech. Rep. NE-129. 55p. (no charge)

Adams, K. B., D. C. Allen, P. D. Manion, and L. P. Abrahamson. 1995. Stewardship of Northern Hardwoods: a Forest Owner's Handbook. SUNY ESF. 84p. **($10.00, check payable to "RF of SUNY") [Both publications are available from the SUNY College of Environmental Science and Forestry; Tree Pest and Disease Service; 133 Illick Hall; 1 Forestry Drive, Syracuse, NY 13210. (315)-470-6745]**

A copy of the results of New York's most recent forest inventory is available from the USDA Forest Service; Publications Distribution; 359 Main Road, Delaware, OH 43015 (Alerich and Drake; 1995; Forest statistics for New York: 1980 and 1993; Resour. Bull. NE-132; 249 p.) ▲

Douglas C. Allen is Professor of Forest Entomology in the Faculty of Forestry at the State University of New York, College of Environmental Science and Forestry (SUNY/ESF); 146 Illick Hall, One Forestry Drive, Syracuse, NY 13210. All photos are by Professor Allen unless acknowledged otherwise.