

In-Place Assessment of Standing Trees

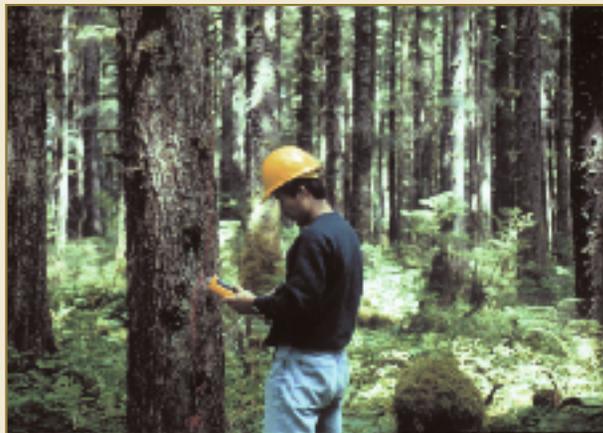
A New Tool to Monitor Forest Health and Guide Forest Management

Xiping Wang, Natural Resources and Research Institute, University of Minnesota, Duluth, Minnesota

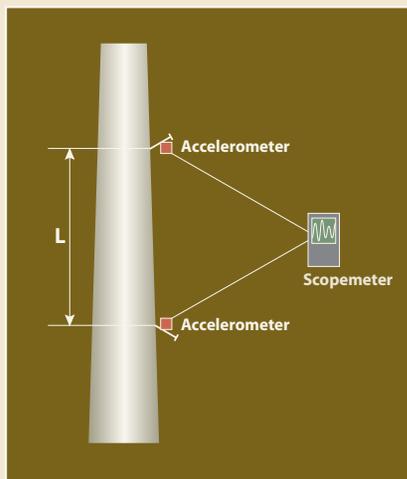
Robert J. Ross, USDA Forest Service, Forest Products Laboratory, Madison, Wisconsin

Summary

A stress-wave nondestructive evaluation (NDE) technique was investigated to evaluate health conditions and wood properties of standing trees in three national forests and one state forest. Field stress-wave tests were conducted in trees of various species (western hemlock, Sitka spruce, jack pine, red pine, ponderosa pine, and Douglas-fir). A stress wave was induced into the tree in such a manner that it flowed primarily along the stem of the tree. It has been demonstrated that the characteristics of the resulting stress waves from tree testing were related to the health condition and the mechanical properties of wood in trees. The stress-wave NDE technique has a potential to be used in the future to determine how forests could be managed to improve health condition and meet desired wood and fiber qualities.



Field testing



Accelerometer

Forest Health

Ottawa National Forest

Issue

Insects are attacking 60- to 70- year-old jack pine plantations.

Objective

Recover fiber and lumber from infested trees.

Method of analysis

NDE to determine health of trees and quality of wood.

Results



Mechanical testing of logs



Pulping

Value to land manager

Basis for timing harvest and assigning stumpage prices.

Plantation Management

Tongass National Forest

Rogue River National Forest

Lake Superior State Forest

Issue

Increased management emphasis on forest health and biodiversity has forced land managers to seek economically viable stand treatment such as thinning to improve the stand condition and wood and fiber qualities.



Objective

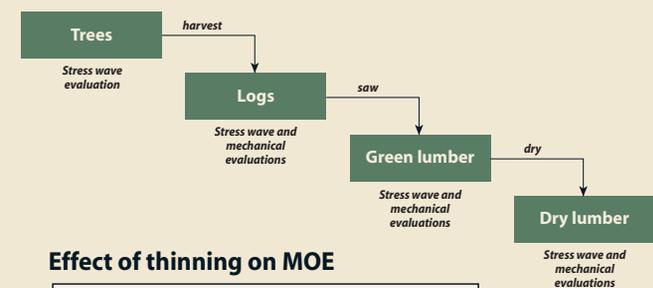
Facilitate stand management activities by identifying final product potential before timber harvest.

Method of analysis

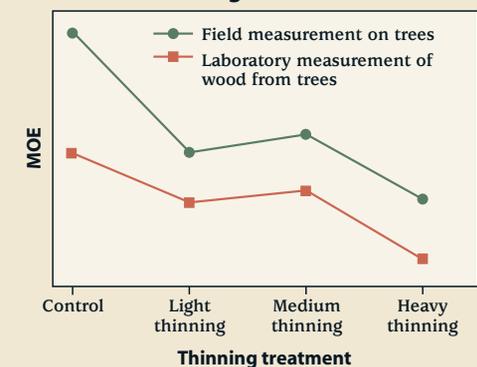
NDE of standing trees, logs, lumber to determine product strength and quality based on thinning levels.

Results

NDE at various stages



Effect of thinning on MOE



Value to land manager

Scientific foundation for determining appropriate thinning schedules to optimize product value and yield.

Collaborators

Michigan Technological University • Oregon State University
Pacific Northwest Research Station • North Central Forest Experiment Station