



FOREST WATCH[®]

Students and Scientists Working Together,
Determining the Health of New England Forests



UNIVERSITY of NEW HAMPSHIRE



Third grade Forest Watch students measuring the DBH of their pine tree

What is Forest Watch[®]?

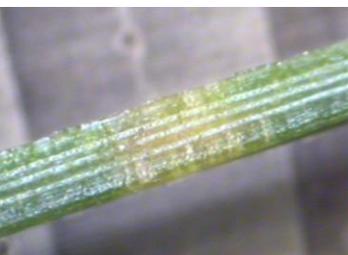
Forest Watch is an inquiry-based scientific outreach program aimed at improving our understanding of the impact of ground-level ozone (smog) on sensitive forest species across New England. This K-12 Outreach Program engages pre-college students in the process of measuring, analyzing, and monitoring the health of white pine across New England. White pine is a known bio-indicator of elevated levels of ozone. In the process of studying inter-annual variations, students collect valuable data as well as branch and needle samples to be submitted to the University's *Forest Watch* research scientists. As a result of more than 15 years of student-collected data, UNH researchers have access to a long-term data base showing that the health of white pine forests across New England has improved. This improved forest health corresponds to improved regional air quality over the same time period resulting in part from the Clear Air Act Amendment in 1990.



Seventh grade Forest Watch students collecting white pine foliar samples for study in the classroom and shipment to UNH for spectral analysis

The Program

Students use the same field, laboratory, and image processing research methods developed at UNH for the study of forest health in the northeastern US, central Europe, and Mexico. In the process of making these measurements, the students “learn by doing” authentic science. Student-collected data is used by UNH research scientists as input to research programs. Student-collected samples are scanned with a spectrometer which provides information on tree health. In addition, students use free image processing software and free satellite data to study the environments near their homes and school.



Chlorotic mottle on a white pine needle – a symptom of elevated ground-level ozone exposure.

Student Activities

By engaging the full age range of pre-college students (K-12) in the *Forest Watch* study of the white pines outside their classrooms, students learn the process of “doing science” (making observations, generating of hypotheses, data collection, testing of hypotheses, and drawing conclusions) by following age-appropriate protocols designed to provide reliable data sets that engage the students. Students measure annual changes in their trees' biomass (Diameter Breast Height, tree height, percent canopy closure, and needle retention), state of health (occurrence of foliar symptoms such as chlorotic mottle and tip necrosis, and forest stand dynamics) by monitoring the same trees year after year. These annual biological changes are then compared to annual summertime ozone conditions across the region. Students compare a given year's forest health conditions with the same year's ozone conditions and with other student data sets from other schools across New England to develop a regional sense of changes in the health of white pines.



Eleventh grade Forest Watch students presenting their research at an international scientific meeting in Boston

More info at: <http://www.forestwatch.sr.unh.edu/>

Point of Contact: Barry Rock, Ph.D., Director
(barry.rock@unh.edu) (603) 862-2949