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February 21, 2013

UNH Forest Watch: Record White Pine Needle Loss in 2010



From left to right, Forest Watch director Barry Rock, 2013 Lauten Award recipient Wesley Blauss, former program coordinator Mike Gagnon, and current Forest Watch program coordinator Martha Carlson. Photo by Kristi Donahue, UNH-EOS.

For two years, people in northern New England have reported seeing unusually large numbers of white pine needles piled up along sidewalks and roadways. Data released this week by the University of New Hampshire's Forest Watch program show that 2010 marked the first time in 20 years of the program's observations that white pines did not retain important older needles.

"White pines usually keep healthy, green needles that contribute significantly to the photosynthetic process by the whole tree for two or three full years," says Forest Watch founding director Barrett Rock of UNH's Institute for the Study of Earth, Oceans, and Space. "Something very serious is stressing the trees. Not since the early to

mid-1990s, when ozone levels were extremely high, have we seen these kinds of measurements of stress in the pines."

Rock discussed the findings with Forest Watch teachers Monday, Feb. 18, 2013, during the program's annual meeting, which also recognized this year's recipient of the Gary N. Lauten Award for outstanding service, Wesley Blauss, a sixth-grade science teacher at Hanson Middle School in Hanson, Mass.

Forest Watch is an inquiry-based science program that takes K-12 students and teachers out of their classrooms to study air pollution and forest health. Since 1991, more than 350 schools across New England have helped researchers at UNH gather samples and measurements of white pine needles to monitor the impacts of tropospheric ozone, or smog.

Ozone is an oxidant that accelerates aging in foliage. In the late 1990s, as the Clean Air Act took effect, ozone levels fell and Forest Watch observations showed needles maintained vigorous growth for longer periods of time.

But more recent samples and measurements made by students and teachers may suggest that a new environmental stressor appeared in spring 2010 and has affected new needles that opened in 2010, 2011, and 2012. Various theories point to possible causes, including an air pollution event in May 2010 that defoliated sugar maples.

"We believe that peroxyacetyl nitrate, a powerful oxidant in wildfire smoke from Canada, in combination with unusually high temperatures, might have heavily damaged those maple leaves,"

Rock says. "The event might also have stressed the pines, and other pollutants from a growing number of wildfires might be causing further stress."

Another theory is that unusually wet weather in 2009 caused an explosion of fungi that are clearly now feasting on the pine needles. In 2010 and 2011, the U.S. Forest Service reported a new occurrence of pine needle cast fungi on older needles, and Forest Watch is currently working with the Forest Service to understand what is causing the dramatic increase in reported cases of needle cast fungus.

Notes Rock, "Such fungi normally only attack needles that have been weakened by some other factor, and the fungi usually only damage a small percentage of the needles, not the large percentages we're seeing."

"Strange orange blisters" are appearing on needles students and teachers submitted in the fall of 2012, and lower-than-normal levels of chlorophyll have been detected in first-year needles. "All of which would be a concern should the trends continue," Rock says adding, "Forest Watch's careful protocols for measuring and sampling will help us test these theories and find the answers."

Lauten Award recipient Blauss and his middle school students have participated in Forest Watch since 2006. Classes annually monitor five trees as part of their participation in the program. Says Blauss, "I love to have my students participating in an authentic research project, and the fact that some of their measurement data have contributed to this new discovery is very exciting."

Gary Lauten, for whom the award is named, was a former Air Force lieutenant colonel who died in December 2001 and served as the Forest Watch program coordinator from 1992-1999. In 2002, the program began recognizing teachers who best exemplify Lauten's devotion to Forest Watch's long-term goals.

For more on the Forest Watch program, visit <http://www.forestwatch.sr.unh.edu>.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,200 undergraduate and 2,300 graduate students.

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Photograph to download: http://www.eos.unh.edu/newsimage/lautengp2013_lg.jpg

Caption: From left to right, Forest Watch director Barry Rock, 2013 Lauten Award recipient Wesley Blauss, former program coordinator Mike Gagnon, and current Forest Watch program coordinator Martha Carlson. Photo by Kristi Donahue, UNH-EOS.

Photograph to download

http://www.eos.unh.edu/newsimage/fwimage1_lg.jpg

http://www.eos.unh.edu/newsimage/fwimage1_sm.jpg

Caption: Typical bright yellow chlorotic mottling seen with ozone damage.

Photograph to download

http://www.eos.unh.edu/newsimage/fwimage2_lg.jpg

http://www.eos.unh.edu/newsimage/fwimage2_sm.jpg

Caption: :Fungal wound in needle.

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