Newsletter
Vermont Monitoring Cooperative
Vermont's Cooperative Forest Ecosystem Monitoring & Research Program

Vermont Monitoring Cooperative | THE UNIVERSITY OF VERMONT | USDA Forest Service | VERMONT AGENCY OF NATURAL RESOURCES

Spring 2008 Volume 12 Issue 1

Director's Notes • April 2008

I hope you have enjoyed this snowy winter! The skiing has been terrific, but it's also nice to know the lazy days of summer are right around the corner.

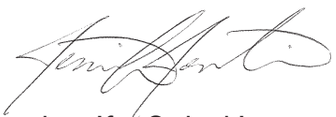
At VMC, we've been busy this fall and winter. We held an Annual Meeting on October 29 that surpassed the attendance record set in 2006. We have been organizing our database, posting new publications online, monitoring meteorological conditions on Lake Champlain and at Mt. Mansfield and lots more (see inside for details). We are planning some new initiatives for upcoming months, as well. Stay tuned!

We always welcome your feedback, but at the moment we're especially interested in improving the ways we communicate with you – our stakeholders. Soon we'll be taking a closer look at the data we've collected over the past 15 years, and building on our strengths to chart a strategic course for the future. So this is an especially good time for you to weigh in with your opinion about how VMC does business. Here are some questions to get you started:

- Does VMC keep you informed adequately about our work? How might we do a better job of reaching out to you, our cooperators and our stakeholders? Did you know, for example, that we maintain over 200 datasets that are available to the public?
- Do you prefer the current paper newsletter (sent via snail mail), or would you rather receive an electronic version (sent via email to your desktop)? (We are seriously considering this: an email list is simple to maintain, and electronic delivery would save time and resources. It might even reach more people.)
- Would you be interested in communicating with other VMC cooperators and stakeholders, perhaps through a "VMC-talk" email list where information of interest (such as requests for proposals, information about other monitoring programs) might be shared among subscribers?
- Do you acknowledge VMC when you use data that have been collected and/or archived by VMC, or when you publish results from a VMC-supported project?

Please get in touch with me (jennifer.c.jenkins@uvm.edu) with answers to these questions, or with any other feedback about VMC and its operations. You could also contact me by phone, at 802-656-2953. I look forward to hearing from you.

Yours truly,



Jennifer C. Jenkins

INSIDE THIS ISSUE:

Colchester Reef – WOW over a quarter of a million, and climbing?

Carl Waite & Richard Furbush, VMC & UVM

As many of you know, Colchester Reef (CR) and Diamond Island (DI) are meteorological stations located on Lake Champlain and maintained and operated by VMC. These two sites are operated with funding provided to VMC by NOAA through the Lake Champlain Research Consortium (LCRC). It was recently brought to our attention just how popular meteorological data from CR has become. Conor Lahiff, meteorologist for the National Weather Service in Burlington (NWS), shared web statistics for the year (February 2007 – January 2008) on the number of hits made to their website for CR data. The total number of internet user visits was over 270,000. It is interesting that the number of visits is quite substantial year round, with over 10,000 hits each month in January, February, and March.

Month	# hits
Feb-07	10,099
Mar-07	11,176
Apr-07	17,443
May-07	22,154
Jun-07	27,482
Jul-07	29,154
Aug-07	35,454
Sep-07	34,140
Oct-07	26,762
Nov-07	17,352
Dec-07	20,179
Jan-08	18,826
Total	**270,221**

Windsurfers and recreational boaters have come to rely on wind data from these sites to plan excursions and navigate the lake. We always knew that the meteorological data from CR were heavily used, but the actual numbers are impressive. Additionally, meteorological data from both CR and DI are continually used by the NWS to enhance their lake forecasts, used by researchers from several local colleges and universities, and by researchers, biologists, and resource managers from state and federal agencies. The NWS URL displaying hourly-updated CR meteorological data and data for the last 24 hours is at: http://www.erh.noaa.gov/btv/html/colreef.html. VMC also publishes hourly-updated data summaries for both CR and DI on our homepage at: http://www.uvm.edu/vmc/.

The news is not all good: funding from NOAA for this program in FY2008 was reduced, and VMC had to absorb a portion of the cut in our 2008 operating budget for the meteorological stations. We rely on these funds to operate these meteorological stations and provide the data to the public, and we are optimistic that future funding will be sufficient to allow us to keep up the good work.

New Equipment Shelter at the VMC Air Quality Site

Miriam Pendleton, VMC Field & Program Technician

Last summer construction began on a new equipment shelter at the VMC Air Quality site located at the Proctor Maple Research Center in Underhill Center. Carl Waite and Marc Eisenhower built a similar structure at the Canopy Tower Site in 2004, so they teamed up again for the Air Quality shelter. Carl Waite is one of the key members of the Greening of Aiken team at UVM, and has lots of knowledge about how to build energy efficient structures. He also has a great deal of field experience and understands the problems presented by having a little shelter in the woods. Marc Eisenhower works on the Rubenstein School's R.V. Melosira during the research season and as a contractor in the off season, and assumed the role of lead carpenter on this project.

During the construction of the tower shelter in 2004, Marc and Carl used an effective deterrent to the bane of field sites: mice. The building has hardware cloth inside the sheathing to discourage rodents. After several seasons, the building at the tower site has remained impervious to these pests; no mean feat as "heated real estate" is much in demand in the local rodent community! Hardware cloth mouse-proofing was also used at the Air Quality site construction.

The Air Quality shelter needed to be larger than the canopy tower structure to accommodate both a small wet lab as well as mercury analysis equipment, since the site participates in several national monitoring networks. It was a great opportunity to have a customized bench and analyzer rack and is a huge improvement over the old shelter. The old AQ shelter started out as a *meat locker* (really!) and was converted to a field lab by the Ekto Co. in Sanford ME. It had very minimal insulation, was not quite weather tight and developed a serious ant infestation over the many years use as a field lab. The new building is a normal stick-built structure using 2x6 studs so plenty of insulation could be put in the walls, floor and ceiling. This insulation will reduce VMC's energy consumption at the site, where we must use electric heat in order to avoid any local emissions when making air quality measurements. The building was also considerably less expensive than a new Ekto shelter. The analyzer rack features slide out shelves so maintenance of the mercury analyzer is facilitated. This is a consideration when trying to obtain the highest percentage of robust data possible. The rack holds a Tekran 2537A mercury vapor analyzer and a Tekran 1130 pump module. It also has room for redundant instruments so that if there is a problem with the primary instrument, the ambient air intake can be easily (and quickly) switched to the secondary instrument avoiding gaps in the data.

Inlets for ambient air monitoring are typically some distance from the ground to minimize contamination from dust and plant material so a steel superstructure was needed. Part of the design of this was dictated by being in on the ground floor of the proposed National Atmospheric Deposition Program's Mercury Trends Network (NADP/MTN). Bob Ettinsburger of Dragon Welding in Underhill was contracted for the fabrication of the platform and equipment mast used for mercury sampling of ambient air. Bob prefabricated the structure at his shop. Carl Waite, with some assistance from Mim Pendleton and Eric Miller, helped Bob with the on-site assembly of the superstructure.

Having such an excellent facility makes the VMC's Air Quality Site more attractive to national monitoring programs and contributes to our reputation as a good candidate for other monitoring efforts. The shelter and the steel structure are roomy enough to house other monitoring or research projects should that opportunity arise.

Major work was completed in December 2007 and the mercury sampling equipment was installed on the new structure in early January. Work moving the power supply and removal of the old shelter will be completed this spring. Thanks to Carl, Marc and Bob for all their hard work!

Forest Health Highlights: Vermont 2007

Reported by the State of Vermont Department of Forests, Parks and Recreation

Special Issues

One of the most important factors affecting forest ecosystem health each year is rainfall. Plentiful rainfall soaks into forest soils, allowing trees and plants to grow abundant foliage and seeds to feed all the forest inhabitants. The growing season of 2007 produced abundant plant growth. Another favorable forest bonus was that insect defoliators, while always present to some extent, affected relatively small areas of forests with only light intensity.

Sugar maple maladies affected 102,551 acres of Vermont forests (Figure 1). Maple anthracnose, a leaf browning disease, was common late in the growing season. But most of the sugar maple foliage problems were caused by a complex of pest factors: an unusually high population of the maple trumpet skeletonizer, pear thrips, saddled prominent, maple leaf cutter, Septoria leaf spot and wind burn. The specific combination of factors varied with location. Most tree damage was light and is not expected to significantly affect long term tree health.

Sugar maple health benefited from a decline in populations of the **forest tent caterpillar**, which caused 539,841 acres of defoliation during outbreak levels from 2004-2006. During those years, this native insect caused repeated defoliations in some forests. In 2007, dieback and mortality affected scattered areas, especially in southern counties, where 1,268 acres of decline were mapped during aerial surveys. Wet and dry sites, or areas recently thinned were most commonly subject to decline. Sugar maple monitoring plots showed that forest tent caterpillar defoliation resulted in the most significant health problem in the last 20 years (Figure 2).

Late season browning of birch was mostly attributed to a leaf disease, **Septoria Leafspot**, and was mapped on 25,278 acres of forest. **Birch Decline** from previous stress events was mapped on 3,563 acres. Most of the damage was at high elevations, in areas where mortality has been observed over the past few years. This wave of paper birch decline was initiated by recent drought years (1999-2001), successive years of defoliation, and in some locations, damage from the 1998 ice storm.

In 2006, wet weather created ideal conditions for the build up of fungi which cause leaf diseases. In 2007, many observations of ailing white and Scots pines were from **brown spot needle blight** where previous-year needles had been lost. White pines also saw heavy populations of **white pine needle adelgid**.

Intense **wind storms** on several dates resulted in 6,090 acres of damage to forests. Most notable was the April 16th wind storm that caused infrastructure damage to the city of Rutland. Other areas affected were in southern Vermont, and in the Northeast Kingdom townships.

Exotic Pests

The introduction of non-native insects, diseases, and forest plants can lead to significant changes in Vermont forests. The natural controls that keep species in balance are not present, so these organisms out-compete native species for resources and space. Some potentially damaging exotics have not reached Vermont and are the subject of detection surveys. Other species are already in Vermont and are monitored for population changes and tree damage.

Vermont is actively surveying high risk forest areas for several new U.S. or North American introductions of serious forest pests. No evidence was found of the **Asian long horned beetle, *Phytophthora ramorum* (sudden oak death), brown spruce long horned beetle, oak splendor beetle,** or the **emerald ash borer.** The emerald ash borer is considered the most serious exotic pest threat, as it is killing millions of ash trees in the Midwest and continues to be found further east from the original infestation in Michigan. It is now present in parts of Pennsylvania and western Ontario. Firewood transport from infested areas seems to be the main method of movement. More information on exotic pests of interest to Vermont can be found at: www.vermontagriculture.com/CAPS/invasive/forestpests.htm.

Hemlock woolly adelgid was found for the first time in Vermont on mature native trees at two separate locations in Windham County. In each case, the infested hemlock trees were located adjacent to bird feeders or bird baths, suggesting that birds are transporting the insect from infested states to our south into Vermont. These new hemlock woolly adelgid populations were probably several years old, and because of our recent warm winters, have been able to survive. Infested trees were burned on site

Forest Health Highlights… continued on page 5

Forest Health Highlights… continued from page 4

or treated with pesticides to eradicate these populations. Follow-up surveys surrounding infested trees did not find the insect in adjacent forests.

The **European wood wasp** was detected for the first time in Vermont by the Vermont Agency of Agriculture at one location in 2007. This insect can fly great distances and is detrimental to certain pine species, especially Scots and red pines. Additional surveys will be done to determine if this insect is truly established at the detected location.

Beech bark disease continues to cause tree decline on severely infested trees. The area of damage aerially mapped this year increased to 61,859 acres. **Balsam woolly adelgid** damage symptoms were visible on 2,321 acres in central and southern Vermont. Past damage also contributed to 9,535 acres of decline mapped in spruce/fir stands. **Gypsy moth** larvae were occasionally observed but egg mass surveys indicate that populations of this defoliator of oak and associated species remain low.

The c**ommon pine shoot beetle** was first detected in Vermont in 1999 in northern Vermont. Since then surveys have found the beetles in many counties, including new detections in Rutland County in 2005. Observations in Vermont have been that tree damage is difficult to find and is limited to new shoot injury. A federal quarantine is in place to limit the spread of this exotic insect into non-affected states. Pine material is free to move inside Vermont. Quarantine details can be found at: www.vtfpr.org/protection/for_protect_forhealth.cfm.

Invasive non-native plants such as glossy buckthorn, Japanese barberry, and Asian honeysuckles, continue to invade forests in Vermont, especially in southern counties.

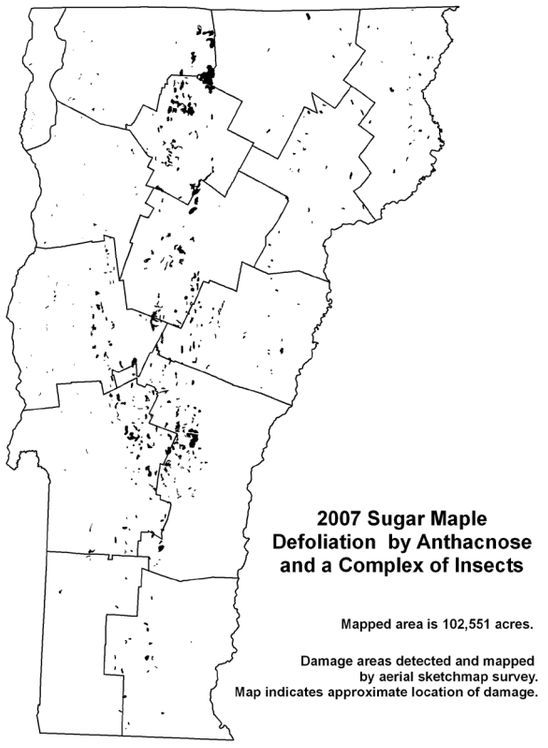


Figure 1. Locations of sugar maple maladies mapped during aerial surveys of forest health in 2007.

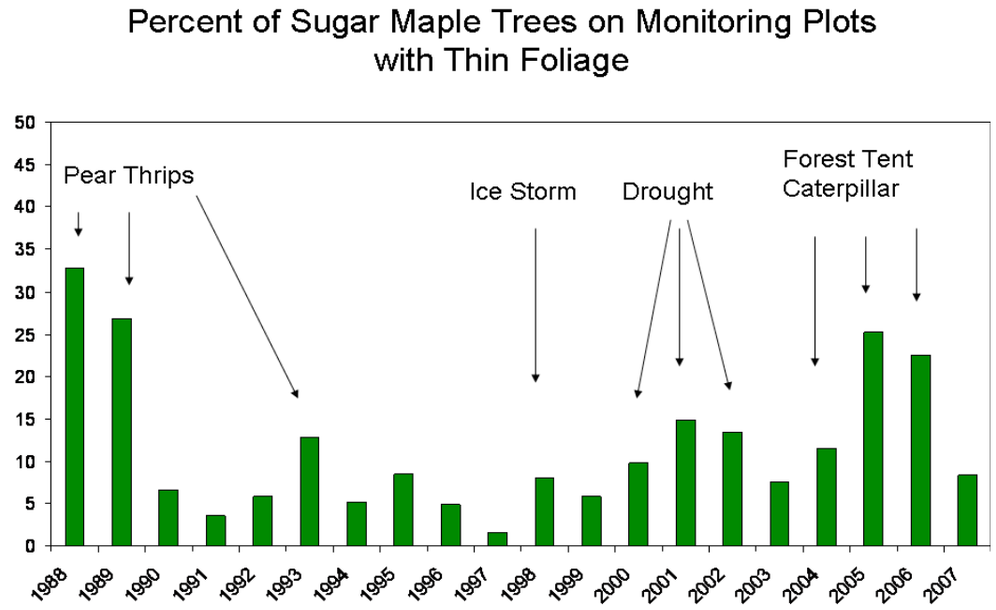


Figure 2. Stress events that have affected sugar maple tree health from 1988 to present. Recently, forest tent caterpillar defoliation caused nearly one-quarter of trees to have thin foliage. Most forests were recovering in 2007.

Earlier Spring Leaf Development in Recent Years at VMC Sites

Sandy Wilmot and Tom Simmons
VT Department of Forests, Parks & Recreation

Based on long-term monitoring data, bud and leaf development of sugar maple trees at the base of Mount Mansfield over a 16-year period is showing signs of earlier springs. The Department of Forests, Parks & Recreation has been visiting sugar maple trees at a 1400 foot elevation since 1991 to record development of sugar maple buds from initial bud swell to full leaf out. One goal is to provide long-term biological data on impacts of climate change. Bud break and full leaf out during the first 8 years of monitoring (1991-1998) were later on average than in the past 8 years (1999-2006) (Figure 1). Preliminary analysis shows bud break 2 days earlier and full leaf out 5 days earlier, on average, when comparing the most recent (1999-2006) to past (1991-1998) time periods. Variations in the timing of leaf development can be great between years, and this relatively short time frame may only capture natural variability. On the other hand, our mighty sugar maples may be serving as living testimony to our changing climate.

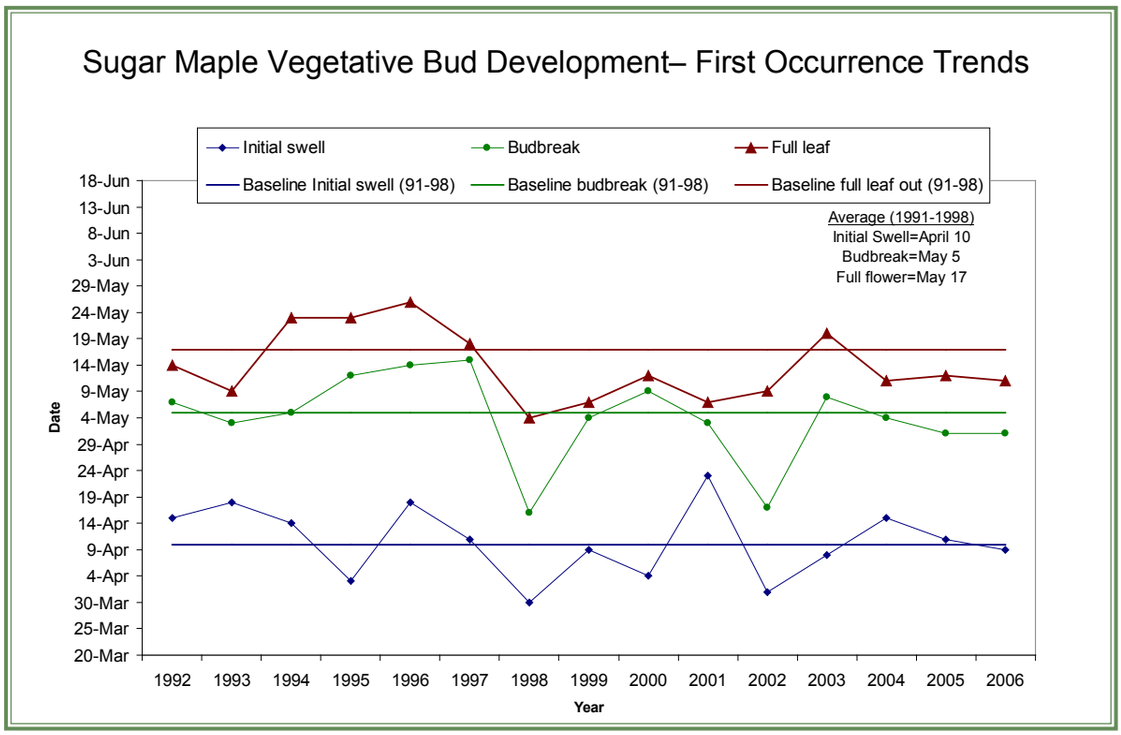


Figure 1. Annual first occurrence dates of sugar maple bud development and full leaf out are compared to a 7 year baseline (1991-1998).

VMC Web and Data Updates

Joanna Grossman, VMC Web & Data Manager

VMC has made several exciting updates to our website over the last six months. Here's a few to check out:

- We've added over 100 publications, each of which can be found under the "Published Papers" tab of any given project. (If you have more publications related to a VMC project that are not on our website, please contact us.)
- We've added Diamond Island to the real-time meteorological section on the homepage. (Wind surfers, don't all thank us at once!)
- We've updated the data downloads for Colchester Reef and improved them so that you may now download QAQC'd (read: cleaned up!) data instead of raw data. We've also made Diamond Island data available for download for the first time and I'm proceeding to do this for dozens more projects and datasets.
- Missed the Annual Meeting? Or want to relive it? We have the complete proceedings on-line linked right to our homepage.

Hello Cooperators! Do you use VMC data? Do you have a swanky publication you haven't told us about? Let us toot your horn. Contact us about your publications and projects so we can spread the science!

Proceedings for 2007 VMC Annual Meeting

For presentations, contact information and project data, please visit our website at www.uvm.edu/vmc

The Original Forests of Vermont: The Appropriate Baseline
Dr. Charles Cogbill

Vermont's Forest in the Present
Randy Morin, USDA Forest Service, Forest Inventory and Analysis Unit

Impact of Global Climate Change on the Timing of Maple Sap Flow in the NE
Dr. Timothy Perkins, University of Vermont, Proctor Maple Research Center

Managing Forested Landscapes for Carbon Sequestration and Resilience to Climate Change
Dr. William Keeton, University of Vermont, Rubenstein School of the Environment and Natural Resources

Update on 2007 Forest Insect and Disease Conditions in Vermont
Barbara Burns, Vermont Department of Forests, Parks, and Recreation

Science to Assist the Restoration of American Chestnut to Vermont
Dr. Paul Schaberg, USDA Forest Service, Northern Research Station

Research and Monitoring of Atmospheric Mercury in Vermont Forests
Dr. Eric Miller, Ecosystems Research Group, Ltd.

For presentations, contact information and project data, please visit our website at
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Reminder to Cooperators:

Researchers conducting work in 2008 on state or federal land or at VMC study sites must update their study site permit and project description with VMC. Any changes should be sent to Sean Lawson at Sean.Lawson@state.vt.us. In addition, if your research is located on the Green Mountain National forest, please contact VMC and Brian Keel, Research and Monitoring coordinator of the GMNF at (802)362-2307 ext 214 or bkeel@fs.fed.us.

If an existing project remains active and unchanged, please confirm your status with VMC to ensure your study site permit remains active. If you need a copy of your study site application on file, please let us know.

Thank you!

FOR MORE INFORMATION ABOUT VMC, PLEASE VISIT OUR WEBSITE AT WWW.UVM.EDU/VMC

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