

Newsletter

Vermont Monitoring Cooperative

Vermont's Cooperative Forest Ecosystem Monitoring & Research Program



The University of Vermont



Summer 2013 Volume 17 Issue 2

VMC Update

Jen Pontius, new VMC Principal Investigator

One of the challenges of doing research is conveying your findings to a broader audience. Scientists may read the latest scientific journals, but what really makes an impact is the ability to convey that information to the land managers and policy makers who control what happens on the ground. This is what originally drew me to the Vermont Monitoring Cooperative. In my tenure as a forest ecologist, I have never seen an organization that has so successfully brought together researchers, ecologists, land managers, policy makers, and the public, over such a long and sustained period of time. Much of this can be attributed to the recent leadership of Lawrence Forcier and the commitment of time, energy, and resources of our cooperators across the state. Looking ahead, this collaborative spirit will become even more important to sustaining the function of Vermont's forested landscape.

At a time when northeastern forests are faced with an array of external stressors (e.g. climate change), a suite of invasive pests and pathogens on our doorstep (e.g. hemlock woolly adelgid and emerald ash borer), and shrinking budgets for environmental work, there has been much talk of finding additional synergies around our forest health and monitoring efforts. Based on its diverse group of active collaborators and mission to promote the coordination of multi-disciplinary monitoring and research activities, the Vermont Monitoring Cooperative is positioned to take the lead in this effort. To this end, be looking for a new, expanded format for the VMC annual meeting this October. By combining the traditional morning plenary with concurrent sessions of offered talks and afternoon break-out sessions, we hope to broaden the audience of VMC cooperators and provide the framework to form new collaborations around future research and monitoring efforts.

A call for abstracts for this October 28, 2013 VMC meeting will be coming out soon. Because of the importance of connecting research efforts across disciplines, organizations, and scales, we welcome presentations based on any aspect of forest ecosystem health. This could in-



Judy Rosovsky

2013 Annual VMC meeting held at the University of Vermont in Burlington, Vermont.

clude disciplines not typically considered such as community forestry, land use dynamics, or forest management, to name a few. In the interest of sharing information regarding ongoing research, presentations on new research and preliminary data are also welcome. The afternoon session will be devoted to multiple, break-out sessions where discussions of key forest ecosystem health issues can lead to more formal collaborations among participants. Be looking for registration information and a draft meeting agenda later this month.

We hope to see you all there this October and continue working with you throughout the upcoming year.

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Soil Scientist Nancy Burt Retires

Miriam Pendleton and Carl Waite



Long time VMC cooperator, Soil Scientist Nancy Burt (front left) with Vermont Youth Conservation Corps at Lye Brook Wilderness Area.

Long time cooperator, advisor and friend of the Vermont Monitoring Cooperative, Nancy Burt, retired in early March after more than 30 years with the U.S. Forest Service. Nancy was a Soil Scientist at the Green Mountain and Finger Lakes National Forests. She became VMC's contact person and liaison at the Lye Brook Wilderness Area and helped guide the VMC through the U.S. Forest Service's regulations that determine how Class 1 Wilderness can be used for monitoring and research.

In 1993, Nancy began working with Diane Burbank on the Lye Brook Ecological Land Type Phase mapping project, which relied heavily on soil maps. Around 1995, Wayne Kingsley, the first Chair of the Lye Brook Subcommittee, retired and Nancy became the new chair of that committee. In this role, Nancy began attending meetings of the VMC Coordination Committee, now the Advisory Committee. Shortly after, Nancy began serving as an active member of the VMC Advisory Committee, helping to shape the direction of the VMC's monitoring and research activities.

A quick scan of the VMC's projects shows that Nancy was associated with projects ranging from forest soils and long-term soil monitoring to air quality. Recently, Nancy received the 2012 *Rise to the Future* award from the U.S. Forest Service. An excerpt from that award announcement follows:

"Nancy Burt, Forest Soil Scientist of the Green Mountain and Finger Lakes National Forests, is recognized for her achievements over more than 30 years as a soil scientist. In particular, Nancy has been a leader in identifying and championing the need for long-term soil monitoring to identify trends in soil acidification and changes in produc-

tivity related to acid deposition and climate change. She initially collaborated with the Natural Resources Conservation Service to establish two long-term soil monitoring plots as part of a state-wide network and then secured support and funding to establish 20 sites for collecting integrated soil and vegetation data on the Green Mountain National Forest. The plots will be re-measured in 10-year intervals and will provide invaluable information on the impacts of environmental change. Nancy's accomplishment in establishing the monitoring program with a coalition of partners has placed the Forest in a leading role in the long-

term soil and ecological monitoring arena."

To ensure continuity and a renewal of collaboration between the Green Mountain National Forest (GMNF) and the VMC, Sandy Wilmot and Nancy organized a meeting held at GMNF headquarters in Rutland in February of this year to review and celebrate progress during the first 20 years of this collaboration. At the meeting, presentations were made by many Lye Brook cooperators who had initiated and performed early studies at or near the Wilderness Area.

We will miss the positive, kind, and can-do attitude that Nancy has always demonstrated over the years. It was a pleasure working with Nancy, and the VMC staff and cooperators all wish her the best in retirement. Thank you for your many contributions, Nancy!

VMC Projects with Nancy as a PI

Lye Brook Area Ecological and Land Type classification
1993

Clean Air Status and Trends Network 1994-2007

Tree nutrition status in long term soil monitoring plots
2000

Long Term Soil Monitoring 2000

Interview with Steve Sinclair, Director of Forests in Vermont

Miriam Pendleton and Carl Waite

Steve Sinclair is the Director of Forests for the Vermont Department of Forests, Parks and Recreation and a long-time member of the VMC Steering Committee. He was the Coordinator of Urban and Community Forests from 1990 until 2002. Steve is an advocate for stewardship of all of Vermont's forests.



Steve Sinclair, Director of Forests with the Vermont Department of Forests, Parks and Recreation

What is your connection with the VMC; how long have you been associated with us and in what capacity?

I have served on the VMC Steering Committee in my capacity as Director of Forests for the past 11 years but I've been with the Department for over 30. I've been following the VMC with interest since its inception, particularly the role that the Department has played with VMC and how that has changed over time. Brent Teillon, former Chief of Forest Resource Protection, drew upon my experience with the Urban and Community Forestry Program to explore pursuing non-profit status for the VMC, so I became more involved during that time. Brent wanted to know if making the VMC a non-profit could leverage funding, but this never really materialized and converting to a non-profit didn't make sense.

What are your most important priorities with respect to Vermont's forests?

Part of the Division's mission statement is "Healthy Forests First" and that's really key to sustainable forests. Most of Vermont is forested, so if you don't have healthy forests, you don't have healthy ecosystems; you don't have healthy communities, and you don't have a healthy economy. Dealing with climate change is one of our biggest priorities. With climate change comes species change with the potential impact of invasives having a competitive advantage over our native species or being able to move into warming habitats that they couldn't have tolerated before. The predictions of more extreme weather events will have

economic impacts on things like forest products and operability for harvesting. With increased rainfall and flooding and shorter winters, it's hard to get into the woods to do harvesting.

There's also a social dimension with climate change on things like outdoor recreation. Homeowners and forest landowners may also be adversely affected and need guidance on how to adapt their lifestyles to the changes in the environment. They also need to be aware of their individual impacts on the environment and actions they can take to help mitigate the effects of climate change. If people are connected to ecosystems then they will value them. VMC can play a role in making that connection.

The priority of healthy forests falls nicely into the role that the VMC plays. Humans may change behaviors but then lose interest or become distracted after a while. VMC is unique in this way; it monitors for a long time! The U.S. Forest Service and its Forest Inventory and Analysis (FIA) program used to support forest health monitoring but that funding is drying up; that makes the work that the VMC does more important than ever.

What are the most rewarding aspects of your job and which are the most challenging?

There are many different aspects to my job from land management to policy. The Forestry Division has a broad array of forest programs. We manage state lands, monitor forest health, promote green infrastructure, just to name a few. I need to be knowledgeable of many different aspects of forestry and forest policy, but since there are so many aspects, my knowledge tends to be broad but not necessarily deep. I'm no scientist! It's been a while since my hands-on forester days; now I'm a manager of people, money and programs, not trees! I enjoy being involved in all these different programs, but the downside is less field time and more desk time which is eroding my forestry chops! As in any profession there needs to be a balance and that is sometimes difficult to achieve.

How did you become interested in environmental issues?

I think a part of it is a function of the generation that I grew up in in Vermont. There was a new awareness of human impact on the environment with Green-up Day and the first Earth Day. Vermont responded to this awareness by getting

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Steve Sinclair *continued from Page 3*

rid of billboards, enacting the bottle law, and shaping development with Act 250. These pieces of legislation happened during and after my high school days, so environmental concerns were in the mainstream.

Also, I grew up in South Burlington. I'm a "suburban Vermonter" which made the woods in back of my house very appealing. I spent a lot of time there and had more fun in the woods than on the baseball field. Sports were alright but being in the woods was better.

My dad [Robert Sinclair, Dean Emeritus of the College of Agriculture and Life Sciences at the University of Vermont (UVM)] took me up to campus where I met Professor Kline in Botany and over to Plant and Soil Science to meet more people, then to the Forestry Department where I met Roy Whitmore... You know how sometimes a chance thing can really set you on a path? It just clicked and I decided Forestry was what I wanted to do.

Can you think of additional ways the VMC might facilitate connections, discussions and information exchange between state, federal, and university forest managers and researchers?

The VMC needs to continue what they are doing; *long-term monitoring*. Core parameters should be identified and maintained and made relevant to Vermonters and funders. One way of engaging would be having quarterly webinars on research topics either funded or supported by VMC monitoring data. This could also involve UVM Forestry, Wildlife, and Extension, utilizing VMC's networks within the University of Vermont and the U.S. Forest Service.

We should also take advantage of the UVM connection by using more students! The VMC staff is unlikely to expand so by using students, more could be accomplished. i-Tree* is a great use of students and VMC should explore other opportunities to engage students and professors in departments throughout the University. Students studying Statistics, GIS, Geography, Geology, Public Policy, etc. could all contribute while gaining real hands-on experience with manipulating datasets or doing actual field work.

The VMC needs to do a better job of telling its story. Does the average Vermonter even know about the VMC? Do they understand why the VMC is important? There needs to be a way to connect a person's individual actions to the forest and to explain the importance of the VMC's work. I think a good way of doing this would be to have a *spatial* way for a homeowner or forest landowner to view his or her property in conjunction with surrounding properties so he or she could understand the implications of individual actions on the very local environment. The VMC web site could de-

velop an interactive map that the average Vermonter could use to provide a spatial visualization of their connection to the larger landscape.

The work of VMC is more important now than it was at its inception. We need to build upon this strong foundation so as to meet future challenges.

**The i-Tree suite of software (www.itreetools.org), developed by the research branch of the Forest Service, uses data from plots located throughout a study area, along with local hourly air pollution and meteorological data, to quantify trends in urban forest structure, environmental effects, ecosystem services and community value. Students from UVM's Rubenstein School of Environment and Natural Resources did the initial survey of randomly selected plots in Burlington. For more information see: <http://www.uvm.edu/vmc/documents/newsletters/VMC-NewsletterFall2011.pdf>*



VMC principal investigator Larry Forcier conducts an iTree training session for students in the University of Vermont Rubenstein School of Environment and Natural Resources in August 2012.



Atmospheric Mercury Network Training Session

Miriam Pendleton

On March 20-22, 2013 a workshop was held at the Proctor Maple Research Center (Proctor Center) for Atmospheric Mercury Network (AMNet) site operators and supervisors as well as other interested parties. The VMC air quality site is located at the Proctor Center, and we wish to express our gratitude for the use of Proctor's facilities both for hosting this workshop as well as providing space for our ongoing VMC monitoring activities.

The Tekran instruments used in the AMNet program are rather complicated and finicky so keeping them running smoothly can be challenging. The real upside to running the Tekran mercury vapor analyzer and the add-on mercury speciation units is that they produce nearly continuous real-time data that allow researchers to see what effect things like the diurnal cycle or weather has on mercury cycling in the atmosphere.

The older method of sampling for atmospheric mercury involved pulling air through a gold plated glass bead trap to collect the vapor phase mercury and a filter pack to collect particulate mercury. Sampling occurred over a twenty-four hour period every six days. The data produced were a composite of whatever vapor or particle phase mercury was around for the preceding 24 hours, but did not provide information about the rates of deposition or exactly what species of mercury were present. The gold trap and filter pack were shipped off to an analytical lab for analysis. Having only one lab do the analyses reduced variability in sample processing, but the resolution of this type of atmospheric mercury sampling is relatively low compared to the on-site analyzer and speciation units.

The advantage of using the mercury vapor analyzer and speciation units is that they quantify how much each of the following species of mercury are present in the atmosphere at very near real time: gaseous elemental mercury (GEM), gaseous oxidized mercury (GOM), and particle bound mercury (PBM). The largest fraction of atmospheric mercury is in the elemental form, but this has less environmental impact than do the oxidized or particulate forms. The GOM and PBM forms can bind more easily to other compounds and have higher wet and dry deposition rates than GEM. Having a speciation system makes it possible to identify and quantify these more environmentally important mercury species.

As mentioned earlier, the instruments are finicky so training operators to keep them running smoothly is important if the systems are to operate well within specifications, so that variability across the network is minimized. The VMC AMNet site (VT99) has been operating without the excellent leadership of Eric Miller of Ecosystems Research Group since EPA funding dried up in early 2012. The AMNet program site liaison, Mark Olsen, suggested holding a workshop for operators in the Northeast and adjacent Canadian provinces (AMNet is an international network) as part of a site visit to VT99. Mark reserved a block of hotel rooms in nearby Williston, VT, and the Proctor Center generously provided space for the workshop to be held. Ten

people attended; some were AMNet site operators, some were graduate students and one was a PhD charged with supervising sites. All wanted to learn more about keeping these systems operating properly within network specifications, so that data from different sites would be comparable.

The Proctor Center staff kindly allowed AMNet geeks to invade and monopolize the conference room for three days where one of VMC's inoperable mercury analyzers was rebuilt and restored to great condition. Attendees were shown how to interpret the data in order to head off equipment problems and how to make online field reports to assist Mark Olsen with his quality assurance and quality control of the network. There was even a demonstration of how to perform routine servicing of the system with good labor-saving steps that are not in the Tekran Manual.

The workshop was a resounding success and demonstrates how the resources of the network, the Proctor Center, and the VMC can be leveraged to provide a very informative session for very little cost; something that is more and more important in a funding-constrained world. VMC/VT99 attendees were Mim Pendleton, Judy Rosovsky, Jim Duncan, and Carl Waite.



Mark Olsen demonstrating streamlined servicing of Tekran1135 particulate mercury speciation module.

Jim Duncan

VMC's Lye Brook Wilderness Area Intensive Site

Miriam Pendleton, Carl Waite, and Sandy Wilmot

The VMC has two intensive sites where monitoring and research take place, one in the northern part of Vermont (Mt. Mansfield) and one in the south (Lye Brook). The original concept for using both of these sites was to document conditions at each from “bedrock to atmosphere.” Having one site in the north and one in the south of Vermont would capture different weather patterns, species composition, and growing conditions. The Lye Brook (LB) site located in southern Vermont is the focus of this article.

The LB intensive site is located in the Lye Brook Wilderness Area on the Green Mountain National Forest, and is designated as a Class 1 Wilderness Area. This is defined by the Wilderness Act of 1964 as “an area where the earth and community of life are untrammelled by man, where man himself is a visitor who does not remain” and “an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.” The 1964 law allows for scientific research to be conducted under close supervision and with some restrictions on what type of research is permitted. One of the conditions that the Wilderness Act addresses is air quality, as determined primarily by visibility, which is why an IMPROVE (Interagency Monitoring of Protected Visual Environments) site came to be located

at LB in 1988. http://vista.cira.colostate.edu/improve/data/improve/improve_data.htm

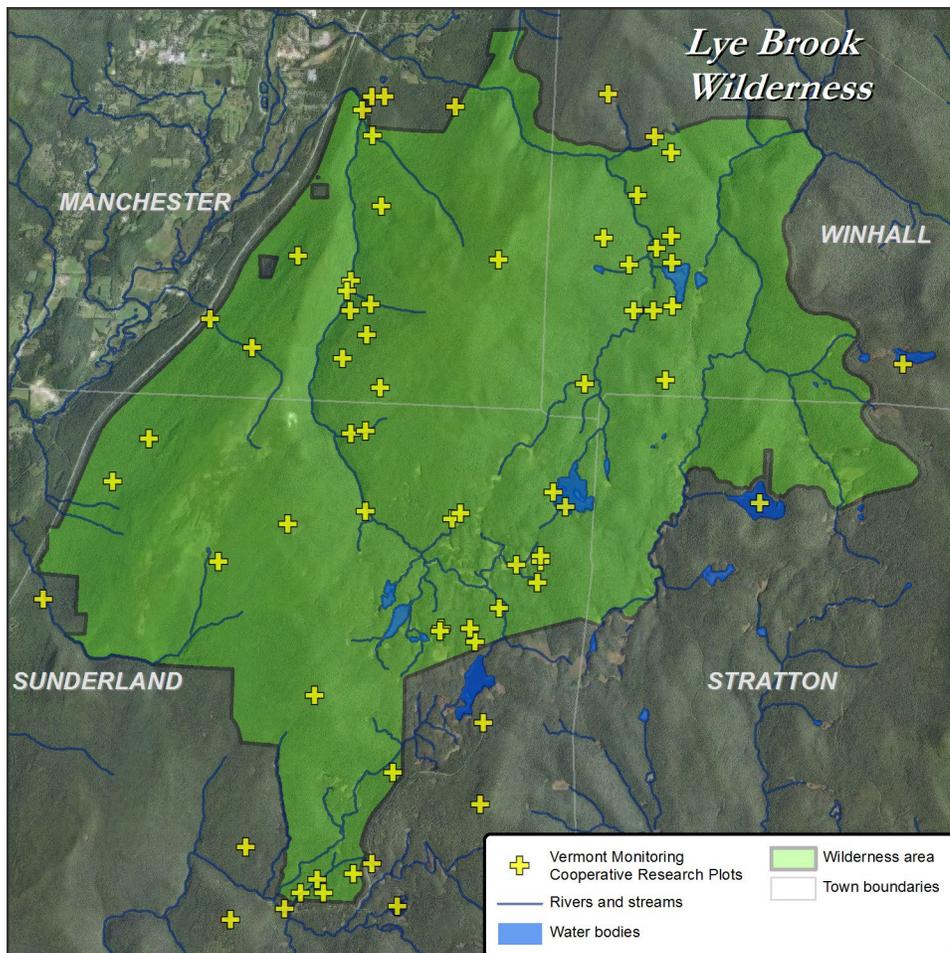
Since the early 1980s, the LB site has hosted various monitoring and research projects ranging from soil to visibility monitoring with a host of flora and fauna projects as well. One of the first projects was conducted in 1982 and involved monitoring fish and the snowpack for mercury. Other early projects conducted at LB looked at spruce decline, atmospheric visibility and ozone damage as determined through the monitoring of bioindicator plants.

Expanding VMC monitoring to the LB site made sense since there was a relatively long record for some measurements already established. There was also an interest on the part of the Green Mountain National Forest's Mark Cleveland to forge interagency collaborations which lead to partnering with the VMC.

With the involvement of the VMC at LB, more projects were added; some are still ongoing and collecting new data, and others were more short-term surveys. The projects include measuring methyl mercury in LB lakes and ponds and surveys of birds, amphibians, lichens, invasive species and soils, just to name a few. Some of the projects were only a year or two in duration and one, the 200-year Soil Monitoring Project, is extremely long-term! One must be patient to be a soil scientist, apparently! There have been

three field samplings for the Soil Monitoring project so far and the project has produced two offshoots; the VT soil team and the NE forest soil monitoring workshop (USGS). A few examples of other relatively long term projects that continue to collect data are the Amphibian Monitoring project, Forest Bird Surveys, and the Soil Climate Analysis Network (SCAN). <http://www.wcc.nrcs.usda.gov/scan/>

New ideas for future projects at the LB include among many others, disturbance monitoring, elevational species demographics, regeneration changes, forest growth trends, and amphibian and reptile inventories on especially rich or warm sites. One opportunity for data integration at the LB site is to use air and soil temperature data from the SCAN site as it relates to amphibian activity and population fluxes. This long-standing collaboration between the Green Mountain National Forest and the VMC will be facilitated by the planned reinstatement of the Lye Brook Subcommittee to enhance communications, locate and coordinate funding, and collaborate on project implementation.



Jim Duncan (Data sources: Vermont Center for Geographic Information, Esri, Green Mountain National Forest and Vermont Monitoring Cooperative)

How Wet Was It?

Miriam Pendleton

After a relatively dry spring, the floodgates opened and the humidity settled right in, here in Vermont. Exactly how wet was it? The first week of May was dry which is very unusual at the VMC air quality monitoring site. A dry week is so rare that getting field blank samples (for quality assurance purposes) from our site is difficult. The precipitation amount recorded during the second week in May was only .28” and the third week’s total was a paltry six hundredths’ of an inch. All that changed late on May 21st. Nearly four tenths of an inch fell between 7 and 10pm which is coming down pretty fast. The rain continued on the 22nd totaling 1.4 inches but we did need the rain...

On May 23rd, we recorded 3.1” at the VMC air quality monitoring site. Enough already! Bursts of heavy precip saturated already wet ground and lead to flash flooding in Underhill and other parts of Northern Chittenden County. The rain continued but with less intensity; on May 24th there was steady rain all day that added another 1.06” to the soggy ground and on May 25th, two inches fell during another all day rain! Finally, on May 26th, the rain stopped in the afternoon after a mere four tenths of an inch fell. Funny, how taken in context, nearly a half an inch of rain in one day doesn’t seem like very much! The last five days in May were much less rainy; the 27th, 28th and 30th were dry and the two days it did rain, the precipitation total was only 0.36”, most falling on May 29th with a trace shower on May 31st.

June started out in the same vein with 0.48” of rain on the first and 0.63” falling in an hour and a half on the second! June 3rd through June 5th was “dry” if extreme humidity and lots of fog can be classified as dry. No precipitation was recorded during this period. The rain returned on June sixth with 0.17” measured. June 7th produced 0.45”, and 0.25” fell on June 8th. June 9th was a welcome non-rainy day but hardly what would normally be considered dry. The rain returned on June 10 when 0.20” was measured and on June 11th the daily total was back up over an inch with

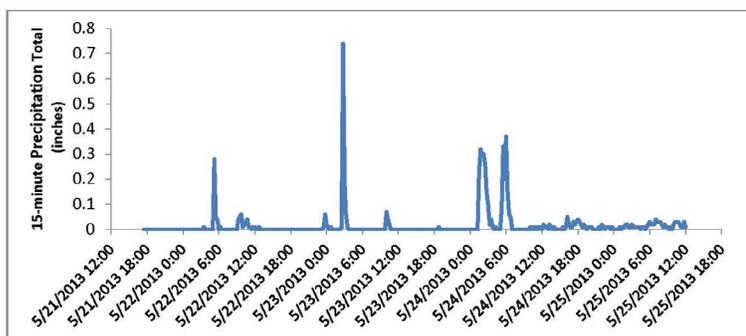
1.66” recorded. The daily total for June 12th was a more moderate 0.19”.

The rest of June was generally very muggy with only two or three day intervals of no rain mixed with rainy days. It got to the point where if it was only sprinkling, then people behaved as if it wasn’t raining at all. It was also quite cool so transplanted seedlings just sat doing nothing except maybe getting paler and smaller. Grass and weeds grew in lush abundance! The monthly total for June was 10.67” with the most intense rainfall occurring on June 20th when between noon and half-past noon, 1.05” of rain poured down. Another notable rain event was on June 29th when after a day of temperatures in the 80s F, afternoon and evening thunderstorms produced nearly an inch and a quarter of rain.

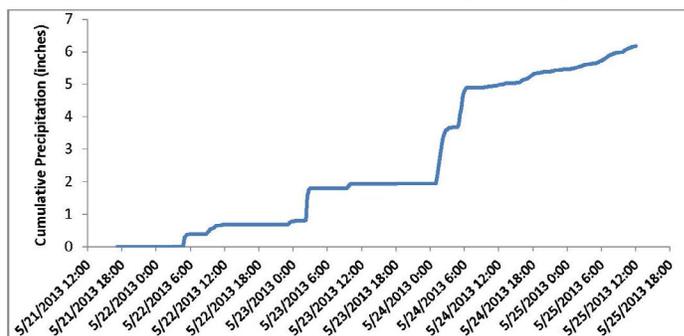
June ended on a rainy note which has continued right into July with Fourth of July festivities postponed or cancelled. On July 3rd, there was significant flooding in Huntington but at the air quality site, only 0.27” of rain fell. The thunderstorm that caused the damage in Huntington was audible and visible from Underhill. The frequency of thunderclaps was intense and served as a natural fireworks display from that safe distance! The most notable difference between the weather conditions in June and July was that in July, temperatures soared and stayed hot for long enough to be an official heat wave. The amount of precipitation recorded in Underhill moderated slightly and finally around July 23rd a shift in the weather pattern brought some relief from the intense heat and humidity.

As of July 23rd, 35.93” of precipitation has been measured this year at the VMC air quality site. According to National Weather Service estimates, the total annual precipitation for Underhill is between 50 to 59 inches. To see the rainfall map of the state of Vermont, click the link below and keep that umbrella handy!
http://www.weather.gov/images/btv/climo/VT_annual_precip.png

Pulses of rain that contributed to flooding in northern Chittenden County in May 2013



Cumulative rainfall total during same time period for northern Chittenden County in May 2013



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Reminder to Cooperators:

Researchers conducting work in 2013 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 Carl Waite at cwaite@uvm.edu. In addition, if your research is located on the Green Mountain National Forest, please contact VMC and Melissa Reichert, at mmreichert@fs.fed.us or (802) 747-6754.

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!

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