
Newsletter

Vermont Monitoring Cooperative

Vermont's Cooperative Forest Ecosystem Monitoring & Research Program



The University of Vermont



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VMC Update

Larry Forcier, VMC Principal Investigator

The Vermont Monitoring Cooperative has new staff and Steering and Advisory Committee members. As a volunteer collaborative, VMC's strength comes from the talent and commitment of its people. The organization was founded and developed to promote data sharing and excellent communication among cooperating organizations and individuals who are passionate about the continuing health of Vermont's forest ecosystems.

Jen Pontius officially joined me as co-principal investigator for VMC. Jen is a Research Assistant Professor in UVM's Rubenstein School of Environment and Natural Resources and a Research Scientist with the Northern Research Station of the U.S. Forest Service. Her Ph.D. from the University of New Hampshire is in environmental science. Jen has skills in remote sensing, forest monitoring, and biometry. She studies forest health relationships at the landscape scale, focusing on mapping previsual forest decline symptoms that result from invasive species, global climate change and acid deposition/nutrient depletion.

Jim Duncan has happily returned to Vermont after 13 years to become the VMC Data and Web Coordinator. Jim earned his M.S. at Oregon State University in geography. His work in Oregon focused on how home building in forests affects landscape ecology and land tenure regimes. He also researched international transboundary river basins and their institutional resilience to climate change. Most recently, Jim was a consultant with the World Bank where he worked to increase transparency and accountability in the oil, gas, and mining sectors, through the use of online mapping tools and open data principles, to provide information to citizens and decision-makers.

The Chair of the VMC Steering Committee, Vermont Department of Environmental Conservation Commissioner **David Mears**, welcomed **Jon Erickson**, Interim Dean of the Rubenstein School, to the committee. He also welcomed **Jen Wright** from the Green Mountain National Forest to the VMC Advisory Committee last month. At that

same meeting, we profusely praised and applauded retiring Green Mountain National Forest Soil Scientist, **Nancy Burt**, for her dedicated, long-term work to support healthy forest ecosystems. Nancy's committed service to the VMC Advisory Committee has been extremely helpful to VMC.

Last month's joint Steering/Advisory Committees meeting had good news about work accomplished this year as well as additions to the talented VMC staff. It provided me an opportunity to reflect on the many people who have contributed to monitoring and analyzing Vermont's forests over the more than two decades we have worked together. Importantly, the meeting brought together representatives from all of the VMC founding organizations – Vermont's and America's senior Senator Patrick Leahy's office, all three branches of the U.S. Forest Service, the three departments of the Vermont Agency of Natural Resources, and three UVM colleges and schools as well as UVM Extension. Thank you one and all.



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VMC Data and Web Management Review Completed

Carl Waite and Jim Duncan

In early November a team of reviewers met at VMC headquarters in South Burlington for a day and a half to review and discuss all aspects of the VMC database and website structure, function, content, management, and security. This rigorous external review was first proposed in 2007 by then VMC leaders Jen Jenkins and Sean Lawson. With the recent hiring of Jim Duncan as successor to Aaron Rice as the new VMC Data and Web Coordinator, this seemed like the perfect time to complete this review and to provide input and clear direction to Jim for the future of the VMC database and website.

One of the major points brought out during this review was that VMC datasets need to meet Extensible Markup Language (XML) metadata standards to be discoverable in broader national ecological searches (outside of the VMC website), and Ecological Metadata Language (EML) format was recommended. Time was also spent during this review discussing VMC's potential niche in Vermont and beyond in terms of both acquiring new datasets and linking to additional relevant environmental datasets and databases, and perhaps even providing a "public portal" to datasets housed by state or federal agencies. The VMC staff wishes to express its thanks and gratitude to review committee members Barbara Burns, Terri Donovan, Mary Martin, Jen Pontius, Ernie Buford, and Jim Steinman for all of their hard work.

The following are thoughts and observations from Jim Duncan, VMC's new Data and Web Coordinator, about the recommendations made by the review committee.



Jim Duncan, VMC Data and Web Coordinator

I was very fortunate to be able to join the Data Management Review in early November. Not only did I have the opportunity to get a crash course in both the database backend and web interface, I was able to listen in on discussions of the committee members and learn a great deal about how other organizations, such as the Long Term Ecological Research sites and the VT Fish and Wildlife Department, are approaching data management and dissemination.

VMC was especially lucky to have a group of committee members that could tackle the finer technical points of data science and database architecture, and just as easily step back and put these points in perspective, discussing how they relate to the larger challenges of making VMC's data more usable, more accessible, and more visible. With current technology and the pace of innovation in the wider community, the potential for expanding VMC's data and web capacity is huge – making it both exciting and a bit overwhelming. Thankfully, I received an initial dose of enthusiasm and can-do attitude from the committee's discussions and other VMC staff by sitting in on the review.

As indicated, there were a few clear areas to focus on going forward:

- Most importantly, making it easier to search and integrate datasets by implementing a standardized terminology for metadata and undergoing a data modeling exercise;
- Building on this new metadata, developing a system to make it easier to solicit good-quality metadata from contributors;
- Creating and strengthening more links to other data provision efforts around the state; and
- Making sure VMC is providing researchers and decision-makers with the highest-value and most useful datasets – and that we know what those are.

I am personally excited to start thinking conceptually about how the VMC database should be structured and to undertake a bit of data modeling to meet the search and user needs discussed at the review. We are lucky to be building on the extraordinary standardization work done by Aaron Rice. His work has set us up to take the next leap of implementing an XML metadata standard such as Ecological Metadata Language to describe VMC data.

With this standardization, the next step of easing the flow of information between contributors and VMC will be to speed the process of getting new datasets loaded in and available online. I am optimistic that this will make it that much easier for new and returning contributors to see why the VMC can be a good home and steward for their data and increase the VMC's ability to adapt and meet needs as they arise.

In terms of finding out what VMC *should be* hosting, we are looking for **your** feedback: What are the most important datasets you wish you could get from the VMC to support your research, decision-making and/or policy work? If you have suggestions, send them to vmc@uvm.edu and we'll see what we can do (and stay tuned to these pages, as we'll be coming back for this kind of input in a more structured way in the near future). In the meantime, if you have any other data or website questions, I look forward to hearing from you!

AAI Pilot Project at the VMC Air Quality Site in Underhill

Miriam Pendleton, VMC Field and Program Technician

Last summer the VMC was approached by Ben Whitney from the Vermont Department of Environmental Conservation (DEC) Air Pollution Control Division to lend a hand on an Environmental Protection Agency (EPA) pilot project that would test methods for evaluating possible future secondary air quality standards for sulfur and nitrogen oxides. Primary air quality standards are set to protect human health, while secondary standards are intended to protect public welfare from adverse air pollution effects.

Acid deposition adversely affects ponds, lakes, and streams and can cause them to be uninhabitable by fish and other biota. People enjoy fishing and other recreational activities on these water bodies, and public welfare is affected by the acidifying effects of sulfur and nitrogen deposition. The Aquatic Acidification Index (AAI) links measured concentrations of sulfur and nitrogen oxides in the air with the estimated effects of sulfur and nitrogen deposition on acid-sensitive surface waters.

The AAI determines a critical load (CL) of atmospheric deposition of sulfur and nitrogen that a water body or group of water bodies receive and still maintain a specified protective level of acid neutralizing capacity (ANC). CL is an estimate of how much pollution from atmospheric deposition can be endured by an ecosystem before damage to that ecosystem occurs. ANC is the buffering capacity of an aquatic ecosystem.

The AAI also includes calculations of actual sulfur and nitrogen deposition, based on measurements of particle and gaseous sulfur and nitrogen compounds in the ambient air. By combining these two criteria, sensitive ecosystems can be identified and managed to mitigate the harmful effects of pollution.

For example, a high altitude pond surrounded by thin, calcium poor soil is more sensitive to acid precipitation than a lower altitude pond in calcium rich soil. Not only is the higher elevation pond subject to more precipitation overall but since the soil is thin and acid, there is less buffering capacity. The advantage of the AAI model over previous standards is 1) it links atmospheric deposition to observed aquatic damages and 2) it allows for ecosystem variation in sensitivity to nitrogen and sulfur compounds thereby protecting different ecosystems to the same degree.

The EPA was considering implementation of these standards because current secondary standards do not afford adequate protection to sensitive ecosystems but ultimately decided not to implement the Aquatic Acidification Index at the present time. Instead, the agency proposed a pilot study to evaluate the methods and take into account the different biogeochemical features of several ecoregions around the country. In the original plan for the pilot, there would have been about twenty stations in several different ecoregions but funding proved to be too challenging, so



Fold-down tower used for ammonia sampling at the Underhill, VT VMC site

only the Northeast remains in the project largely because of New York State's involvement. New York experienced the "dead lake" phenomenon back in the early 1970s due to acid deposition, so it stands to reason that the AAI would be of interest to them.

The EPA identified the combined VMC and Vermont DEC site at the Proctor Maple Research Center in Underhill as a perfect location for the pilot program due to its heavy instrumentation. Many of the parameters needed to test the AAI were already being measured at Underhill.

The problem: no one at the EPA let anyone at the Underhill site in on the plan! The VT DEC was already overcommitted doing its regulatory work with fewer staff and of course, there was no money..... But there was a fold-down tower and five years of Ammonia Monitoring Network membership that would be funded by the EPA Clean Air Markets Division. The VMC had been advised to add ammonia monitoring to its suite of air quality measurements, so this seemed like an opportunity.

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Interview with Barbara Burns, Forest Health Program Manager

Miriam Pendleton, VMC Field and Program Technician



Sandy Wilmot

Barbara Burns, Forest Health Program Manager, and Keith Thompson, Chittenden County Forester, both with the Vermont Department of Forests, Parks and Recreation

What is your connection to the Vermont Monitoring Cooperative (VMC)? How long have you been associated with VMC and what role(s) have you performed within the organization over the years?

I have been involved with the VMC from the get-go with setting up the forest health plots and serving on and off as a member of the VMC Advisory Committee. Initially I stepped in for Scott Pfister and then was tapped by Larry Forcier to serve as the representative from my office. Importantly, VMC partners have been co-workers of mine through the forest health team.

What and where is your current position? What is the main focus of your work and what are some of your primary duties?

I am the Forest Health Program Manager at the State of Vermont Department of Forests, Parks and Recreation. We are primarily responsible for non-federal lands (public and private) forest health monitoring both from aerial and ground-based surveys. We track forest pests and other threats such as droughts, and help people manage forest land.

Which of the services, data and information provided by the VMC do you find most useful and relevant to issues

encountered in the day-to-day activities of your work?

All are important! I'm impressed with how some data generated by the VMC are already useful because of the long-term data record. The air quality record, phenology, and flora and fauna are all very helpful.

When the VMC was established, there were no forest health data sets to use for comparison; land managers wished there were! No one had long-term records; not the states or the feds. There was a lack of data at the state and federal level. This is why we decided we needed an organization devoted to long-term ecosystem monitoring.

Are there other services or information that the VMC might be able to provide that would help you in your position as a forest health professional? What other or more effective approaches should VMC use to support

other forest managers or those making policy decisions related to forested ecosystems?

The data archive is very helpful, and I'm looking forward to seeing the VMC tap its potential as a data library. Many of my colleagues have data but it's not accessible. It would be great to have all these data sets in one place where they are easily shared.

The great thing about the VMC is that issues change over time, but the VMC is steady. That's the real value of a monitoring organization; it gathers data the same way over time and isn't just waving in the wind doing whatever is trendy at a particular time.

Why do you think ecosystem-level data are needed to manage Vermont's forested landscapes?

Forest management is a science-based field, and we need good information to make good management decisions; otherwise we are just guessing!

What led you to an interest in the environment and environmental issues?

Like so many in this field, I like being outdoors! It turned out science was fascinating!

2012 Vermont Monitoring Cooperative Annual Meeting

Carl Waite, VMC Program Coordinator

The Vermont Monitoring Cooperative (VMC) held its 2012 Annual Cooperators Meeting at the University of Vermont Davis Student Center on November 19, 2012. The meeting, previously scheduled for October 29th but rescheduled due to superstorm Sandy, was well attended and VMC staff wish to thank everyone who came.

Speakers during the initial session entitled “Acidification” included **Richard Scheffe**, Science Advisor, EPA’s Office of Air Quality Planning and Standards who spoke about EPA’s Aquatic Acidification Index and proposed secondary standards. Also speaking during this session were **Paul Schaberg**, Research Plant Physiologist, US Forest Service’s Northern Research Station (USFS, NRS), who talked about impacts of acidification on forest tree health and growth in Vermont, and **Heather Pembrook**, Environmental Technician, State of Vermont Department of Environmental Conservation (VT DEC), speaking about total maximum daily loads for acid-impaired lakes in Vermont.

The “Cooperator Reports” session featured talks by **Jamie Shanley**, Research Hydrologist, US Geological Survey; **Neil Kamman**, Program Manager, VT DEC; **Don Ross**, Research Associate Professor, UVM Plant and Soil Science Department; **William Kilpatrick**, UVM Howard Professor of Zoology and Natural History, UVM Department of Biology; and the UVM Rubenstein School’s Professor **Bill Keeton** and **Alejandro del Peral**, a MS candidate working with UVM Associate Professor **Beverley Wemple**.

During the afternoon session **David Bloniarz**, Director of the Urban Natural Resources Institute, USFS, NRS, spoke about the newly-released i-Tree 5.0 software (<http://www.itreetools.org>) as a tool for inventorying and managing urban and community forests. Dave also

responded to questions from panelists Rubenstein School Research Assistant Professor **Jen Pontius** and USFS, NRS Scientist **Mark Twery** about i-Tree’s potential to help VMC meet its mission.

Over the past two years Dave Bloniarz has worked with UVM NR-1 lab teachers and course instructor **Larry Forcier**, and the VMC staff, to introduce and teach i-Tree as a part of the NR-1 curriculum. In both August 2011 and 2012, Dave led training sessions held at the US Forest Service Lab in South Burlington for NR-1 lab teachers, the VMC staff, and other attendees from the VT Department of Forests, Park and Recreation and the Burlington Parks and Recreation Department. During these sessions attendees learned about the many capabilities of i-Tree, were taught how to perform the different measurements and record data on the standardized data forms, and practiced doing the measurements in the field.

Several posters authored by students and faculty at the Rubenstein School and Middlebury College, and VT Fish and Wildlife staff were displayed at the meeting. Posters featured research and information about the influence of tropical storm Irene on invertebrate and invasive species communities and distributions, rehabilitation forestry and carbon market access, the VMC paired watersheds on Mt. Mansfield and stress factors contributing to forest decline in northern hardwood ecosystems.

New to the VMC Annual Meeting this year were two remote presentations given by our out-of-state speakers (Scheffe and Bloniarz). Despite a few anxious moments, the presentations went well, and we anticipate that other speakers will choose to participate from afar at future meetings. To view the full Annual Meeting Agenda please go to: http://www.uvm.edu/vmc/annualMeeting/2012/VMC_Agenda_2012.pdf.



AAI Pilot Project *continued from Page 3*

Since the DEC site and the VMC site are next door neighbors, Ben Whitney knew that the VMC site had daily coverage, so he asked if the VMC would be willing to do the weekly filter-pack change and the every two week passive ammonia sampler change. The state would provide backup site coverage and logistical help with the tower. Co-operative is our name, so this was an obvious partnership and consistent with the VMC mission. Our participation in the pilot project started on December 20.

So far, the additional sampling has not been terribly difficult or time-consuming with one exception; the rope that is used to lower the tower got soaked and then froze

when rain turned to snow. Since it was frozen, it was not as stretchy and did not allow the tower to fold all the way down, which required yours truly to have to change out the filter pack while perching on a step ladder on uneven ground. The rope is now stored inside the field shelter—part of the learning curve! Next challenge: how to fold the ladder over when coated with a thick layer of ice? Good thing there is some flexibility in the sampling schedule!

To learn more about the Aquatic Acidification Index, visit: http://www.uvm.edu/vmc/annualMeeting/2012/VMC_ScheffePresentation_AnnualMeeting_20121114.pdf.

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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 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!

VMC Staff

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For more information about VMC, please visit our website at <http://www.uvm.edu/vmc>.

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