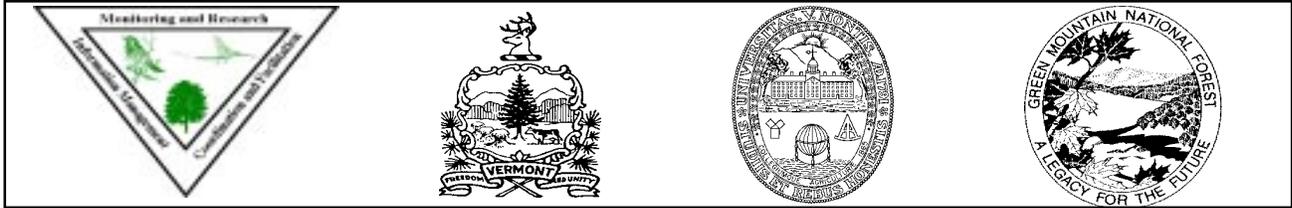


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# Newsletter

## Vermont Monitoring Cooperative

*Vermont's Cooperative Forest Ecosystem Monitoring and Research Program*



Winter 2006

Volume 11 Issue 1

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Dear VMC Cooperators and friends,

The past year has been one of many changes for VMC and our staff. It was with sadness that we bid farewell this past fall to outgoing VMC Executive Director, Dr. Melody B. Burkins – but she has not gone far. Congratulations to Melody on her new appointment as Special Projects Director at the University of Vermont! On behalf of all of the VMC staff and our Advisory and Steering Committees, thank you to Melody for her dedication, perseverance and leadership during a remarkable three years at VMC.

Under Melody's able guidance, VMC embarked on an ambitious and expanding mercury research and monitoring program, hired a new Monitoring Coordinator, launched a new website, migrated our data library to the University of Vermont's Spatial Analysis Lab, established a new meteorological station on Lake Champlain, and leveraged our base funding to enhance and greatly support research and monitoring activities across the state. Although Melody will remain connected to our work, we will miss her presence at VMC.

It is my great pleasure to announce that I have accepted the position of Acting Executive Director of the Vermont Monitoring Cooperative, a position with the University of Vermont. I am honored to serve in this capacity and look forward to our work ahead. I will also be continuing in my capacity as Monitoring Coordinator for Forests, Parks, and Recreation.

As we look to the future, we are currently in the process of hiring a new full time VMC Data and Web Manager, which will enable us to begin work on Phases II and III of our continued upgrades and development of the VMC website and Project Library, along with improved accessibility to VMC data. My primary goals as VMC Acting Executive Director are to ensure that the VMC continues as a successful model for long-term forest health monitoring, that our research program is further developed and improved, and that we enhance the working relationships between the University of Vermont, the State of Vermont, the US Forest Service, and our federal delegation in Washington D.C. I look forward to working with and hearing from you in these efforts.

Sincerely,

Sean



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## Pictures from the Reconstruction of the VMC Forest Canopy Tower



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# Reconstruction of the VMC Forest Canopy Tower

By Carl Waite and Mim Pendleton, VMC

In the Summer 2005 VMC newsletter we related the story of how the forest canopy tower blew over in early December 2004. Since then we have made significant progress toward restoring the tower to pre-disaster form. Restoration began with construction of a new access road to the tower site during midsummer 2005. Nearly 100 cu. yd. of crushed rock were needed to fill in ruts left from the tower rescue and raise the road surface up out of the mud and water. This required hundreds of trips with a compact tractor to spread crushed stone along the roadway. Those familiar with the tower probably remember access to the site being a bit problematic during much of the year.

Armed with a set of professionally engineered plans for our anchoring system, designed by Engineering Ventures of Burlington, we proceeded to dig four very impressive holes by hand (5'x5'x5') to be later filled with concrete with an anchor embedded within each. Structural damage to five sections of tower was skillfully repaired by local welder/fabricator Bob Ettensperger of Underhill. Bob also fabricated four reinforcing rod frames used to position and hold the anchors while the concrete was being poured and also reinforce the concrete structures. Fortunately, we were able to have the 19 cu. yd. of concrete (equivalent to over 1000 bags of sakrete

mix) required to fill the anchor holes, pumped approximately 600' out to the site. With the aid of a pumper truck, expert assistance from ST Griswold personnel, and our own hard-working VMC crew, we were able to fill the anchor holes with concrete in about 2 hr. on the morning of September 28<sup>th</sup>.

On the morning of October 3<sup>rd</sup>, the VMC crew, Eric Miller, and Harry Simrell embarked on the process of reconstructing the forest tower. Harry has over 20 yr. experience in constructing and maintaining towers and agreed to be our resident "expert". By the end of that day, the tower was more than half completed. Reconstruction of the tower was completed the following day (Oct.4), including hanging the heated intake lines used in Eric Miller's Hg flux measurement work.

The remaining work, including installation of the Hg sampling equipment, associated meteorological instruments, and VMC's permanently established micrometeorological monitoring instruments, will be completed in spring and early summer 2006. Upon completion of this work, the VMC forest canopy tower will be back in full operation providing valuable infrastructure and research and monitoring data to VMC and the public.

Restoration of the forest canopy tower was a total group effort and we gratefully acknowledge the contributions of the following individuals, companies and groups:

CSE Rigging	Sean Lawson	Judy Rosovsky
Jon Drew	Eric Miller	Harry Simrell
Marc Eisenhower	Engineering Ventures	ST Griswold, especially Bob Ettensperger
Mim Pendleton	Jack Curtis	Carl Waite
Zack Heyward	PMRC staff, especially Brian Stowe	

**Carl Waite** deserves special recognition for the outcome of this project. According to eyewitness Mim Pendleton, "He moved all the crushed stone over the access road bucket load after bucket load, carefully avoiding damage to any tree and sometimes in adverse weather. Then he took the tower apart and identified the sections that needed repair. Carl also pretty much single-handedly dug the holes; huge ones in hard-pan soil in the heat and the bugs.... Meanwhile he took charge of the convoluted risk-management red tape and dealt with the structural engineering people at UVM so that we could put the tower back. Finally, Carl worked with the concrete contractors and scoped out how we would pump all that concrete out to the anchors. Oh, and he hauled the sections up when that part of the job came around." Thanks Carl!



Marc Eisenhower and Carl Waite spreading concrete in the anchor holes.

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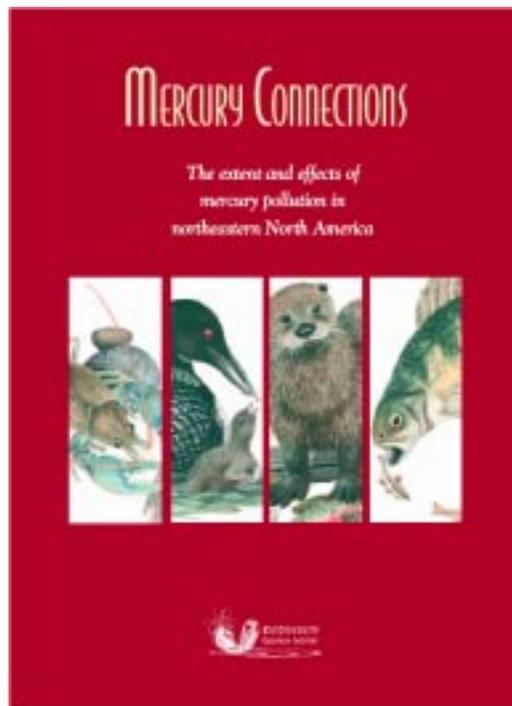
## *Research and Monitoring*

# Mercury Connections

A new publication called, Mercury Connections: The extent and effects of mercury pollution in northeastern North America was highlighted at the VMC annual meeting by Neil Kamman, Vermont Department of Environmental Conservation, Water Quality Division. The report, published by the journal Ecotoxicology in April, 2005, includes 21 papers related to mercury pollution in our region. The research project spanned four years and included fifty scientists from the United States and Canada. The report communicates four key messages: "1) Mercury levels are high and pervasive in northeastern North America, 2) New research shows that many animals, even forest song birds, have elevated mercury burdens, 3) Biological hotspots that pose an ecological risk are identified and mapped for the first time in northeastern North America, and 4) Environmental monitoring programs must be expanded in order to fully document the extent and impact of mercury pollution in North America." (www.briloon.com). The project helped convince Vermont lawmakers of the importance of mercury issues and Governor Jim Douglas signed a Bill (S.084) to protect Vermont ecosystems from continued mercury pollution.

The research effort was truly integrated in nature including abiotic (air, water and sediment) studies, biotic (plankton, crayfish, salamander, fish, mink and otter,

piscivorous birds and Bicknell's thrush) studies, as well as papers that focused on policy goals and accomplishments, risk assessment, and approaches to data integration. More information and the Mercury Connections report are available at [www.briloon.com](http://www.briloon.com) and by contacting Neil Kamman at [Neil.Kamman@state.vt.us](mailto:Neil.Kamman@state.vt.us).



### **VMC is hiring new staff!**

We are looking for a talented individual who is an able learner with experience in data management and/or information technology to fill the position of VMC Data and Web Manager. Excellent computer and communication skills are required. Please visit the State of Vermont personnel website at <http://erecruit.per.state.vt.us/> for a full description and to apply for this position. It is listed as a state classification title of "Senior Research and Statistics Analyst." Questions may be directed to Sean Lawson at (802) 879-5687 or [sean.lawson@state.vt.us](mailto:sean.lawson@state.vt.us).

# Research and Monitoring

## Monitoring Forest Health in Vermont 2005

Sandy Wilmot, Forest Protection Specialist from the Vermont Department of Forests, Parks and Recreation presented an update on forest health monitoring activities at the VMC annual meeting in October. Topics included observations and measurements of general indicators of forest health as well as an introduction to several exotic invasive insect and plant species of increasing interest in Vermont.

Drought symptoms, declining tree health by elevation and east-west slope tree health comparisons have been conducted annually since at least 1997. Sample plots are found throughout Vermont and include 14 plots on elevational gradients on Mount Mansfield and five at Lye Brook, the two major VMC study sites. Trend results include higher percentages of decline on eastern facing slopes but a decreasing percentage of decline from 2004-2005 (Fig. 1). In addition, trees at 3800 feet on Mount Mansfield show greater (~ 37%) and increasing percent decline than at the lower elevation plots located at 1400, 2200 and 3800 feet (~ 10% each). Trees at 1400 feet are showing a slight increasing trend in decline while those at 2200 and 3800 are slightly healthier over the last two years.

Other monitoring efforts focus on the white spotted sawyer beetle, beech bark disease, ash decline, and annual measurements from the North American Maple Plots (NAMP). Foliage transparency and dieback are two important health indicators annually monitored on maple plots. Foliage transparency has increased since 2002 both statewide and at the VMC plot on Mount Mansfield while dieback remains relatively steady at all locations. Lecanium scale, an insect that can damage maple trees, is being studied in relation to its distribution

in the canopy. The insect, observed at both the crawler and scale stages, is found throughout the maple canopy but was most concentrated at 20, 30 and 40 foot elevations with the least at 60 feet (Fig. 2).

Exotic invasive insect surveys include the hemlock wooly adelgid, emerald ash borer, and Asian longhorned beetle. These insects have not yet been detected in Vermont forests; however hemlock wooly adelgid was found on imported nursery stock and removed from the State upon discovery. Foresters, land-

owners and the general public are being asked to be vigilant and immediately report any suspected infestations. Exotic plants of interest include buckthorn, honeysuckle, barberry and multiflora rose found on 26% of the sugar maple plots in 2005 and buckthorn, honeysuckle, barberry, Japanese knotweed, garlic mustard and giant reed found on 18% of sites in the hardwood health survey plots in 2001. Norway maple is another plant being monitored as a potential invasive species. VMC forest plots remain free of exotic plants in 2005.

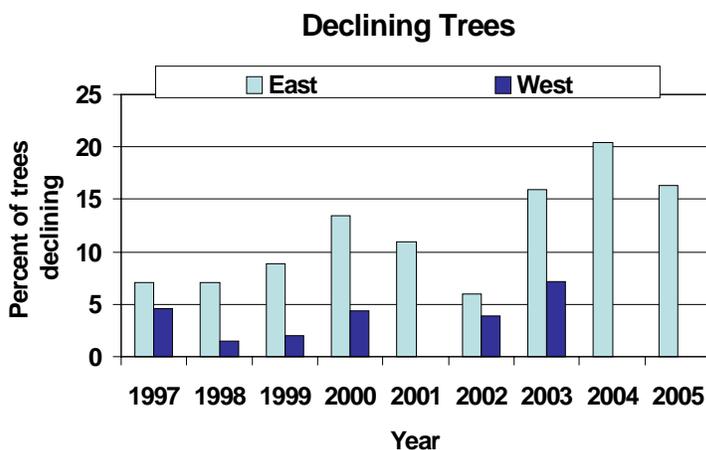


Fig. 1 Declining Trees East/West-facing Slopes

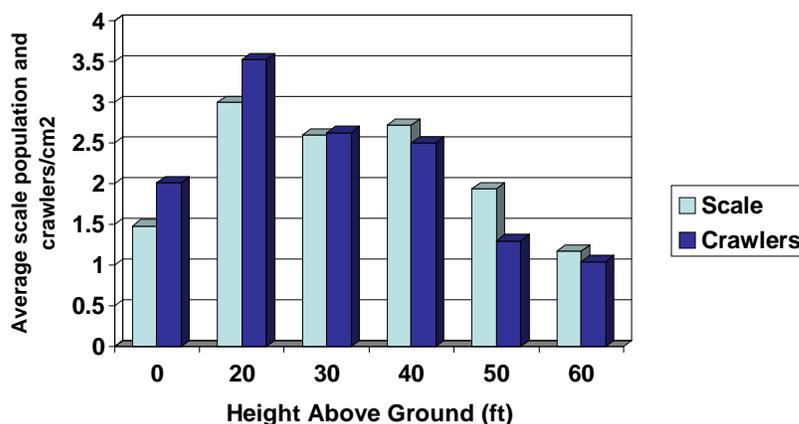


Fig. 2 Lecanium Scale Stage and Canopy Height

# Research and Monitoring

## Vermont Fall Foliage and Tree Phenology in 2005 An Unusual Year

By Sean T. Lawson, VMC

As you likely observed, summer and fall in 2005 were warmer than average across the state of Vermont. Weather stations at Mt. Mansfield and Burlington, VT recorded one of our warmest growing seasons on record. Growing degree days (Base 50 F) were 15.1% higher than the 30 year average (1971-2000) at Burlington (34m) and 47.4% higher than average near the summit of Mt. Mansfield (1204m) for 2005. Another unusual part of the growing season was the late arrival of our first frost. The first state-wide frost of fall 2005 was on October 21, one of the latest dates on record. First frost was recorded 15-28 days later than average at eight National Weather Service stations across the state. For most locations in Vermont the average date of first frost falls during the last ten days of September. These two factors, warm temperatures and a lack of sub-freezing nights contributed to the noticeably late arrival of fall foliage season. In northern Vermont, we observed muted colors and entirely green hillsides until mid to late October.

The Vermont Monitoring Cooperative established tree phenology plots in 1991 on the west slope of Mt. Mansfield, Vermont to measure forest conditions, establish the timing of developmental events and trends, and detect long-term changes. The study sites are located in a northern hardwood forest at 425m, 670m, and 792m elevations. Annual measurements include visual estimates of percent color, percent green, percent leaf drop, transparency, and dieback. A July/August survey establishes the baseline, followed by weekly surveys in September and October. Data from the 425m site in 2005 (Figs. 1-2) indicate that "peak color" (tracked by % color) in sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), and yellow birch (*Betula alleghaniensis*) was 8-13 days later than the 5 year average (2000-2004). Percent color in most trees was also much lower than average during the foliage season until a brief late peak. The lack of frost in September and most of October led to low production of anthocyanin (red pigments), a key mechanism for the brilliant colors in maples.

The foliage season, when it finally arrived was marked by gray skies, wet weather, and finally several snowfalls, which led to a short period of peak color. Measurable snowfall (3-7 cm) arrived with the first frost on October 21. A second significant snowfall (8-46cm across different elevations) on October 25 caused extensive damage to trees, since many still retained most of their leaves (especially beech, birch, apple, and ornamentals). Lengthy power outages occurred across northern Vermont due to limbs and uprooted trees falling on power lines. Observers also noted that the rainy weather which preceded the snow had saturated soils across the state. The greatest damage to forest stands was observed in the 300-600m elevation range. Fall 2005 in Vermont will be remembered as unusually warm, with lackluster color and notably late senescence. A special thanks goes out to Tom Simmons of VT Forests, Parks, and Recreation who has faithfully collected our fall phenology data for the last 14 years!

Sugar Maple (*Acer Saccharum*) fall color at 425m, Mt. Mansfield, VT

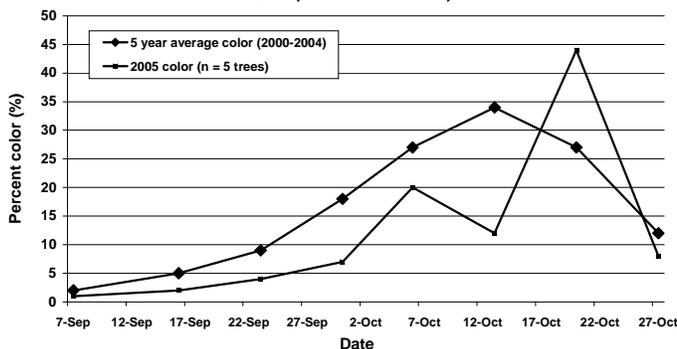


Figure 1

Red Maple - female (*Acer rubrum*) fall color at 425m, Mt. Mansfield, VT

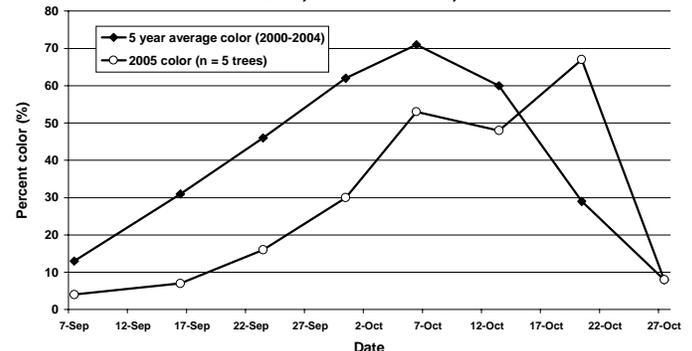


Figure 2

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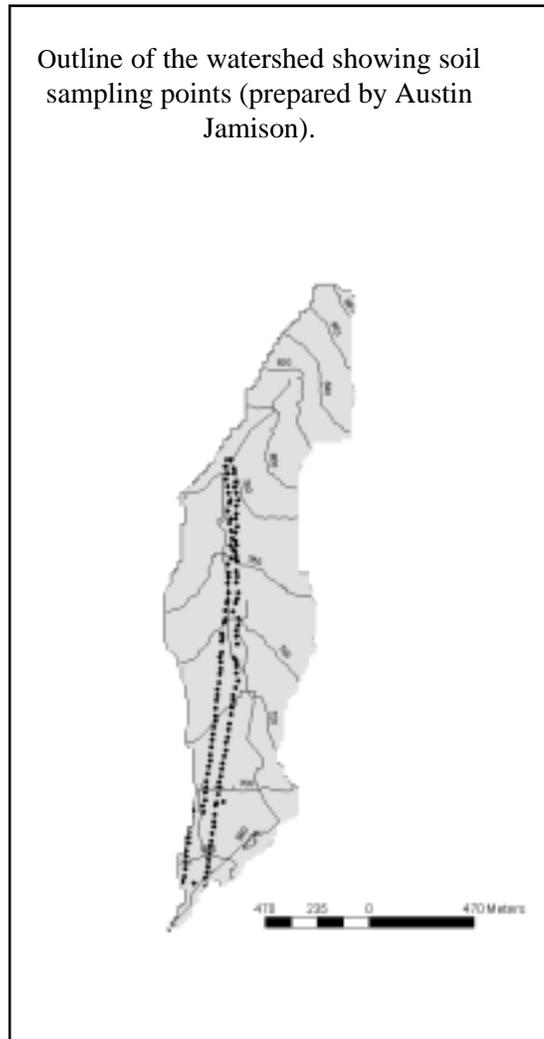
# Research and Monitoring

## Linking Soil and Stream Processes

by Donald Ross, UVM

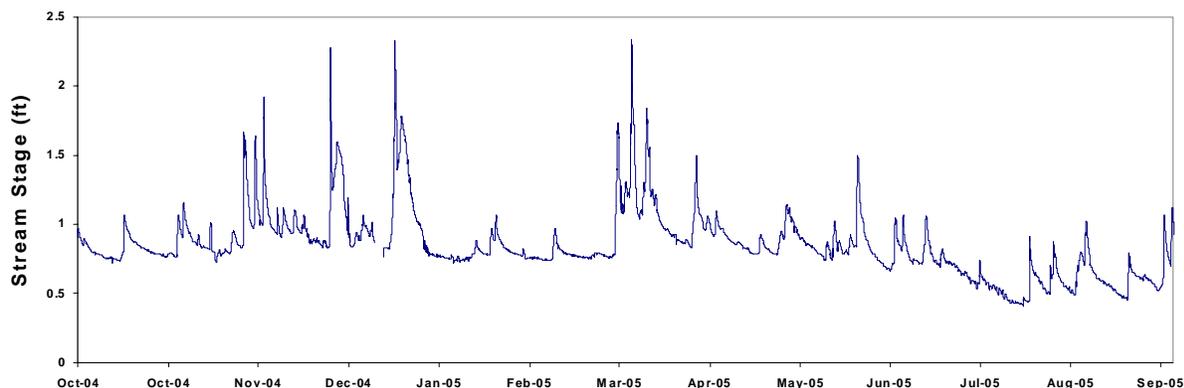
As part of a region-wide study, we have been monitoring the stream and sampling soils from a 124 ha watershed that lies just outside of the Lye Brook Wilderness Area, near Branch Pond. The project, funded by the Northern States Research Cooperative, includes nine other watersheds and we are examining the link between soil nitrification and stream nitrate export. Although nitrogen deposition occurs everywhere in the northeast, nearby watersheds can have very different patterns in the amount of nitrate export. Soil processes may be the explanation. Beginning in the fall of 2001, stream stage has been recorded at 15 minute intervals and an automated sampler has been taking water samples during storm events. Hal Bell of the Forest Service has visited the site every two weeks, retrieving the data and samples (which have been analyzed by the Forest Service lab in Durham, NH). Nancy Burt and Kathy Donna, also of the Forest

Outline of the watershed showing soil sampling points (prepared by Austin Jamison).



Service, have been instrumental in setting up and maintaining the site. In the fall of 2002, and three times thereafter, a crew from UVM sampled soils and measured vegetation along the transects shown in the watershed map. These 130 samples were tested for nitrification potential and a suite of routine soil chemical analyses. Nitrification rates, and most soil characteristics, were in the middle of the range found across all study sites. However, soil calcium concentrations appear to be at the low end and may be cause for concern. Analysis of the data is ongoing but initial results indicate a good relationship between soil nitrification rates and the annual stream export of nitrate. Cooperators on the overall project include the VMC, Beverley Wemple of UVM, Jamie Shanley and Greg Lawrence of the USGS, and Scott Bailey and John Campbell of the Forest Service. We hope to keep the monitoring going at this watershed as long as possible in order to track changes over time.

Stream Stage for the 2005 Water Year



## Reminder to Cooperators

Researchers conducting work in 2006 at VMC study sites need to update their study site permit and project description with VMC. Any changes should be sent to Judy Rosovsky at [judy.rosovsky@state.vt.us](mailto:judy.rosovsky@state.vt.us), (802) 879-5691. If an existing project remains active and unchanged, please send a short note to confirm your status. If you need a copy of your study site application on file, please let us know.

Thank you!

## VMC Newsletter

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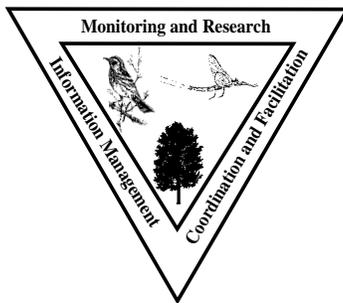
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