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

Spring 2012 Volume 16 Issue 1

Amphibian Monitoring at VMC Intensive Sites and *The Vermont Reptile and Amphibian Atlas*

Miriam Pendleton, VMC Field and Program Technician

James S. Andrews earned a BS in Environmental Studies from UVM and a Masters in Biology from Middlebury College. He worked at Middlebury as a research scholar in Herpetology until 2008. He began part-time herpetological fieldwork in Vermont in 1984 and began working full time as a herpetologist in 1990. He currently serves as chair of the Vermont Reptile and Amphibian Scientific Advisory Group to the Endangered Species Committee. He coordinates the Vermont Reptile and Amphibian Atlas Project and serves as a research associate with Vermont Family Forests in Bristol, Vermont, as well as teaching Field Herpetology at UVM. He has been a VMC cooperator since 1994. Photo credit: C.C. Groom.

Since 1994, Jim Andrews has spearheaded an effort to understand the distribution and abundance of reptiles and amphibians in Vermont. This work has been funded in part with annual monitoring/research grants from the VMC.

The monitoring is composed of two discrete but synergistic projects — *intensive* monitoring of amphibians at Mt. Mansfield and the Lye Brook Wilderness Area and *extensive* reptile and amphibian monitoring throughout Vermont. The two VMC intensive sites are relatively undisturbed by human activity and give an indication of amphibian population changes that are not as directly linked to development and habitat fragmentation. Having a record of changes in population and species distribution in these sites can inform the extensive statewide monitoring that is compiled in *The Vermont Reptile and Amphibian Atlas*. Likewise, the statewide monitoring includes information on amphibians that are not found in the relatively high altitude intensive sites.

At the intensive sites, amphibian population increases or declines can be indicative of broader environmental changes such as water and air quality. Amphibians serve as excellent bioindicators due to their permeable skin and ectothermic metabolism which render them more susceptible to external changes than other vertebrates. They are also dependent on stable weather patterns which influence quantity and timing of rainfall, a reliable insulating snowpack, and persistence of vernal pools for breeding, to name a few variables. As such, amphibian population changes can indicate the effects of climate change on forested ecosystems. Climate change can influence the species distribution so having new species discovered at or disappearing from the intensive sites can illustrate the way these changes manifest themselves on the local level.

Amphibians have relatively small home ranges, many within the radius of a square mile, making human activity a strong influence on local populations. These creatures need to be able to move from breeding habitats to terrestrial habitat then on to overwintering areas to survive. While it might be expedient to blame air pollution or climate change

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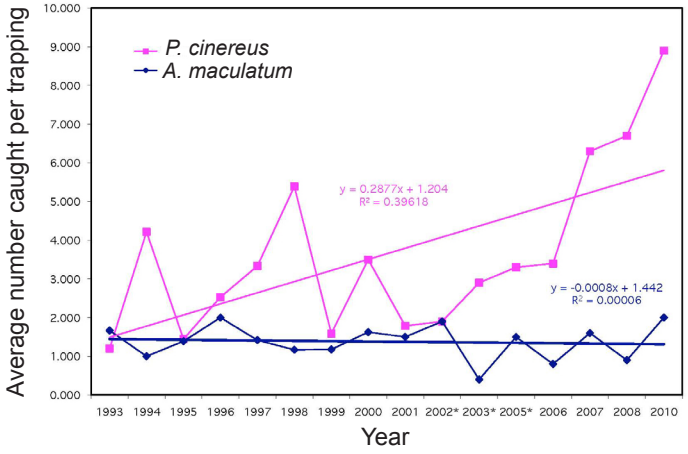
for declines in amphibian populations, many of the things that people do locally can cause changes in populations. Perhaps that vernal pool at the bottom of the driveway is a nuisance and is filled in; a prime amphibian overwintering site becomes a house site with a lawn; or perhaps concerned citizens help amphibians cross a busy road during the spring migration to a wetland. The extensive monitoring can measure the effects of human activity on the amphibians that live nearby.

The Vermont Reptile and Amphibian Atlas (Herp Atlas) is where data from the statewide monitoring are compiled. This project relies on interested individuals making observations and entering the location, species, and other information at: http://VtHerpAtlas.org. By engaging the public to obtain this information, the Atlas builds awareness of these easily overlooked vertebrates and the landscape on which they depend. Public awareness leads to better stewardship and land management practices. Agencies such as the Vermont Departments of Transportation; Fish and Wildlife; and Forests, Parks and Recreation and The Nature Conservancy and Green Mountain National Forest use data provided by the Atlas, as do private landowners and land managers. The Atlas also provides data used in establishing regional species ranges for reptile and amphibian mapping on a broader scale. Several other northeastern states are using the Vermont Herp Atlas as a model on which to develop their own reptile and amphibian atlases.

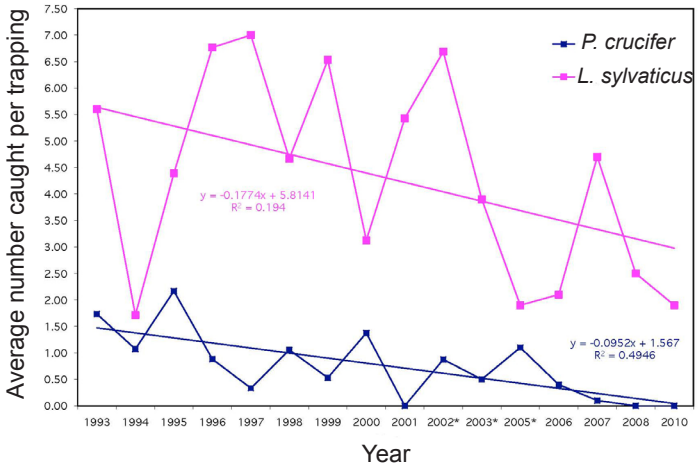
By opening the world of these diminutive denizens of the landscape we share, Vermonters develop an appreciation for them. Since there is a value given to these creatures, the habitat they depend on is managed or conserved in ways that encourage these species. Since these vertebrates are such good indicators of environmental health, management practices that encourage the wellbeing of amphibians and reptiles also benefit the forested landscape as a whole.

To see the power of an engaged public in action, visit http://conservation.townofsalisbury.org/?page_id=949.



*Spotted Salamander (*Ambystoma maculatum*) and Eastern Red-backed Salamander (*Plethodon cinereus*) population indices from Mount Mansfield, Underhill, Vermont, 1993-2010.*

This year's unusual warm spell in March caused Wood Frogs and other amphibians to be on the move earlier than ever before, according to Jim Andrews."We have movement on March 6, which is almost a week earlier than our previous early date set just a couple years ago. At the Colby Hill Ecological Program monitoring site in Lincoln, [Vermont], we can see that most of the Wood Frogs overwintered fine and have laid their eggs. Some of the eggs have already hatched. However, some of the other species such as Spotted Salamander and Spring Peeper, started to move but then stopped." Photo credit: E. Talmage.



*Wood Frog (*Lithobates sylvaticus*) and Spring Peeper (*Pseudacris crucifer*) indices from Mount Mansfield, Underhill, Vermont, 1993-2010.*

Invasive Species in Vermont: A Forestry Professional's View

Judy Rosovsky, VMC Monitoring Assistant

Kathy Decker is a District Forestry Manager for the Vermont Department of Forests, Parks and Recreation. She has a BS in Forestry and a MS in Forest Pathology. She provides diagnostic services through the Department's Forest Biology Lab. Ms. Decker is currently the co-chair of the Vermont Invasive Exotic Plant Committee, serves on the Vermont Pesticide Advisory Council, and attended the 2011 VMC Annual Meeting as a panelist for a discussion of invasive species. The following is an interview between Kathy Decker and VMC staff member Judy Rosovsky.

Please give an overview of invasive species in VT's forests.

You can't really summarize all of the taxons that are invading Vermont forests these days. You have insects, microorganisms, and plants. From the perspective of my job, the biggest problems are buckthorn and honeysuckle, but you can't ignore emerald ash borer (EAB), Asian longhorned beetle (ALB) and hemlock woolly adelgid (HWA).

It's hard to say which one is the most troublesome. Plants are sneakier – they don't kill trees outright like some of the invasive insects do, so they don't get as much attention. Another reason that plants get overlooked is that when someone looks out into the understory, you can't tell native and non-natives apart, and the forest understory looks green and great. But as a forester, sometimes you look out there and realize that the whole understory is invasive shrubs.

Gallery of Invaders: Insects

Clockwise from upper left: emerald ash borer (EAB), image courtesy of Wisconsin Department of Natural Resources; Asian longhorned beetle (ALB), image courtesy of U.S. Forest Service; hemlock woolly adelgid (HWA), photo courtesy of New York Department of Environmental Conservation. EAB and ALB are not in Vermont. HWA is present in southern Vermont.

If invasives reach "deep" forests, how do they threaten long-term forest ecosystem health? What ecosystem processes and interactions are of concern?

The replacement of native plants in the understory by invasives is a big problem. The changes are subtle, and take place more slowly than the damage that insect invaders cause, but they can be just as big a threat. Many of the actual effects of invasive plants are not well researched. They take up the space that native plants would grow in, and they provide poor quality food for the animals that eat them. There is research being done on the effects of garlic mustard on the mycorrhizal (fungal-root) associations of other plants, for example. And it is known that robins experience greater rates of predation in areas with invasive plants.

Gallery of Invasives: Plants

Left to right: Japanese honeysuckle, photo courtesy of Virginia Tech Weed Guide; buckthorn, photo courtesy of Wisconsin Department of Natural Resources; garlic mustard, photo courtesy of Wisconsin Department of Natural Resources. There are native and exotic species of honeysuckle and buckthorn in Vermont. Garlic mustard is exotic.

What could the VMC do as far as monitoring these species?

The Vermont Department of Forests and Parks has been looking at the effects of invasive species on regeneration. We are asking these questions. What species are present? Is tree health affected more by invasive shrubs reducing tree access to water and nutrients or by defoliators, etc.? A comparison of forest health on an invaded area versus an all native area would be helpful, as would more information on soil chemistry changes due to invasive species. Just don't let the invasives on the control plot escape!

And we don't have a good handle on species occurrence and extent. There are some efforts to address this, using volunteers, like the First Detectors program, and iMap. For information on First Detectors in Vermont, please go to http://vtinvasives.org/tree-pests/first-detectors/program. For more information on iMap, please go to: http://www.vtinvasives.org/node/49

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Purple sticky trap for emerald ash borer detection. These traps are being hung in Vermont as an early detection tool for EAB. Photo courtesy of the NorthWoods Stewardship Center.

There were two different management strategies mentioned at the annual meeting. Do you have any thoughts on that?

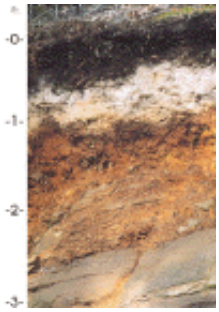
Yes, we are moving towards invasive plant management on a landscape scale. For example, the St. Johnsbury Town Forest is infested with buckthorn. It is surrounded by neighbors whose land is infested too. Without involving the neighbors, you are never going to win against those plants. But if you get the neighbors involved, you can make good progress. Landscape scale management is more effective than small parcel management or trying to protect refugia.

The other thing is to get more people helping. If we did everything possible to keep EAB out of Groton State Forest, but that beetle lands on an adjacent landowner's property, all our efforts are in vain. So we are trying to educate the public, put up those purple traps, get a broader reach. State employees by ourselves are not going to be able to detect and eliminate these pests. We need help from Vermont's citizens.

St. Johnsbury, Vermont. Photo courtesy of Town of St. Johnsbury.

How should we allocate our monitoring resources to the various kinds of invasive species?

The VMC can't fix the problem, but you can study some of the parts. Try and identify what other effects invasive species have on the ecosystem and help sell the need to get rid of them. Comparisons of sites with and without invasive species would be good, but you are taking a risk by not managing the invasives on the study plot. And you'd have to keep the deer out.



Soil profile. Photo courtesy of Natural Resource Conservation Service, Vermont.

You and I both heard Josef Gorres' great talk on invasive earthworms at the recent Vermont Forest Health Information meeting in White River Junction. Those worms have been here for 300 or so years. Can we tell what effects they have had on our forests?

We might not have seen those effects settle out yet. Trees have long lifespans, and not that many generations of trees have gone by since the worms were introduced via ship ballast. Have the trees adapted successfully? We know that micronutrients are released and relocated, and that soil horizons can be completely changed. How has that changed our forests?

Should we just leave the forests out there to adapt to these pests? They are part of the natural world, elsewhere.

Well, you have to remember that we have changed the speed of introductions, and can forests evolve that fast? Smallpox is natural too, but we don't let it run amok, killing people.

It was human activities that got these pests here. Wooden pallets, ship ballast, and other international product movement was the route of introduction for many species. Once here, certain activities can help spread invasive species, like roadside mowing, or timber harvesting, or earth moving and trail building. We aren't going to stop doing those things, but we can raise awareness. We have a new tool in our arsenal, a ***Best Management Practices for Terrestrial Invasive Plants*** handbook that is just out. Contact me if you want a copy. My email is Kathy.Decker@state.vt.us and my phone number is 802-751-0117.

Interview with Kimberly Wallin, VMC Advisory Committee Member

Miriam Pendleton, VMC Field and Program Technician

Kimberly Wallin, Research Assistant Professor at the University of Vermont

Kimberly Wallin is a Research Assistant Professor of Forest Ecosystem Health and Graduate Program Coordinator within the Rubenstein School of Environment and Natural Resources (RSENR) at the University of Vermont. Kimberly joined the RSENR faculty in 2008, and her position is funded jointly by the University (RSENR) and the U.S. Forest Service's Northern Research Station, but she is directly associated with the Aiken Forestry Sciences Laboratory on Spear Street as part of the collaboration between the School and the Forest Service. She earned her PhD in Forest Entomology, with a minor in Genetics, from the University of Wisconsin-Madison in 2002. Dr.Wallin conducts research on insect host selection behaviors and tree and insect genetics with landscape level population dynamics of forest insects. She also teaches three undergraduate courses and started and leads the Terrestrial Ecosystem Health Group at UVM. Dr. Wallin mentors and advises graduate students, undergraduates, and interns as well as serving on the VMC Advisory Committee. The following is an interview with Dr. Wallin.

What and where is your current position; what are your research interests?

My current position is one of many joint positions with USDA Forest Service and University of Vermont in the Rubenstein School of Environment and Natural Resources. My research interests are far and wide reaching with the ultimate goal to provide information needed to understand and manage abiotic and biotic interactions in forested ecosystems.

My research focuses on two broad areas: 1) integrate mechanisms operating across multiple levels of scale, link patterns and processes to develop comprehensive understanding, and apply this understanding to protect and restore the diverse values of natural resources and 2) engage in collaborative multidisciplinary research on challenges to natural resource management that include invasion ecology, genetic and biological diversity, and interactions associated with changing climate.

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

I've always been interested in the environment and environmental issues so it is difficult to pinpoint one or two things that led me to an interest in the environment. I grew up in rural Minnesota with nature and the environment all around me. So, in large part the way I was raised to be resourceful, respect the earth, others, and myself made caring for the environment an innate trait. Jump ahead to my early 20s and an adventure "out west". The adventure led to working in northern Idaho on a tree planting crew, fire crew, and trail maintenance crew for two years (before I knew a career in forestry was an option). During this time I came to appreciate the interconnectedness of the soil, fungi, insects, trees, the abiotic environment, and humans. Upon my return to Minnesota I knew researching and teaching about environment, ecology, and forestry were my home.

What is your connection to the Vermont Monitoring Cooperative; how long have you been associated with VMC and what role(s) do you perform within the organization?

I happily accepted the invitation to serve on the VMC Advisory Committee. Two years ago, at the 2010 VMC Annual Cooperators meeting, I facilitated a panel discussion on forest health issues in Vermont.

In what ways do VMC data contribute to your research or teaching efforts? What could VMC do to make these data more accessible, useful, or relevant?

Those are two great questions. I will answer the first with a question. What can my teaching and research efforts contribute to VMC?

A significant portion of my research is focused on direct and indirect effects of winter climate change on forested ecosystems. So, we strive to understand the potential impacts and relationships of reduced snow pack on soil chemistry, sugar maple tree vigor, biological diversity of insects, and genetic diversity of terrestrial snails and birds that rely on calcium to have viable offspring. Additional data on winter climate conditions would contribute to our ability and capacity to integrate these mechanisms across multiple scales and link the patterns and processes so we can better apply this to manage the diverse values of natural resources.

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Interview with Robert Paquin, VMC Steering Committee Member

Miriam Pendleton, VMC Field and Program Technician

In this installment of our series focusing on members of the VMC Steering Committee, we are featuring Bob Paquin. Bob has been involved with the VMC from the very beginning and was instrumental in the creation of this statewide cooperative. He served on Senator Leahy's staff, first, as a Legislative Aid in Washington, DC then as Director of the Senator's office in Montpelier and liaison to the Vermont legislature starting in the early 1980s.

Bob has been involved in Vermont conservation issues and has co-drafted bills on the Northern Forest, Green Mountain National Forest, the Connecticut River and Lake Champlain during his career with Senator Leahy. In 2009, he was appointed by U.S. Dept. of Agriculture (USDA) Secretary Tom Vilsack to the position of State Executive Director of the USDA Farm Service Agency (FSA).

Along with serving as an Ex-Officio member of the VMC Steering Committee, Bob is on the Board of Advisors for The University of Vermont (UVM) College of Agriculture and Life Sciences (CALS) and the Vermont Council on Rural Development. An interview with Bob follows.

Robert Paquin, founding member of the VMC Steering Committee. Photo courtesy of the Caladonia Record.

What is your connection to the VMC; how long have you been associated with us and what roles have you performed within the organization over the years?

In the late 1980s, Governor Madeline Kunin named a Vermont Forest Health Task Force on which I served along with Dr. William Luginbuhl (chair), the former Dean of the UVM College of Medicine and a skilled amateur horticulturist, Conrad "Connie" Motyka, then Commissioner of the Vermont Department of Forests, Parks and Recreation, and others. One of the recommendations that came out of the task force was the need to monitor forest health.

Connie, Larry Forcier, who was the Dean of the School of Natural Resources at that time, and I had worked together in the early 1980s on a forest management demonstration project along with the late Mollie Beattie, who later served as Director of the US Fish & Wildlife Service. My involvement stemmed from Senator Leahy's sponsorship of the project we affectionately called "Demo" which sought to bring more private forest landowners into forest management. The project area included the towns of Waitsfield, Warren, and Fayston in the Mad River Valley. This area was chosen because it comprised a special planning district working with the local ski areas as they developed, so a great deal of data was readily available and coincidentally, the demonstration project actually gave GIS (geographic information systems) a bit of a jump start in Vermont.

A few years later, with satellite imagery being used to identify healthy or stressed forests at a time when "acid rain" was a mystery of growing concern, Senator Leahy invited the U.S. Environmental Protection Agency (EPA) administrator Lee Thomas to join him on a hike up the western side of Camel's Hump to observe acid rain damaged trees first hand. This was something that Mr. Thomas and all concerned agreed to do without realizing the effort required to reach the elevation being studied by Professor Hubert "Hub" Vogelmann to view the evidence. Senator Robert Stafford, then Congressman James Jeffords, and Governor Kunin were on that trip as well as media and many Vermonters. Fortunately, Green Mountain Club volunteers were on hand to keep the group on the trail so as not to damage the vegetation. That was a busy summer setting up the visit; I must have been up and down Camel's Hump at least three times.

I have to believe that all of this history set the stage for a more formal environmental monitoring entity in Vermont and from this, the VMC was formed. Early partners signing on to the VMC were Larry for UVM, Connie for the Vermont Department of Forests, Parks and Recreation and Denver Burns for the U.S. Forest Service. Soon after, Michael Rains joined the partnership on behalf of State and Private Forestry within the U.S. Forest Service.

How does VMC need to evolve or change to remain poised to address future forest health and other environmental issues?

Where will the data that underpins so much forest research come from if not the VMC? Ideally, budget woes shouldn't get in the way of continued monitoring and support for the VMC; this model of partnerships with cooperators is very innovative and cost-effective.

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VMC Interview with Bob Paquin
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Several years ago, a meeting was held at the Bishop Booth Conference Center in Burlington. Many different agencies attended and at that meeting it was proposed that every agency benefitting from the VMC data sets and monitoring work should pay a small amount to provide a stable budget—I thought of it as "tithing" arrangement. All in attendance thought this was a good idea; if you get enough modest funding sources together, no one agency or institution's budget is asked to carry the burden alone and the small amounts can really provide stable funding. It's clearly time to revisit this idea.

Perhaps research grants offered through various funding sources from EPA to National Oceanic and Atmospheric Administration (NOAA) or others should have a small percentage allocated towards supporting long-term monitoring organizations in each state or region. We all use the data, so we all have a responsibility to keep the long-term record going. This is why we are all so concerned with the mercury record – maybe it could withstand a brief break and still produce a valid trend, but what amount of time is that? The long-term record is extremely valuable particularly in light of the recent EPA decision to regulate mercury. These types of records (amphibian, phenology, etc.) are even more important in the face of climate change. We need to know what the trends are.

What can VMC do to enhance its interaction with the public to inform and educate current and future generations?

We struggle with this question even at the USDA Farm Service Agency, believe it or not. Outreach—getting one's message out, making the public and potential new partners and clients aware of one's services and capabilities—is crucial. But is that the role of VMC? Maybe that role should be our partners' responsibility. In a time of budget pressure, we can't do as much outreach as would be desirable so maybe that role could be assumed by cooperators. At least, we have to initiate that discussion. Bringing together organizations and partners whose missions complement VMC's may be timely.

In VMC, we have something special and valuable that is worth supporting, and I'm confident we will figure out a way to do just that.

VMC Interview with Kimberly Wallin
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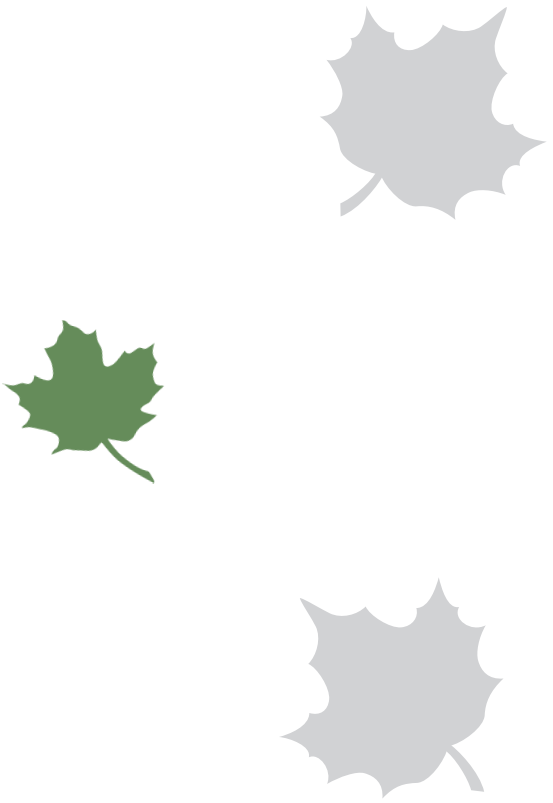
Also, VMC data could be used to increase our understanding of "if and how" quickly invasive plants, fungi, and animals will invade Vermont's forests. The data could grouped by climate, land-use change, etc. to increase our predictive power and direct the on-the-ground management of these organisms.

Can you envision involving students in projects utilizing VMC data?

Absolutely! Working with VMC data provides synthesized information to ecologists, other scientists, educators, citizens, and decision makers. The data could dove-tail with existing data to include "data suites" such as climate, biodiversity, biogeochemistry, infectious disease, and land use change. Including these types of data suites would then lead to hypothesis testing by undergraduate and graduate students! Let's talk!!



Newsletter

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Reminder to Cooperators:

Researchers conducting work in 2012 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!

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

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