

BLACK ROCK FOREST NEWS

Winter 2013

The Black Rock Forest Consortium

Consortium Looks to Future with Strategic Plan



Eddie Walsh of Tahawus Trails, consultant for the NY-NJ Trail Conference, lays out a course for the proposed new Visitor Entrance Pathway with Whit Schuster.

The Consortium has adopted a strategic plan setting exciting and ambitious goals for the next three to five years. With core themes of sustainability and collaboration, the plan includes goals for scientific research, education, conservation, and capacity building. One key aspect of capacity building has already been adopted, a new board structure that will enhance the Consortium's fundraising capacity.

The strategic planning effort began in 2011 with a retreat attended by representatives of all Consortium member institutions that was facilitated by Marc Smiley of Solid Ground Consulting, followed by a staff retreat in 2012. Then the staff, in collaboration with member representatives and the board's Planning Committee, worked to refine strategies, define specific goals, develop financial sustainability plans for programs, and create methods for measuring how effectively the Consortium meets its goals. The resulting strategic plan was enthusiastically adopted by the Consortium's board.

Later in the fall, executive director Dr. William Schuster and board chair Sibyl R. Golden met with each of the member institutions to discuss how they could best collaborate with the Consortium and each other to further the strategic plan and the changes in governance structure. At its winter meeting, the board unanimously accepted the new bylaws which detail the changes.

Research Goals

Access to data is essential to research productivity, and so the first research goal is to build a technology platform that will enhance information management and communications to enable simplified, global access to all of the Consortium's scientific data, collections, and publications from long-term studies to current research, from the Forest's herbarium to data from the environmental monitoring stations, and more. This goal, while located in the research section of the plan, will also provide the underpinnings for education and conservation activities. It will require a thorough analysis of technological infrastructure and data management needs, and prob-(continued on page 5)

Forest Learning: Summer Classes and a Family Workshop

For a second year, the Consortium will offer summer classes for high school and middle school students (see "Summer + Students + Science," Fall 2012). This year's program will build on last year's pilot program by offering four weeks of classes at the Forest, as well as a week at another field station, the Seahorse Key Marine Laboratory in the Cedar Key National Wildlife Refuge on an island off Florida's Gulf coast, and a week in the Adirondacks. The Consortium hopes to add more courses each year, at the Forest, at neighboring sites, and at field stations around the country.

At the Forest

From July 15 through July 19, both middle school students (those entering 7th through 9th grades) and high school students (those entering 10th grade through their freshman year in college) can take day classes at the Forest; from July 22 through July 27 and from August 5 through 9, high school students can take day and residential classes; and from July 29 through August 2, middle school students can take day and residential classes. Residential students will stay in the Forest Lodge, supervised by chaperones at night. Students will be able to choose one morning class and one afternoon class for the week. The cost will be \$225 for a half-day class, \$450 for a full-day class, and \$450 for a week of lodging and meals. The Bay and Paul Foundations have generously contributed start-up funding for the program, and the Consortium is currently seeking funding for scholarships.

Classes will be taught by professors and graduate students from Consortium and other institutions and will include such topics as animal behavior, ornithol-*(continued on page 3)*

Report from the Executive Director

In 1996, after a very snowy winter, I wrote in this space that climatologists predicted increasingly frequent extreme weather events. Now, as the shock lingers from two direct hits on the New York area by hurricanes in two years, people are discussing weather and climate more than ever, interested in knowing what these extreme events really mean. Are these just random events in a variable system or has our climate changed so that we should anticipate "extreme" weather every year?

Searching online records, one finds that a majority of the most deadly storms in New York State since 1820 occurred after 1990. A major reason for this is a well-documented increased frequency of tropical storms and hurricanes in the North Atlantic since 1995. Seven deadly hurricanes impacted New York just in the fourteen years from 1999 to 2012 (Floyd, Cristobal, Isabelle, Frances, Tammy, Irene, and Sandy).

Especially striking is the range of extreme events that are now more common. Black Rock Forest maintains an objective database of environmental records, with extensive data especially for the 54 years since 1959. As I was writing this article, we received a 16-inch snowstorm, so I decided to review all snowstorms of 17 inches or more, as well as the Forest's records for droughts, rains of more than 4 inches, floods, fires, and ice storms. I found a sevenfold increase in the frequency of extreme weather events from the 1960s to the early 2010s.

In 32 years between 1959 and 1990, Forest records document eleven extreme weather events including four huge snowfalls in the 1960s, hurricanes Agnes, Belle, and Gloria, and a drought so extreme in the mid-1960s that it is visible in nearly all tree ring samples. In the 1990s, extreme events increased to ten over the decade, and there were seventeen extreme weather events recorded in the 2000s. In the first three years of this decade there have already been seven extreme events three snowfalls of 17 inches or more, a devastating ice storm, a drought, and hurricanes Irene and Sandy. From an average of three extreme events per decade during the 1960s, 70s, and 80s, we now average two extreme events per year. Our frame of reference for what constitutes an "extreme" event, or a 50or 100-year flood, was a period of time much less eventful than we are now experiencing.

Ice storms are sparsely documented in Forest records before the 1990s, but there were two ice storms of note in the 90s, then four in the past six years (2007, two in 2008, and 2011). Some ice storms may have escaped documentation, but every snow since 1959 has been recorded, and over half of the largest snowfalls (seven of thirteen) fell in the last fifteen years. Of the seven largest rainfalls, only two came in the first 40 years of records and the other five all occurred since 1999. At the other extreme, the Forest experienced serious droughts in 1999, 2001, 2007, and 2010 — each time the Cascade Brook stream station recorded zero stream discharge for more than three months.

The implication of increasingly frequent extreme events for our forests and biota is an important topic for study. Warming can lead to increased growth of some species. Our tree-ring records show that evergreens grow more in years with warm winters/early springs, and that longer growing seasons result in more ecosystem carbon uptake. On the other hand, for some organisms these extreme events severely reduce growth and productivity. Increased disturbance generally favors species adapted to open, high-light environments. Native termites have undoubtedly benefitted from all the downed wood from hurricanes and ice storms, but increased disturbance often favors non-native invasive species at the expense of natives.

The past provides no guarantees for the future, but scientists have long predicted that the heat energy and heat-retaining molecules that human activities add to the atmosphere mean that more energy will be produced as violent storms. Resilience — the ability of systems to withstand and/or recover from disturbance — is an increasingly popular metric for evaluating landscapes and ecosystems. Humans would do well to study ecological resilience and emulate it so that we will be better able to weather the storms that certainly lie ahead.

— Dr. William Schuster

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William T. Golden (1909-2007), Founding Chairman The Black Rock Forest Consortium advances scientific understanding through research, education and conservation programs It is a not-for-profit 501(c)(3) organization supported by membership dues, grants, and gifts.

Consortium Staff

William Schuster, Ph.D., Executive Director John Brady, Forest Manager Emily Cunningham, Director of External Affairs Jeffrey Kidder, Ph.D., Education Director Jack Caldwell, Operations Manager Barbara Brady, Office Manager Matthew Munson, Data/Network Manager Kate Pavlis, Research Associate/ Environmental Educator

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Hold your spot in the Summer Science Class program! Download the brochure from our home page; call 845-534-4517 to register.

Forest Learning (continued from page 1) ogy, entomology, turtles, plant adaptations, impact of soil, water, and atmospheric chemistry on tree growth, tracking and trapping night-time mammals, field ecology and biodiversity, biological illustration, wetlands, and soil invertebrate zoology. The Consortium is also offering a course on scientific and artistic observation and drawing in collaboration with the neighboring Storm King Art Center, and a kayaking exploration in partnership with the Constitution Marsh Audubon Center and Sanctuary.

Last year's classes were a huge success with students, parents, and instructors. As one student said, "I wanna come back next year." All of the students said they would recommend the classes to others, and 97% said they were more interested in learning about nature after participating in the program. Parents were pleased that the classes gave their children access to scientists in the field, and the instructors were impressed by the students' interest and motivation.

Beyond the Forest

The Consortium's executive director, Dr. William Schuster, is currently the presi-

dent of the Organization of Biological Field Stations (OBFS), a network of more than 250 field stations primarily, though not exclusively, in North America. Through this connection, the Consortium is able to offer students the opportunity to study for a week at remote locations, this year at Seahorse Key, which is operated by the University of Florida. From June 23 to 29, some 15 students will combine field trips on and off the water with experiments with diverse researchers (including an oyster biologist) by day, and stay in an 1850s lighthouse by night.

Closer to home, in collaboration with the adjacent Storm King School, students will have the opportunity to spend the week of August 11 through 17 on an Adirondack eco-adventure. They will stay in cabin tents, hike to the highest point in New York, paddle a canoe on lakes and streams, and learn about the adaptations of organisms to habitats ranging from miniature alpine gardens to highly acidic bogs.

"The connection to the OBFS gives us a huge opportunity to set up classes that allow students to explore ecosystems that are different from the one they are familiar with at Black Rock Forest," notes Dr. Jeff Kidder, the Consortium's education director. "We hope to develop a way for students to compare what they learn at the marine laboratory with what they know about the Forest's ecosystem. And we hope, in future years, to offer classes at other field stations in other ecosystems around the country."

Family Programs

In December, the Consortium held the inaugural Black Rock Forest Holiday Workshop, the first in a series of Family Natural History Programs that it plans to produce in the years to come. About 30 Leadership Council members and Friends of the Forest attended. Led by Dr. Jeff Kidder, the Consortium's education director, along with other Forest staffers and volunteers, the participants created holiday centerpieces using plants from the Forest, including evergreen branches, pine cones, rose hips, and more. Other activities included a Forest hike to gather pine boughs.



Immersed in science: Summer Science Class students pull a turtle trap.

"We hope to expand next year's event and build on the opportunity to educate families about Black Rock Forest's native plants," says Emily Cunningham, the Consortium's director of external affairs. "Anyone interested in serving on a committee to plan next year's Holiday Workshop should call me at the main Forest number."

An Unwelcome Visitor: Hurricane Sandy

Although downgraded to a tropical storm by the time it blew through the Forest on October 29-30, Hurricane Sandy nonetheless made its mark, knocking down many, often large, trees. Forest Manager John Brady describes the impact in his report on p. 8.

While Sandy made herself felt largely through wind, Mr. Brady and the Forest crew prepared for the effects of heavy rain which has damaged the Forest in past storms. They cleared drainage ditches and culverts and built berms to redirect water over the Forest's 15 miles of dirt roads. Although the buildings lost power for 48 hours, Matt Munson, the Consortium's data manager, kept the generator running to power basic needs, including keeping all the trout alive.



STUDENT RESEARCH SPOTLIGHT



Small Mammals and Environmental Change

mall mammals play an integral role in forest ecosystem functioning through seed dispersal, nutrient cycling and soil aeration. Understanding how the small mammals of Black Rock Forest respond to environmental change is the basis of my master's research. It is part of the Consortium's Future of Oak Forests project and of an ongoing experiment directed by Dr. Kate McFadden which began in June 2008 (see "Future of Oak Forests Research," Spring 2012). The data collected may provide insight into the impact of the loss of key, foundational oak species on small mammals. Small mammals rely on the structure, architecture, and abundance of oak trees to survive in forest ecosystems, and plant diversity and decomposition are greatly influenced by the diversity of small mammals in a forest ecosystem. The loss of foundation tree species may cause a "ripple effect" and impact other species and functions.

Previous masters students analyzed aspects of small mammal ecology and population dynamics on a single-year basis. My project will use all five years of data to determine the impact of environmental change on small mammal diversity, abundance, and survival. Using the small mammal data along with environmental data collected by collaborative researchers, I will identify the environmental conditions that most influence small mammal species habitat use following disturbance events. I will focus on six environmental variables: soil moisture, soil temperature, air temperature, canopy openness, coarse woody debris, and leaf litter. Based on other small mammal studies, I hypothesize that coarse woody debris and leaf litter are the two most influential environmental variables impacting abundance.

Preliminary analysis has shown a decrease in small mammal species diversity across all experimental sites, including the control sites where no trees were girdled. In the first two years of the project, a wide variety of small mammals were captured, including red-backed voles, masked shrews, white-footed mice, Eastern chipmunks, woodland voles, and short-tailed shrews. Over the years the variety of species captured has declined and, in 2012, only Eastern chipmunks, white-footed mice, and a single short-tailed shrew were captured. This may indicate that the changes to the environment impacted some species more than others. Eastern chipmunks and white-footed mice are able to survive in more variable environments, while voles and shrews are likely habitat and food specialists. Reduction in species diversity may result in reduced ecosystem functioning.

— Katie Keck is working with Dr. Kate McFadden as a first year MS student in Clemson University's Wildlife and Fisheries Biology program.

New Member Profile Harlem Academy

S ince joining the Consortium last fall, the Harlem Academy has embraced the opportunities it offers. An independent school serving grades one through eight, the Academy's mission is to "prepare bright, motivated students for success at top secondary schools and lifelong learning."

So far, fifth and sixth graders have visited the Forest to participate in the Virtual Forest Initiative's water chemistry module (see "The Virtual and the Real," Fall 2012), generously funded by the Toyota USA Foundation. "In the classroom, students used the Virtual Forest graphing tool to analyze the relationship between different water quality parameters at Cascade Brook," explains Vinny Dotoli, the school's head. "They then visited the Forest to test the parameters studied in class. Students were particularly excited to use real scientific instruments and to see that the data they collected were consistent with the results they obtained using the virtual tools."

Eventually, Mr. Dotoli envisions all grades visiting the Forest, primarily for science-based investigations but also for "writing, history, advisory, and community building units." Staff members spent



Harlem Academy student holds an organism he found in Cascade Brook, while classmates use a key to identify it.

two days at the Forest before school started to plan for the coming year and become oriented to the Forest. Mr. Dotoli also looks forward to collaborating with other Consortium members to share learning resources and to participate in scientific projects organized and led by Consortium staff.

"Black Rock Forest is a unique resource that we are proud to be able to share with the students at Harlem Academy," says Mr. Dotoli. "Not only does it fit with many different aspects of the curriculum, but it also gives our students the opportunity to experience time with nature. Coming from New York City, this is a rare opportunity. Visits to the Forest will allow our students to have experiences and make connections that are different and meaningful." **Plan** (continued from page 1) ably the eventual hiring of a data and technology manager.

Other research goals include developing a postdoctoral fellowship program focusing initially on forest ecology and global change, fostering increased research at the Forest through outreach to the scientific community, and developing mechanisms to increase graduate student research. "Revolutionary new advances in scientific tools and techniques automated environmental sensing, full-genome sequencing, computational and visualization methods that integrate data over huge temporal and spatial scales - are providing new insights into the nature, pace, and mechanisms underlying environmental change," explains Dr. Schuster. "With this plan, the Consortium resolves to incorporate these developments and significantly advance sustainability science."

Education Goals

Noting that the Consortium brings together unparalleled depth of expertise and resources, the Strategic Plan calls for enhancing the Consortium's educational continuum from kindergarten through graduate school by developing innovative experiential K-12 curriculum modules focused on the natural sciences that integrate with curricular goals of Consortium schools, a K-12 program of summer and afterschool science enrichment classes (see "Forest Learning," p. 1), a program for teacher professional development, and family science and nature programs.

The Consortium is well situated to meet many of the needs confronting science education today. "New modes of education and new technologies provide opportunities for students and teachers to work with scientists as real communities of scholars," says Dr. Jeffrey Kidder, the Consortium's education director. "Instead of science in isolation, the Consortium is committed to broad education goals including interdisciplinary work and collaborative projects that can help students develop a lifetime capacity for learning and critical thinking."

Conservation Goals

Not only has the land of Black Rock Forest been conserved for nearly a cen-



Columbia graduate student Jason Sircely samples Forest soils.

tury, through the foresight of Dr. Ernest Stillman in the 1920s, but it is located in the midst of a variety of other conserved land, from state parks like Schunemunk and Harriman to private land like the Storm King Art Center to the adjoining West Point Military Reservation. Thus the Consortium is well situated to bring scientific knowledge and principles to regional partnerships that seek to protect and promote ecological connectivity (see "Addition to Forest's Land Helps Build Wildlife Corridor," Spring 2011) and develop and implement management plans for threatened native species and problematic invasive species. The Consortium also plans to develop a new pedestrian access trail to provide visitors with an attractive alternative to walking on the main road and to create more informative visitor signage.

"These conservation goals are intertwined with our research and education goals," Dr. Schuster notes. "Scientific research on wildlife movements is needed to inform work on ecological connectivity, and plant studies are necessary for understanding how best to deal with invasive species. There are opportunities for student involvement in the research and in service projects, such as removing invasive species and planting native ones and helping to build the new access trail."

Organizational Capacity

In order to create these programs, the Consortium needs to build its own

capacity. The Strategic Plan calls for modifying governance and management structures to enhance success, increasing financial health and sustainability, creating a communications plan, and assessing facilities and equipment needs for the future.

One key change has already been made: restructuring the Consortium's board. When the Consortium was founded in 1989, the expectation was that the dues paid by the institutional members would be sufficient to fund the Consortium's operations, and thus the board was organized to include a representative of each Consortium institution as well as the trustees of the Black Rock Forest Preserve, which owns the land and buildings, and at-large members selected to add scientific, educational, and conservation prestige to the fledgling organization. The Consortium has also engaged

in a variety of successful fundraising strategies over the years.

It became clear that in order to carry out its ambitious goals, including those outlined in the Strategic Plan, the Consortium needed a more traditional not-for-profit board that could focus primarily on its fiduciary responsibility and fundraising. At the same time, it is vital to retain the enthusiasm and expertise of the Consortium's member institutions. Thus the new board structure includes five representatives from member institutions in addition to the Preserve trustees and other members chosen to enhance the Consortium's public profile and fundraising capabilities. The institutional members will continue to meet together to share programmatic experiences and ideas. At its winter meeting, the board unanimously approved the new structure and selected its first representatives to the new board, which met for the first time in March.

As the Strategic Plan notes, "The strategies that we propose will require that we fulfill the promise of our Consortium ("partners throwing their lots together") and achieve outcomes greater than the sum of parts. Consortium staff and educators from our member institutions have developed many successful educational products and practices, sometimes in collaboration, but there has been no institutionalization of this process. This plan aims to do just that."



RESEARCH AT THE FOREST

The Black Rock Forest Consortium is committed to encouraging collaboration among member institutions and also between researchers and students. To help members learn what other members are doing and explore opportunities for collaboration, we here present a list of current research projects at the Forest, along with contact information.

Linking Holocene Vegetation and Carbon Accumulation with Hydrological Change using Macrofossils, C/N, Stable Isotopes and Biomarkers from Sutherland Pond/Fen and Tamarack Pond. Dorothy Peteet (Lamont-Doherty Earth Observatory, Columbia University).

Analysis of Avian Diversity in Relation to Habitat Diversity in the Black Rock Forest-Schunemunk Mountain Wildlife Corridor. Sarah Gilly and Terryanne Maenza-Gmelch (Barnard College).

Scaling of Variability in Populations, Individuals, and Ecosystems: Taylor's Law and Beyond. Joel E. Cohen (Rockefeller University and Columbia University), Meng Xu (Rockefeller University), and William Schuster (Black Rock Forest).

Temperature Tolerance of the Physiological Processes Controlling Carbon Gain in Northeastern Forest. Angelica Patterson and Kevin Griffin (Lamont-Doherty Earth Observatory, Columbia University).

Consequences of Oak Loss on Microbial Community Composition and Function. Krista L. McGuire (Barnard College).

Impacts of Oak Mortality on the Black-Legged Tick (*Ixodes scapularis*), the **Primary Vector of Lyme Disease.** Mary Killilea (New York University).

The Future of Oak Forests. William Schuster (Black Rock Forest), Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), Shahid Naeem (Columbia University), Kathleen Weathers (Cary Institute for Ecosystem Studies), and Jerry Melillo (The Ecosystems Center, Marine Biological Laboratory).

Population Dynamics of Painted Turtles in the Black Rock Forest. Christopher Raxworthy (American Museum of Natural History) and William Schuster (Black Rock Forest).

Native Plant Performance along an Urbanization Gradient. Kevin Griffin and Natalie Boelman (Lamont-Doherty Earth Observatory), William Schuster (Black Rock Forest), Matthew Brown (Central Park Conservancy), and J. D. Lewis (Fordham University).

Ecology of Slave-Maker Ants and Their Hosts: The Effect of Geographic Variation in Parasite and Host Range on Co-Evolutionary Trajectories. Christine A. Johnson (American Museum of Natural History).

The Carbon and Nitrogen Dynamics of Coarse Woody Debris in an Oak-Dominated Northern Forest. Matthew Palmer and Dan Flynn (Columbia University) and Kevin Griffin (Lamont-Doherty Earth Observatory, Columbia University).

Small Mammal Response to Oak Removal. Kate McFadden (Department of Ecology, Evolution and Environmental Biology, Columbia University).

Insect and Arachnid Diversity of Black Rock Forest. Vladimir I. Ovtsharenko and Boris Zakharov (American Museum of Natural History).

Biodiversity Lunch

hat can be learned from biodiversity success stories in our region and around the world? At "Biodiversity," the Black Rock Forest Consortium's spring benefit luncheon, keynote speaker Dr. Thomas Lovejoy, a conservation biologist who coined the term "biological diversity," will address this issue. Dr. Lovejoy is the Biodiversity Chair at the H. John Heinz II Center for Science, Economics and the Environment and University Professor of Environmental Science and Policy at George Mason University. This festive event is scheduled for May 8 from 12 to 2 PM at the Metropolitan Club in New York City.

The luncheon will also include presentation of the E. G. Stillman Award to Christopher Buck. Named after Forest founder Dr. Ernest G. Stillman, the award honors an individual who has demonstrated environmental vision and leadership in the mid-Hudson area. The Consortium is delighted to honor Mr. Buck for his commitment to smart growth, adaptive reuse, and land preservation in this region. Mr. Buck is the president of the Peter and Carmen Lucia Buck foundation and serves on the boards of Scenic Hudson and the Hudson Highlands Land Trust. Previous Stillman Award recipients have included Carol Ash, Steve and Smokey Duggan, Kim Elliman, Dr. Gene Likens, Franny Reese, and Anne and Connie Sidamon-Eristoff, among others.

Noah and Maria Gottdiener will chair the luncheon, and an event committee is being created. Table and ticket categories feature the plant and animal families of Black Rock Forest and range from Pinaceae (the largest conifer family), a \$250 individual ticket, to Ursidae (the bear family), a \$10,000 table for 10. For more information on the Biodiversity luncheon, please contact Emily Cunningham, at 845-534-4517, extension 26.

"Last year's Weather Event luncheon featuring Dr. Heidi Cullen was a tremendous success," says Consortium executive director Dr. William Schuster, "and we expect the response to this Biodiversity luncheon to be equal or greater. It is an opportunity for friends of the Forest to get together and to introduce potential new friends to the exciting scientific research, education, and conservation activities taking place in Black Rock Forest. It is sure to be both fun and informative about how science benefits our region." **A**



Caught on camera. A coyote and red fox captured by a motion sensor camera in Black Rock Forest.

Forest News in Brief

Research Symposium June 17

The eighth biannual Black Rock Forest/Highlands Research Symposium is scheduled for Monday, June 17. All researchers working in Black Rock Forest or the surrounding region are encouraged to present a talk or poster about their work. Authors should send a talk title and a brief abstract to the Consortium office at brfoffice@blackrockforest. org. The plenary session will run from 9 AM to noon at the Forest Lodge (239 Reservoir Road, Cornwall), with afternoon breakout sessions from 1 to 4:30 PM in the adjacent Science Center. Talks will be 15 minutes each, and posters will be on display all day. Box lunches will be available for \$8 if requested in advance, and overnight accommodations will be available in the Forest Lodge (register at https://availabilityonline.com/avail-Abstracts able.asp?un=forest_lodge). from previous Research Symposia are posted on the Consortium's web site at http://www.blackrockforest.org/docs/ scientist-resources/research-at/ResearchSymposia.html.

Educator Workshop

For a third year, the Consortium held a teacher training workshop (see "Teacher Training," Spring 2010). This year's

workshop, led by education director Dr. Jeff Kidder and Consortium staff, included a full day on March 1 and a half day on March 2. The purpose of the workshop was to train teachers to use the mammal curriculum and give them independence in using the materials at the Forest and in their classrooms. The activities included mammal classification, understanding form and function with skulls and pelts, live-trapping (including random sampling, compass and GPS use, and habitat mapping), tracks, skull preparation, and mammal development.

Hike on April 7

All Friends of Black Rock Forest are invited to a hike to "little-known sites of historic significance" on Sunday, April 7 from 9 AM to 2 PM. It will be led by Forest Manager John Brady and other Consortium staff. Meet at the Reservoir Road parking lot and expect about 5 miles of hiking. The hike is limited to about 25 hikers, so contact Emily Cunningham, the Consortium's director of external affairs, at 845-534-4517, extension 26, to reserve your spot.

Virtual Forest Update

Throughout the fall, teachers and students from the Virtual Forest Partner-

ship, generously funded by the Toyota USA foundation (see "The Virtual and the Real," Fall 2012), have been using the water chemistry module in the classroom and visiting the Forest to fieldtest what they learned virtually. "I implemented the water chemistry module within a larger unit entitled The Global Water Crisis," says Dr. Alicia Reed, 6th and 7th grade science teacher at the Thurgood Marshall Academy for Learning and Social Change in Harlem. "After students learned about water issues around the world, I implemented this module so that students could learn about New York's watershed and how water quality is affected by a variety of factors. The water chemistry module aligns beautifully with the rigorous Common Core State Standards that we are implementing at Thurgood Marshal, as the module provides opportunities for students to explore authentic scientific data to draw conclusions and make inferences from graphs and analyses that they have created. In this way, they experience what being a scientist is and develop multiple skills, including critical thinking. The impact of exposing students to such rich experiences in science, particularly at their developmental age, cannot be taken for granted." 🌺



Return Service Requested

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Report from the Forest Manager

On Tuesday, October 30, the peak colors of autumn ended abruptly. Last year's Halloween trick was 18 inches of snow on October 18; this year's was Hurricane Sandy. Although downgraded to a tropical storm by the time it reached Black Rock Forest, it was quite a blow. The strong winds caused tree blow down predominantly on southern-facing slopes. Fortunately, the storm lacked heavy rainfall. The 1.5 inches of rain did little to carry the freshly fallen leaves to clog culverts and waterways.

Trees that fell to the wind were mostly red oak, and large. Trunk diameters of 22 inches and greater accompanied their large crowns to the ground, taking down nearby trees in a domino effect. A 2.5-inch rainfall a few days earlier soaked the soil and lubricated the root systems. Also contributing were past silvicultural practices. Spacing oaks to become dominant canopy trees 70 to 80 years ago has resulted in large over-mature trees (120 years) in shallow glacial till, prone to blow down.

The heaviest blow down area was the white and Norway spruce plantation between the Stone House and Tamarack Pond. Over 30 of the 80-year-old trees were uprooted in the old Chatfield farm pasture. Uprooted trees will be used to construct a new outpost structure at Tamarack Pond, and many large trees will be milled for lumber and firewood.

Hurricane Sandy certainly was not the most forest-altering storm of recent years. Conditions of season, moisture, wind direction, and temperature determine a storm's magnitude of effect on the Forest. Consider Hurricane Irene, August 28-29, 2011: the mid-morning surge of rain created great difficulty in streams choked with the carcasses of dead hemlocks killed by the woolly adelgid. They inundated lower areas of the Forest and town, dramatically changing the landscape.

Both hurricanes are rivaled by Hurricane Floyd, September 16, 1999, when nearly 11 inches of rain followed a summer drought and forest fires. The flow of water throughout the Forest gave the illusion of the entire forest floor moving downhill. The erosion effects are still seen today.

The greatest forest canopy-changing events are snow and ice. November 16-17, 2002, and December 11-12, 2008, are well remembered. Ice accumulating nearly 2 inches on every surface possible was followed by days of strong winds. The combination of large limb breakage and blow down will alter the health and appearance of trees for decades.

Maybe the most influential weather events concerning wildlife were the blizzard of March 13-17, 1993 and the summer drought of 1999. Both events caused mortality, emigration, and poor health of many populations of animals.

These ongoing changes in the Forest by weather events have occurred since the beginning of time. Forest structure constantly changes, whether fast or slow. \clubsuit

— John Brady

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