

## Winter Inspires Visitors to Explore the Forest

Winter is a beautiful and inspiring time in Black Rock Forest, as nearly 1000 visitors from 11 Consortium member institutions and other organizations discovered this year. Activities ranged from research on snow, hemlock defoliation, and soil respiration to educational activities such as animal tracking and ice coring and to teacher training, peer leadership opportunities, and a writing retreat.

### An Icy Weekend

On the first weekend of February, 19 students, mostly Environmental Studies majors, and four faculty and staff members from Hunter College's Teacher Academy and Department of Geography enjoyed a winter field trip to the Forest. Led by Teacher Academy director Dr. Deborah Gardner and by Dr. Alan Frei, Traci Warrentin, and Tom Walter from the Geography department, the students toured the Consortium's green buildings, gathered and analyzed samples of lake ice and snow, learned to use compasses, wrote in nature journals, and hiked in the Forest to see examples of forest succession and the devastation of recent ice storms. They also prepared (and cleaned up) the group's meals. A Small Grant that Drs. Gardner and Frei received from the Consortium last year (see "Small Grants," p. 1) provided financial support for the students, enabling them to participate for a nominal \$10 fee.

The lake ice activities were a highlight of the trip. The group hiked

two miles to Arthur's Pond on a cloudy, windy day, in 20°F temperatures. "During the hike, the cold was not a problem," explained Dr. Gardner, "because the uphill walk kept everyone warm. But when we got out onto the open, frozen lake, we felt the wind." Nevertheless, the students collected ice and snow samples, drilled ice cores, and learned about the formation and ecological effects of lake ice from Data/Network Manager Matt Munson before retreating to the Stone House for a warm fire and hot chocolate. The next day, guided by the Consortium's Executive Director Dr. William Schuster, the students performed chemical analyses of the samples they had collected, discovering that mineral content (as shown by electrical conductivity) and acidity (pH) differed

depending on where the samples were obtained. "What stands out most to me was our frigid experience on the reservoir," wrote one student. "Ice is very complex and the data one can gather tells an entire story."

"The students all expressed great excitement about their experiences and the opportunity to have such a fun, hands-on, educational time," says Dr. Gardner. "Even though many had limited experience in nature, especially in the winter, they were able to participate in a completely safe and comfortable environment. All felt that group, departmental, and school spirits were lifted."

*(continued on page 4)*

## Research & Education

### 2010 Small Grants Awarded

Since 1990, Black Rock Forest's Small Grants program has helped scientists and educators from Consortium institutions start new projects, fund summer student research, and produce a wealth of publications and theses. This year, the 21st (and the ninth generously funded by the Stiefel Foundation), the program awarded \$19,322.06 to four research projects and one education project, bringing the total to 131 grants and nearly \$500,000.

Four of the five grants relate to the Consortium's signature multi-year, multi-investigator Future of Oak Forests research. This project is the first direct, manipulative investigation of the cascades of impacts likely to follow the loss of oaks, in advance of what may occur should they succumb to current and/or future threats (see "Research on Future of Oak Forests," Winter 2010). As a foundation species group in northeastern forests, oaks play vital roles in the ecosystem, affecting water yield and quality, carbon storage, fire regimes, and biological diversity.

### Small Mammals and Fungi

The oak forest project employs sixteen 1.3-acre plots on the Forest's North Slope, four for a pilot project and another 12 treated to test different tree-loss scenarios. The treatments created three plots in which all the oaks were girdled (to mimic a pathogen like sudden oak death), three with half the oaks girdled, three with all non-oaks girdled, and three that serve as unmanipulated controls; each plot also contains a subplot fenced to exclude deer. Prior to the treatments, researchers

*(continued on page 5)*



Hunter students take ice cores. (Photo: Natalia Kaliszuk)

## Black Rock Forest Consortium

*Black Rock Forest News* is published three times a year by the Black Rock Forest Consortium.

The Black Rock Forest Consortium is an alliance of public and private schools, colleges, universities, and scientific and cultural institutions engaged in research, education, and conservation in the 3835-acre Black Rock Forest in New York's Hudson Highlands.

The Consortium is a not-for-profit 501(c)(3) organization supported by membership dues, grants, and gifts.

### Consortium Institutions

American Museum of Natural History  
Barnard College  
The Browning School  
The Calhoun School  
Central Park Conservancy  
Columbia University  
Cornwall Central School District  
The Dalton School  
Hunter College  
Marine Biological Laboratory at Woods Hole—The Ecosystems Center  
Metropolitan Montessori School  
Newburgh Enlarged City School District  
New York City Department of Parks and Recreation  
New York City Public School 311  
New York – New Jersey Trail Conference  
New York University  
The School at Columbia University  
The Spence School  
Storm King School  
Trevor Day School  
Urban Assembly for Applied Math and Science

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*Black Rock Forest News*

Sibyl R. Golden, Editor

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## Report from the Executive Director

The Black Rock Forest's mission of conserving nature is shared by many people and organizations, and by our government. We conserve nature and individual species for several reasons. One is to preserve the goods and resources they provide for us. Another is the desire to keep the world rich in biological diversity for future generations and not drive other species to extinction.

Retaining some land in natural habitat will not be enough. To preserve the future of native plants and animals, areas currently rich in native biodiversity need special attention. Sufficient habitat is needed to support populations large enough to survive bad periods and retain genetic diversity. Movement patterns and migration must be taken into account. To survive, many animals migrate seasonally through different habitats for feeding, breeding, overwintering, etc. And all organisms need opportunities for young to disperse and at least occasionally exchange genes with other populations.

Habitat patches poorly connected to others cannot support many species over time. Isolated populations are often stressed for food and breeding habitat and cannot move when climate or environmental conditions change. As fragmentation increases and movement between patches is restricted, the most adaptable, generalist, and sometimes problematic species benefit at the expense of others. Forest fragmentation has been shown to favor white-footed mice over other native rodents, increasing an important vector of Lyme disease. Lack of viable movement corridors between habitats has doomed native wildlife populations in the past. Corridors need not always provide ideal habitat. Many animals can cross unsuitable habitat as long as they do not encounter absolute barriers.

The Wildlands Network is a non-profit concerned with continental-scale wildlife movement and connections. It identifies important wildlife linkage areas and works with landowners, communities, agencies, and other non-profits to maintain and restore landscape connections. One focus is the "Eastern Wildway" from the Everglades along the Appalachians through eastern Canada. In ad-

dition to its historical importance as a movement corridor for many species, long-term north-south ecological connectedness will allow species to move in response to climate change. The US Fish and Wildlife Service recently funded a study of wildlife movement corridors from the Adirondacks up to Maine and Canada.

The Wildlands Network is now looking at the ecological connectivity of the Catskills, Shawangunks, and Highlands, and at how these areas connect to the middle and southern Appalachians. The Highlands retain moderate diversity but are not well connected to the main trunk of the Appalachians, a potential future liability. The most viable connection may be along the New York-New Jersey border west to the Poconos.

In our area, there is fairly high ecological connectivity from Sterling Forest and Harriman/Bear Mountain State Parks through the West Point Military Reservation and Black Rock Forest/Storm King Mountain, but future connectedness will depend on human policies and actions. Schunemunk Mountain is connected only by a patchy corridor of private forest lands to the Highlands. Orange County's 2004 Open Space Plan recommends improving wildlife corridors to connect some of these core areas.

Any of us can examine the isolation or connectedness of bio-rich areas around us. Could an otter, a fish, a salamander, or a turtle move between areas of suitable habitat? Where are the accident hotspots between wildlife and cars, and could safer passage for both be implemented? But broad, cooperative visioning, scientific expertise, planning, and action will be needed for many of our native species to survive. Regional efforts could survey wildlife cores and corridors, and agencies and communities could use this resource to steer new roads and developments away from busy wildlife corridors. In some cases, new ecological connections may rescue threatened and endangered populations. We will be better able to sustain our native wild creatures if we increase our attention to ecological connectivity. Otherwise we risk the biological richness and integrity of our future. ■

— Dr. William Schuster

## ***Consortium to Hire First Education Director***

**B**lack Rock Forest Consortium is in the process of hiring its first Director of Education, thanks to generous funding from the Toyota USA Foundation, the Estate of Marian O. Naumburg, and the MetLife Foundation. The new Director of Education not only will oversee all the Forest's education programs, from elementary through graduate school, and ensure their quality, effective pedagogy, and robust scientific basis, but will also direct a new program to design and implement new high-school and middle-school science modules for the Consortium's developing Virtual Forest Initiative.

Since its founding in 1989, the Consortium has been fortunate both to have skilled educators on staff and to benefit from the talents of teachers at its member institutions. Together, they have produced a broad range of curricula for every educational level. In 2004, after the Center for Science and Education and the Forest Lodge were completed, representatives from Consortium institutions and other friends of the Forest created a long-range plan focusing on the steps needed to continue the Consortium's growth. A full-time education director

who could coordinate the Consortium's educational activities, develop new programs, and help find new sources of funding was one of the key components of that plan.

"Education is a cornerstone of the Black Rock Forest Consortium and all of our member institutions," explains Executive Director Dr. William Schuster. "Our new education director will work with staff and dozens of education professionals to support and enhance teaching and learning at the Forest. He or she will allow us to employ new technologies and the most effective teaching methods, and to seize new opportunities to benefit thousands of students each year."

The education director will also have teaching duties; act as a liaison between Forest staff and member institutions; establish and maintain collaborative relationships with teachers, administrators, and scientists; develop procedures to evaluate the effectiveness of educational programming; improve and enhance existing programs and integrate new research findings; design and implement new rigorous science and research programs at all levels; contribute to web-based educational activi-

ties; and work with Forest staff and Consortium colleagues to secure major educational grants including, potentially, a new site-based National Science Foundation Research Experiences for Undergraduates program.

The Consortium's Virtual Forest Initiative, developed in partnership with the Columbia Center for New Media Teaching and Learning, is creating a digital interface that will allow students to access the Forest's research data (see "Virtual Forest Initiative," Winter 2009). Already, the initiative has produced four modules that are used in courses at Columbia University and Barnard College.

The very generous three-year, \$500,000 grant from the Toyota USA Foundation will allow the Consortium to design and implement new standards-based high-school and middle-school modules for a group of New York City public schools as well as for Consortium member institutions. The education director will work with other project team members to write curricula, lead field investigations and professional development efforts, and design evaluation procedures for the secondary school components of the Virtual Forest Initiative. ■

## ***New Leadership Council Builds on 20th Anniversary Celebration***

**I**nspired by the enthusiastic response to its 20th anniversary celebration last May (see "Consortium Celebrates!," Spring 2009), the Consortium has created the Black Rock Forest Leadership Council, a group that will build on the excitement created at the event by supporting the Consortium, introducing it to new friends and collaborators, and serving as ambassadors for the Forest.

The Consortium is fortunate to have Richard Bartlett as chair of the group. A principal at Resource Holdings, Mr. Bartlett is deeply involved with Princeton University and very interested in education. "Black Rock Forest is a valuable but relatively unknown resource," he says. "It is doing important environmental research and has the potential to become one of the leading research forests in the eastern United States. The Leadership Council is exciting because it can help get more people interested in

the work of the Consortium and the vital issues it addresses."

An initial group of nine Council members held an inaugural meeting in March, where they learned about key Consortium programs including the Future of Oak Forests research (see "Research on Future of Oak Forests," Winter 2010) and the Virtual Forest Initiative (see "Consortium to Hire First Education Director," above) from Executive Director Dr. William Schuster and President Dr. Frank Moretti. The plan is to expand to 15 to 20 members. Leadership Council members increase awareness and understanding of the Consortium's mission and programs in the larger community, provide advice to Consortium leadership, and help the Consortium build new relationships; they also make significant commitments to the Consortium's annual fund.

These first Leadership Council members include people actively in-

involved in other not-for-profit organizations that share interests with the Consortium and people deeply connected to the Hudson Highlands region. During the spring and summer, they will tour the Forest with Dr. Schuster and other scientists conducting research there. Along with Consortium board members, Leadership Council members will help produce a cocktail benefit for Black Rock Forest Consortium to be held in Manhattan on September 30 (see "Forest News in Brief," p. 7).

"Our new Leadership Council will be instrumental in helping the Forest succeed in its vitally important mission of enhancing environmental understanding," says Dr. Schuster. "The involvement and support of this wonderful, energetic group of people will help connect the Consortium with the individuals, organizations, and resources that will allow it to continue to succeed and flourish." ■

# Student Research Spotlight: Deer Population Density

by *Laura Diefenbach*

Following my 2008 summer internship at Black Rock Forest, I decided that it would be an ideal location for my undergraduate thesis research on white-tail deer (*Odocoileus virginianus*) populations. Starting in the summer of 2009, under the guidance of Forest Manager John Brady and Executive Director Dr. William Schuster, I began to delve into the history of the deer population at the Forest. I was able to travel to the Forest with the help of a travel grant from Columbia University's Earth Institute. My other thesis mentors are Barnard College environmental science senior lecturer Dr. Peter Bower and Dr. Jenna Lawrence of the Department of Ecology, Evolution and Environmental Biology at Columbia.

White-tail deer populations have risen from near extinction to levels that may be too high for the environment to sustain. In the northeast United States, white-tails typically do

not encounter interspecific competition and their predators have been greatly reduced or eliminated. In areas of high densities, deer are altering forest habitat by diminishing canopy diversity and understory tree and shrub layers and preventing forest regeneration, making deer density management crucial. Long-term exclosures, high fences intended to exclude deer, have been constructed at Black Rock so scientists can quantify the effects of deer on the Forest.

This is the first quantitative analysis seeking to determine what factors most influence Black Rock Forest deer population densities in order to predict and manage deer populations in the future. John Brady has collected biological information on deer family groups since 1981. Because most of this information was not in digital form, I have collaborated with my mentors to compile, interpret, and analyze the data, and

have constructed exclosures and performed population estimates. The density of this population fluctuates annually, which may be in response to a density-dependent factor such as hunting or density-independent factors such as natural events related to winter severity, precipitation, and acorn availability. I am performing statistical analyses to identify any strong correlations between these factors and the deer population density. However, I have not yet completed interpreting the results.

I hope to propose changes to the current deer management approach at Black Rock, creating a more effective plan for controlling deer density. I also would like to educate others on the severity of deer overpopulation and the resulting effect on the forest and our environment. ■

*Laura Diefenbach will graduate from Barnard College in May with a B.A. in environmental biology.*

**Winter** (continued from page 1)

## More Visits

Two schools brought student leadership groups to the Forest. Twenty-four seniors from Dalton's Peer Leadership Group held a retreat. During the year, the students learn leadership skills and mentor 9th graders; during the retreat, they took stock of the year's progress and determined themes and topics for the remainder of the year. "Black Rock was a perfect way to get away from the distractions and conflicts of the busy school year," says Peer Leadership Advisor Will Hopkins, who also teaches environmental science. "Going for a hike was a great way to relax, get some fresh air, and clear the mind for the tasks at hand."

In addition, twelve 11th grade students from the Interschool Leadership Program, which builds partnerships between schools and community groups and includes Spence, Brearley, Chapin, Collegiate, and Dalton in New York City, as well as students from Browning

and Nightingale, visited the Forest to develop awareness of their strengths and weaknesses as leaders and in groups. Spence teachers Scott Wade and Amanda Corbett designed a leadership challenge that required students to get to individual sites in the Forest without adult guidance. "The setting felt serene and removed," says Mr. Wade. "The Lodge is a great place for an experiential learning retreat."

Other noteworthy trips included a two-day Teacher Workshop (see p. 6); a three-day writing retreat for people from Dr. Shahid Naeem's lab in Columbia University's Department of

Ecology, Evolution and Environmental Biology; weekly trips from Metropolitan Montessori School that included snowshoeing and ice exploration; observations of newly hatched trout eggs and trout development by classes from the Newburgh and Cornwall Schools (see "Renovated Hatchery," Spring 2009); and visits by Cornwall Schools classes for animal tracking, winter observations, and water studies. Columbia University and New York University scientists continued investigations, and several visiting groups also held retreats in the Forest Lodge.

"Winter is a great time for visiting the Forest," says Dr. Schuster. "You can see the landscape better and do activities that cannot be done at any other time. Studying organisms that remain active during the winter can be a real eye-opener; students discover the advantages of being warm-blooded. Our buildings remain open, and the Stone House is great for a fire and hot chocolate." ■

## Blizzard Brings Record Snowfall to Forest!





**Small Grants** (continued from page 1)

surveyed the plots to determine baseline data on flora, fauna, soil, and environmental variables; with the treatments in place for nearly two years, scientists can now determine their initial impact on these variables.

Dr. Kate McFadden, from Columbia University's Department of Ecology, Evolution and Environmental Biology (E3B), received a grant for her research on the effects of oak removal on small mammals, including species composition, abundance, and distribution. Oaks are an important food source and provide habitat for many small mammals; additionally, they play a key role in the risk of Lyme disease, since acorns are an important food source for white-footed mice (*Peromyscus leucopus*) and deer. The funds will support training and thesis study opportunities for students.

Monthly, from April through October, the researchers will set up live traps on each plot for three days at a time to catch mice, voles, jumping mice, squirrels, chipmunks, and shrews. They will gather data on gender, age, size and weight, and other factors, and mark and release each individual to assess abundance and see if animals move between plots. They will collect and analyze scats to determine what the animals are eating, and will collect arachnids and insects, important food sources for small mammals.

Saproxyllic fungi, which live in decaying wood, are "essential for the functioning of the forest ecosystem," says Dr. Fabio Corsi, also from Columbia's E3B department. "They recycle the major components of wood and mineral nutrients back into the ecosystem, aiding soil formation and forest regeneration, and they provide habitats for many other organisms." Dr. Corsi and his postdoctoral associate Silvia Bibbo were awarded a small grant to study the effects of the treatments in the oak futures project on saproxyllic fungi. They will look at different species of trees, different forms (such as logs, stumps, and trees that are dead but still standing), and different degrees of decay.

The researchers will compare the fungal species composition and distribution in the experimental and control plots and investigate changes in species composition and richness over the course of the decay process.

**Carbon**

Dr. Kevin Griffin from the Lamont-Doherty Earth Observatory of Columbia University received a small grant to continue his study of the below-ground carbon budget in the Forest and how the treatments of the oak futures project affect carbon cycling. The funds will provide a summer stipend for Jennifer Levy, who is completing her doctoral research. Dr. Griffin notes that Black Rock Forest has long-term records on above-ground species composition and biomass, enabling the quantification of above-ground carbon. "With this project," he says, "we can complete the



Dr. Peteet discussing her research.

below-ground component of the Forest's carbon budget and start thinking about how it may change."

Back in 2007, with funds provided by another small grant, Dr. Griffin obtained baseline data for carbon storage in six of the study plots. This new study, he says, "will measure below-ground carbon on all 12 study plots and evaluate changes in storage to quantify how the carbon budget responds to declines in oak populations." Using soil cores, floor litter collections, and soil respiration chambers, Ms. Levy will gather and analyze data on carbon pools and on soil respiration, a carbon flux, and will collaborate with other scientists to obtain data on carbon fluxes from above-ground litterfall and dissolved organic and inorganic carbon.

**Student Film-Makers**

Four high school students from the Urban Assembly School for Applied Math and Science, with help from teachers Tom Zavrel and Kerri Murphy, will use a small grant to create a video documentary of the Forest's oak research. "The project will improve the ability of these students to communicate scientific ideas in accessible ways, introduce Black Rock to other students at the school as we integrate the Forest into our entire curriculum, and give the Consortium a documentary it can use to support and promote its ecological research," says Mr. Zavrel. The funds will allow the students to travel to the Forest to work on the video: three trips with the two teachers and one to explain the oak research to a 6th grade class.

**Macrofossils and Droughts**

Dr. Dorothy Peteet from Lamont-Doherty has analyzed plant macrofossils in a sediment core from Sutherland Fen to identify hydrological and ecological changes during three major climate shifts since the fen formed about 15,000 years ago as the region deglaciated (see "Sixth Research Symposium," Fall 2009). In particular, based on plant species and evidence of fires, both this core and records from sites north of the Forest suggest that the regional climate was significantly dryer from about 6000 to 4000 years ago. She plans to obtain new sediment cores from other ponds and analyze pollen and macrofossils to discover whether evidence of dryer and wetter periods is consistent throughout the region.

The small grant will provide funds for an undergraduate intern to analyze macrofossils under Dr. Peteet's direction and for carbon-14 dating to maintain chronological control. "Our project aims to develop records of drought and wetter intervals through the mid- to early Holocene from lakes and wetlands in Black Rock Forest to give us a long-term perspective," she says.

"Every year, the Small Grants program has funded innovative projects," says Executive Director Dr. William Schuster. "It is miraculous what bright people can do with a relatively small amount of money. All Consortium members should keep this opportunity in mind." ■

## 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. ■

**Consequences of Oak Loss on Microbial Community Composition and Function.** Krista L. McGuire (Barnard College). *Contact: kmcguire@barnard.edu.*

**Distribution, Assemblage, and Activity of Bats in a Temperate Urban Landscape.** Chanda Bennett (American Museum of Natural History). *Contact: bennett@amnh.org.*

**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). *Contact: William Schuster (schuster@blackrockforest.org).*

**Cycling of Mercury in Terrestrial Environments.** Anthony Carpi (John Jay College, City University of New York), Alan Frei (Hunter College, City University of New York), and David Evers (Biodiversity Research Institute). *Contact: Anthony Carpi (acarpi@jjay.cuny.edu).*

**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). *Contact: Kevin Griffin (griff@ldeo.columbia.edu).*

**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). *Contact: cjohnson1@amnh.org.*

**Functional Ecology of Complex Plastic Traits in Forest Trees: Pilot Studies of Reproductive and Root Traits.** Hilary S. Callahan (Barnard College) and Louise Comas (Pennsylvania State University). *Contact: Hilary S. Callahan (hcallahan@barnard.edu).*

**Diversity of Saproxylic Fungi: Effects of Treatments in the North Slope Experimental Permanent Plots.** Fabio Corsi and Silvia Bibbo (Columbia University). *Contact: Fabio Corsi (fc2257@columbia.edu).*

**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). *Contact: peteet@ldeo.columbia.edu.*

**Land-Atmosphere Coupling at Black Rock Forest: The Role of Snow, Vegetation, and Soil Thermodynamics.** Alan Frei (Hunter College), Gavin Gong (Department of Earth and Environmental Engineering, Columbia University), Jason Smerdon (Lamont-Doherty Earth Observatory), and Jessie Cherry (University of Alaska). *Contact: Jason Smerdon (jsmerdon@ldeo.columbia.edu).*

**Effects of Host Defoliation and Distribution on Spatial Patterns in Ectomycorrhizal Fungi.** J. D. Lewis (Fordham University). *Contact: jdlewis@fordham.edu.*

**The Tamarack Pond Core as a Rosetta Stone for Impact Events: Correlation to Known Ejecta Layers.** Dallas Abbott (Lamont-Doherty Earth Observatory). *Contact: dallas@ldeo.columbia.edu.*

**Small Mammal Response to Oak Removal.** Kate McFadden (Department of Ecology, Evolution and Environmental Biology, Columbia University). *Contact: kwm6@columbia.edu.*

**Insect and Arachnid Diversity of Black Rock Forest.** Vladimir I. Ovtsharenko (American Museum of Natural History). *Contact: ovtshare@amnh.org.* ■

## Teacher Workshop

Twenty-four teachers from 11 schools gathered at Black Rock Forest on March 12 and 13 for a teacher training workshop. They came from several Consortium schools, including Metropolitan Montessori, Newburgh Schools, the School at Columbia, Storm King School, Trevor Day School, and the Urban Assembly School for Applied Math and Science, as well as from programs associated with other Consortium members, including the Central Park Conservancy, New York City Department of Parks and Recreation, Columbia University, and NYU. Some non-Consortium teachers also participated. Most were elementary school teachers, but some taught middle school.

Executive Director Dr. William Schuster and Operations Manager Jack Caldwell opened the program with an introduction to Forest staff and the web site, followed by a hike. After lunch, the participants broke into teams led by Forest staff members to develop student activities: the topics were energy use and production, GPS use with maps and compasses, life cycles of native species, green living and waste control, and dendrology and measurements.

After this, the group broke into teams based on grade level and subject and worked together to develop lesson plans for their classes to use in the Forest; this was the highlight of the workshop for most of the teachers. The afternoon session wrapped up with the teams sharing their lesson plans and discussing ways to end class trips by asking students to reflect on their experiences. Teachers who stayed until Saturday morning took a hike that introduced them to the Forest's Ecosystem Habitat Trail Program.

"Due to the enthusiastic response, we plan to keep offering these teacher workshops at the Forest every winter," says Dr. Schuster. "The experience helps teachers learn how to most effectively use the Forest and our resources in their teaching. Plus, it is helping to expand the educational network associated with the Forest as people get to know their colleagues and more about who is doing what." ■

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### Forest News in Brief

**June 13 Is Consortium Day!** Consortium Day will take place from 12 to 4 PM on Sunday June 13. Highlights will include presentation of the E. G. Stillman Award to the Hudson Highlands Nature Museum in recognition of its 50 years of providing environmental education programs. The day will include talks by scientists about their studies in the Forest, tours of the Forest's alternative energy and green building projects, fun events for the whole family, and refreshments.

**Cocktail Benefit September 30.** The Consortium will hold a cocktail benefit at the Century Association on West 43rd Street from 6 to 8 PM on September 30. Andrew Revkin, former senior environmental reporter for the *New York Times*, will make brief remarks. Sibyl R. Golden, chair of the Consortium, and Richard Bartlett, chair of the new Leadership Council (see p. 3), are co-chairing the event, and a committee is in formation. Prices range from \$175 to \$500 for an individual ticket and from \$1750 to \$5000 for a package of 10 tickets. To find out more about the festivities, please contact Barbara Brady in the Forest office. Invitations will be mailed at the end of the summer.

**Record Snowfall Hits Forest!** The blizzard of February 25 to 27 brought the most snow to the Forest from a single storm since record-keeping began in 1959 (see photo on p. 4). Some 30 inches fell at the Open Lowland monitoring station near the Old Headquarters Building and an average of 36 inches higher up at the Science Center. These totals were on top of 10 inches already on the ground. Snowpack in parts of the Forest reached as deep as 52 inches.

**Rain Garden Demonstration.** On Saturday May 1, Forest staff, along with Simon Gruber, a local environmental consultant, led a public education program and tour of Black Rock Forest's rain garden (see "Rain Garden Captures Runoff, Improves Water Quality," Winter 2010). With funding from the New York State Environmental Protection Fund and the Hudson River Estuary Program, Consortium staff worked with Mr. Gruber and with the Orange County Soil and Water District and the Cornell Cooperative Extension to build the rain garden last year. "Rain gardens help manage stormwater runoff to reduce flooding, prevent erosion, and recharge groundwater, while also providing advantages like more landscaping and greenery, wildlife habitat, and a number of other benefits," explains Mr. Gruber.

**Urban Assembly Students Help Survey Trout.** For five Saturdays in April and May, four students from the Urban Assembly for Applied Math and Science joined Forest staff and aquatic biologists Dr. Alan Wells and Della Wells in surveying all fish in Forest streams, as part of the project funded by the Sarah K. deCoizart TENTH Perpetual Charitable Trust (see "Restoring Brook Trout," Winter 2010). The ninth and tenth graders identified the species and recorded the length and mass of each fish caught, and also took environmental measurements such as pH, water conductivity, water and air temperature, stream flow, latitude and longitude, and elevation. Established brook trout populations were found in every stream. The students also helped plant white pines along stream banks to replace lost hemlocks to keep stream temperatures cold all year. ■

**Black Rock Forest Consortium**  
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**Consortium Day!**  
**June 13**  
**See p. 7**

<b><i>Inside This Issue</i></b>	
Winter Inspires Visitors to Explore the Forest	Page 1
2010 Small Grants Awarded	Page 1
Consortium to Hire First Education Director	Page 3
New Forest Leadership Council Created	Page 3
Student Spotlight: Deer Population Density	Page 4
Teacher Workshop	Page 6

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## ***Report from the Forest Manager***

In previous reports I have written about the places in history that Continental and West Point Roads hold. These thoroughfares had destinations outside the Forest, from Newburgh-Cornwall to West Point-Highland Falls. Built for war and commerce, they created access to this part of the Hudson Highlands. Junctions with local trails developed, becoming the wagon paths of mountain farmers of the 19th century. These woodland dwellers, to be successful, needed to be well acquainted with the use of ox, mule, or horse. The best path for those workmates would determine the route. Their destinations were usually simple: to neighbor, relative, or friend. The worn paths were maintained by their travelers, and hand-laid rocks are still seen at troublesome passages. Along the way were fields and woodlots, both eligible to be worked in the proper season.

Some destinations require imagination to understand, such as the worn, manicured paths to rocky peaks. Did early settlers have time to enjoy the view? Or did they continue their work, as the name “Threshing

Rock” suggests? Rocky ridge tops are usually breezy, making a good place for the machine-less mountain farmer to thresh and separate the wheat from the chaff. The next stop would be Mailley’s Mill (now the site of our Science and Education Center) for grain to be crushed into flour and cereals. Connections to Continental and West Point Roads conveyed wood, grain, and fruit to market, as well as the famous Mineral Springs water.

The woodland roads of Black Rock became virtually abandoned along with the Highland farms between 1890 and 1920. Then arriving on the scene was the Stillman family. James considered the old paths as access for future compounds of friends and family. But it was his son, Ernest, who possessed the foresight to upgrade old trails for access to a useful and productive future forest. First in his thoughts were the people of Cornwall. Their growing numbers required a water supply. Old paths which led to blueberry and cranberry swamps now were transformed into dirt roads to convey the machinery of dam and reservoir construction.

Second, Ernest Stillman decided to incorporate the Black Rock Forest in 1927 as a demonstration forest. In helping Harvard University get in on the ground floor of the developing sciences of forestry and silviculture, he saw that more old paths were upgraded to create better access for researchers and managers. From 1920 to 1950, 18 miles of woodland paths were upgraded to forest roads.

Most of the old paths were left as foot paths. Today’s 24-mile trail system still shows signs of its past. Many trails follow the contour of the land, similar to deer trails. Others are bordered by mountain laurel which came in after the old disturbance and now provides a tunnel of flowers in June as pretty as a mother’s smile.

Virtually all the forest roads and trails began as wagon paths. From these thoroughfares, the life and times of previous generations lead to present destinations. From a land of rabbits and grouse to a forest of deer and turkey, the purpose of the destination has changed but the way to get there was always there. ■

— John Brady