BLACK ROCK FOREST NEWS

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"Art about Water" Brought a Month of Art and Music to the Forest

Mix an environmental art installation, a women's hand drum group performing Native American chants, a silent art auction, and a concert by renowned saxophonist Paul Winter with Black Rock Forest and you have a large part of last October's Art About Water: The Moodna Creek Watershed project.

Organized by The Arts Alliance of the Lower Hudson Valley and the Moodna Watershed Coalition, the multievent program was designed to "raise public awareness of the challenges and opportunities for protecting streams, wildlife habitat and public landscapes in the Moodna Creek watershed and other tributaries of the Hudson River, and to acknowledge and celebrate water as our most vital resource."

The month-long program attracted new visitors to Black Rock Forest and also raised some money to support its programs. Activities outside the Forest included a biodiversity hike at the Moodna Viaduct, a film about water use in Kenya, and an African drum and dance concert.

Art and the Environment

In the Forest, Art About Water kicked off in late September with an invitation to artists to visit the Forest to draw, paint, take photographs, or create other types of art. Several artists took advantage of this offer, and their work formed part of the art show and silent auction held in the Forest Lodge on October 7. Highlights of the show included paintings by such established artists as Deborah Beck, Shawn Dell Joyce, and Cheryl Vlachos; photographs by Dickson Despommier (in frames made from Forest wood by Forest Manager John Brady), Tom Doyle, and Jean Linville; and sculptures by James Thompson, along with several pieces in various media by students. Of the approximately 50 pieces in the exhibition, 12 were sold in the silent auction; 40% of the proceeds went to Black Rock Forest.

Another highlight of October 7 was the opportunity to view Jean Linville's environmental art installa-

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The Wolf Cry Singers performing at the Upper Reservoir.

Urban-Rural Gradient

Field Season Yields Plant Growth Data

With another field season complete, scientists participating in Black Rock Forest's urban-rural gradient study are uncovering some intriguing data about the differences in plant growth between cities and the areas around them. The research focuses on four sites along a gradient that runs from intensely urban New York City through the suburban Lamont-Doherty Earth Observatory and the centrally located Black Rock Forest to the completely rural Ashokan site in the Catskill Mountains, and aims to estimate New York City's "ecological footprint" on surrounding areas.

Begun in the spring of 2005, the multiyear project is examining urban-rural gradients in environmental variables such as day- and nighttime temperatures, growing season length, incident diffuse radiation (indirect radiation that is scattered by the atmosphere), chemical deposition, and ozone and carbon dioxide concentrations, and is investigating their individual and interacting influences on native plant growth. The research team includes Executive Director Dr. William Schuster, Dr. Kevin Griffin of Lamont-Doherty, Dr. Matthew Turnbull of the University of Canterbury in New Zealand, Dr. David Tissue of Texas Tech University, and Dr. James D. Lewis of Fordham University (see "Impact of Cities on Plant Growth," Winter 2006).

The team originally planned to examine growth in three native plants: a tree, red oak (*Quercus rubra*); a shrub, witch hazel (*Hammamelis viginiana*); and an herb, fireweed (*Erechtites hieracifolia*), but this year decided to substitute the non-native, and invasive, herb

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

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Black Rock Forest News
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Report from the Executive Director

"Interaction effects" are often when things get really interesting. If the effect of factor A is X and the effect of factor B is Y, then they are said to "interact" when together they produce not A + B but something different, say Q. This is often important, because in the real world things frequently interact to create nonadditive results, though the interactive effects are often difficult to predict. For example, we know that increased atmospheric carbon dioxide (CO_2) can lead to higher productivity, with more carbon produced and stored. But experiments have shown that when elevated CO_2 is combined with atmospheric deposition of nitrogen (as in acid rain), the effects can be reduced or enhanced and the outcomes depend on exactly which species are involved.

Science has historically progressed by isolating single factors and studying their effects. But often the results of experiments differ greatly from initial projections, and sometimes this is due to the fact that important interaction effects were not studied. In statistics, when interaction effects are found to be significant, it is generally considered misleading to draw conclusions about individual factors, because their effects depend on the levels of the other factors.

Really complex interactions among organisms can lead to amazing changes over time. Symbiotic organisms provide good examples. Lichens, for example, consist of two different organisms, an alga and a fungus. Each is unable or barely able to survive without the other. But together they exchange critical materials and energy, grow and reproduce, and produce novel, beautiful structures that allow them to flourish in a very wide range of environments.

This edition of our newsletter features an article about an ongoing study of some ecological impacts of urbanization. Drs. Tissue, Lewis, Turnbull, and Griffin are interested in the complex suite of environmental changes that nearly always accompany the growth of urban areas. These include increased temperatures, increased atmospheric CO_2, high levels of acid and nitrogen generation and deposition, ozone production, increased levels of particulates, and others. There are many individual factors whose effects we still do not fully understand. However, it is their combined and interactive effects that will be most important to identify if we are to fully comprehend our impacts on nature and devise more sustainable ways of living.

Since the world changes in many ways simultaneously, many of today's best experiments manipulate several factors, such as increased CO_2 with high ozone, or invasive species with warming temperatures. In another Black Rock Forest experiment, designed to more fully understand the ecosystem-level importance of oak trees, we are manipulating deer herbivory levels as another factor. We know that the impact of high deer herbivory is important in its own right and may well have interactive effects with the presence or absence of oaks. Unfortunately, it is almost impossible to simultaneously manipulate all the important factors in all possible combinations in any kind of reasonable pattern on the landscape.

In some cases, interactive effects can have beneficial consequences. We have noticed that forest canopy disturbance combined with high levels of deer herbivory can prevent some aggressive, non-native species, such as tree-of-heaven (*Ailanthus altissima*), from becoming problematic.

Human interactions can similarly run the gamut of possible outcomes. Collaborations and partnerships do not always ensure success. You may have heard the de-motivational statement about meetings: "None of us is as stupid as all of us together." But here in the Black Rock Forest, we have seen thoughtful, dedicated people combined with a great resource become something more than just a sum of parts. Probably no one could have predicted how the experiment that is our Consortium would have unfolded over the years. The future is equally unknown, but serendipity and unique interactions will almost certainly play important roles. Many of you who are reading this have played important parts in making Black Rock even greater than the sum of its parts. So let us all keep interacting, and no doubt the future will prove interesting! ■

— Dr. William Schuster

One Year of Solar Energy for Forest Buildings

Black Rock Forest's solar panels have now been officially running for a year, having begun full operation last January. In their first 11 months, they produced nearly 26,000 kilowatt-hours (kW-h) of electricity, or roughly half the total energy used by the Center for Science and Education, saving about $3000. "During the summer," notes Executive Director Dr. William Schuster, "we used a little energy from Central Hudson each night, and then early in the morning the meter would stop and the solar panels would provide all the energy we needed until sundown."

The system consists of 80 photovoltaic panels connected to inverters in the Science Center basement that convert the direct current the panels produce into alternating current (see "Solar Energy Starts to Provide Electricity for Forest," Winter 2006).

The system's software is now up and running and providing real time (and archival) data on peak instantaneous power (kW), total power produced (kW-h), insolation (a measure of sunlight in W/m^2), and temperature of the solar panel cells (which relates to their efficiency). These data are currently available on the web site of Northern Power, the installer of the solar panels and the prime contractor for the project; Consortium members may view the data for research or classroom activities by asking Jack Caldwell for a password.

"These raw data would be good for physics or environmental science classes studying solar energy and power production," explains Dr. Schuster. "We can then provide data on how much total energy the Science Center is using, and students can calculate the difference, examine seasonal variations in the amount supplied, look at efficiency, and calculate how this would relate to their homes and schools if they too had solar panels." Production of instructional materials related to the solar panel arrays and other "smart" and "green" features of the Forest buildings is one of the priority areas for this year's Steifel Foundation Small Grants (see "Forest News in Brief," p. 7).

"We know that we actually produced excess electricity that went back onto the grid," Dr. Schuster says, "and we will be installing a sensor that will track what percent of the building's total energy load is being supplied by the solar panels, so we can quantify just how much energy we supply to the grid and when. Then we hope to find a way to get some credit for that." New York State allows home-owners with solar panels a credit for excess energy they return to the grid, but at this time does not extend that credit to not-for-profit organizations; at least one bill has been drafted for the State Assembly that would permit this. ■

School in the Forest Classes Study the Hudson River Estuary

City school children from Black Rock Forest's School in the Forest program have been making connections between the Forest streams at the top of the watershed and the Hudson River into which they flow, thanks to a generous $30,000 grant from the Hudson River Estuary Grant Program funded by the New York State Department of Environmental Conservation (DEC). The School in the Forest program offers students in New York City public schools the same opportunity to participate in the Forest's scientific programs that students from independent schools and local public schools have long enjoyed (see "Fall in the Forest for City Public Schools," Winter 2004).

As they have for the past four years, fourth and fifth graders from PS 311 in the Inwood section of upper Manhattan and PS 220 in the Bronx first explored the high upland landscape of the Forest and studied the organisms, chemistry, and water quality of its ponds and streams. This year, they then visited the Kowawese Unique Area, a riverfront park at Plum Point in New Windsor, where they seined for a sampling of fish and macroinvertebrates; measured pH, dissolved oxygen, salinity, and temperature; documented commercial, transportation, and recreational activities on and near the river; learned about tides, currents, and the salt front; and made connections between their water quality studies in the Forest and those in the Hudson.

"Although third through eighth graders participate in the School in the Forest," explain educators Joyce and Norman Baron who run the program, "research shows that students are most likely to develop a commitment to preserving the environment if they have personally meaningful outdoor experiences at about 9 to 11 years old. The students have been very engaged, curious, and fast learners."

PS 311 students test pH of the Hudson River on Snapshot Day (photo: Jamie Kamlet).

Each fall, the DEC's Estuary Program, with the help of Lamont-Doherty Earth Observatory, holds Snapshot Day, in which school groups visit sites up and down the Hudson River to collect and exchange data on water characteristics, fish and macroinvertebrate diversity and abundance, and the physical environment.

This year, the fourth graders from PS 311, their classroom teachers Judy Guitierrez and Wendy Aponte, and parent volunteers joined Joyce and Norman Baron and Forest educators Chris Lee and Jamie Kamlet at the 79th Street Boat Basin in Manhattan. There, they performed the same tests they had conducted at Kowawese, but used fish traps instead of seine nets. Their results, along with those of the more than 1300 other students who participated in Snapshot Day, are online at www.ldeo.columbia.edu/edu/k12/snapshotday. ■

Student Spotlight: Is There Cosmic Debris in Black Rock Forest?

by Jessica Leber

In a core from Black Rock Forest's Tamarack Pond, students working with Dr. Dallas Abbott of Lamont-Doherty Earth Observatory of Columbia University found two sediment layers containing marine microfossils. So far, radiocarbon dating of one layer shows that it was deposited about 1,750 years ago, practically yesterday in geologic time. The question is: how did oceanic fossils wind up at Tamarack Pond?

The fossils are one line of evidence that suggests the layer was deposited when an asteroid or comet struck the ocean floor. If a strike is large enough, impact ejecta, a mix of oceanic material and cosmic debris, disperses far from the site of impact – to places like Black Rock Forest.

Two summers ago, Perri Gerard-Little, a senior at Columbia University, helped Dr. Abbot collect a core from Tamarack Pond, which once was a bog. "We canoed to a floating mat of vegetation in the middle of the pond," explained Perri, "and we cored 7 to 8 meters down." After washing and sieving the collected material, she passed it on to Stephanie and Sarah Costa.

Stephanie and Sarah, twins who are now seniors at Tappan Zee High School, serendipitously met Dr. Abbott at a canoe and kayak club while they were searching for a science research project. Over the past two summers, they first prepped and then searched the core, looking under a microscope until their eyes were red to pick out glassy or unusual grains.

Using a more powerful scanning electron microscope, Dr. Abbott and Dee Breger, formerly also of Lamont, helped them confirm that they had found fossils and spherules (cooled spheres of melted rock from an impact site) in two 20-centimeter-thick layers. Some grains had splashes of iron, chromium, and nickel in a ratio and abundance that give additional evidence of an extraterrestrial source.

Sarah (who now plans to study geology in college) and Stephanie have won an award for their work with Dr. Abbott at the Rockland County Science, Invention, and Technology Fair and may continue on to larger science fairs with their project.

Dr. Abbott collected the core as part of her global search for evidence of the hypothesis that the Earth has sustained multiple large oceanic impacts over the last 10,000 years – a rate more frequent than many experts currently acknowledge. She has found preliminary evidence of more than a dozen candidate impact structures, using satellite gravity data to locate them. Dr. Abbott and her collaborators aim to correlate worldwide evidence of impacts with the oceanic impact sites.

As recently highlighted in the *New York Times* ("Ancient Crash, Epic Wave," November 16, 2006), Dr. Abbott's search for evidence of impacts has brought her as far as Madagascar and Australia. But it also brings her right here to Black Rock Forest. ■

Jessica Leber is a graduate student in the Earth and Environmental Science Journalism dual master's degree program at Columbia University.

Art and Water *(continued from page 1)*

tion entitled "Whispered Wisdom 12518." The installation had four components, with three on display in the Forest: "A Closer Look" at the Upper Reservoir, "9in10tentions" along the Duggan and Reservoir trails, and "Story Time" outside the Forest Lodge (the fourth, "Wisdom of the 4 Waters," was exhibited later in the month at the Storm King School). Dr. Linville designs her work, which incorporates materials from the woods and the trees, rocks, and other features of the Forest itself, so visitors can interact with it and reflect on the natural world as well as on the art. More information can be found on her web site at www.dancingbranches.com.

Music in and of the Forest

October 7 also brought the Wolf Cry Singers to the Forest. A women's hand drum group, the Singers chant and sing traditional and contemporary Native American pieces by the Mi'kMaq, Cherokee, Navajo, Abenaki, and Delaware, as well as their own compositions. (The Native Americans who once lived in the Black Rock Forest area were probably from the Waoranec tribe.) The Upper Reservoir made a stunning backdrop for their afternoon performance, and the Singers also played later in the day at the art exhibit in the Lodge. More information about the group and its music is available on the internet at www.wolfcrysingers.com.

The featured event of the Art About Water series was a concert by Paul Winter that filled the neighboring Storm King School's Walter Reade Theater on October 21. The saxophonist played solo, but accompanied by tapes, sometimes of whale sounds, wolves calling, and elk bugling. Speakers included Carol Ash, then the executive director of the Palisades Interstate Park Commission; Fran Dunwell, coordinator of New York State's Hudson River Estuary Program; and Susan Mitchell, Cornwall High School environmental science teacher and leader of the school's environmental club.

Before the evening concert, some 50 people attended a reception for Paul Winter in the Forest Lodge that was a fundraiser for the Black Rock Forest Consortium. They had the opportunity to chat with the musician and to enjoy homemade refreshments served by the Cornwall High School environmental club. Paul Winter noted that he had a new-found attraction to the west side of the Hudson River, including Storm King Mountain and Black Rock Forest, which he had not previously visited, and that he was contemplating recording an album about the Hudson River.

Landscape Traditions

"This landscape has such a strong and historic connection to the arts," notes Black Rock Forest Executive Director Dr. William Schuster, "from the development of the Hudson River School of painting in the 1800s to the world-class Storm King Art Center sculpture garden and the modern interest in plein air art, so it is fitting that we continue the tradition with events that link art with science. We have long known that the Forest makes a wonderful natural location for art creation and performance, and it is nice to learn that our beautiful Forest Lodge also serves as a great venue for music and art. We are looking forward to making such a celebration an annual event." ■

Urban-Rural *(continued from page 1)*
cocklebur (*Xanthium strumarium*) for the fireweed. They also moved the New York City site from Swindler's Cove Park in upper Manhattan to Central Park (thanks to the Central Park Conservancy, a new Consortium member).

A Pattern of Oak Growth

The oak component of the study involves seedlings grown from acorns collected at Black Rock Forest and grown there in a planting box for three years. The researchers then transplanted the seedlings to pots and distributed them to the research sites in early 2005, before the leaves came out. Thus, when the scientists measured the young trees this fall, there had been two growing seasons in the study locations.

The researchers found a clear pattern of growth, with the trees in Central Park growing the most (measured as the increase in trunk diameter compared to original diameter), followed, in sequence, by those at Lamont, Black Rock Forest, and the Catskills. Separately, Dr. Lewis and an undergraduate cored the trunks of 10 mature trees at each of the four sites to examine annual growth over the past 50 years; here too, annual growth decreased with distance from the city.

Dr. Griffin and his students found several environmental factors that vary along the gradient: the average difference in the temperature between daytime and nighttime (the diurnal temperature range) and carbon dioxide (CO_2) and ozone (O_3) concentrations. Dr. Griffin believes that the large decrease in diurnal temperature range from the rural site (10.17°C) to the urban site (6.95°C) "could have a significant effect on plant physiology and growth and is something I strongly suspect is influencing the growth of the trees. The decrease in the city mimics predicted alterations in temperature associated with climate change as nighttime temperatures are rising at twice the rate of daytime temperatures."

Along with his Lamont-Doherty colleague Dr. Wallace Broecker, and thanks to a grant from the Comer Foundation, Dr. Griffin is sending wood samples for carbon-14 (^{14}C) analysis to quantify the atmospheric CO_2 concentrations along the gradient; he suspects that CO_2 in the city may be stimulating growth there. Additionally, and somewhat counter-intuitively, O_3 concentrations are higher in rural environments (35 parts per billion at the Catskills site) than in cities (17 ppb in Central Park) because, although ozone precursors are emitted in urban areas, they blow out of the cities and react with sunlight to actually form O_3; further, nitrogen oxides that are also produced in cities can react with and destroy urban O_3. Dr. Griffin suspects that the interactions among many variables are causing the growth differences, not any one variable.

Patterns of Herb Growth

Dr. Lewis, along with his master's student Gretchen Gary, examined the growth of *Xanthium strumarium* at the four sites. After planting the cocklebur in June, Ms. Gary measured height and leaf number weekly from seed germination to plant death. Once the plants died, she harvested them and separated and dried their parts (stems, leaves, fruit). This will enable her to weigh them and determine any differences in the size of the plants and the relative amount of material allocated to their different parts.

"The data are still quite preliminary," Dr. Lewis says, "but it appears so far that the plants put on mass faster the closer they were to the city. However, location didn't affect the rate at which they developed: they flowered at the same time regardless of location. Further, they all produced approximately the same number of leaves on the main stem." He believes this response pattern is probably due to increased CO_2 concentrations or higher temperatures nearer the city, and notes that "the broader significance is that urbanization makes at least some invasive plants more invasive."

"Black Rock's location on the edge of suburban sprawl makes it ideal for examining how urbanization affects plants and forests and whether exurbs behave more like urban or rural areas," adds Dr. Lewis.

Student Projects

Students have been an important part of this study from the beginning, helping with both research and analysis. In the spring semester, several students in Dr. Griffin's plant physiological ecology class will continue to work on the project. For his senior thesis, Victor DeTroy will estimate photosynthetic efficiency of the plants by measuring chlorophyll fluorescence. Another senior, Stephanie Searle, is running a growth chamber experiment to isolate the effects of temperature and will make additional gas-exchange measurements to quantify leaf photosynthetic and respiratory rates; she will return to work on the project as part of her doctoral research. Emily Muhlhausen, a student in the Earth and Environmental Science Journalism master's program who is taking Dr. Griffin's course, has what Dr. Griffin calls "a unique data set, with very clear, very interesting and highly statistically significant data" showing that leaves in rural areas have more stomata (pores) than those in the city, which he suspects is related to CO_2 concentrations.

"This project is an outstanding teaching tool," notes Dr. Griffin, "allowing students from an urban university to quantify the effects of humans on ecosystem functions."

Future Research

In the spring, the researchers will start a new batch of oak seedlings, this time from acorns, covering them with chickenwire to foil squirrels. They would like to add environmental monitoring sensors at each site to provide continuous measurements of atmospheric CO_2 and O_3, and an automated drip irrigation system to better control for soil moisture. Another factor to examine is herbivory, which was markedly greater at the Catskills site, although it is not clear whether this is an effect of the environmental gradient or of the population ecology of the local insect populations. Ultimately, Dr. Griffin would like to establish a forest plot at each site to look at actual ecosystem responses in addition to potted plants.

Gretchen Gary hopes to grow cockleburs from seeds gathered at each of the four sites. Seed size often increases as plant size increases; she wants to examine whether seeds from urban plants grow faster than seeds from rural plants.

"As urban areas expand around the world, our climate is also changing, with many feedbacks between the two," says Dr. Schuster. "These urbanization-impact studies are critically needed to tease apart the variables and understand the important processes involved so we can learn to live sustainably for the future." ■

Current 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. ■

Oak Forest Sustainability and Response to Canopy Disturbance. William Schuster (Black Rock Forest), Shahid Naeem and Maria Uriarte (Columbia University), Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), and Jerry Melillo (The Ecosystems Center, Marine Biological Laboratory). *Contact William Schuster.*

Cycling of Mercury in Terrestrial Environments. Allan Frei and Anthony Carpi (City University of New York) and David Gay (US Mercury Deposition Network). *Contact Anthony Carpi.*

Native Plant Performance along an Urbanization Gradient. Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), William Schuster (Black Rock Forest), and J. D. Lewis (Fordham University). *Contact Kevin Griffin.*

Plasticity of Plant Reproductive Traits in Manipulated Ecosystems: Pilot Studies of Red Oak Reproductive Output and Offspring Quality. Hilary S. Callahan (Barnard College). *Contact: Hilary S. Callahan.*

Carbon and Nitrogen Cycling in the Cascade Brook Watershed of Black Rock Forest. Kevin Griffin and H. James Simpson (Lamont-Doherty Earth Observatory of Columbia University). *Contact: Kevin Griffin or H. James Simpson.*

Long-Term Carbon Storage in Wetlands. Dorothy Peteet (Lamont-Doherty Earth Observatory of Columbia University) and Terryanne Maenza-Gmelch (Barnard College). *Contact: Dorothy Peteet.*

Long-Term Black Rock Forest Meteorological and Snow-Related Research. Jason Smerdon, Gavin Gong (Lamont-Doherty Earth Observatory) and Jessie Cherry (University of Alaska). *Contact: Jason Smerdon.*

Effects of Host Defoliation and Distribution on Spatial Patterns in Ectomycorhhizal Fungi. J. D. Lewis (Fordham University). *Contact: J. D. Lewis..*

The Tamarack Pond Core as a Rosetta Stone for Determining the History of the Black Rock Forest Region. Dallas Abbott (Lamont-Doherty Earth Observatory). *Contact: Dallas Abbott.*

Long-Term Study (75 Years) of Tree Population Dynamics and Carbon Storage. William Schuster (Black Rock Forest). *Contact: William Schuster.*

The Effect of Leaf Longevity on the Carbon Gain and Growth of Japanese Barberry (*Berberis thunbergii*). Kevin Griffin and Chengyuan Xu (Lamont-Doherty Earth Observatory of Columbia University). *Contact: Kevin Griffin.*

Long-Term Studies of Painted Turtle Population Dynamics and Dispersal. Christopher Raxworthy (American Museum of Natural History) and Susan Mitchell (Cornwall Central School District).

The Potential Role of Physiology in the Age-Related Decline of Red Oak Productivity at Black Rock Forest. Kevin L. Griffin (Lamont-Doherty Earth Observatory of Columbia University) and Will Bowman (Center for Environmental Research and Conservation at Columbia University). *Contact Kevin Griffin.*

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

International Visitors

They came from as far away as Japan, Australia, New Zealand, Brazil, Germany, Estonia, Finland, Russia, Scotland, and Switzerland, and from major universities and research forests around the United States. In October, some 50 forest scientists spent two days and nights in Black Rock Forest as the third and final part of a traveling meeting of the International Union of Forest Research Organizations. The goal of the meeting was to assess "the state of knowledge of the tools and experiments needed to predict regional responses of forests to global and regional environmental change."

The scientists first visited the Bartlett Experimental Forest in New Hampshire's White Mountains and the Harvard Forest in Massachusetts. At Black Rock, they toured research sites in the Forest, heard keynote speakers and paper and poster presentations, and enjoyed free time in the woods. The papers from the conference will be published, after peer review, in a special issue of the prestigious journal *Tree Physiology*.

"The leg of the meeting at Black Rock Forest was so successful," noted Dr. Matthew Turnbull, one of the participants from New Zealand, "because of the quality of the facilities, the quality and knowledge of the staff, and the quality of the developing research program. Combined with the small group format in a great location, these made for a really productive and enjoyable end to the traveling meeting."

And a researcher from Texas, Dr. David Tissue, pointed out that "the opportunity for an international group of foresters to observe the breadth and depth of research currently conducted in Black Rock Forest, and to consider the potential opportunities for future research there, is valuable both for the Forest and for forest research in general. Prior to the visit, most participants did not know much about Black Rock, but after their visit, many commented to me that it was the most exciting part of their tour, both scientifically and in terms of scenery. The science, scenery and facilities at BRF stole the show." ■

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Forest News in Brief

2007 Small Grants Available. The Consortium has announced its 18th annual Small Grants program, with awards of up to $5000 for scientific research and up to $3000 for education projects conducted in the Black Rock Forest. This program is funded by a generous grant from the Ernst Stiefel Foundation. Grants, awarded on a competitive basis, can support purchases of equipment, summer stipends for students, transportation costs, and other needs. Housing facilities are available.

Proposals are particularly solicited for projects that enhance the availability of scientific information through the Forest web site, research on forest ecosystem sustainability and response to disturbance, studies of plant and ecosystem function along urbanization gradients, production of instructional materials related to the new solar panel arrays and other "smart" and "green" features of the Science Center and Forest Lodge, and research into the impacts of humans on the health of the forest ecosystem, particularly, but not limited to, the impacts of trails and roads. This last research category, the impacts of recreation on the environment, is new and is supported by a matching grant from the New York—New Jersey Trail Conference; thus applications in this category may request up to $10,000.

Guidelines and application materials are available from Consortium institutional representatives and on the web at www.blackrockforest.org/small_grants.html. Consultation with the Forest's Executive Director is suggested. The application deadline is February 1.

Lodge Available for Winter Fun and Learning! Don't miss out on the opportunity for winter educational and scientific activities in the Forest. Last year, students enjoyed snowshoeing; tracking raccoons, mice, deer, and coyotes by their footprints; identifying leafless trees by buds, bark, and structure; clearing trails and cutting branches; learning how animals survive in winter, and many other activities, including stopping at the Stone House for a fire and hot chocolate. "Winter is a delightful time in the Forest," notes Executive Director Dr. Schuster, "and our facilities allow greater activity than ever before." Make your winter Forest Lodge reservations now!

Fifth Forest Research Symposium. The fifth Black Rock Forest Research Symposium will be held on June 25 in the Center for Science and Education. An announcement and call for papers will follow in early spring. Past symposia have attracted researchers, educators, and other interested people, giving them the opportunity to learn about the breadth of research going on at the Forest and to interact with each other. (See "Research Symposium Highlights Varied Studies," Fall 2005.)

Consortium Day. This year's Consortium Day will be held on Sunday, June 10, 2007. More information will appear in the next issue of this newsletter.

History of Black Rock Forest Hike. Forest Manager John Brady will lead a hike highlighting the history of Black Rock Forest for Friends of the Forest on March 31. Please contact the Forest office if you are interested in participating. ■

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Small Grant Deadline February 1
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Report from the Forest Manager

Deep in this forgiving Forest persists a very wild track of land keeping the forest's native integrity. The environment in and around Sutherland Pond is forged by the harshest of weather. This high-elevation pond has continually supported wild populations of beaver, otter, bear, deer, coyote, and fox. The best attempt to conquer this area was by John Odell, who began farming a small portion in the mid-1800s. The meager stoneworks are the partial remains of his toils. It was a challenging task, establishing a mountain farm, dealing with local wildlife while trying to keep livestock. There was no one to continue this early farm into the twentieth century.

This brings us to the goats, horses, cows, or pigs that grazed on Odell's field. During this period of livestock grazing, many young saplings were eaten; only a few white and red oaks survived. Later, in 1986, these beautifully formed 120-year-old trees succumbed to an insect from Europe: the gypsy moth devastated most of the region by defoliation. The devastation on Odell's field was complete; all plant life appeared dead. Harvesting these once large-crowned trees made an impact on future forest form, and in 1987 a fence was erected to exclude white-tailed deer on the one-acre parcel and to observe the renewal of the forest.

The deer exclosure at Odell's field was created by this forest manager, constructing fencing from the trees that were harvested. His then-three-year-old son discovered these wilds of Black Rock Forest; soon the project came to be known as "Matthew Forrest." In 1991, school groups from Newburgh asked why this forest had a fence.

Soon a bluebird house project was born. As the fenced-in land sprouted with blueberry, elderberry, and black and red raspberry, birdhouses were hung and bluebirds nested in the fencepost-mounted houses. But quickly, the bluebirds disappeared as trees of birch, maple, and poplar shaded out the berries and most flowering plants needed by these beautiful birds. Soon wild turkeys were seen using the food and cover of the young forest.

In a short 10 years, the study plot went from a thorny walk to one with branches poking ears and noses. The trees are back, commonly black birch, with up to eight stems per square meter racing with others to the sun, growing nearly 0.5 meter per year since 1998. An occasional tulip poplar gives a good race, as the gray birch and fire cherry slowly concede. This is a different look for Black Rock as most of the rest of the Forest is mature oaks and maples.

By 2004, the birch and poplar were well established. To observe the impact of deer on the 20-year-old forest, half of the study plot previously denied to deer was returned by removing half of the fencing. At first, the impact was minimal, as deer had little to browse under the dense canopy of trees 10 meters tall. But come the autumn breeding season, one out of every five trees was damaged by antlers.

Through a century of human use and study, "Matthew Forrest" has kept its original integrity of native regional woodland. ■

— John Brady