BLACK ROCK FOREST NEWS

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What Will Happen to Our Forests If the Oaks Die?

What would happen to our forests if the oak trees died? What if we could predict, in advance, some of the cascades of impacts of the catastrophic loss of this key species group on our northeastern forests?

That's what a research team composed of Executive Director Dr. William Schuster, Dr. Kevin Griffin of Lamont-Doherty Earth Observatory, Dr. Jerry Melillo of the Ecosystems Center of the Marine Biological Laboratory, Dr. Shahid Naeem and Dr. Maria Uriarte of Columbia University's Department of Ecology, Evolution, and Environmental Biology, and colleagues aims to find out in a new multiyear study in Black Rock, beginning with a pilot project already underway.

A study plot with oaks removed.

"Throughout history," Dr. Naeem explains, "major groups of plants and animals have vanished, from the dramatic disappearance of the dinosaurs to the loss of elms and chestnuts from most of our forests. But, in the past, nobody asked these questions, so this will be path-breaking research."

"This collaborative research is important for Black Rock for three reasons," notes Dr. Schuster. "First, it will extend the Forest's long history of basic and applied forest research, using the powerful tools of ecological manipulation and modeling. Second, it integrates a significant educational component from the primary through graduate levels, a hallmark of the Consortium. And third, the results should help us understand critical factors that regulate ecosystem health and thus help us sustainably manage our forests in the face of today's changing environmental conditions and challenges."

Threats to Oaks

In our northeastern temperate forests, oaks (*Quercus* species) have been the dominant hardwood for the past ten millennia; in the study area in Black Rock Forest, for example, they account for two-thirds of the canopy trees. They provide important ecosystem services, including soil formation, nutrient cycling, timber, shelter and food for wildlife, air purification, watershed protection, prevention of flooding and erosion, and scenic beauty.

But the future of our oak forests is uncertain. Long-term data at Black Rock show no successful oak regeneration since the 1970s, as excessive deer browsing (a result of predator removal) and other factors have prevented seedling survival. And the effects of other pressures, such as tree aging, insect outbreaks, diseases, storm damage, extractive logging, and fires, are increasing: mortality of canopy oaks in long-term study plots in the Forest has averaged 4% per year for the past five years, compared to just 1% annually from 1930 through 2000.

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Education and Science

Winter Wonderland in the Forest

Consortium members who think spring and fall are the only times to visit the Forest are missing a winter wonderland of educational activities and a fruitful time for scientific research.

This winter, Dr. Jessie Cherry of Lamont-Doherty and her colleagues conducted snow research, measuring snow depth, snow pack temperatures, and light and heat from the snow and ground, and studying the soil/snow mercury cycle. Columbia graduate students Jason Sircely and Chengyuan Xu and Barnard undergraduate Maskit Ronen worked on ongoing projects, and Dr. Won-Young Kim and Lamont-Doherty colleagues investigated installing a seismograph.

Tuesdays at Black Rock

Every Tuesday, students from the Metropolitan Montessori School travel to Black Rock (see "Weekly Visits to Forest," Winter 2006); each class is scheduled to come in each season. "The kids really like being outdoors in winter," notes Ric Fry, the school's director of environmental stewardship who coordinates the project. "They have boundless energy."

The school's winter activities included snowshoeing; tracking raccoons, mice, deer, and coyotes by following their footprints; identifying leafless trees by buds, bark, and structure; clearing trails and cutting branches; learning how animals survive in winter; visiting nearby Kenridge Farm, part of the Museum of the Hudson Highlands, for maple sugaring and sap boiling; and stopping at the Stone House for a fire and hot chocolate in really

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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.

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Browning School
The Calhoun School
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The Dalton School
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Black Rock Forest News
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Report from the Executive Director

Sometime around October of last year, the Black Rock Forest welcomed its 100,000th Consortium visitor. We did not take the time to note this with any special ceremony or award to the visitor. And we do not know: Was it a first grader on a first trip into nature? Was it a scientist studying how the Forest is responding to environmental challenges? Was it a teacher learning how to immerse students in the Forest to accelerate their understanding? We do not know who it was or what he or she did, but we expect that the experience was a good one that may benefit our society in some larger way over time. It is important for many reasons, however, that we do recognize and celebrate success and learn what we can about why certain activities are successful.

One reason to celebrate success is to counteract negativism and complacency. I recently viewed an interesting film about water conservation on the web site of actor Leonardo DiCaprio (www.leonardodicaprio.com). As good as it was on the issues — all life depends on water, fresh water is a limited resource, pollution daily reduces the amount available for us all to survive — I was struck by the fact that it failed to highlight some of our greatest successes, such as the rebirth of the Hudson River.

My concern is that restricting coverage to bad news runs the risk of turning people off and making them feel powerless to make a positive difference. It is innovations and actions that benefit humanity and our planet that inspire people to positive action. Focusing on the negative runs the risk of having the opposite effect.

When we pause to give proper credit where it is due, we are tacitly recognizing and advertising what it took to make a change for the better. The aforementioned rebirth of the Hudson River is an excellent example of a far-reaching environmental success that should be celebrated! In the 1960s, the Hudson River ecosystem was impaired to the point of dysfunction and was termed "an open sewer" by a presidential council. The actions of a few individuals (e.g., Pete Seeger), followed by a great many individuals and organizations (e.g., Scenic Hudson), along with the impartial lens of scientific scrutiny applied by individuals and organizations (e.g., the Hudson River Foundation) and the implementation of environmental laws (e.g., the Clean Water Act), enabled us to understand why the Hudson was in such bad shape, how it got that way, and what was needed to make it better.

Today, while problems (including PCBs in the Upper Hudson) continue to exist, water quality has improved tremendously. Hundreds of species of fish swim in the river again, and increasing numbers of people are again enjoying this wonderful river/arm of the sea. The people and organizations that worked to improve the river, their actions, and the remarkable Clean Water Act should be widely celebrated, cited as examples, and used to guide us in the future.

Despite these successes, we cannot relax our efforts or our standards, or fail to establish new goals. Education programs in the Black Rock Forest are increasingly incorporating the Hudson River. They examine the critical linkages and fluxes between our terrestrial and aquatic systems and the dependence of human and other life on these upland - river interconnections.

One of the lofty goals of the Hudson River Estuary Action Agenda (www.dec.state.ny.us/website/hudson/hreagenda05.pdf) is to make the Hudson River swimmable from the Adirondacks to New York City. Targeted for 2009, the 400th anniversary of Henry Hudson's voyage of discovery up the river, this is a challenging goal, but one that should be sought, achieved, and maintained.

The year 2009 should see quite a celebration on and around the Hudson River! Commitment, inspiration, actions by individuals and organizations, along with science and education (hallmarks of our Consortium), are what will be needed.

Here at Black Rock Forest, it took the Consortium about a decade after its formation to reach the 50,000-visitors mark. But it took us less than 6 ½ years to welcome the second 50,000. This increasing success is something we should all celebrate as we establish new goals for the future. ■

— Dr. William Schuster

Small Grants Support Diverse Research Projects

From soil microbes to oaks to cosmic impacts, and from light sensors to snow sensors, the research projects that received Small Grants this year are investigating diverse aspects of Black Rock Forest. Generously funded by the Ernst C. Steifel Foundation for the fifth year, the Consortium's Small Grants Program awarded $23,446.50 to five projects. Over the past five years, the Steifel gift has provided nearly $125,000 to 30 researchers and educators working in the Forest. Throughout its 17-year existence, including earlier support from funds established by Harvard University, the Small Grants Program has made 108 grants totaling more than $400,000; it provides up to $5000 for research projects and up to $3000 for education projects.

"Over the years," explains Executive Director Dr. William Schuster, "these small grants have attracted many researchers and educators to the Forest. They have produced a wealth of new environmental and biological information, many publications and theses, and student learning and training at many levels. They support the natural cycle of science, as the results have led to additional questions, external funding, and extended studies in several cases."

Oak Removal Study

Two of the funded projects tie in with the multiyear study of the future of our oak forests (see "What Will Happen If the Oaks Die?," p. 1). Dr. Kevin Griffin of Lamont-Doherty received an award to provide environmental sensors for the pilot component of the project. Complementing the Forest's existing network of meteorological, hydrologic, and energy sensors, these new devices will be installed at four locations in each of the four pilot plots and will measure light, soil and air temperatures, and soil water availability. "This will allow us to quantify how these factors drive ecosystem change and affect other variables." Dr. Griffin explains,"

Dr. Shahid Naeem of Columbia University's Department of Ecology, Evolution, and Environmental Biology will use his Small Grant to support a graduate student's summer work in the Forest. Jason Sircely will document the plant and microbial diversity in the main study area before the plots are subjected to logging and tree-girdling, focusing on five invasive species prevalent in the Forest and known to have detrimental effects on native biodiversity. "We expect the results we collect in advance of the manipulation will prove of lasting importance for interpreting the experiment in the following five years," notes Dr. Naeem.

Acorns and Age

Dr. Hilary Callahan of Barnard College was awarded a Small Grant for a pilot study of the plasticity of red oak reproductive ecology. "Ecologists study the phenotypic plasticity of plant traits (their variability in response to environmental changes) in order to understand their adaptive significance, including the possibility that plasticity itself can be adaptive," she explains, adding that "plant traits that influence ecosystem processes not only vary among species but also change as plants age or environmental conditions vary."

A soil core (from Glycerine Hollow uplands).

She will take advantage of Black Rock Forest's long-term study plots of even-aged red oaks (*Quercus rubra,* approximately 40-, 95-, and 135-years old) and its thorough records of annual acorn production to investigate whether tree age contributes to variations in seed output or seedling quality. Barnard undergraduates will participate in acorn collection, sorting, measurement, and analysis. Dr. Callahan envisions a longer-term project (with external funding based on the results from this pilot), and parallel studies on the plots being manipulated for the oak removal study.

Snow Monitoring

Dr. Jessie Cherry, who created a snow research tower near Old Forest Headquarters during her doctoral work at Lamont-Doherty, and who is now a postdoctoral fellow at the University of Alaska, will use her Small Grant to add a second snow research tower near the Forest's ridgetop environmental sensor on Frog Hill. She and colleagues Dr. Jason Smerdon and Dr. Gavin Gong will also automate the transfer of the information collected to a data library at Lamont-Doherty and make it more accessible to researchers and educators.

Dr. Cherry's first goal is to study snowfall trends and snow pack characteristics, since snow is so important as a freshwater supply in Orange County and its supply is decreasing even as water demand is increasing. The second is to investigate the coupled relationships between snow cover and below-ground temperatures. "Measurements that extend from the top of the snow pack to several meters below the ground surface would be unique and valuable," she says. She also notes that snow research at Black Rock has attracted a tremendous level of interest from other researchers in the New York area (see "Let It Snow," Winter 2006).

A Cosmic Connection?

Dr. Dallas Abbott of Lamont-Doherty was awarded a Small Grant to investigate burning and erosion in the Forest during the Holocene (the past 10-12,000 years) by analyzing the charcoal content and mineral composition of a sediment core from Tamarack Pond and correlating layers in it with pollen data from a Sutherland Pond core. The funds will pay two high school students to sample the core, weigh and sieve the samples, and pick out interesting mineral grains.

A further goal is to determine if spikes in charcoal indicate cosmogenic events — meteor impacts. Such impacts leave markers in the form of distinctive mineral layers. "If we find cosmogenic material," Dr. Abbott says, "the Tamarack Pond core could be a potential Rosetta Stone, linking high-resolution records of climate change from tree ring records and ice cores to the terrestrial record in bog cores." ■

Student Research Spotlight: Stand Age, Regeneration, the Understory

by Maskit Ronen

Human activities have been the main cause of disturbance in northeastern forests since European settlement. In Black Rock Forest, the most common land use was clearcutting for timber production.

With clearcutting, all the trees in a site are cleared, and a new, even-aged stand is allowed to grow. When all trees are cut regardless of their commercial value, species that are ecologically important for conserving nutrients, minimizing erosion, and serving as a source of food for wildlife are removed as well. This limits regeneration since there are no mature trees to produce seeds after the seeds initially on the ground are exhausted, and it may significantly change the understory layer of the forest as different types of plants colonize the area. The goal of my study was to examine how this so-called forest succession affects understory vegetation by looking at the relationship between forest age (years since clearcut) and the understory layer.

In July 2005, I surveyed five stands in the Forest that were clearcut in various years. The canopy trees in each stand are all approximately the same age, with averages of 36, 71, 92, 92 and 131 years in 2005. I collected data on the species and diameter of canopy trees, the number and species of tree seedlings, and the percentage of ground covered by each understory plant group or species.

I found that the understory species composition was most similar in the two 92-year-old stands, and generally differed the most between the oldest and youngest stands.

Although forest succession models predict increasing ground cover with increasing stand age, I found no significant relationship**.** This may be partly due to the limited number of samples collected from each stand and/or the lack of replication sites.

An interesting finding was the nonlinear relationship between tree regeneration and stand age. When the number of seedlings in a stand was plotted as a function of stand age, the total number of seedlings, especially of red oak and red maple, first increased and then decreased. Conversely, the numbers of shade-intolerant black birch seedlings first decreased and then increased. This may be due to factors that change as trees mature: varying light conditions, increasing competition for nutrients and moisture, and changing amounts of seeds available. Additionally, the stands were thinned after the initial clearcut, changing the natural growth of the trees and influencing the understory community.

Further study of the understory community is required, since my study was limited to one stand of each forest age, the number of samples was limited by the size of the stands, and it would be preferable to add very young and very old forests. ■

Maskit Ronen worked on this study for her undergraduate thesis at Columbia University. She plans to go to veterinary school.

Winter *(continued from page 1)*

cold weather. "The students commented on how quiet the Forest was," Ric Fry says. "Some thought the it was the best time to visit the Forest."

The Lodge in Winter

This January, the Calhoun School designed a less expensive alternative to its traditional intersession ski trip to Vermont for high school sophomores and juniors: a four-day visit to Black Rock Forest. Nine hardy students, Director of Athletics Amanda Brown, and Upper School chemistry teacher Chris Augda snowshoed, went ice fishing, tracked animals, and cooked all their meals together.

"The students loved it," says Ms. Brown. "In fact, one junior, Mirella Brussani, called it a 'winter wonderland adventure that helped some hopeless New Yorkers become transcendentalists and expert animal trackers.' It was a lot of fun and a true bonding experience."

Montessori second-graders snowshoeing.

Visitors Galore

For the Newburgh, Cornwall, and Storm King schools, Black Rock is practically their back yard. Their students participated in the Forest's trout breeding project, tracked animals, studied deer, and engaged in peer leadership training.

The Consortium also allows compatible nonmember organizations to conduct mutually beneficial activities in the Forest. Over the winter, Dr. Karin Limburg from the SUNY School of Environmental Science and Forestry at Syracuse, with support from the state Department of Environmental Conservation and the Water Resources Institute, initiated a new study of the Moodna Creek watershed; researchers from the US Forest Service studied forest inventory and analysis (FIA) plots; the Museum of the Hudson Highlands researched iron ore mining in and around the Forest; Hudson Basin River Watch held macroinvertebrate training; the Hudson River Watershed Educators visited; Friends of Fishes brought city students for outdoor education; Sullivan County BOCES held an art educators symposium; and the Black Rock Fish and Game Club learned about deer management. Hikers, of course, enjoy the trails in all seasons.

"Winter is a quieter time," notes Executive Director Dr. William Schuster, "although our new facilities allow greater activity than ever before. Visitors discover activities such as skiing, snowpack studies, and maple sugaring that are unavailable in other seasons. Eagles are much more common, ponds have a thick layer of ice, and the long views through leafless trees make winter a delightful time in the Forest." ■

Oaks *(continued from page 1)*

The greatest threat is new: so-called sudden oak death, in which groups of oaks die essentially simultaneously within periods of as short as a few weeks, leaving large stands with dead canopies and many downed trees. Caused by a previously unknown pathogen, *Phytophthora ramorum*, the disease itself is currently confined to California and Oregon, but shipments of live plants and wood products disperse the pathogen, and it has been discovered in 21 states, including in many eastern tree nurseries. It may already be present in our eastern forests.

Cascading Impacts

A rapid loss of oaks from eastern deciduous forests is likely to dramatically impact the forest ecosystem and the broader environment in complex ways. "The central idea," Dr. Naeem explains, "is that loss of a foundation species group triggers cascading events, a sort of ecological domino effect in which everything from the abundance of animals and plants to the spread of invasive species and the prevalence of disease changes. At its most complex, our forests could become unrecognizable."

For example, the canopy of oak leaves shades the forest beneath; the animals and other plants that live there are adapted to living in shade. Without those leaves, light will reach the forest floor and the soil will become dryer, influencing which plant species will replace the oaks and which animals and soil microbes will be able to survive there, with cascading impacts on insects, birds, and mammals that depend on these species. As another example, in healthy forests, nutrients and water are retained in the ecosystem, cycling among the trees, soil, and atmosphere. Before new trees take the place of dead oaks, critical nutrients such as calcium and nitrogen could leach into groundwater and stream water; water runoff, erosion, and sedimentation could all increase, damaging water quality.

An Advance Look

When other tree species have died rapidly, the American chestnut, for example, scientists have only been able to observe the effects of tree loss, rather than analyzing changes as they take place. For this study, through experimental manipulations and computerized models, the researchers plan to investigate – in advance – the likely impacts and long-term implications of the loss of oaks.

The experimental manipulation involves mimicking the natural loss of oaks in a series of 18 plots in the mature North Slope oak forest on Black Rock Mountain. One-third will be logged, using environmentally responsible techniques, to remove all canopy oak trees; in another third the oaks will be girdled to approximate the effects of sudden oak death, which leaves dead trees in place; and a third will be left as is, as a control. To evaluate the effects of herbivory by deer and other mammals, half the plots will be fenced and half left open.

Over the course of five years, the researchers will study changes in five areas they have identified as key to understanding how the loss of oaks may impact ecosystem health and services. First, they will look at ecosystem productivity, quantifying the mass of living plant species, the rate at which it accumulates, and how much carbon is stored in it. Next, they will examine nutrient cycling and water quantity and quality. Third, they will study biological diversity, quantifying changes in animal, microbial, and sub-canopy plant distribution and abundance. Fourth, they will document the response of invasive and exotic species. Finally, they will examine disease vectors, focusing on the deer ticks that harbor the bacteria that cause Lyme disease.

Computer Modeling

A key component of the study is SORTIE, a computer simulation program that models forest growth. "Forest change is a slow process," explains Dr. Maria Uriarte. "Models allow ecologists to explore how environmental changes might impact forest dynamics in the long term; they help us explore scenarios."

The SORTIE forest simulator uses individual tree data, such as species, size, location within a plot, and light availability, to develop mathematical models of seed dispersal, seedling establishment, light and nutrient availability, and tree growth and mortality. Researchers then use the simulator to explore specific disturbances — such as the impacts sudden oak death might have beyond the study's five-year data-gathering period.

The Pilot Project

The larger 18-plot study is awaiting funding (with a proposal in review at the National Science Foundation), but a pilot project is already underway in four plots adjacent to the main study area. Researchers have mapped and measured the trees, quantified the understory plants, and counted the acorns and seedlings. They have also sampled the soils, assessed light levels, and surveyed tick densities.

This past winter, three of the plots were treated the way the main plots will be (one logged, one girdled, one control); the fourth plot was logged, but 15% of the canopy oaks were left in place to enhance regeneration. Half of each plot has been fenced to exclude deer. The scientists will take ongoing measurements in these plots to study productivity, changes in the plant community, acorn production and tree regeneration, nutrient cycling, microbial biodiversity, and tick densities.

Wider Connections

Investigators from many institutions are interested in studying other facets of the oak project, including carrion beetles and dung beetles (Dr. James Danoff-Burg, Center for Environmental Research and Conservation), spiders and insects (Dr. Vladimir Ovtsharenko, American Museum of Natural History), fungal associations and soil chemistry (Dr. J. D. Lewis, Fordham University), and researchers working on a similar hemlock-removal project at the Harvard Forest.

Educational opportunities abound: the scientists estimate that two doctoral dissertations and eight masters theses can be expected as a result of the full-scale project, as well as research training for at least ten undergraduates from Columbia and Barnard alone. Students in K-12 Consortium schools will be able to tour a long-term field exhibit at the pilot plots, and the group will seek support for a public demonstration capacity.

"We hope this study will prove of lasting importance for future resource management," explains Dr. Schuster. "Our predictions of the future of the eastern deciduous forest and impacts on ecological services should inform land managers and policy makers and help them deal with current threats to the sustainability of our natural resources." ■

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. ■

Note: The online version of the newsletter does not include the e-mail contact information for the researchers; if you would like to contact one of them, you can usually find the information through the web links provided below.

Taxonomic Inventory of the Black Rock Forest in Relation to Environmental Stability: A Voucher-Based Field Collection. Angélique Corthals and Julie Feinstein (American Museum of Natural History). *Contact Angélique Corthals.*

The Future of Oak Forests: Ecosystem Consequences of Foundation Taxon Loss. 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.*

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 Data Management for Black Rock Forest Meteorological and Snow-Related Research. Jason Smerdon, Gavin Gong, and Jessie Cherry (Lamont-Doherty Earth Observatory). *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 .*■

Forest Stewardship

Black Rock Forest now has a state-approved Forest Stewardship Plan that identifies management goals for different sections of the Forest and entitles the Consortium to apply for state funding to meet these goals. It was developed by Matthew Paul of the state Department of Environmental Conservation (DEC), working with the Watershed Agricultural Council, Executive Director Dr. William Schuster, and Forest Manager John Brady.

"We had long wanted a written forest management plan," Dr. Schuster explains. "It can help us reach our goals for the property and evaluate proposals and projects to ensure that they are consistent with these goals. Also, John Brady and I share a desire to expand our forest management research, historically Black Rock's forte, so we can educate landowners and other visitors about how we can sustainably yield products from our forests."

The plan describes major management objectives for use of the Forest, forest health issues, harvesting trees for stand improvement, techniques of red oak silviculture and riparian management, and forest access methods. Dividing the Forest into four sections, it identifies existing conditions and management goals for each, including eligibility for state funding to address problems and reach goals. It provides information on tree species and a list of resources.

Activities identified in the plan include erosion control, vegetation restabilization on stream banks, control of invasive plants, and fencing to limit deer overbrowsing in experimental areas and regeneration plots. Through the DEC's Forest Land Enhancement Program, the Consortium expects to receive grants to purchase deer fencing and to stabilize some eroding old roads. "We are delighted that the Watershed Ag Council and the DEC offered to compile this plan for us, integrating our goals for management of the Forest with valuable information about sustainable forest management practices," notes Dr. Schuster. "With regular updates, it will be a valuable guide for us for many years to come."■

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Forest News in Brief

Join Us on Consortium Day! This year's Consortium Day, on Sunday June 11 from noon to 5 PM, will highlight the presentation of the annual Stillman Award to Frances Dunwell, Hudson River Estuary Coordinator at the New York State Department of Environmental Conservation and author of *The Hudson Highlands*. The day includes hikes, demonstrations by scientists and school groups, refreshments, and camaraderie.

New Members Join the Consortium. Trevor Day School and the Central Park Conservancy have joined the Consortium. In an initial collaborative project, the Forest is collecting seeds and providing plants to the Conservancy to recreate a "Highlands" ecosystem in part of Central Park; this will become a new location for the urban-rural gradient study begun last year (see "Impact of Cities on Plant Growth," Winter 2006). Trevor, an independent Manhattan school covering nursery through high school, has already held overnight trips to the Forest. Welcome!

Monthly Lodge Information Updates. Jack Caldwell, the Consortium's Operations Manager, has launched a monthly e-bulletin to provide member schools with up-to-date information about educational opportunities and the Forest Lodge. If you would like to receive this Forest Bulletin, please contact him.

State Provides Grant for School in the Forest. The Hudson River Estuary Grant Program, funded by the New York State Department of Environmental Conservation (DEC), has awarded $30,000 to the Consortium's School in the Forest project (see "Fall in the Forest for New York Public Schools," Winter 2004). The grant will enable students from the New York City public schools that participate in the program to study the connections between the Forest streams at the top of the watershed and the Hudson River into which they flow by engaging in educational activities at a riverfront park in Cornwall. Hudson River legend Tom Lake, of the DEC and also the editor of the *Hudson River Almanac*, will lend his expertise.

New Research Equipment in the Forest. Dr. Won-Young Kim of the Lamont-Doherty Earth Observatory is installing an underground seismic station near the Science Center to measure earthquake activity; the data collected will be made available for educational programs. Dr. Allan Frei and Dr. Anthony Carpi of the City University of New York, who are collaborating with Dr. Jessie Cherry from Lamont-Doherty on snow research in the Forest (see "Small Grants," p. 3), are monitoring mercury emissions from the soil surface adjacent to Old Forest Headquarters as a complement to their wintertime measurements. As guest researchers, they will provide the Consortium with site usage fees.

International Forest Organization to Meet at Forest. The International Union of Forest Research Organizations, a network that unites 15,000 scientists and 700 organizations from more than 110 countries, will hold part of its week-long traveling annual meeting at Black Rock Forest in September. They will tour ongoing research studies in the Forest, hold contributed paper sessions, and spend two nights in the Forest Lodge. ■

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Consortium Day
June 11, 2006
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Inside This Issue

Report from the Forest Manager

More than a century ago, mountain farmers lived with this Forest. The imprints they left on the land are still present. The stonework, cellars, and remnant plantings of grape and apple are hidden by a new forest that still whispers of the past.

Mountain farmers, a hardy breed, lived off the Forest's abundance and created their own abundance through subsistence farming.

Of the 16 to 20 homestead farms located within the present Black Rock Forest boundary (see "Black Rock's Hidden History," Spring 2004), many were related. Names such as Chatfield, Babcock, Rose, and O'Dell reoccur as place names. Brothers Isaac and John O'Dell lived a half mile apart, connected by their own wagon road in the back woods of Cat Hollow and Mineral Springs.

A prominently placed homesteader was Joe Hulse. With his farm located at the long-time intersection of historic Continental Road and Sutherland Road (now known as Two Gates), many a traveler may have stopped at Joe's for a cool drink and a rest after the long climb up the mountain from Cornwall. Like other mountain farmers, Joe Hulse dug out his dwelling near a rare freshwater spring. If he enjoyed views, his homestead had a long view to the sunset and to the north, facing into the cold prevailing winds of winter.

Seasonal timing met his needs. During the early days of spring, snow mixed with mud and made earth work difficult. This was a time to take advantage of sap flow. Maple sap was collected mainly from sugar maples at lower elevations but, here on the mountain, sap flow meant the easy peeling of bark. Another maple, striped maple or moosewood, could have its bark easily stripped into long thin strips used for box strapping and basket-making. These trees were common in this second-growth forest and could sprout new stems if bark stripping girdled the trunk.

Oak trees also give their bark easily in spring. A tannery a mile south on Continental Road in Bog Meadow needed supplies of bark containing tannin. The common red oak and hemlock were debarked to meet those needs. The mountain farmers returned to harvest the remaining wood during drier times.

With the signs of late winter and early spring gone, the gardens, fields and roads would call for attention. The nearly endless labor of de-stoning the ground to make room for future cultivated fields was made miserable by black flies. Soon the flowering of mountain laurel would promise the start of berry-picking season.

From spring to early winter, the silence of the woods was punctuated with the drumming of the male ruffed grouse. This once abundant game bird flourished in the young dense forest. The birds were fair game year round, as were "varmints" and deer. Most mountain farmers were well aware when hunting that harvesting females and young of the year would produce hardship in coming years.

It is most likely that Joe Hulse lived through hard-working times. But rest and reflection were also part of his life, as can been seen at Mineral Springs Falls where he and Jim Miller painstakingly chiseled their full names and the date: 1856. ■

— John Brady