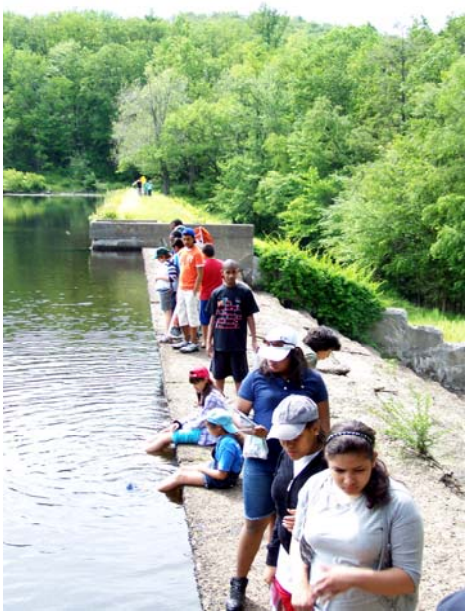
BLACK ROCK FOREST NEWS

Fall 2011 | The Black Rock Forest Consortium | Volume XXI, No. 3

Consortium Hosts Its Seventh Research Symposium

A session devoted to the Consortium's signature Future of Oak Forests project was one of the highlights of the Black Rock Forest Consortium's Seventh Research Symposium on June 20. Scientists working at the Forest or around the Hudson Highlands region also gave presentations on topics as varied as forest and climate history, microbial communities, population studies, watershed planning, and internet projects. Some 25 scientists gave talks, and six posters were displayed in the Science Center. As with the last symposium, this one was co-sponsored by the Palisades Interstate Park Commission and the Highlands Environmental Research Institute.



New York City public school students in Toyota USA-funded project collect water quality data at Aleck Meadow Pond (see article about education director). ***(Photo: Emily Cunningham)***

"A nice feature of this symposium is that it brings together young scientists, seasoned researchers, and others in between, all describing their recent research in a relaxed setting," notes Dr. William Schuster, the Consortium's executive director. "The information interchange at this symposium has often improved the interpretation of results from individual studies and has occasionally led to productive new collaborations. It includes enough talks to provide a good feel for the research activities taking place at Black Rock and around the Highlands region."

Oak Forest Study

Dr. Schuster kicked off the symposium with an overview of the oak forest project. Led by a team of faculty-level scientists, it is the first direct, manipulative investigation of the cascade of impacts likely to follow from the loss of oaks, in advance of what may occur should they succumb to current or future threats. He noted that oaks have "dominated the forest canopy of Black Rock and much of the surrounding 4-million acre Highlands region for the past 10,000 years, are considered foundation taxa, species that exert control over key ecosystem processes, and that their future is in doubt." He added that ecosystem changes have recently occurred: while aboveground forest biomass tripled from 1930 to 2000, it has decreased 15% since then due to oak mortality.

Using a species-removal technique, the study mimics the effects of pathogens, such as sudden oak death, in a series of experimental plots (some with all oaks girdled,

(continued on page 4)

Jeff Kidder

Meet the New Education Director

"Black Rock Forest offers so many educational opportunities," says Dr. Jeffrey Kidder who started work on August 15 as the Consortium's first director of education. "I look forward to exploring ways to integrate the research community with the K-12 community." As the education director, he is responsible for managing all the Consortium's education activities, as well as developing and seeking funds for new programs for undergraduates, K-12 students, and teachers.

Dr. Kidder comes to the Forest from the University of Colorado at Boulder, where he was an assistant professor in the department of ecology and evolutionary biology and led the Science Discovery program which brought professors, graduate students, and undergraduates into local classrooms and K-12 students to the university's campus. Prior to that, he was an assistant professor in the Department of Urban Education and the director of science outreach at Rutgers University. In 12 years, in these two roles, Dr. Kidder secured $8 million in science education grants from the National Science Foundation.

Dr. Kidder holds a doctorate in zoology, with a major concentration in developmental biology and minor concentrations in reproductive physiology and animal science, from Cornell University, where he also earned a masters in wildlife science. He received his undergraduate degree from Edinboro State University of Pennsylvania and worked as a high school biology teacher before entering graduate school. Initial funding to create the position of Director of Education

(continued on page 3)

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. It 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
Frederick Douglass Academy
The Hewitt 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 – 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

Consortium Staff and Officers

129 Continental Road
Cornwall NY 12518-2119
Phone: (845) 534-4517
Web: www.blackrockforest.org

Black Rock Forest News
Sibyl R. Golden, Editor

Report from the Executive Director

Since July, I have been making weekly trips to Black Rock Forest as part of my responsibilities as the Acting Executive Director, filling in for Bill Schuster who is on sabbatical. And as the weeks have gone by, I have reveled in the opportunity to observe the subtle changes in the Forest that mark the passage of time as the growing season progresses. As I write, these changes are accelerating and becoming spectacularly obvious as autumn arrives and the Forest transitions from its summer season of growth and activity to the winter season of maintenance, hibernation, and survival. Transitions are all around us, vital to the natural cycle of life in the Forest. Watching the leaves turn leads me to reflect on the meaning of these changes.

The most obvious change, leaf color, is accompanied by a more subtle but important change in our knowledge and understanding of the biology of forests. As a botany student I learned, as I'm sure many of you did, that the red anthocyanins and other pigments that give the leaves their vibrant fall color are always present but rendered invisible to our eye by the abundance of chlorophyll, the green pigment in the leaves. I was taught that in the fall, chlorophyll is broken down so nitrogen resources can be reabsorbed into the trunk where they are stored over the winter and used again the next year to produce a new batch of leaves. Only as the chlorophyll is dissembled are other pigments revealed.

Turns out, this is incorrect, at least for the red pigments; the yellows that also blend with the reds to make some of the brilliant orange colors do appear to hold to this original idea. Research published in the late 1990s gave us a new paradigm: the red pigments that create the spectacular fall colors are newly created, assembled *de novo* as the growing season draws to an end.

As with most good science, this finding poses more questions than it answers. Why would energy be invested in creating new compounds just as the tree is preparing to drop its leaves? It seems illogical, a bad investment of the precious and often limiting resources needed for tree growth. Two hypotheses have been put forth. The first is that the red pigments act as a signal, letting potential insect parasites know that the tree contains defensive compounds and should be avoided as an overwintering home. The second hypothesis is that these red pigments act as a photo-protectant, a sunscreen that that keeps leaf metabolic activity safe from the high light and cool temperatures that can mark fall days. This second hypothesis suggests that metabolic activity is needed to break down the chlorophyll molecules and move the recovered nitrogen building blocks to an overwintering storage location in the stems. By this logic, creating these sunscreens is a good use of resources, ultimately recovering more than were initially invested.

I wonder if there is not a third possibility, again related to metabolic activity. On a clear blue-sky day following a chilly autumn night, the temperatures can be quite low. Respiration is very sensitive to temperature, decreasing exponentially as leaf temperatures drop. Since respiration supplies energy and carbon to fuel metabolic reactions, it's possible that the low temperatures limit metabolic activity and thus the process of breaking down the chlorophyll. Perhaps the red colors increase the leaf temperature and stimulate respiration. Just as we wear light colors to stay cool in the midsummer sun, perhaps by creating dark pigments leaf temperatures remain high.

I suspect the answer lies somewhere at the nexus of these ideas; they are not mutually exclusive and could all be partially right. Students now learn that trees make these red colors each fall. Of course, this is not the end of it: science will push forward, continuously modifying and refining our understanding of form and function of forest trees.

As autumn marks the transition from summer to winter, soon spring will mark the transition back to summer. I too will transition back to my responsibilities as a professor, and Bill will step back into the position of executive director. I will surely miss my weekly Forest trips and my chance to watch the subtle changes in this spectacular landscape.■

— Dr. Kevin Griffin
Acting Executive Director

Hurricane Irene Visits the Forest!

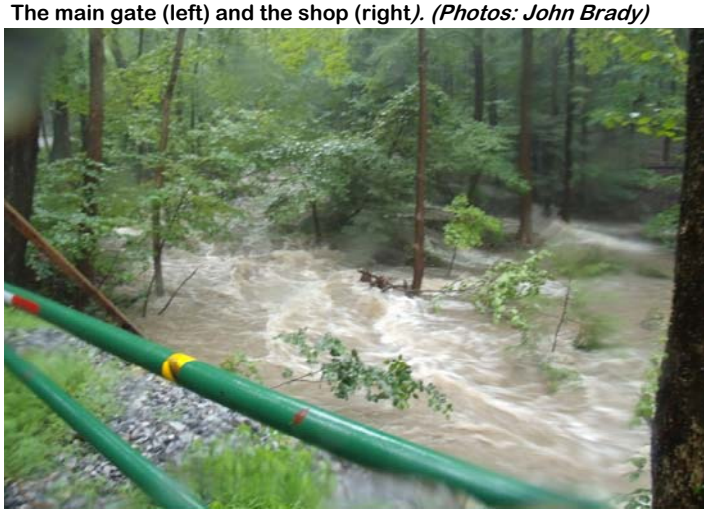
Hurricane Irene may have been downgraded to a tropical storm by the time it reached Black Rock Forest on August 27 and 28, but it still managed to dump 8.3 inches of rain on the Forest, much of it during a heavy downpour on the morning of August 28. Thanks to advance preparations by Forest Manager John Brady and the Forest crew, the damage to the Forest was reduced. They spent the three days before the storm hit getting ready by clearing ditches and creating berms to channel water. They worked during the storm too, using the force of the water to help channel road ditches. In addition, and thanks to a generous donation of new culverts from Harry Jones, the chief patrolman of the Black Rock Fish and Game Club, four culverts in major waterways had been replaced last spring with larger-diameter culverts. "The areas where these four culverts were changed were the only ones that survived the 8+ inches of rain," John Brady noted.

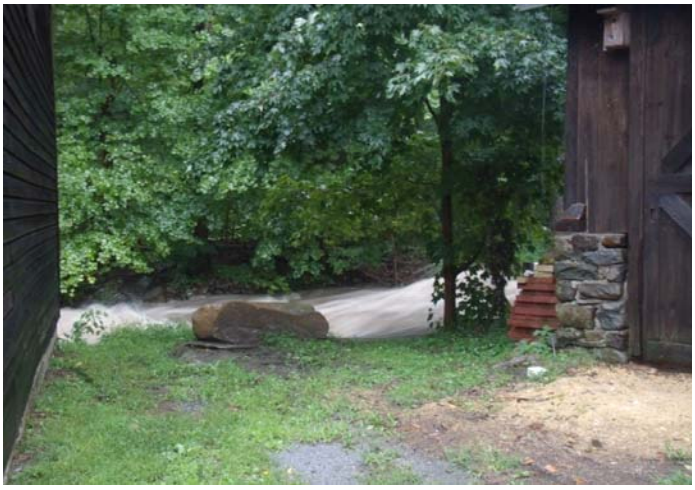
With water surging down and across them, many Forest roads had washouts, but these were repaired within a week. There was minor flooding near the shop on Continental Road and the Old Headquarters Building. The major damage involved the dam for the lower reservoir, which washed away. Fortunately, the reservoir had not been used as a water source for half a century, but the Consortium has used it for invertebrate studies. John Brady hopes to build a bench for students with the large shale slabs that capped the dam.

Even before Irene, August was a very rainy month, with 10.2 inches of rain, so the monthly total was 18.5 inches, topping not only the average 4.5 inches for the month but also the previous record of 9.8 inches. The ground was saturated and the reservoirs full before Irene arrived. September was another rainy month, with 10.9 inches of rain, bringing the total rainfall over 60 days to nearly 30 inches. Each inch of rain, John Brady explains, translates into 27,154 gallons of water per acre.

Thanks to John Brady and all his crew for their heroic efforts in preparing for hurricane Irene and cleaning up afterwards! ■

The main gate (left) and the shop (right*). (Photos: John Brady)*





Education *continued from page 1)*
was provided by The Bay and Paul Foundations, the MetLife Foundation, and the Toyota USA Foundation.

"When I first heard about this job, it sounded very exciting," Dr. Kidder explains. "I had experience doing outreach from a university to schools, but the idea of the Consortium, with its members with all kinds of resources, was amazing. I look forward to meeting people from all the member institutions to see what they're doing, learn about their programs, and seek their input about future directions." He adds that he already has many project ideas, including developing a Forest science curriculum that could be shared with Consortium members, creating teacher development programs, and incorporating educational outreach components into scientific grants.

One of Dr. Kidder's responsibilities is directing the Virtual Forest Partnership funded by the Toyota USA Foundation. Now in its second of three years, the program supports the creation of middle school modules for the Consortium's Virtual Forest Initiative and brings students from eight Harlem middle schools to the Forest. This summer, 69 students from six New York City public schools took overnight trips to the Forest, conducted water quality tests and assessed the effects of water quality on the living environment in Forest ponds, trapped turtles and collected data on them as part of a long-term study, and dissected perch to learn about fish anatomy and physiology.

When Dr. Kidder was asked about his first impressions of the Forest, he was enthusiastic, noting that staff members were very welcoming and that their dedication to the Forest and its mission is a real asset, that the facilities are wonderful, and that the Forest Lodge is comfortable and accommodating.

Now that he's been the Consortium's education director for two months, he sees the enormous potential of sharing Consortium resources with the K-12 community much more clearly. "I am very excited about establishing teacher development programs as a means for having the broadest impact on K-12 students," he explains. "Providing Consortium access and opportunities for teachers will be a primary focus of my work." ■

Students Fill the Forest in Summer

School may be out, but summer is always a busy time for students in the Forest, and this year was no exception. Undergraduates working as research interns, high school students in the Consortium's internship program and a Columbia University program, and middle school students from Newburgh and New York City all made the Forest hum with activity.

Six Barnard College undergraduates worked in the Forest this summer on projects that included monitoring bird populations to understand bird-habitat interactions; analyzing soil samples for macrofossils, carbon levels, and pollen; studying turtle populations; assisting with the environmental monitoring stations; collecting data for the Consortium's Future of Oak Forests project; and examining the 1960s legal controversy over plans to build a pumped storage plant on Storm King Mountain.

The Consortium held its fourth Field Ecology Research Internship program for high school students. Twelve students from five Consortium schools and three non-Consortium schools lived in the Forest Lodge for two weeks. Once again, Dr. Terryanne Maenza-Gmelch of Barnard College led the course, assisted by Angie Patterson, an instructor at Barnard and now a Columbia graduate student.

In the second week, the students were joined by scientists who introduced them to a diversity of research projects and methodologies. Dr. Kevin Griffin from Columbia's Lamont-Doherty Earth Observatory covered leaf traits and plant physiology, Dr. Julian Stark from the City University of New York discussed entomology, Dr. Krista McGuire from Barnard talked about mycology, and Marnie Miller and Tom Cunningham from Pace University and the Palisades Interstate Parks League of Naturalists engaged the students in radio telemetry and painted turtle biology. A parent of one of the students noted that the program leaders were "amazing teachers who created an experience that was challenging and fun."

For a second year, some 180 rising sixth and seventh grade students from the Newburgh Schools visited the Forest in a program funded by a Title I School Improvement Grant from the US Department of Education and designed to enrich English, math, and science skills and help students avert the summer loss of information. The students divided their time between the classroom and the Forest; in the Forest, they studied aquatic environments. "The students collected water quality data such as pH, dissolved oxygen, and flow, and looked at macroinvertebrates in order to measure the cleanliness of the water in the Forest and gain an appreciation for the water-purifying properties of our forests and wetlands," explains Katie Pavlis, the Consortium's research associate/environmental educator. They also studied turtle ecology and behavior, used GPS to graph elevation changes, and observed plants and animals to construct a forest food web.

Rising sixth grade students from the American Museum of Natural History's Lang Science Program visited the Forest as part of a program in which the Museum works with the students in the summers and the school years until they graduate from high school. Led by Stephanie Seto, a teacher at Browning who worked at the Forest as a Columbia masters student, the students observed amphibians in their natural habitats.

Dr. Kevin Olival from Columbia University brought 20 students, from tenth to twelfth grade, who were participating in a summer science program to the Forest for three days. They stayed in the Stone House and learned about trout restoration and turtle ecology with Forest Manager John Brady and Data/Network Manager Matt Munson.

"Introducing students to research and the joy of discovery may be the single most important thing we can do," explains Acting Executive Director Dr. Kevin Griffin. "With opportunities for students of all ages and abilities, the Forest is making a significant contribution ensuring the future of science in our communities and country." ■

Symposium *(continued from page 1)*

some with half the oaks girdled, some with all non-oaks girdled, and some controls); part of each plot is fenced to exclude deer. Before girdling, scientists obtained baseline data. More than a dozen investigators from eight institutions have participated in studies so far, examining biogeochemistry, microbial ecology, insects and small mammals, modeling, and more.

"Some of the early results," explained Dr. Schuster, "have documented how the loss of oak trees produced changes in key environmental factors like soil temperature, water, and light. Several animal taxa (ants, spiders, millipedes, mice, and chipmunks, for example) have shown significant abundance changes. Chemical changes have been noted in the forest litter and soil layers and have begun to impact soil water chemistry and process rates, including nitrification and nitrogen mineralization, and carbon cycling is dramatically altered." He noted that the experiment will continue for at least five years and that "forest models will explore what the implications may be for up to a century in the future."

Seven researchers participated in a session on the project, examining tree nitrogen use, carbon storage, abiotic changes, understory vegetation, spiders and other soil invertebrates, biogeochemical changes in water, and changes in tree biomass.

Nitrogen, Carbon, and More

Nancy Falxa-Raymond discussed the research on the ecological physiology of tree nitrogen following forest disturbance that she conducted for her masters in conservation biology at Columbia University; she now works for the US Forest Service (see "Student Research Spotlight: Tree Nitrogen Physiology," Fall 2010). She noted that nitrogen is considered a limiting element in northeastern forests and that competition by plants for nitrogen in the soil requires complex, energy-intensive, biochemical reactions. She found increases in nitrogen content in the birches (*Betula lenta*) in the girdled plots, compared to those in the control plots, and in their growth rates.

In another part of her study, she looked at the impact of urbanization on leaf nitrogen content in four other

(continued on page 5)

Symposium *(continued from page 4)*
species found in both Black Rock Forest and New York City parks, and found that it was greater in trees in the disturbed urban parks than in those in the Forest, although different species responded differently. "This indicates that the disturbed forests have more soil nitrogen available," she explained, "and that it is cycling at a faster rate. The increase in black birch growth rates suggests that they are able to respond to additional nitrogen availability and/or light availability. Together, my findings suggest that physiological differences among tree species could lead to changes in forest canopy composition in ecosystems with altered nitrogen."

Dr. Kathleen Weathers from the Cary Institute of Ecosystem Studies also looked at nitrogen. She examined soil water biogeochemistry in the treated plots as part of an effort to understand ecosystem responses to oak loss from the soil down, in particular changes in the biosphere that affect other processes such as nutrient cycling, leaching, and runoff. She found that while there was "no significant effect of girdling treatment on the amount of water collected . . . nitrate concentrations were elevated in soil water in the plots in which all oaks were girdled." She noted that her previous work in the Catskill Mountains showed that species matter to nutrient cycling and have unique nitrogen cycling profiles: maples, for example, create nitrate (NO_3, the mobile form of nitrogen) and oaks suppress its formation (nitrification) because they require more nitrogen to grow. Thus, in an oak-dominated area, there is less nitrogen leaching into water than in areas dominated by maples. She also noted that it is possible that an "oak legacy" persists in the 50% girdled plots in Black Rock Forest, although "how long this legacy may last is unknown."

Jen Levy studied below-ground carbon for her doctoral research at Columbia University (see "Student Research Spotlight: Below-Ground Carbon," Spring 2008). Part of her work involved examining the impact of girdling on forest floor litter and soil organic carbon at various depth intervals three years after the experimental plots were treated. Despite a recent hypothesis that there would be a short-term decline in below-ground carbon storage following a pest or pathogen attack, she found no differences in forest floor litter carbon, total soil organic carbon, or carbon concentration through the soil profile and across the treated plots. "We propose that shifts in the source components within the below-ground carbon pool could offset carbon losses resulting from altered decomposition rates," she explains.

Katherine Pavlis, the Consortium's research associate and coordinator of the oak forest project, described the abiotic factors that are being measured and monitored for the study. These include light, snowpack, air temperature, soil temperature, and soil moisture. Other than light and snowpack, these factors are recorded as part of the environmental monitoring arrays set up on the experimental plots. She reported that the data show "an increase in light and snowpack on oak-girdled plots, as well as a decrease in soil temperature" and that more extensive tests will be needed to ascertain whether there are differences in soil moisture in the different kinds of treated plots.

Plants and Animals

Dr. Matthew Palmer from Columbia University is monitoring the response of understory vegetation in the treated plots. He explained that the understory vegetation on the North Slope, where the study is located, is quite sparse, with a variety of native shrubs and tree seedlings being most abundant and generally few non-native invasive species, although Japanese stiltgrass (*Microstegium vimineum*) can be locally abundant. He will describe changes in understory vegetation over time, he said, "and use the data in research on plant functional traits and on the relationship between plant functional diversity and soil microbial communities."

Dr. Schuster discussed the changes in tree biomass and growth in the study area, noting that there were 7554 trees representing 20 species in 12 plots, allowing researchers to calculate biomass by species. While the forest composition is dominated by red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), black birch (*Betula lenta*), and sugar maple (*Acer saccharum*), most of these are small trees and represent only 16% of the total live above-ground biomass. "The canopy," he said, "is dominated by oak trees: red and black oaks (*Quercus rubra* and *Q. velutina,* 57% of live above-ground biomass), chestnut oak (*Q. prinus*, 18%), and white oak (*Q. alba,* 6%)."

Before girdling, total above-ground biomass averaged 250 metric tons per hectare; while the control plots have continued to increase in biomass, in plots in which all the oaks were girdled, biomass dropped to about 65 metric tons per hectare even though the non-oak trees on the plot showed a significant increase in growth rate. However, it seems that some trees are more able to survive if neighboring trees are alive: in the plots in which only half the oaks were girdled, he notes, "a higher proportion of trees were able to keep their above-ground parts alive (with biomass dropping to about 190 metric tons per hectare), either temporarily through using internal stored energy and nutrient reserves or by growing new conducting tissues across the cut area." On the plots in which non-oaks were girdled, "the girdling took longer to take effect and the proportion of trees that survived was even higher;" biomass only dropped to about 230 metric tons per acre.

He noted the importance of species differences: some trees took longer to die than oaks, and some were able to respond and grow when their competition died. "Species do matter," he concluded. "The impacts of treatments on tree species are important to understand to properly interpret responses of other ecosystem components and processes."

Dr. Vladimir Ovtcharenko of the American Museum of Natural History examined the biodiversity of spiders and other invertebrates, as well as their seasonal dynamics and biomass, in the treated plots. Between 2008 and 2010, he and Dr. Boris Zakharov of La Guardia Community College (part of the City University of New York) collected 210 species of spiders in the oak forest study plots, as well as representatives of many other orders of invertebrates including insects, crustaceans, mites, ticks, earthworms, and many more. He discovered little differences in spider biomass between the unfenced and deer exclosure parts of the study plots, suggesting that the spider com-

(continued on page 6)

Symposium *(continued from page 5)*
munity is not significantly affected by herbivorous mammals such as deer. However, spider biomass does vary with the plot's slope position: it is significantly lower on higher (and dryer) plots than on lower plots with higher humidity and more vegetation. He also found that spider biomass outside of the fenced areas "shows a very strong correlation with the type of experimental plot," with the lowest spider biomass on the plots with all the oak trees girdled, the next lowest on the plots with half of the oak trees girdled, next on the plots with all non-oaks girdled, and the maximum spider biomass on the control plots. "The data show that the state of the dominant tree's health plays an important role in species diversity and total spider biomass," he concludes.

Other Forest Research

Several talks involved other research taking place at Black Rock Forest. Emily Cunningham, the Consortium's director of program and resource development, discussed the two-year trout population assessment which "concluded that a handful of streams in the Hudson Highlands may well contain ancestral brook trout (*Salvelinus foninalis*) strains, suitable for restoration efforts." With their habitat (cool, clear streams) endangered by human transformation of the landscape, including clearcutting, stream warming and sedimentation, releases of other trout species, and pollution, the trout, the New York State fish, has been driven to the brink of extinction.

Dr. Allan Frei, from Hunter College, described statistical analyses he has been conducting with Dr. Adam Kalkstein of the neighboring US Military Academy (USMA) to reconstruct historic temperature and precipitation variations in Black Rock Forest. Since the Forest's records go back to the 1990s but other meteorologic stations in the region have longer records, they are trying to determine whether the USMA's meteorological records, which extend back decades, can be used to provide historical climate data for Black Rock Forest and the Moodna Creek watershed. Despite the proximity of the USMA site to the Forest, they have concluded that it may not be the best record to use during all seasons, but they hope to use data from other stations, resolve statistical issues, and extrapolate to produce daily as well as monthly information. Precipitation is very localized, and historical precipitation estimates will have larger uncertainties than temperature estimates. The analysis is part of their effort to create a water balance model and estimate the full hydrological cycle in the Moodna Creek watershed back to the early 20th century.

Dr. J.D. Lewis from Fordham University discussed his ongoing research on the impact of the decline of the Eastern hemlock (*Tsuga canadensis*) associated with infestation by the hemlock woolly adelgid (*Adelges tsugae*), specifically its effect on soil microbial communities, including ectomycorrhizae, the symbiotic fungi that grow around the roots of some tree species, thereby helping the trees obtain nutrients. He compared seedling growth of red oaks (*Quercus rubra*), which often replace hemlocks, in stands dominated by hemlocks infested with the woolly adelgid and in adjacent stands dominated by oaks, and determined that they grew more slowly and had significantly less ectomycorrhizal root tip density and morphotype richness in stands that were dominated by infested hemlocks. He noted that "these results suggest that oak seedling growth in declining hemlock stands may be affected by reduced ectomycorrhizal inoculum potential, and that there could be cascading effects on recruitment and growth of other species after the hemlocks die."

With Dr. Krista McGuire of Barnard and Dr. Amy Litt of the New York Botanical Garden, Dr. Lewis is also examining how other types of forest degradation, such as forest fragmentation, might be affecting the health of the Forest through the effects on the mycorrhizal community; his graduate student, Alison Cucco, discussed some of this in her presentation on urbanization effects on nitrogen cycling and plant growth.

Dr. Terryanne Maenza-Gmelch from Barnard College demonstrated the paleocological module for the Consortium's Virtual Forest Initiative, which it is developing with the Columbia Center for New Media Teaching and Learning (CCNMTL) in collaboration with Barnard College and Columbia University faculty. It is designed to provide a virtual palynological experience for undergraduates using pollen photomicrographs and pollen percentage data from cores from Sutherland Pond. Students learn pollen morphology using a diagnostic key and can also visualize the core and its pollen content at different core levels. Through interactive activities, she explains, students "learn about core sampling strategies, pollen and plant macrofossil identification, the application of radiocarbon dating methods to core samples, and the use of modern range maps to interpret paleoecological data."

Dr. Dorothy Peteet of Columbia's Lamont-Doherty Earth Observatory presented research, conducted with Dr. Maenza-Gmelch, comparing cores taken from Sutherland Pond and Sutherland Fen to "improve our understanding of the local and regional signature of vegetation in both depositional environments" as both temperature and moisture changed over the past 15,000 years. She examined changes in the macrofossils, while Dr. Maenza-Gmelch looked at pollen and spores. She concluded that both cores are needed because the pond core is especially useful for understanding regional uplands and landscape disturbance, while the fen records reveal local taxon information. They also examined the changes in carbon sequestration as climate and vegetation shifted.

Other Papers

Other papers presented at the symposium covered topics including urban-rural gradients, watershed planning, changes in the West Point Military Reservation's forest over the past two decades, biological control of invasive swallow-worts, turtle conservation and the impact of exotic turtles introduced into the environment, the paoleoenvironmental record of Constitution Marsh, restoration of Iona Island Marsh, the creation of an internet map server for the Rampao River watershed area, discovery of a crustacean previously unknown in Orange County, and the possible role of the eradication of aquatic springtails in the decline of the northern cricket frog. Abstracts of the talks, and a list of poster presentations, are available at www.blackrockforest.org/docs/scientist-resources/research-at/ResearchSymposia.html. ■

Join Us! Become a Friend of Black Rock Forest!

☐ **New Member or** ☐ **Renewal**

☐ American Chestnut	$10,000 or more
☐ Red Oak	$5000
☐ White Oak	$1000
☐ Tamarack	$500
☐ Moosewood	$250
☐ Sugar Maple	$100
☐ Individual	$20
☐ Student/Over 65	$15
☐ Family	$25

Please make checks payable to the Black Rock Forest Consortium and mail with this coupon to: Black Rock Forest, 129 Continental Road, Cornwall NY 12518-2119. *All contributions are tax-deductible; the Consortium is a 501(c)(3) organization. Thank you!*

Name _____

Address _____

_____

Phone _____

E-Mail _____

☐ My company will match my gift.
Company name and address _____

_____

☐ Please send me information concerning:
☐ Gifts of land/real estate ☐ Memorial gifts

☐ I would like to volunteer to help with the following:

_____

Forest News in Brief

Progress with Strategic Planning. Building on the ideas generated at a strategic planning meeting in May, Consortium staff have worked with consultant Marc Smiley to produce a Phase I plan containing goals and strategies for the coming year to keep the momentum going while Executive Director Dr. William Schuster is on sabbatical. Phase II, to take place after he returns in January, will refine the strategies, define specific goals, and develop methods for measuring how effectively the Consortium meets its goals. To unleash its collaborative potential, the Consortium will leverage the tremendous human and physical resources of partner institutions and the unique natural laboratory of the Forest. The plan calls for refining and disseminating a collaborative education program, both field-based and virtual, that draws on the science taking place in the Forest; becoming a major contributor of peer-reviewed research in the earth, environmental, and life sciences in the northeast; providing the scientific basis for advancing collaborative regional conservation initiatives; serving as a resource for conservation technologies; and building institutional capacity. The plan was enthusiastically endorsed by the Consortium's board and several new projects will begin this fall.

Collaborative Salamander Monitoring Project. On September 21, in collaboration with the New York City Department of Parks and Recreation, the Consortium welcomed 250 students, from fifth through tenth grades, from five New York City schools to the Forest for a citizen science project developed by the Parks Department's Natural Resources Group. The project aimed to compare salamander abundance and diversity in a rural site (the Forest) and in New York City parks as a way of monitoring forest health. In the Forest, the students followed transects; measured such factors as humidity, air temperature, leaf litter depth, size of covering objects (rocks and logs), and the number and type of invertebrates; and gathered salamander data. Congratulations to Parks for great coverage in *The New York Times*, www.nytimes.com/2011/10/08/nyregion/salamander-study-enlists-new-york-city-seventh-graders.html.

AMS in New York Times. The Urban Assembly for Applied Math and Science (AMS) was featured in a *New York Times* article, available online at www.nytimes.com/2011/09/04/nyregion/before-the-first-school-bell-teachers-In-bronx-make-house-calls.html.

Spring Fundraiser. Please mark your calendars for the Consortium's fundraising luncheon on Tuesday, May 8, 2012, from 12 to 2 PM, at the Yale Club in New York City; speakers and further details will be announced later.

New Treasurer. Since its founding in 1989, Bill Kelly has served as the Consortium's only treasurer. Now that he's moved to Georgia, he has stepped down and Geoffrey Dann has taken over as treasurer. At the September Consortium board meeting, the board passed a resolution thanking Bill for his many years of dedicated service. An investment manager for more than 20 years, Geoff has worked closely with Bill in the past and is on the board of the Cary Institute for Ecosystem Studies where he leads the Audit and Investment Committee and serves on the Finance Committee. Thank you, Bill, and welcome Geoff! ■

Black Rock Forest Consortium
129 Continental Road
Cornwall NY 12518-2119

Fundraising Luncheon!
May 8
See p. 7

Inside This Issue

Report from the Forest Manager

Geologic time has left us a wonder of nature. Below Sphagnum Pond Dam is a remnant 15-acre wetland in the upper watershed of Canterbury Brook. At an elevation of 1230 feet, the Beaver Swamp is one of the highest and most productive wetlands in the Hudson Highlands. Visitors experience its natural beauty in autumn, lively colors with a backdrop of spruce green, and witness the deafening eruption of life in early March while the surrounding forest is still locked in winter.

Originally, the northern drainage of this basin was spread over 300 feet. Water would then drop nearly 1000 feet in one short mile and merge with Black Rock Brook.

In 1780, the first compromise of its drainage was created with the building of the Continental Road across its drainage moraine. Next, it was the work of Joe Hulse, who farmed on the site during the mid- to late 1800s. Mr. Hulse benefitted because the road slowed down the flow from the beaver swamp, keeping soils moist. Remnant apple trees and grape vines are still evident near his stone-trimmed dugout homestead.

It wasn't until 1928 that the drainage would abruptly change. The Sphagnum Pond Dam was being built to create a supplemental water source for the Village of Cornwall. When released from the dam, the water would fill the swamp. Trenching at the Continental Road was needed to redirect much of the water to the Town of Cornwall's drinking water reservoir at Aleck Meadow. This was a noble engineering project for that time. Beaver returned and found the trenched outlet instinctively appropriate for damming.

In 1990, an attempt to remedy the need to filter the healthy swamp water of its turbidity, smell, and wine-colored organic water was undertaken. The reservoir water would bypass the swamp by an underground pipeline around the swamp. Twenty years later, with considerably less water, the Beaver Swamp was beaverless and starting to shrink with the advance of bordering high bush blueberry, red maple trees, and other woody stems.

Today, with help from summer rains, beavers have returned; their workings are obvious. The flooding of the swamp has given a boost to students' efforts to restore the wetlands. There is a short trail from Continental Road to view the beaver swamp. From this vantage point, a visitor may witness the beauty and spirit of this ecosystem. This site is also station ten of the Forest Ecosystem Trail. The Forest Ecosystem curriculum, organized by Isabel Ashton, explores the many trees and animals living in habitats throughout the Forest and creates awareness of the environmental factors affecting sustainability.

Currently, Jessica Vogel's Metropolitan Montessori School sixth graders are working to improve access to this station, building a small bridge and working compatibly with beavers and the land. Her wet-footed students are motivated to help others achieve dry access to a wonderful experience.

Let us see how they make out with the beaver! ■

— John Bradyy