BLACK ROCK FOREST NEWS

Fall 2009 | The Black Rock Forest Consortium | Volume XIX, No. 3

Sixth Research Symposium Highlights Forest Research

Discussing topics as varied as the future of our northeastern oak forests, the presence and impact of mercury in our environment, carbon and climate history, root morphology, slave-maker ants, the impact of invasive shrubs on earthworm and salamander populations, and a variety of other plants and animals, 23 scientists from Consortium institutions and around the Hudson Highlands gave presentations at Black Rock Forest's Sixth Research Symposium on June 22. The talks were divided into several sessions, with some taking place simultaneously in the Science Center and the Forest Lodge. Seven poster presentations were also on display.

Columbia University masters student Allisyn-Marie Gillet with a red-winged blackbird.

"This Symposium," said Dr. William Schuster, the Consortium's Executive Director, "brought together many of the people working in the Black Rock Forest region to share information about their work. Its value should grow over time as many investigators will benefit from the knowledge they gained and some new collaborations may well result."

Forests and Their Future

Dr. Schuster opened the Symposium with a comparison of the Forest to other forests in the Highlands region, undertaken to determine if and how studies in Black Rock Forest, which is centrally located in the Highlands, might be more broadly applicable. Using data from sources such as the US Forest Service and the Brooklyn Botanic Garden, he examined environmental conditions, forest stand characteristics, soils and nutrient cycling, energy flow, trophic structure, disturbance regimes, and challenges and threats. He noted that the southern half of the Highlands region, south of the glacial margin in New Jersey, differs in several parameters from the northern half, and that Black Rock Forest has more in common with the more heavily forested northern half. In a later talk, Dr. Gerry Moore, Director of Science at the Brooklyn Botanic Garden, presented an overview of the vegetation of the Highlands region.

Dr. Schuster continued with an overview of the Consortium's multiyear, multi-investigator future of oak forests project and a look at some of its initial results. The study aims to predict, in advance, some of the cascades of impacts that will result from the loss of oaks, a foundation taxon (a key species group), on northeastern forests. Using a species-removal technique, it mimics the effects of pathogens, such as sudden oak death, in a series of experimental plots (some with all oaks girdled, some with half the oaks girdled, some with all non-oaks girdled, and controls) (see "Oak Forest Update," Spring 2008). Early results

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Summer in the Forest

Students Learn and Conduct Research

Summer may be a vacation from school, but it wasn't a vacation from research and education for the 12 high school students who participated in the Consortium's second Field Ecology Research program or the college and graduate students who worked on research projects in the Forest.

Research Internship

This year's Field Ecology Research Internship program built on the success of last year's (see "Two Weeks of Forest Ecology for High School Interns," Fall 2008). The goal of the two-week, residential program is to help science-interested students gain exposure to future careers in the sciences, while learning skills needed to participate in scientific investigations.

Once again, Barnard environmental science professor Dr. Terryanne Maenza-Gmelch, with the able and enthusiastic assistance of Angelica Patterson, a research assistant in Barnard's Department of Biological Science, taught the course. This year's group, evenly split between boys and girls, included students from both independent and public schools in New York City and Orange County. Thanks to a generous contribution for scholarships from the Peter and Carmen Lucia Buck Foundation, the Consortium was able to choose students for the program on a needs-blind basis.

At the beginning of the two-week program, the students were introduced to field methods, such as keeping a nature journal, orienteering, and sampling methods. During the first week, they studied

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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
Sibyl R. Golden, Editor

Report from the Executive Director

Here are 350 words about carbon dioxide (CO_2) and climate change:

• Carbon dioxide is the fifth most common component of our atmosphere, after nitrogen, oxygen, water vapor, and argon. Yet it comprises less than 1/20th of one percent of the atmosphere.

• All organisms produce CO_2 during respiration. You and I released CO_2 into the air as we read and wrote, respectively, this sentence.

• All carbon in the tissues of all of the plants in the world came from uptake of atmospheric CO_2.

• The global balance between CO_2 uptake and CO_2 release has the earth's current atmosphere at an average concentration of about 385 parts per million (ppm) of CO_2.

• During summer, high uptake by the much greater mass of plants in the northern hemisphere (compared to the southern hemisphere) reduces the average atmospheric CO_2 level to about 380 ppm. In winter, when many plants shut down photosynthesis, the greater respiratory release drives the level back up to about 390 ppm.

• *Homo sapiens* has substantially increased atmospheric CO_2 concentrations in the past two centuries, primarily by unearthing and burning carbon-rich sediments (fossil fuels) that had been buried for millions of years.

• If not for the burning of these carbon-rich deposits, average atmospheric CO_2 concentration would still be about 280 ppm, as it was in pre-industrial times.

• Most plants, if provided with suitable growing conditions, can respond to higher CO_2 by growing faster.

• But CO_2 is also a major "greenhouse gas." That means that its presence in the atmosphere helps to keep heat present in the lower atmosphere from escaping into space.

• Independent lines of evidence demonstrate that, for hundreds of thousands of years, earth's air and surface temperatures and atmospheric CO_2 levels have been very tightly linked. Periods of low carbon dioxide concentration correspond to ice ages, while warm periods had high carbon dioxide concentrations.

• Because humans have substantially changed the earth's atmosphere (as well as ocean chemistry) through massive emissions of CO_2, which then act to retain more heat in the atmosphere and trigger climate changes, the Environmental Protection Agency in April officially listed CO_2 emission as a form of pollution.

Why did I choose to write 350 words about CO_2? 350 parts per million (or thereabout) is a level at which the most detrimental potential impacts of high atmospheric CO_2 (sea level rise, coral reef collapse, permafrost melting, etc.) can be prevented. In the words of NASA scientist James Hansen, "If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced from its current 385 ppm to at most 350 ppm." A campaign called "350.org" calls for action to bring atmospheric CO_2 back to this level. October 24 has been designated a global "day of climate action." Some people are planting 350 trees, others are hanging 350 banners, organizing bike rides with 350 riders, etc. The goal is to influence world leaders at the December international climate conference in Copenhagen to craft a new treaty on cutting emissions that will lead to reduction of average CO_2 concentration to this level. Individuals, groups, community organizations and others can find many ideas on this site for how to contribute. I chose to write this essay.

A September 1 paper published by the Royal Society (UK) analyzed various options for reducing global atmospheric CO_2 and averting the worst of the potential consequences. Even if significant reduction of CO_2 emissions takes place, levels will continue to rise and there will be climate impacts. The paper concluded that enhanced uptake by healthy forests is by far one of the best options, with minimal negative impacts. Geoengineering techniques, such as reflecting sunlight back into space, could become necessary in emergency situations, but these could have serious and detrimental impacts on organisms and ecosystems. It will certainly be better, if we can, to avoid climate emergency in the first place. ■

— Dr. William Schuster

Summer Students *(continued from page 1)* the basic principles of ecology, visited different parts of the Forest, and engaged in varied activities: identifying plants, setting and retrieving turtle traps, comparing the variety of insects caught in disturbed and undisturbed sites, and collecting and analyzing data on vegetation and birds. Some of the information collected by the students became part of the Consortium's long-term database.

By the second week, the students were ready to work directly with scientists conducting research in the Forest, including Consortium Executive Director Dr. William Schuster, Dr. Kevin Griffin from Columbia University and his doctoral student Jen Levy, Dr. Matthew Turnbull, from the University of Canterbury in New Zealand, and Dr. James Lewis from Fordham University. Each student had to engage in the scientific method by posing a question, designing an experiment, collecting and analyzing data, and writing up a report. "The research was definitely the most exciting part of the program," said Alyssa Tromibitas, a participant from the Harvey School. Kate Davis, from the Calhoun School, agreed, noting "It was so cool that our hands-on work helped produce results. I didn't expect that we would have such important roles as interns."

"This year's internship was another great success academically and socially," said Dr. Maenza-Gmelch.

Dr. Terryanne Maenza-Gmelch shows field ecology interns how to set turtle traps. ***(Photo Angelica Patterson)***

"Like last year, students were very motivated and excited about their participation in real research. As they worked side by side with scientists, they appreciated the process of posing a question and then collecting data in the field and lab that culminated in discussion and analysis of important issues in ecology."

Student Researchers

Graduate students, undergraduates, and a recent high school graduate all helped with Forest research projects over the summer. Sharon Newman, a Conservation Biology masters student in Columbia's Department of Ecology, Evolution, and Environmental Biology (E3B), trapped (and released) hundreds of small mammals, including white-footed mice (*Peromyscus leucopus*), chipmunks (*Tamias striatus*), shrews (*Blarina brevicauda* and *Sorex cinerereus*), flying squirrels (*Glaucomys sabrinus*), and voles (*Microtus pennslyvanicus* and *Clethrionomys gapperi*), as part of the Consortium's future of oak forests project (see "Oak Forest Update," Spring 2008). Using blood and scat samples to identify mammal diets, she is trying to determine if the removal of oak trees affects mammal abundances and foraging behavior by comparing data collected from different experimental plots. Her work continue Stephanie Seto's 2008 research (see "Small Mammal Response to Oak Loss," Fall 2008); her adviser is Dr. Kate McFadden.

Allisyn Gillet, another E3B masters student, worked with Dr. Christine Sheppard from the Wildlife Conservation Society and the Center for Environmental Research and Conservation collecting data on mercury concentrations in red-winged blackbirds (*Agelaius phoeniceus*) on an urban-to-rural gradient; their data will add to the breadth of the Consortium's mercury research projects (see "Mercury Research Takes Off," Spring 2007). A third E3B masters student, Sara Josenhaus, worked with Dr. Matthew Palmer and Dr. Schuster on understory vegetation in the oak project's experimental plots and tagged seedlings to enable longer-term studies of their fates.

Undergraduate researchers included Aimee Kemp, also from E3B, who became interested in the impact of invasive Japanese barberry (*Barberis thunbergii*) on soil, earthworms, and native salamanders after a field trip to the Forest with Dr. Palmer and decided to work with him on this topic for her senior thesis. "One of the biggest advantages of working at Black Rock was the support I received," she said.

Emily Spokowski, an environmental studies major at Barnard and a Lamont-Doherty intern at the Forest, worked with Dr. Schuster on various projects and conducted research on painted turtles (*Chrysemys picta*) in Aleck Meadow Pond and Sutherland Pond, using data she collected as well as data gathered over the past decade to analyze the impact of pond health (using pH as an indicator) on turtle growth rates. "I've always been interested in turtles," she noted, "but before coming to Black Rock I had never spent much time in a forest. This summer was full of hard work, but I had a lot of fun learning so many new things."

Laura Diefenbach, another Barnard student, helped establish deer exclosures near the Forest and worked with Dr. Peter Bower from Barnard, Forest Manager John Brady, and Dr. Schuster to compile the Forest's extensive deer information database into one easily sharable document and to statistically analyze that data to evaluate what factors regulate deer populations.

Peter Erwin, a Hamilton College student, was a research intern and a member of the Forest Crew. He completed field work in tree measurement, vegetation analysis, mapping, soil sample collection, and chemical analyses of water and soil samples, and also assisted with data analysis.

Finally, Noel Poindexter, a Cornwall Schools graduate who is going to Boston College this fall, worked at the Forest on an Orange-Dutchess Garden Club internship, mostly on the oak forest project,

"This was an outstanding summer for student work in the Forest," said Dr. Schuster. "The students in the Field Ecology Research internship consistently worked at a college level. And the whole group of interns and graduate students formed a nice summer community at the Forest and all supported each other's work. Much was accomplished, as should be indicated by theses and papers produced over the next year." ■

Symposium *(continued from page 1)*
show that the reduction of biomass on plots with girdled trees varied depending on whether oaks or non-oaks were girdled (the oaks tended to die, while the non-oaks often leafed out again after girdling) and that soil moisture levels were higher and respiration was lower on treated plots; increased ammonium and nitrate concentrations have been observed on some treated plots.

Jennifer Levy, a doctoral student at Lamont-Doherty Earth Observatory of Columbia University, discussed her research on soil respiration (the release of carbon dioxide, CO_2, from the soil) in the experimental plots. Her goal was to determine how much below-ground respiration comes from oak roots and their associated mycorrhizal fungi (fungi with a symbiotic relationship with tree roots) and how much from the breakdown of plant material by bacteria by comparing plots in which the trees had been girdled and died with plots with living trees. She found that about half of the soil respiration came from tree roots in the fully oak-girdled plots, but that the results in the partially girdled plots were not proportional, which might indicate the effects of the fungi. She also noted the implications for the forest carbon budget.

Stephanie Seto and Sharon Newman, masters students in Columbia's Department of Ecology, Evolution, and Environmental Biology (E3B), presented their research on small mammals in the oak forest project's experimental plots. Live trapping began in 2008 (see "Small Mammal Response to Oak Loss," Fall 2008) in order to obtain baseline data on small mammal species composition, abundances, and foraging behavior before the girdling treatments took effect, and will continue so the researchers can observe the impact of girdling. In the baseline year, they found no significant differences in species diversity, abundances, or diet among the four plot types, but they expect to see differences in future years.

Mercury Research

In recent years, Black Rock Forest has become a regional center for research on mercury in the environment (see "Mercury Research Takes Off in Forest," Spring 2007). Dr. Anthony Carpi from John Jay College of the City University of New York (CUNY) who, along with his CUNY colleague Dr. Allan Frei from Hunter College, arranged for the Consortium to join the national Mercury Deposition Network by establishing a monitoring site on adjacent West Point land, summarized their research on pathways of mercury transport in the Forest ecosystem. They have been measuring wet and dry deposition of mercury and the re-emission of mercury to the atmosphere in the Forest as part of a larger project to determine how environmental variables (such as solar radiation, temperature, and rainfall) affect mercury emissions, and thus how the mercury cycle might respond to climate change.

Sharon Newman, a Columbia masters student, with a trapped eastern chipmunk.

Allisyn-Marie Gillet, a masters student in Columbia's E3B department, presented her study of the impact of mercury on insect-eating birds. It has long been known that fish-eating birds frequently have high levels of mercury in their bodies, since mercury is known to accumulate in the fish that they eat, and that this can affect their reproductive success by reducing clutch size, parental attentiveness to chicks, fledgling growth rates, and fledgling success. However, it has only recently been shown that insect-eating birds also may accumulate mercury through their diet. Her study examines the impact of mercury on the reproductive success of red-winged blackbirds (*Agelaius phoeniceus*).

Invasive Species

Studies of invasive species, especially but not exclusively the hemlock woolly adelgid (*Adelges tsugae*), have taken place in Black Rock Forest for many years (see "Hemlock Adelgid: New Study Looks at Ecosystem Impacts," Fall 2004). J.D. Lewis from Fordham University discussed his recent work on the impact of the adelgid on hemlock trees (*Tsuga canadensis*) in which he examined changes in nitrogen uptake and needle biochemistry in trees infested by the adelgid, as well as changes in soil nitrogen cycling associated with adelgid infestation. He found that nitrogen levels were higher in both the trees and the soil when the adelgid was present, but different variables may drive soil nitrification rates, nitrogen uptake, and needle nitrogen concentrations.

Aimee Kemp, an undergraduate in Columbia's E3B department, presented the work she is doing for her senior thesis, with Dr. Matthew Palmer, on the impact of the invasive Japanese barberry (*Berberis thunbergii*) on the surrounding soil and hence on earthworms and salamanders. Leaf litter from the barberry increases the soil pH. "This facilitates the spread of invasive earthworm populations," she explained, "which in turn decrease the amount of organic matter in the soil and forest floor . . . and are expected to have pronounced effects on the leaf litter layer and subterranean components of forest ecosystems." Her research examines the impact of these effects on salamander populations; she hopes to "illustrate some of the broader impacts of exotic plant and animal invasions on forest floor communities."

Windows into the Past

Black Rock Forest can provide a window into past environments, helpful for understanding both the interactions of climate and vegetation and possible cosmic impacts that affected the Hudson Highlands. Dr. Dorothy Peteet, from NASA/Goddard Institute for Space Studies and Lamont-Doherty Earth Observatory, discussed her analysis of macrofossils in a core from Sutherland Fen, adjacent

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Symposium *(continued from page 4)*
to Sutherland Pond, which "provide new details concerning hydrological and ecological shifts" during three major climate shifts since the fen formed about 15,000 years ago as the region deglaciated. She has been able to determine both the species present and how these relate to carbon sequestration under different climatic conditions. For example, for the last 4000 years or so, in the acidic, moist fen environment, carbon accumulation is higher than in an earlier warmer and dryer period because the predominance of *Sphagnum* leads to less decomposition.

Diana Hsueh, a masters student in conservation biology in Columbia's E3B department, presented her research on past and present concentrations of carbon dioxide (CO_2) along an urban-to-rural gradient from New York City to Lamont-Doherty to Black Rock Forest to the Catskill mountains (see "CO_2 in an Urban-Rural Gradient," Spring 2009). She measured radiocarbon (^{14}C) content in tree rings to determine historic concentrations of CO_2 from the past 100-150 years and used data from a network of atmospheric monitoring stations (the Lamont Atmospheric Carbon Observation Project, LACOP) to establish current levels. Her research shows that, historically, CO_2 levels declined moving away from the city; current data suggest that the city is still exposed to higher levels, but not consistently. "By examining what CO_2 concentrations past flora were exposed to, current levels, and weather data," she explained, "we can better understand the basic physics, plant physiology, and chemistry of our surroundings, and thus have a better understanding of how urbanization affects our environment."

Dr. Dallas Abbot of Lamont-Doherty Earth Observatory discussed fossils and minerals (for example, shocked quartz) found in seven discrete layers in a core from Tamarack Pond that "are difficult to explain" except through impacts of asteroids or comets on the ocean floor, five of which must have been far away from Black Rock Forest (see "Is There Cosmic Debris in Black Rock Forest?," Winter 2007). She also noted that one of two layers containing locally derived material is the same age, about 2300 years ago, as a tsunami layer identified elsewhere in the region, evidence of a major impact in the Atlantic Ocean at that time. "If all of these layers are derived from impacts that produced craters," she said, "the data imply a very high impact rate during late Holocene time."

Ants, Snakes, and More

Several presentations focused on the fauna of the Highlands region – from ants and spiders to rattlesnakes, frogs, and mice. Dr. Christine Johnson, from the American Museum of Natural History, discussed her research on the ecology of slave-maker ants, which she explained are "specialized social parasites that repeatedly ransack colonies of other ant species for their young, which become a work force on which the slave-maker depends for its survival." She is interested in variations in the strength of reciprocal selection between parasite and host species that may depend on variations in the numbers of host and parasite species in a particular geographic area. Using a field enclosure experiment, she examined the interactions between a slave-maker species (*Protomognathus americanus*) and its host (*Temnothorax curvispinosus*) in Black Rock Forest, where the slave-maker has exclusive access to its host, and compared them to interactions at a site in Ohio where two different slave-making species compete for one host.

Dr. Vladimir Ovtsharenko, from the American Museum of Natural History, presented his ongoing research on spiders and other invertebrates of Black Rock Forest, including censusing some of the experimental plots for the Consortium's long-term future of oak forests project. Using pitfall traps from April to November, 2008, he collected all groups of invertebrates, including spiders, ticks, insects, myriapods, isopods, and snails.

Dr. Edwin McGowan of the Palisades Interstate Park Commission used radiotelemetry to study the relative impacts of male body size and male mate-searching ability on the mating behavior of timber rattlesnakes (*Crotalus horridus*). He found that larger males have a reproductive advantage during the period when females can predictably be found on outcrops where they shed their skin, and that smaller males could successfully mate by searching out females when they were elsewhere in their habitat.

Columbia undergraduate Aimee Kemp with a red salamander.

Dr. Jason Munshi-South from Baruch College of the City University of New York discussed his research using molecular genetic tools to evaluate "what types of urban land use facilitate or hinder the movement of small mammals and their genes between urban habitat fragments." He found greater genetic variability among the population of white-footed mice (*Peromyscus leucopus*) in Black Rock Forest than in urban populations from parks in the Bronx and elsewhere in New York City.

Jay Westerveld of the New York Natural History Council discussed the migration habits of the endangered northern cricket frog (*Acris crepitans*), found in nearby Glenmere Lake.

Plant Research

Brianna McTeague, a 2009 Barnard College graduate, discussed fine tree root morphology, research she did with Barnard's Dr. Hillary Callahan. They looked at the length, diameter, tissue density, and number of root tips in 23 species of mature trees in Black Rock Forest and the Pennsylvania State Experimental Forest, and discovered that root phenotypes are species-specific and do not vary geographically. "By improving our understanding of root form and function," Ms. McTeague explained, "studies like this may help improve efforts to model ecosystem-level effects of rapid climate change and shifts in vegetation boundaries."

Dr. Amy Tuininga and masters student Timothy Kerin from Fordham University presented ongoing research on the impact of the loss of eastern hemlocks (*Tsuga canadensis*), partly because of the invasive woolly adelgid (*Adelges tsugae*; see section on invasive species, above), on soil characteristics. They have discovered that decreasing densities of hemlocks

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Symposium *(continued from page 5)*
affect soil chemistry, including extractable ammonium and nitrate, and the richness and diversity of mycorrhizal fungi, species that are symbiotic with tree roots, and that these factors could affect the health and survival of the hemlocks that remain.

Citizen Scientists, Maps

Two speakers discussed the use of citizen scientists to gather data. Dr. Catherine Burns, of the University of Maine, works with "collaborative teams of academic scientists, managers, and citizen scientists . . . to quantify the abundance and diversity" of plant and animal communities in protected areas along an urbanization gradient in the New York area to determine the impact of urbanization on biodiversity and on different species groups and the features of protected areas that are especially important for biodiversity. During the project's first two years, more than 50 citizen scientists, matched with the project by the Earthwatch Institute, contributed more than 4000 person-hours of data-gathering. "We hope this research will inform management of natural and development areas in metropolitan regions around the world," said Dr. Burns, "and will also further conservation efforts in urban areas by reconnecting people with the natural environment."

Dr. Joan Ehrenfeld from Rutgers University worked with the New York-New Jersey Trail Conference to train volunteers to identify 13 exotic plant species and collect semiquantitative data on their location and abundance as they hike. Over the past three years, they trained 164 volunteers who collected data, in pairs, over 2-mile stretches of trails in three areas in New Jersey and two in New York. The volunteers' accuracy was checked by ecologists; the researchers discovered that the accuracy of the field observations was highly variable. She concluded that "citizen science data on the occurrence and abundance of exotic species requires careful validation to ensure that analyses of ecological correlates and management activities are correctly based."

Donald Steinmetz, a GIS specialist with the Highlands Environmental Research Institute (HEnRI) described its project to create an interactive map server on the internet with data on hydrologic, geologic, and political conditions within the Ramapo River watershed. HEnRI is working with the Intermunicipal Council, which represents 26 municipalities and four counties, all of which depend on the watershed. He expects this "to be an essential tool in disseminating scientific data, riparian zoning, and land use information to all concerned parties, providing transparency and a solid foundation for dialogue."

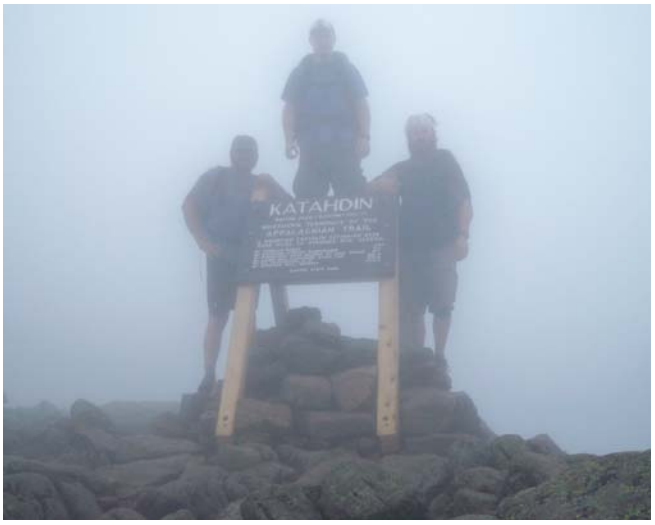
Posters

Seven scientific posters were displayed. They covered nutrient leaching as a response to the loss of oaks; variation in plant growth and reproduction along an urban-to-rural gradient; using radiocarbon data to analyze the forest, climate, and fire history of the Highlands over the past 12,500 years; turtle population management; the relationships between woolly adelgid infestations and changes in soil and fungi associated with hemlock roots; climate variability and human impacts at two sites on the Hudson River; and the impact of urbanization on the pigment content of red oak seedlings. ■

The End of the Trail !

On March 31, Matt and Ben Brady, the sons of Forest Manager John Brady and Office Manager Barbara Brady, along with Matt's dog Rogue, set out to hike the 2200-mile Appalachian Trail from Georgia to Maine (left). Matt finished the complete hike on August 21 and was joined, in wind and fog, by Ben and John atop Mount Katahdin, the northern end of the trail (right); Ben expects to complete the trail segments he missed at a later date.

Before the trip, Matt and Ben visited the third and fourth graders at the Willow Avenue and Lee Road schools of the Cornwall school system, and the students were then able to track their progress along the Trail online. In addition, the hikers requested contributions to the Forest Crew, the volunteers who help maintain the Forest; 25 people and organizations contributed $2613.■



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Forest News in Brief

Support the Forest Ride! It's not too late to support the intrepid bicyclists who will ride anywhere from 62 to 185 miles over the Columbus Day weekend, October 10-12, to raise money for the Consortium. The cyclists will enjoy the beautiful scenery of the Hudson Highlands, incomparable camaraderie, and abundant support; to find out how you can ride, volunteer, or contribute, please visit the Ride's web site, www.forestride.org. You will be helping to support science education programs at the Forest for public schools serving disadvantaged communities.

Urban Assembly Wins National Award. The Urban Assembly for Applied Math and Science, a Consortium member, won the 2009 Intel Schools of Distinction Award for excellence in middle school mathematics. The award noted that "by implementing a strategic organization of teachers, ongoing team meetings, purposeful scheduling, and extended school time, the school has been able to support their mission of math achievement . . . [T]he school designs and delivers lessons that allow students to manipulate, test, adjust, measure, conjecture, and discover." Located in the South Bronx, the Urban Assembly is a college preparatory school that is open to all students in its district. Congratulations!

Goodbye Hannah, Welcome Katie. Since 2006, first with two summer internships and then as the Consortium's Research Associate/Environmental Educator, Hannah Roth worked on a variety of projects, including the future of oak forests research. A graduate of Barnard College, she is now heading to Brooklyn Law School to pursue a degree in environmental law. Katie Pavlis, the new Research Associate/Environmental Educator, joined the Forest this summer after earning a masters degree in Conservation Biology at Columbia University. Katie notes that her "twin passions" are research and scientific education; she will divide her time among oak loss research, science education programs, and the trout restoration program.

Consortium Surveys Brook Trout Populations. Thanks to a generous grant from the Sarah K. deCoizart Article Tenth Perpetual Charitable Trust, the Consortium is working with aquatic biologist Alan Wells to survey Eastern brook trout (*Salvelinus fontinalis*) populations in Black Rock Forest. This thorough survey will set a benchmark for the ongoing effort (and the focus of the grant) to restore this native brook trout, the New York state fish, in the Hudson Highlands region.

Electricity Bills Plummet with Sales Back to Utility. Now that the Consortium can receive credit on its electricity bills for energy sent back to the grid (thanks to New York State's new net metering law permitting not-for profit organizations to do this, cosponsored by State Senator Bill Larkin), the Forest's solar panels are really proving their worth. In June, the Consortium received a bill for $0, and the local utility noted that the Consortium was receiving credit for returning 1400 kilowatt-hours of energy. Of course, the Consortium can't return that much electricity to the grid all year round; this ability peaks with the long days around the summer solstice. ■

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Join the Forest Ride!
October 10-12
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Inside This Issue

Report from the Forest Manager

The boys are back! Matt and Ben have returned from the Appalachian Trail with Rogue the dog (see "The End of the Trail!," p. 6). Matt is the only one of the through-hikers to complete the trail. Ben's knee pain became concerning in New Hampshire and he rested his legs until the end of the trail to climb Mount Katahdin with Matt and me. Rogue began to pull up lame in Massachusetts and they thought it best not to risk permanent injury. The distances covered were 2178 miles for Matthew, 1804 miles for Benjamin, and 1500 miles for Rogue (I'm sure she had many more miles on her own journeys).

With their trail name, "Brothers Rogue," the three hiked the backbone of the eastern US, the Appalachian Mountains, experiencing their beauty and awe. Meeting many different people along the way, the Brothers Rogue discovered some good old American hospitality, sometimes called "Trail Magic," a term coined by hikers to describe events that unexpectedly lift their spirits, whether an act of nature or the generosity and kindness of strangers known as "Trail Angels." Communications between hikers spread surprisingly fast, relaying trail conditions or where they might find trail magic.

The views must have been spectacular too, just like here at Black Rock Forest. Before the boys left in late March, they were helping with the clean-up from the December 12th ice storm, and were slightly disappointed because work from the storm damage still remained. One of the happiest to see their return was Joe Oliva. Joe has been an important member of the Forest Crew since 1999 and had shouldered most of the slack until the Crew was back to its full strength. All of the main roads and trails have been cleared, but many fire breaks still need work.

The funds raised by Matt, Ben, and Rogue have been partially tapped already. As a form of "forest magic," volunteers of all ages helped plant 400 white pine trees. The pines are of very hardy stock, with well developed root systems and two feet of stem growth. The three-year-old seedlings were purchased with a grant we received from the Sarah K. deCoizart Trust to help support the brook trout program and small habitat restoration projects, including re-establishing a conifer species in areas where the eastern hemlock has been devastated by the woolly adelgid. Located in rugged north-facing ravines, these conifer stands provide shading that is critical to regulate stream temperatures. Cool water temperatures help maintain higher oxygen content so important to the survival of many sensitive creatures (e.g., mayflies, caddisflies, and brook trout).

From seedlings to lumber, with the help of the volunteers, the Forest Crew milled the salvaged logs from last winter's ice storm damage on the forest sawmill. The heavy chore of stacking green lumber was gratefully shared by all. And the pizza purchased with the funds the hikers raised sure tasted good.

Matt and Ben experienced many natural connections to the land which they can call upon. These are difficult to explain, but often summed up appropriately along the trail: "It is not the destination, but the journey." ■

— John Brady