BLACK ROCK FOREST NEWS

Fall 2012 | The Black Rock Forest Consortium | Volume XXII, No. 3

Summer + Students + Science: Classes and Research

Summer always brings students to the Forest for learning and research, but the Consortium added a new feature this summer by running a series of three week-long science classes as a pilot for a larger program in the years to come. The high school students who participated in this program enjoyed the Forest, as did middle school groups and college and graduate students who helped with Forest research or worked on their own projects.

Science Classes

From July 8 through 13, 23 high school students, mostly from Consortium member schools, attended a summer science camp in the Forest that offered three intensive field classes. The students could either take an all-day class, Field Ecology and Survey Methods: A Biodiversity Blitz, taught by Barnard's Dr. Terryanne Maenza-Gmelch, or the two half-day classes: The World of Insects: Infinite Variety on a Common Theme, taught by Dr. Julian Stark who came from Queensborough Community College, and Mysterious Mammals: Trapping and Tracking the Creatures of the Night, taught by Stephanie Seto, a Browning School science teacher and a former graduate student researcher in the Forest, along with Katie Pavlis, the Consortium's research associate/environmental educator. The students stayed in the Forest Lodge, supervised by two retired local teachers, Jamie Kamlet and Chris Lee-Kamlet.

The students were enthusiastic about the program, which also included movies, walking to and telling ghost stories in the Stone House, and recreation such as ping-pong, volleyball, and water balloon fun. Comments included "The camp helped me discover who I wanted to be," "I think that this made me more enthusiastic about the outdoors. It surprised me how calm I was about the mice and insects," and "I wanna come back next year!" All of the students said they enjoyed the summer science camp and would recommend it to others; 96% said they were more interested in learning about nature after participating in the program.

Dr. Julian Stark, with students in the insect class.

One parent noted that the program provided "terrific access to the scientists in the field . . [It] definitely helped my son to be able to see himself in a career in science." The instructors were also excited about the camp. "I was very pleased with the students' interest and motivation," said Dr. Stark. "They definitely resembled young entomologists."

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Under the Canopy

The Understory and Woody Debris

Oak trees form much of the canopy of our northeastern forests, but what is happening beneath the canopy and how will this be affected by the potential loss of oaks? As part of the Black Rock Forest Consortium's Future of Oak Forest project, researchers are investigating changes in understory vegetation and how changes in coarse woody debris (dead wood) may influence the carbon cycle.

Led by a team of faculty-level scientists, the oak study 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. It uses a species removal technique (girdling) to mimic tree loss to a pathogen, 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 some controls); part of each plot is fenced to exclude deer. Each treatment type is replicated at lower, middle, and higher elevations. Before girdling, scientists obtained baseline data; more than a dozen investigators from eight institutions have examined biogeochemistry, plant diversity and ecology, microbial ecology, insects, small mammals, modeling, and more.

The Understory

"The understory is a particularly important aspect of the ecosystem to study for several reasons," explains Dr. Matthew Palmer, a Colubia University ecologist. "Since the diversity of plants is much greater than in the canopy, we can ask

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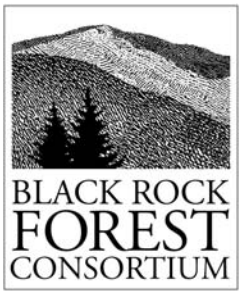

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Consortium Staff and Officers

65 Reservoir Road, Cornwall NY 12518
Phone: (845) 534-4517
E-Mail: brfoffice @ blackrockforest.org
Web: www.blackrockforest.org

Editor: Sibyl R. Golden

Report from the Executive Director

Black Rock Forest Consortium's new Strategic Plan (to be highlighted in our next newsletter) represents the continuing growth of our organization. It also mirrors changes taking place in our society, in science and many other endeavors. In our Strategic Plan, collaboration, use of new technologies, and sharing information through universal access are central to achieveing our mission of advancing scientific understanding of the natural world.

The Consortium's previous strategic plans focused inward as we built a functional organization that served institutions and people. Following our Master Plan of 1998, we built our Science Center and Forest Lodge, which have enriched the experiences of more than 100,000 students, teachers, and scientists. Following our Long Range Plan of 2004, we hired an Operations Manager, a Director of Education, and a Director of Development to establish our core staff structure and capabilities.

We will now begin to implement our 2012-2017 Strategic Plan. Core foci are development of collaborative teams to take advantage of the tremendous resources of our Consortium, outreach to a broader audience than ever before, and universal information accessibility. Our shared goal, and challenge, are to maximize the benefits of a true Consortium with renewed commitments from each of our member institutions. And we have included a commitment to interact productively with the rest of the world to achieve a more sustainable future. The first stated goal, of fifteen in the plan, is to provide simplified and universal access to the vast scientific information and collections developed at the Black Rock Forest over the past 82 years

A recent example illustrates why this is so important. Dr. Joel Cohen, of Rockefeller and Columbia universities, asked last year if we had certain types of spatially and temporally explicit data available from studies of the trees in Black Rock Forest. He was working on a grant from the National Science Foundation to investigate mathematical relationships underlying variations in the spatial distribution of different types of organisms (see "New Use for Data," p. 6). The Consortium did indeed have the required type of data, including historical records collected by staff as far back as 1930. But the capability has not existed – the technological infrastructure and staff expertise – to make these data widely known and easily accessible to anyone interested. Once Joel and his postdoctoral associate Meng Xu obtained these data, they proved to be a treasure trove. Their first paper, published in the *Proceedings of the National Academy of Sciences*, confirms their theoretical predictions with Black Rock Forest data. A second manuscript, now in review, helps explain Taylor's Law, a widely recognized but incompletely understood pattern in population ecology; more are planned. How much farther will science advance when voluminous historical data from places like the Forest become easily accessible around the world?

Information not properly preserved, documented, and shared too easily becomes knowledge lost forever. That is why many journals now require that underlying data sets be published along with the resulting papers. The National Science Foundation now requires that all funded studies implement data management plans to ensure that data will be preserved for use by others. New insights into large-scale patterns are becoming possible through the ability to access and simultaneously analyze large numbers of data sets over vast regions.

When I examined data and tree populations in the field, from Pennsylvania through Connecticut, for a chapter in *The Highlands* (see "New Book," Winter 2012), I found that the most important factors driving change (e.g., excess herbivory, invasive species, altered disturbance regimes, climate changes) are not local, but shared across the region and sometimes the globe. To address and solve issues like these will require thinking outwards, working collaboratively, and a willingness to share. Effective information sharing can only make the scientific process more robust and advance understanding and produce societal benefits we cannot even envision today. ■

— Dr. William Schuster

Oak Study *(continued from page 1)*
questions about the effects of diversity on ecosystem processes. Additionally, ecological interactions in the understory, such as competition for resources and herbivory, will affect the structure and function of the forest in the future, as the understory vegetation may affect the germination, growth rates, rates of herbivory, and mortality of tree seedlings before they grow up to higher layers in the forest. Finally, understory vegetation responds to change relatively quickly compared to changes in the tree canopy, providing results in a few years rather than a few decades."

Dr. Palmer and his students established plots within the main oak forest study plots. The team annually samples all the vascular plants in the understory, including ferns, broadleaf flowering plants, grasses and sedges, and woody plants, and make annual counts of tree seedlings by tagging individuals and following them through the years. They look at how the canopy treatment affects the understory and the effects of the position along the slope and the presence or absence of deer exclosures.

In analyzing the first two years of data, the researchers have found that both the canopy and the deer exclosures influence understory vegetation. The plots with all the oaks girdled have both the greatest abundance of understory vegetation and the greatest number of different species, known as species richness. The plots with all the non-oaks girdled have intermediate (and variable) levels of both abundance and richness. The remaining two types of plots, those with half the oaks girdled and the control plots, have low understory abundance and richness.

"Our interpretation," Dr. Palmer says, "is that removing all the oak trees creates the greatest canopy disturbance and therefore releases resources such as light, water, and probably nutrients, a result we expected. We would have expected smaller but similar effects for the plots in which fewer canopy trees were removed, rather than the variable results for the non-oak plots and the lack of an effect in the 50% oak plots; these results suggest that there is some kind of threshold effect in which small losses to the oak canopy are buffered, but large losses have large effects on the understory." Interestingly, he also notes that while the amount of vegetation increases when deer are excluded, the species diversity is quite variable and has not, so far, responded to the exclusion of deer.

Next steps include collecting and analyzing the 2012 data and preparing a paper, and Dr. Palmer hopes to continue monitoring these plots in the years ahead as the forest begins to recover from the canopy disturbance. He also hopes to work with his colleague Dr. Shahid Naeem on relating the changes in structure of the understory vegetation to the functions performed by that vegetation, including effects on soils, hydrology, and nutrient dynamics.

Katie Pavlis and Sara Pace surveying understory vegetation.

Woody Debris

Katie Pavlis, the Consortium's research associate/environmental educator, has been working on the coarse woody debris study with a variety of summer interns, under the guidance of Dr. William Schuster, the Consortium's executive director. Coarse woody debris is large (over 7.5 cm in diameter) pieces of dead wood, such as stumps, branches, logs, and snags (standing dead trees), Ms. Pavlis explains. "It is important because it relates to other variables we are measuring on the study plots, especially how the carbon cycle may change with the loss of oaks. Trees take up carbon as carbon dioxide and release oxygen, and are therefore very important in acting as carbon reservoirs and providing clean air for us to breathe. Different tree species take up carbon and decay at different rates, so the loss of one species may have a different effect than the loss of another. We are interested in how the loss of oaks will change the carbon cycle, which will help us understand other changes such as those in understory vegetation and soil decomposition."

Because the pieces of woody debris generally come in odd shapes and are often too heavy to lift, Ms. Pavlis and the student interns use measurements and geometry to estimate the volume of objects, and density values known from previous Black Rock Forest studies and published information to calculate the dry mass of the pieces of debris. They also determine the tree species (easier for newly dead pieces of wood and harder for wood that has decayed more) and the decay class, categorized from class 1, for pieces that still have hard wood, bark, and attached fine twigs, to class 5, for pieces that barely hold their shape and can be easily broken with one's hands. They have also been examining the decay rates of different species.

Ms. Pavlis and Dr. Schuster are still analyzing their data, but the 2010 results show, not surprisingly, 100 to 1000 times more coarse woody debris on the oak-girdled plots than on the controls. The next steps are to combine the data on the coarse woody debris with data on tree growth rates, leaf litter, soil carbon, and respiration (from a study by former graduate student Jennifer Levy; see "Student Research Spotlight," Spring 2008) to understand how the debris affects the carbon cycle, and to produce a paper.

"One interesting early result of the study is that oak trees not only store carbon at much faster rates than all the other tree species," says Dr. Schuster, "but they also hold on to that carbon for much longer after death – as long as 60 years in some specimens examined."

"At one time dead wood was considered to be "waste" and was neglected or removed," he adds. "But it is now appreciated that woody debris is a critical part of the forest ecosystem, conserving nutrients, adding structure, and providing resources and homes for a great variety of native organisms. To thoroughly understand how ecosystems function and respond to disturbance, understory plants and dead wood must be studied." ■

Student Spotlight: Interning at the Forest

by Emily Jager

For my last six weeks of high school at the Calhoun School, I spent three days a week working as an intern at Black Rock Forest. I was inspired to do this by four class trips to the Forest in the past year.

Every day I did something different and and learned something new. I mostly worked with Katie Pavlis, the Consortium's research assistant and environmental educator, and the things I was involved with ranged from collecting and measuring water samples obtained from lysimeters throughout the experimental plots in the Forest to putting together centerpieces for the Consortium's benefit luncheon. One day I sat in a classroom and learned how to differentiate mammal skulls, and another day I accidentally fell into Sphagnum Pond while I was out searching for macroinvertebrates with a dip net and wading boots. One of my favorite activities was helping out with school groups. I really enjoyed having so many different experiences because I got a good overview of everything that happens at Black Rock and all that the Consortium is capable of.

I had planned on learning to teach a class on my own, and Jeff Kidder (the Consortium's education director) gave me the opportunity to be the teaching assistant in the mammal class taught by Katie Pavlis and Stephanie Seto in the summer program for high school students. We went out each evening to set mammal traps with the students and, each morning at 7 AM, alternating groups of students went out to check the traps. The class also included classroom instruction and trivia games that sparked discussion of what had been taught earlier. I've always had the idea of potentially being a teacher in the back of my mind, and I was able to learn about and experience what teaching is like.

Working in the Forest has been the main influence for my interest in biology and ecology. I am currently attending Bucknell University in Lewisburg, PA, and I plan on majoring in environmental studies. I had an interest in biology before I came to work in the Forest, but the experience I had allowed me to see what more specifically I love and am passionate about. During my stay in the Forest, I was also inspired to make some sketches and small watercolors that have furthered my love for art and have motivated me to consider double majoring or at least minoring in studio art. ■

Emily Jager graduated from the Calhoun School last spring and now is a freshman at Bucknell University.

The Virtual and the Real: Modules on Water Quality and Mammals

Teachers from a network of New York public schools will bring their middle- and high-school classes to the Forest this fall for water chemistry field investigations based on the web-based, interactive modules known as the Virtual Forest, and in the spring for the rapidly developing mammal/habitat ecology module. These projects are possible thanks to a generous three-year, $500,000 grant from the Toyota USA Foundation that allows the Consortium to collaborate with Columbia's Center for New Media Teaching and Learning (CCNMTL) and New York City and Newburgh public schools (see "Virtual Forest," Winter 2012).

"Two key components of the project are teacher training before classes come to the Forest and program evaluation," says Dr. Jeff Kidder, the Consortium's education director. "The evaluator will develop methods that teachers can use to measure what their students have learned: their subject knowledge, problem-solving abilities, graphing and analysis skills, and facility using instruments and technology." Teachers will focus on dissolved oxygen and acidity, and on aquatic pollution and eutrophication if they have time.

The students learn about the importance of dissolved oxygen for the health of aquatic systems, its influence on which species can live in them, and the physical, biological, and human factors that can affect dissolved oxygen levels. They measure dissolved oxygen in Cascade Brook and other ponds and streams and study the relationships between water chemistry and the organisms they find in each location. Back in the classroom, they use a graphing tool in the Virtual Forest module to examine long-term data recorded from the Brook to look at how dissolved oxygen levels change over time, compare them to measurements made at the same time in the Hudson and Harlem rivers, and try to figure out what causes these changing levels of dissolved oxygen and the implications for aquatic life.

The mammal module also has both real and virtual components, and is the first of a series of planned modular curricula for use at the Forest and in schools. Dr. Kidder has long been using skulls and skins to teach about mammal characteristics, adaptations, and classification; now he has created kits (curriculum modules) that can travel to schools so Consortium teachers can use them in their own classrooms. Teachers will be able to obtain the kits starting next March, and participate in a teacher-training workshop on using them. At Black Rock, students can participate in live mammal trapping (and release), seeing animals from shrews and flying squirrels to coyotes up close without direct contact.

These trapping data will be fed into habitat maps that the CCNMTL team is creating, dividing the Forest into blocks. Using this grid, GPS, compasses, and a 30-meter tape measure, students will be able to place traps in random locations to scientifically sample and document the spatial diversity of mammals in the Forest. The data they obtain, as well as observational data, will then become part of the habitat maps. Students will be able to study habitat ecology (where different species of mammals are found), investigate differences between the habitats of generalists and specialists, and more. ■

Students *(continued from page 1)*

Dr. Jeff Kidder, the Consortium's education director, initiated the summer science class program based on his experiences connecting university professors and graduate students with middle- and high-school students at Cornell and Rutgers universities and, most recently, at the University of Colorado at Boulder. "This year's camp was a pilot," he explains, "so we could get the program up and running. We want to expand it to include more courses at more locations, including sites at member schools in New York City, over a longer time period, and we plan to increase the number of classes and sites each year." The program is designed to provide authentic science learning experiences in the classroom, laboratory, and field, as well as to produce revenue for the Consortium, although scholarships will be available for some students who could not otherwise afford to attend. This year, scholarships were generously funded by the David L. Klein, Jr. Foundation and by the Garden Club of Orange and Dutchess Counties.

The program also serves as a teacher development program, as Dr. Kidder hopes to involve teachers from Consortium member schools in the classes so they can add their classroom expertise. The teachers increase their content knowledge and gain experience with new laboratory and field techniques that they can take back to their classrooms.

This year, Veronica Dunham, a Newburgh Schools teacher, and Andrew Peterson, from a Brooklyn public school, assisted with the classes, as did Emily Jager, a recent Calhoun School graduate who was interning at the Forest (see "Student Spotlight," p. 4). "As a teaching assistant," Ms. Dunham notes, "I learned techniques used in the field by scientists studying plants, insects, and mammals."

Middle School Visits

For a third year, Newburgh students entering the sixth and seventh grades came to the Forest as part of the Newburgh Schools summer STEM program funded by a Title I School Improvement Grant from the US Department of Education. About 100 students split their time between the classroom and the Forest, where they participated in tree, salamander, macroinvertebrate, and turtle studies. They hiked, made observations about animals they saw, learned to identify evidence of animals, observed animals "caught" in camera traps, and worked on graphing, data analysis, and art and writing projects. Zachary Coto, a student from the College of Environmental Science and Forestry at the State University of New York in Syracuse, helped Jack Caldwell, the Consortium's operations manager, with the program.

Thanks to their winning a competitive grant to participate in New York City's Summer Quest, an initiative funded by the city's Department of Education and Department of Youth and Community Development, and by the Fund for Public Schools, the Urban Assembly School for Applied Math and Science (AMS) brought some 100 middle school students to the Forest for overnight stays as part of its five-week Camp AMS.

Like the Newburgh program, Summer Quest is intended to avert summer learning loss, which research shows accounts for more than 50% of the achievement gap between higher– and lower-income communities. The AMS program was designed to provide "rich, fun, and intellectual activities," according to David Krulwich, the school's principal. Students spent two weeks each at the beginning and end of the summer at AMS and visited the Forest during a mid-summer week.

For most of the students, it was their first overnight camping trip. They hiked up Eagle Cliff, carried their supplies to and from the Stone House, and cooked dinner over a campfire. "Although the entire program was a huge success," says Mr. Krulwich, "the camping trips were the highlight of the summer. They allowed our students to experience "sleep-away camp" in a beautiful setting outside the City. If we get funding in future years, we would love to expand the program to include longer Forest visits with science activities."

Student Research

As usual, a variety of college and graduate students worked in the Forest over the summer. Sarah Gilly, who will be a senior at Barnard College in the fall, helped with general Forest research and, as part of her senior thesis project, assisted Dr. Terryanne Maenza-Gmelch, also from Barnard, on her study of the relationships among bird diversity, plant species diversity, and forest structural complexity (see "Student Research Spotlight," Spring 2012). Another Barnard student, Madeline Hirshan, who will be a junior, also helped with general Forest research and worked with Dr. William Schuster, the Consortium's executive director, Katie Pavlis, and Barnard professor Dr. Peter Bower to design a senior thesis project on the effect of forest use on mammal diversity and behavior that she will work on next summer.

Sara Pace, who received a master's from Columbia University's Department of Ecology, Evolution, and Environmental Biology, helped survey the understory vegetation inside and outside deer exclosures as part of the Future of Oak Forest research (see "Under the Canopy," p. 1) and also helped with bird surveys. Angelica Patterson conducted research for her doctoral degree at Columbia; she is studying physiological responses to increasing temperature of tree species that have northern or southern range limits within the Hudson Highlands (see "Student Research Spotlight," Winter 2012). She was assisted by Jamie Yu, another Barnard student.

Finally, the Consortium benefitted from the enthusiastic help of a variety of interns, including Whit Schuster, Dr. Schuster's son, and his friends Shane Ward and Justyn Trella, all Cornwall High School graduates, as well as Corey Allred (Carlton College), Alex Patton (Penn State Altoona), and Emily Jager, a recent Calhoun School graduate. They helped with various research projects. The Consortium also enjoyed the assistance of Kelly Seiz, a Storm King School graduate now a journalism major at SUNY Albany, who worked in the office as an administrative and program assistant.

"Working and living here for extended periods in the summer gives students experience conducting research and training in modern field and lab methods," explains Dr. Schuster, "and creates a feeling of camaraderie and a community committed to deeper understanding of nature. And the students provide an enthusiastic workforce that substantially advances the Consortium's mission and specific goals in research, education, and conservation." ■

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. ■

Linking Holocene Vegetation and Carbon Accumulation with Hydrological Change using Macrofossils, C/N, Stable Isotopes and Biomarkers from Sutherland Pond/Fen and Tamarack Pond. Dorothy Peteet (Lamont-Doherty Earth Observatory, Columbia University). *Contact: peteet@ldeo.columbia.edu.*

Analysis of Avian Diversity in Relation to Habitat Diversity in the Black Rock Forest-Schunemunk Mountain Wildlife Corridor. Sarah Gilly and Terryanne Maenza-Gmelch (Barnard College). *Contact: Terryanne Maenza-Gmelch (tm263 @columbia.edu).*

Scaling of Variability in Populations, Individuals, and Ecosystems: Taylor's Law and Beyond. Joel E. Cohen (Rockefeller University and Columbia University), Meng Xu (Rockefeller University), and William Schuster (Black Rock Forest). *Contact: William Schuster (wschuster @blackrockforest.org).*

Temperature Tolerance of the Physiological Processes Controlling Carbon Gain in Northeastern Forest. Angelica Patterson and Kevin Griffin (Lamont-Doherty Earth Observatory, Columbia University). *Contact Kevin Griffin (griff @ldeo.columbia.edu).*

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

Impacts of Oak Mortality on the Black-Legged Tick (*Ixodes scapularis*), the Primary Vector of Lyme Disease. Mary Killilea (New York University). *Contact: mek5 @nyu.edu..*

The Future of Oak Forests. William Schuster (Black Rock Forest), Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), Shahid Naeem (Columbia University), Kathleen Weathers (Cary Institute for Ecosystem Studies), and Jerry Melillo (The Ecosystems Center, Marine Biological Laboratory). *Contact: William Schuster (wschuster @blackrockforest.org).*

Population Dynamics of Painted Turtles in the Black Rock Forest. Christopher Raxworthy (American Museum of Natural History) and William Schuster (Black Rock Forest). *Contact: William Schuster (wschuster @blackrockforest.org).*

Native Plant Performance along an Urbanization Gradient. Kevin Griffin and Natalie Boelman (Lamont-Doherty Earth Observatory), William Schuster (Black Rock Forest), Matthew Brown (Central Park Conservancy), and J. D. Lewis (Fordham University). *Contact: Kevin Griffin (griff @ ldeo.columbia.edu).*

Ecology of Slave-Maker Ants and Their Hosts: The Effect of Geographic Variation in Parasite and Host Range on Co-Evolutionary Trajectories. Christine A. Johnson (American Museum of Natural History). *Contact: cjohnson1 @amnh.org.*

The Carbon and Nitrogen Dynamics of Coarse Woody Debris in an Oak-Dominated Northern Forest. Matthew Palmer and Dan Flynn (Columbia University) and Kevin Griffin (Lamont-Doherty Earth Observatory, Columbia University). *Contact: Matthew Palmer (mp2434 @columbia.edu).*

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

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

New Use for Data

Data from the Forest's long-term plots, in which individual trees on fixed plots have been counted and measured for more than 75 years, have been put to a new use by Dr. Joel Cohen, a mathematical population biologist associated with both Rockefeller and Columbia universities. Working with his colleague Dr. Meng Xu and Dr. William Schuster, the Consortium's executive director, Dr. Cohen used the tree data to test and extend a well-known pattern in population variability called Taylor's law: it says that the greater the average population density of a species or group of related species, the greater the variability in the population density.

"Variations in time or space of population density have practical consequences for fisheries, forestry, agriculture, and the control of pests that transmit animal and plant diseases," explains Dr. Cohen. "So it is important to understand the variability of populations."

The scientists also used data from the Consortium's oak forest study and a 1985 Forest-wide survey. Dr. Cohen adds that because the foresters measured the trees as well as counting them, he can study how the variability of population sizes is related to the size of trees. "Connecting individual characteristics like body size with population size is an exciting new area for basic and practical ecological research."

"This study documents how important it is to carefully record and preserve scientific data and make them available to others," says Dr. Schuster. "Past Forest researchers like Hal Tryon, Jack Karnig, and James and Kathleen Friday could not possibly have foreseen the future uses of their data, but they kept meticulous records and Forest staff have preserved those data and made them available so they can continue to be used to advance our understanding of nature."

The first of several reports on this work has been published in the *Proceedings of the National Academy of Sciences*. Dr. Cohen is grateful to the National Science Foundation for a grant to The Rockefeller University that supported his and Dr. Xu's work. ■

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Forest News in Brief

Strategic Planning Process Nears Conclusion. Since the spring of 2011, the Consortium has been engaged in a strategic planning process that has involved almost everyone connected to the Consortium: institutional members, board members, staff, scientists and educators working at the Forest, and an outside facilitator, Marc Smiley of Solid Ground Consulting. After discussions and revisions, the final plan will be presented to the board for adoption at its fall meeting. The plan includes goals for research, education, conservation, and capacity building, and provides benchmarks for accomplishing a variety of projects. A detailed article will appear in the next issue of this newsletter.

Spring Benefit on May 8, 2013. Following its successful 2012 luncheon (see "Festive Luncheon Supports Forest, Spring 2012), the Consortium is planning an even more exciting benefit luncheon for May 8, 2013, at the Metropolitan Club in Manhattan. The speaker will be the world-famous biodiversity expert Dr. Thomas Lovejoy, now the Biodiversity Chair at the Heinz Center for Science, Economics, and the Environment. Plans are still being developed, and more information will appear in the winter issue of the newsletter, but mark your calendars now!

Teacher's College Joins Consortium. Teacher's College of Columbia University, the oldest and largest graduate school of education in the country, is the newest member of the Consortium. Dr. Thomas James, Provost and Dean of the College, is excited about the opportunities for teacher training and collaboration with Consortium scientists and educators. A future newsletter article will describe Teacher's College and its plans for working in the Forest and with the Consortium in more detail.

Our Mail Is Moving, But We're Not! The Black Rock Forest Consortium is changing its mailing address to 65 Reservoir Road, Cornwall, NY 12518. This address is at the entrance to the Forest, and so is more convenient for staff than the old mailing address which was on the other side of Route 9W at the Old Headquarters Building.

Tree Dedicated in Memory of Constantine Sidamon-Eristoff. On July 14, the family of Connie Sidamon-Eristoff met at the Forest to dedicate a "Northern Spy" heritage apple tree in his memory. Mr. Sidamon-Eristoff, along with his wife Anne, who has served on the board of the Consortium since it was created, had been devoted to environmental causes for decades. In 2003, the Consortium awarded them its E. G. Stillman Award, named for the Forest's founder, for environmental leadership and support of Black Rock Forest and the Hudson Highlands region.

ASTE Returns to Forest for Meeting. In October, the Association for Science Teacher Education will once again hold its northeast regional meeting at Black Rock Forest. The mission of the organization is to promote excellence in science teacher education world-wide through scholarship and innovation. According to Dr. Mary Leou, the representative of New York University's Steinhardt School of Culture, Education, and Human Development to the Consortium's board, ASTE is looking forward to an exciting meeting of science teacher educators, scientists, science coordinators and supervisors, and informal science educators. ■

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Report from the Forest Manager

Fall has arrived, and students of all ages continue to visit Black Rock Forest, learning and enjoying the ways of the woods. Seasonal changes in the Forest offer lessons in science and math and develop student understanding and appreciation.

Primary school students become acquainted with the Forest by hiking on trails through varied habitats and then reflecting on top of one of the Forest's eight mountains. Along the way, teachers translate the survival techniques and basic principles of life offered by trees and animals.

The appearance of bird, amphibian, and reptile life brings incessant questions: What is it? Where did it come from? What does it eat? Does it bite? Teachers prod the young minds for the answers and discuss explanations with the class.

Acorns that fall in late September to mid-October become more than a tree seed. Collection, counting, and viability measurements provide a hands-on understanding of plant and animal connections.

Third-grade teachers from the Cornwall Schools use fall to continue their seasonal observations. Environmental measurements of soil, water, and air, in addition to plant and animal observations, are recorded and pictured. The students analyze and compare data, and eight- and nine-year-olds will develop their own understanding of seasonal changes. Students will then work in small groups to present their data and conclusions to fellow students and parents in June.

Autumn is also the time of year to begin a brook trout nursery. Third- to sixth-grade teachers will take advantage of the fall spawning and raise the young fish from egg to adult in the classroom and here at Black Rock. As offspring develop, biology, math, and water chemistry lessons relate the sensitivities of the food web.

Release of the trout, which is the New York State Fish, in the waters of Black Rock Forest is the final stage, and these young aquaculturists determine the best stocking area to release the fish they have come to know so much about.

Fall is also the time when the Montessori School's sixth grade starts its annual construction project. The projects of past years, which included designing and building trails, bridges, and boardwalks, have helped Consortium members access sites safely. This year's project is very ambitious: the students will build a pavilion not far from the Stone House. This lean-to-type structure will be used by the Consortium as a sheltered educational outpost and will also assist Consortium overnight campers. The young architects will participate in design, forest lumber preparation, and construction.

While the Forest's natural rhythms turn a new season, so do the teachings of the Consortium teachers. As winter arrives, the strength and endurance of the Forest will be their natural focus until the lessons of spring burst forth. ■

— John Brady