

BLACK ROCK FOREST NEWS

Fall 2013

The Black Rock Forest Consortium

Volume XXIII, No. 3

Students and Teachers Rave about Summer Science Camp!



Dr. Antonia Florio and Dr. Bryan Falk measure a snapping turtle in the Surveying Turtles class.

The Black Rock Forest Consortium's pilot program of four weeks of Summer Science Camp, three at the Forest and one at the University of Florida's Seahorse Key Marine Laboratory, was a big hit with students, teachers, and parents. Students said, "I loved how we got to hold the turtles," "I loved going out and catching bugs," "The instructors were awesome," and "I felt ecstatic about the camp," and many are already thinking about coming back next year and telling their friends about it. Parents raved too. "I was so impressed at [my son's] field journal and the detailed notes he took. They really show me his interest and excitement about the program. . . He and I cannot wait until next year," wrote one. Another noted that her daughter didn't watch television when she came home from the camp; instead "her time is spent reading and doing research on the computer. I am happy to see such a change in my daughter."

Emily Boronkay, a Storm King School teacher who assisted with several class-

es, noted that she learned a lot she could apply to her classroom. "The teachers were so enthusiastic and made the 'work' so inviting that even the most reserved and timid of campers found a way to participate," she said. "Another benefit of the camp," she added, "for students who love to learn, who love science, and who are excited by things that many think are weird, who are probably the nerdy students at their schools, is the opportunity to be with their peers. I don't think anyone anticipated how powerful that experience would be. During the high school week, the connections between students who might never have been with their true peers before was wonderful to observe. They bonded quickly and spent the week laughing and talking about ideas and observations. Beautiful!"

The Camp Program

The concept of the camp, as developed by the Consortium's education director

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Research Symposium

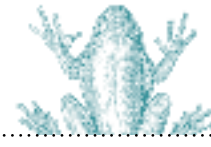
Consortium Hosts Regional Scientists

Scientists working at Black Rock Forest and around the Hudson Highlands region presented their work at the Consortium's eighth Research Symposium, held on June 17, 2013. Some 100 people attended the event, which included 36 talks as well as eight posters on display in the Science Center. The symposium, co-sponsored by the Palisades Interstate Park Commission, was divided into four sessions: a plenary in the morning, and simultaneous afternoon programs on water resources and biodiversity, animals and the environment, and plants. "The Highlands are an important region," noted Dr. William Schuster, the Consortium's executive director, "and there is a lot of exciting work going on."

Consortium Research

Several of the talks featured signature Consortium research, including the Future of Oak Forests experiment, urban-rural gradient investigations, and studies designed to help ensure wildlife connectivity between the Forest and Schunemunk Mountain. Dr. Schuster led off the symposium with a presentation on the results of the oak research, a multi-year, multi-investigator project designed to identify the cascade of impacts following the loss of oaks, a foundation taxon in northeastern forests, should they succumb to current or future threats (see "From Microbes to Mammals," Spring 2012, and "Under the Canopy," Fall 2012). He reviewed the history of the project, which involved using a species-removal technique in experimental plots: some with all oaks girdled, some with all non-oaks girdled, some with half the oaks girdled, and some controls. Before girdling, sci-

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Report from the Executive Director

Whether great leaders are born, or made, we all recognize great leadership when we see it, and miss it when it is gone. We lost a great leader and friend when Frank Moretti, our Consortium president, died in July.

Frank pursued ideas with passion, even when conditions on the ground or limited resources meant that the pace of progress was likely to be slow. He had a vision for our Black Rock Forest Science and Education Center at least five years before we were able to construct it, and sold others on the concept. Realizing the vision for our flagship “green and smart” facilities took a huge amount of work, time, and fundraising. But once the project began, Frank was already envisioning some of our next important steps.

The Virtual Forest was a concept we worked on starting around 1997. We began with one remote, automated monitoring station connected to a radio telemetry network and a crude web interface that provided something painfully far from “real-time” transmission of environmental data. Now, 15 years later, a six-station monitoring network supports a range of research studies and has informed the development of innovative web-based tools and curricula used to enhance college and secondary school courses in life science and chemistry.

Another of Frank’s visions will soon become a reality in the Forest. Two years ago, he shared with us a concept of remote, self-contained student work stations distributed around the Forest, networked to each other and to schools and colleges. These would enable remote experimentation and collaborative projects among teams with discrete functions ranging from on-the-ground data collection to sophisticated data analysis, interpretation, and discussion back on school campuses. At about the same time, Black Rock’s recently hired education director, Dr. Jeffrey Kidder, was independently advocating for new remote teaching and research facilities around the Forest to free groups from dependency on our Science Center and Forest Lodge structures.

As has often happened, Consortium member effort combined with the nearly boundless capacity of Forest Manager John Brady to turn vision into reality. One of the hallmarks of Metropolitan Montessori School’s activities has been to implement a new project in the Forest each year, usually working with John. They independently designed a project for a teaching/sleeping platform at a remote Forest location to allow students to more easily immerse themselves in nature. John and our staff recognized the congruence of these ideas and worked to ensure that the design would provide classroom and sleeping space, and an outdoor science lab with a high-speed Internet connection.

The Montessori School students, John, and the Forest Crew worked on it through the year, and now the new “Outpost” is nearly ready for use. I inspected it with Dr. Kevin Griffin last month and we agreed that it could provide great support for Forest research teams, reminiscent of some remote sheltered spaces in New Zealand in which we had earlier set up multi-investigator ecophysiology experiments near ancient Podocarp forests. Constructed with Black Rock Forest timber from the site, the Outpost will be dedicated in Frank’s memory.

I am very pleased to announce that Dr. Griffin, another great leader in education and also in ecological research, has agreed to become the Consortium’s next president (see Forest News in Brief, p.7). At its genesis, the Consortium was fortunate to have Barnard College Professor Phillip Ammirato as its first president, providing the leadership needed to start and firmly establish the new organization. Phil was then succeeded by Frank, and now the Consortium is privileged to be led by Kevin Griffin and to help pursue realization of his visions. Great leadership is invaluable regardless of whether it is innate or developed over time. But we all recognize that we have clearly seen it in the succession of presidents of the Black Rock Forest Consortium.

— Dr. William Schuster

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The Black Rock Forest Consortium advances scientific understanding through research, education and conservation programs. It is a not-for-profit 501(c)(3) organization supported by membership dues, grants, and gifts.

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Frank Moretti Visionary Consortium President

When Dr. Frank A. Moretti died in July, the Black Rock Forest Consortium lost not only its long-time president but also a true friend of the Forest. Dr. Moretti was a visionary leader who had a deep understanding of the Consortium's past and present, and who could look into the future and see where the Consortium should be headed. He knew countless people and organizations — sometimes it seemed he knew almost everybody — and delighted in introducing the Consortium to them all.

At its 2012 benefit luncheon, the Consortium presented its William T. Golden Award, named after its founder, to Dr. Moretti: the award celebrates innovative leadership in promoting science and science education. Sibyl R. Golden, Mr. Golden's daughter and the chairman of the Consortium's board, told the luncheon guests how Dr. Moretti got involved with Black Rock Forest. "Frank likes to say that he's been working on Black Rock Forest for 30 years, and that's about right. It was back in 1981 that my father first started developing the idea of the Consortium and began talking to schools, universities, and other organizations around New York to determine their interest. The Dalton School was one of the first institutions to express its enthusiasm, and after a while its headmaster, Gardner Dunnan, asked Frank to represent the school. In typical Frank fashion, he soon felt frustrated that things were moving along too slowly and decided to go see my father to talk about how to get things going. That was the beginning of Frank's commitment to the idea of the Consortium and to the Consortium itself, and he hasn't slowed down yet." In 1994, Dr. Moretti became the second president of the Consortium, following Dr. Phillip Ammirato of Barnard College.

"Frank had an indelible impact on our Consortium and on so many of us who he worked with," said Dr. William Schuster, the Consortium's executive director. "He urged us to embrace new technologies, to expand our staff and facilities, and to create new connections among people and across institutions. His love of ideas was infectious, his capacity for vision incredible, and his energy nearly inexhaustible. He helped set our Consor-



Dr. Frank Moretti with his family at the Consortium's 2012 luncheon where he received the William T. Golden Award for innovative leadership in science and science education. Photo: Jennifer Strader.



Dr. Frank Moretti (center) with Dr. William Schuster and Sibyl R. Golden at Consortium Day in 2007.

tium on the path to success and we will always be grateful for his dedication and leadership."

Dr. Moretti cofounded the Columbia Center for New Media Teaching and Learning (CCNMTL) in 1999 and served as its executive director until his death. Thanks to Dr. Moretti's leadership, the Consortium and CCNMTL partnered on several projects, most recently and most successfully on the Consortium's Virtual Forest Initiative. In addition to his CCNMTL role, Dr. Moretti was a professor of Communications, Computing, and Technology at Teachers College. Before he came to Columbia, he served as associate headmaster at the

Dalton School, where he also cofounded its New Laboratory for Teaching and Learning and developed the school's technology plan. He had a PhD in history from Columbia University, several masters degrees from both Columbia and Teachers College, and a BA in Greek and Latin from St. Bonaventure University.

"Frank was a visionary," notes Ms. Golden, "but he also

was someone who got involved in the nitty-gritty of Consortium activities. He participated in interviewing several key staff candidates, once by Skype from an internet café in Cairo, and often said that he liked to hire people who 'brought him gifts,' meaning perspectives and talents that he didn't already have. Frank brought the Consortium gifts, with his enthusiasm, creativity, wisdom, persistence, and networking. We miss him."

The Consortium plans to plant a white pine in Dr. Moretti's honor near the Science and Education Center, and his friends and family have contributed to the Consortium in his name. ♣



Middle school students using field guides in the Summer Science Camp's Amazing World of Plant Adaptations class. Photo: Dave Sirota

Summer Science Camp (cont. from p. 1)

Dr. Jeffrey Kidder (see “Meet the New Education Director,” Fall 2011) was to harness the resources of the Consortium, in particular graduate students from college and university member institutions, to teach hands-on science classes to middle- and high-school students from Consortium and other schools. Lorrin Johnson, who coordinated the Consortium’s Toyota-funded Virtual Forest Initiative, served as program manager, and the entire Consortium staff helped the program succeed. This year, as a pilot, the Consortium held two weeks of camp for middle-school students, one residential and one day-only, one residential week for high-school students, and one week for high-school students at the Seahorse Key field station. The instructors came from the American Museum of Natural History, including its Gilder Graduate School, Columbia University, NYU’s Steinhardt School, and Teachers College, along with professors from the City University, Barnard College, and other institutions.

Students came from Consortium schools, including the Urban Assembly for Applied Math and Science, the Cornwall Schools, the Newburgh Schools, Calhoun, and Dalton, as well as from schools around New York City and the Hudson Valley and from as far away as

Florida and Hong Kong. Scholarships generously provided by the Dyson Foundation, Time Warner Cable, the Ralph E. Ogden Foundation, the David L. Klein Jr. Foundation, the Cornwall Lion’s Club, and other individuals and organizations allowed students to participate on a needs-blind basis.

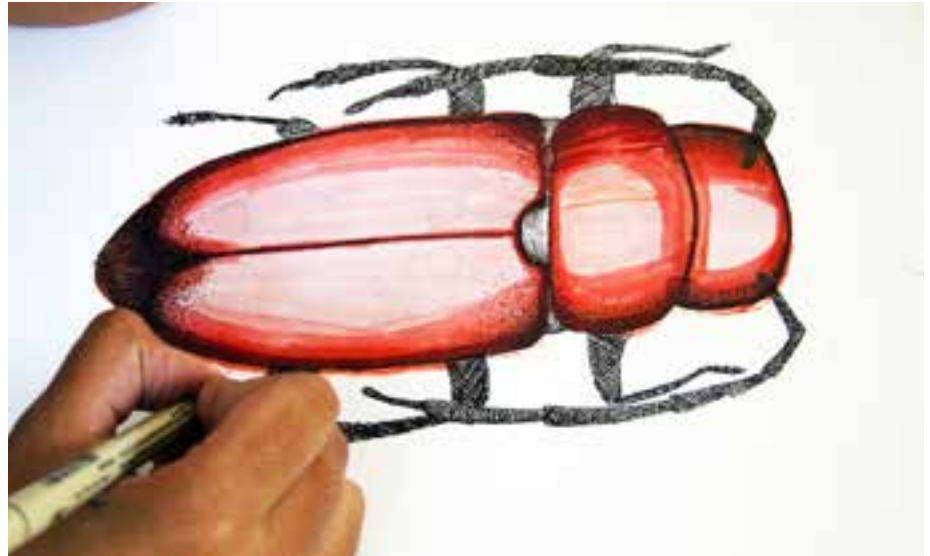
During their week at camp, students could take one class in the morning and another in the afternoon. Middle-school classes included ornithology, art and nature, scientific and artistic observation and drawing in partnership with the neighboring Storm King Art Center, plant adaptations, insects, wetland ecology, and a full-day biodiversity blitz class. The high school classes, in addition to the week at Seahorse Key (to be featured in a future issue), covered ornithology, turtles, field collections of insects, and the full-day biodiversity blitz. In the evenings, Lodge supervisors Jamie Kamlet and Chris Lee, both retired teachers, led the residential students in fun activities, including a raptor talk with live raptors and a water balloon “battle.”

Artistic Collaboration

The Consortium was fortunate to be able to partner with the neighboring Storm King Art Center, one of the world’s leading sculpture parks, which integrates its

display of art with the landscape, on a course entitled “The Art of Scientific Observation — From Microecology to Monumental Sculpture.” The middle-school course was co-taught by Hara Woltz, an artist, landscape architect, and doctoral student in the Department of Ecology, Evolution, and Environmental Biology at Columbia University, and Victoria Lichtendorf, the Art Center’s director of education and public programs. The students kept accordion-style field book journals in which they noted their scientific and artistic observations and drew sculptures, landscapes, bodies of water, trees, meadow grasses, flowers, and insects. The instructors focused on developing the students’ observational and representational skills and on demonstrating techniques and media.

“The students’ enthusiasm for the class was wonderful,” said Ms. Woltz. “My favorite part of teaching them was engaging with them about their observations and watching the evolution of their observational skills over the week.” John Stern, the president of the Art Center’s board, visited the class and got involved in a philosophical discussion with the students about artist Andy Goldsworthy and the ephemeral nature of art. The students also, on their own, showed their sketchbooks to other visitors to the Art Center who were sharing



Student's pen and ink drawing from the Visualizing Entomology class (above). Students at the Seahorse Key Marine laboratory study sea vegetation they gathered (left).

the tram that was taking them around the grounds, and discussed their work with them.

"The collaboration with Black Rock Forest and Hara Woltz was an immensely rewarding experience for our staff at Storm King," noted Ms. Lichtendorf. "The enthusiasm and openness of the students exceeded all expectations. Their meaningful engagement with one another and the course material was made evident by the beautiful journals they produced over the course of the week. Happily, the Art Center had become a second home."

Turtles and Plants

Scientists from the American Museum of Natural History have tracked turtles in the Forest's ponds and recorded demographic data about them for the past 15 years. Working with Dr. Antonia Florio, a research associate at the Museum, 14 high school students (7 each in the morning and the afternoon) contributed to this long-term project by setting up and baiting hoop traps to capture turtles, identifying turtles that had previously been trapped by determining whether they already had a small electronic tag called a PIT tag, and then recording shell size, age, and in what pond the turtle was found. In the course of this hands-on activity, Dr. Florio

was able to teach the students about turtle ecology, behavior, evolution, and diet. The ongoing research, involving mostly painted turtles (*Chrysemys picta*), but also snapping turtles (*Chelydra serpentina*), helps scientists and conservationists assess turtle abundance, health, and potential migration patterns.

"I loved that the entire class was outside," says Dr. Florio, "and I think the students did too. They were outside hiking, setting and retrieving traps in muddy water, and looking at turtles throughout the course. That is a huge advantage of having classes in the Forest."

The world is filled with organisms with fascinating adaptations for survival, including plants which, unlike animals, can't move around; in the Forest, for example, plants must adapt to a cold, temperate climate. Rebecca Stern, a recent science education graduate of the Teachers College Graduate School of Education, and a science teacher, led a class for 15 middle school students (some in the morning and some in the afternoon) entitled "The Amazing World of Plant Adaptations: Investigating the Monstrous, Spiny, Beautiful, and Carnivorous." The students learned to identify plants using keys and figure out their adaptations. Each student also created a mini field guide by choosing and sketching five plants, picking fun facts about them, and describing their adaptations for survival.

"I loved the enthusiasm the students had for what they were learning," Ms.

Stern said. "The students were so excited to go out into the field every day. They had the opportunity to do work that real scientists do by making their own observations and asking questions for which they wanted to find answers. There is also the wonder factor: we always found exciting things taking place in the Forest that we didn't expect, and weren't necessarily focused on, but we would stop to learn about them anyway. For example, we discovered brightly colored mushrooms and saw a red eft and a frog cross our path. These were the best opportunities for learning, because the students were instantly curious, and asked so many questions about what they observed."

"This year's Summer Science Camp was the best and most diverse we have offered and allowed us to provide week-long, immersive science, art, and nature experiences for more than 90 students," Dr. William Schuster, the Consortium's executive director said. "This is the place to send your high-school or upper middle-school students if they are really interested in learning about these topics working with professionals in the field! It highlights the tremendous diversity of resources within our Forest and our Consortium, and at allied institutions like Storm King Art Center and other biological field station partners around the country. If you are interested, keep an eye on our web site for information and online registration for next summer's exciting offerings." 🐾

Research Symposium

(continued from page. 1)

entists obtained baseline data, and have continued to examine biogeochemistry, microbial ecology, insects, small mammals, and more over the four years since the trees were girdled.

Dr. Schuster then turned to some of the key results that are beginning to emerge from the study, in particular that there seems to be a threshold of oak loss that has to be exceeded before some changes are noticeable. For example, the soil is significantly cooler and has greater water content in the 100% oak-girdled plots, with implications for chemical cycling rates and water runoff, but not in those in which 50% of the oaks were girdled. He also noted that there was a large increase of soil nitrate on the most heavily disturbed plots, which could end up in streams and the water supply. Turning to plants, he said a mixture of non-native species was observed growing in the fully girdled plots, as well as tree species that were opportunistic and fast growing, such as red maple and black birch; however, all tree regeneration is limited by deer browsing. Finally, he noted that soil fungi may play a key role in the threshold effect in which changes were limited when only 50% of the oaks were killed because their composition changes substantially when all oaks are lost, along with soil chemistry.

Other speakers addressed other aspects of the oak forest study, including Dr. Vladimir Ovtcharenko from the American Museum of Natural History, who discussed changes in spider biodiversity and biomass in the study plots, and Kate Pavlis, the Consortium's research associate, who discussed research on small mammals she, Dr. Schuster, and Kate Keck and Dr. Kate McFadden, now at Clemson but formerly at Columbia, are carrying out (see "Small Mammals and Environmental Change," Winter 2013).

Researchers also discussed the Consortium's urban-rural gradient studies designed to investigate how urbanization affects plant growth and what causes differences in plant growth along a gradient. Dr. Kevin Griffin, of Columbia's Lamont-Doherty Earth Observa-



Columbia doctoral candidate Angie Patterson measuring photosynthesis rates of maple tree leaves in one of the Consortium's laboratories.

tory, spoke about differences in CO₂ levels over the past 150 years observed from an analysis of tree ring data along a gradient from New York City to the Catskills, including Black Rock Forest. Nancy Falxa-Raymond from the USDA Forest Service talked about research she did with Dr. Griffin and Dr. Matthew Palmer of Columbia University comparing foliar nitrogen in four tree species extensively used in reforestation sites in New York City with the same species in Black Rock Forest. She noted that "understanding nitrogen cycling in urban systems and the associated physiological changes in vegetation" is important for evaluating urban forest restoration and may also "have implications for carbon sequestration and water quality issues associated with nitrate export, two important areas of management concern."

Two speakers discussed connectivity-related topics (see "Addition to Forest Helps Build Wildlife Corridor," Spring 2011). Kate Pavlis described research she is doing with Dr. Terryanne Maenza-Gmelch from Barnard College and others on determining the populations of several bird species in the Forest and the connectivity area more generally in order to obtain a designation as an Important Bird Area by BirdLife International and the National Audubon Society. Madeline Hirshan, a Barnard College student, discussed her project designed to analyze which mammals use culverts under roads in the Forest region, how frequently, and whether there are differences in landscape and culvert characteristics that affect whether and how

mammals use them to gain access to a broader habitat.

Other Research

Some of the research covered in other talks also involved research at Black Rock Forest, including a series of presentations on the new Queens College study of how topography influences the transport of air through a forest ecosystem (see "Forest News in Brief," Spring 2013); ongoing research by Dr. Dorothy Peteet of Lamont-Doherty analyzing climate change in the late-glacial era by examining microfossils in cores taken in Forest ponds

and fens; statistical studies by Dr. Joel Cohen and Dr. Meng Xu of Rockefeller University, along with Dr. Schuster, using Forest tree data (see "New Use for Forest Data," Fall 2012); research on bird diversity in relation to vegetation composition and structure by Dr. Maenza-Gmelch; and a study of the effect of temperature on tree physiology by Columbia doctoral student Angie Patterson aimed at understanding which trees grow where.

Scientists from around the Hudson Highlands presented research on other topics, including mercury in songbirds; wintering bald eagles and their roosting sites; habitat functions of *Phragmites*; water resources, water management, and biodiversity in the Moodna Creek basin; whether the frequency of extreme hydrological events is changing in southern New York; rare plants at West Point and on Torne Mountain; the decline of golden-winged warblers; and a variety of conservation issues, such as aquatic habitat fragmentation from dams and culverts, eels in the Hudson River, and identifying and combating invasive species.

"It was exciting to see the diversity and extent of research taking place in the Highlands region and to be able to provide a venue for these investigators to meet and share information," said Dr. Schuster. "This may have been the largest number of research presentations ever at one place and time in the Highlands region, encouraging us to continue hosting these symposia in the future." Abstracts of all the talks will be available on the Consortium's web site. 🌲

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Forest News in Brief

Consortium's 25th Anniversary Celebration! The Consortium will celebrate its 25th anniversary at a benefit luncheon on May 7, 2014, at the Metropolitan Club in New York City. Dr. John Holdren, science advisor to President Obama, will speak and receive the William T. Golden Award for innovative leadership in promoting science and science education.

New Consortium President. Dr. Kevin Griffin, a professor of earth and environmental science at Columbia University's Lamont-Doherty Earth Observatory, was elected president of the Consortium at the Consortium's fall board meeting. Dr. Griffin and his graduate students have conducted research in the Forest for many years, and Dr. Griffin has served as a vice president of the Consortium.

Science Outpost near Tamarack Pond. Students from the Metropolitan Montessori School worked with Forest Manager John Brady last year to design and build a structure near Tamarack Pond for future education and research activities. They built the platform floor, using Black

Rock Forest wood and stone, and over the summer Forest staff completed the structure for the roof. The "Outpost" will have solar panels to provide power, can be used as a classroom or laboratory for Consortium groups, and can sleep up to about 20 people in sleeping bags. It will be dedicated in honor of past Consortium President Frank Moretti.



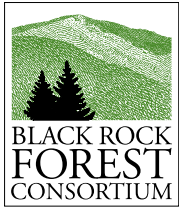
Minds initiative to promote student involvement in STEM (science, technology, engineering, math) education and enrichment activities and awareness of STEM-related careers. The Consortium is also the recipient of in-kind support from TWC, a 30-second public service announcement on the Summer Science

Time Warner Cable Partners with Consortium. The Consortium was awarded a \$15,000 grant by Time Warner Cable (TWC) as part of the company's Connect A Million

Camp that will air this fall. The Consortium was pleased to offer nine scholarships to New York City students for the 2013 Science Camp through the TWC grant, and will offer fall after-school programming as part of the partnership.

More Summer Activities in the Forest.

Graduate students in the American Museum of Natural History's Master of Arts in Teaching program for middle school earth science teachers spent two weeks at the Forest; the North American Denroecological Fieldweek, an international training program, was held; and Dr. Kevin Griffin's lab at Lamont-Doherty Earth Observatory carried out a month of research on the physiology of trees near their northern or southern range limits. The Urban Assembly for Applied Math and Science spent an intensive week on science enrichment at the Forest, thanks to a competitive grant from New York City Summer Quest, a project of the Fund for Public Schools, in partnership with the City departments of Education and Youth and Community Development, to prevent summer learning loss. 🌲



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Report from the Forest Manager

As of early September, anticipation for this year's acorn crop by researchers and educators was high. Projects and lessons involving acorn value and ecology have been absent the past two years due to a total failure of the oak tree seed crop. This year's good crop of chestnut oak and partial white oak mast will supply an autumn energy boost to acorn-eating animals. But northern red oak acorns, sought after by many, frustratingly failed for the third straight year.

Explanation of this long period of mast failure is complicated, considering the many factors affecting oak tree flowering and pollination. However, from observations following the ice storm of December 2008 which caused massive canopy damage, oak trees seemed to react with an unusually large mast crop in 2010 and then two years of zero mast.

What importance to the Forest ecosystem do acorn crops actually have? To understand, it helps to consider the ecosystem as an organism. For many years, I have stood in streams and ponds explaining to students the power of water, not only as a physical force but also as a life force, enabling diversification of life through the water cycle. I stress water quality as if it were the blood of an organism. This comparison gives the Forest an identity, with circulation of water by brooks and streams similar to veins and arteries. With the aid of science, tree measurement has come of age to record incredibly accurate readings. The point-dendrometer can measure the diam-

eter of a tree so precisely that it will detect a slight change of diameter as photosynthesis starts up with morning sun and decreases at evening. This technology gives the impression of a chest breathing. The thought of 4000 acres of trees simultaneously respiring is overwhelming, considering the life energy produced. The circulation and respiration measurements of the Forest prove a powerful force by scientific methods but also invite expressions of spirituality.

Science consistently reveals ecosystems as similar to complicated living organisms, containing incredible life forces. This comparison agrees with many Native American interpretations of nature and life.

So what is the importance of mast crops to this huge living organism? Is it a simple release from its many energy channels, a burp, if you will, or a life-giving gift from the "spirit" of the trees? Science may have trouble with the latter, but it does support related observations such as a dramatic reduction of tick populations. This three-year time period has clearly demonstrated the relationships between mast, acorn-eating mammals, and ticks.

During these times of acorn worries, the past three growing seasons have been very productive otherwise. Volunteer trail maintainers from the New York-New Jersey Trail Conference have trimmed back overgrown grasses and shrubs to keep our trails clear.

—John Brady