



BLACK ROCK FOREST NEWS

Spring-Summer 2015

Black Rock Forest Consortium

Volume XXV, No.2

Benefit Luncheon: Communicating Science . . . Effectively

Dr. Neil deGrasse Tyson, speaking in conversation with Dr. Kim Kastens, was the highlight of the Black Rock Forest Consortium's benefit luncheon and the recipient of the William T. Golden Award, named for the Consortium's founder, for innovative leadership in science and science education. Held on May 4 at the Metropolitan Club, the luncheon's theme was Communicating Science Effectively. It was chaired by Sibyl R. Golden (chairman of the Consortium's board), with vice-chairs Catherine Morrison Golden, Samantha Kappagoda, and Dr. David K. A. Mordecai. The luncheon also featured remarks by Lisbeth Uribe, a teacher at The School at Columbia, on the role of teachers in communicating science.

A sold-out crowd of more than 265 people gathered for the festivities. Many member institutions took tables, as did board and Leadership Council members and other friends of the Consortium. All provided vital support for the Consor-

tium's research, education, and conservation programs.

Sibyl R. Golden welcomed everyone, thanked the luncheon's supporters, and told guests that the tree seedlings and tree rings at their tables came from Black Rock Forest. Commenting that "communicating science effectively is vital for the future of this country and indeed the world, as only informed and scientifically literate people can make decisions about many of the difficult issues we face and will face in the years and decades to come," she introduced Dr. Tyson. She said that "when we first came up with this year's luncheon theme, we could think of no one we would rather have speak than Dr. Neil deGrasse Tyson, science communicator extraordinaire." She noted that he requested that the Consortium choose the format of a conversation, rather than a speech.

Dr. Tyson is the director of the Hayden Planetarium at the American Museum of

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About Our Annual Report

If you have contributed time, services, and/or financial support to Black Rock Forest Consortium, this is the moment when we hope to show our appreciation formally! On pages 4 & 5, you will find our annual report with audited financials for Fiscal 2014 and a summary of impact in pursuing the Consortium's mission of *increasing scientific understanding of the natural world*.

How well did we serve our audiences? In education, we invested in a formal evaluation of student engagement that has the potential to unite Consortium educators in conversations about how to increase effectiveness of science education. Participants in last summer's pilot used the consultant's feedback to measurably improve instruction techniques.

To improve service to researchers, we created the Calvin Whitney Stillman Research Archive, putting the Forest's long-term research data online. So far, in Fiscal 2015, scientists accessed this data nearly 70 times, with a majority in January, presumably to help plan studies for the next field season which typically extends from April to October.

Some of the year's most promising developments were in conservation, as native tree saplings have sprouted abundantly in the Forest for the first time in decades. This is only possible when deer population size falls below a threshold level. The Consortium's ecosystem management plan includes a carefully regulated deer hunt, in association with the Department of Environmental Conservation and local hunters. It also includes protection for threatened bird populations, and we have applied to become a designated Audubon IBA (Important Bird Area).

Nothing achieved in Fiscal 2014 would have been possible without our Friends of the Forest. Thanks to all of you who helped make it a great year. ♻️



Dr. Neil deGrasse Tyson and Dr. Kim Kastens, in conversation. Photo: Jen Strader

Report from the Executive Director

Black Rock Forest Consortium hosted its ninth biennial Research Symposium this year on Monday, June 22. We invited anyone doing research in Black Rock Forest or elsewhere in the Highlands region to attend and present a short talk about their work. The volume of papers and posters presented at the Symposium has increased over time, from 10 - 20 in the first few years to 30 - 40 or more presented at each of the last several symposia.

Research in Black Rock Forest dates back to 1930, and thanks to support provided by members of the Stillman family, descendants of the Forest's founder Ernest Stillman, last fall we were able to provide online access to the first 46 research papers produced in Black Rock Forest through our website (<http://blackrockforest.org/research/environmental-data/forest-legacy-data>). Research topics in those early years ranged from pioneering studies of soil fertility, tree nutritional status as revealed by leaf chemical analysis, and tree root distributions and relationships with soil fungi to many practical topics in what was then the relatively new field of forestry.

Over time, the research programs in Black Rock Forest have broadened and evolved, mirroring trends at other places and institutions. As a recent report of the National Academy of Sciences stated, field stations like Black Rock Forest "place scientists on the front lines of our changing Earth, helping them gather the data needed to better understand shifting climate and ecosystems and make robust projections of future conditions." Authors of Black Rock Forest research papers in recent years have ranged from undergraduates to seasoned scientists, time scales from nearly instantaneous to millennia, and spatial scales from microscopic to global. Our website now also makes many of these recent Forest research papers available online (<http://blackrockforest.org/research/publications>).



Among the dozen most recent papers is one by Vladimir Ovtsharenko and colleagues documenting the biodiversity of spiders in Black Rock Forest: 279 different species including some found for the first time in New York State. In a study of animal responses to loss of forest canopy trees, Katie Keck and colleagues found that small mammal diversity decreased overall but that white-footed mouse populations increased with major canopy disturbance. In another recent paper by Meng Xu, Joel Cohen, and me, we found that Taylor's Law, a mathematical relationship between the mean and variance of population densities, holds for groups of forest trees regardless of how they are grouped. And in another new paper published in *New Phytologist* by Owen Atkin and many co-authors including Consortium Pres-

ident Kevin Griffin, Black Rock Forest comprises one study site in a worldwide plant respiration database from 100 sites. The results clarify how this important parameter varies with global temperature and aridity patterns and will help improve models of the terrestrial biosphere.

Black Rock Forest Consortium's efforts to advance scientific understanding of the natural world include being open to new lines of research as they arise over time and to new ideas and methods. The Consortium's website makes it clear that investigators do not need to be affiliated with a Consortium institution to work in Black Rock Forest; indeed anyone can propose a research project which will be reviewed for compatibility with ongoing research by Consortium scientists. The Forest's diversity of landscapes, organisms, and ecosystem processes are available for all to study, in a permanently protected setting, and with a great deal of background information freely available. And for so many of you with something to share with others, we were glad to see you at the Forest on June 22.

— 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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Benefit Luncheon

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Natural History and the recipient of the NASA Distinguished Public Service Medal. He has served on two presidential commissions and on NASA's Advisory Council. He has also hosted *Cosmos: A Space-Time Odyssey*, PBS's *Nova ScienceNow* and *Origins*, and *StarTalk Radio*, and is the author of ten books, including *Death by Black Hole*, which luncheon guests received as a gift. Dr. Kastens is a Special Research Scientist at Lamont-Doherty Earth Observatory of Columbia University and served as Distinguished Scholar at the Education Development Center from 2012-2014. She developed the first student activities using data from the Consortium's environmental sensor network, and received the Award for Excellence in Geophysical Education from the American Geophysical Union.

When Dr. Kastens asked Dr. Tyson about how to handle people, in classrooms or elsewhere, who deny things that are accepted as scientific findings, he replied, "this science denial phenomenon is not a new thing. People have been denying science since the beginning of science. The challenge then is communicating the consequences of science denial. . . . I would like an adjustment in the school curriculum where students could spend a year not learning any particular science but learning why and how science works, and learning how the methods and tools of science inform an objective reality about this world."

Among a wide range of topics, Dr. Kastens also asked Dr. Tyson about emerging technologies and their importance in engaging the public with science. He said that "the future of apps" is really exciting as they can embed technologies that enhance or completely replace the human body's senses. He envisions a future "molecular analyzer" app that would allow the user to read the spectrum of gases in the air, for example, showing readings of high CO₂ or methane (swamp gas), and more. There might one day be apps such as seen on *Star Trek*, that can detect all electromagnetic information, such as microwave, UV, and infrared radiation. Human sight is "narrow compared to the total spectrum" of electromagnetic information that could be made "visible" by apps. He added that "the portfolio of scientific devices has 30, 50, possibly 100 senses . . . there are other things you can measure that there's no way your body could do even any part of."



Lisbeth Uribe discussing effective education.

In conclusion, Dr. Tyson noted that "if everybody were scientifically literate, that's all you need to completely drive society into the 21st century; it's not just for the STEM elite, it is for everybody."

After guests enjoyed their main course, Dr. Kevin Griffin, the Consortium's board president, discussed the role of scientists in communicating science. "As a college professor," he said, "I have found that rather than simply lecturing to my students, the single most important thing I can do is to get them involved. I strive to provide the opportunity for students to learn by doing — experiencing the scientific process, collecting data, and testing their own ideas. And of course my favorite way to do this is by bringing them to Black Rock Forest." He also highlighted the role of both technology and creativity in opening up research opportunities for citizen scientists.

Dr. Griffin then introduced Ms. Uribe, a lead science teacher at The School at Columbia, where she created a Lego robotics curriculum for grades 2-4 with her colleagues and a K-8 gender and sexuality curriculum in collaboration with Columbia University physicians. She won the National Geographic Hands-On Explorer Challenge in 2007, and her after-school robotics team has won top awards in every national RoboCupJunior competition for the past 10 years. In 2014, she was named a New York State Finalist for the Presidential Awards for Excellence in Mathematics and Science Teaching. Ms. Uribe described the process whereby students create robots, explaining that "educational robotics gives children the opportunity to find new ways to work together, express themselves, problem-solve, and think



Scott Godsen and colleagues from the Spence School. Photos: Jen Strader

innovatively." She concluded by noting that "talent is universal, but opportunity is not. If you respect, encourage, and include people, you will also empower and inspire them" and that "scientific literacy is not just specialized knowledge for the gifted few or those who choose science or engineering as a career, but essential for citizenship."

Finally, Dr. William Schuster, executive director of the Consortium, spoke about the role of the Consortium itself in communicating science effectively, explaining the various ways in which the Consortium promotes science communication, from education to research to conservation. He noted that "matching the flexibility of our non-profit with the resources of great member institutions, we can customize educational experiences, and incorporate hands-on science." He went on to describe the Summer Science Camp, experiences for earth science teachers in training, and efforts to maximize student engagement, all in collaboration with member institutions. He discussed research activities including training new scientists, holding a biennial research symposium, making research papers accessible online on the Consortium web site, and planning for a postdoctoral position. Finally, he described the role of effective science communication in informing conservation activities, including the new conservation easement and the new Visitor Access Pathway (see articles in Winter 2015 newsletter).

"Thanks to our event leadership, institutional members and other supporters," said Dr. Schuster, "this was a great event. We were honored that Dr. Tyson and the other featured speakers shared their thoughts with us, sending us away with new ideas for creating a future with better public understanding of science." 🐼

The Consortium's Impact in Fiscal 2014

CONSERVATION

- Sensor cameras reveal presence of at least two bobcats and several bears, indicators of rebounding ecosystem health
- Abundant native tree sapling regeneration for the first time in decades, responding to ecosystem management and reduced deer populations
- Application submitted, and community support built, for designating Black Rock Forest as an Audubon Important Bird Area



Bobcat caught on motion sensor camera.

RESEARCH

- *Entomologia Americana* publishes a Consortium scientist's study of 279 spider species in the Forest, the most comprehensive study in New York
- Calvin Whitney Stillman Archive makes Forest long-term data available online for the research community
- Six early career scientists complete research studies in Black Rock Forest, supported by Consortium scientists and staff



A female orb weaver spider (*Araneus* sp.).

EDUCATION

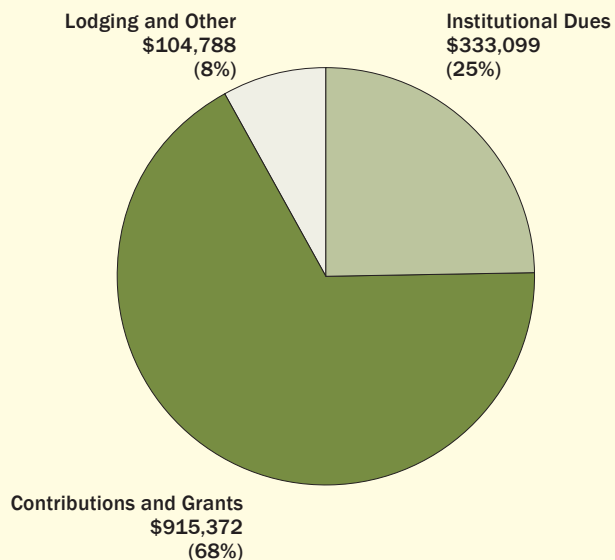
- BROMP (Baker Rodriguez Observation Monitoring Protocol) evaluation by independent consultant measures student engagement to improve science education at the Forest
- Record attendance of 112 students at Summer Science Camp, including international students and 40% attendance on need-based scholarships
- Staff supported approximately 13,000 student visitor days at the Forest



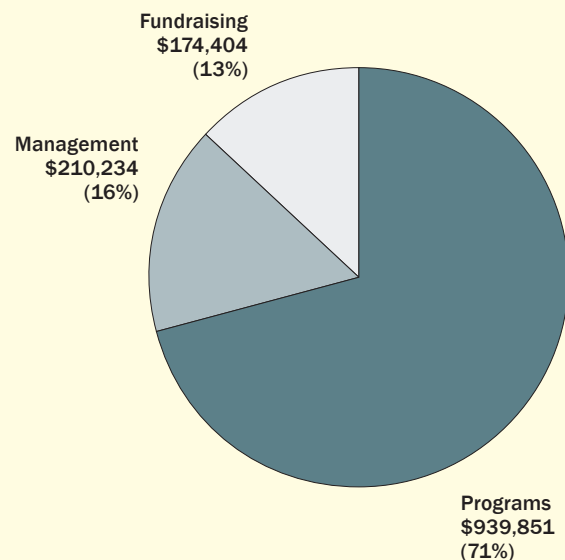
A teacher training workshop in Black Rock Forest.

Audited Financial Information for Fiscal Year 2014

INCOME*



EXPENSES



*Percentages total more than 100% because of rounding.

RESEARCH STUDIES IN THE BLACK ROCK FOREST 2015

The Black Rock Forest Consortium is committed to encouraging collaboration among member institutions and also between researchers and students.

Nitrogen Fixation and Nutrient Cycling Experiments in Black Rock Forest. Duncan Menge (Columbia University). *Contact: dm2972@columbia.edu*

Are Garlic Mustard Effects on Soil Processes and Microbial Communities Reversible? Kristina Stinson (Harvard Forest) and Serita Frey (University of New Hampshire). *Contact: Kristina Stinson (kstinson@harvard.edu)*

Mercury Concentrations and Exposure Levels in Terrestrial Foodwebs: Pathways for Mercury Bioaccumulation in Insectivorous Songbird Communities in New York State. David Evers (Biodiversity Research Institute). *Contact: devers@bri.com*

Analysis of Avian Diversity in Relation to Human Activity in Black Rock Forest. Marissa Wasmuth 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 and Meng Xu (Rockefeller University) and William Schuster (Black Rock Forest Consortium). *Contact: Joel Cohen (jcohen@rockefeller.edu)*

Physiological Response to Temperature across Nine Tree Species in a Northeastern Temperate Forest. Angelica Patterson and Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University). *Contact: Kevin Griffin (griff@ldeo.columbia.edu)*

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

Native Plant Performance along an Urbanization Gradient. Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), William Schuster (Black Rock Forest Consortium). *Contact: Kevin Griffin (griff@ldeo.columbia.edu)*

Loss of Foundation Tree Species: Consequences for Small Mammal Assemblages in Forest Ecosystems. Katie Keck (USGS), Katie Pavlis and William Schuster (Black Rock Forest Consortium). *Contact: Katie Keck (krh1985@gmail.com)*

Effects of Tree Girdling and Herbivory on Mesofauna Communities in a Temperate Deciduous Forest. Natalie Bray (Columbia University) and Kevin Griffin (Lamont-Doherty Earth Observatory). *Contact: Natalie Bray (nab2165@columbia.edu)*

Ecophysiological Functions of Urban and Rural Forest Trees: Testing the "Urban Ecosystem Convergence" Hypothesis. Nancy Falxa Sonti (US Forest Service). *Contact: Nancy Sonti (nsonti.fs@gmail.com)*

Historical and Archeological studies on Whitehorse Mountain in Black Rock Forest. Christopher Lindner (Bard College). *Contact: lndnerarch@gmail.com*

Winter Deer Density

Winter deer density in Black Rock Forest has been uncharacteristically stable at 9-13 deer per square mile for the past three years. This has been confirmed by two methods in fairly close agreement. Forest Manager John Brady and helpers have been tracking deer groups and determining group sizes for decades. This winter had many snowfalls and enough snowpack to allow many good tracking days. From these data, John calculated an average of 12.5 deer per square mile.

The other method uses counts of deer scat piles in April after the snowpack melts. Thirteen people including volunteers (thank you!) walked 22 miles of transects across the Forest, examining 854 eight-foot diameter plots, producing an estimate of 8.6 deer per square mile. These are similar to numbers from last year and the year before.

Some areas like Glycerine Hollow appear to have higher deer densities, while others like the Eagle Cliff area have lower densities. In previous years, average density was as high as 30 or more per square mile and fluctuated substantially from year to year.

Complete failure of the oak acorn crop in the fall of 2011 and 2012 is likely a factor in lowering deer density. But acorn crops were good in 2013 and 2014 and there has not been a corresponding increase in deer population size. Annual mortality appears to be roughly equivalent to the new fawns born each spring. New tree reproduction has been evident across the Forest for the past few years, probably responding to reduced deer browsing. But indicators of deer health such as weight and antler size have shown only slight improvement. Deer health may continue to improve and we will keep monitoring the indicators. And if anyone wants to get into the woods and help our deer surveys next April, just contact us!

— Dr. William Schuster



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| <input type="checkbox"/> Student / Over 65 | \$15 |
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Please make checks payable to the Black Rock Forest Consortium. Your contribution is tax-deductible; the Consortium is a 501(c)(3) organization. Thank you!

Black Rock Forest Consortium
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Forest News in Brief

Linda Stillman Joins Board. Linda Stillman, an artist and a granddaughter of Forest founder Dr. Ernest Stillman, has joined the board of the Black Rock Forest Consortium. She has taught art in the Summer Science Camp and with other relatives created the Calvin Stillman Research Archive, named for her uncle who published two *Black Rock Forest Papers* in the 1960s.

Thank You Time Warner and Other Science Camp Supporters! Thanks go to the supporters of this year's Summer Science



AN INITIATIVE OF
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Camp: the Cornwall Lions Club, the Dyson Foundation, the Ogden Foundation, and Time Warner Cable all provided funding for needs-based scholarships for the Camp.

New Truck Supports Canopy Research. In April, the Consortium purchased a new 65-foot JBL extension boom lift truck, primarily to support forest canopy research. The platform can hold up

to three people and can get almost anywhere within a tree canopy, providing the tree is within about 30 feet of an area that the lift can drive to. It is already being used every week for this purpose and could make new lines of research possible.

New Honey Hill Trail Opens. The new Honey Hill trail is open and ready for use. It begins at Mailley's Mill bridge, crosses the Reservoir Trail, and goes over the top of Honey Hill and down the other side, continuing to Aleck Meadow Reservoir. In addition to providing a nice view of Black Rock Mountain, it is now the easiest and shortest way to reach one of the Forest's summits and is the quickest way to get to Aleck Meadow from the Science Center. Metropolitan Montessori School was involved in the project from the beginning, working with the Forest Crew.

Grant Supports Curation of Natural History Collections. A generous grant from the Peck Stacpoole Foundation will enable the Consortium to catalog its collections of tree rings and herbari-

um specimens, thus making them more readily usable, and to make digital scans where possible.

Fall Family Days October 3 and 10. Please save the dates for the Consortium's Fall Family Days on two Saturdays, October 3 and 10, from 1:30 to 4 PM at the Forest. We will have a variety of activities for families with kids aged 3-17. On October 3, we will be delighted to welcome Dr. Rafael Yuste of Columbia University for "Neuroscience and Behavior of Hydra," a hands-on introduction to neuroscience featuring hydra from Forest ponds. To receive details on Fall Family Days, please contact Emily Cunningham in the Forest office.

Sold-Out Events! Both Birding By Ear Workshops, held on May 30 and June 6 quickly sold out. Participants in the first bird workshop heard and saw 34 bird species, and 36 in the second. These workshops were led by Dr. Terryanne Maenza-Gmelch of Barnard College. The Family Biodiversity Blitz on June 27 was cancelled due to thunderstorms.



BLACK ROCK FOREST CONSORTIUM

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Report from the Forest Manager

The snow and cold of winter were both invigorating and educational here at the Forest. Early snows in November blanketed the autumn leaf drop, securing acorns in a hidden, moist winter nursery, but not before the third graders at Willow Avenue School in Cornwall were able to collect and sample the Forest acorn crop. Nearly 100 trees were measured and cataloged into tree diameter classes by species. Acorns were then gathered under the outlined tree crowns during a stopwatch-timed two minutes.

The acorns were counted and weighed. The acorns per pound calculations were related to scientific data about the diets of acorn-eating animals. For example, deer can eat three pounds of acorns per day. After students completed a one-acre inventory of trees, their conversion of acorns per acre was applied to the larger Forest. They used pictures and colored string to display the acorn food web and to demonstrate the connections, complexity, and potential of the Forest's major energy source. Acorns, a factor driving Forest mammal health, then led to predictions of wildlife population trends.

The acorns were then returned to the Forest in front of a motion-activated camera. Photos showed mice, chipmunks, squirrels, fox, raccoon, turkey, and deer being drawn to the pile of acorns. Black bears, coyotes, bobcats, and mink were photographed visiting the beaver dam at Continental Road.

December and January had little snow, helping Metropolitan Montessori School continue work on the new Honey Hill Trail (see "Forest News in Brief," p. 7), and complete their field work, uncovering 120-year-old artifacts, at the Honey Hill archeological site. Cold created a deep ground frost as a foundation for the snows of February and March.

Snowshoes sank deep in the powdery snow during February, frustrating deer tracking for about two weeks. When conditions improved, the change in wildlife movement was evident in the snow tracks. The prolonged cold and snow up to 30 inches deep caused deer to restrict their movement. Beginning at depths of 15 inches, single travel lanes formed. Adult females lead and plow for the family group. Additional snows caused family groups to combine, a survival instinct known as "yarding." During this time, deer groups swelled to eight to ten containing three to four family groups. Coyote tracks were sometimes seen in the deer's restricted pathways. Seldom harassing but optimistic of potential winter mortality, coyote presence did not threaten healthy deer, strong from a very good fall acorn crop.

The winter snowfall total was 85 inches. During the 120-day period from December 1 to April 1, 102 days were in snowcover, with 31 continuous days over 18 inches. The cold ground frost kept the snow until April 15 at the Stone House. — *John Brady*