



BLACK ROCK FOREST NEWS

Winter 2017

Black Rock Forest Consortium

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Opening of the ADA-Accessible Visitor Access Pathway

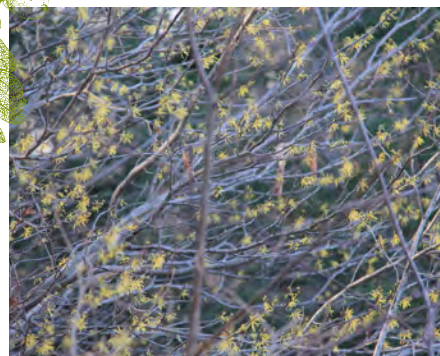
Black Rock Forest Consortium celebrated the completion of an ADA-accessible pathway with a ribbon cutting on Friday, October 21st, 2016. Nearly 100 people joined the Consortium board and staff to hear remarks from key project partners and take an ecology stroll along the 1/3-mile path with Dr. William Schuster, the Consortium's executive director, and New York State Parks Commissioner Rose Harvey.

"We are thrilled that more visitors will be able to enjoy the expansive trails that make up Black Rock Forest, thanks to the great new addition of the Visitor Access Pathway," said Commissioner Harvey. "Thanks to Governor Cuomo and the Black Rock Forest Consortium, this treasured property that inspires us all will now be even more accessible."

Douglas Hovey, Executive Director of

Independent Living, a Newburgh-based organization which provides services to people with disabilities, had been instrumental to the project and spoke at the event. In a personal moment that drove home the significance of the pathway, Hovey spoke of his love of the outdoors and fear of losing access to trails after an accident left him wheelchair-bound at age 18. He explained how limited the options are for people who want to experience the woods and how special it is to have a pathway that enters pristine forest through rugged, mountainous terrain, yet is still accessible to many with mobility impairments.

The pathway now offers 50-mile views up the Hudson Valley to the Shawangunk and Catskill mountains. It was built in six months by the specialized
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Will Witch Hazel Gain if Oaks Lose?

If oaks are lost to pathogens and/or regeneration failure in the Highlands region, recent research has shown that black birch (*Betula lenta*) is one of the species likely to benefit. A new paper published in *Canadian Journal of Forest Research* from work in Black Rock Forest by Benton Taylor and colleagues shows that, in the understory, the shrub witch hazel (*Hamamelis virginiana*) is another species likely to benefit. The study—one of the most extensive on this species—examined ecological, physiological, and growth responses of the shrub to oak loss and concluded that it may play a controlling role in the response of other species.

In the study, oak loss from a trunk girdling treatment designed to mimic pathogen attack resulted in significantly greater openness in the tree canopy and a more than 1000% increase in nitrogen availability (in the form of nitrate) in mineral soils. Witch hazel leaves had significantly higher nitrogen and chlorophyll content and also higher carotenoids which protect leaves from damage in high-light environments. Photosynthesis rates were positively related to the amount of light available. Respiration rates were also higher in leaves from shrubs on oak-girdled plots. This apparently fueled rapidly increased

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From L-R: Jeannette Redden, Palisades Interstate Park Commission; Dr. Lucy Waletzky, NYC Council of Parks; Fred Osborn, NY-NJ Trail Conference (NY-NJTC); Assemblyman James Skoufis; Rose Harvey, NYS Parks Commissioner; Doug Hovey, Independent Living; Ann Marie Maglione, Orange County Office for the Aging; Michael Summerfield, Cornwall Town Council; Brendan Coyne, Cornwall-on-Hudson Mayor; Richard Randazzo, Cornwall Town Supervisor; John Blenninger, NY-NJTC; William Schuster, Black Rock Forest Consortium; Ed Goodell, NY-NJTC; Eddie Walsh, Tahawus Trails. (Photo: Jeffrey Simms)

Report from the Executive Director



A colleague recently told me “it’s a shame that we ecologists and conservationists are compelled to justify our work based on a crisis mentality. I think in our hearts you and I work on natural systems because of their inherent value, beauty, and significance. I would want to do this even if there was never any such thing as acid rain or climate change.” Impact, however,

is something we all hope to achieve.

For a scientist, ‘impact factor’ means the frequency with which your published work is cited in science literature. However, impact on society, when it occurs, may take decades to happen. In September, the Organization of Biological Field Stations presented its “Distinguished Service” award to Dr. Gene Likens. Beginning in the 1960s, Likens’ research with colleagues at Hubbard Brook Experimental Forest led to the discovery of acid rain, its sources, and many of its effects. Likens’ findings led to the 1990 Amendments to the Clean Air Act, which cut emissions of sulfur dioxide dramatically. Rainfall has become only about half as acidic as it was before the Amendments — an achievement three decades in the making.

Similarly, researchers who have spent years at Black Rock Forest are seeing “real world” impact. Dr. Kevin Griffin and postdoctoral fellow Dr. Mary Heskell were part of a 2016 study that has improved our understanding of forest responses to temperature. When plants photosynthesize they take up carbon dioxide (CO₂), a gas that plays a major role in global temperature regulation. When plants respire, they release CO₂ back

to the atmosphere, and release more when the temperature rises. Plant respiration puts more CO₂ into the atmosphere than all human sources combined. Griffin and Heskell’s study established that all plants regulate their respiration’s response to temperature, resulting in lower than expected CO₂ increases. Their work has improved global climate models and helped identify what will or will not likely be problematic in the future.

Dr. Terryanne Maenza-Gmelch and regional birders also had recent impact. Their surveys show how forest structure in our region supports the needs of many threatened and rare bird species. As a result, in June Audubon New York announced that Black Rock Forest and the area around it, from Schunnemunk Mountain to Storm King Mountain, has been designated as New York State’s newest Important Bird Area. The designation helps protect resident and threatened bird species. It helps ensure environmental reviews to prevent uncontrolled development that fragments nature and harms wildlife.

Adding to knowledge without immediate impact can be important. Dr. E. O. Wilson began his career by following his love of nature, studying and cataloging insects, and over time his work and writing have had global impact. Educators do this every day. Not every student will go on to cure cancer. But teachers know that education leads to knowledge and behavior that create better ways of doing things that benefit humanity. That’s why the basic, everyday, non-crisis-oriented work of our Consortium and our clientele—the educators, the scientists, the students in training—remains so important, even if we can’t always immediately quantify its impact.

— Dr. William Schuster

New! Summer Science Partnership with the Boys and Girls Club of Newburgh

Last summer, thanks to generous support from The Dyson Foundation and Time Warner Cable’s Connect a Million Minds initiative, Black Rock Forest Consortium partnered with the Boys and Girls Club of Newburgh to bring 150 students in first through eighth grades to the Forest to learn about science and nature from Forest staff, Kate Terlizzi and Jack Caldwell. Some students attended the Consortium’s Summer Science Camp program and some attended a new “Camp Extension” — one-day excursions to Black Rock Forest for children in grades one to six. This partnership was facilitated by Windell Spaulding, Director of Afterschool Programs at the Newburgh Boys and Girls club.

Twenty-five 8th graders participated in the week-long Summer Science Camp, attending the Cold Blooded Creatures and the World of Insects classes. Each day these students spent a half-day in



Boys and Girls Club students in the Cold Blooded Creatures class examine the plastron of a painted turtle (*Chrysemys picta*) with Post Doc, Brendan Reid of the American Museum of Natural History. Photo: Brienne Ciadakis

the Forest itself, checking turtle traps in ponds or collecting insects to study their evolution and learn methods of museum style display.

Then, over the course of the three-

week Camp Extension, each student spent a day at the Forest. First graders collected fallen leaves and made their own leaf animals, which introduced them to the variety of leaves and trees in the Forest. Second graders collected sticks and twigs, to learn the difference of building a bird nest with only natural materials and no man-made tools. Third graders learned about human uses for plants by collecting wild blueberries and making a no-bake cheesecake. In the upper grades, fourth graders gained first-hand experience with food webs through a predator-prey game in the Forest, while fifth and sixth graders tested their observational skills with an “un-nature” hike; teams walked a path and looked for human-made objects that didn’t belong in the Forest. The Camp Extension was a terrific introduction to the forest for many kids! 🍄

— Katherine Terlizzi

Opening of the ADA-Accessible Visitor Access Pathway

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contractor, Tahawus Trails, with grades not exceeding 7 percent and a small-grain gravel and packed tread material.

Black Rock Forest Consortium gratefully acknowledges the support of many who made this project possible, including the New York State Office of Parks, Recreation and Historic Preservation, the Open Space Institute, State Senator Bill Larkin, and the New York-New Jersey Trail Conference. The Consortium also thanks the many elected officials and their representatives

who helped us celebrate increased forest access in October.

This first leg of the pathway was made possible by funds from the New York State Environmental Protection Fund; in-kind contributions of labor, including staff and volunteers, and natural materials from Black Rock Forest Consortium, and matching funds secured by State Senator Bill Larkin. A second and final phase of the Pathway is planned for construction in 2017, to open in 2018, connecting the Pathway to the Forest's trail network. ♻️



From L-R: NYS Parks Commissioner Rose Harvey and NYS Council of Parks Chair Lucy Waletzky at the ribbon cutting, near the new visitor kiosk on Reservoir Road; Bill Schuster with Jim McGee, District Director for Sen. Larkin; Consortium board members Bill Glaser and Deborah Gardner with Bill Schuster; Steven Sirota enjoys the new Pathway's scenic view. ♻️



**BLACK ROCK
FOREST
CONSORTIUM**

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

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Will Witch Hazel Gain if Oaks Lose?

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growth: witch hazels on oak-girdled plots showed an average 334% increase in annual growth after girdling.

Witch hazel plays important ecological roles in these forests and is well adapted to low under-canopy light levels and the rocky slopes and acidic, low-nutrient soils of Highlands forests. The same chemical compounds extracted for human use provide it with protection from herbivory and it is more resistant to deer browsing than many other species. As a dominant forest understory shrub, it uses soil resources and

casts heavy shade, thus substantially driving environmental conditions beneath it. The authors conclude that witch hazel's response to the multiple environmental changes accompanying oak loss will have significant ecological consequences for temperate hardwood forests. Its greater resource use and faster growth will play a major role in the regeneration of tree seedlings as well as other shrubs and herbaceous plants. It may well cause seedling communities to be dominated by shade-tolerant species instead of light-loving species, despite the canopy becoming more open after oak loss. ♻️

Annual Report, Fiscal 2015: Program Impact

CONSERVATION

- Secured largest conservation easement in the region: 3,777 acres of Black Rock Forest
- Secured new \$1.5 million conservation fund for purchased or eased lands in a critical wild-life corridor, with partner, the Open Space Institute
- Documented rare/threatened birds, applied for Important Bird Area status.

EDUCATION & OUTREACH

- Won \$216,924 Environmental Protection Fund grant to build area's first ADA-accessible forest trail
- Supported nearly 13,000 researcher and student-visitor days at Black Rock Forest
- Consultant found Summer Science Camp students engaged and "on task" 80% of the time in many classes; gave instructors "real time" feedback on how to improve engagement.

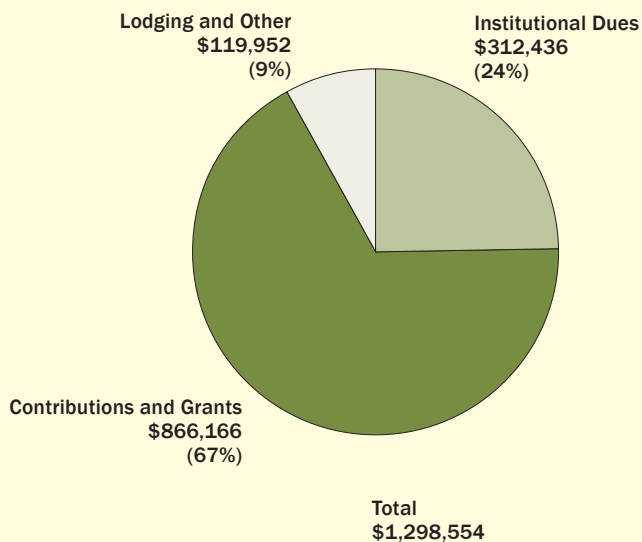
RESEARCH

- Hosted Environmental Research Symposium with presentations by 39 science faculty and early-career scientists
- Supported or led eleven research studies in Black Rock Forest, including those of Ph.D. candidates
- New Columbia University study investigates the effects of a documented warmer fall climate on trees (Griffin lab)
- Another new Columbia University study explores tree species that can fix nitrogen from the air, and why they aren't more abundant in regional forests (Menge lab)

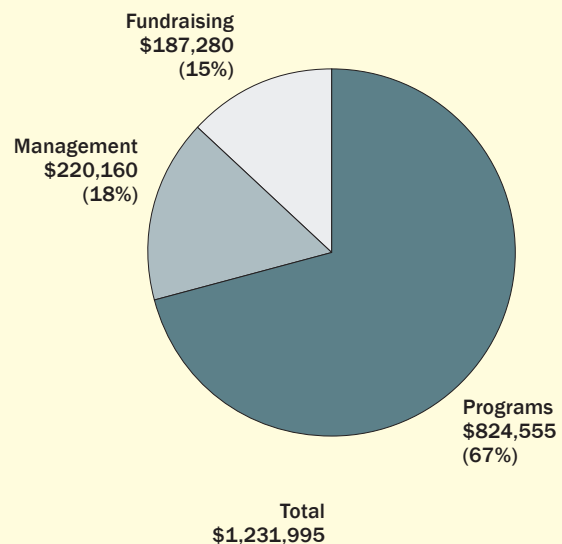


Audited Financial Information for Fiscal Year 2015

INCOME



EXPENSES



Monitoring Our Water Supply

"I am sure I run no risk of overpraising the charm and attractiveness of a well-fed trout stream, every drop of water in it as bright and pure as if the nymphs had brought it all the way from its source in crystal goblets, and as cool as if it had been hatched beneath a glacier."

From *Speckled Trout* by John Burroughs.

These streams are still here. They provide us with a myriad of enjoyment opportunities, and perhaps most important, these streams provide millions of us with our daily water supply. But our large population pushes waste overruns into the forests, challenging and degrading the very streams that were at one time full of 'well-fed trout.'

Can we resuscitate these wonderful streams? Can we reverse the injury that human conditions visited upon them? Many believe we can. With careful monitoring and corrective actions, our streams will return to that "bright and pure" supply of water that John Burroughs praises.

The monitoring of streams can employ a variety of techniques. A "stream walk" allows people to observe and record the physical conditions of the stream and the surroundings it passes through. A great contrast can be seen when you follow Canterbury Brook from its source in Black Rock Forest, through the village below, under roads, and around neighborhoods before it empties into the Moodna Creek. But what about the life the stream should be supporting? Can it handle these various environments? Another monitoring technique may provide us with some answers.

By placing leaf packs in stream riffles, pools and runs, one can collect the animals that live in the water. A month or more after placing leaf packs in the stream, we can retrieve them and find macroinvertebrates. These animals provide us with a very good sense of the quality of the water in the stream. That is because macroinvertebrates require certain conditions to live their lives well. They need a proper pH range, neither too acid-

ic nor too alkaline. They need water that is cold enough and bounces over rocks and stones to hold plenty of dissolved oxygen. They need naturally placed debris, broken branches, or fallen trees that are able to hold the leaves of each autumn.

What a surprise it was for a Newburgh Free Academy (NFA) biology class to learn that pollution-intolerant macroinvertebrates were not found in Silver Stream, which feeds their drinking water reservoir! These sensitive animals were not in the stream that empties into Washington Lake in New Windsor, the reservoir for the City of Newburgh. Washington Lake has been in the news recently, as its water supply was found to be contaminated and unfit for human consumption. The real world becomes more real as a simple leaf pack project in Black Rock Forest prepares a public high school science class to come to terms with real consequences of human activity.

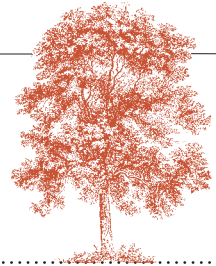
Hopefully, after examining the leaf packs, we will discover a variety of macroinvertebrates. Hopefully, many of them will be very sensitive to pollution and poor quality water. We may also find macroinvertebrates with some tolerance to pollution.

Together, these animals provide us with what we want to know. Are our streams healthy? Can we revive the streams that are not? Can we bring back that "well-fed trout stream" of John Burroughs? His trout stream and our drinking water. 🐟

—Jack Caldwell, Operations Manager and Educator, Black Rock Forest Consortium



TOP: Stream in Black Rock Forest. Photo: Sara J. Pace ABOVE: NFA Students examine a leaf pack for macroinvertebrates with Jack Caldwell (center). Photo: Brienne Cliadakis



Day of Tours Celebrates Student-Built Tiny House

The Consortium welcomed juniors from Avenues: The World School and their Integrated Science teachers, Steven Carpenter and Jason Hoeksema, for a day of student-led tours of the new tiny house at Black Rock Forest on Saturday, November 5th.

A total of 49 students designed and built the house in the spring of 2016 to study energy transfer in physical and electrical systems, as well as ecological

systems, through a composting toilet study. With a budget of \$15,000 and stringent requirements, including 100 square feet of living space and off-grid energy sources to power light, heat, running water, and appliances, the students had to extract maximum thermal performance from the house and choose which comforts of home to provide.

The tiny house is located on Whitehorse Mountain next to the Solar Pavilion. It will house academic visitors, and can be reserved by Consortium members by contacting Jack Caldwell at the Consortium office. 🌲

Tour the Tiny House!

You can tour the tiny house virtually two ways: visit the students' project website at tinyhouse.avenues.org, or view curricular materials, photos, video and press coverage at blackrockforest.org/tinyhouse.

You can tour the house itself by appointment by contacting the Consortium office at 845-534-4517. See if you can "reverse engineer" the house on your tour by answering these questions:

- Why did the students choose a half-gable roof design? Why is the roof angle so important?
- Why did the students install a greywater system with a 32 gallon water tank? What benefits are provided? Why is the tank in the loft? Will the tank water ever freeze?
- Why did the students choose to power lighting and refrigeration – instead of heating or other appliances?
- Why were golf cart batteries chosen for the photovoltaic system?



SUMMER SCIENCE CAMP 2016 IN REVIEW

Summer Science Camp's two-week program last July featured a nearly sold-out middle school week and a high school week. This year was day-only, but that didn't stop non-regional students from participating. One family stayed in a local campground having driven from Oneonta in order to participate. New York City participants stayed with friends or family locally to eliminate the commute.

Middle school classes included Biodiversity Blitz, Cold Blooded Creatures, Engineering from Nature, Nature Writing, and Wildlife Photography. The Engineering class studied mechanical behavior of macroinvertebrates using Little Bits electronics, many of which were donated from the Consortium's 2016 "Learning from Nature" benefit.

Fifty-eight students participated. One student commented that science now "feels more like real life," while another said that nature "increased my



ABOVE: An Engineering from Nature student builds a vehicle for challenging terrain. RIGHT: The Bio Blitz class spots a northern water snake in the pond.

creativity." Other students said the camp helped them overcome fears, like "being brave enough to hold a garter snake." An Engineering from Nature student was "most proud" when he "turned a slow car into the fastest in the class by moving the weight."

The 2017 camp dates are July 10-14 and 17-21 and both weeks are for middle school students. Interested families can register online at blackrockforest.org after February 1st. 🌲

— Katherine Terlizzi



Forest News in Brief

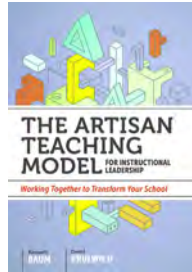


ABOVE: Eliza Chung and Lisbeth Uribe receiving PAEMST Awards at the White House. With Kevin Fittinghoff, Grade 3-5 Division Head, The School at Columbia.

Congratulations to Lisbeth Uribe and Eliza Chung of The School at Columbia for winning Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) for New York State! Uribe won the PAEMST award for science and Chung won for K-6 math. The award was distributed at the White House by Dr. John Holdren, Assistant to the President for Science and Technology. Uribe’s application featured her work in robotics, and included a Black Rock Forest salamander monitoring project. She has taught at Black Rock Forest for more than a decade.



Congratulations to Dr. Martin Stute of Barnard College on his publication in Science. Longtime Consortium scientist Martin Stute and his colleagues published the results of their ‘Carb Fix’ project in the June 10, 2016 issue of the journal *Science*. Stute and team successfully injected CO₂ gas underground, where it turned to stone in less than two years. This technique may be used on a larger scale to mitigate CO₂ emissions, with the ultimate goal of mitigating climate change.



Congratulations to Ken Baum and David Krulwich, the former and current Principals of the Urban Assembly for Applied Math and Science (AMS) in the South Bronx, for their August, 2016 publication of *The Artisan Teaching Model for Instructional Leadership: Working Together to Transform Your School*. The book describes how Baum and Krulwich created a non-selective school in one of the poorest communities in the U.S., achieved an on-time graduation rate of 92%, and consistently prepared students to make top scores in AP Calculus and other standardized tests. Joel Klein, the former

Chancellor of New York City’s Department of Education, considers the authors to be “leaders of one of the most successful new schools in New York City.” AMS has been a Consortium member for nearly a decade.

Dr. William Schuster presented at the Organization of Biological Field Stations’ NYC event in October. Actor and environmental activist Mark Ruffalo gave remarks, and with them an impassioned plea for scientists to be actively involved in advocating for solutions to environmental problems. The event was co-sponsored by the RiskEcon Lab at NYU’s Courant Institute.

Save These Dates!

- Join us for **How to Make a Great Teacher**, our Annual Benefit Luncheon on Thursday, May 11 at the Metropolitan Club, 12 — 2 PM. Keynote by authors and award-winning educators Ken Baum and David Krulwich.
- **Winter in the Forest Hike** is on Sunday, February 5th, 9:30 — 11:30 AM
- **Archeology & History Hike** on Saturday, April 15th, 9:30 AM — 12:30 PM
- **To RSVP** for the hikes, contact Brienne at the Consortium office, 845-534-4517.

Support BRFC! Be a Friend of Black Rock Forest.

BRFC offers public education programs, serves nearly 13,000 student-visitors annually, maintains a biological field station used by faculty researchers and early-career scientists, conserves land and keeps our 23-mile trail network open for peaceful recreation for 50,000+ hikers. We can’t do it without you! Please donate by mail or give online at www.blackrockforest.org

<input type="checkbox"/> Tamarack \$500	Name _____
<input type="checkbox"/> Moosewood \$250	Address _____
<input type="checkbox"/> Sugar Maple \$100	_____
<input type="checkbox"/> Yellow Birch \$50	E-Mail _____
<input type="checkbox"/> Red Mulberry \$25	<input type="checkbox"/> Matching Gift
<input type="checkbox"/> Other _____	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!
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65 Reservoir Road
Cornwall, NY 12518

Winter 2017 Newsletter

Report from the Forest Manager

Another chapter of regional history is being uncovered by an archaeology study by the fourth graders at Willow Avenue School in Cornwall.

The Continental Road, which connected the Garrison at West Point to George Washington's Army encampment at New Windsor, is still intact through Black Rock Forest, though tracing the entire route is difficult. Historical markers along present day roadways provide dates and locations for creating timelines and sketch maps. The road was constructed in 1782, possibly guided by General Henry Knox, as an upgrade of an old pathway previously used by patriots fleeing the British capture of nearby forts Montgomery and Clinton on October 6, 1777.

A three-mile section of the 234-year-old road bisects the forest from north to south, creating access to early mountain farmers and travelers and adding names and dates to the timeline.

Three classes explored sites along the Continental Road in Black Rock Forest. Lessons were learned in mapping, planning, and investigation techniques to better understand past generations and their meaningful lives on the mountain.

The sites are named for the teachers. One is the Cleaves site,



unknown on historical maps. This site provided artifacts of large horseshoes and bridles. Soil samples in depressions revealed layers of charcoal, probably evidence of earthen kilns used to make charcoal back in the 19th century.

The Mante site, also previously unmapped, contains a well outlined foundation. Careful investigation uncovered a small forge, hand-made bricks used as

flooring, a pebble encrusted tar roof, and remnants of a wood stove.

The Gilson site, also known as the Joe Hulse place, displayed signs of mountain farming. The stone foundation of a 20 x 20-foot structure is collapsed onto its earthen floor. Later rock and brick dumping made the work of junior archaeologists to uncover the earthen floor very laborious. Nearby hidden stone walls, an artesian spring, and a possible garden complemented the site.

Artifacts already found indicate that additional treasures still await discovery.

Black Rock Forest Consortium's Jack Caldwell summed up a day's dig "It's good to see them get a little dirt under their fingernails."

—John Brady