HUBBARD BROOK

RESEARCH FOUNDATION

Promoting the understanding and stewardship of forest ecosystems through scientific research and monitoring, policy outreach, and education

A Report for 2012 CELEBRATING THE 50TH **ANNIVERSARY** OF THE HUBBARD BROOK **ECOSYSTEM**

STUDY

HUBBARD BROOK RESEARCH FOUNDATION

ECOSYSTEM STUDY

Founded in 1993, the Hubbard Brook Research Foundation (HBRF) works to sustain and enhance the Hubbard Brook Ecosystem Study in New Hampshire, in partnership with the U.S. Forest Service/Northern Research Station, the National Science Foundation's Long-Term Ecological Research Network (LTER), the Hubbard Brook Consortium, and many colleges, universities, and other research institutions. Our goals are:

- To sustain and expand long-term ecological monitoring and research at the Hubbard Brook Experimental Forest.
- To bridge the gap between ecosystem science and public policy by enhancing the exchange of information among scientists, policymakers, and land managers.
- To foster public understanding of the functions of ecosystems and their importance to society.





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HUBBARD BROOK Consortium

The Hubbard Brook Consortium is a membership group of research and educational institutions that supports the work of HBRF and the Hubbard Brook Ecosystem Study (HBES), with special emphasis on field research opportunities for undergraduates, facilities, and public outreach events. Consortium members include the Carv Institute of Ecosystem Studies, Dartmouth College, Plymouth State University, Syracuse University, U.S. Forest Service/Northern



LETTER FROM THE EXECUTIVE DIRECTOR

ast year the collective Hubbard Brook research community did a double-pause, at first looking backward fifty years into the Hubbard Brook Ecosystem Study's storied past, then pivoting sharply to consider an uncertain future. The backward gaze was triggered by the death of F. Herbert Bormann, a co-founder of the study in 1963 with Gene Likens, Noye Johnson, and Bob Pierce, and a giant in the field of ecology. Even at age ninety, Herb was a constant presence at the 8,000-acre Hubbard Brook Experimental Forest, imbuing the Study with his signature creativity, congeniality, and curiosity. Together with his colleague Gene Likens, Herb personified the stunning discoveries made there about acid rain, the cycling of lead and salt pollution in ecosystems, and the conspicuous losses of critical elements such as calcium, potassium, and nitrogen that occur after clear-cutting, ice storms, or other forest disturbances. It was particularly fitting that the HBRF Board of Trustees re-named one of its facilities — a place beloved by Herb, his family, and generations of his students — the F. Herbert and Christine Bormann Ecosystem Campus at Pleasant View Farm.

Planning for the 50th anniversary of the Hubbard Brook Ecosystem Study in 2013 re-focused our attention on the future, inspiring us to consider what Hubbard Brook will be fifty years from now, in 2063. Researchers, administrators, and friends of Hubbard Brook know that any concept of the future must involve protecting and enhancing what makes Hubbard Brook special today: the long-term ecological record; the quest to understand the intricate dynamics of forest ecosystems; the wonderful public-private partnership between the U.S. Forest Service and academic scientists; the willingness to share new ideas in a culture of generosity and cooperation; and the distribution of Hubbard Brook alumni — many of whom hold positions of influence — to countless organizations across the country in the conservation sphere. In an era of sequestration and funding cutbacks for research, achieving a future consonant with this rich and remarkable past will be a challenge, but one that Hubbard Brook Ecosystem Study in Brook Ecosystem Study in Brook administrators, and friends of Hubbard Brook special today: the long-term ecological record; the quest to understand the intricate dynamics of forest ecosystems; the wonderful public-private partnership between the U.S. Forest Service and academic scientists; the willingness to share new ideas in a culture of generosity and cooperation; and the distribution of Hubbard Brook alumni — many of whom hold positions of influence — to countless organizations across the country in the conservation sphere. In an era of sequestration and funding cutbacks for research, achieving a future consonant with this rich

HUBBARD Brook



ECOSYSTEM STUDY 1963-2013

As this annual report indicates, HBRF supports Hubbard Brook science in three crucial ways: we provide housing and other facilities to scientists who crisscross the country, coming from California, Maine, Montana, New York, and North Carolina, among other far-flung places, to study at Hubbard Brook; we share cutting-edge research through education programs aimed at middle-and high-school students, undergraduates, and other members of the public; and we link scientists with policy makers, land managers, and other stakeholders, making relevant, practical connections between Hubbard Brook research and citizens of a world beset by climate change and other vexing environmental problems.

We will celebrate the 50th anniversary of the Hubbard Brook Ecosystem Study on Tuesday, July 9, 2013, with a day-long symposium, open to the public and featuring a cross section of the people who make Hubbard Brook special (researchers of all ages from many disciplines) and who consider Hubbard Brook important (policymakers, elected officials, and agency and NGO leaders). Topics will include migratory birds and moose; the mystery of nitrogen in forest soils and the persistence of acid rain; the storage of carbon in tree trunks; and the dwindling snowpack attributed to climate change.

Given the current political dissonance and uncertain economic future, the way forward can seem complicated and unclear. Yet in the face of this uncertainty, the Hubbard Brook community will do what it does best. It will take the pulse of the forest, seeking answers about the patterns and processes of ecosystems and charting the results for the long term.



David Sleeper with field tech, Pála

Sincerely,

David Sleeper, Executive Director

May 2013

SCIENCE AND POLICY

A key mission of the Hubbard Brook community is to bring state-of-the-art science to bear on the environmental dilemmas of our time, in relevant and useful ways. This was true for discussions about clear-cutting in the 1960's and acid rain in the decades that followed. Current policy issues include climate change, forest pests and pathogens, and mercury and nitrogen pollution. Hubbard Brook scientists are nonpartisan, seeking to share information in ways that lead to creative and long-lasting solutions.

Science Links

HBRF launched its hallmark Science Links program in 2001 in an effort to bridge the gap between ecosystem science and public policy. Science Links projects convene teams of scientists and policy advisors to identify and define policy-relevant issues that can benefit from clearly presented, timely, scientific information. To date, Science Links projects have addressed acid rain, nitrogen pollution, long-term ecological monitoring, mercury pollution, and community responses to carbon emissions. A new **Science Links Migratory Birds Project** will explore multiple stresses on bird populations, particularly climate change, atmospheric pollution, invasive plants, wildlife pathogens, and suburban and exurban development. To date, no *quantitative* assessment of the *relative* risks from these interacting threats exists for birds in the Northeast or elsewhere. The long-term bird study at Hubbard Brook will provide baseline data for this project. Funding from the U.S. Forest Service's

Hubbard Brook scientists are nonpartisan, seeking to share information in ways that lead to creative and long-lasting solutions.

Northeastern States Research Cooperative supports the project.

Science Links provides nonpartisan information about likely ecosystem consequences of policy actions that is credible, salient, and legitimate.

Dr. Charles Driscoll, Syracuse University



The migratory birds project will benefit from a new collaboration that HBRF administers and helped to establish called the **Science Policy Exchange** (SPE). SPE leverages the scientific

resources of six world-class research institutions and four Long-Term Ecological Research (LTER) sites to bring ecosystem science out of the ivory tower and into the highest levels of public discourse. The Science Policy Exchange will target regional issues that have national implications and that are likely to face key decisions in the near future. As with HBRF's Science Links projects in the past, the new collaboration



will embrace a comprehensive bridge-building strategy that includes: 1) dialogue with decision makers; 2) policy-relevant synthesis; and 3) policy and media outreach. Along with HBRF, the founding institutions are: Cary Institute of Ecosystem Studies; Harvard Forest, Harvard University; the MBL Ecosystems Center; Syracuse University; and University of New Hampshire. The Science Policy Exchange is supported by the Northeastern States Research Cooperative and the Fine Fund.

Hubbard Brook Roundtable

In 2006, HBRF established the **Hubbard Brook Roundtable**, a series of facilitated dialogues that brings scientists together with business executives, citizen-groups, and local decision-makers and government officials to discuss timely issues. Past roundtables have covered long-term environmental issues facing the Northern Forest; wood biomass energy; payments for ecosystem services; winter climate change; long-term ecological monitoring; and forest carbon sequestration and the Regional Greenhouse Gas Initiative. In some cases, dialogue itself was the main "product" — often the first time stakeholders met with working scientists doing forest research. Other roundtables yielded op-ed pieces, white papers, or scientific articles. In a recent roundtable on winter climate change, Hubbard Brook scientists met with people whose livelihoods depend on the winter landscape, including ski area operators and snowmakers, foresters, maple sugar producers, and managers of recreational areas and trails.

Other Hubbard Brook Roundtables have resulted in "proof of concept" projects that explore innovative landscape management strategies or conservation outcomes. The **Poultney Woodshed Project** (see photo below), in collaboration with Green Mountain College in Poultney, Vermont, sought to secure an increasing portion of the college's 5,000-ton biomass energy requirements from local, privately owned forestlands, with the wood harvested in a sustainable manner. The project brought traditional stewards of the forest — landowners, loggers, and mill owners — together with college faculty members, state natural resources officials, and leaders of local NGO's to develop an enduring model that may be replicated in other communities. Another roundtable on ecosystem services payments created **CleanWaterFuture.org**, a webbased marketplace that uses crowd-funding techniques to enable people to contribute to on-the-

ground projects that protect watershed services including clean water, recreation, and flood control. CleanWaterFuture.org is now a project of the Connecticut River Watershed Council in Greenfield, MA.

Hubbard Brook Roundtable projects have been supported by the National Science Foundation, Northeastern States Research Cooperative, Dartmouth College, USDA/NRCS, the Davis Conservation Foundation, Rutland Regional Planning Commission with funding from the U.S. Department of Energy, High Meadows Fund, Merck Family Fund, and Riverledge Foundation.

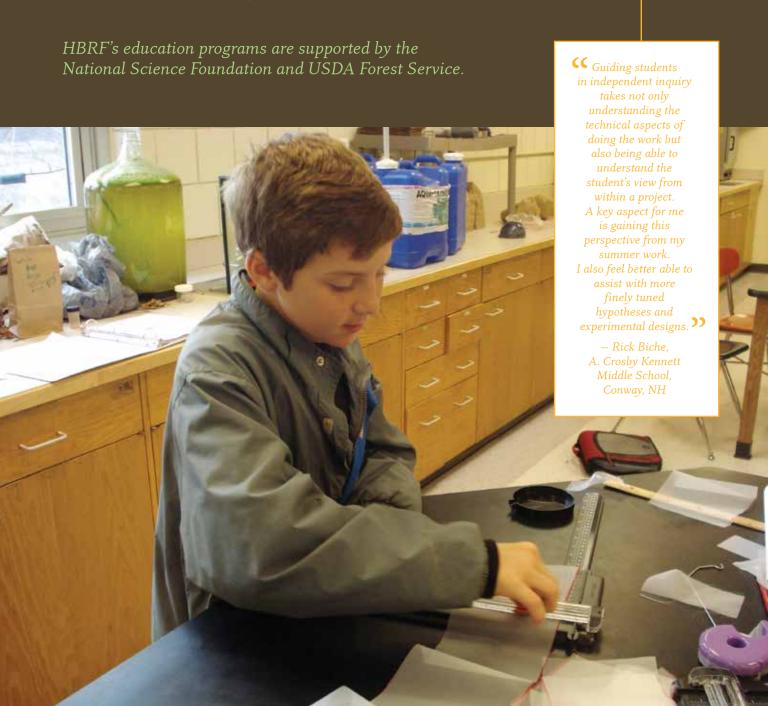


EDUCATION

HBRF's Environmental Literacy Program (ELP) receives funding from the USDA Forest Service Northern Research Station and the National Science Foundation's Schoolyard Long-Term Ecological Research Program. In 2012, we made significant progress within each of the three arms of the ELP program: *curriculum development*, *teacher professional development*, and *partnerships with local schools*.

Curriculum Development

In the past year we developed five new data-based lessons and one slideshow and began work on four new lessons. Done in cooperation with participants in our Research Experience for Teachers program (described below), these lessons use authentic data and align with the National Science Content Standard, "Science as Inquiry," requiring students to "combine processes and scientific knowledge as they use scientific reasoning and critical thinking to develop their understanding of science." To date, we have developed eight original slideshows and 22 lessons that align with the Science-as-Inquiry standard.



Teacher Professional Development

HBRF hosted five teachers working at the Hubbard Brook and Bartlett Experimental Forests in the third year of our Research Experience for Teachers (RET program). Teachers worked in the field with scientists and research teams and developed lessons based on data collected at the experimental forests. Site visits to the teachers' schools clearly indicated that RET participants were applying their new skills back in their classrooms.

In year two of a three-year Math-Science Partnership Grant, we partnered with the New Hampshire Education and Environment Team to provide high quality professional development opportunities for elementary and middle school science teachers. During this second year, 35 K-8 teachers and administrators participated in workshops as part of an overall revamping of science instruction in their districts.

We also partnered with the USDA-FS White Mountain National Forest, USDA-FS State and Private Forestry, and New Hampshire Project Learning Tree to obtain funding for *A Forest For Every Classroom*, a nationally renowned, year-long teacher professional development program. The program has been renamed the *Institute for Nature-Based Learning* and will be updated to better meet the needs of teachers in light of the Next Generation Science Standards and Common Core State Standards. The program is expected to begin in August 2013.

Partnerships with Schools

In addition to continuing our relationships with schools in each of the four districts closest to Hubbard Brook, we made new connections with the district that includes the Bartlett Experimental Forest. Our approach to school partnerships is flexible; we strive to serve each school in a unique way, customized to address its specific interests, needs, and goals. For example, a science teacher and former RET participant from the Lin-Wood School in Lincoln, NH, designed a locally based water unit with input from Hubbard



Brook scientists. We also facilitated the school's participation in *Bridging the Americas*, a Smithsonian Migratory Bird Center program that HBRF helps to administer in New Hampshire and Vermont. At Bethlehem Elementary School, in Bethlehem, NH, we were invited to visit and to discuss the role of Hubbard Brook in acid rain research. And finally, after years of bringing his classes to Hubbard Brook for tours, we invited a Newfound Regional High School teacher (Bristol, NH) to participate in the RET program. It was gratifying to see this teacher flourish through deeper engagement, his experiences clearly translating back in the classroom, enriching his students' understanding of Hubbard Brook science.

Beyond the local districts, we worked with two advanced placement statistics teachers from Concord, NH, to provide students with Hubbard Brook data for in-depth analysis. We also hosted a weekend field-trip with the Boston Youth Environment Network, which focuses on careers in forestry and forest research while providing Boston public school students with hands-on science learning opportunities.

**HBRF should continue to serve as a conduit between classroom teachers and the scientific research community, continuing to try to find and make available real data that our students can analyze to answer real questions about ecosystems and watersheds. **\footnote{\text{SP}}

FACILITIES

With researchers based at home institutions across the country, a core set of centralized facilities is needed to serve the community at Hubbard Brook, especially during the busy summer research season. In conjunction with the Forest Service's Robert S. Pierce Ecosystem Laboratory, HBRF's facilities include housing, meeting and laboratory space, and storage for a diverse group of principal investigators, field technicians, and students. The goal is to provide facilities that reflect the world-class nature and collaborative spirit of the Study itself.



F. Herbert and Christine Bormann Ecosystem Campus at Pleasant View Farm

Pleasant View Farm is known by generations of researchers and students for its dormitory-style farmhouse with shared kitchen and common areas, including a large wrap-around screened porch. Adjacent wet and dry labs make on-site processing of ecological material possible, but the "real science" often happens during impromptu volleyball and basketball games, while weeding the vegetable garden, or while attending a potluck supper. Weekly Science Nights are a tradition, where it's not uncommon to find a member of the National Academy of Sciences in deep conversation with a group of undergraduates in our annual REU program.

Mirror Lake Conservation Campus

Also known as "the Hamlets," the Mirror Lake Campus comprises eight residences and a classroom/storage facility on the shores of what has been called "the most studied lake in the world." HBRF purchased the property in 2004 to protect it from the development of time-share condominiums which threatened the ecological integrity of the 37-acre lake. The happy result for researchers is a lakeside campus affording a collegial atmosphere conveniently adjacent to the Hubbard Brook Experimental Forest. A new campaign for Mirror Lake has raised funds to reduce the debt on the property, while at the same time developing an operating plan to ensure its financial stability through professional property management and a combination of revenues from subsidized researcher housing, short-term rentals, and longer-term leases.

Stay at Hubbard Brook

Bring your organization for a private eco-retreat to Hubbard Brook. Lodging is available at both the Pleasant View Farm or the private cottages on Mirror Lake. HBRF facilities are available for short-term rentals during the non-research season from August through April. With advance planning, educational tours of the Hubbard Brook Experimental Forest can be arranged.

Mirror Lake provides the ideal location for housing in support of the world class research at Hubbard Brook.)

- Dr. Nicholas Rodenhouse, Wellesley College



HUBBARD BROOK RESEARCH FOUNDATION

December 31, 2012 and 2011

Statement of Financial Position

ASSETS	2012	2011
Cash and cash equivalents	\$ 184,961	\$ 96,436
Pledges receivable	31,720	200
Grants receivable	22,438	38,242
Other receivables	1,129	2,440
	•	
Deferred expenses	0	0
Prepaid expenses	1,112	1,468
Total current assets	241,360	138,786
Property and equipment:		
Buildings and improvements	1,921,801	1,921,801
Equipment	68,682	68,682
Land	470,200	470,200
	2,460,683	2,460,683
Less: accumulated depreciation	573,511	512,161
Total property and equipment	1,887,172	1,948,522
Long-term pledges receivable	12,932	0
Total Assets	2,141,464	2,087,308
101417135615	2,111,101	2,007,300
LIABILITIES AND NET ASSETS		
Current Liabilities:	21 102	7 A A 77
Accounts payable and accrued liabilities	21,103	74,475
Deferred income	34,245	-
Accrued interest	-	-
Total current liabilities	55,348	74,475
Note Payable	614,909	714,909
Net Assets:		
Unrestricted	1,282,992	1,239,925
Temporarily restricted	188,215	57,999
Total net assets	1,471,207	1,297,924
Total liabilities and net assets	2,141,464	2,087,308
	2,111,101	2,007,300
STATEMENT OF ACTIVITIES AND CHANGES IN NET ASS	SETS	
Revenue & support		
Contributions and grants	721,532	461,933
Rental Income	64,695	79,474
HBRF Consortium dues	89,460	72,586
Donated Services	-	29,303
Other Income	6,247	13,806
Total revenues and support	881,934	657,102
Expenses		
Program costs:		
Facilities	168,960	198,600
Education	337,778	353,205
Total program expenses	506,738	551,805
Supporting services expense:	100 154	140 700
Management and general	192,174	148,729
Fundraising	9,739	41,076
Total supporting services	201,913	189,805
Total expenses	708,651	741,610
	170 000	(0.4.500)
Change in net assets	173,283	(84,508)
Net assets, beginning of year	1,297,924	1,382,432
Net assets, end of year	\$ 1,471,207	\$ 1,297,924

Note: These schedules should not be confused with HBRF's 2012 audited financial statements. That report, including footnotes and the auditor's opinion, is available upon request or may be found on the HBRF website.

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HUBBARD BROOK RESEARCH

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RESEARCH FOUNDATION



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