

HUBBARD BROOK RESEARCH FOUNDATION

Donor Report

December 2017



Photo: Richard Guldin

Unfiltered and Unbiased, Science Gives Us a Clear-Eyed View of the Natural World

Media distortions and political hyperbole fuel skepticism about the condition of our natural world. We know that environmental decisions should be based on scientific facts, as they emerge and our knowledge deepens, not on instinct, intuition, or hidden agendas. HBRF is not an advocacy organization, but we believe in the power of sound science to inform environmental problem-solving. Hubbard Brook represents a 62-year tradition of scientific truth-telling, and generations of Hubbard Brook scientists have staked their reputations on the unbiased quality of their research and reporting. In the global debate about our changing environment, truth is in increasingly short supply. We believe that there is a market for it, and Hubbard Brook has it in abundance. For the Hubbard Brook Research Foundation, building relationships among decision-makers on the basis of sound science is our mission.

Let's figure out what's true and then talk about it.
Solutions will flow from shared, reliable information.

Thank you for taking part in the conversation.

A handwritten signature in dark ink, which appears to read "Anthea Lavallee".

Anthea Lavallee, *HBRF Executive Director*



Trustees

Peter Martin, *Chair*
Steven Hamburg, *Vice Chair*
Environmental Defense Fund
John Smitka, *Secretary*
Stanton Williams, *Treasurer*
Charles Driscoll
Syracuse University
Peter Groffman
CUNY Advanced Science
Research Center at Brooklyn College
Cary Institute of Ecosystem Studies
Fred Hunt
Gene E. Likens
Cary Institute of Ecosystem Studies
Nicholas Rodenhouse
Wellesley University
Michael ShooB
Stuart V. Smith, Jr.
Jane E.S. Sokolow
Anant Sundaram
Tuck School of Business at
Dartmouth College
Pamela Templer
Boston University
Harriet Van Vleck
Lindsey Rustad, *Advisor*
USDA Forest Service

Staff

Sarah Garlick
Director of Science Policy & Outreach
Anthea Lavallee
Executive Director
Brenda McCartney
Director of Finance & Administration
Don Mower
Field & Maintenance Technician
Zachariah Ralph
Administrative Assistant
Elisa Speckert
Assistant Director
Hannah Vollmer
Field & Maintenance Technician
Geoff Wilson
Facilities Manager

Hubbard Brook Consortium

The Cary Institute
of Ecosystem Studies
Cornell University
Dartmouth College
Plymouth State University
Syracuse University
University of Vermont
USDA Forest Service/
Northern Research Station
Wellesley College

THE HUBBARD BROOK COMMUNITY

Hubbard Brook is a network of environmental thinkers including scientists, communicators, stakeholders, and engaged citizens. In this report, we share “snapshots” of staff and other members in order to give you a sense of their work and expertise and how, together, we create a close-knit, diverse, dedicated, and dynamic community.

Hubbard Brook Research Foundation

Administrative Offices

30 Pleasant Street, Woodstock, VT 05091
(802) 432-1042

Pleasant View Farm & Mirror Lake Campus

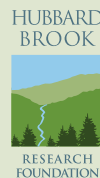
25 Dobson Hill Road, Thornton, NH 03285

Hubbard Brook Experimental Forest

Robert S. Pierce Laboratory

Operated by the USDA Forest Service
Ian Halm, Site Manager
(603) 726-8902

www.hubbardbrook.org



After more than 35 years of service, Don Mower, Hubbard Brook Field and Maintenance Technician, retired in November. We will miss Don's hard work, dedication, and special brand of good humor but wish him the very best as he begins this exciting new chapter.

HBRF STAFF SPOTLIGHT

Hannah Vollmer has been working as a Field Technician and an Educator at Hubbard Brook for a few short years, but she shares a lifelong connection to the forest. Born and raised in the local community and with an abiding appreciation for the natural world, Hannah grew up against the backdrop of the Hubbard Brook Experimental Forest, and their roots are deeply entwined.

I grew up three miles from the Hubbard Brook Experimental Forest, and it's had an influence on my life before I even knew what it was. The confluence of Hubbard Brook with the Pemi was a playspot of mine as a child. I've been swimming in Mirror Lake since I was a toddler, sharing it unknowingly with Hubbard Brook students, scientists, and their scientific instruments. The cut watersheds could be seen from my school playground. The shape of



Snake-wrangling at an early age

of them on the distant hill is etched in my memory, and it's fun to know that the forest in Watershed 5 is the same age as I am. As the president of the Earth Club in fourth grade, I visited Pierce Lab with my friends and learned about acid rain. So this place and I have a long history. I went on to earn my degree in Conservation Ecology with a concentration in Natural History from Sterling College in Craftsbury Common, Vermont. But I knew I wanted to come back home to settle down, which is why I'm so excited to be able to work here at Hubbard Brook. I've really enjoyed continuing to learn about the hydrology and ecology of this forest in my backyard, satisfying the curiosity I've had of it since I was young.



Swimming in Mirror Lake as a teenager



Hannah is now an Educator and Field and Maintenance Technician at Hubbard Brook. ➤

COOPERATING SCIENTIST

Unexpected and often uninvited, insects insinuate themselves into our daily lives, and most of us do our best to work around them. For **Dr. Matthew Ayres**, Professor of Biological Sciences at Dartmouth College, they are his life's work. At Hubbard Brook, Matt explores variations in insect abundance over time and across the land as a function of nutrient availability within the forest. Specifically, nutritional properties of leaves determine their quality as a food source for caterpillars which are, in turn, food for birds and other animals. In keeping with Hubbard Brook's ethic of collaboration, Matt's work connects him to colleagues who contribute expertise from a wide variety of disciplines, including biogeochemistry and avian ecology. Across the United States and overseas, Matt is working to understand how and when insect populations shift and expand in response to climate change and human activity, among many factors. Puny and inconsequential on their own, the collective power of insect populations makes them formidable agents of ecosystem change and architects of our future forests. In terms of the emerging science of insect population dynamics, Matt is at the leading edge.



"Who could love insects? — bark burrowing, nocturnal, six-legged, tiny, beetle-browed herbivores. But they are easy to count, experimentally tractable and economically very important. Matt chose well to study insects and learn from them about the truths of simplicity, complexity and eccentricity. And Matt knows more eccentrics than anyone else working at Hubbard Brook — entomologists. When everyone else carefully prepares a PowerPoint presentation, he draws one image, puts it up as a slide and tells an insightful story that advances understanding of an ecological concept. Then he laughs, we laugh, and are tipped toward enlightenment and creativity. He is a joy to be with, as scientific challenges become opportunities to have fun."

— Dr. Nicholas Rodenhouse, Professor of Biological Sciences, Wellesley College

◀ In May, Matt participated in the annual meeting of the Long Term Ecological Research (LTER) network Science Council. More than 70 scientists from 25 LTER sites convened at Hubbard Brook to explore the theme of ecosystem disturbance.

TEAM LEADER, USDA FOREST SERVICE



Dr. Lindsey Rustad is a Research Ecologist, Co-Director of the USDA Northeast Climate Hub, and Forest Service Team Leader for the Hubbard Brook Experimental Forest. Whether she is bird-watching, fly-fishing, or gaining new insights from the forest through cutting-edge experiments, Lindsey is in her element among the woods and streams of our region. Lindsey's research explores human impacts on forest ecosystems, from air pollution to climate change, and she is a driving force behind Hubbard Brook's innovative Ice Storm Experiment. In addition to her scientific contributions, Lindsey brings fresh approaches to communicating research results and data. She is the intellectual and creative engine powering *WaterViz*, a visualization and sonification tool that depicts the ebb and flow of

Hubbard Brook's water cycle as it is transmitted through a network of forest sensors in near-real time. Through dynamic digital imagery and sound effects synchronized to water flow at Hubbard Brook, *WaterViz* is an alternative to standard formats for data presentations.



Photo: Joe Klementovich

"It is endlessly exciting and challenging to work with fellow scientists, educators, and staff at the Hubbard Brook Experimental Forest as we all strive to provide the best possible scientific basis for managing northern forest ecosystems and to fuel the discoveries that will let us better understand the forests of tomorrow today."

◀ *Lindsey Rustad surveys the spectacular results of the experimental ice storm.*



HUBBARD BROOK SUPPORTER



Dr. Anant Sundaram is a Trustee of the Hubbard Brook Research Foundation, a Professor of Business Administration at the Tuck School of Business at Dartmouth College, and a leader at the intersection of environmental thinking and corporate practice. In his MBA course, “Business and Climate Change,” perhaps the first of its kind in the U.S., Anant shapes the minds of future corporate leaders through a perspective on the emerging ‘climate economy’ — one that is growing in the areas of carbon efficiency, non-CO₂ sources of energy, and carbon capture and storage/use — that is both enlightened and pragmatic. Anant challenges his students to envision

a not-so-distant future in which major corporations will be accountable for their emissions through a mandated carbon price. As the primary emitters of greenhouse gases, corporations will be increasingly called upon to develop innovative solutions. Environmental impacts will be measured and assigned market values. Under these conditions, embedding sustainability into corporate strategy and culture will not only make good environmental sense, but also sound business sense. Corporate leaders and ecosystem scientists will be natural partners. In his role as Trustee, Anant is in a position to help forge new relationships between what he believes are fundamentally compatible but often distinct worlds, by bringing scientists and corporate leaders into a mutually beneficial conversation.



“As a Professor of Finance, I inhabit a world where mindsets are changing dramatically. Corporations are asking ‘What can we do to mitigate our impact?’ Hubbard Brook makes a remarkable difference as a rich repository of more than 60 years of scientific data, a place that gathers the insights, discoveries, and knowledge from the world’s leading ecosystem scientists, and an outreach effort that connects research to policy and practice.”

UNDERGRADUATE SCHOLAR

For future ecosystem scientists, early, firsthand experiences in nature make indelible impressions, setting young feet on scientific career paths that may ultimately lead them to unravel the environmental dilemmas of their time. Through the National Science Foundation's Research Experience for Undergraduates (REU) program, Hubbard Brook investigators provide mentorship and intensive training to the next generation of ecosystem thinkers. This past summer, **Simone Burns**, Syracuse University, Class of 2019, College of Engineering and Computer Science, was among a group of REU students who lived and worked at Hubbard Brook, learning field methods and techniques from Hubbard Brook's intellectual leaders and experts in forest ecology. Simone focused specifically on Hubbard Brook's Ice Storm Experiment, a simulation designed to reveal the effects of these extreme weather events on forest structure and function.



"I was able to get hands-on experience doing field work and analysis of data. Being able to collect samples in the field allowed me to understand the site and make appropriate connections in the data during analysis. I will continue to work on the project throughout this year, and I was also able to present my project at the Annual Cooperator's Meeting which was a great experience for me to make connections and learn about various topics from many researchers, staff, and students."

REU students represent an important link in Hubbard Brook's chain of academic excellence, including undergraduate scholars, graduate student field technicians, early-career investigators pushing the frontiers of ecosystem science, and established experts, working at the tops of their fields.


Through hands-on experience, Simone learned to assess the structural characteristics of the forest. ►



HUBBARD BROOK SCIENCE AND PROGRAM UPDATES

- 🍁 In July, we dedicated the **Likens Conservation Campus at Mirror Lake**, honoring the leadership and scientific achievements of Gene E. and Phyllis C. Likens.
- 🍁 Attendees at our **Annual Cooperators' Meeting** in July represented 1,298 years of participation in the Hubbard Brook Ecosystem Study.
- 🍁 In August, Hubbard Brook launched **www.hubbardbrook.org**, a new website integrating scientific content from the Hubbard Brook Ecosystem Study with education and outreach materials from the Hubbard Brook Research Foundation.
- 🍁 Last December, we hosted a **roundtable dialogue** focused on Hubbard Brook's **Ice Storm Experiment**. Participants included the Assistant Chief of Field Services for NH Homeland Security and Emergency Management, an arborist from the local electric utility, the Forest Supervisor from the White Mountain National Forest, and a meteorologist from the National Weather Service/NOAA.



- 
- ❧ In January, and as the next stage in the **Ice Storm Experiment**, funded by the National Science Foundation, ice was applied to two of the original eight 20 X 30-meter treatment plots in order to explore the short- and long-term impacts of ice storm damage in 2 successive years.
 - ❧ Through funding from the Northeastern Ecosystem Research Cooperative and the Northeastern States Research Cooperative, HBRF's Director of Science Policy and Outreach, Sarah Garlick, worked with partners from multiple universities including the University of New Hampshire and the University of Maine on a **Winter Climate Change Science Links** project. Indicators of change include the number of days suitable for snow-making and winter logging and the number of home-heating days in a season.
 - ❧ In response to stakeholder feedback, HBRF and the USDA Forest Service released a new fact sheet synthesizing climate data from Hubbard Brook.
 - ❧ *Hubbard Brook: The Story of a Forest Ecosystem*, by Richard T. Holmes and Gene E. Likens, from Yale University Press, won a PROSE Award from the American Association of Publishers for the most noteworthy professional and scholarly publication in the Biological Sciences for 2017.
 - ❧ Since the spring, Hubbard Brook staff have conducted **16 forest tours** for groups of visiting researchers as well as elementary, high school, undergraduate, and graduate students.

Participants in the Ice Storm Roundtable rumbled into the forest on vintage Snocats to tour experimental plots.

"It used to be that foresters, of all agencies and groups, would get together to talk. We don't anymore. Times have changed and technologies have changed. Your programs do this — they bring people together."

– Hubbard Brook Roundtable participant

HUBBARD BROOK IN THE MEDIA

Widespread media coverage over the past year has connected Hubbard Brook science to a global audience. A professional photographer and videographer was part of the field crew during the Ice Storm Experimental treatments over the past two winters, resulting in stories from *The Weather Channel*, *New Hampshire Public Radio*, *VICE News*, *Northern Woodlands* magazine, and many more. A syndicated article about the Ice Storm Experiment from the Associated Press landed in local and regional newspapers worldwide, reaching more than one million readers. Other projects featured by the popular press included local newspaper coverage of a middle school student from Conway, New Hampshire, who presented her science fair research during the Hubbard Brook Cooperators' Meeting and a profile in the Dartmouth Alumni Magazine about the work of Hubbard Brook scientist Matt Ayers. Last December, the National Academy of Sciences published an in-depth article rooted in Hubbard Brook research called *The Acid Rain Economy: How the Free Market Tackled an Environmental Challenge*, part of a series about scientific discovery and human benefit. You can find links to these stories and more on the Hubbard Brook website under "News and Events."

Select Hubbard Brook Media Coverage in 2017

- 🌿 *Science of the Seasons*, new podcast from the Northern Research Station
- 🌿 Weather.com
- 🌿 AP News
- 🌿 *Earth Island Journal: News of the World Environment*

Students from Thetford Academy on a fall field trip to Hubbard Brook ➤





THANK YOU FOR YOUR SUPPORT *The following list gratefully acknowledges donors who contributed to Hubbard Brook between October 1, 2016 and September 30, 2017*

Stewardship Circle

Anonymous
 Scott Brown
 Children's Fund of the Upper
 Valley, NH Charitable Foundation
 Curt and Alice Dietrich¹
 Charles and Kimberley Driscoll
 Timothy and Lois Fahey
 Peter and Helen Fahey
 Freeman-Martin Family Fund,
 NH Charitable Foundation¹
 Steven Hamburg and Sarah Barker
 Timothy A. Ingraham
 Harold W. and Betsy Janeway
 Robert H. Koppe
 Gene Likens⁴
 Wilhelm Merck and Nonie Brady
 Ronald Miller and Jackie Fischer
 Carol J. Pierce²
 Sydney Pierce and
 Timothy Zimmer²
 David M. and Barbara Roby
 Nicholas Rodenhouse and
 Marianne Moore
 Frank and Brinna Sands
 Emmy-Lou Sleeper
 Mike and Jean Smith
 Larry and Eleanor Spencer
 Andria and Trevor Staniec
 Anant Sundaram and Faith Beasley
 Barbara K. Sweet
 Tarleton Fund of the NH
 Charitable Foundation
 Roy and Emily Van Vleck

Donors

Anonymous (2)
 Scott and Amey Bailey
 Patricia A. Barker
 Whit Beals¹
 Charlotte F. Belser
 Yuriy Bihun
 Putnam and Marion Blodgett
 Joel D. and Cindy Blum
 Christine Bormann¹
 Rebecca Bormann and
 Gary Oehlert¹
 Frank and Mardi Bowles
 Kevin Breunig and Linda Rosen
 Winslow R. and Ann M. Briggs
 Judy and Jim Brown
 Philip Browne and Patty Jared
 Susan Buck⁵
 John L. Campbell
 Peter and Debbie Carter
 David and Sally Cedarholm²
 Chester Forest Products
 Robert A. and Anne S. Cochran
 Jon Cole and Nina Caraco
 Peter B. and Diana Starr Cooper¹
 Robert L. Corcoran
 Harte and Ann Crow
 Mathew Crowe
 Ron and Lorraine Daigle
 Charlet and Peter Davenport
 Scott G. Dietrich
 Peter and Kathy Drexel
 Durgin and Crowell Lumber Co.
 Alan and Jerry English
 Stephen R. Fahey
 Charles and Charlotte Faulkner
 C. Anthony Federer²
 Allan and Myra Ferguson
 John and Isabel Freeman⁴

Carolyn F. Fine and Jeremiah
 Friedman
 Jameson French
 Anne Giblin and Ken Foreman
 Robert S. Gilmore
 Joshua Ginsberg
 Ellie Gordon
 Clark and Happy Griffiths
 Evan S. Griswold
 Peter Groffman and Katherine Bishop
 Margaret and Harry Hampton
 John and Joanna Hawkins
 Richard and Deborah Holmes
 Kathy and David Hooke³
 George and Janet Hooper
 Brucie Hubbell
 Pamela Hunt
 Fred Hunt and Mary MacVey
 Ron Jansen
 Robert A. Jones²
 Marilyn J. Jordan
 Kevin and Punam Keller
 George and Susan Kimball
 King Forest Industries
 Sam Knight, Jr.
 Donald Kress
 Elizabeth Krusi and Sandy Harris
 James W. La Baugh
 Anthea Lavallee
 Theodore Allen Lee
 James N. and Jane B. Levitt
 Charitable Fund
 Rebecca Lovejoy and Kevin Peterson
 Thomas E. Lovejoy¹
 Vincent and Lois Lunetta
 Mary Martin
 Mark D. Mattson
 Brenda and Pat McCartney
 Olive C. McGregor
 Douglas and Barbara McIlroy

Diane McKnight and Larry Esposito
 Amanda Merrill
 Nancy N. Merrill
 Carolyn and Peter Mertz
 Myron and Deborah Mitchell
 John P. Morgridge
 June Noreen²
 New England Forest Products
 Philip and Mary Jean Oman
 Pauline and Harry W. Parker
 Benjamin Peierls and Karin Howe
 Ralph and Christine Perron²
 Lynn and Nancy Peterson
 Bryant Pierce²
 Peter and Deborah Rhoades
 Corine S. Richardson
 Maribeth Rubenstein
 Elisabeth Russell
 Rick Russman
 Lindsey Rustad
 Douglas F. and Lillian M. Ryan^{1,3}
 Schiffman, Dattilio, & Liepmann, P.C.
 Jill and John Schiffman
 Mark and Jennifer Schiffman
 Frederick and Helena Schwalm
 Michael Shooob and Judy Yocom
 John and Nancy Silander⁴
 Peter M. and Anne Silberfarb
 David and Cronin Sleeper
 John Smitka and Amelia Bormann¹
 Jane E.S. Sokolow^{1,3}
 Frank B. Stevens
 Sharon J. Surra
 Freda Swan
 Dennis Swaney and Karin Limburg
 Roger and Ann Sweet
 David and Martha Talbot
 Pamela Templer
 Gerald A. and Alice R. Thornton²
 David Thurlow

Continued

Continued from previous page

Tig and Elise Tillinghast
Rick Van de Poll
Harriet Van Vleck
John Vogel and Judy Music
Rhoda Walter
Louise and Chuck Weed
Geoff Wilson
Cynthia L. and David H. Wood
Christopher and Emily Woodall
Ruth D. Yanai¹
Joseph Yavitt and Susan Merkel

¹ *In Memory of F. Herbert Bormann*

² *In Memory of Robert S. Pierce*

³ *In Memory of Tom Siccama*

⁴ *In Memory of Phyllis Likens*

⁵ *In Memory of Deborah Johnson Pyles*

HBRF is grateful for funding in 2016 and 2017 from: The Getz Charitable Trust, Citizens Bank, N.A. Trustee, The Jack & Dorothy Byrne Foundation, and Network for Good.

Capstone Campaign for Mirror Lake

Since launching the Capstone Campaign for Mirror Lake in the fall of 2015, we have raised \$268,500 toward full ownership of the campus.

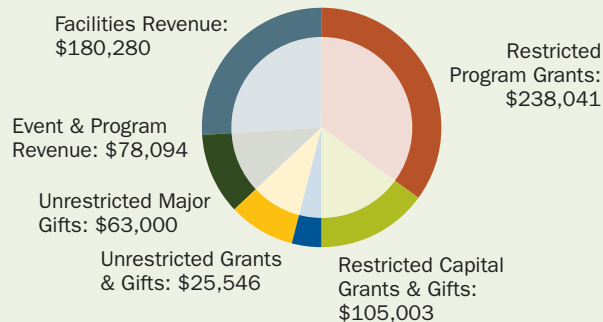
2017 Gifts to the Capstone Campaign for Mirror Lake, in Memory of Phyllis C. Likens

Anonymous (3)
Joyce E. Abugov
Nancy and Myles Alderman
Christopher Barton and Sarah Tebbens Barton
John Battles and Janis Ching
Alan Berkowitz and Miriam Straus Berkowitz
Thomas and JoAnn Bianchi

Stephen Blackmer and Kelly Short
Children's Fund of the Upper Valley,
NH Charitable Foundation
Starling Childs
Lynn Christenson and Alan Tousignant
Ivan Fernandez
John and Isabel Freeman
Sarah Garlick
Peter Groffman and Katherine Bishop
Tom Gross
Steven Hamburg and Sarah Barker
Richard and Deborah Holmes
Bruce Hubbell
Fred Hunt and Mary MacVey
Anthea Lavallee
Lynn Bradley Leopold
Madelyn Leopold and Claude Kazanski
Wendy Leuenberger
Gene Likens
Gary Lovett and Janet Allison
Mary Lunt and Bill Waterman
Mark D. Mattson
Donald and Patricia Nelson
Pauline and Harry W. Parker
Carol J. Pierce
James Pyles
Ginny and Tim Quinn
Nicholas Rodenhouse and Marianne Moore
John and Eleanor Rorer
Douglas F. and Lillian M. Ryan
Carl Schlichting and Jan Conn
Scott Sillett
Mike and Jean Smith
John Smitka and Amelia Bormann
Charles E. Snelson
Jane E.S. Sokolow
Matt Vadeboncoeur
Harriet Van Vleck
Jo Ann Whitehead and Bette Jo Green
Winslow Foundation
Tammy Wooster
Alexander Young

Hubbard Brook Research Foundation FY 2017 (October 1, 2016 – September 30, 2017)

Revenues \$689,964



Expenses \$669,139

