Northeastern States Research Cooperative

Annual Report

2021

USDA

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

1865 THE UNIVERSITY OF MAINE

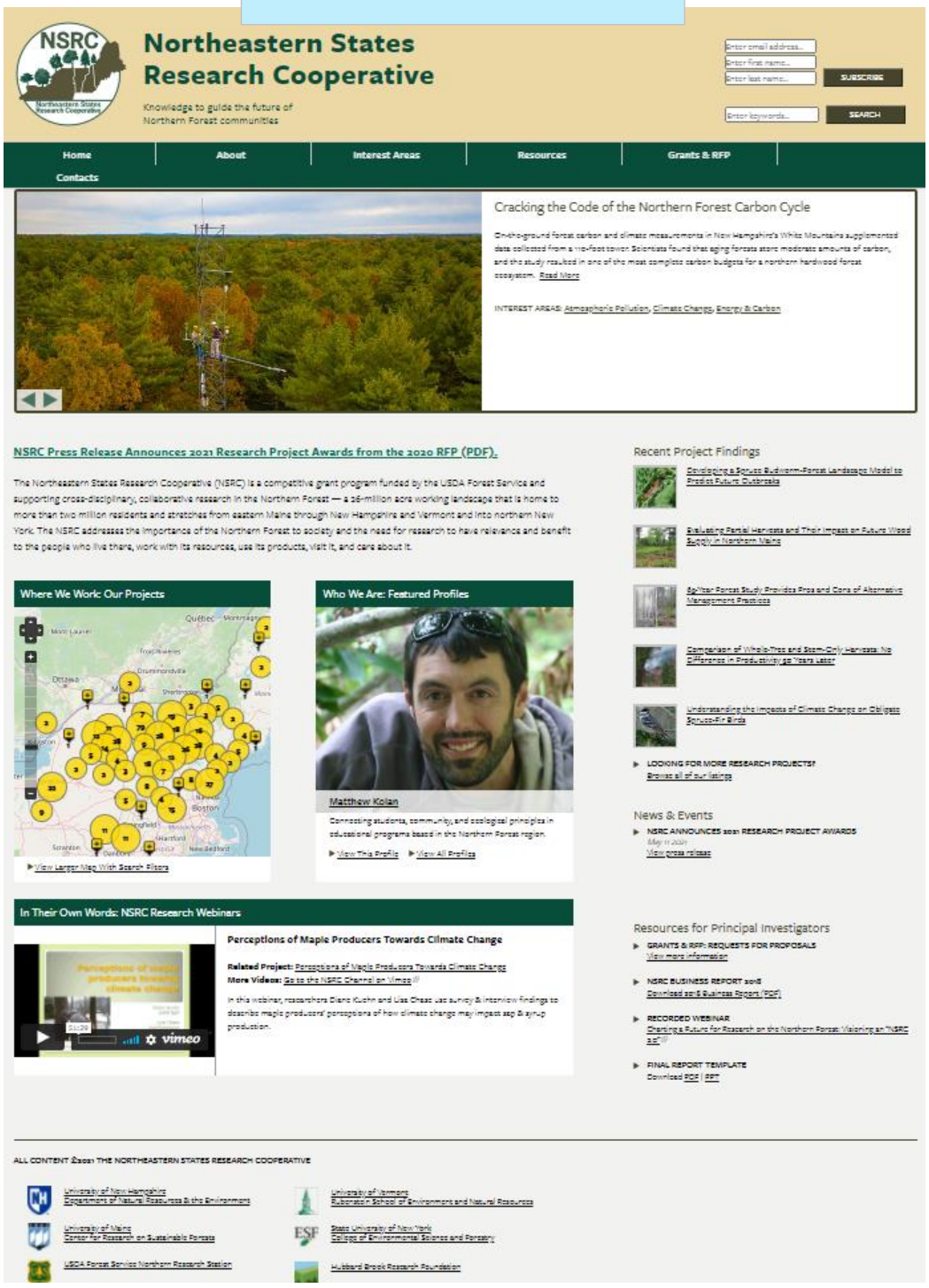
The University of Vermont

University of New Hampshire

ESF
State University of New York College of
Environmental Science and Forestry

HUBBARD BROOK
RESEARCH FOUNDATION

nsrcforest.org



The NSRC website serves as a source of information about the program and a repository for results from funded projects. Webinar recordings, researcher profiles, grant RFPs, and project reports by NSRC researchers are accessible at nsrcforest.org.

Cover Photo – Newman Hill Conservation Easement, Orono. Photo courtesy Meg Fergusson, UMaine Center for Research on Sustainable Forests. Used with permission.

Message from NSRC Executive Committee

From 2001 to 2016, the Northeastern States Research Cooperative (NSRC) was a critically important source of funding for applied forest research and outreach efforts throughout the Northern Forest. During those years, the program has supported more than 335 projects, across 50 organizations. After years of declining congressional funding for the program followed by no funding from 2017-2019, we were delighted that Congress reinstated funding to support the NSRC in 2020. Our revitalized NSRC 2.0 will strive to put regional forest research to work again across the Northern Forest in support of a vibrant and thriving economy and culture, rooted in forest health.

We are pleased to showcase here NSRC's revitalization progress and scientific contributions to the economy and culture of the Northern Forest. Last spring 13 projects were funded with nearly $1.6 million to explore a broad range of concerns related to land use and sustainable forestry, rural communities and economic development, climate change, biodiversity, recreation and tourism, invasive pests and diseases, and Traditional Ecological Knowledge. These projects were carefully vetted by an external stakeholder panel, which prioritized research based on the potential to engage stakeholders and to have meaningful impact to the region. In future reports and on our website, we will share broadly the results and outcomes of these projects over the next three years.

In the meantime, with ongoing Congressional funding, we look forward to supporting high-impact science with direct relevance for healthy forests, and welcome any and all feedback as we move forward.

Sincerely,

William "Breck" Bowden, University of Vermont (**breck.bowden@uvm.edu**)
René Germain, State University of New York (**rhgermai@esf.edu**)
Anthea Lavallee, Hubbard Brook Research Foundation (**alavallee@hubbardbrookfoundation.org**)
William H. McDowell, University of New Hampshire (**bill.mcdowell@unh.edu**)
Aaron Weiskittel, University of Maine (**aaron.weiskittel@maine.edu**)
Chris Woodall, US Forest Service (**christopher.w.woodall@usda.gov**)

The Northeastern States Research Cooperative (NSRC) supports cross-disciplinary, collaborative research in the Northern Forest — a 26-million-acre working landscape that is home to more than one million residents and stretches from eastern Maine through New Hampshire and Vermont and into northern New York. Congressional authorization for the NSRC was passed as part of Public Law 105-185.

Additional information on the Northeastern States Research Cooperative projects is available at **nsrcforest.org.**

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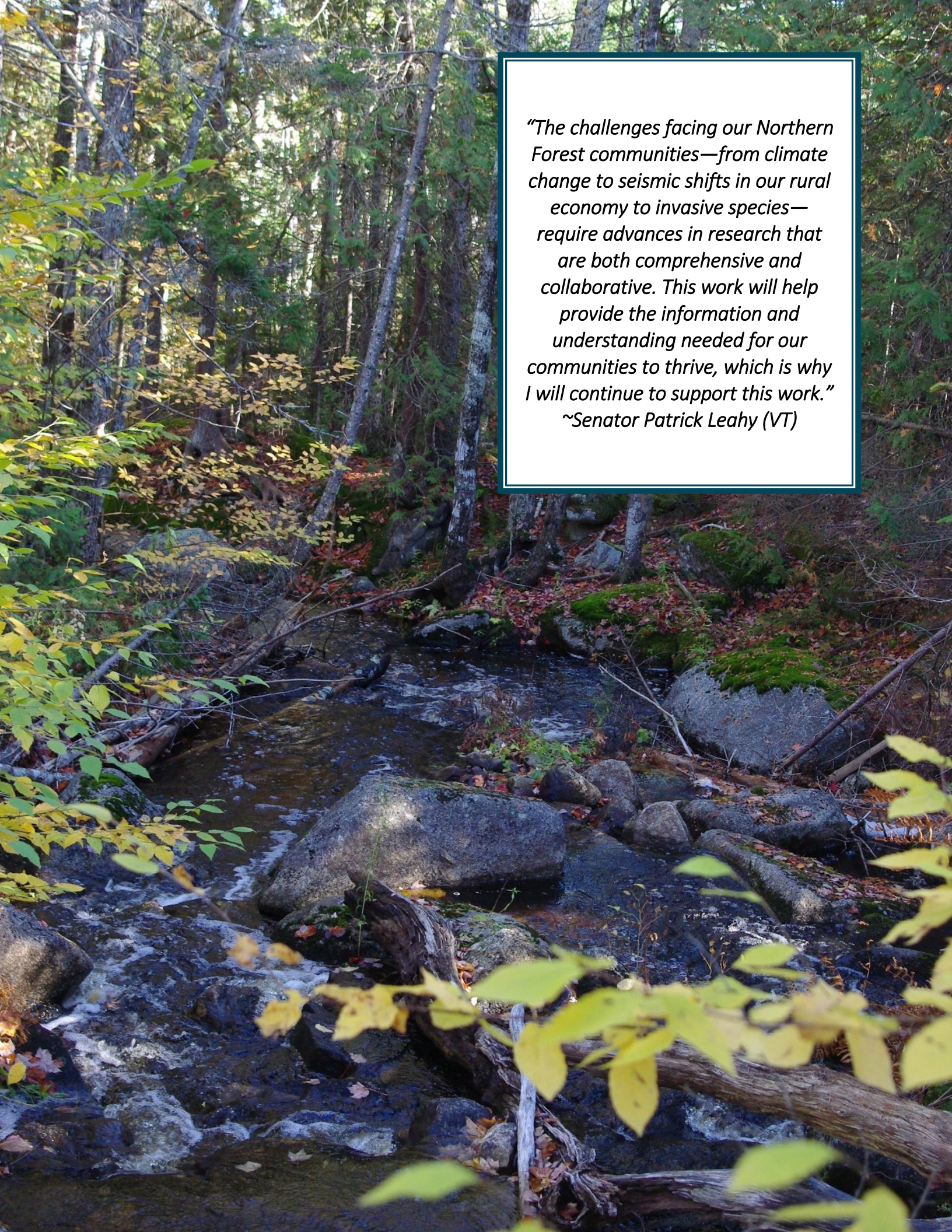


"The challenges facing our Northern Forest communities—from climate change to seismic shifts in our rural economy to invasive species—require advances in research that are both comprehensive and collaborative. This work will help provide the information and understanding needed for our communities to thrive, which is why I will continue to support this work."
~Senator Patrick Leahy (VT)

Program Overview

History

2001-2019

The NSRC is a competitive grant program for Northern Forest research, directed and funded by the USDA Forest Service Northern Research Station (USDA-NRS) and a designated institution in each of the four Northern Forest states: The **Rubenstein School of Environment and Natural Resources at the University of Vermont**, the **Department of Natural Resources at the University of New Hampshire**, the **Center for Research on Sustainable Forests at the University of Maine**, and the **State University of New York College of Environmental Science and Forestry**. The **Hubbard Brook Research Foundation** in New Hampshire serves as the designated regional institution.

MISSION

The **Northeastern States Research Cooperative** supports regional, collaborative research in the Northern Forest—a 26-million-acre working landscape that is home to more than two million residents and stretches from eastern Maine through New Hampshire and Vermont and into northern New York. Research goals are stipulated in the NSRC Congressional Authorization (Public Law 105-185). A central component of the program is the importance of the Northern Forest to society and the need for relevant research that benefits "the people who live within its boundaries, work with its resources, use its products, visit it, and care about it."

The origin of the NSRC dates back more than three decades. In the 1980s, the distinctive Northern Forest region—a working landscape with unique recreational opportunities, vast forested watersheds, and diverse northern wildlife—was designated a priority for national protection in response to growing concern that remaining forest land and its timber were at risk of unplanned fragmentation, piecemeal development, and real estate speculation. In response to these concerns, Congress allocated funding for collaborative research in the Northern Forest that focused on the environmental and economic impacts of these stressors.

From 2001 to 2016, NSRC was a critically important source of funding for applied forest research and outreach efforts throughout the Northern Forest. The program supported more than 335 research projects involving 50 organizations and hundreds of landowners and managers, conservation groups, government staff, and private citizens. NSRC developed original data, predictive tools, and recommendations to manage, protect, and monitor essential natural resources in a regional culture and economy that depends on a healthy, working Northern Forest.

In 2018, NSRC released a comprehensive **Business Report (PDF)** on the program's sixteen years of contributions to knowledge about the environment and the economy of the Northern Forest. NSRC directors and Congressional delegations worked together to rebuild a program for renewed funding. This came to fruition in FY2020.

2020-2021

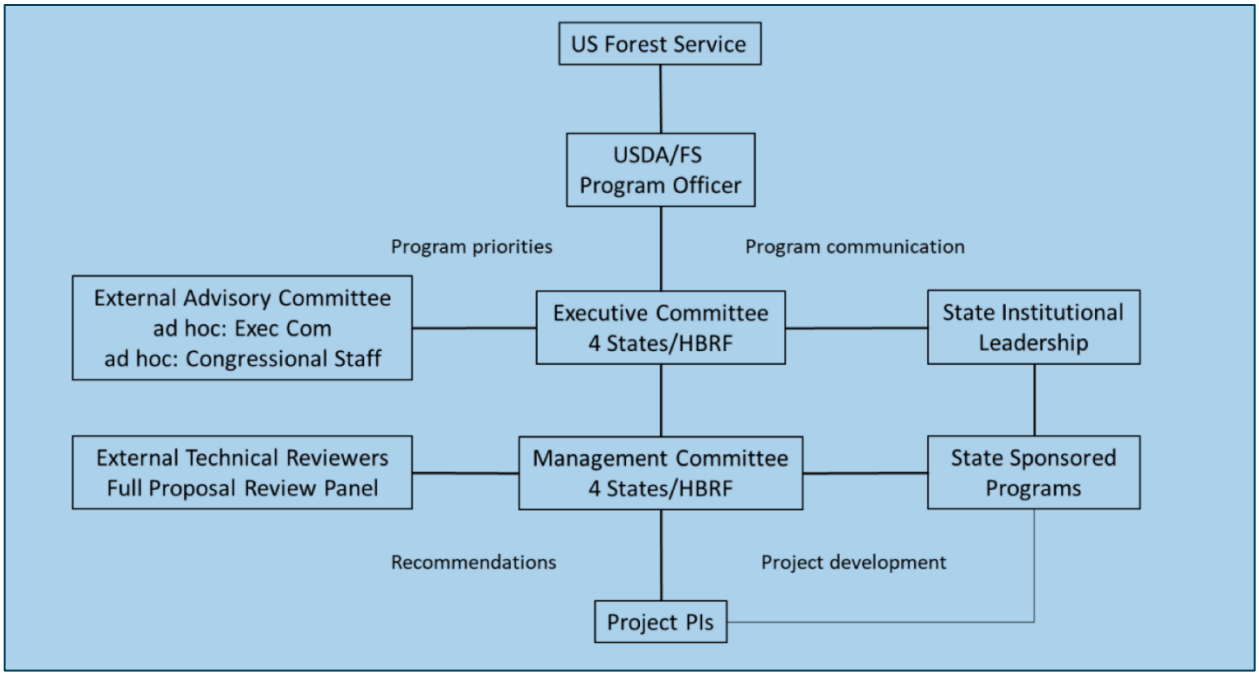
In 2020, Congress reinstated funding to support the ecosystem and economics of the Northern Forest through NSRC. The NSRC Charter was updated, revised, and signed by the collaborating institutions and executive directors. This document describes new governance and operational principles for NSRC 2.0 and serves as the foundation for the structure, governance, and guidelines for this cooperative.

During summer of 2020, and in the midst of the COVID-19 pandemic, an External Advisory Committee (EAC) was convened virtually to identify key areas of research and priority issues facing forest stakeholders in the Northern Forest region and to provide guidance crafting the request for proposals for the following year. The EAC is composed of seventeen Northern Forest stakeholders representing the communities, businesses, industries, and agencies in the Northern Forest Region who contribute to and benefit from knowledge generated by research funded via the NSRC.

With an anticipated $1.5 million available to support research projects starting in 2021, the NSRC released a request for proposals (RFP) in September 2020 that addressed (1) the state of the forest, (2) measuring and quantifying impacts, and/or (3) developing tools for response. In response, the NSRC received 50 research project proposals requesting $6.3 million in funding.

In May 2021, the NSRC Directors were pleased to announce 13 grants, totaling $1.6 million of federal funding and $0.8 million of matching funding for research that will serve priority issues identified by forest stakeholders in the Northern Forest region. The projects cover a broad range of concerns related to land use and sustainable forestry, rural communities and economic development, climate change, biodiversity, recreation and tourism, invasive pests and diseases, and Traditional Ecological Knowledge.

NSRC Organizational Structure



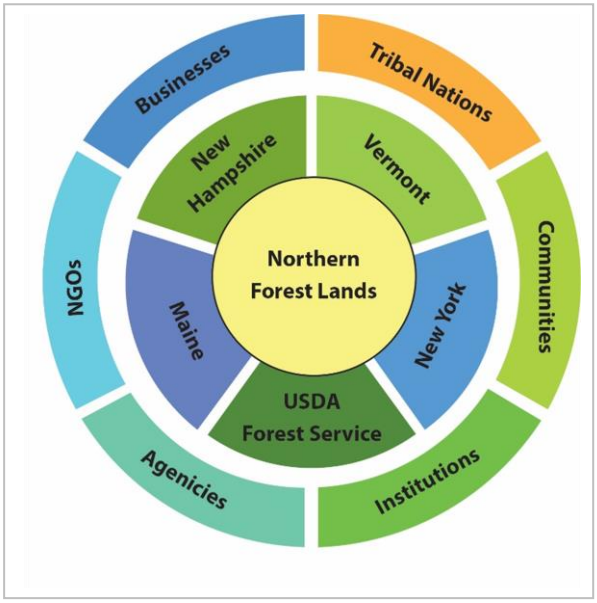


Figure 1. NSRC partnerships

Partnerships

Strong partnerships are the foundation of the NSRC's success. Partners include leaders from the USFS-NRS and the four universities overseeing the program, citizens of the Northern Forest, principal investigators and their co-researchers, and personnel from cooperating organizations. NSRC stakeholders include: (1) scientists and experts from academic institutions, (2) officials from local, state, and federal agencies, (3) NGO and industry professionals, (4) Tribal consultants, and (5) private residents of the Northern Forest (Figure 1).

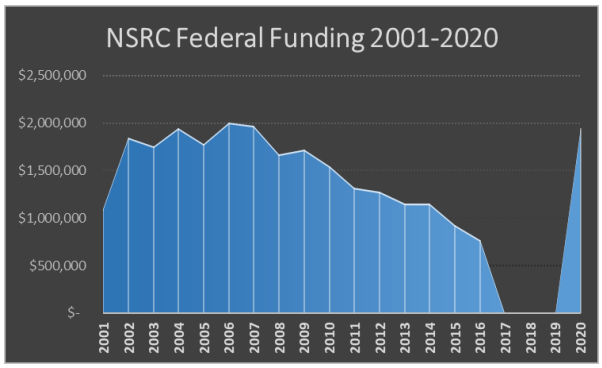


Figure 2. NSRC has received nearly two decades of federal funding to support forest research in the region

NSRC Funding

Federal funding to support NSRC research projects comes from Congressional appropriations through a partnership with the research and development arm of the USDA Forest Service (Figure 2). In 2020, Congress allocated $2 million to NSRC, with more than $1.6 million directly to support research projects by scientists, resource managers, policy makers, and other stakeholders identified as the most relevant and transformative to forest lands in the northern tier of New York, Vermont, New Hampshire, and Maine (Tables 1, 2). In addition, the private sector, states, and other organizations offer significant matching funding ($853,643) for proposed projects, thereby expanding the reach and impact of the research projects. With federal support, NSRC will continue to support and disseminate cross-disciplinary, collaborative research that focuses on ecosystems, socio-economics, forest products, and conservation among communities in the Northern Forest region.

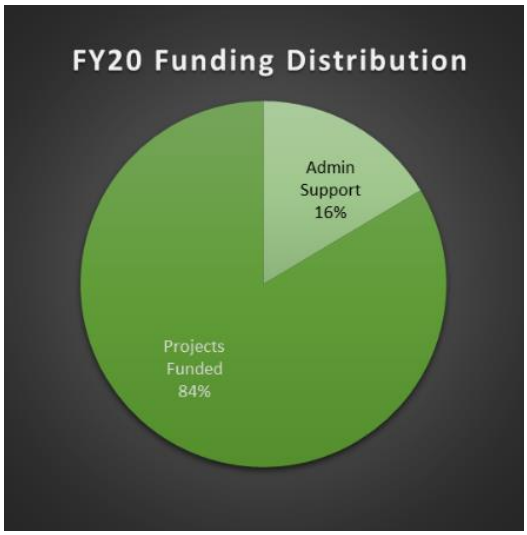


Table 1. FY20 program administration funding

Location	Institution	Amount
Regional	HBRF	$59,000
State: ME	UM	$59,000
State: NH	UNH	$59,000
State: NY	SUNY ESF	$59,000
State: VT	UVM	$59,000
	Total	$312,000

Table 2. FY20 research project funding

State	PI	Institution	Project Title	Award	Match
NH	Asbjornsen, Heidi	University of New Hampshire	Assisted Migration: A Viable Silvicultural Technique for Facilitating Adaptation of Northern Forest Tree Species to a Warmer and Drier Future World?	$174,492	$87,312
NH	Carson, Jessica	University of New Hampshire	Escaping to the Northern Forest: Migration, Housing, and Community Implications in the Time of COVID	$44,002	$22,286
VT	Danks, Cecilia	University of Vermont	Vermont Town Forest Census for Covid, Carbon and Capacity-Building	$80,339	$82,169
VT	Faccio, Steven	Vermont Center for Ecostudies	Evaluating the Efficacy of Audubon's Bird-friendly Maple: Can Managing Sugarbushes for Birds Provide Additional Benefits to Biodiversity, Ecosystem Services, and Forest Resilience?	$51,658	$26,600
NY	Fernando, Danilo	SUNY-ESF	Quantifying the Genetic Impacts of Forest Management Strategies on Sugar Maple (Acer saccharum) in the Northern Forest	$166,611	$84,916
ME	Hayes, Daniel	University of Maine	The State of the Northeastern Forest Carbon Cycle: High-Resolution Carbon Accounting for the Regional Forest Sector	$173,790	$88,008
ME	Kenefic, Laura	U.S. Forest Service	A New Silvicultural Guide for Northern Conifers in the Northeast	$98,429	$59,715
NY	Kimmerer, Robin*	SUNY-ESF	Haudenosaunee Forest Principles	$49,999	$44,224
ME	Mech, Angela	University of Maine	Pheromone-based Monitoring and Control Program for Browntail Moth in the Northeast	$191,647	$96,263
VT	Murdoch, James	University of Vermont	Integrating Genetic and Ecological Data Using a New Circuit Theory Approach to Measure and Map Wildlife Connectivity across the Northeast	$142,526	$72,343
NH	Sirén, Alexej	University of New Hampshire	Predicting Density and Occurrence of Keystone and Umbrella Species Using Drone-based LiDAR	$174,031	$90,977
NY	Vidon, Elizabeth	SUNY-ESF	Visitor Versus Local Community Perceptions of Crowding and Risk in the Adirondack Park	$189,964	$98,830
NH	Wymore, Adam*	University of New Hampshire	NEBI (Water): Connecting N'dakinna (Land), Bilowagizegad (Climate), and Alnobak (People)	$48,568	-
			totals	$1,586,056	$853,643

*Indigenous Forest Knowledge Fund awardees.

In 2021, the Congressional appropriation to the NSRC was $3,000,000, of which $2,500,000 will be managed directly by the NSRC state and regional team and $500,000 will be managed directly by the USDA Forest Service. These funds will enable NSRC to continue the competitive research program and Indigenous Forest Knowledge Fund and facilitate widespread utilization of research findings.

Advisory Committees

External Advisory Committee

During the summer of 2020, staff from the Hubbard Brook Research Foundation (HBRF) convened a seventeen-person External Advisory Committee (EAC) to identify priority issues facing forest stakeholders in the Northern Forest region and therefore set the research agenda for the 2020 request for proposals (RFP). For an outcome summary of the EAC meeting, see Appendix B.

Prior to the meeting, individual EAC members were interviewed by NSRC staff about key challenges and knowledge gaps of importance to the forests and people of the Northern Forest region. The issues that people raised in their interviews clustered into the following themes (these themes became the research topics highlighted in the RFP):

- *Invasive pests and diseases*
- *Mitigating climate change*
- *Adapting to climate change*
- *Sustainable forestry, forest fragmentation, and working with private landowners*
- *Forest products industry*
- *Rural community and economic development*
- *Recreation*
- *Environmental justice, equity, and inclusion*
- *Energy*

The EAC recommended that the NSRC prioritize research by: (1) how relevant it is across the four-state region, as opposed to a narrower focus on localized areas or individual states; and (2) how actionable it is to practitioners, decision makers, and other stakeholders.

EAC Recommendations on Research Approaches
Collaborations that bring practitioners and researchers together from the beginning to co-design projects and programs: Engage genuinely with those who are intended to be beneficiaries of the research, not just in one-off, occasional conversations or advisory committees.
Deliverables: Field trips to present research, progress and final reports, demonstration sites, easy to navigate decision support tools, summary data.
Future business leaders: Develop innovative and sustainable business models; communicate these topics at the student level; link students to the conversation; how to take research to spur something innovative.
Synthesis and integrated research: Need for into longer term, more comprehensive teams and a coordinated effort to develop an integrated body of knowledge.
Applied research: Academics need to create directions for applied science so that practitioners can implement it on the ground. Researchers need to be thinking: what does the practitioner need to know?
Support for implementation in rural communities: Need for technical assistance for towns and communities moving a process forward, need for big effort to get capacity building in these communities.

Further, the EAC recommended that the RFP and proposal review process: (a) be intentionally designed to support interdisciplinary teams that demonstrate genuine grounding of the research in stakeholder priorities, with buy-in and engagement at the project design phase and throughout its execution; and (b) include clear communication plans for how research results and products will serve broader stakeholder groups and communities in the region.

Because the NSRC Executive Committee is composed primarily of academic forest researchers, the EAC suggested that extra effort should be made to assess the practical, economic, and social elements of each proposal with consideration for social/human dimensions, synthesis, interdisciplinary teams, and scalability and applicability. The EAC also proposed that the RFP be organized around three categories of research: State of the Forest, Measuring and Quantifying Impacts, and Developing Tools for Response.

Tribal Nations External Consultants

In September 2020, the HBRF staff met with three consultants from Tribal Nations representing communities of Indigenous Peoples in the region. The consultants discussed their perspectives on the top issues and concerns related to the forests and Indigenous Peoples in the Northern Forest region and how forest-related research might serve those issues and concerns. A theme underscoring all of these topics is the importance of recognizing how pre- and post-colonial history influences many of the current issues and dynamics in the region today.

See Appendix C for the Tribal Nations External Consultant's Report.

NORTHEAST REGION TRIBAL NATION TOPICS AND CONCERNS FOR FOREST-RELATED RESEARCH

- Access to forest lands, off reservations, is needed for hunting, gathering medicinal foods and plants, and participating in cultural practices such as teachings, prayer, and reconnecting with the land
- Recognition of Tribal Nations by non-Indigenous scientists as vital partners
- The need for non-Indigenous researchers and research organizations to build trusting relationships and establish ongoing partnerships with Tribal agencies, Indigenous scholars, and other Tribal Citizens
- A lack of opportunities for young people to engage in scientific education and research, and training in natural resource management and decision making
- The health of culturally and economically significant species, such as brown ash
- Forest management strategies for adaptation and mitigation of climate change and impact of invasive species
- Specific environmental topics, including emerald ash borer, sugar maple mortality, and adaptive land management

"The Northeastern State Research Cooperative has been an important source of regional research funding for the last two decades. This new set of projects demonstrate an effective partnership between the US Forest Service, regional stakeholders, and applied researchers. We look forward to continuing to build this vital regional program in the years to come."

~ Aaron Weiskittel,
Director of the Center for Research on Sustainable Forests
at the University of Maine

The NSRC greatly appreciates the time and effort expended by the following members of the External Advisory Committee.

2020 External Advisory Committee

Susan Arnold, Vice President for Conservation, Appalachian Mountain Club
John Bartow, Executive Director, Empire State Forest Products Association
Amanda Cross, State Wildlife Planner, Maine Department of Inland Fisheries and Wildlife
Frank Cuff, Senior Research Forester, Northern Hardwood Region, Weyerhaeuser
Robert K. Davies, State Forester, State of New York; Director, NY Department of Environmental Conservation, Division of Lands and Forests
Chad P. Dawson, Board Member, Adirondack Park Agency; Professor Emeritus, Recreation and Resources Management, SUNY-ESF
Rich Grogan, Executive Director, Northern Border Regional Commission
Kathy Fallon Lambert, Senior Advisor, Harvard T.H. Chan School of Public Health, Center for Climate, Health, and the Global Environment; Co-Founder, Science Policy Exchange
Donald Mansius, Director, Forest Policy and Management Division, Maine Forest Service
Ian Prior, Chair, Executive Committee, Cooperative Forestry Research Unit, University of Maine; Inventory Analyst, Seven Islands Land Company
Tyler Ray, Founder and Principal, Backyard Concept
*Sean R*oss, Managing Director, Lyme Timber Company
April M. Salas, Executive Director, Revers Center for Energy at Tuck School of Business, Dartmouth College; Chief Sustainability Officer, Town of Hanover, NH
Joe Short, Vice President, Northern Forest Center
John Sinclair, Forest Supervisor, Green Mountain and Finger Lakes National Forests
Michael Snyder, Commissioner of Vermont Forests, Parks, and Recreation, State of Vermont

Research Proposal Process, 2020-2021

Overview

Participation in the research proposal process is open to scientists, resource managers, policy makers, and other stakeholders pursuing research relevant to forest lands in the northern tier of New York, Vermont, New Hampshire, and Maine. Proposals were required to encompass one or more of three focus areas: State of the Forest, Measuring and Quantifying Impacts, and Developing Tools for Response. Investigators were encouraged to address one or more of the research topics identified by the EAC. The 2020 NSRC Request for Proposals (RFP) process attracted 83 high quality pre-proposals and ultimately yielded 50 full proposals. For this RFP, $10.7 million was requested at the pre-proposal stage and $6.3 million was requested at the full proposal stage, well in excess of the $1.5 million available to distribute. Furthermore, in recognition of the deep, primary knowledge of Tribal Nations in the Northern Forest region, NSRC released a second RFP in spring 2021, the Indigenous Forest Knowledge Fund, making an additional $100k funding available (proposal requests exceeded $150k). Consequently, many very good proposals submitted in 2020-21 could not be funded (Figure 3).

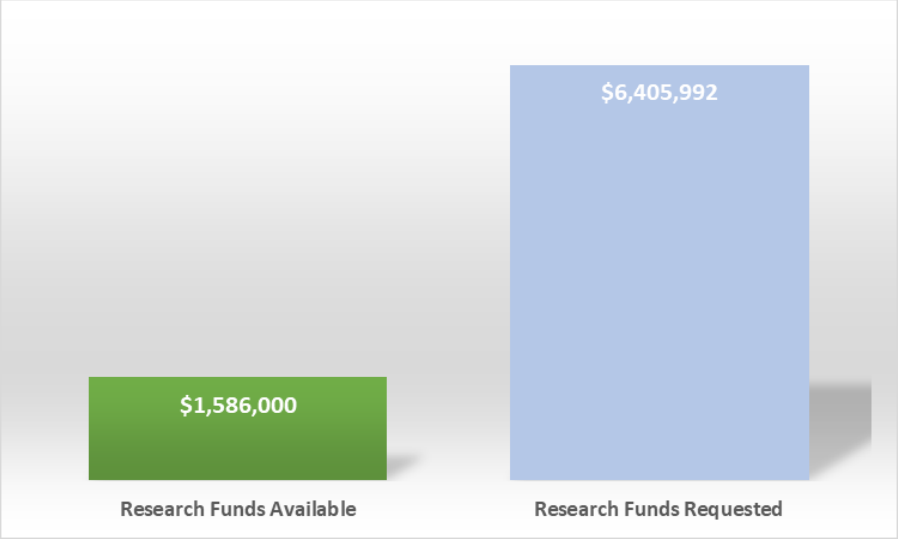


Figure 3. Total research funds requested for both RFPs (53 projects) compared with available funding.

RFP Process

The general RFP was issued in fall 2020 for projects to be funded in spring 2021. The first step in the process was a simple pre-proposal submission. There was no formal assessment of the intellectual or technical merit of the pre-proposal idea; the primary intent at this stage was to

provide rapid feedback to the project investigators regarding the likely competitiveness of their proposal relative to the RFP. Pre-proposal submissions came from across the region (Figure 4).

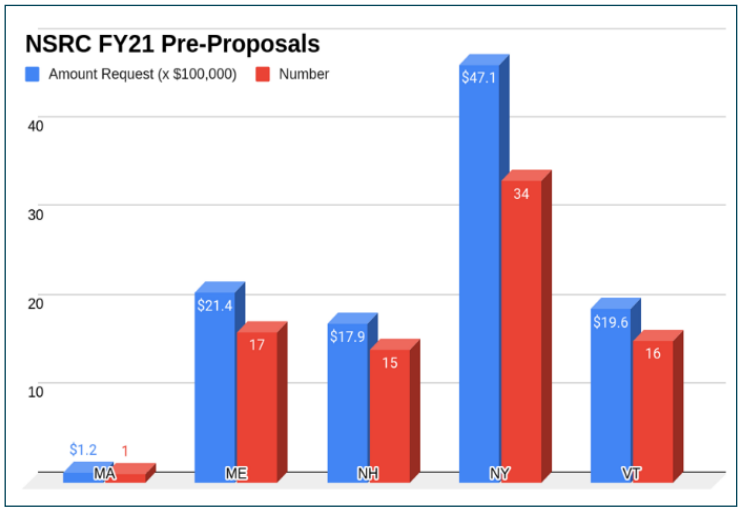


Figure 4. Pre-proposal funding requests by PI location.

Full proposals were reviewed for technical merit by two external experts. Technical reviewers provided their perceptions of the major strengths/weaknesses of proposals and their assessments of whether the proposals are impactful and worth funding. Each project received a rating (strong to weak) for the following:

- Problem is clearly defined and substantially justified.
- Project objectives, hypotheses, or questions are logical and stated clearly.
- Proposed methods or approaches are appropriate.
- Proposed project is likely to achieve its objectives and stated outcomes in the time frame indicated.
- Proposed project is relevant to the NSRC RFP focus areas and priority research topics and the Northern Forest region.
- Proposed project is likely to inform resource management decisions or public stakeholder groups.
- The cost-benefit ratio of the project is favorable, the project budget fits the scope of the work proposed, and meets cost-share requirements (50% match)
- Proposed project team appears adequate to the work proposed.

Following the expert technical reviews, the twenty highest ranked projects were vetted by a review panel composed of regional stakeholders. The panelists prioritized research based on potential to engage stakeholders and have meaningful impacts in the region. Ultimately, eleven proposals under the general RFP were recommended for funding.

Indigenous Forest Knowledge Fund

While the general RFP encouraged projects of high cultural significance to Indigenous communities and lifeways (e.g., the health of brown ash and Indigenous peoples' access to lands for hunting, fishing, gathering materials, and other purposes). NSRC leaders were committed to going further to (1) acknowledge and address structural inequities in opportunities for Indigenous youth to participate in forest research and (2) invest in the cultural and intellectual sovereignty of Tribal forest traditions alongside other forms of applied forest research. With these goals in mind, NSRC awarded $98,567 in funding for two projects chosen by a committee composed of program organizers representing forest science, public outreach and education, and Tribal climate/forest science and cultural values.

The NSRC could not have adequately and thoroughly reviewed the fifty proposals submitted in response to the RFP without the expert help of our technical reviewers. We thank them for volunteering their time and care in consideration of the proposals.

Dan Ardia, Franklin & Marshall College
Brett Butler, USDA Forest Service, Northern Research Station
Paul Catanzaro, University of Massachusetts
Riva Denny, University of Michigan
Timothy Divoll, SWCA Environmental Consultants
Mike Dockry, University of Minnesota
Therese Donovan, United States Geographical Survey (USGS), University of Vermont
Julie Evans, The Northern Forest Center
Timothy Fahey, Cornel University
Alex Giffen, New England Forestry Foundation
Josef Gorres, University of Vermont
Joshua Halman, Vermont Department of Forests, Parks and Recreation
Daniel Harrison, University of Maine
Max Henschell, New York Natural History Program
Lloyd Irland, The Irland Group
Dan Johnson, University of Georgia
Bill Livingston, University of Maine
Jackie Matthes, Wellsley College
Solange Nadeau, Canadian Forest Service
David Orwig, Harvard Forest, Harvard University
Peter Palmiotto, Antioch College
Nancy Patch, Licensed Forester, Vermont
Sean Robinson, SUNY Oneonta
Shannon Rogers, University of New Hampshire (Extension)
Stephanie Snyder, USDA Forest Service, Northern Research Station
David Vail, Bowdoin College
Philippe Vidon, SUNY-ESF
Shaun Watmough, Trent University
Christopher Webster, Michigan Technological University
Matthew Whiles, University of Florida
Aaron Whitman, Cornell University
Brendan Wiltse, Paul Smith's College
Justin Wright, Duke University

Awarded Projects: 2021

Thirteen projects received nearly $1.6 million in federal funding with an additional $0.8 million of matching funding. The research covers a broad range of concerns related to land use and sustainable forestry, rural communities and economic development, climate change, biodiversity, recreation and tourism, invasive pests and diseases, and Traditional Ecological Knowledge. Principal investigators come from throughout the region. The following pages showcase project synopses for research to be conducted over the next 2-3 years.

Assisted Migration: A Viable Silvicultural Technique for Facilitating Adaptation of Northern Forest Tree Species to a Warmer and Drier Future World?

Principal Investigator: Heidi Asbjornsen, University of New Hampshire
Co-PIs: Anthony D'Amato, University of Vermont; Cameron McIntire, USDA Forest Service; Jay Wason, University of Maine

Greater frequency and intensity of drought in the Northern Forest region will likely impact survival, growth, and reproduction of different tree species under future climate conditions. At the same time, the rate at which climate is changing in the region is outpacing tree species' ability to migrate into future suitable habitats. Both of these phenomena threaten sustainability of the region's forest ecosystems and communities. Forestry assisted migration, the intentional movement of climate-adapted tree species into anticipated future suitable areas outside their current range, may be a useful silvicultural tool for promoting future resilient forests.

NSRC researchers and local stakeholders in the four-state region will evaluate the capacity of ten assisted migration tree species to acclimate to new environments and drought in a periodically drier, warmer future Northern Forest. They will also quantify how morphological, anatomical, and physiological tree species traits show plasticity, or flexibility, to handle drought and the potential for particular traits to be indicators of seedling success.

Escaping to the Northern Forest: Migration, Housing, and Community Implications in the Time of COVID

Principal Investigator: Jessica A. Carson, *University of New Hampshire*

Nearly a year into the COVID-19 pandemic, popular press and local anecdotes continue to paint a picture of people fleeing urban spaces to take refuge in amenity-rich, rural regions. Fear of contracting the virus has paired with a new unlinking of employment from geography and a renewed appreciation for outdoor recreation, spurring moves into rural spaces, including the Northern Forest region. However, regional stakeholders have thus far been unable to quantify this migration.

Community and economic development professionals from across the region suggest that understanding how many people have moved into communities and their characteristics will highlight challenges and opportunities for serving movers, supporting locals, and sustaining communities. Beyond this specific wave of migration, identifying factors that "pull" migrants into one part of the region over another helps inform stakeholders' long-term planning for future migration, including in response to climate change, natural disasters, and impending waves of generational retirements. NSRC researchers will estimate patterns of COVID-era migration into the Northern Forest region, identify the extent of migration, the socio-demographic characteristics of migrants, and the features of communities that have attracted the greatest number of migrants. Community and economic development stakeholders across four states will serve as informal advisors and will benefit from the research and recommendations emerging from this project.

Evaluating the Efficacy of Audubon's Bird-friendly Maple

Principal Investigator: Steven D. Faccio, *Vermont Center for Ecostudies; Co-PIs: Steve Hagenbuch, Audubon Vermont; Brendan Fisher, University of Vermont; Anthony D'Amato, University of Vermont*

Maple sugaring is experiencing rapid growth across the Northern Forest in the scale of operations, acreage impacted, and number of people involved. As a result, it is becoming increasingly important to better understand how sugarbushes can be managed to benefit both maple production and biodiversity conservation.

Maple syrup can be produced from forests that are managed in dramatically different ways. The long-term sustainability of maple sap production is entirely contingent on healthy forests, but our knowledge is limited on how the complex drivers of increased maple sap production intensity, differing management strategies, and climate change will affect biodiversity, ecosystem services, and overall ecological health of sugarbushes. By conducting field surveys of biodiversity and ecosystem service metrics across a gradient of sugarbush production and management intensities, NSRC researchers will pioneer this knowledge base and develop tools and policies that provide sustainable sugarbush management guidelines that are relevant across the Northern Forest landscape. This will result in updated guidance for sugarmakers and specific revisions to the bird-friendly maple management guidelines in order to achieve the desired benefit for bird populations.

Haudenosaunee Forest Principles

Principal Investigator: Robin Kimmerer, *SUNY College of Environmental Science and Forestry; Co-PI: Neil Patterson Jr., SUNY-ESF*

Haudenosaunee people are the traditional caretakers of over twenty million acres of forests in what is now called New York State.

The goal of this project is to bring together Indigenous community leaders, knowledge holders, and practitioners to consider the ways that Haudenosaunee forest protocols and traditions can be applied to contemporary forest management practices. Together, we will develop a set of Haudenosaunee Forest Principles based on the Haudenosaunee Environmental Protection Process, a guideline developed by the Haudenosaunee Environmental Task Force (HETF) in 2007. The development of these Principles will also result in the creation of lesson plans designed to teach and demonstrate traditional forest knowledge from Indigenous elders and practitioners to youth during *Native Earth*, a program for Indigenous students to explore the intersection between traditional ecological knowledge and environmental science. The lessons will be piloted during Native Earth workshops for youth to engage in participatory research and education as directed by community needs and goals.

Influence of Multiple Impacts on User Experience and Decision Making in the Northeastern Forest

Principal Investigator: Elizabeth S. Vidon, *SUNY College of Environmental Science and Forestry; Co-PI: Paul Hai, SUNY College of Environmental Science & Forestry*

During the COVID-19 pandemic, recreation lands in the Northern Forest have seen a dramatic increase in visitors. While this has clear positive outcomes (revenue for communities, emotional and physical benefits for users), there are also challenges associated with increased use and crowding (ecological degradation, litter, waste, conflict, risk) that, when combined, interfere with user satisfaction and impact overall experience.

For this study, researchers will work in high-use areas of the Adirondack Park that provide outdoor recreational opportunities for health and wellness, receive high visitor volume, and may be at heightened risk because of increased visitation during COVID-19. NSRC researchers will contribute to understanding the ways various impacts work together to inform the whole picture of user experience and decision making. This, in turn, will allow for more comprehensive management and mitigation strategies than management approaches based on a single stressor. This work is widely applicable to forested areas of the northeastern United States and beyond.

Integrating Genetic and Ecological Data Using a New Circuit Theory Approach to Measure and Map Wildlife Connectivity across the Northeast

***Principal Investigator: James D. Murdoch**, University of Vermont; Co-PI: Stephanie McKay, University of Vermont*

The northeastern United States region provides key habitat that allows for movement and genetic exchange of animals across several states and provinces, which promotes healthier and more resilient populations. It also represents a critical linkage for movement of species northward as climate conditions change. However, habitat fragmentation, alteration, and loss represent persistent conservation problems that substantially impact wildlife populations by limiting how and where species move across the landscape.

NSRC researchers will integrate ecological and genetic data using a new circuit theory approach to map connectivity for 10 managed species with high ecological, economic, and cultural importance: moose, deer, bear, bobcat, coyote, red fox, gray fox, fisher, marten, and turkey. Their goal is to provide a precise and comprehensive depiction of wildlife connectivity across the region that can be used to support management decision-making at multiple spatial scales.

NEBI (Water): Connecting N'dakinna (Land), Bilowagizegad (Climate), and Alnobak (People)

***Principal Investigator: Adam Wymore**, University of New Hampshire*

The goal of this project is to provide Indigenous college students in New Hampshire with research opportunities that combine Indigenous knowledge of watersheds with empirically collected data from forested watersheds.

Vital to life in N'dakinna (present-day Northeastern United States) is access to clean and safe surface waters. For the Indigenous people of N'dakinna, the Abenaki and Pennacook, nebi (Abenaki for water) provides the interconnected web that organizes life, providing access to fish, clean drinking water, and a network of waterways for transportation, trade, and communication. The relationship to water throughout contemporary New Hampshire maintains these relationships including access to food and clean water and supporting agriculture.

One challenge for Indigenous communities and water resource management alike is the uncertain effects of global change. This includes rising temperatures, shorter winters, extreme flooding, and prolonged drought. Human population pressures also impact water resources including changes in land use and degraded water quality. The proposed project will engage Abenaki college students to develop (1) a virtual storyboard that preserves and shares Indigenous knowledge, language, and history about regional watersheds and (2) a unique research project using long-term surface water chemistry data to understand the effects of climate change on forested watersheds.

A New Silvicultural Guide for Northern Conifers in the Northeast

***Principal Investigator: Laura Kenefic**, U.S. Forest Service Northern Research Station, University of Maine; Co-PIs: Robert Seymour, University of Maine; Keith Kanoti, University of Maine*

The silvicultural guide for the northern conifer forest type covering 6 million acres of New England is close to 50 years old with little relevance to the conditions and challenges facing forest managers today. NSRC researchers will remedy that problem by synthesizing and interpreting an additional half-century of forest research to develop scientifically robust and ecologically sound silvicultural recommendations within the context of contemporary forest management needs. Researchers will ensure applicability and inclusion of diverse perspectives through a process of co-production in which an advisory panel of stakeholders from state and federal agencies, Tribal entities, landowners, forestry practitioners, and others provide guidance on content and delivery.

Pheromone-based Monitoring and Control Program for Browntail Moth in the Northeast

Principal Investigator **Angela Mech**, University of Maine; Co-PI: Jeff Garnas, University of New Hampshire

Browntail moth populations in Maine have seen population growth spurts every 15 years or so, but in 2015, populations exploded to 100-year highs, causing both forest and human health problems. Since then, the moth has spread across 4 million acres of Maine, Nova Scotia, and New Brunswick. This outbreak has caused over 150,000 acres of hardwood defoliation and tree mortality in areas that have experienced repeated years of defoliation. In addition, caterpillars have toxic hairs that cause severe rashes and respiratory problems in humans. The hairs go airborne, so direct contact with caterpillars is not required for serious symptoms, and outbreaks negatively impact tourism and outdoor recreation. NSRC researchers will contribute to a browntail moth management plan by developing a monitoring program using mating pheromones. This program will be used to detect current and future outbreak populations prior to buildup and allow for rapid control measures. Pheromones will be used to test if a mating disruption control program is an effective management option.

Predicting Density and Occurrence of Keystone and Umbrella Species Using Drone-based LiDAR

***Principal Investigator: Alexej Sirén**, University of New Hampshire: Co-PIs: Anthony D'Amato, University of Vermont; David Lutz, Dartmouth College; Michael Palace, University of New Hampshire; Franklin Sullivan, University of New Hampshire*

Forest and wildlife managers need a more efficient way to map forest attributes at broad spatial scales to better understand the influence of microhabitat features. NSRC researchers will use drone-based Light Detection and Ranging (LiDAR) sensors to identify and predict forest structural conditions critical for snowshoe hare and American marten in the Northern Forest. Identifying the habitat overlap between an early- and a late-successional species should indicate high biodiversity and inform forest management and conservation in the region. Researchers expect findings to reveal how microhabitat influences biodiversity at varying scales and inform forest management to balance wildlife and economic needs. This research will provide tools and guidance for large landowners to map and manage forests and economic opportunities for small

Quantifying the Genetic Impacts of Forest Management Strategies on Sugar Maple (*Acer saccharum*) in the Northern Forest

***Principal Investigator: Danilo Fernando**, SUNY College of Environmental Science and Forestry*

To examine how forest management practices affect genetic diversity of sugar maple, NSRC researchers will quantify the effect of two common management strategies (even-aged and uneven-aged) on northern hardwood stands with a strong sugar maple component. Managers use both practices to achieve a variety of objectives; however, no one has explored their impacts on tree genetic diversity.

Researchers will measure differences in genetic diversity between stands treated with shelterwood, selection methods, and no management within the last 100 years (control group) by examining three age classes (seedlings, saplings, and mature trees) per stand.

Findings will help refine management practices, such as identification of trees or stands that are genetically diverse and ideal for use as seed stocks for regeneration or restoration and of pollen sources for assisted pollination to genetically enrich future generations. Results will provide baseline information for the level of sugar maple diversity and serve as the start of a Forest Genetic Resource Monitoring program for the Northern Forest to detect potentially harmful changes to forest adaptability. Genetically sound harvesting practice is central to sustainable management of forest resources, especially the "genetic resource" that allows population and species-level adaptations to change.

The State of the Northeastern Forest Carbon Cycle: High-Resolution Carbon Accounting for the Regional Forest Sector

***Principal Investigator: Daniel Hayes**, University of Maine*

Ten Northeast and Mid-Atlantic states have joined in the Regional Greenhouse Gas Initiative to develop strategies and policies for reducing greenhouse gas emissions and mitigating their carbon impacts. These include New York, Vermont, New Hampshire, and Maine which have each adopted policies to achieve net or near zero emissions targets in the next 25 to 30 years. NSRC researchers will develop and report a spatially- and temporally-explicit carbon budget for the forest sector of the northeastern states that is comprehensive of the major components.

Researchers will build on current inventory-based carbon estimation methods by integrating state-of-the-art remote sensing data and techniques for wall-to-wall mapping of forest biomass dynamics at high spatial and temporal resolution. They will reconcile and translate the scientific budget with the key policy questions including the current and potential forest-sector carbon offsets to regional- and state-level fossil fuel emissions. The overall result will be a comprehensive estimate of the average annual net forest carbon sink, which will be compared to state-level emissions data to calculate the offset provided by forest carbon uptake.

Town Forest Census: Carbon, COVID, and Capacity-Building

***Principal Investigator: Cecilia Danks**, University of Vermont*

Town forests play a special role in forest conservation in the Northern Forest region. These publicly managed, accessible forest parcels contribute not only to forest integrity, ecosystem services, and community well-being, but also can serve as models to family forest owners of sustainable forest management and conservation for diverse goals. Acquisition of new town forests often add strategic pieces to regional conservation efforts that counteract the growing fragmentation of the Northern Forest and help sustain the forest products industry. Many communities, however, find that managing these parcels can also bring challenges when trying to accommodate diverse public demands with limited resources.

NSRC project collaborators have identified several needs hampering these efforts: lack of a complete inventory and key contacts for town forests, inadequate public maps and information on town forests, and uneven knowledge of community needs. This research project will help fill these gaps while asking novel questions about impacts of the COVID-19 pandemic and potential for forest carbon markets to help finance stewardship activities. NSRC researchers with deep knowledge of town forests will provide a complete inventory of community forests in Vermont, a census of Vermont town forests that can be repeated in the future, an updated database with public interface, and an interactive, publicly-available map. These products will enhance efforts to bolster the ability of communities to steward their forest resources to produce benefits that extend beyond their borders.

Program Impacts

Project Diversity

The Northern Forest is a complex and dynamic region that is highly dependent on its abundant natural resources, particularly its sustainably managed and multi-use forests. The Northern Forest is managed by a variety of landowners, including non-industrial private, industrial private, federal and state agencies, and non-governmental organizations. Management policies and practices vary by state but are highly dependent on available local product markets, tourism, and recreation. Over its history, the NSRC has maintained a diverse array of research projects across 14 primary interest areas that reflect stakeholder priorities. In 2016, NSRC released a comprehensive **Business Report** on the program's contributions to generation of knowledge about the environment and the economy of the Northern Forest since 2001.

To date, nearly 335 projects have been completed (2001-2016; summarized on the NSRC website: **https://www.nsrcforest.org**). The highest concentrations of research from those years fell under the focus of these areas: (1) Forest Management & Productivity; (2) Atmospheric Pollution; (3) Forest Health & Invasive Species; and (4) Climate Change.

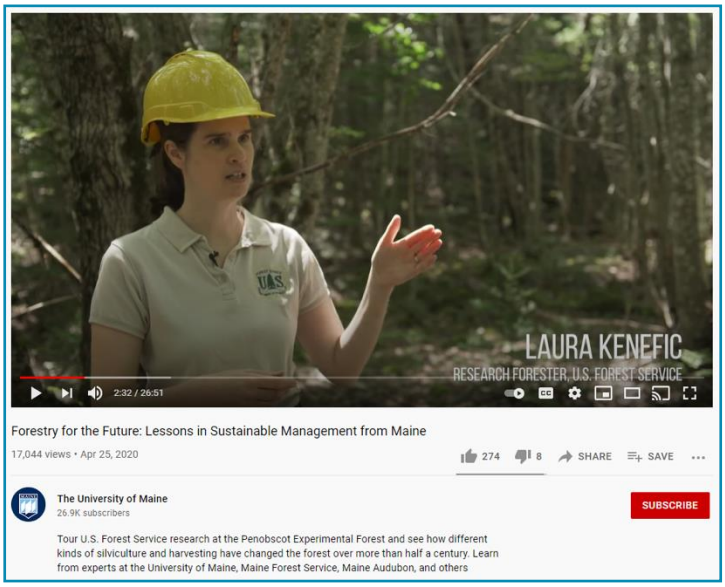


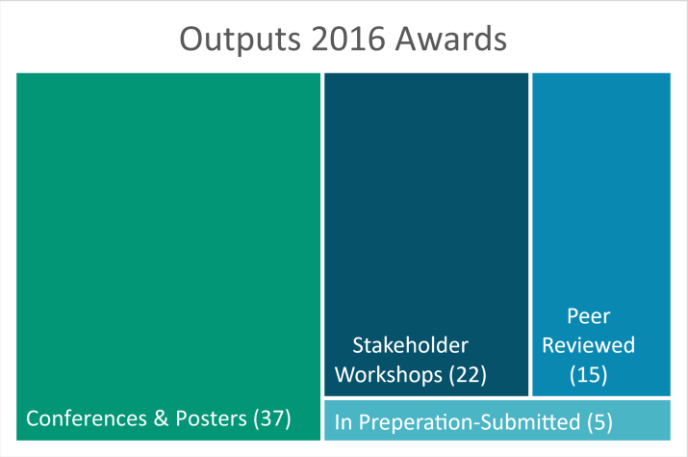
Figure 5. This video available on YouTube is the one of the results from a long-term study of sustainable northern conifer forest management (Kenefic et al.) conducted on the Penobscot Experimental Forest in Maine. The video introduces forest management concepts and findings from this study for a general audience: ***https://www.youtube.com/watch?v=eykwZkKrYKg***

Research supported by the NSRC resulted in more than 300 peer-reviewed publications. A complete bibliography of these publications can be found and sorted according to Interest Areas on the NSRC website (**https://nsrcforest.org/interest-areas**). Additionally, hundreds of reports, guides, tools, and plain-language documents, videos, etc. were developed for Northern Forest stakeholders.

Despite the complications resulting from the COVID-19 pandemic, researchers were able to move their research forward in 2020, with significant stakeholder outcomes over the past few years.

Recent Program Outputs

Prior to the suspension of federal funding for NSRC, in 2016 ten research projects were awarded to project investigators from Maine (2), New Hampshire (2), Vermont (2), and New York (4). These projects covered a range of issues: winter climate change in the Northern Forest; carbon impacts of biomass energy; carbon and nitrogen dynamics in post-harvest soils; carbon consequences of silvicultural management to pest outbreaks; landscape-level factors influencing spruce budworm outbreaks, balancing bat conservation; using social media to quantify forest-based tourism; and mapping forest disturbance patterns. These projects have now been completed and final reports are available on the NSRC website.



In addition to publishing journal articles (15 peer-reviewed and 5 in preparation) and presenting and attending conferences/talks (37), these NSRC project teams led 22 workshops while conducting their research. These workshops involved stakeholders, scientists, and the public all who were integral to the success of the research projects.

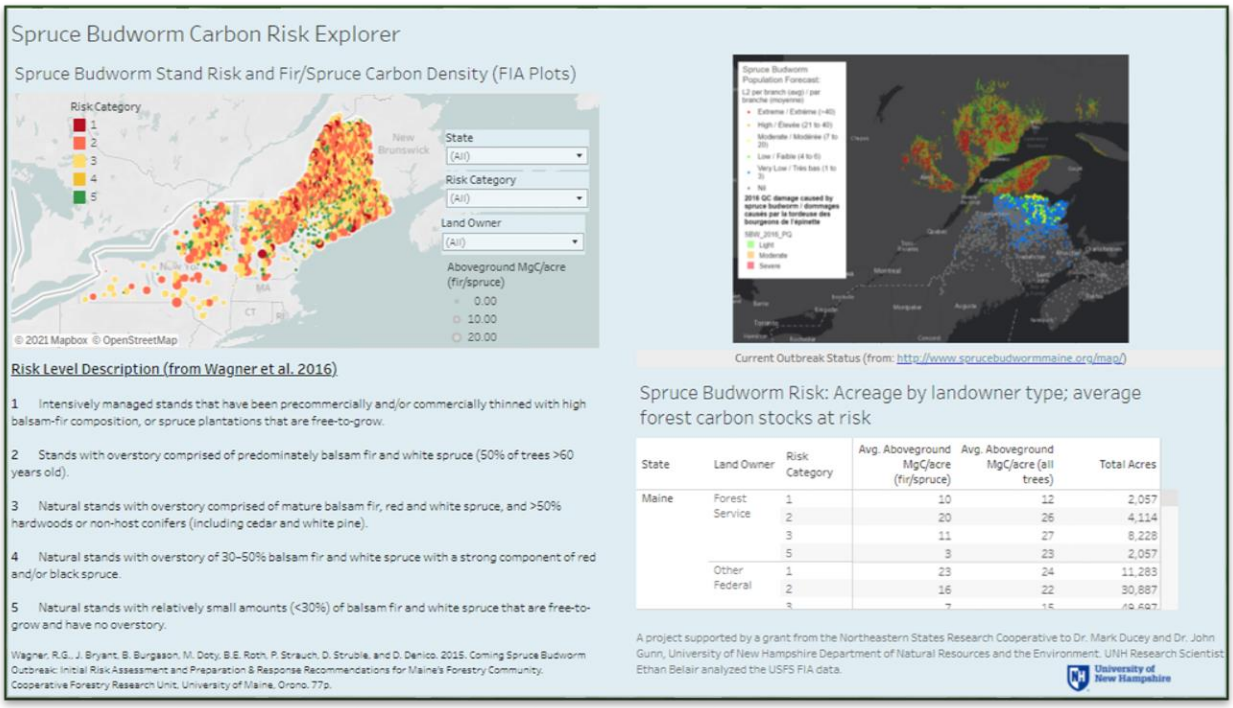


Figure 6. Screen shot of web page developed to allow users to interactively query and explore the FIA data and simulation results from the carbon consequences of silvicultural management in response to pest outbreaks project (Ducey & Gunn, 2016).
Website link: Spruce Budworm Carbon Risk Map

Of significant value to stakeholders are the online tools that have been an outcome of NSRC research. These tools (see screenshots in Figure 6, 7, and 8) provide an array of interactive data and information about the Northern Forests.

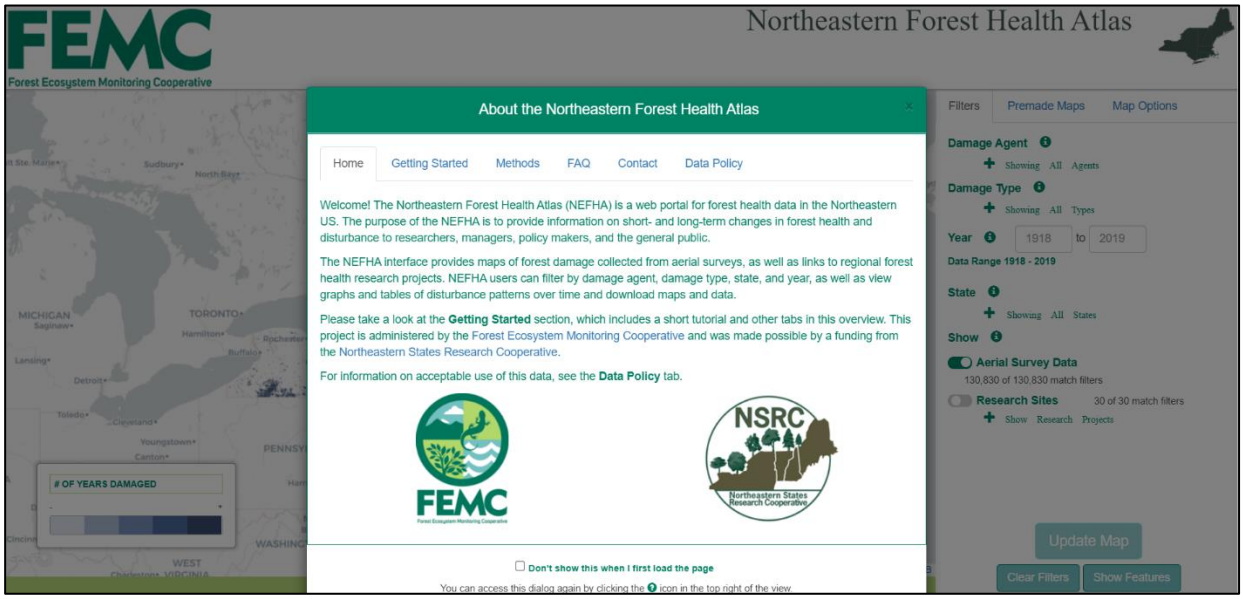


Figure 7. Screen shot of the Northeastern Forest Health Atlas tool, which integrates existing aerial surveys of forest health and disturbance (tree mortality and decline).
Website link: Forest Health Atlas

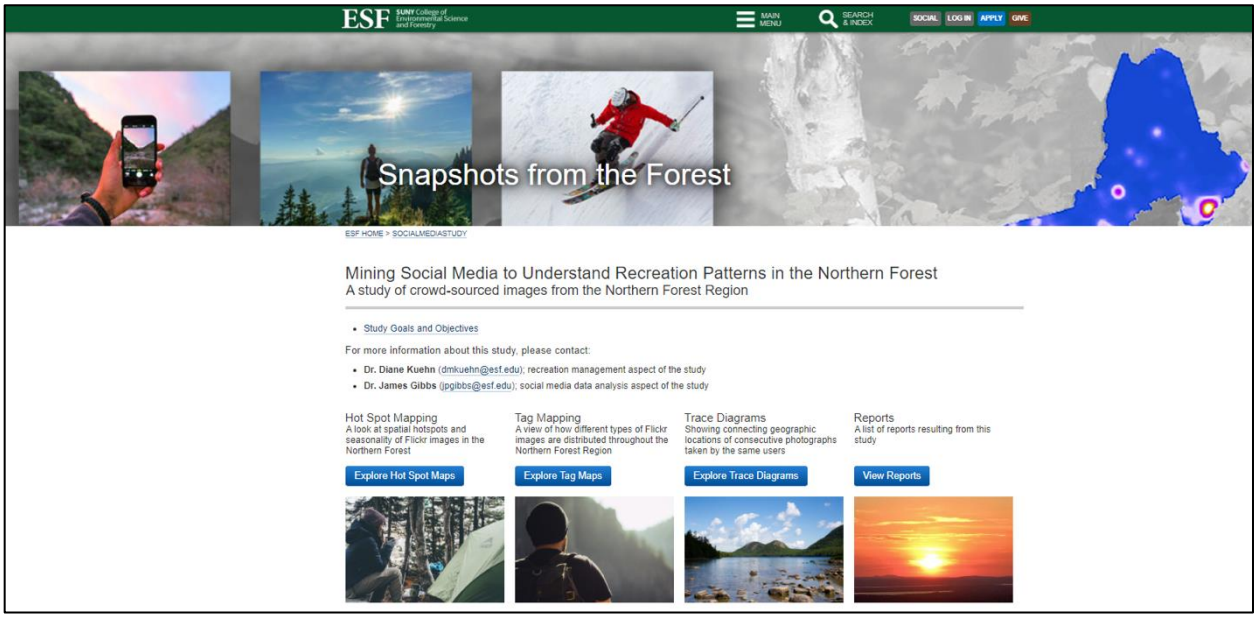
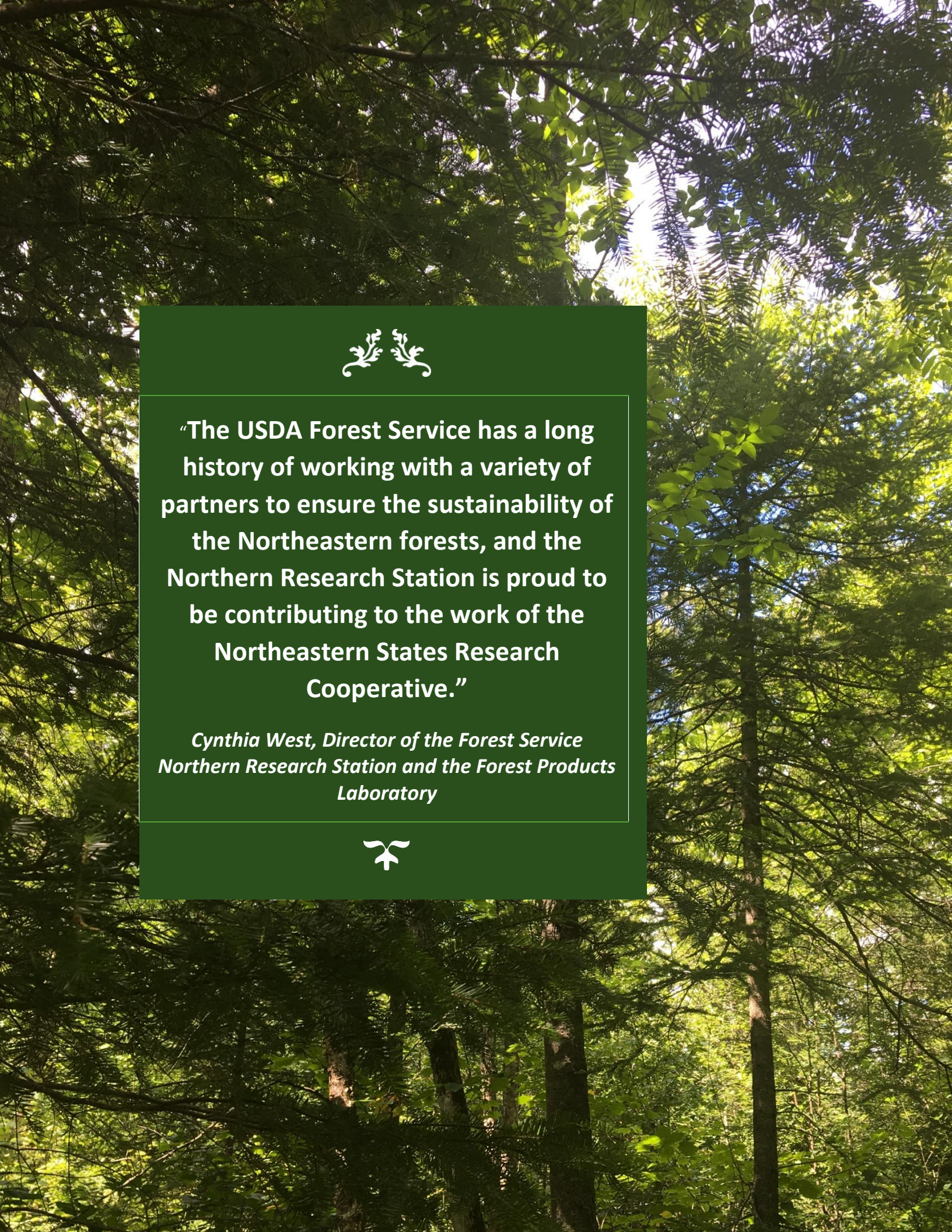


Figure 8. Using social media to quantify forest-based tourism project (Kuehn et al.) website.
Website link: Snapshots from the Forest



"The USDA Forest Service has a long history of working with a variety of partners to ensure the sustainability of the Northeastern forests, and the Northern Research Station is proud to be contributing to the work of the Northeastern States Research Cooperative."

Cynthia West, Director of the Forest Service Northern Research Station and the Forest Products Laboratory

Appendix A

NSRC Congressional Authorization (Public Law 105-185)

Authorization (from Public Law 105-185, Forest and Rangeland Renewable Resources Research Act of 1978 section 1642 (d) (3) as amended in 2003

"At the request of the Governor of the State of Maine, New Hampshire, New York, or Vermont, the Secretary may cooperate with the northeastern States of New Hampshire, New York, Maine, and Vermont, land-grant colleges and universities of those States, natural resources and forestry schools of those States, other Federal agencies, and other interested persons in those States to coordinate and improve ecological and economic research relating to agriculture research, extension, and education, including —

(A) research on ecosystem health, forest management, product development, economics, and related fields;
(B) research to assist those States and landowners in those States to achieve sustainable forest management;
(C) technology transfer to the wood products industry of technologies that promote efficient processing, pollution prevention, and energy conservation;
(D) dissemination of existing and new information to landowners, public and private resource managers, State forest citizen advisory committees, and the general public through professional associations, publications, and other information clearinghouse activities; and
(E) analysis of strategies for the protection of areas of outstanding ecological significance or high biological diversity, and strategies for the provision of important recreational opportunities and traditional uses, including strategies for areas identified through State land conservation planning processes."

Appendix B

External Advisory Committee 2020 Summary Report

The complete report, including the Interview synthesis report, can be accessed on the NSRC website.

External Advisory Committee for the Northeastern States Research Cooperative
2020 Summary Report

September 3, 2020
Prepared by: Sarah Garlick, Clara Chaisson, and Anthea Lavallee
Hubbard Brook Research Foundation

Overview of the Committee Charge and Process

The charge of the 2020 External Advisory Committee (EAC) for the Northeastern States Research Cooperative (NSRC) is to inform the NSRC Executive Committee about the priority issues facing forest stakeholders in the Northern Forest region and to provide guidance to the NSRC Executive Committee for crafting the 2020 request for proposals (RFP) in response to broader stakeholder interests and needs. This report is a summary of responses from the EAC following one-on-one interviews with individual members conducted in June and July 2020, a three-hour facilitated EAC group meeting via Zoom held on August 6, 2020, and EAC member feedback on a draft of this report during a two-week comment period, August 13–27, 2020.

2020 External Advisory Committee Members

Susan Arnold, Vice President for Conservation, Appalachian Mountain Club
John Bartow, Executive Director, Empire State Forest Products Association
Amanda Cross, State Wildlife Planner, Maine Department of Inland Fisheries and Wildlife
Frank Cuff, Senior Research Forester, Northern Hardwood Region, Weyerhaeuser
Robert K. Davies, State Forester, State of New York; Director, NY Department of Environmental Conservation, Division of Lands and Forests
Chad P. Dawson, Board Member, Adirondack Park Agency; Professor Emeritus, Recreation and Resources Management, SUNY-ESF
Rich Grogan, Executive Director, Northern Border Regional Commission
Kathy Fallon Lambert, Senior Advisor, Harvard T.H. Chan School of Public Health, Center for Climate, Health, and the Global Environment; Co-Founder, Science Policy Exchange
Donald Mansius, Director, Forest Policy and Management Division, Maine Forest Service
Ian Prior, Chair, Executive Committee, Cooperative Forestry Research Unit, University of Maine; Inventory Analyst, Seven Islands Land Company
Tyler Ray, Founder and Principal, Backyard Concept
Sean Ross, Managing Director, Lyme Timber Company
April M. Salas, Executive Director, Revers Center for Energy at Tuck School of Business, Dartmouth College; Chief Sustainability Officer, Town of Hanover, NH
Joe Short, Vice President, Northern Forest Center

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John Sinclair, Forest Supervisor, Green Mountain and Finger Lakes National Forests
Michael Snyder, Commissioner of Vermont Forests, Parks, and Recreation, State of Vermont

Summary of Recommendations

Through one-on-one interviews and group discussion, the EAC members identified issues of pressing importance to the forests and people of the Northern Forest region (Table 1). During the group discussion, rather than choosing to narrow or prioritize the initial list of topics from the interview summary (Appendix A), the EAC unanimously chose to retain the full list. Several suggested changes were made to the original wording and organization of the list, which are reflected in Table 1 below (e.g., consolidating the climate change and energy categories, distinguishing maple sugaring within the forest products industry category, and adding a separate category for biodiversity and habitat connectivity).

The EAC recommends that the NSRC prioritize research by: (1) how relevant it is across the four-state region, as opposed to a narrower focus on localized areas or individual states; and (2) how serviceable it is to practitioners, decision makers, and other stakeholders. The EAC recommends that the RFP and proposal review process: (a) be intentionally designed to support interdisciplinary teams that demonstrate genuine grounding of the research in stakeholder priorities, with buy-in and engagement at the project design phase and throughout its execution; and (b) include clear communication plans for how research results and products will serve broader stakeholder groups and communities in the region.

Given that the NSRC Executive Committee is composed primarily of academic forest researchers, members of the EAC suggested that extra effort should be made to assess the practical, economic, and social elements of each proposal. Recruiting technical proposal reviewers with this expertise will help to assess each project's potential for on-the-ground application.

During the EAC Zoom meeting, in addition to the recommendations above, small groups proposed and discussed possible frameworks for the RFP. One idea was to organize the RFP around three categories of research:

1. *State of the forest:* Research that elucidates the state of the Northern Forest region, with preference given to projects related to forest health and those with predictive power (e.g., regional trends, future projections).
2. *Measuring and quantifying impacts:* Research that measures/quantifies the ecological, social, and economic impacts of management and policy decisions, with consideration for how to create shared or standardized measurement approaches across the region (e.g., carbon accounting).
3. *Developing tools for response:* Research that leads to practical, on-the-ground tools for practitioners and other decision makers for predicting and responding to change (e.g., climate, land use, invasive forest pests and diseases). These tools could include management approaches/techniques, new technologies or applications, decision support tools, and messaging/communication strategies. Several EAC members emphasized the need for evidence-based communication strategies for engaging with private forest landowners about sustainable forest management, and for engaging with stakeholders from external industries about the use of sustainably harvested wood (e.g., engineering, architectural, and construction firms; corporate sustainability officers; business associations).

The group came up with the following ideas for recommended filters or lenses through which the above topics should be approached:

- Social/human dimensions
- Synthesis of existing knowledge, perspectives, and tools/resources
- Building interdisciplinary teams
- Environmental and social justice, equity, diversity, and inclusion — need to think creatively about how these issues are addressed in the Northern Forest
- Scalability and applicability (i.e., considering not only how research findings can be scaled up to the regional level, but also how they are scaled down and applied on the ground.

Following the Zoom meeting, one EAC member noted that the three categories outlined above are not exclusive and that competitive projects would likely integrate ideas from more than one category. Another EAC member commented that the emphasis on forest health in the "state of the forest" category could be broadened to include other dimensions beyond ecology, for example the health of the region's economy.

An additional framework that was proposed during the EAC Zoom meeting grouped topics into four categories:

1. Climate change (mitigation, adaptation, carbon accounting, renewable energy)
2. Forest health (invasive pests and diseases, biodiversity, sustainable forest management, connectivity, water quality)
3. Land use (role of the future of private lands, recreation impacts, fragmentation, environmental justice)
4. Rural communities and the bioeconomy (workforce, forest products industry, recreation and tourism).

Table 1: Priority issues in the Northern Forest

1. Invasive pests and diseases - Forest health is a big concern: insect- and disease-related pressures on the forest and concerns about vulnerabilities due to lack of stand diversity - "We need research that can help us detect things earlier and help us respond earlier."
2. Climate change and energy: mitigation, adaptation, and accounting - Forests and forest-related industries as part of the solution to climate change - Managing for carbon, measuring/accounting for carbon, and setting up/accessing carbon markets - Forest management strategies for increasing resilience to the impacts of climate change - Tradeoffs between biomass and other energy sources - Quantifying ecological impacts of solar and wind farms (tradeoffs between renewable energy and loss of forest cover)
3. Land use, sustainable forestry, and forest fragmentation - How to help landowners keep forests as forests (e.g., tax incentives, conservation finance, alternative markets) - Effective messaging and communication tools for working with private forest landowners (e.g., Vermont's Foresters for the Birds program) - Challenges of navigating management for a variety of competing needs (wildlife habitat,

carbon, resilience) - Concerns about regeneration and stand diversity - Potential for increased fragmentation with COVID-related migration to rural areas
4. *Forest products industry (wood and maple products) and innovative technologies* - Concerns about workforce and market declines, need for innovations in products and technologies - Need for engagement with external stakeholder groups about sustainable wood products (e.g., corporate sustainability officers, engineering and architectural groups, business associations) - Opportunities at the intersections of job creation, sustainable forestry, and climate change mitigation - Impacts of industrial sugaring on wildlife, site productivity, and ecological function
5. *Rural community and economic development* - Need for shared vision for the future - Challenges of implementation in rural communities - Concerns about workforce, housing, and broadband
6. *Recreation* - Managing for recreation - Understanding visitor motivations and behaviors; increased visitation due to COVID-19 - "Carrying capacity" of lands and waters - Economic impacts of outdoor recreation and tourism - Recreation impacts on wildlife
7. *Environmental justice, equity, and inclusion* - Creating more inclusive communities, conservation lands, and recreational opportunities within the Northern Forest - More equitable consideration about who pays and who benefits from ecosystem services, especially air and water quality - Importance of including Indigenous knowledge and engaging with stakeholders from the Tribal Nations in the region
8. *Biodiversity and connectivity* - Addressing terrestrial, riparian, and aquatic biodiversity and connectivity - Being able to integrate management for carbon with long-term biodiversity and sustainability goals - Amount and configuration of conserved and working lands needed to support biodiversity - Wildlife, species recovery, species adaptation

Appendix C

External Consultants Report

2020 External Consultants Report
Perspectives on research-related priorities of Tribal Nations and Indigenous communities in the Northern Forest Region

September 8, 2020
Prepared by: Sarah Garlick, Clara Chaisson, and Anthea Lavallee
Hubbard Brook Research Foundation

Overview
The Hubbard Brook Research Foundation was charged with convening decision makers and stakeholders in the Northern Forest region to provide guidance to the Executive Committee of the Northeastern States Research Cooperative (NSRC) for crafting the 2020 request for proposals (RFP) in response to broader stakeholder interests and needs. This report is a summary of perspectives from three consultants asked to comment on research-related priorities of Tribal Nations and communities of Indigenous Peoples in the Northern Forest. The three consultants are citizens of Tribal Nations and members of Indigenous communities in the region and they were recruited through their work with the following organizations:
- United South and Eastern Tribes, Inc.
- Northeast and Southeast Climate Adaptation Science Centers
- Vermont Commission on Native American Affairs

Executive Summary
In semi-structured interviews, three consultants discussed their perspectives on the top issues and concerns related to the forests and Indigenous Peoples in the Northern Forest region and how forest-related research might serve those issues and concerns. Key topics that came up during the interviews were: access to forest lands for hunting, gathering, and cultural practices; the importance of the Tribal Nations in the region being seen and recognized by non-Indigenous scientists as vital partners; the need for engaging with Native youth; and interest in specific environmental topics, including the emerald ash borer, sugar maple mortality, and adaptive land management. A theme underscoring all of these topics is the importance of recognizing how pre- and post-colonial history influences many of the current issues and dynamics in the region today. Key recommendations from the consultants for the NSRC are that:

1. The request for proposals (RFP) includes language to encourage projects that address Tribal priorities in the Northern Forest.
2. Proposals that seek to be relevant to Tribal Nations and Indigenous communities in the region include Tribal partners on the proposal and demonstrate how partners will be equitably involved and appropriately acknowledged.

3. The Executive Committee consider funding early-stage projects that are focused on taking the time to build equitable relationships with Tribal partners as a key outcome.
4. The RFP encourage proposals that include work with Tribal Nations to support Native youth, either connecting with a Tribal Nation's K–12 program (many Tribal Nations are developing K–12 youth environmental programs e.g. the Wabanaki Youth in Science (WaYS) Program and the Native Earth Environmental Youth Camp) and/or proposals that support the work of Native undergraduate, graduate, and post docs working on projects that support Tribal priorities.

Top Issues

(A) *Access*: All three consultants raised the issue of access to forest lands as a top concern for Indigenous Peoples in the Northern Forest region. Historically, Tribal Nations were forced or coerced to cede vast tracts of land for natural resources and for the settlement of what would become the states and the United States. Many Tribal Nations in the Northeast have less than 1% of their original land bases. However, Tribal Nations have reserved the rights to access usual and accustomed places, both on and off reservations, to continue cultural practices. Access to forest lands, off reservations, is needed for hunting, gathering medicinal foods and plants, and participating in cultural practices such as teachings, prayer, and reconnecting with the land. There is a need for facilitating agreements with landowners, land managers, and state agencies for securing ongoing access. There is also a need for sharing information about those agreements and places with Tribal citizens in the region.

"We dealt with harassment from environmental protection officers saying, 'You can't be here.' Our Tribal citizens are like, 'This is our land. This is where we're from. This is what we've always done.'"

"We don't buy sage, we don't buy sweetgrass, we don't buy cedar. Those are things we have to go out to collect, and those are part of our daily lives."

(B) *Recognition of Tribal Nations by non-Indigenous scientists*: The Northern Forest region is home to 12 federally recognized Tribal Entities, as well as several non-federally recognized groups and communities (Table 1). Also, there are Tribal Nations originally from the Northern Forest region, with continued cultural ties to the region, but whose Nations are now located outside of the region because of forced removal or complete loss of land bases (e.g., Mohican, Munsee, and Oneida Peoples) now in Wisconsin[1]. There is a need for researchers and scientific organizations to understand and recognize the existence of the Indigenous Peoples and Tribal Nations within the region and the diversity of Tribal communities and perspectives—i.e., Tribes are not a monolith, not a "stakeholder group."

"To be inclusive and working with Tribal Nations, people have to understand that we're here, and where we are."

"It's important to be understood as sovereign nations. What if you wanted to clean up Lake Ontario and the U.S. says, 'We're going to work with our stakeholder, Canada.'? Canada's another nation on that lake. 'Partner' would make a lot more sense."

[1] The "Oneida Indian Nation" is still in Central New York and sought the restoration of lands about 20 years ago, but "Oneida Nation" remains in Wisconsin.

"Indigenous People are kind of an afterthought. There's still a lot of people who don't know we still exist. I think this is a really wonderful opportunity to bridge some gaps and to maybe heal some wounds from a long time ago."

(C) *Building partnerships with Tribal agencies and Indigenous scholars:* There is a need for non-Indigenous researchers and research organizations to build trusting relationships and establish ongoing partnerships with Tribal agencies, Indigenous scholars, and other Tribal Citizens. Often this takes years. An important aspect of these partnerships is building an understanding of what information is confidential and what information can be shared. It is also critical to recognize the contributions of partners from Tribal Nations in the authorship of scientific publications.

"*Build relationships before the deadlines, before the grants."*

"There is a lot of history in terms of research not being in the priority of the Tribe. There's good reason why sometimes that relationship is a must before moving forward."

"There's not a protocol for dealing with culturally significant data. The term that gets tossed around is 'data sovereignty.' That needs to be explored more."

(D) *Engaging the next generation is a priority:* More opportunities are needed for young people to engage in scientific education and research, and training in natural resource management and decision making.

"That's always something I hear Tribal leaders talk about: bringing in the next generation of Tribal youth to engage."

"Trying to find support for Tribal youth to do the work, get the scientific experience, and be able to bring that back to their Tribe or work with multiple tribal nations for an organization like USET... that's what I hope to see."

(E) *The health of culturally significant species:* The threat to brown ash, a culturally and economically essential species for the Wabanaki people, is a key concern. Some Tribal Nations are preparing for the emerald ash borer's (EAB) arrival and are trying to keep it out; others are in "response mode" and dealing with the aftermath. There are concerns about the unintended impacts of biocontrols for EAB and the potential human health impacts of pesticide treatments to brown ash trees, as basket-makers put splints into their mouths. Sugar maple is also a culturally
significant priority, particularly in western Maine, where sugar maple mortality at high elevations has been observed.

"Brown ash is the only species we can make our splints out of. It has deep ties to our cultural identity; it's mentioned in our creation story. So it being threatened by emerald ash borer has been a pressing issue for the Tribal community."

"Emerald ash borer research often focuses on white ash, because that has commercial value. Brown ash has often been forgotten or not mentioned because of its lack of commercial value."

(F) *Forest management strategies:* Tribal Nations are working to develop management strategies to adapt to climate change and mitigate the negative impacts of invasive species. There is interest in seed collection and seed banking, particularly with brown ash, as well as techniques for underplanting and assisted migration. Soil surveys are needed, especially north of Bangor where previous efforts did not extend. Tribal leaders are also concerned about the legacy impacts of pesticide use in commercial forestry operations. Penobscot leaders are working on riparian forest management strategies, including dam removal, water quality, and stream restoration. Looking forward, tick-borne illness, from both a human health and wildlife perspective, is an emerging priority.

"A lot of Tribes are concerned with herbicides and pesticides, which are widely used in the northern Maine forest and commercial forest operations. There are not a lot of studies that look at legacy impacts. The Aroostook Band of Micmacs are concerned because they are right next to a lot of these heavily managed forests that use glyphosate. A lot of the studies on glyphosate that do exist are funded by the forest management companies, so there wouldn't be a real priority to understand the impacts."
"Our knowledge base of soils is also lacking. That would help with a lot of different management."
"Biocontrols seem to be something that the State and the U.S. Forest Service are using as a main management option for emerald ash borer. The Tribal community has a lot of pushback—again, you're inviting a nonnative insect to control another nonnative insect. Looking at the efficacy and impacts of those biocontrol impacts is something a lot of folks have expressed interest in."

Table 1: Tribal Nations and other Indigenous groups in the Northern Forest region

Federally Recognized Tribal Entities	Some of the State-Recognized Tribal Entities and Other Indigenous Groups in the Region
1. Aroostook Band of Micmacs 2. Cayuga Nation 3. Houlton Band of Maliseet Indians 4. Oneida Indian Nation 5. Onondaga Nation, 6. Passamaquoddy Tribe – Pleasant Point 7. Passamaquoddy Tribe – Indian Township 8. Penobscot Nation 9. Saint Regis Mohawk Tribe 10. Seneca Nation of Indians 11. Tonawanda Band of Seneca 12. Tuscarora Nation	- Abenaki Nation at Missisquoi - Koasek Band of the Koas Abenaki Nation - Nulhegan Abenaki Tribe - Elnu Abenaki Tribe

A selection of direct quotes from three of the external consultants are available on the NSRC website.


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