



**Northeastern States Research Cooperative (NSRC) FY2020  
USDA FS Award #: 20-DG-11242307-025**

**Interim Progress Report  
Period ending December 31, 2024**

**ADMINISTRATION AND INFORMATION TRANSFER.....2**

**ONGOING RESEARCH PROJECTS .....5**

**ASSISTED MIGRATION: A VIABLE SILVICULTURAL TECHNIQUE FOR FACILITATING  
ADAPTATION OF NORTHERN FOREST TREE SPECIES TO A WARMER AND DRIER FUTURE  
WORLD? .....5**

**VISITOR VERSUS LOCAL COMMUNITY PERCEPTIONS OF CROWDING AND RISK IN THE  
ADIRONDACK PARK.....7**

**PHEROMONE-BASED MONITORING AND CONTROL PROGRAM FOR BROWNTAIL MOTH IN  
THE NORTHEAST.....8**

**THE STATE OF THE NORTHEASTERN FOREST CARBON CYCLE: HIGH-RESOLUTION CARBON  
ACCOUNTING FOR THE REGIONAL FOREST SECTOR..... 10**

**TOWN FOREST CENSUS: CARBON, COVID, AND CAPACITY-BUILDING ..... 12**

**SIGNATURE..... 14**

**APPENDIX A: PRODUCTS..... 15**

## *Administration and Information Transfer*

The Northeastern States Research Cooperative (NSRC; <https://nsrcforest.org/>) is a research-granting program administered collaboratively by the USDA Forest Service Northern Research Station, the Rubenstein School of Environment and Natural Resources at the University of Vermont, the Department of Natural Resources and the Environment at the University of New Hampshire, the Center for Research on Sustainable Forests at the University of Maine, the State University of New York College of Environmental Science and Forestry, and the Hubbard Brook Research Foundation.

NSRC's goal is to foster research that is relevant and beneficial to the people who live within the Northern Forest boundaries, work with its resources, use its products, visit it, and care about it. The specific objectives of the NSRC are to:

- Develop a multi-stakeholder platform for the Northern Forest to inform research priorities and recruit a strategic roster of funded research projects.
- Support high priority scientific research through efficient research administration, data archiving and sharing, and annual financial and technical monitoring and reporting.
- Share and foster dialogue regarding research findings and synthesis to stakeholders through multiple communication channels.

Between January 1 and December 31, 2024, NSRC:

- Conducted outreach and communications activities to increase the visibility of the NSRC with people who live within the Northern Forest boundaries, work with its resources, use its products, visit it, and care about it.
- Monitored and tracked all research and IFKF projects.
- Organized a special session at the 2024 Forest Ecosystem Monitoring Cooperative conference in Burlington, Vermont, highlighting research from 2020 and 2021 projects to over 50 people.
- Rebranded NSRC with activities including updated colors, a new logo, and a redesigned NSRC website. The new website is set to launch in the Spring/Summer of 2025.
- Initiated collaboration with the Northern Research Center communications team.
- Modified reporting workflows to include more robust review of research progress based on information contained in annual reports.

## Summary of progress in 2024

Objectives and tasks described in the NSRC 2020 proposal narrative are on schedule and described below.

### **1. Develop a multi-stakeholder platform for the Northern Forest to inform research priorities and recruit a strategic roster of funded research projects.**

- EAC formed—Complete, [2020 EAC Members List](#)
- EAC meets and recommends priorities for research—Complete, [2020 EAC Report](#)
- Successful RFP process—Complete. 2 RFPs were released for this award.
  - **The general fund** received 50 research project proposals requesting \$6.3 million in funding. 13 grants awarded totaling \$1.6 million of federal funding and \$0.8 million of matching funding.
  - **The IFKF** awarded 2 grants totaling nearly \$150K of federal funding.

- Research project awarded–Complete, [view all of the projects on our website](#) and in table 1 below.
  - IFKF projects awarded– Complete, [view all of the projects on our website](#)
- 2. Support high priority scientific research through efficient research administration, data sharing, and annual financial and technical monitoring and reporting.**
- Annual technical and financial reporting–Ongoing, this is the final annual progress report for this award. Only five research projects are ongoing. In 2024, the NSRC management team modified reporting workflows to include more robust review of research progress based on information contained in annual reports.
  - Research outputs, to include scholarly and public-facing publications and activities—Ongoing. In 2024, this award supported 11 scholarly articles, 11 presentations, and 4 other public facing communications pieces (See Appendix A).
  - Project data archived with the FEMC–Ongoing. An NSRC collection with available data is accessible [on the FEMC website](#).
- 3. Share and foster dialog regarding research findings and synthesis to stakeholders through multiple communication channels.**
- Communications outputs–New NSRC logo, FEMC conference special session, print publications, press releases, and project specific communications materials.
  - NSRC website with current list of projects, research outputs–Communications team is in the process of updating the website. The current website is used by PIs and partners to find projects, RFP information, and publications.
  - Engagement with partners and the public–Ongoing, key partners include the USFS, the universities in the Northern Forest, and members of the EAC.

## Next reporting period

This project will end on 4/30/25. There are five research projects that are continuing into the Spring of 2025. The administrative team will continue to ensure successful research projects and collect and disseminate project findings including final reports and publications.

The main portion of this annual report is composed of summaries of progress for the administration project, ongoing research projects, and IFKF projects.

**Table 1: Research and Indigenous Forest Knowledge Fund projects funded through the NSRC 2020 award (20-DG-11242307-025). Projects with a \* completed work in 2024 or earlier. The final report for each research project will be attached to the final award report.**

NSRC 2020 Research Projects	PI	Lead Institution
<b>Assisted Migration: A Viable Silvicultural Technique for Facilitating Adaptation of Northern Forest Tree Species to a Warmer and Drier Future World?</b>	Asbjornsen, Heidi	University of New Hampshire
<b>*Escaping to the Northern Forest: Migration, Housing, and Community Implications in the Time of COVID</b>	Carson, Jessica A.	University of New Hampshire
<b>*Evaluating the Efficacy of Audubon’s Bird-friendly Maple: Can Managing</b>	Faccio, Steven D.	Vermont Center for Ecostudies

<b>Sugarbushes for Birds Provide Additional Benefits to Biodiversity, Ecosystem Services, and Forest Resilience?</b>		
<b>Influence of Multiple Impacts on User Experience and Decision Making in the Northern Forest</b>	Feldpausch-Parker, Andrea	SUNY College of Environmental Science and Forestry
<b>*Integrating Genetic and Ecological Data Using a New Circuit Theory Approach to Measure and Map Wildlife Connectivity across the Northeast</b>	Murdoch, James D.	University of Vermont
<b>*A New Silvicultural Guide for Northern Conifers in the Northeast</b>	Kenefic, Laura S.	U.S. Forest Service, Northern Research Station
<b>Pheromone-based Monitoring and Control Program for Browntail Moth in the Northeast</b>	Mech, Angela M.	University of Maine
<b>*Predicting Density and Occurrence of Keystone and Umbrella Species Using Drone-based LiDAR</b>	Sirén, Alexej P. K.	University of New Hampshire
<b>*Quantifying the Genetic Impacts of Forest Management Strategies on Sugar Maple (<i>Acer saccharum</i>) in the Northern Forest</b>	Fernando, Danilo D.	SUNY College of Environmental Science and Forestry
<b>The State of the Northeastern Forest Carbon Cycle: High-Resolution Carbon Accounting for The Regional Forest Sector</b>	Hayes, Daniel J.	University of Maine
<b>Vermont Town Forest Census for Covid, Carbon and Capacity-Building</b>	Danks, Cecilia M.	University of Vermont
<b>NSRC 2020 Indigenous Forest Knowledge Fund (IFKF) <i>Projects</i></b>	<b><i>PI</i></b>	<b><i>Lead Institution</i></b>
<b>*Haudenosaunee Forest Principles</b>	Kimmerer, Robin	SUNY College of Environmental Science and Forestry
<b>*NEBI (Water): Connecting N'dakinna (Land), Bilowagizegad (Climate), and Alnobak (People)</b>	Wymore, Adam S.	University of New Hampshire

\* indicates the project is finished. The final report for each research project will be attached to the final award report.

## *Ongoing Research Projects*

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

**Project Leader:** Dr. Heidi Asbjornsen, Professor, University of New Hampshire

#### Summary of progress:

- Seedlings were processed for above and belowground biomass calculations which involved the tedious process of separating roots from potting soil
- Statistical analysis of growth, physiology, and anatomy data was conducted to near completion
- Leaf samples were dried and ground for chemical analysis (carbon and nitrogen percentages, carbon isotopic ratios), with the goal of completing analysis in early 2025
- The first draft of the manuscript is nearly complete

#### Plans for 2025:

- Complete leaf chemical analysis
- Finalize data analysis and submit manuscript for publication

#### Publications and presentations in 2024:

Zuckerman, S. “Assisted migration: a phenotypic evaluation of species, ecotypes, and drought responses”. Forest Ecosystem Monitoring Coalition Conference. Burlington, VT. Dec. 2024.

Zuckerman, S., Asbjornsen H., Vadeboncoeur M., McIntire C., Wason J., D’Amato, A. Assisted migration and drought in the Northeast: a greenhouse common garden experiment. Talk presented at Ecological Society of America Annual Meeting. Long Beach, CA. Aug. 4-9, 2024.

Zuckerman, S., Asbjornsen H., Vadeboncoeur M., McIntire C., Wason J., D’Amato, A. Species, ecotype, and drought: seedling growth and physiology data to support assisted migration decision-making in the Northeast U.S. Poster presented at Gordon Research Seminar. South Portland, ME. June 8-9, 2024.

Zuckerman, S. Assisted migration and drought in the Northeast. Talk presented at UNH Graduate Research Conference. Durham, NH. Apr. 15, 2024.

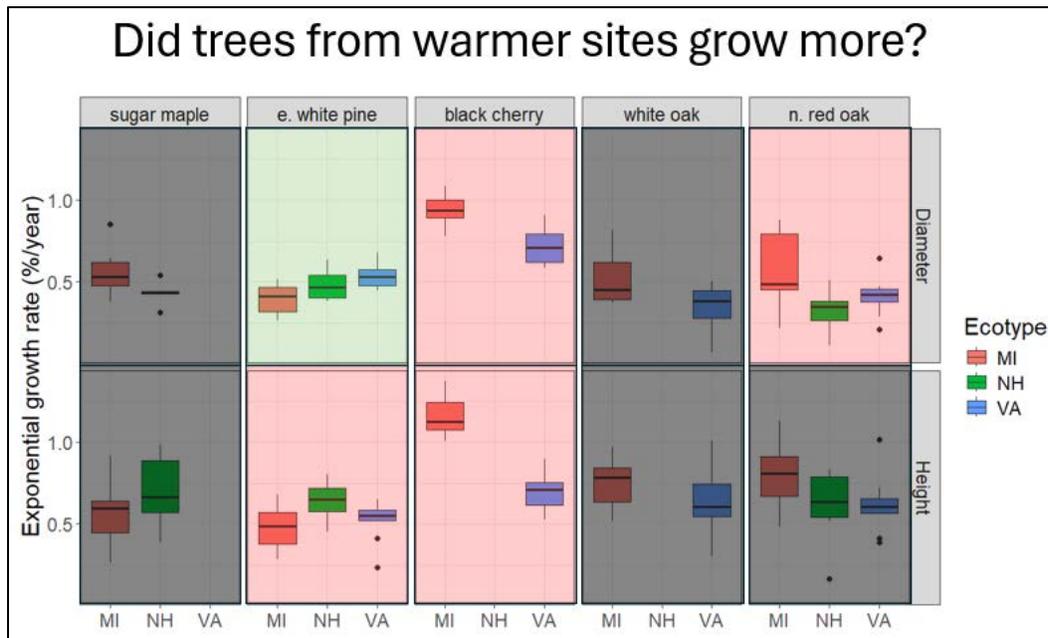
Zuckerman, S. Assisted migration and drought in the Northeast. Poster presented at: Univ. of New Hampshire Macfarlane Greenhouses Open House. Durham, NH. Apr. 6, 2024.

Zuckerman, S., Asbjornsen, H., McIntire, C., D’Amato, A., Wason, J., Vadeboncoeur, M. Assisted migration and drought in the Northeast. Poster presented at: New England Society of American Foresters annual conference. Burlington, VT. Mar. 27-28, 2024

Tables and Figures:



**Figure 1:** Visual progression of stress from 2023 drought treatment showing a) no stress after one week of drought, b) wilting in the 'severe drought' group two weeks after drought, and c) mortality after four weeks of drought in the 'severe' group



**Figure 2:** The hypothesis stated that in the warm greenhouse, seedlings sourced from warmer climates would show faster growth rates. This was the case only in eastern white pine diameter growth (green box). Red boxes show significant differences in seedling origin—though in directions that do not fully match the hypothesis. Gray boxes designate no significant growth differences among ecotypes.

# Visitor versus Local Community Perceptions of Crowding and Risk in the Adirondack Park

**Project Leaders:** Dr. Andrea Feldpausch-Parker (PI; Professor at SUNY-ESF) and Dr. Anita Morzillo (co-PI; Associate Professor at UConn)

## Summary of Progress

Additional car count and survey data from the Shelving Rock Road and Pilot Knob Road sites by Lake George, NY in Adirondack Park were also conducted by Dr. Paulami Banerjee for both field seasons and are still being processed for analysis. Furthermore, Dr. Banerjee conducted supplemental interviews with stakeholders in Adirondack Park about their trail and community experiences. This will be beneficial as a point of comparison or explanation of survey data. UConn MS student, Laura Kelly, completed her analysis of the Connecticut portion of the study that incorporated car count and survey data from the Bulls Bridge Scenic Area and Steep Rock Preserves in CT from the summer 2023 and 2024 field seasons.

## Plans for 2025

The following are planned for the remainder of the project:

- Complete NY analysis
- Write publications

## Description of Collaboration:

Collaborators for site access and data collection include: NYDEC (all sites in NY), Steep Rock Association (Steep Rock Preserves, CT), and FirstLight Power (Bulls Bridge Scenic Area, CT).

## Project Products:

MS student Laura Kelly defended her thesis in January 2025. A PDF copy of the thesis is available upon request.

# Pheromone-based monitoring and control program for browntail moth in the Northeast

**Principal Investigator:** Angela Mech – University of Maine

## Summary of Progress

- a) **Monitoring Program** – 40 sites were selected for the statewide monitoring program in 2024; 14 new sites were added. 2 traps were set up at each site – Lure 2714 (the lure used in 2022 & 2023), and Lure 2778 (the new lure found to be the most attractive one in 2023 lure tests). 226 male BTMs were caught in 2024. Lure 2778 caught the majority of BTM males (86%, n = 195), while lure 2714 caught 31 males (16%). It is assumed that BTM populations have overall declined in the state based on Lure 2714’s catches, which can be compared to the previous two years. In 2024, a population of BTM was found established in New Hampshire. Traps and lures were sent there with 19 sites set up. This included an island, at a coastal park, and along the NH-Maine border heading north. All three locations caught 1 moth, with the island catching 2.
- b) **Mating Disruption** – A field study testing the ability of Lure 2778 to mask virgin females in the field was conducted for 7 nights at 4 sites. All locations had 2 treatments: 1) a virgin female in a center trap surrounded by lure 2778-baited traps spaced 5 ft away in each cardinal direction and 2) a virgin female alone. Results found more males (80%) located the female when she was alone compared to when she was surrounded by the lures.

## Problems or Changes:

Browntail moth monitoring sites were increased to 40, to increase coverage in central, northern, and Downeast Maine.

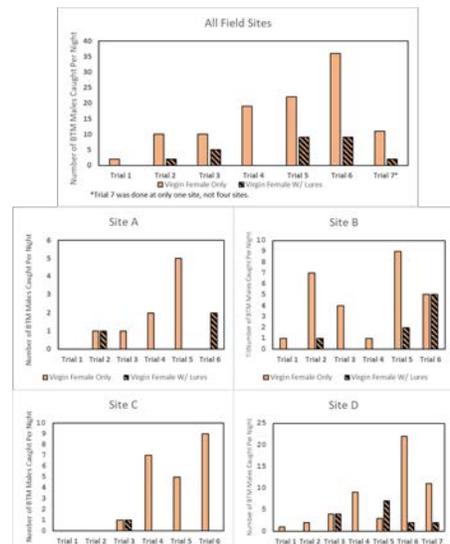
## Plans for 2025

### a) Monitoring Program:

- 1. Starting in January 2025, all 40 sites from the summer 2024 monitoring program will be revisited to count the number of winter webs in a fixed-radius area around where the trap was placed. Future analyses will evaluate whether a population/threshold model can be established from this correlation.

### b) Analyses:

- 1. Analyses will be conducted to determine: (a) whether there is a correlation between the number of males caught in pheromone-baited trap and the number of winter webs at that site over the past 3 years, and (b) whether the pheromone can successfully mask a virgin female BTM, both in the field and in lab experiments.



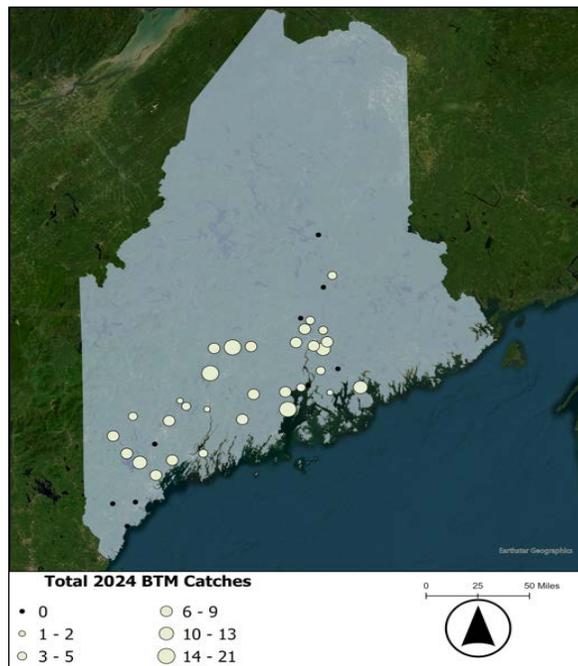
**Figure 3: Results from a study testing the ability of a synthesized sex pheromone to mask a virgin BTM female. The experiment was conducted at 4 sites over 6-7 nights in July, 2024.**

## Collaboration with USFS

Forest service collaborators have participated in meetings via zoom to provide recommendations for project success.

## News pieces regarding research

- Promising research at UMaine may help curtail browntail moths. By Joe Lawlor. 7/4/2023. Portland Press Herald <https://www.pressherald.com/2023/07/04/promising-research-at-umaine-may-help-curtail-browntail-moth-populations/>
  - Browntail Moth in Maine. By Tim King. September 2023 *Maine Organic Farmer and Gardener* (Fall 2023 issue) <https://www.mofga.org/our-community/publications/the-maine-organic-farmer-gardener/>
  - In addition, the Ph.D. student working on this research (Devin Rowe) entered the 2024 *Dance Your Ph.D.* competition sponsored by *Science*. His video displaying what it is like to study browntail moth monitoring and mating disruption is here: <https://www.youtube.com/watch?v=SFwRMZKODbc>
- 



**Figure 4: Total male BTM catches per site from 40 sites surveyed in Maine in 2024.**

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

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

## Summary of progress in 2024

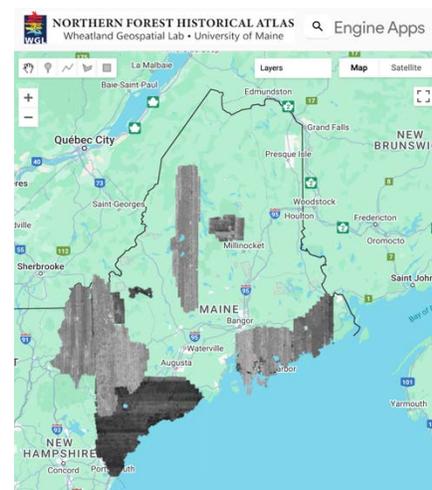
The research team can report significant progress on both the state of Maine carbon budget analysis and the regional book-keeping accounting system framework. First, they finalized version 2 of the [carbon budget for the state of Maine](#), which was included in the state’s [Tenth Biennial Greenhouse Gas Emissions report](#) to track progress toward the state’s “net zero emissions” goal. In addition to the emissions report, they compiled a [technical document](#) on the data and approach used to generate version 2 of the state budget, which was released in October 2024. They developed two new tools to account for key components of the carbon budget: a wood products model to calculate the contribution of forest harvesting (Wei et al., 2023) and a lateral aquatic flux model to estimate the lateral transfer to the ocean (Wei et al., 2024). Overall, the results suggest that the forest sector accounted for a carbon offset of approximately 90% of the state’s gross emissions over the 2017 to 2021 period. Second, they have developed an open-source python tool to calculate plot-based carbon pools from the FIA database and expand those data regionally using NSVB growth curves (Westfall et al., 2024) and climate analysis (Wei et al., 2025) within the book-keeping framework. To implement carbon stock changes and transfers in the accounting framework, updated results from Landsat-derived disturbance mapping over the region is being used as implemented on the Google Earth Engine.

## Problems or changes

The team has been working through the remaining technical challenges with the remote sensing data processing for generating full (wall-to-wall) regional coverage map products. They have experienced delays in recruiting and onboarding the graduate research assistantship to work on this project.

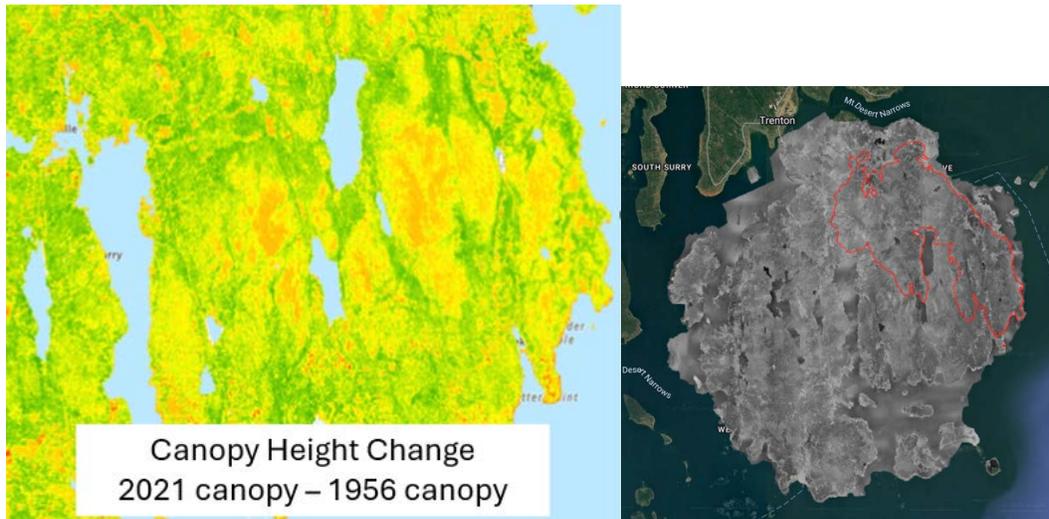
## Alignment and collaboration

The team continues to hold regular meetings with the USFS collaborator, Chris Woodall, to report on project progress and ensure alignment of the work with the broader goals of the USFS in carbon management and climate mitigation initiatives. The team worked closely with the Maine Department of Environmental Protection in developing “version 2” of the state carbon budget to be included in the Tenth Biennial state GHG emissions report, and in spring 2025 will begin planning for the Eleventh biennial report.



**Figure 5: “Version 2” of the carbon budget of the state of Maine estimated for the major contributing sectors as annual averages, in million metric tons of CO<sub>2</sub>-eq per year, for the 2017 to 2021 time period.**

## Figures



**Figure 6: Relationship between stand age and aboveground biomass in northeastern United States forests (from Wei et al., 2025)**

**Figure 7: The 30 m resolution disturbance map for the NSRC region based on the US Forest Service Land Change Monitoring System (LCMS) product, showing year of “Fast Loss”.**

## Products

- Wei, X., J. Zhao, D.J. Hayes, L. Li, A. Daigneault, and H. Zhu (2023) [A life cycle and product type based estimator for quantifying the carbon stored in wood products](https://doi.org/10.1186/s13021-022-00220-y), *Carbon Balance and Management*, 18, 1, doi.org/10.1186/s13021-022-00220-y.
- Wei, X., Hayes, D. J., Li, D., Butman, D. E., & Brewin, R. J. (2024). [Fates of Terrigenous Dissolved Organic Carbon in the Gulf of Maine](https://doi.org/10.1021/acs.est.3c08218). *Environmental Science & Technology*, doi:10.1021/acs.est.3c08218.
- Wei, X., Hayes, D. J., Weiskittel, A., & Zhao, J. (2025). [Warming-driven shifts in dominant tree species potentially reduce aboveground biomass in northeastern United States forests](https://doi.org/10.1002/for.2700). *Forest Ecology and Management*, 580, 122536.
- Westfall, James A.; Coulston, John W.; Gray, Andrew N.; Shaw, John D.; Radtke, Philip J.; Walker, David M.; Weiskittel, Aaron R.; MacFarlane, David W.; Affleck, David L.R.; Zhao, Dehai; Temesgen, Hailemariam; Poudel, Krishna P.; Frank, Jereme M.; Prisley, Stephen P.; Wang, Yingfang; Sánchez Meador, Andrew J.; Auty, David; Domke, Grant M. (2024). [A national-scale tree volume, biomass, and carbon modeling system for the United States](https://doi.org/10.2737/WO-GTR-104). Gen. Tech. Rep. WO-104. Washington, DC: U.S. Department of Agriculture, Forest Service. 37 p. <https://doi.org/10.2737/WO-GTR-104>.

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

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

## Summary of Progress in 2024

The VT Town Forest Team completed and tested the Census form in Qualtrics with iterative input from the Advisory Committee and other volunteer experts and town forest stewards throughout the state. A PDF of the final form is [linked here](#). A two-step process was developed: 1) to identify all the town forests in the state (the inventory), and 2) to get the Census form into the hands of the right steward for each forest (census deployment). For the inventory step, MS student Julie Frost



*Figure 8: Photo from town forest by Cecilia Danks*

developed a contact list for every municipality in the state and emailed them a brief survey asking how many forests they owned and the contact information of the lead steward for each one. She cross-checked responses with existing databases and online resources and followed up with non-respondents six times. She then deployed the census form link to “Cohort 1,” the stewards of the 153 forests identified in step one. To date, census forms for 89 forest areas have been completed, and more are rolling in.

In fall 2024, new undergraduate research interns were recruited who expanded [the project website](#) and conducted additional online research to fill in the forest and steward inventory data for towns that did not respond to the initial survey.

In May 2024, Julie presented the project at the Vermont UCF Conference, in part to boost response rates. PI Danks gave presentations of the project and preliminary findings in December 2024 at the UCF Council and the Forest Ecosystem Monitoring Cooperative Annual Conference.

## Problems and Changes

The first step, to create a complete inventory of forests, encountered some challenges. It was time consuming to get current contact information for Vermont’s 253 cities/towns and to engage in the sometimes-lengthy email exchanges with each town. To date, 128 towns responded, 42 of which had no forests, and 86 had one or more forests. To process and report on data before the end of the grant, the project is closing cohort 1 and will analyze these data as a sample, rather than a census. Non-response bias analysis will be conducted to determine how forest and town attributes of cohort 1 may vary from the full population of town-owned forest areas. The team remains committed to collecting census data from 100% of forests owned by Vermont municipalities and has developed a viable plan to do so with undergraduate research assistance.

The criteria chose for inclusion in this census casts a wide net which is catching more areas than are traditionally thought of as town forests. In applying the USDA FS eligibility criteria for inclusion in its [Community Forest Program](#), which is at least 5 acres and 75 percent forested, the team found some town forests were left out (due to low forest cover) and many parks and conservation areas were included. A census question was added about the respondent’s definition of a town forest, in itself of research interest, and will develop typologies as data are analyzed.



**Figure 9: Photo from Boyce Hill Town Forest. By Cecilia Danks**

## Plans for 2025

Data collection of Cohort 1 towns and forests will close on February 15, 2025. Qualitative and quantitative analysis of data collected to date has already begun. The team just did an interview with Vermont Public for a Brave Little State episode on town forests which should air in February 2025. The project is on track to complete a technical report summarizing census responses to date and an “operating manual” providing a detailed methodology and lessons learned to guide future census cycles. Julie’s master’s project will be completed in summer 2025. The project continues to expand the inventory of town forests. Moving forward, the team will deploy census forms on a

rolling basis, i.e. as soon as the best person for each forest is identified to complete the census, rather than batching them in cohorts. Additional undergraduate research assistants are being recruited in 2025, including an honors college student to assist in data analysis in Fall 2025. An updated technical report will be prepared in summer 2025 with data collected after cohort 1.

## Alignment with USFS, Other Partners, and the Public

This project complements USFS-funded work led by the state to assist local municipalities in Vermont with town forest governance. Several leaders within VT Forest, Parks and Recreation are close collaborators on this census. Many of the relevant stakeholders have been brought directly into the project via the Advisory Committee. The engagement of the project Advisors has been very high, likely because the work of each member will benefit from the census findings regarding the technical and financial needs of communities managing forests. The organizations and stakeholder groups represented by the advisors are listed in the attached appendix.

## Hyperlinks

Project website: <https://site.uvm.edu/vermonttownforestcensus/>

## Signature

The signing party is the official representative and authorized to act for matters related to the above- referenced grant/agreement.

March 25, 2025



Anne Jefferson  
Patrick Professor, Watershed Science and  
Planning NSRC Director  
University of Vermont and State Agricultural College  
Anne.jefferson@uvm.edu

**The Northeastern States Research Cooperative operates through funding from the United States Congress made available by the USDA Forest Service. The conclusions and opinions in this paper are those of the authors and not of the Forest Service or the USDA.**

### **Non-discrimination statement**

In accordance with Federal law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, disability, and reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.)

Program information may be made available in languages other than English.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, and American Sign Language) should contact the responsible State or local Agency that administers the program or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339.

To file a program discrimination complaint, a complainant should complete a Form AD-3027, USDA Program Discrimination Complaint Form, which can be obtained online at <https://www.ocio.usda.gov/document/ad-3027>, from any USDA office, by calling (866) 632-9992, or by writing a letter addressed to USDA. The letter must contain the complainant's name, address, telephone number, and a written description of the alleged discriminatory action in sufficient detail to inform the Assistant Secretary for Civil Rights (ASCR) about the nature and date of an alleged civil rights violation. The completed AD-3027 form or letter must be submitted to USDA by:

- (1) Mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue SW, Washington, D.C. 20250-9410; o
- (2) Fax: (833) 256-1665 or (202) 690-7442; or
- (3) Email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

# Appendix A: Products

## Scholarly Articles

1. Wei, X., J. Zhao, D.J. Hayes, L. Li, A. Daigneault, and H. Zhu (2023) [A life cycle and product type based estimator for quantifying the carbon stored in wood products](#), *Carbon Balance and Management*, 18, 1, doi.org/10.1186/s13021-022-00220-y.
2. Wei, X., Hayes, D. J., Li, D., Butman, D. E., & Brewin, R. J. (2024). [Fates of Terrigenous Dissolved Organic Carbon in the Gulf of Maine](#). *Environmental Science & Technology*, doi:10.1021/acs.est.3c08218.
3. Wei, X., Hayes, D. J., Weiskittel, A., & Zhao, J. (2025). [Warming-driven shifts in dominant tree species potentially reduce aboveground biomass in northeastern United States forests](#). *Forest Ecology and Management*, 580, 122536.
4. Westfall, James A.; Coulston, John W.; Gray, Andrew N.; Shaw, John D.; Radtke, Philip J.; Walker, David M.; Weiskittel, Aaron R.; MacFarlane, David W.; Affleck, David L.R.; Zhao, Dehai; Temesgen, Hailemariam; Poudel, Krishna P.; Frank, Jereme M.; Prisley, Stephen P.; Wang, Yingfang; Sánchez Meador, Andrew J.; Auty, David; Domke, Grant M. (2024). [A national-scale tree volume, biomass, and carbon modeling system for the United States](#). Gen. Tech. Rep. WO-104. Washington, DC: U.S. Department of Agriculture, Forest Service. 37 p. <https://doi.org/10.2737/WO-GTR-104>.
5. Reinhardt**Error! Bookmark not defined.**, E., Coleman, K., Perry, E., Alldred, M., and Leahy, J. (revised and resubmitted) "We Have Some Growing Pains": Developing A New Regional Recreation Conflict Model Through Examination of the Growth of Mountain Biking. Submitted to Society and Natural Resources.
6. Reinhardt**Error! Bookmark not defined.**, E., Coleman, K., Baran, M., Perry, E., and Alldred, M. (2024) Chasing Informed Decisions: A Research Note on the Potential for Strava to Support Rural Recreation Planning. Submitted to the Journal of Recreation and Tourism Administration. doi:10.18666/JPra-2024-12457
7. McCurdy**Error! Bookmark not defined.**, A., Perry, E. E., Leahy, J. E., Coleman, K. J., Doyle**Error! Bookmark not defined.**, J., Kiewra**Error! Bookmark not defined.**, L. A., Marocco**Error! Bookmark not defined.**, S. A., Iretskaia**Error! Bookmark not defined.**, T. A., Janes**Error! Bookmark not defined.**, M. M., and Deliyski**Error! Bookmark not defined.**, M. (2024). Gaining traction on social aspects of e-biking: A scoping review. *Sustainability*, 16(17), 7397. <https://doi.org/10.3390/su16177397>.
8. Kuklinski**Error! Bookmark not defined.**, K., Coleman, K., Leahy, J., Perry, E. E., Reinhardt**Error! Bookmark not defined.**, E. and Briccetti**Error! Bookmark not defined.**, L. (2024). Scoping the Lines: Assessing the Mountain Biking Research Terrain and Calling for a Holistic Scholarship Agenda. *Journal of Outdoor Recreation and Tourism*. 46: 100748. <https://doi.org/10.1016/j.jort.2024.100748>
9. Fernando, D. D., Yun, S., Heo, N., & Kiernan, D. H. (2024a). Impact of silvicultural practices on the genetic variations between sugar maple (*acer saccharum* marsh.) stands in the Northern Forest, U.S.A. *Forest Ecology and Management*, 572, 122302. <https://doi.org/10.1016/j.foreco.2024.122302>

10. Kelley, L. (2024) Site Use Patterns and Social Carrying Capacity of Connecticut Outdoor Recreation Areas. Master's Thesis, University of Connecticut.
11. Little, J. Assessing Biocultural Restoration Pathways for Land Being Returned to the Onondaga Nation in Tully Valley, New York: A Historical Ecology and Plant Community Approach. MS Thesis (2024) [https://experts.esf.edu/esploro/outputs/graduate/Assessing-Biocultural-Restoration-Pathways-for-Land/99953582004826?institution=01SUNY\\_ESF](https://experts.esf.edu/esploro/outputs/graduate/Assessing-Biocultural-Restoration-Pathways-for-Land/99953582004826?institution=01SUNY_ESF)

### Conferences and Presentations

1. Zuckerman, S. "Assisted migration: a phenotypic evaluation of species, ecotypes, and drought responses". Forest Ecosystem Monitoring Coalition Conference. Burlington, VT. Dec. 2024.
2. Zuckerman, S., Asbjornsen H., Vadeboncoeur M., McIntire C., Wason J., D'Amato, A. Assisted migration and drought in the Northeast: a greenhouse common garden experiment. Talk presented at Ecological Society of America Annual Meeting. Long Beach, CA. Aug. 4-9, 2024.
3. Zuckerman, S., Asbjornsen H., Vadeboncoeur M., McIntire C., Wason J., D'Amato, A. Species, ecotype, and drought: seedling growth and physiology data to support assisted migration decision-making in the Northeast U.S. Poster presented at Gordon Research Seminar. South Portland, ME. June 8-9, 2024.
4. Zuckerman, S. Assisted migration and drought in the Northeast. Talk presented at UNH Graduate Research Conference. Durham, NH. Apr. 15, 2024.
5. Zuckerman, S. Assisted migration and drought in the Northeast. Poster presented at: Univ. of New Hampshire Macfarlane Greenhouses Open House. Durham, NH. Apr. 6, 2024.
6. Zuckerman, S., Asbjornsen, H., McIntire, C., D'Amato, A., Wason, J., Vadeboncoeur, M. Assisted migration and drought in the Northeast. Poster presented at: New England Society of American Foresters annual conference. Burlington, VT. Mar. 27-28, 2024
7. In May 2024, Julie presented the project at the Vermont UCF Conference, in part to boost response rates. PI Danks gave presentations of the project and preliminary findings in December 2024 at the UCF Council and the Forest Ecosystem Monitoring Cooperative Annual Conference.
8. McCurdy **Error! Bookmark not defined.**, A., Perry, E., Leahy, J., and Coleman, K. (2024). Are studies on e-bikes gaining traction? Investigating how e-bikes are discussed across academic disciplines, with emphasis on recreational use. Paper presented at National Environmental and Recreation Research Symposium. Annapolis, MD.
9. Reinhardt **Error! Bookmark not defined.**, E., Coleman, K., Leahy, J., Perry, E., and Sachdeva, S. (2024). Trends in mountain biking recreation span international borders: Stories from the northern forest. Paper presented at the 12th Colloquium on Quebec Studies. Sherbrooke, QC, Canada: <https://www.youtube.com/watch?v=GCS54QI8L5U>
10. Perry, E., McCurdy **Error! Bookmark not defined.**, A., Lee **Error! Bookmark not defined.**, H., Reinhardt **Error! Bookmark not defined.**, E., Coleman, K., Dvorak, R., Leahy, J., and Sachdeva, S. (2024). Switching gears toward recreation: Impacts of mountain biking participation and amenities development on local communities and terrains. Poster presented at the Stewardship Network Symposium. East Lansing, MI.
11. Coleman, K., Reinhardt **Error! Bookmark not defined.**, E., Leahy, J. and Perry, E. (2024) Relations Across Generations and Migration: How Do Practices, Beliefs, and Values Towards Nature Change Through Space and Time? Presented at the North American Congress for Conservation Biology, Vancouver, British Columbia.

## Other Products

1. Town Forests website: <https://site.uvm.edu/vermonttownforestcensus/>
2. State of Maine's Carbon Budget. Tenth Biennial Greenhouse Gas Emissions report. Available at: <https://crsf.umaine.edu/forest-climate-change-initiative/carbon-budget/>
3. Browntail Moth in Maine. By Tim King. September 2023 Maine Organic Farmer and Gardener (Fall 2023 issue) <https://www.mofga.org/our-community/publications/the-maine-organic-farmer-gardener/>
4. Rowe, D. 2024 Dance Your Ph.D. competition sponsored by Science. [video] <https://www.youtube.com/watch?v=SFwRMZKODbc>