



Annual Conference

Forest dynamics and
stewardship at a
crossroads

FEMC

November 20,
2025



Highlights from FEMC's work in 2025



Mapping forest clearing over 10 years

Example Chittenden 10m Land Classification

2016 Preclearing



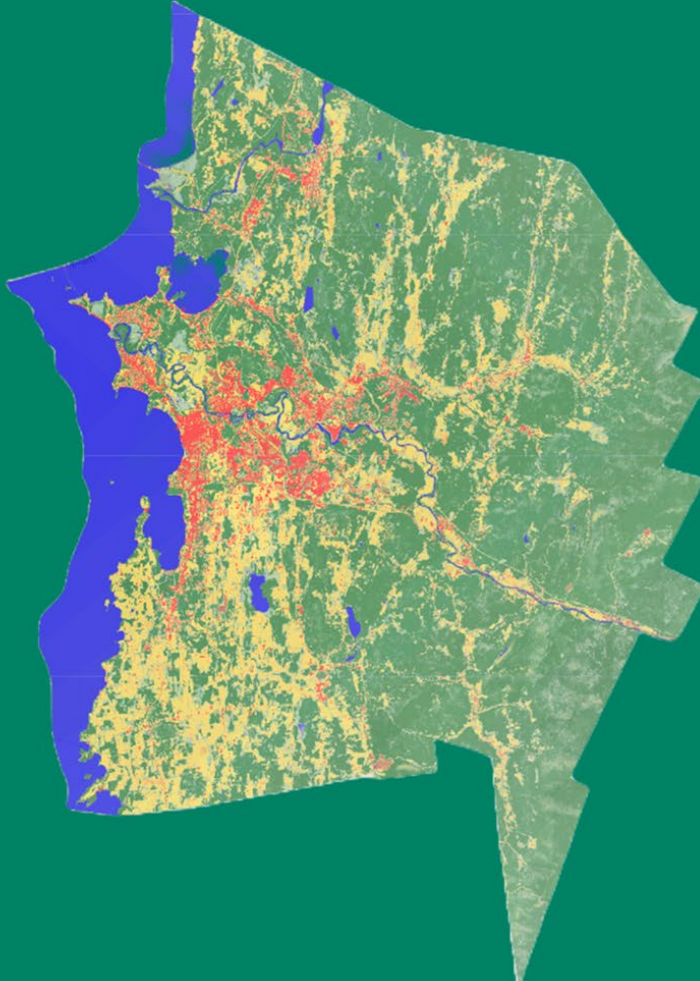
2024



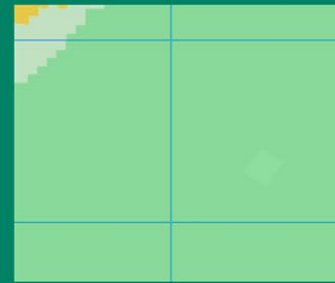
Classified Forest Loss



2024 Chittenden County Land Classification



2016 Preclearing



2017 Clearing Year



2024 Classes

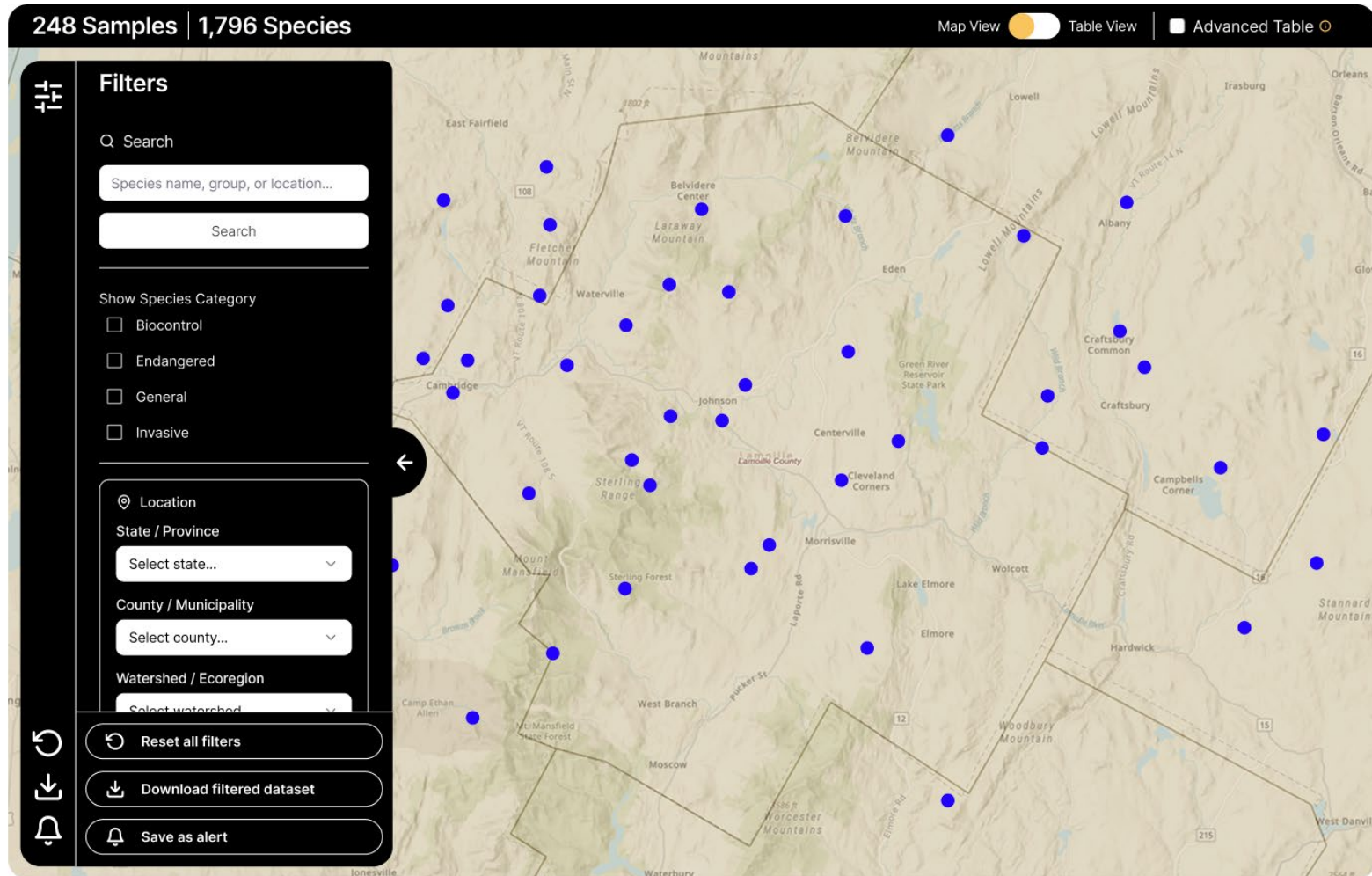
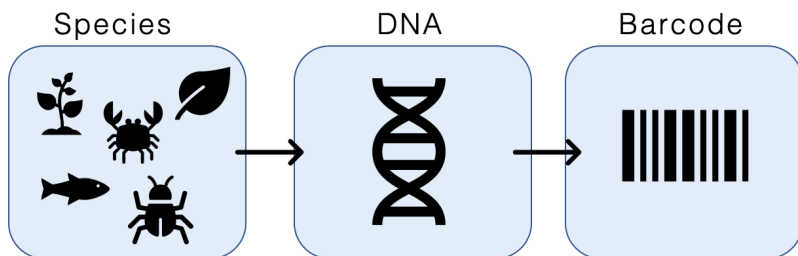


- Detecting permanent transitions from forest → non-forest
- 10m classification across New England + NY
- Multi-year composites + cloud-masking & seasonal filtering complete
- State-level modeling complete, with regional scaling underway
- Products expected early 2026



Creating an eDNA metabarcoding database

- UX/UI firm hired; designs nearly complete
- Initial end user interviews completed; user testing schedule
- Beta version of platform to be built in 2026



Northeast Forest Inventory Network (NEFIN) Updates

What is in the NEFIN Data Collection?

Number of CFI Programs:
11

Program Years:
1960-2024

States Represented:

CT

MA

ME

NH

NY

RI

VT

Total Plots:
5,437

Total Trees:
163,001

Tree Species:
116

- Streamlined the process for adding data from new programs with new templates and user documentation
- Added data from 3 new programs:
 - FEMC Forest Health Monitoring (FHM) data – previously included only VT data
 - Northeast Temperate Inventory & Monitoring Network data
 - Connecticut Blue Ribbon data (awaiting approval)



2025 Regional forest health monitoring

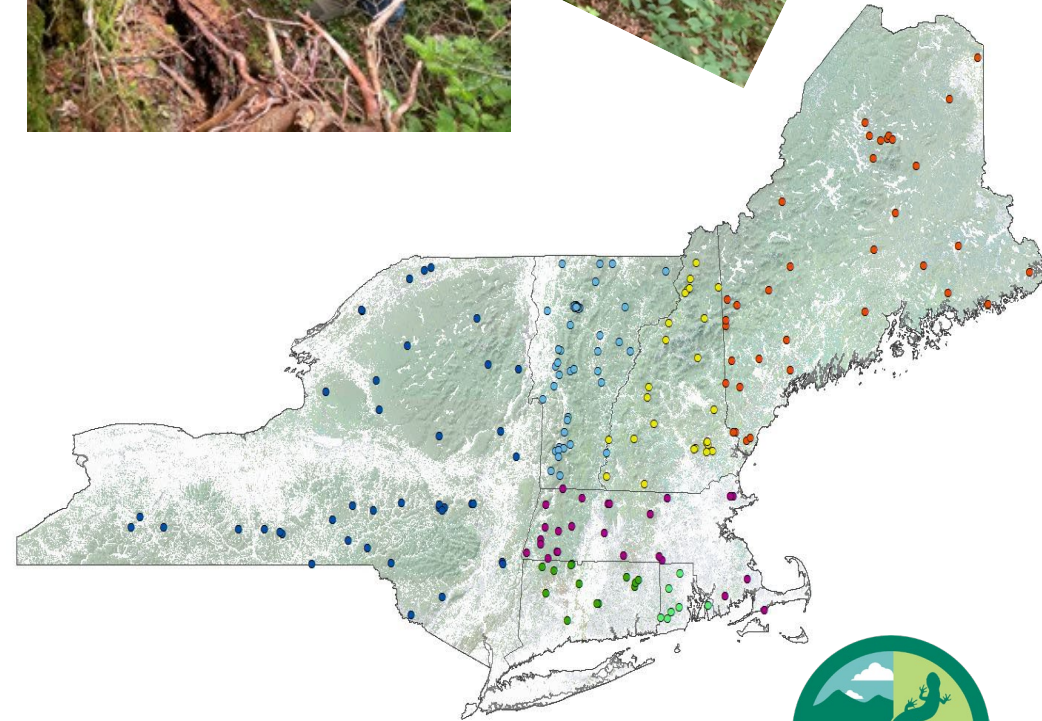
171/194 plots in New England and New York

Crews of 12 technicians in NH, MA, CT, RI, VT, and ME

- Crew leads
- Training and calibration of forest health metrics with staff and state agency personnel
- NY crew managed by NYDEC

Long-term monitoring

- Overstory analysis
 - DBH measurements, dieback, transparency, vigor, defoliation, discoloration, tree heights, special damages, and prism
- Seedling regeneration
- Sapling survivorship
- Browse and invasives



New in 2025: Jumping Worms Monitoring



- Worked with UVM Professor Josef Gorres to develop protocol
- Minimal time added to monitoring
- Ability to add simple additional monitoring tasks like this one to structured FEMC plots
- If you want to see results, go to Ben Porter's talk this afternoon!

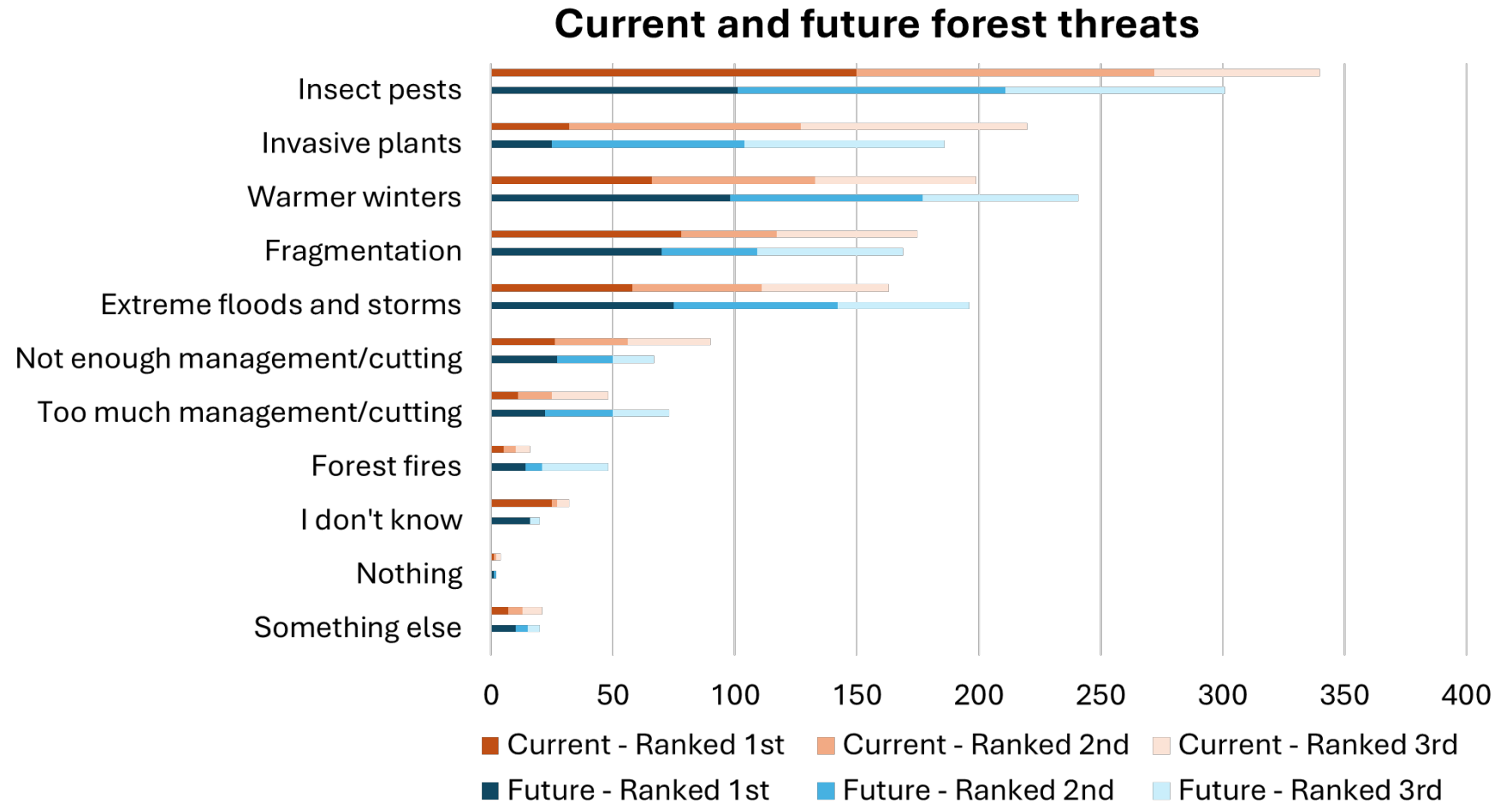
New in 2025: Ash monitoring

- Tree Species in Peril project (The Nature Conservancy)
- Monitoring for lingering ash and contributing to black ash cultural keystone protection – developing partnerships with NE Indigenous communities
- Began monitoring for lingering ash and establishing new plots in 2025 season
- Project will continue for at least two years



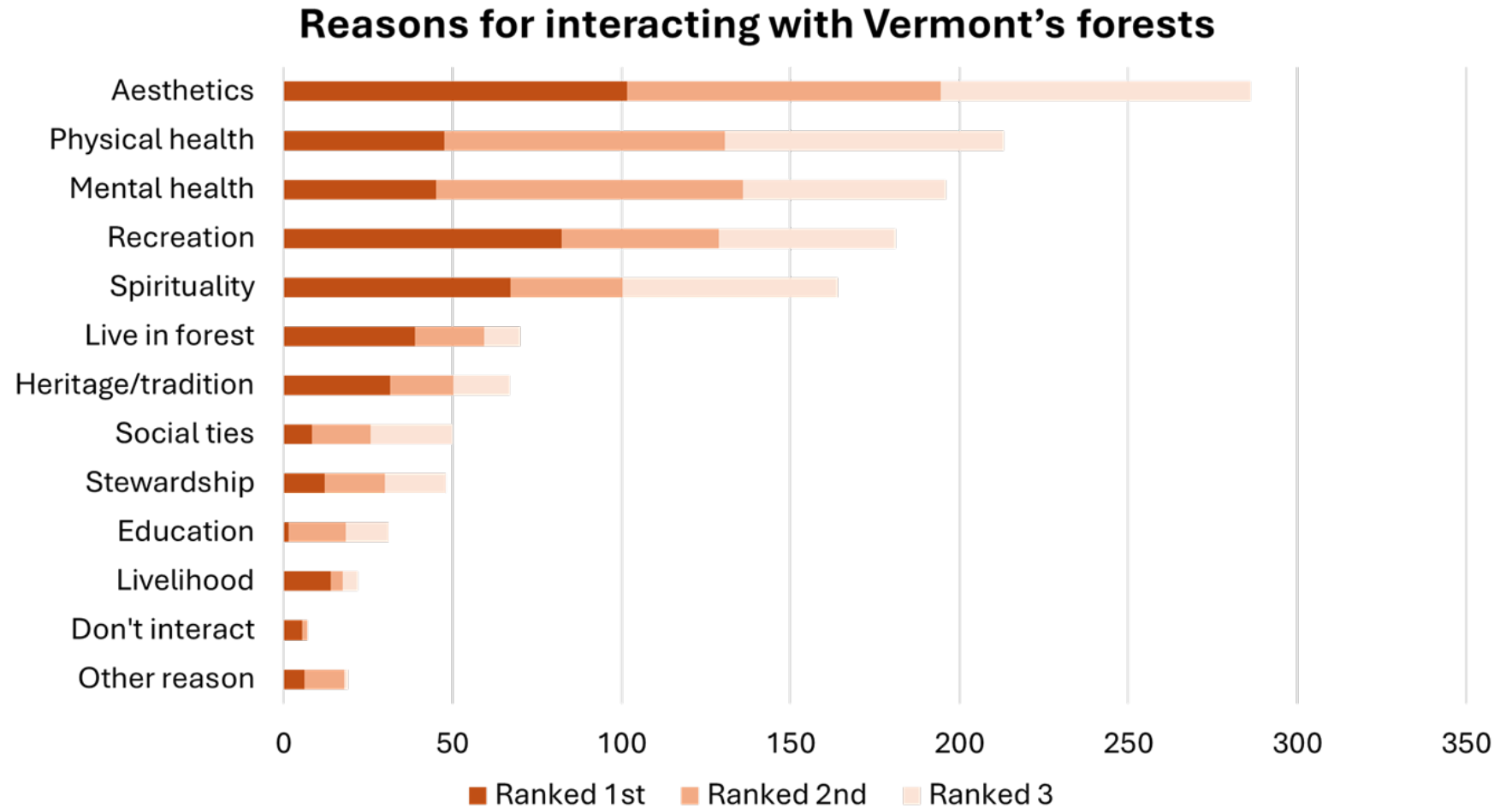
New in 2025: Forest values monitoring

- Worked with VT Forests, Parks, & Recreation and VT Fish & Wildlife to develop a brief pilot survey on Vermont forest values
- Results can guide communication, deepen understanding of public response to proposed management actions
- Hope to repeat every 3-5 years, may expand regionally (with support)



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Many thanks to...



FEMC Staff



Principal
Investigator (PI):
Jen Pontius



Co-PI:
Nick Aflitto



Director:
Alison Adams



Assistant
Director:
Elissa Schuett



Monitoring
Coordinator:
Ben Porter



Data Engineer:
Soren Donisvitch



Front-end Web
Developer:
Xana Wolf



Web and Database
Developer:
Nancy Voorhis



Monitoring
Assistant:
Matthew Rios



Data Systems
Engineer:
Daniel Scheuermann

Student Employees:



Devyn Jennings,
Communications
Assistant



FEMC State Coordinators

NH – Larissa
Robinson



VT – Savannah
Ferreira



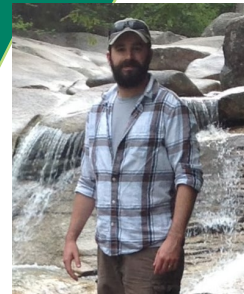
ME – Aaron
Bergdahl &
Jeff Harriman



NY – Amanda
Dillon



MA – Eric Peterson



CT – Eli Ward



RI –
Alana Russell



FEMC Steering Committee

Kyle Lombard (NH; Chair), Will Hochholzer (CT; Vice Chair), Josh Halman (VT), Kathy Decker (VT), Patty Cormier (ME), Jess Cancelliere (NY), Pete Church (MA), Chris Martin (CT), Nancy Stairs (RI), Peter Newman (UVM)

USFS non-voting members: Rick Cooksey, Eric Sprague, Liz Matthews, Mike Bohne, John Sinclair, Susan Ellsworth



Our many funders!



Hopeful
Hollow
Foundation

Conference planning,
support,
& sponsors



Elissa Schuett & Devyn Jennings,
Volunteers, University Event
Services, and the Davis Center team



Introducing FEMC's new Co-Principal Investigator



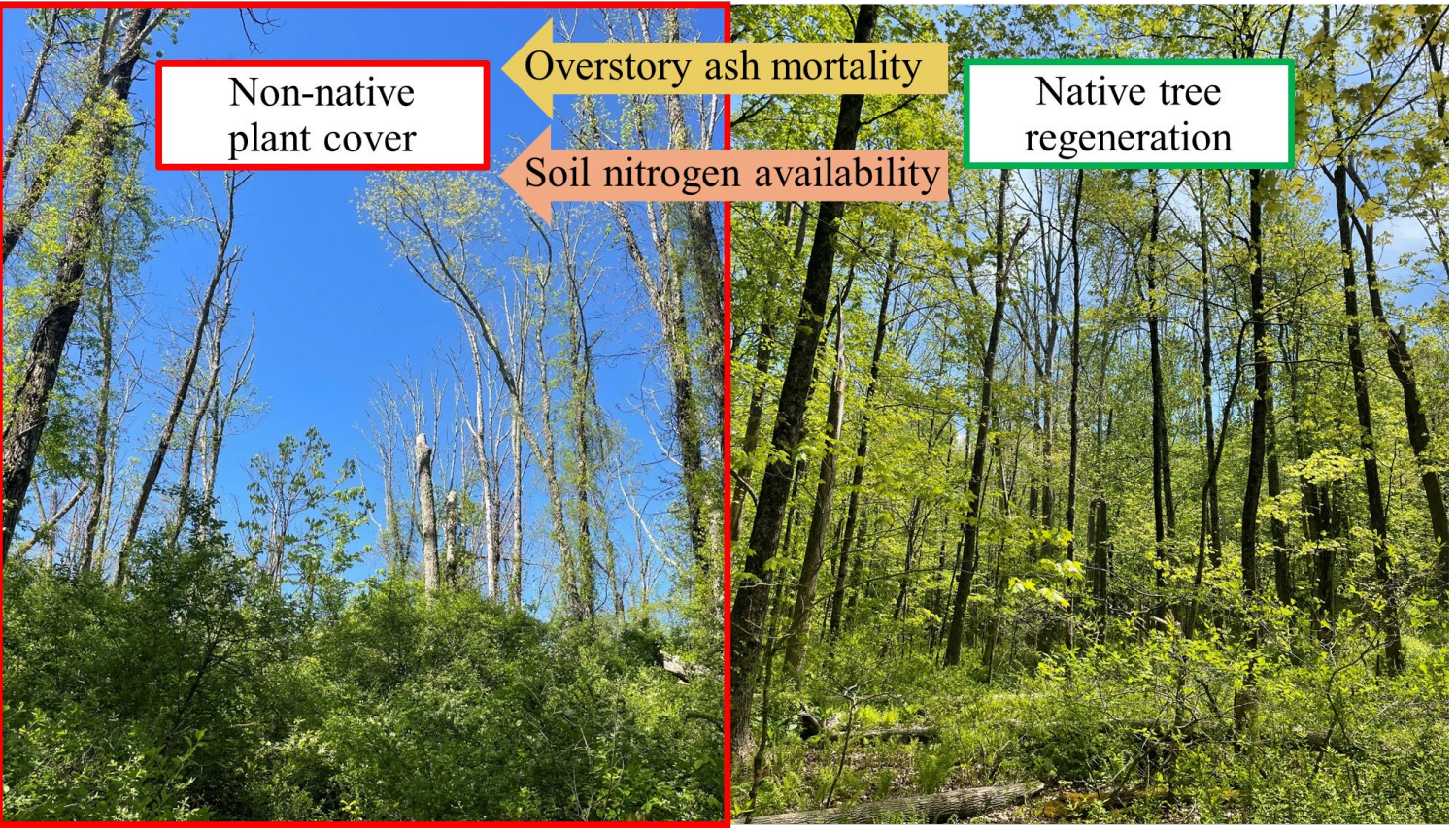
Dr. Nicholas Aflitto
Assistant Professor, UVM RSEN
Forest Ecosystem Health



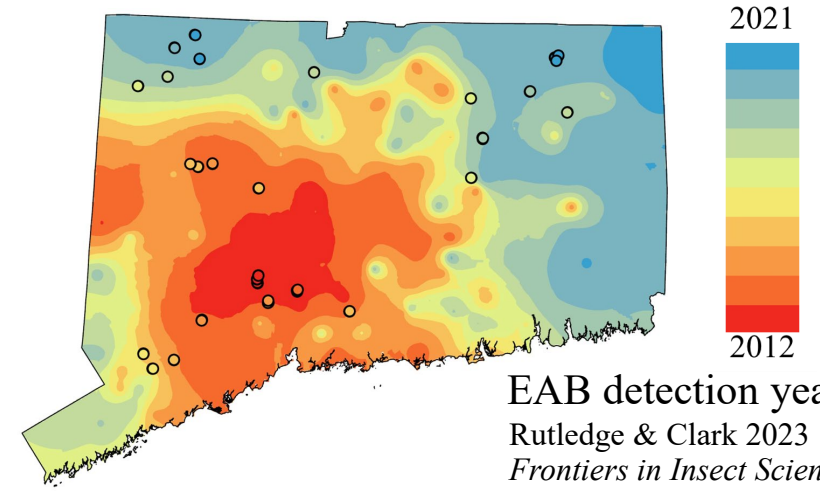
Let's hear from FEMC's
state coordinators!

Changes in Connecticut's forest composition following Emerald ash borer invasion

Forest composition is shifting towards a higher abundance of non-native plants following overstory ash decline from EAB



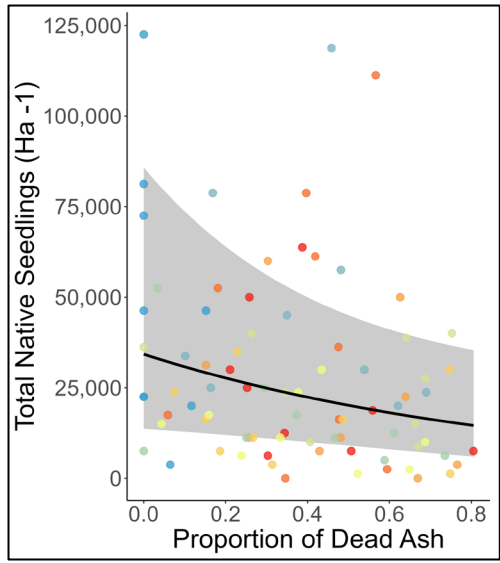
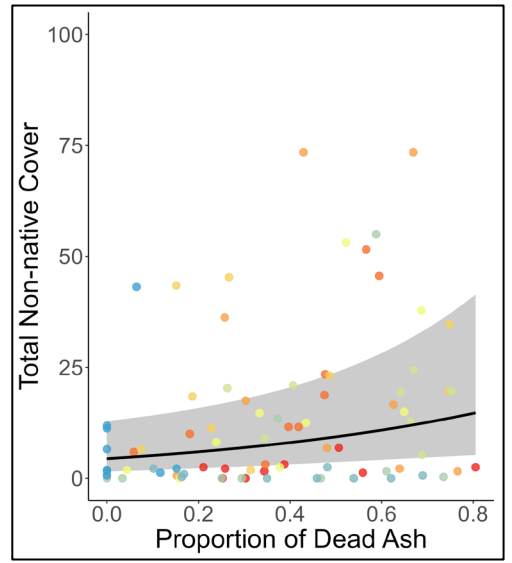
Hatajik, JE, Duguid, MC, Bradford, MA, Kuebbing, SE, Rutledge, CE, Ward, EB. In prep. Tree mortality caused by an invasive insect is strongly associated with forest plant invasions.



EAB detection year
Rutledge & Clark 2023
Frontiers in Insect Science

Non-native plant cover

Native tree regeneration



Overstory ash mortality

Maine: Spruce Budworm

T18 R13
WELS



- Spruce Budworm is a native defoliator with periodic outbreaks every 30-60 years (~40)
- 1970s Outbreak: Mortality rates for red spruce reached 30-66%; balsam fir reached 84-97%
 - Estimated 20-25 million cords of spruce-fir mortality
- 2024: Models built using larval population data indicated SBW populations in northern Maine meet the threshold for treatment according to the principle of Early Intervention Strategy (EIS)
- 2025: Roughly 240K acres received aerial treatment (bt or synthetic molting hormone)
 - Federal and State funding with landowner through a cost share program



Southern pine beetle Massachusetts Active Infestations



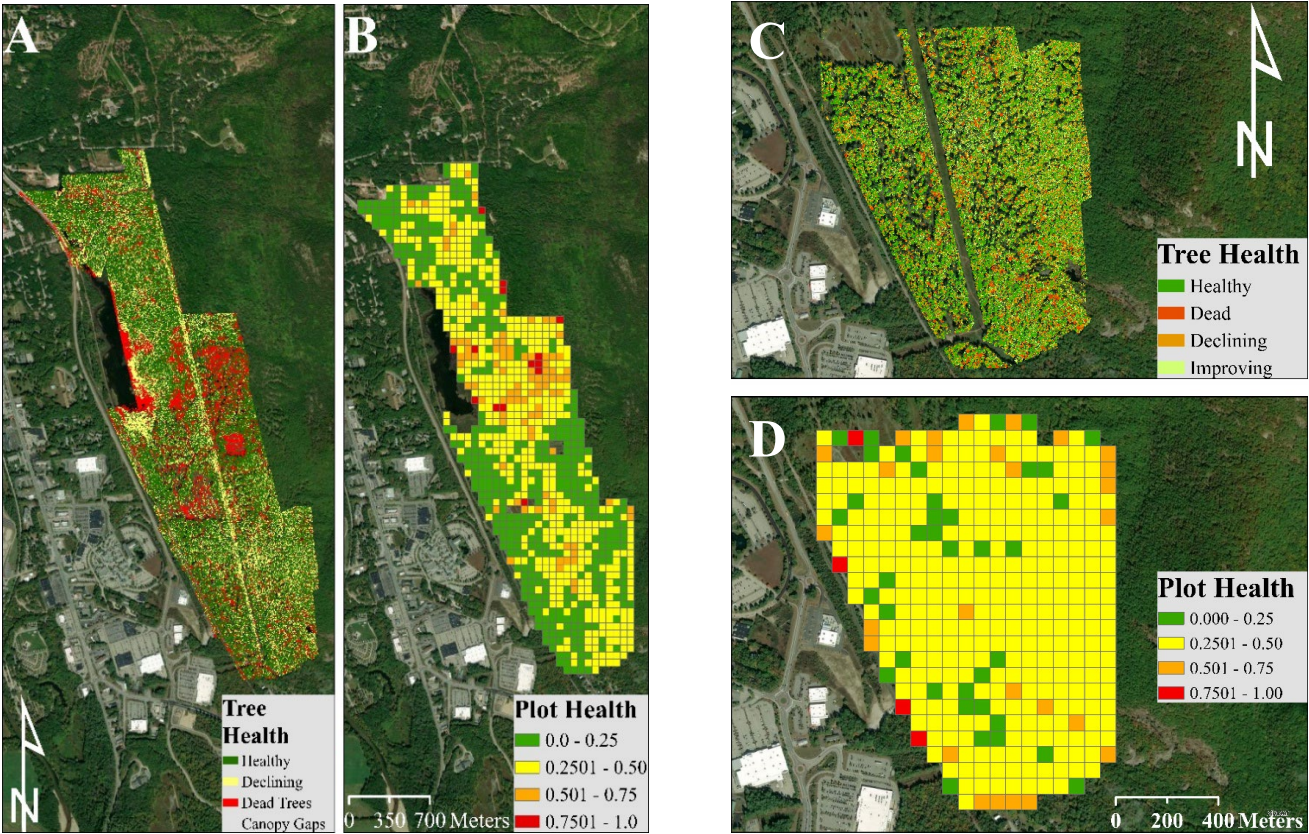
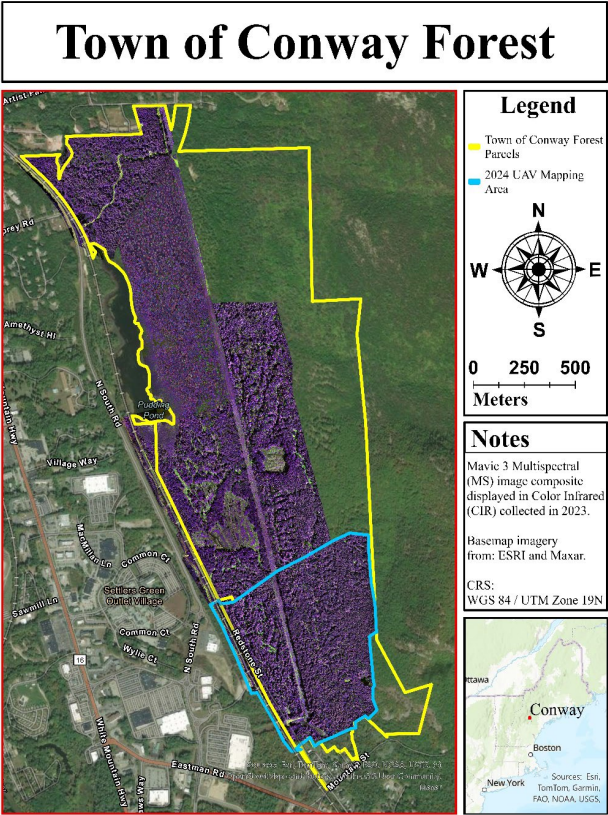
- Trapping efforts yielded low numbers for years.
- 2023 first outbreak infestations detected in pitch pine.
- Multiple infested sites on Marthas Vineyard and Nantucket Islands.
- Increased outbreaks on Cape Cod mainland.
- Rapid mortality and tree decline observed.
- Suppression actions...what's next?



NEW HAMPSHIRE: Assessing Oak Recovery from Spongy Moth using Drone Imagery & Analysis

Overview:

- 1) ~35,000 acres defoliated by spongy moth 2021 & 2022
- 2) Drought conditions 2021 & 2022
- 3) May 17-18th 2023 we got 20 F temps
- 4) Conway hotspot:



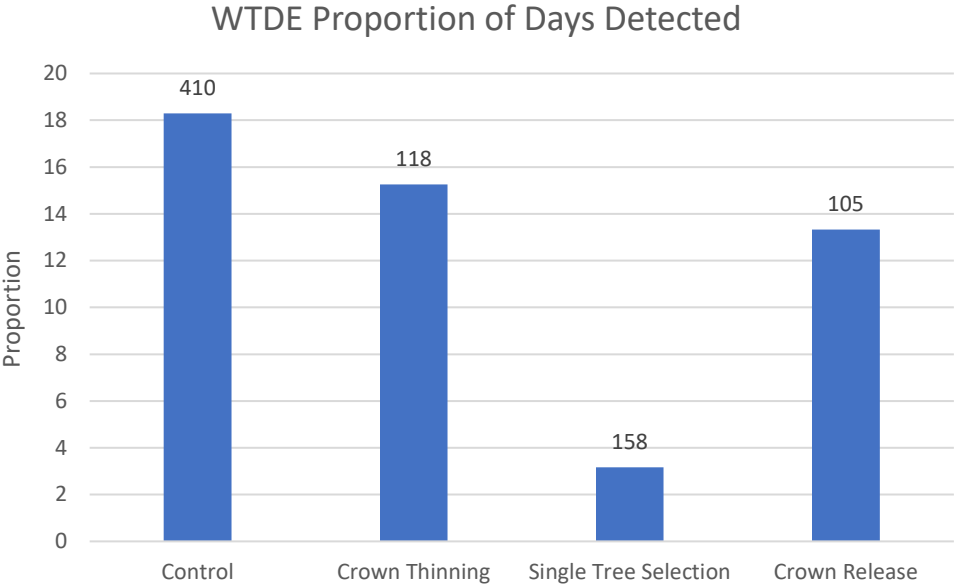
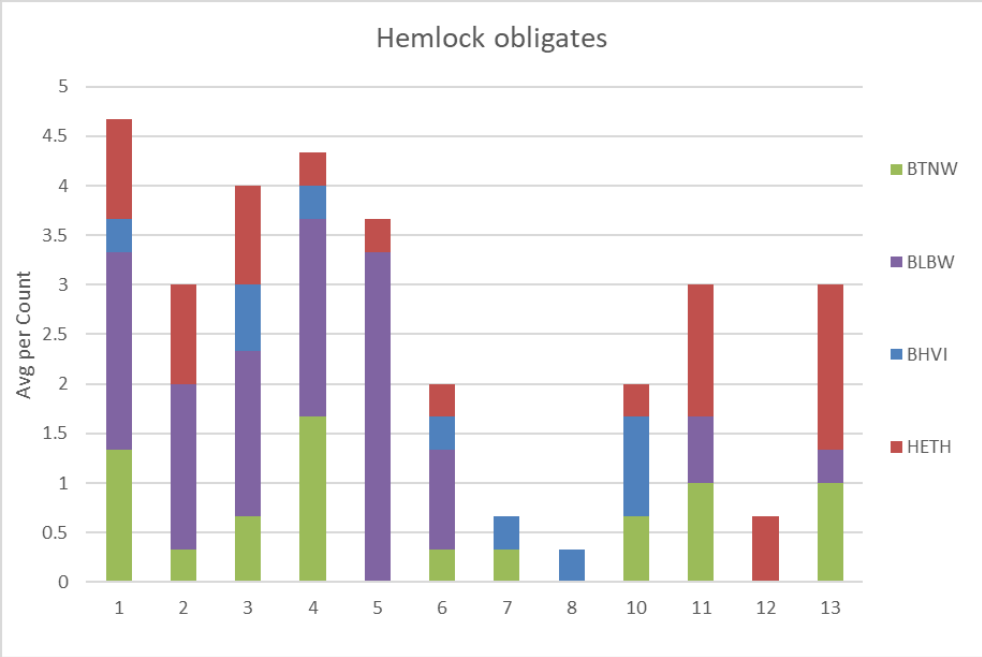
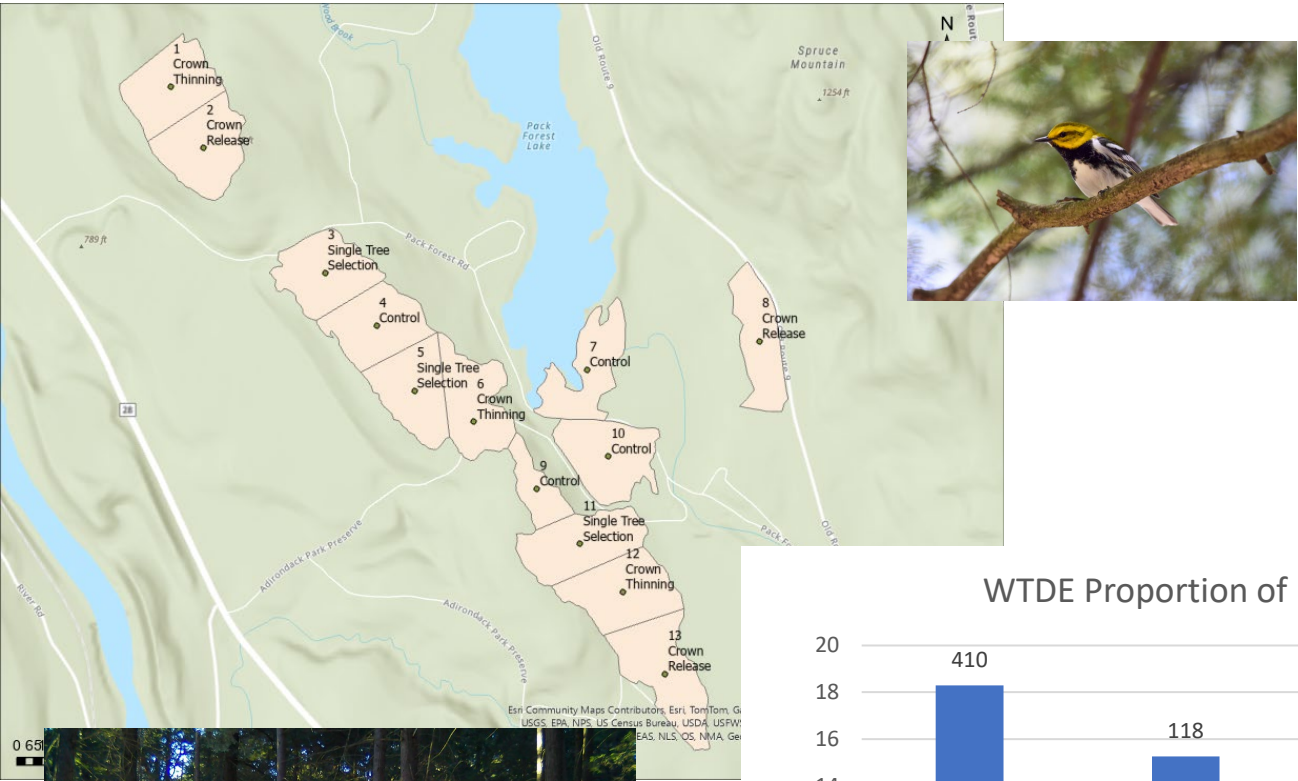
September 2023

September 2024

PRELIMINARY RESULTS: Individual tree health change based on 2023 and 2024 UAV imagery:

	Healthy	Improving	Declining	Dead
Individual Trees	49.8%	15.2%	28.6%	6.4%

New York: Hemlock Silviculture





Rhode Island forest health priority: revamping winter moth biocontrol



WM- invasive
defoliator of maples
and oaks in coastal
New England/NY



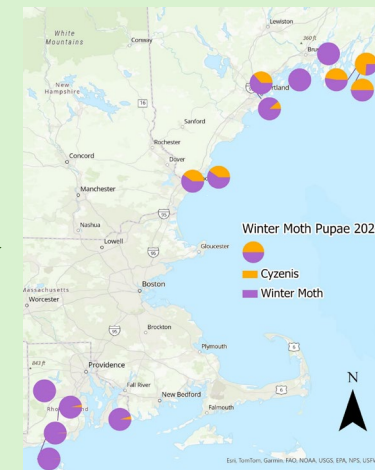
Biocontrol with
Cyzenis albicans
credited to previous
WM decline



A WM resurgence
has been building
since 2022 in RI



Parasitism studies
were conducted in
2024



2024: % parasitism
by *C. albicans*
significantly lower
in RI vs. ME

Need: boost
biocontrol impacts
with new
inoculations of *C.*
albicans

2025: NFFPC
mobilization hosted
by ME Forest
Service

Thank you, Maine
and NFFPC!





Black Ash Project (VT)

- Collaboration
 - Indigenous partners, Northwoods Stewardship Center, Intervale Center, Fish and Wildlife
- Workshops and public outreach
 - Black ash ID, Ecology, EAB
- Basket maker led education
 - Cultural significance
 - 2025: 2 workshops on black ash log pounding and splint making
- Preservation patches
 - 12-20 mature, high vigor ash
 - 6 locations in 2025: Caledonia, Franklin, Lamoille, and Rutland counties
- Seed saving initiative
 - Collecting, Saving and Storage
 - 2025 was not a highly productive year





Dr. Anne Jefferson

RSENR Professor, Lake Champlain Sea Grant,
NSRC Executive Committee



Northeastern States Research Cooperative: Science Supporting the Northern Forest and Indigenous Knowledge

Anne Jefferson¹, Anthea Lavallee², Mark Ducey³,
René Germain⁴, Aaron Weiskittel⁵, and Deahn DonnerWright⁶



FEMC Annual Meeting
20 November 2025



¹ Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT

² Hubbard Brook Research Foundation, Woodstock, VT

³ Department of Natural Resources and the Environment, University of New Hampshire, Durham, NH

⁴ Forest and Natural Resources Management, SUNY-ESF, Syracuse, NY

⁵ Center for Research on Sustainable Forests, University of Maine, Orono, ME

⁶ Northern Research Station, USDA Forest Service, Rhinelander, WI



A Partnership for the Northern Forest



We support cross-disciplinary, collaborative research in the Northern Forest within ME, NH, VT, and northern NY. Research activities are relevant and beneficial to people who live within its boundaries, work with its resources, use its products, visit it, and care about it.

<https://nsrcforest.org/>

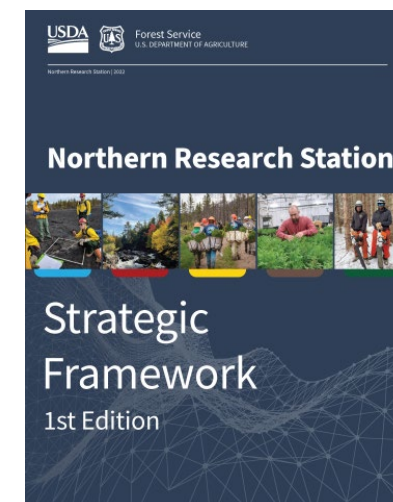




NSRC & the U.S. Forest Service

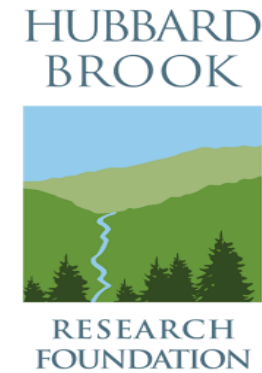
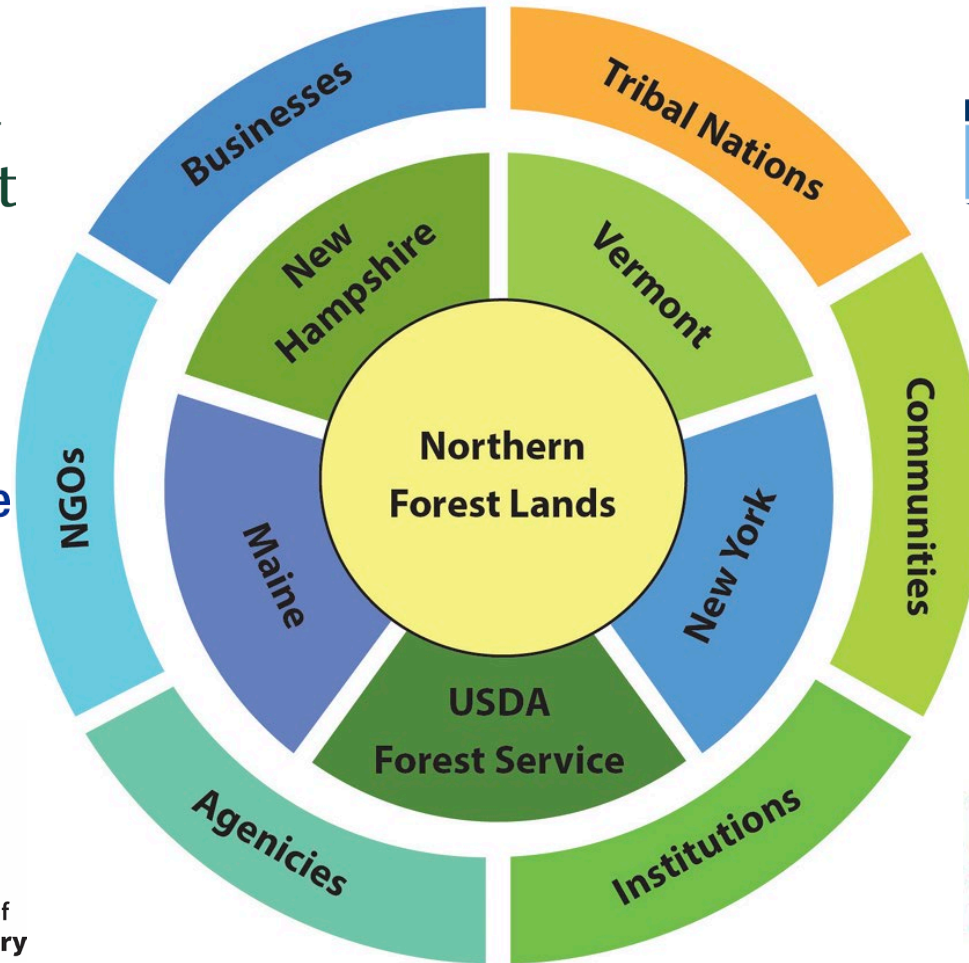


- The U.S. Forest Service values its partnership with the NSRC
- We have mutual interests in providing the science to support management of the diversity of forest ecosystems and landscapes in the Northeast and throughout the Eastern Region
- Our partnership is guided by the Northern Research Station strategic framework





NSRC Cross-Regional Partnerships



Long history of extensive private-public-academic partnerships across the region

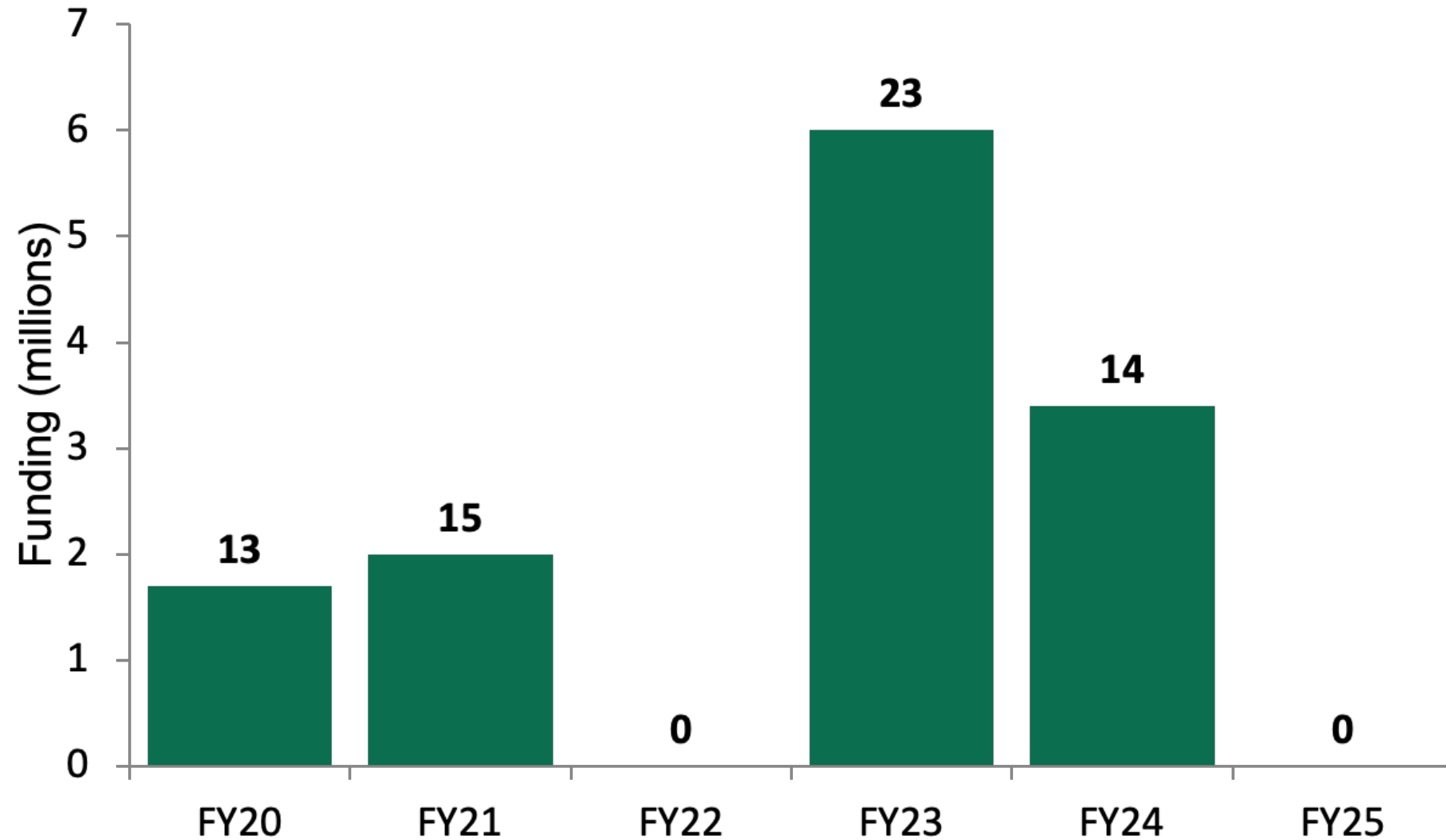


In 2024, NSRC-funded research produced:

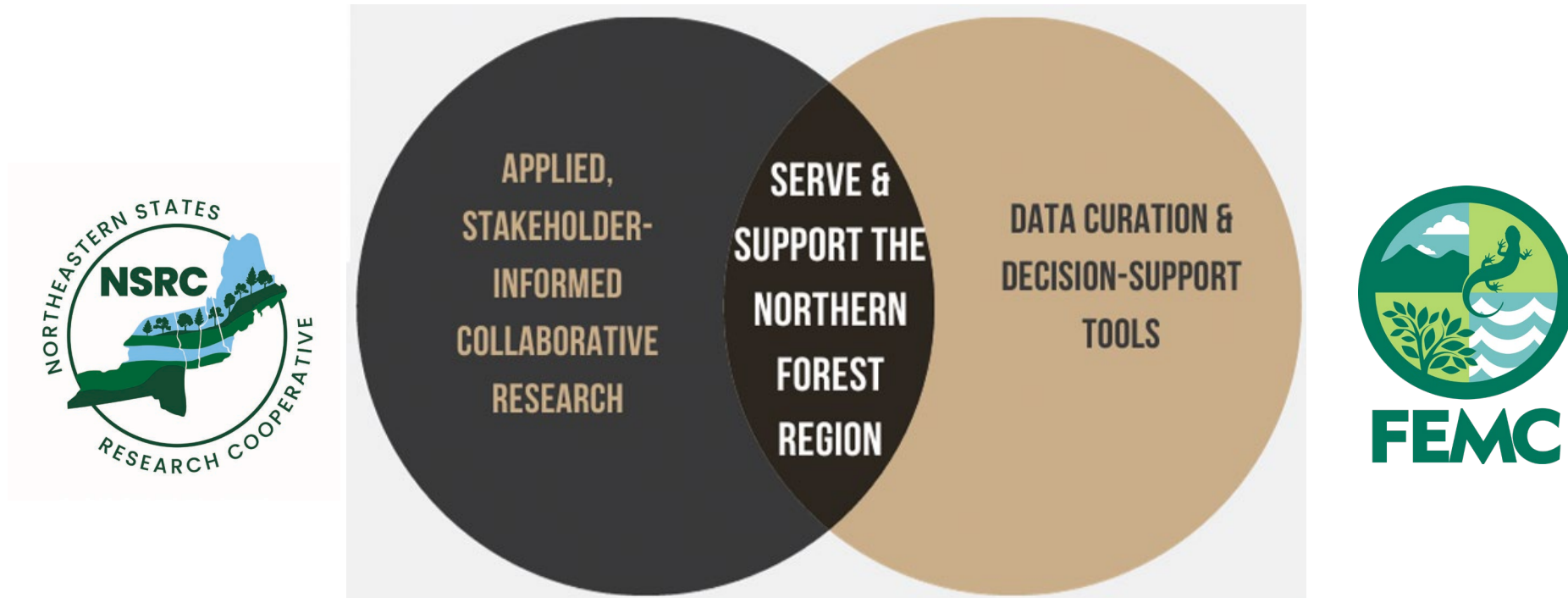
- 24 articles
- 44 presentations
- 22 other products



Funding and Projects Awarded



NSRC & FEMC Partnership



A formal partnership between the organizations has been established and will grow in the future



Summary

- NSRC is a vital regional program that produces answers to management-relevant problems
- Given pressures on the region, the need for NSRC has not been higher
- We are optimistic that NSRC's future remains strong, and we invite your engagement and support
- Partnership with FEMC leverages strengths of both organizations

<https://nsrcforest.org/>





Dr. Beverley Wemple
UVM Geography Professor, WRI Faculty Director

Highlights from long-term research and monitoring on watersheds of Mt. Mansfield

2025 FEMC Annual Meeting
November 20, 2025



Beverley Wemple
University of Vermont

Jamie Shanley
U.S. Geological Survey



Mountain development pressures

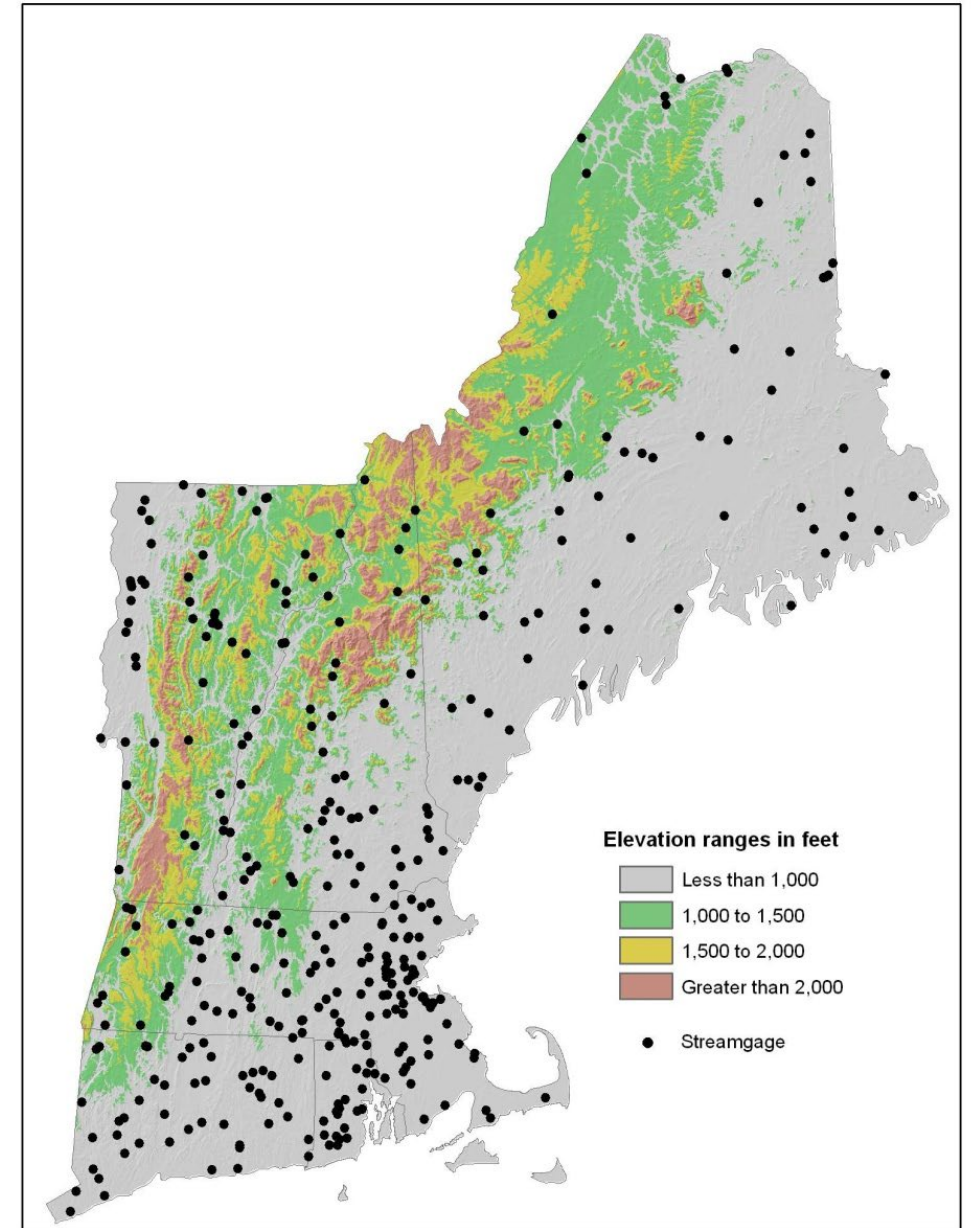


Photo credits : Burlington Free Press, Vermont Digger, Evan Schiller

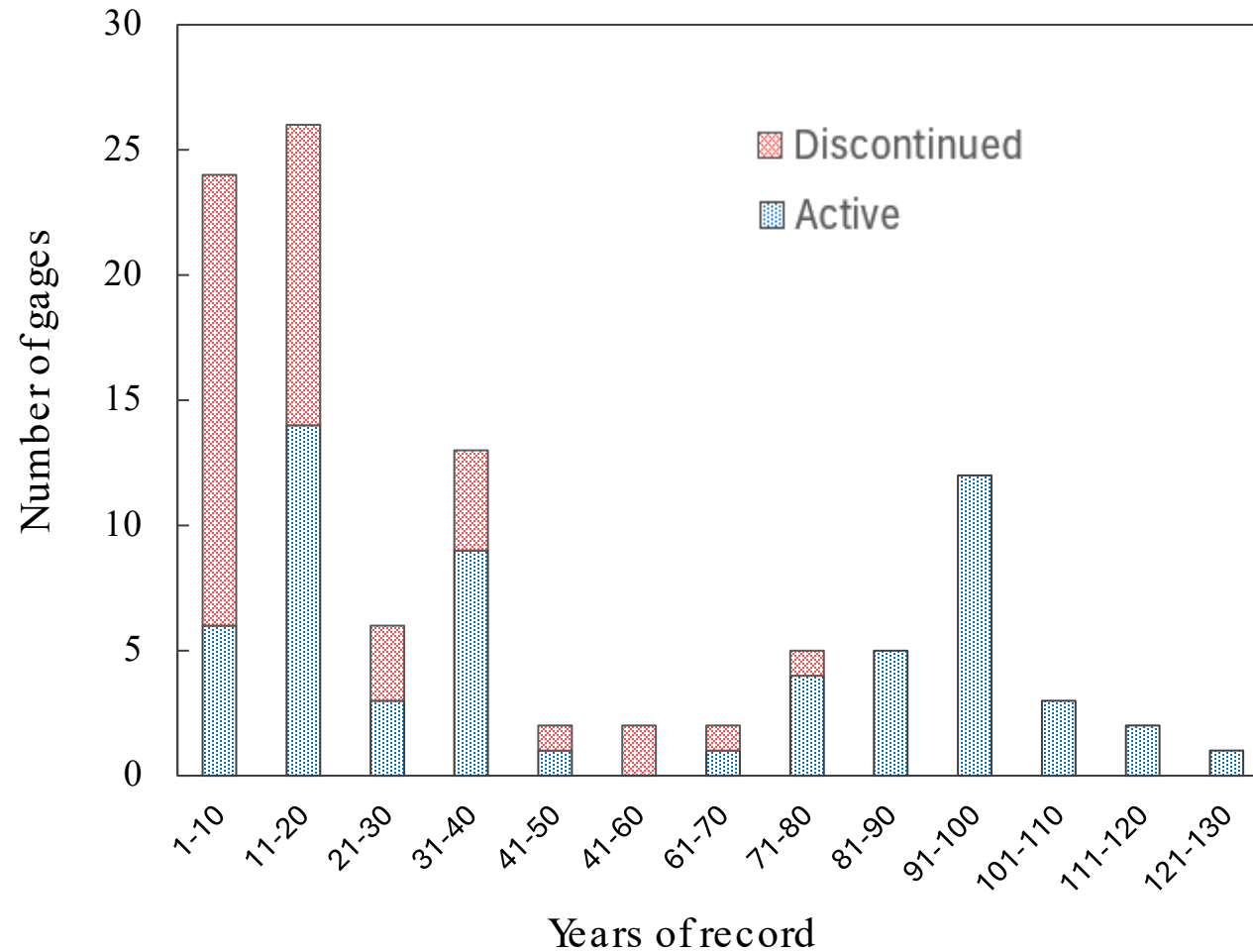
Scientific need

In New England....

One-third of the land area is over 1000', but only 4% of the USGS stream gages.



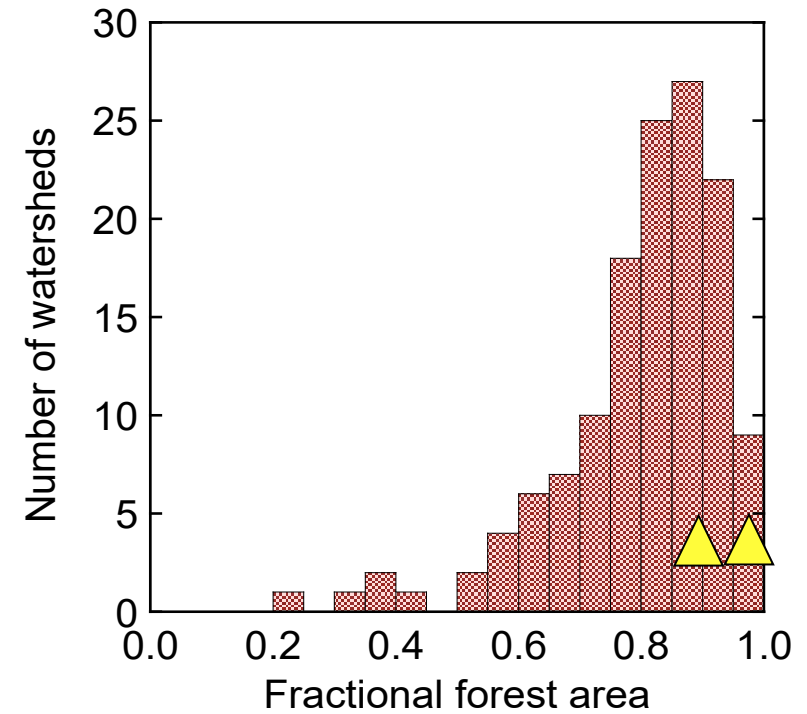
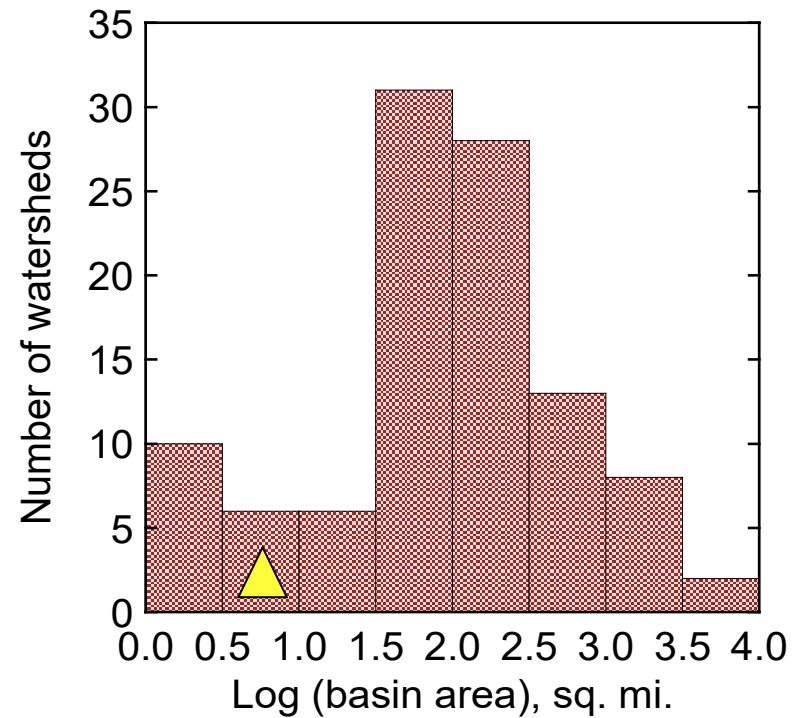
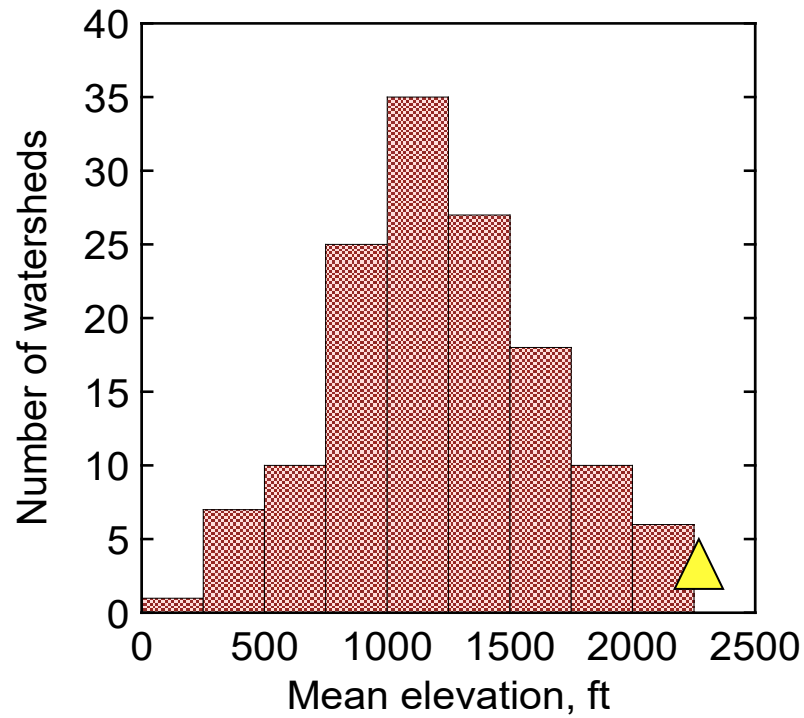
Vermont streamflow gages period of record



Mt Mansfield paired-watershed study



Mt Mansfield gages fill a critical niche



Timeline



Oct 1, 2000
USGS gaging
begins

March 2001
Water quality
sampling begins
(cations, anions)

2010
Highest
recorded peak
discharges
WB: 8/4/2010
RB: 9/30/2010

2011
Second highest
recorded peak
discharges
4/27/2011

2024
Third highest
recorded peak
discharges
WB: 6/23/2024
RB: 7/10/2024

Sept 30, 2025
25 years of
continuous
streamflow
monitoring

Summer 2003
Spruce Peak
expansion begins



2007
West Branch
gage moved
downstream of
snowmaking
pond

Summer 2022
Summit to Shore
Environmental
Observation
Network stations
installed



Funding support

Vermont Monitoring Cooperative (now FEMC)

Lintilhac Foundation

U.S. Geological Survey

Vermont Water Resources and Lake Studies Center

Vermont Department of Environmental Conservation

U.S. Army Corps of Engineers Cold Regions Research and Engineering Lab (CRREL)

NOAA Cooperative Institute for Research to Operations in Hydrology (CIROH)



LINTILHAC
FOUNDATION





Formerly the VERMONT MONITORING COOPERATIVE

Search...

LOG IN



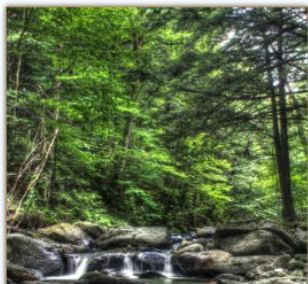
ADVANCED SEARCH

DATA MONITORING TOOLS & PRODUCTS SERVICES COLLABORATE ABOUT FEMC

PROJECT: PAIRED WATERSHED STUDY ON THE EAST SLOPE OF MOUNT MANSFIELD: HYDROLOGIC MONITORING

Dataset: Ranch Brook and West Branch Stream Flow Data from 2000 to current

OVERVIEW METADATA DATA DOCUMENTS/IMAGES



Dataset Overview

Daily averages of stream flows from two gages on Mt. Mansfield, one in a disturbed watershed, and one in an undisturbed watershed

[See Full Dataset Documentation](#)

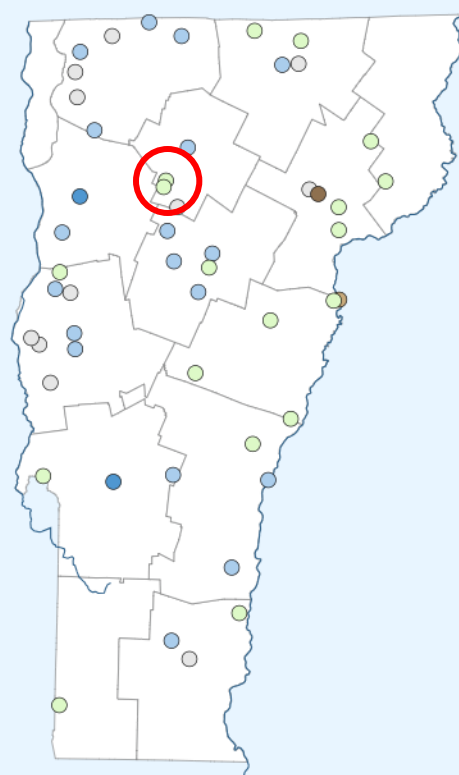
Purpose Monitoring the hydrology of disturbed and undisturbed watersheds

Data Collection Data collection for this dataset is ongoing



Vermont water conditions

WDFN Home WDFN tools and data ▾ Other water data resources ▾ Connect ▾



51 monitoring locations

Data collection - **Continuous**

Using filters for

Data collection duration - **The last 120 days**

Showing locations with
- **Discharge, cubic feet per second**

Show only locations with

- ☒ Discharge
- ☐ Gage height
- ☐ Depth to water level
- ☐ Water temperature
- ☐ Any data

Publications

1. Hale, K., A. Schroth, J. Shanley, B. C. Wemple. 2025. Warmer, dynamic winters drive declines in snowpack and coupled increases in annual and seasonal runoff in a headwater catchment of the Northeastern USA. *Hydrological Processes*, 39:e70092 <https://doi.org/10.1002/hyp.70092>
2. Shanley, J.B., B.C. Wemple, B. Hastings, D.W. Kincaid. 2021. Hydrology on high: Assessing the effect of ski resort expansion and changing climate at the Mount Mansfield paired-catchment study in Vermont, USA. *Hydrological Processes*, 35(10) (Special Issue: Research and Observatory Catchments: The Legacy and the Future). <https://doi.org/10.1002/hyp.14378>
3. Ross, D. S., J. B. Shanley, J. L. Campbell, G. B. Lawrence, S. W. Bailey, G. E. Likens, B. Wemple, G. Fredriksen, and A. E. Jamison, 2011. Spatial patterns of soil nitrification and nitrate export from forested headwaters in the northeastern USA. *Journal of Geophysical Research*, DOI: 10.1029/2011JG001740.
4. Ross, D. S. and B. C. Wemple, 2011. Soil nitrification in a large forested watershed, Ranch Brook (Vermont) mirrors patterns in smaller northeastern US catchments. *Forest Ecology and Management*, 262: 1084-1093.
5. Shanley, J.B. and Wemple, B., 2009. Water quantity and quality in the mountain environment. In: Milne, J.E, J. Lemense, and R.A. Virginia, eds., *Mountain Resorts: Ecology and the Law*. Chapter 4, pp. 65-98. Ashgate Publishing Co., Burlington, Vermont.
6. Ross, D. S., B. C. Wemple, A.E. Jamison, G. Fredriksen, J. B. Shanley, G. B. Lawrence, S. W. Bailey, J. L. Campbell, 2009. A Cross-Site Comparison of Factors Influencing Soil Nitrification Rates in Northeastern USA Forested Watersheds. *Ecosystems*, 12(1): 158-178.
7. Wemple, B. C., J. Shanley, J. Denner, D. Ross, and K. Mills. 2007. Hydrology and water quality in two mountain basins of the northeastern US: assessing baseline conditions and effects of ski area development. *Hydrological Processes*, DOI: 10.1002/hyp.6700.
8. Shanley, J. B. and B. C. Wemple, 2002. Water Quantity and Quality in the Mountain Environment in J. Milne and E. Miller (eds.) *Mountain Resorts: Ecology and the Law* special issue of the *Vermont Law Review*, 26(3): 717-751.

Educational opportunities



Development and Evaluation of a Physics-Based Snow Model to Assess Spatiotemporal Snowpack and Snowmelt Runoff Variability in Vermont

Anna Grunes¹, Graham Sexstone², John Hammond³, Kate Hale^{4,5}, Donna M. Rizzo^{1,6}, Patrick J. Clemins^{6,7}, Beverley Wemple^{5,8}, Arne Bombles¹

¹Civil and Environmental Engineering Department, University of Vermont
²U.S. Geological Survey Colorado Water Science Center
³U.S. Geological Survey Maryland-Delaware-DC Water Science Center
⁴Department of Geography, University of British Columbia
⁵Water Resources Institute, University of Vermont
⁶Department of Geography and Geosciences, University of Vermont
⁷Department of Computer Science, University of Vermont

University of Vermont CRREL USGS Eastern Snow Conference

A person is standing in front of a large screen displaying a presentation slide. The slide shows a snowy mountain landscape.

Highlights from long-term research and monitoring on watersheds of Mt. Mansfield

Williams Room, 3:00-4:35pm

- Warmer winters drive snowpack declines and runoff increases in a headwater region of the northeastern United States - Dr. Kate Hale, Dept. of Geography, University of British Columbia
- The Summit-to-Shore Snow Monitoring Network in Vermont - Dr. Arne Bomblies, Dept of Civil & Environmental Engineering, University of Vermont
- Determining Links Between LiDAR-Derived Canopy Metrics and Daily Changes in Snow Depth around Vermont, US. – Jacob Ladue, Dept of Civil & Environmental Engineering, University of Vermont
- Insights from 25 Years of Biological Monitoring in the Ranch Brook and West Branch Little River Watersheds: A Comparative Study of Benthic Macroinvertebrates - Meaghan Hickey, Vermont Department of Environmental Conservation
- POSTER: Vermont Mesonet - A Statewide, Meteorological Monitoring Network – Samantha Koehler, UVM Water Resources Institute

Forest dynamics and
stewardship at a
crossroads:
Science, partnerships,
and adaptive strategies
for moving forward



Dr. Tony D'Amato
Director & Professor, UVM Forestry Program
Director, UVM Research Forests

Forest dynamics and stewardship at a crossroads: science, partnerships, and adaptive strategies for moving forward

2025 FEMC Annual Meeting
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Tony D'Amato
University of Vermont

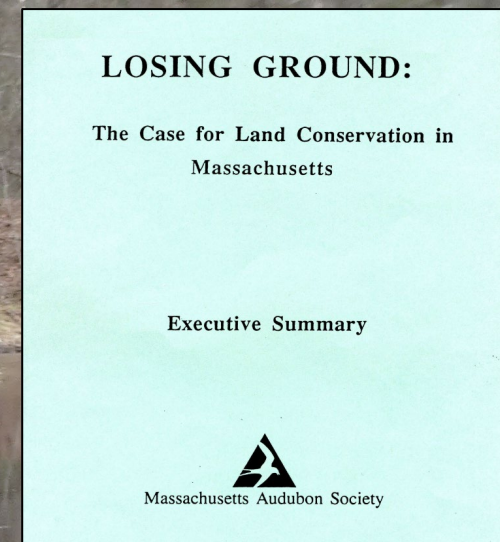
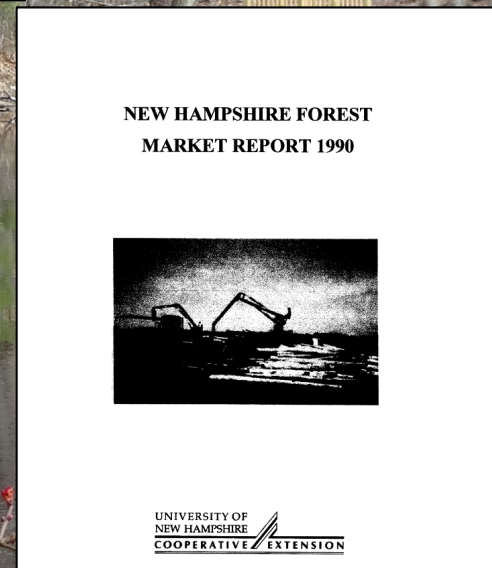
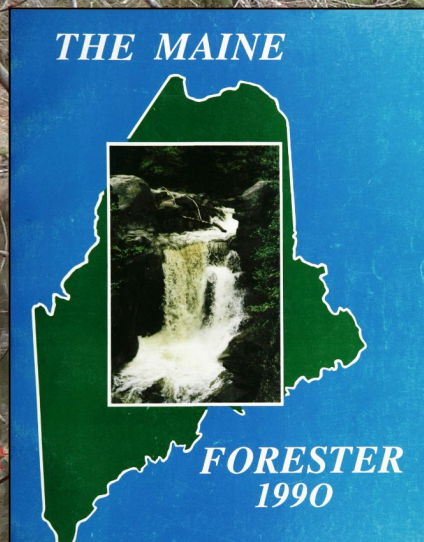
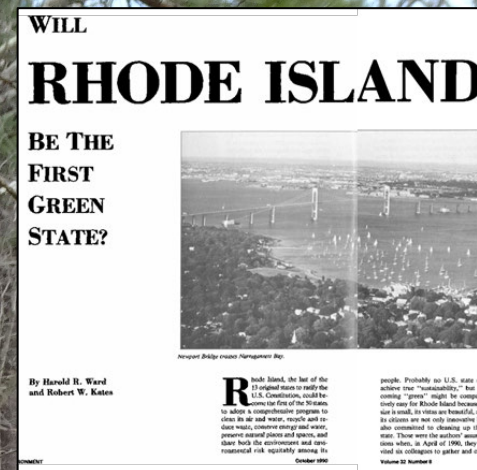
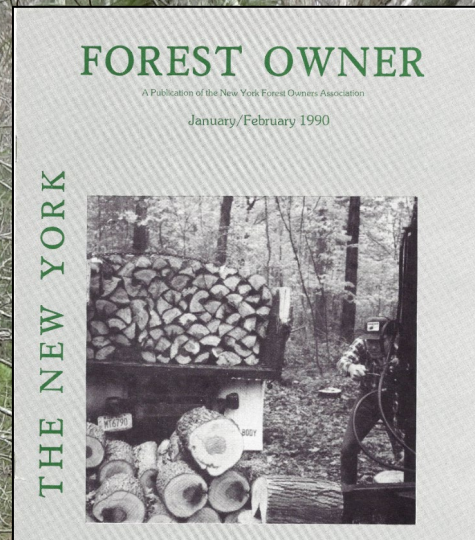
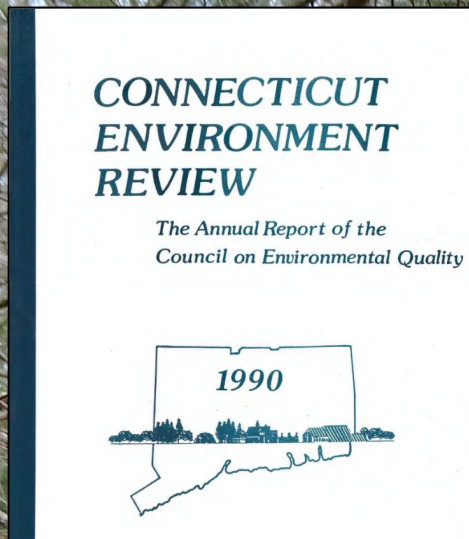
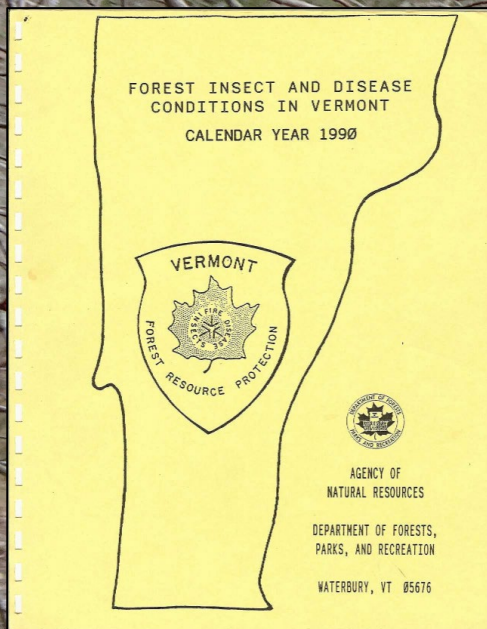


THE UNIVERSITY OF VERMONT
FORESTRY



NECASC
Northeast Climate Adaptation Science Center





Our shifting forest baselines

Forest Dynamics

Forest Stewardship

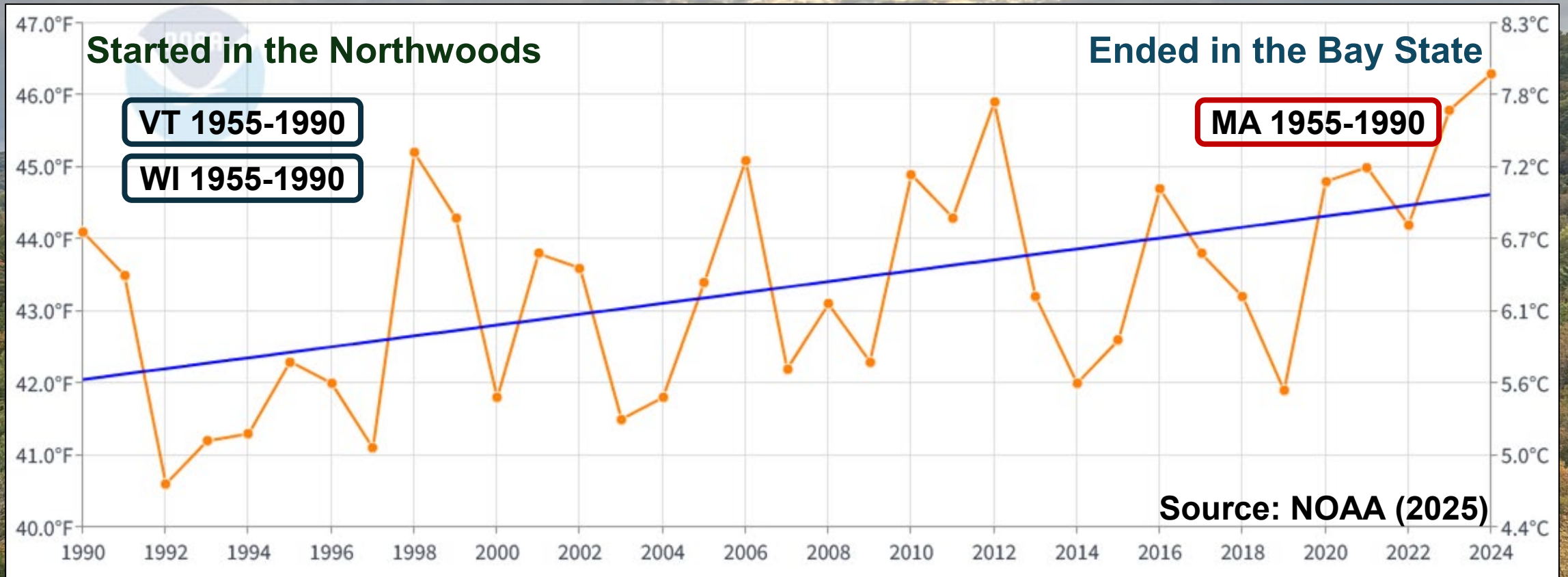
Forest Science

Shifting baselines: forest dynamics



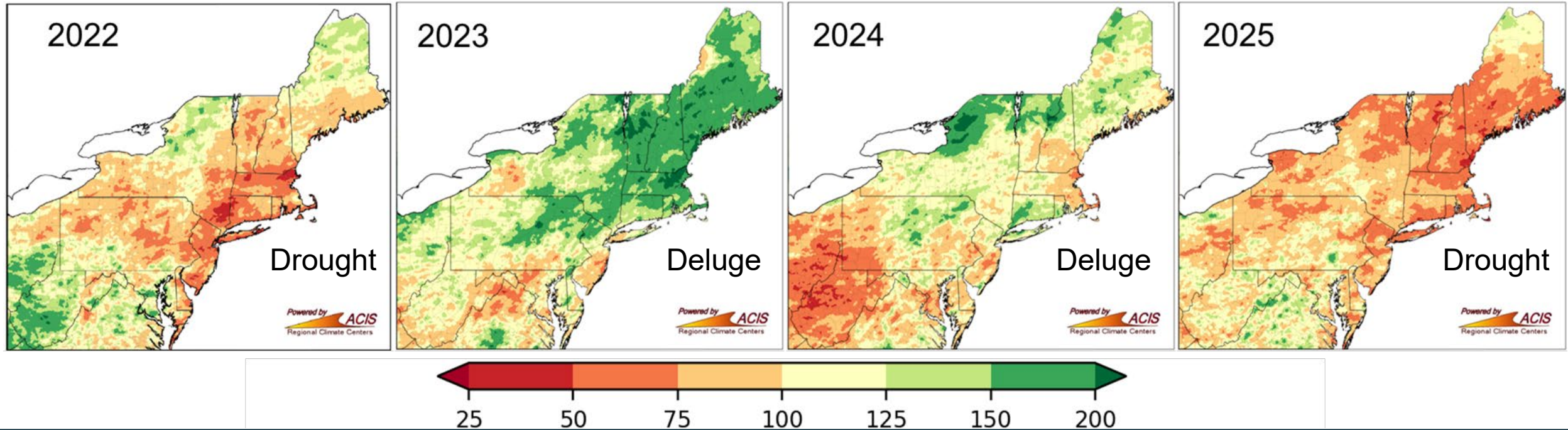
Shifting baselines: forest dynamics

Vermont Average Temperature 1990-2024



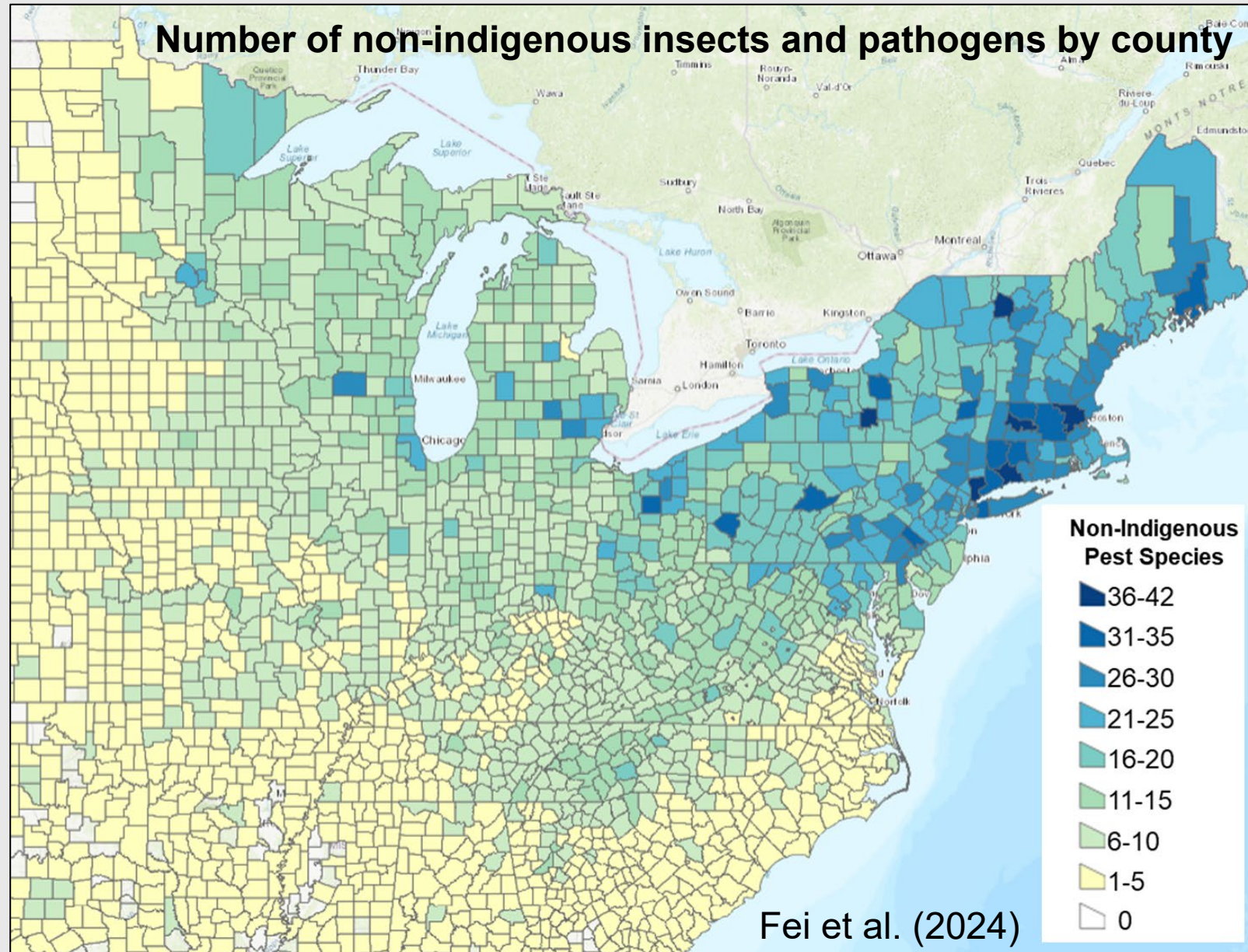
Shifting baselines: a tale of climate extremes

Percent of normal precipitation (June-August)



Shifting baselines: forest dynamics

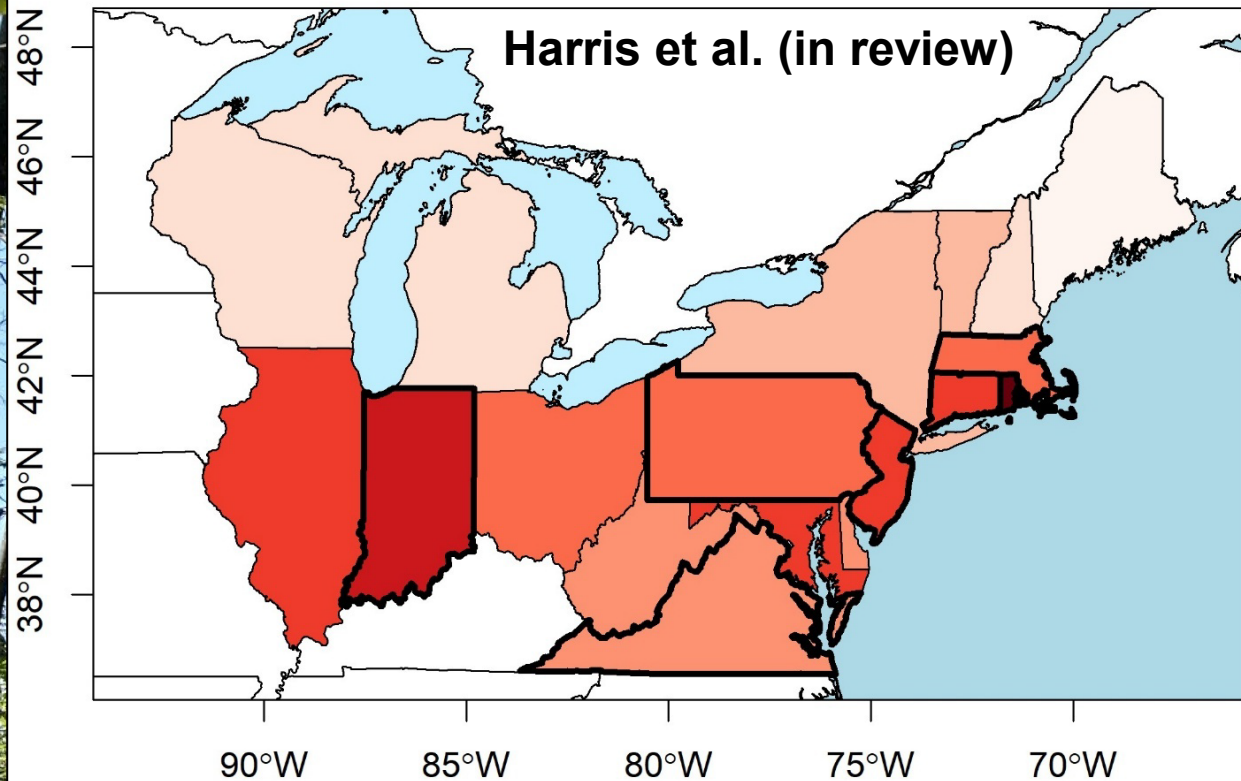
Number of non-indigenous insects and pathogens by county



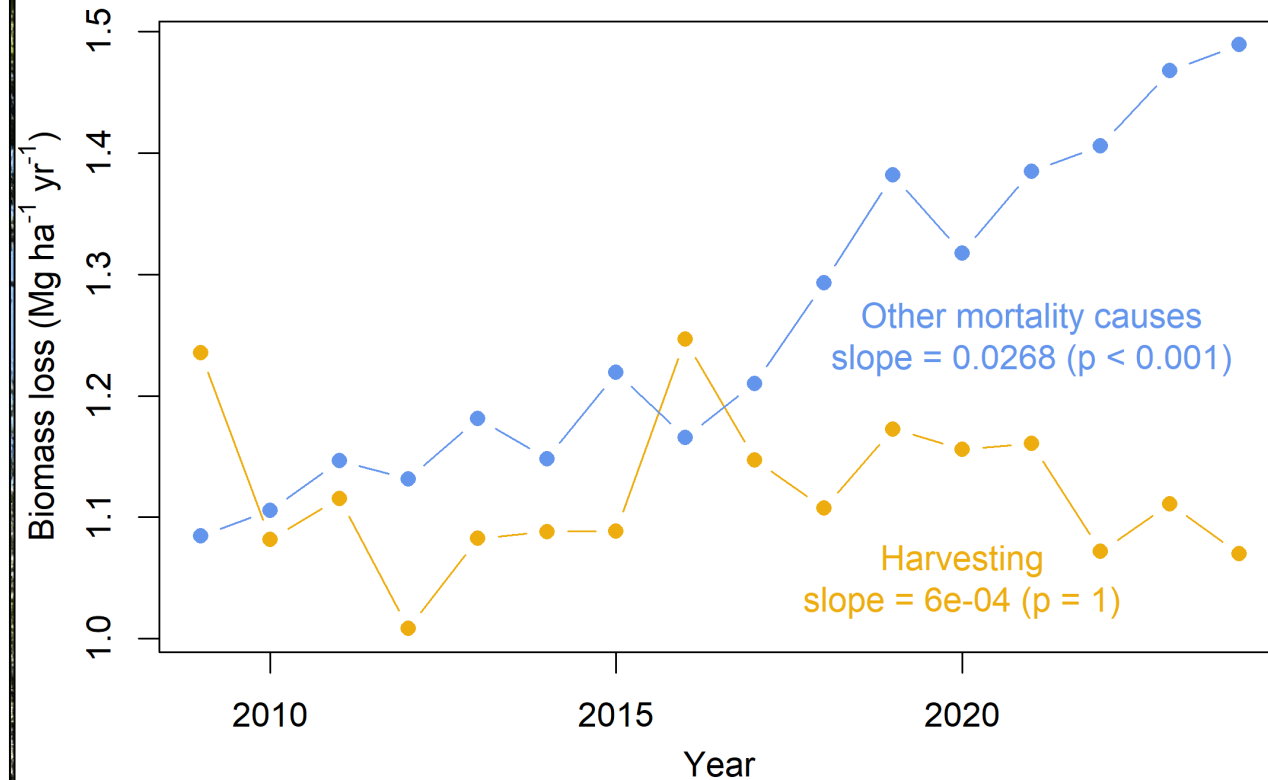
**New England and New York
average 22 non-indigenous
insects and pathogens per county
(range: 13-42 species/county)**

Pathogens and insects: outsized impact

Tree mortality from non-human causes 2018-24



Harvesting no longer most common agent



- Now, 39% more tree biomass lost to non-human vs. harvesting disturbance
- Harvesting disturbance only greater in ME and VA
- Insect mortality alone outweighs harvesting in CT, MA, NJ, RI

Shifting baselines: forest stewardship



Shifting baselines: forest stewardship

Evolution of views, motivations, and approaches to stewardship



Forest production and protected areas



Forest practice acts, BMPs, sustained yield, ecosystem mgmt

Forest Cutting Plan

Landowner Information Sheet for
Chapter 132 - The Forest Cutting
Practices Act, 304 CMR 11.00
Effective Date: 3/15/16

Please Read **BEFORE** signing your Cutting Plan and keep
for your own records.
If you have any questions, call the nearest DCR regional
office (listed on page 2) or
mass.gov/dcr/service-forestry

The Massachusetts Forest Cutting Practices Act:
The Massachusetts Forest Cutting Practices Act (the "Act") requires the improvement,
maintenance, and protection of forest lands for the purpose of conserving water, preventing floods
and soil erosion, improving the conditions for wildlife and recreation, protecting and improving air
and water quality, and providing a continuing and increasing supply of forest products. The Act
requires that a Forest Cutting Plan be filed with the appropriate Department of Conservation and
Recreation (DCR) Regional office before harvesting timber to ensure that these values are
protected. The cutting plan is meant to satisfy the law, reflect **your objectives for your land**, and
help you understand the proposed harvest.

Your Objectives:
The most important information on a Forest Cutting Plan is the landowner's objectives. You will
be asked to choose between Long-term Forest Management or a Short-term Harvest. This choice
will determine which trees will be harvested and which will remain: **this decision will also
determine the future condition of the forest for decades to come.** You will indicate your
objective by checking one of two boxes in the Landowner Signature Section on page 4.
Information on the two choices is provided below.



Managing for ecosystem functions, services, and values



Managing for socio-ecological resilience, adaptability, center IK

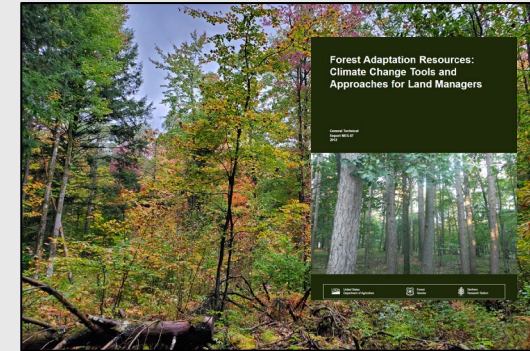
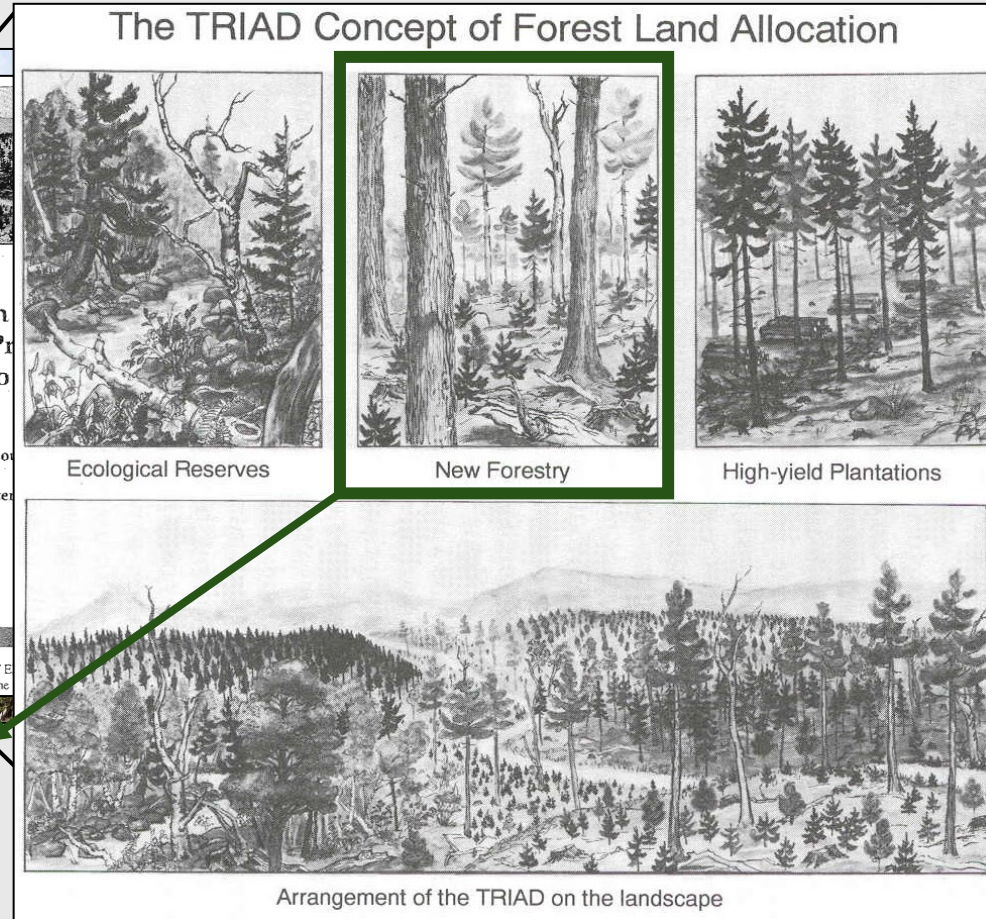
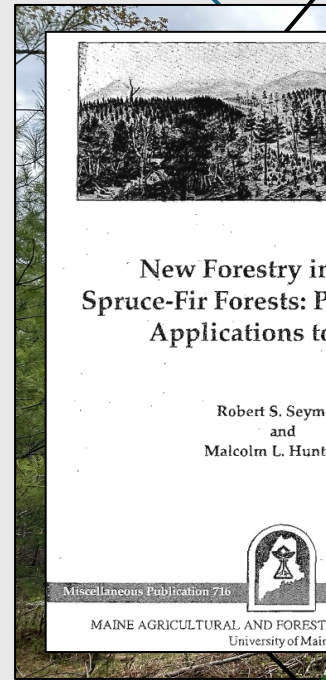
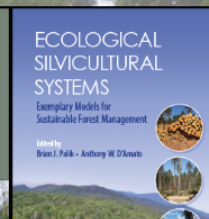
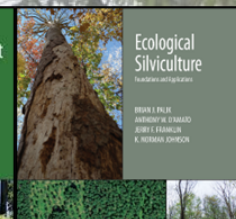
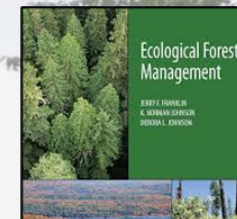
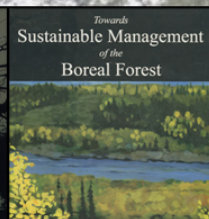
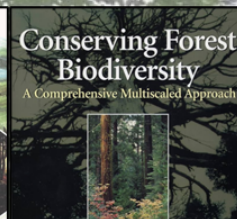
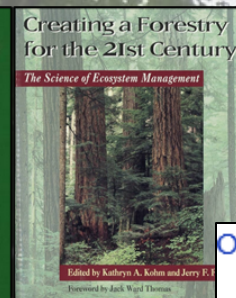
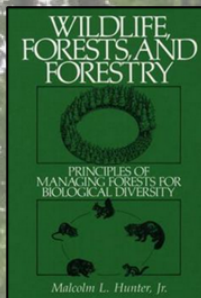


Photo: F. Lake

Shifting baselines: forest stewardship



Stewardship applying understanding of structure, function, and dynamics of natural forests to achieve integrated environmental, economic, and social outcomes ("Ecological Forestry")



OPINION

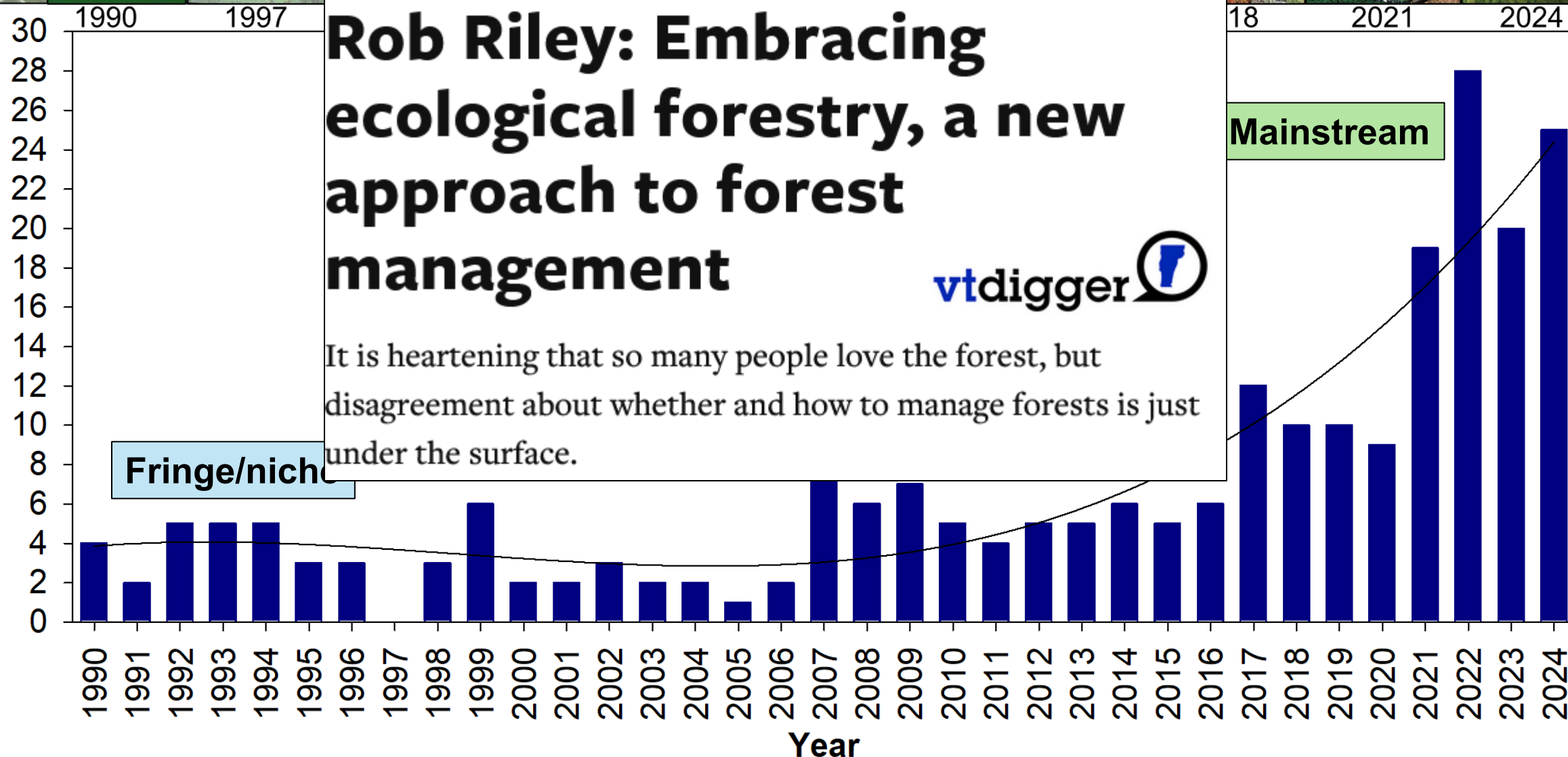
November 11, 2025

Rob Riley: Embracing ecological forestry, a new approach to forest management



It is heartening that so many people love the forest, but disagreement about whether and how to manage forests is just under the surface.

Number of publications



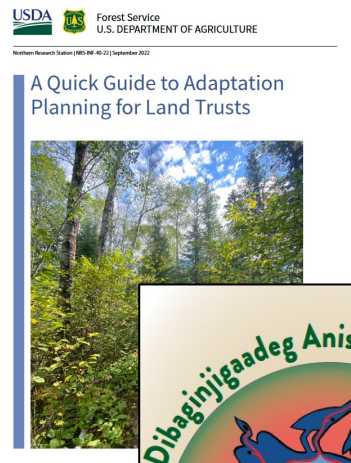
Shifting baselines: forest stewardship

Adaptation has become the norm



Forest Adaptation Resources:
Climate Change Tools and
Approaches for Land Managers

General Technical
Report NRS-57
2012



EMERGING RESEARCH

WILDLIFE
SOCIETY

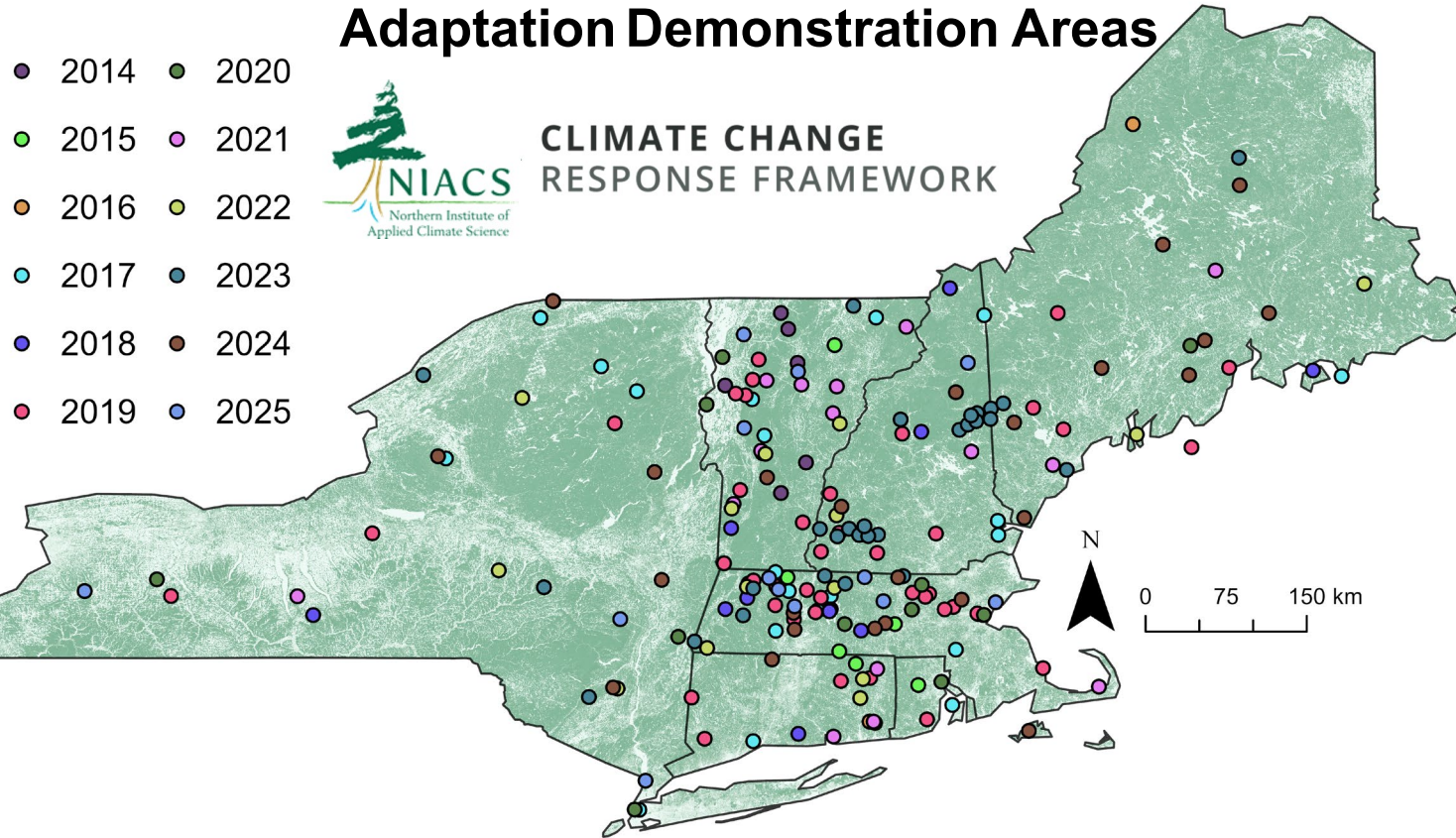
THE
WILDLIFE
SOCIETY

A menu of climate change adaptation actions
for terrestrial wildlife management

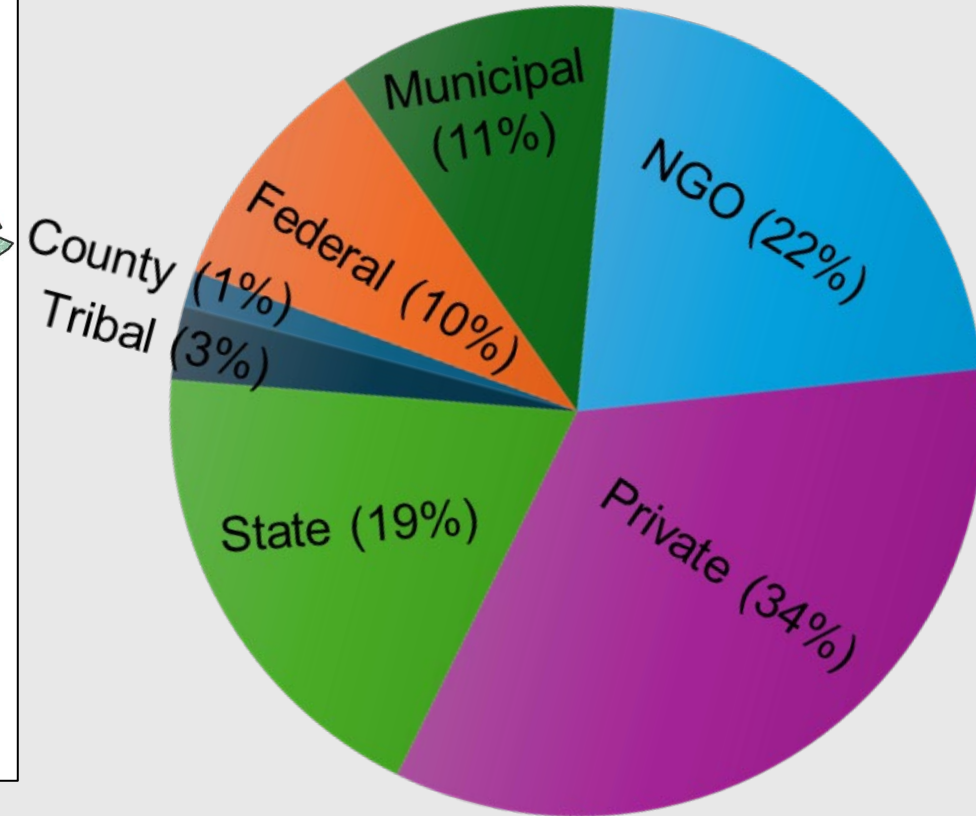
Stephen D. Handler¹ | Olivia E. Ledee² |
Christopher L. Hoving³ | Benjamin Zuckerberg⁴ |
Christopher W. ...

Shifting baselines: forest stewardship

Adaptation has become the norm



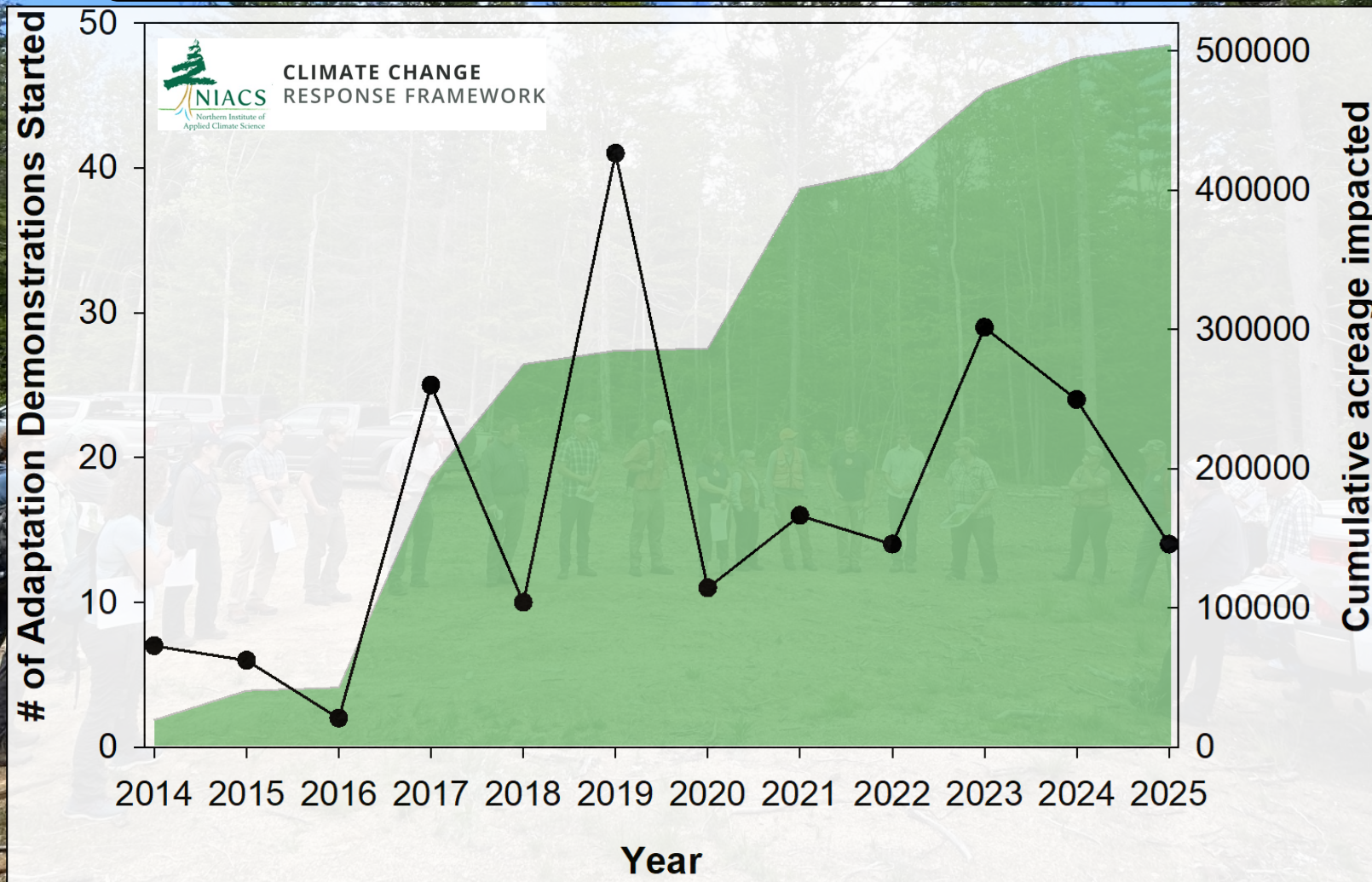
Ownerships Developing Demonstrations



200+ Adaptation Demos since 2014 reflecting diversity of ownerships, objectives, & tactics

Shifting baselines: forest stewardship

Adaptation has become the norm



Shifting baselines: forest stewardship

“Old” practices for new reasons

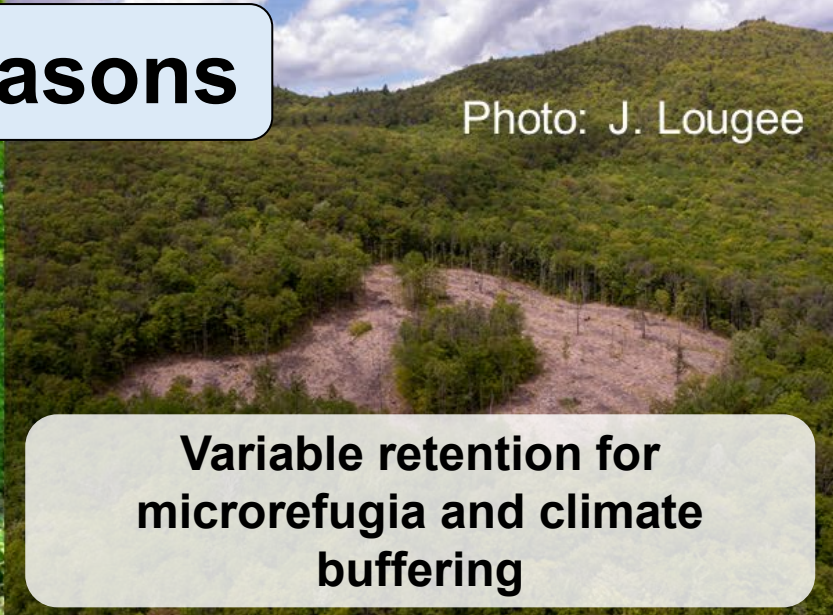
Photo: J. Lougee



Mixed-species conditions to spread/reduce risk, favor diversity of functional responses



Retention of resistant genotypes, preservation of threatened canopy species



Variable retention for microrefugia and climate buffering



Multi-aged conditions to spread/reduce risk, provide options for recovery



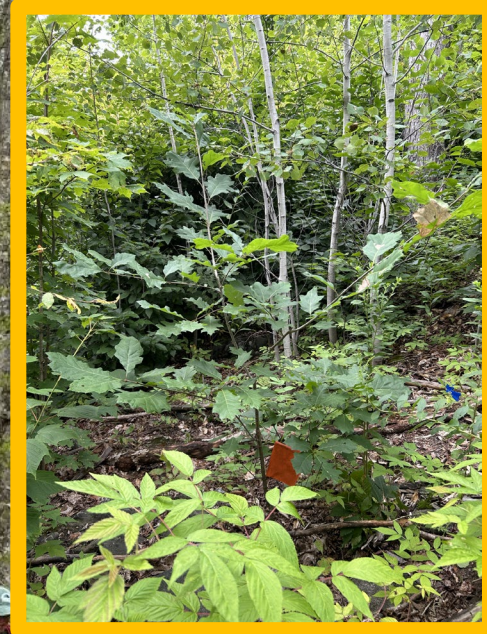
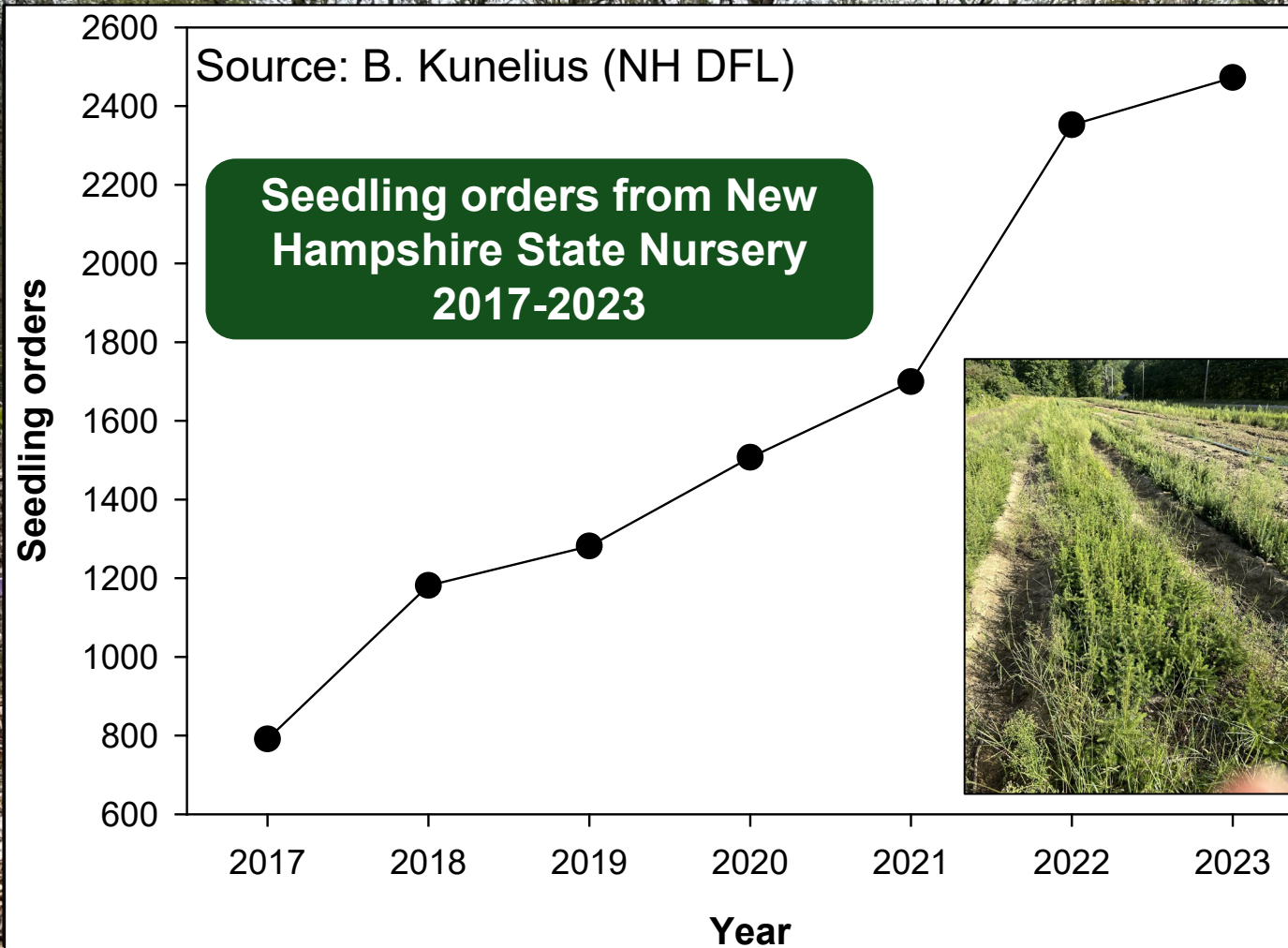
Deadwood recruitment for safe sites, localized buffering of temp and precipitation extremes



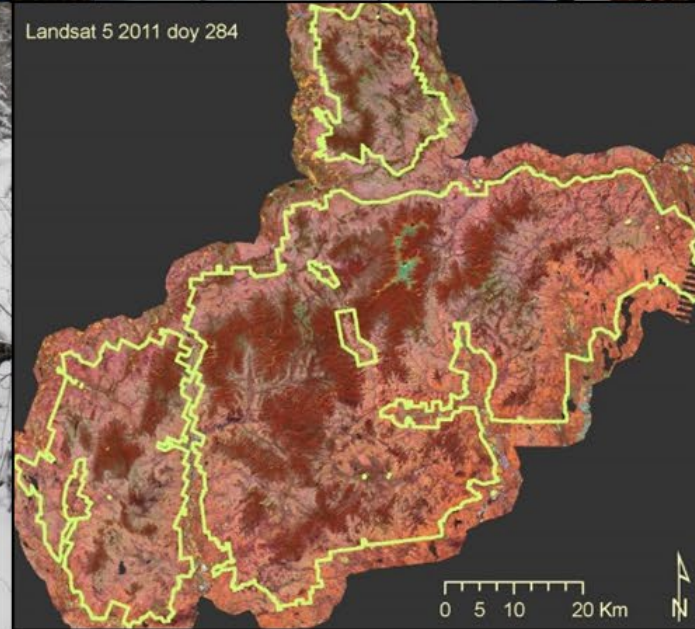
Enhancing spatial complexity to provide range of microclimates and adaptive pathways

Shifting baselines: forest stewardship

We're also changing what we do

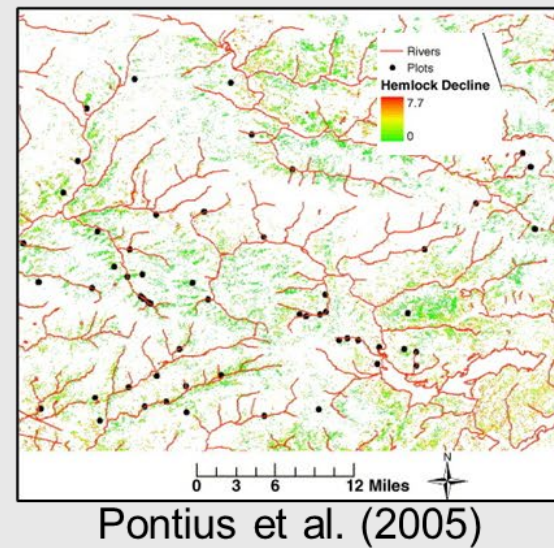
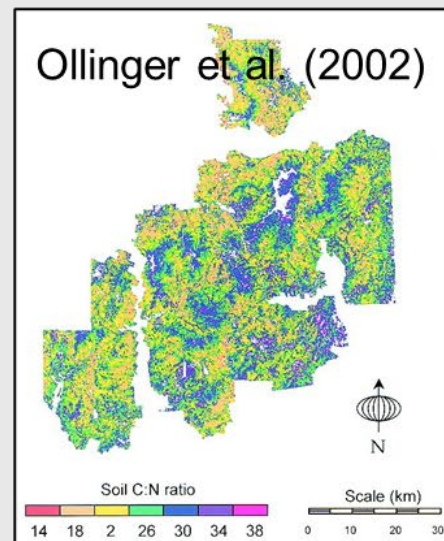
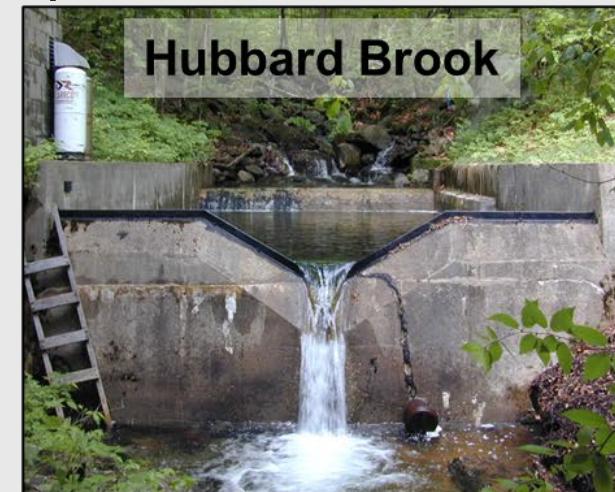
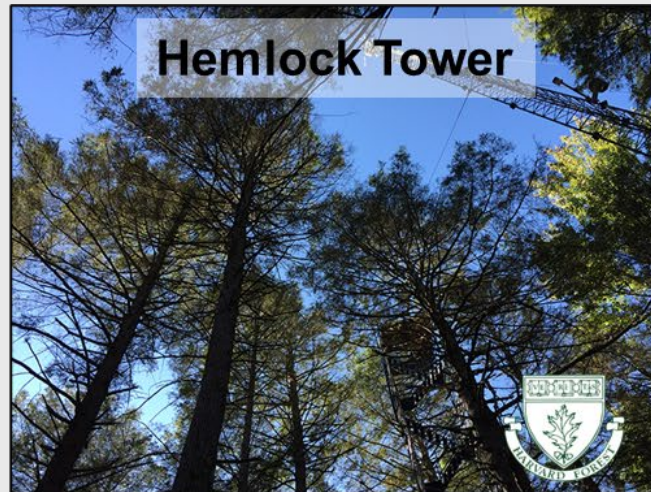
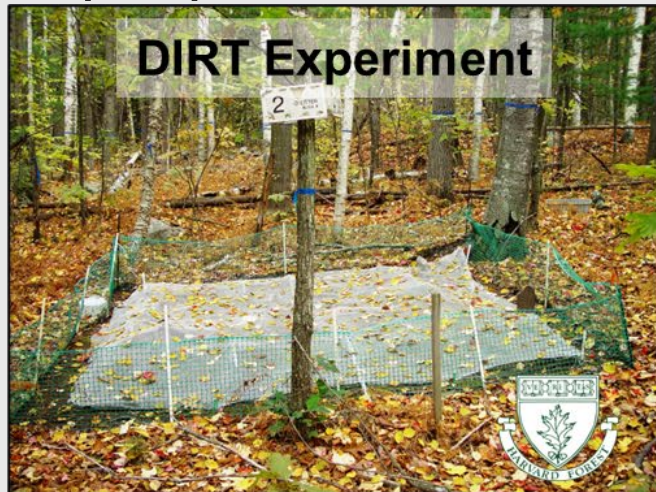


Shifting baselines: forest science



Understanding Ecosystems and Our Impacts

- **1990-early 2000s:** Significant federal investment in the infrastructure, experiments, people, and tools to better understand how forests work and our impacts on them



Understanding Ecosystems and Our Impacts

REVIEWS REVIEWS REVIEWS

Loss of foundation species: consequences for the structure and dynamics of forested ecosystems

Aaron M Ellison^{1*}, Michael S Bank¹, Barton D Clinton², Elizabeth A Colburn¹, Katherine Elliott², Chelcy R Ford², David R Foster¹, Brian D Kloeppel¹, Jennifer D Knoepp², Gary M Lovett⁴, Jacqueline Mohan¹, David A Orwig¹, Nicholas L Rodenhouse², William V Sobczak⁶, Kristina A Stinson¹, Jeffrey K Stone⁷, Christopher M Swan⁸, Jill Thompson⁹, Betsy Von Holle¹, and Jackson R Webster¹⁰

The Auk 118(3):589–609, 2001

THIRTY-YEAR BIRD POPULATION TRENDS IN AN UNFRAGMENTED TEMPERATE DECIDUOUS FOREST: IMPORTANCE OF HABITAT CHANGE

RICHARD T. HOLMES^{1,3} AND THOMAS W. SHERRY²

¹Department of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755, USA; and

²Department of Ecology and Evolutionary Biology, Tulane University, New Orleans, Louisiana 70118, USA

Forest Ecosystem Responses to Exotic Pests and Pathogens in Eastern North America

GARY M. LOVETT, CHARLES D. CANHAM, MARY A. ARTHUR, KATHLEEN C. WEATHERS, AND ROSS D. FITZHUGH

Ecological Monographs, 90(4), 2020, e01423
© 2020 by the Ecological Society of America

Carbon budget of the Harvard Forest Long-Term Ecological Research site: pattern, process, and response to global change

ADRIEN C. FINZI¹, MARC-ANDRÉ GIASSON¹, AUDREY A. BARKER PLOTKIN¹, JOHN D. ABER³, EMERY R. BOOSE², ERIC A. DAVIDSON⁴, MICHAEL C. DIETZE⁵, AARON M. ELLISON¹, SERITA D. FREY¹, EVAN GOLDMAN⁶, TREVOR F. KEENAN^{7,8}, JERRY M. MELILLO⁹, J. WILLIAM MUNGER¹⁰, KNUTE J. NADELHOFFER¹⁰, SCOTT V. OLLINGER¹⁰, SCOTT V. OLLINGER¹⁰, DAVID A. ORWIG², NEIL PEDERSON², ANDREW D. RICHARDSON^{12,13}, KATHLEEN SAVAGE¹⁴, JIANWU TANG⁹, JONATHAN R. THOMPSON¹⁰, CHRISTOPHER A. WILLIAMS¹⁵, STEVEN C. WOFSEY¹⁵, ZAIXING ZHOU¹¹, AND DAVID R. FOSTER²

Nitrogen Saturation in Temperate Forest Ecosystems

Hypotheses revisited

John Aber, William McDowell, Knute Nadelhoffer, Alison Magill, Glenn Berntson, Mark Kamacka, Steven McNulty, William Currie, Lindsey Rustad, and Ivan Fernandez

Consequences of climate change for biogeochemical cycling in forests of northeastern North America¹

John L. Campbell, Lindsey E. Rustad, Elizabeth W. Boyer, Sheila F. Christopher, Charles T. Driscoll, Ivan J. Fernandez, Peter M. Groffman, Daniel Houle, Jana Kiebusch, Alison H. Magill, Myron J. Mitchell, and Scott V. Ollinger

Articles

Ecosystem Consequences of Soil Warming

Microbes, Vegetation, Fauna and Soil Biogeochemistry

Edited by Jacqueline E. Mohan

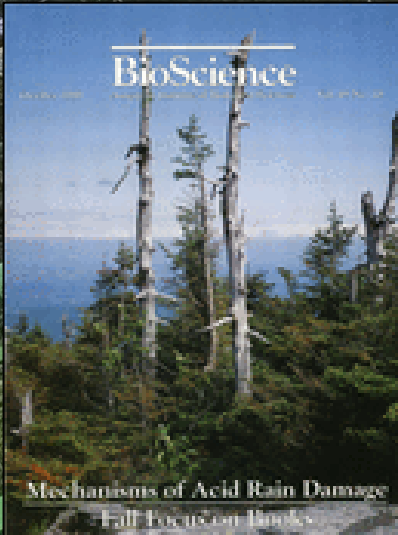
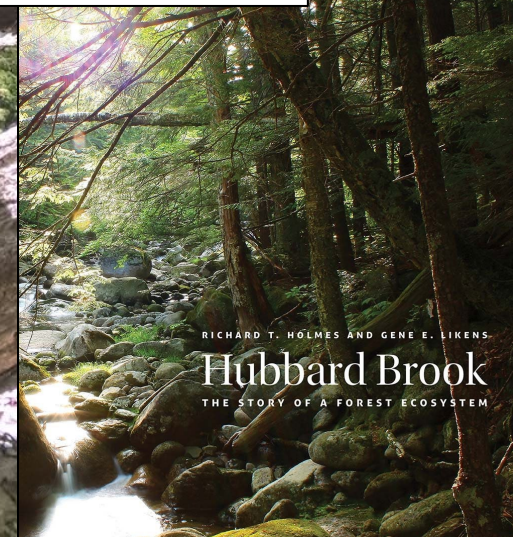


Forests in Time

The Environmental Consequences of 1,000 Years of Change in New England

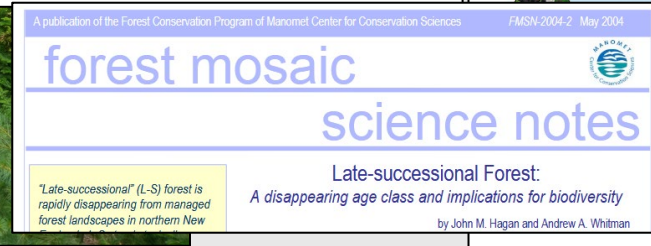
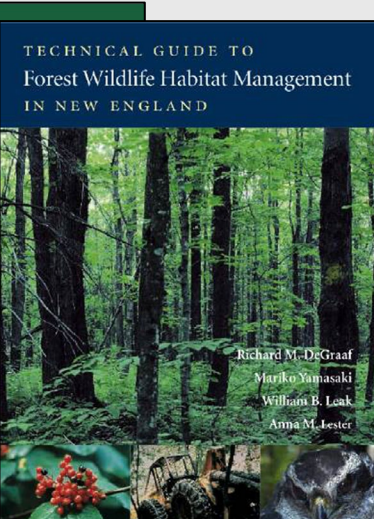
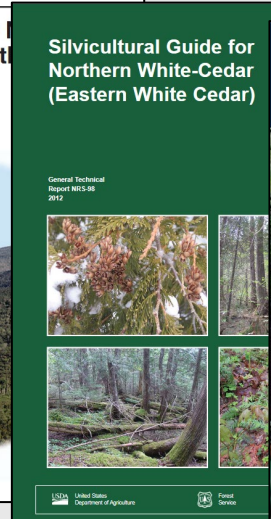
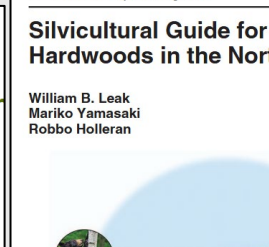
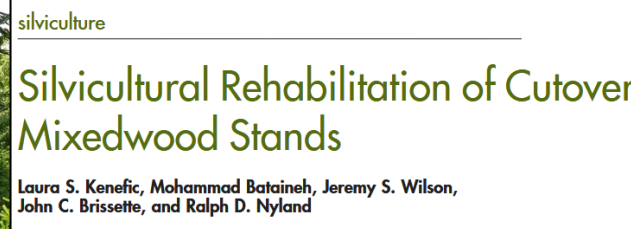
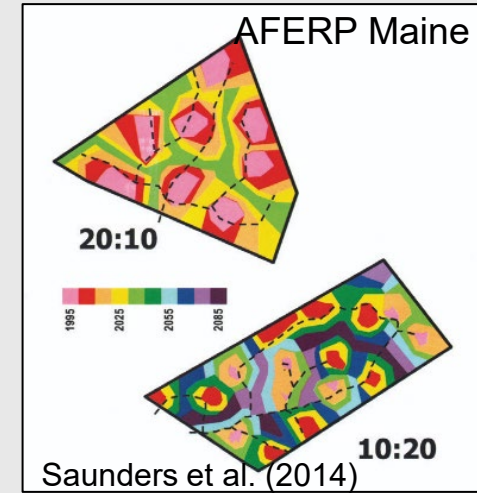
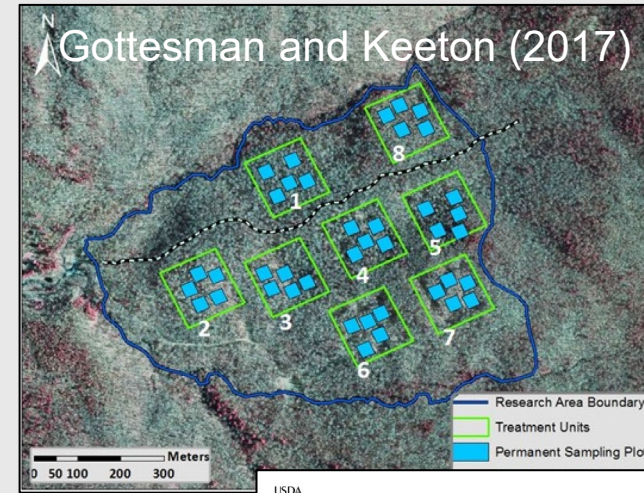
Edited by David R. Foster and John D. Aber

RICHARD T. HOLMES AND GENE E. LIKENS
Hubbard Brook
THE STORY OF A FOREST ECOSYSTEM

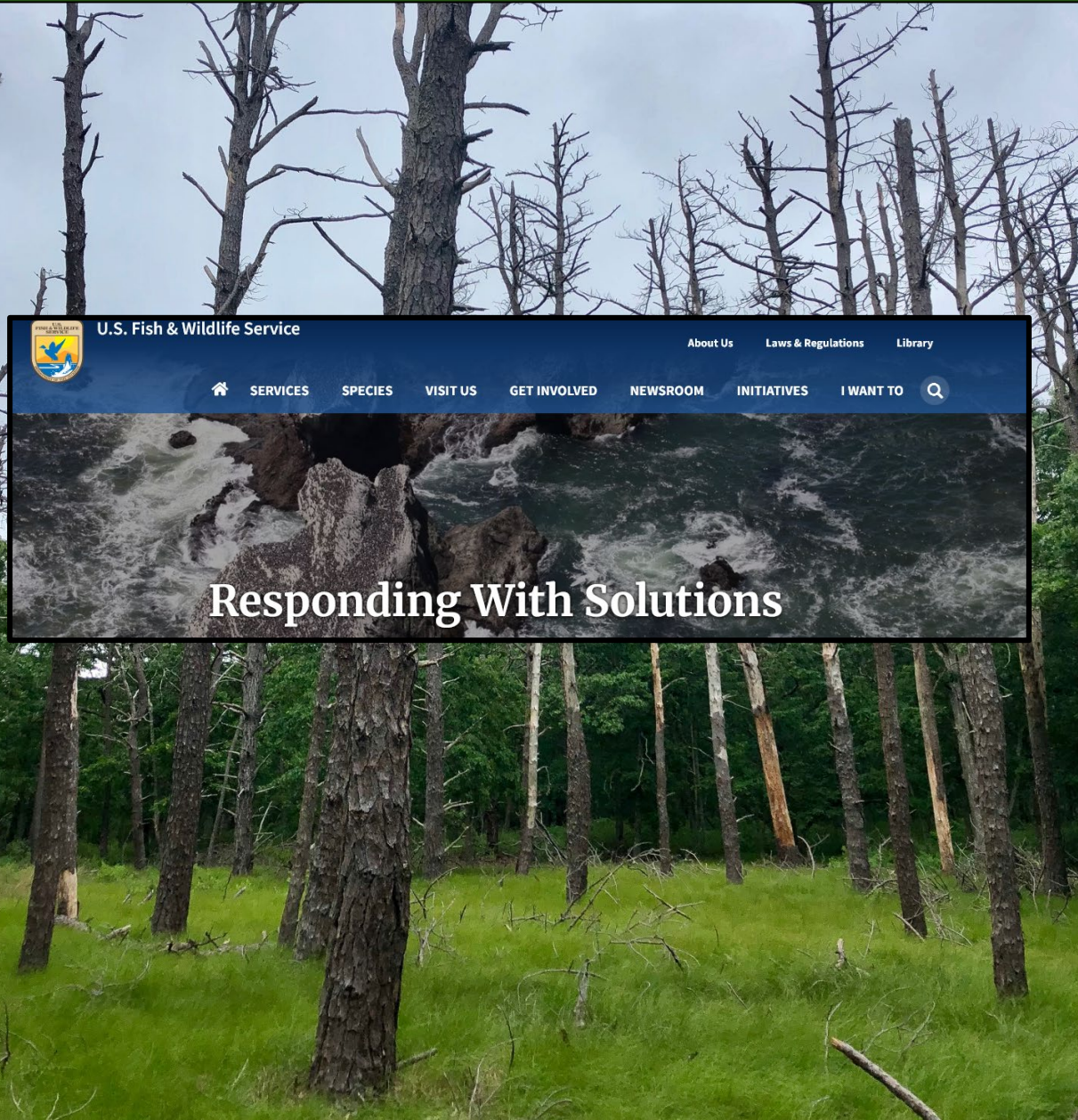


Science Guiding Stewardship

- **1990-early 2000s:** Continued federal investment in long-term applied research necessary for guiding stewardship to meet evolving objectives (USDA, NSRC)



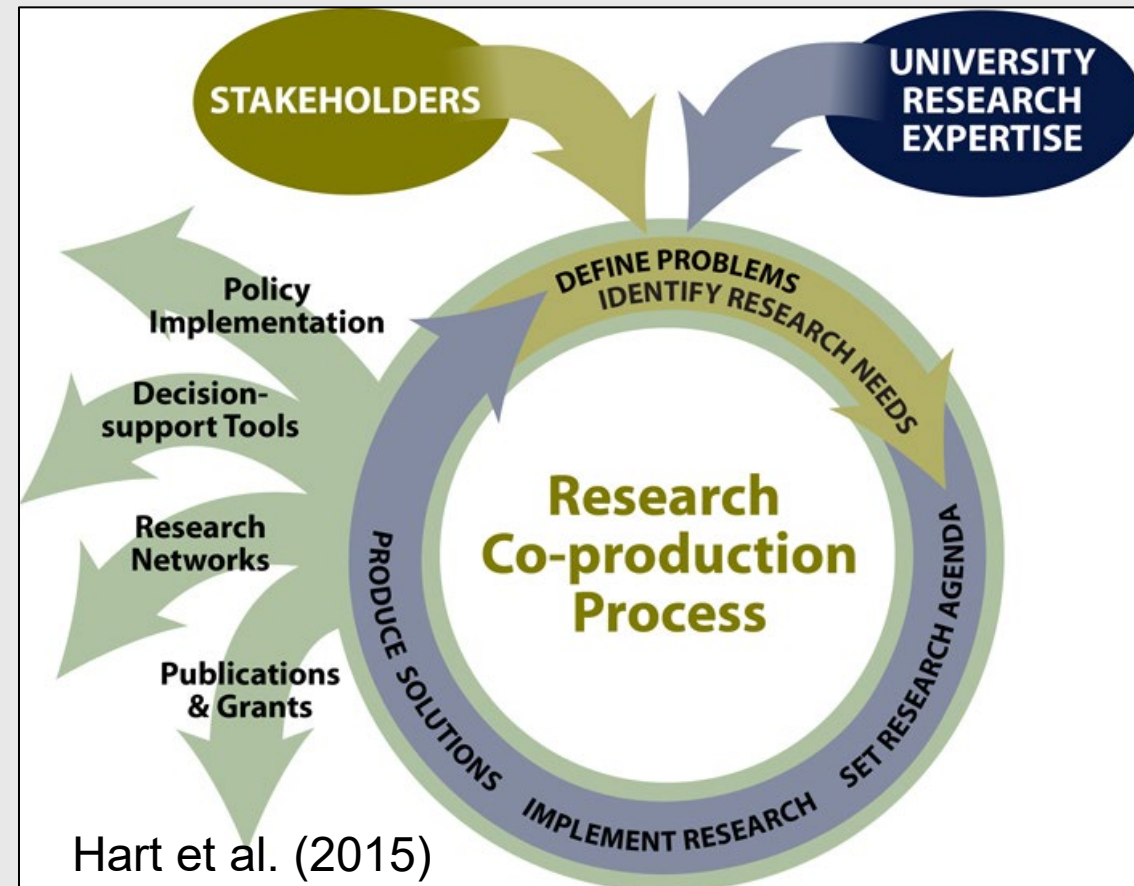
Pivot Towards Actionable and Inclusive



Pivot Towards Actionable and Inclusive

Moving beyond ***Broader Impacts*** statements....

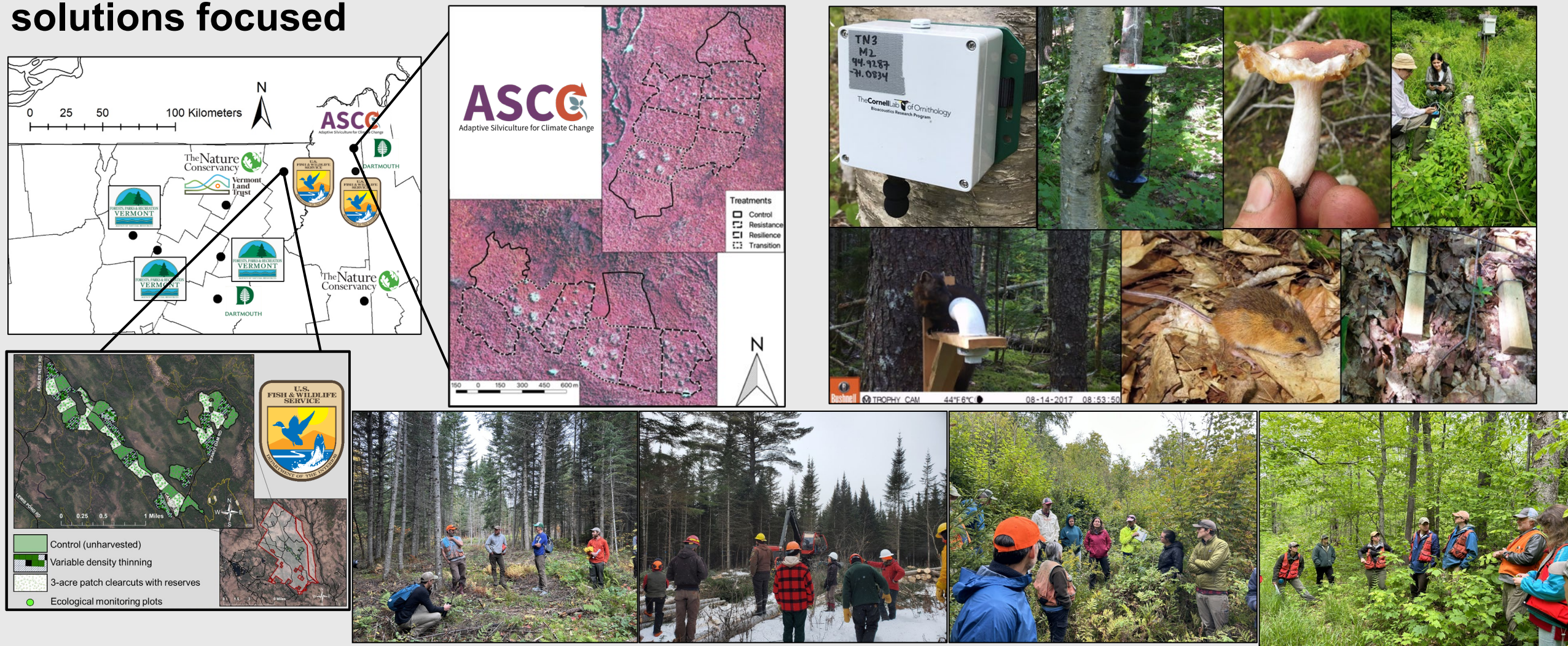
Normalizing science co-production: research collaboration between practitioners, community members, scientists, and other partners to generate actionable science



Pivot Towards Actionable and Inclusive

Moving beyond *Broader Impacts* statements....

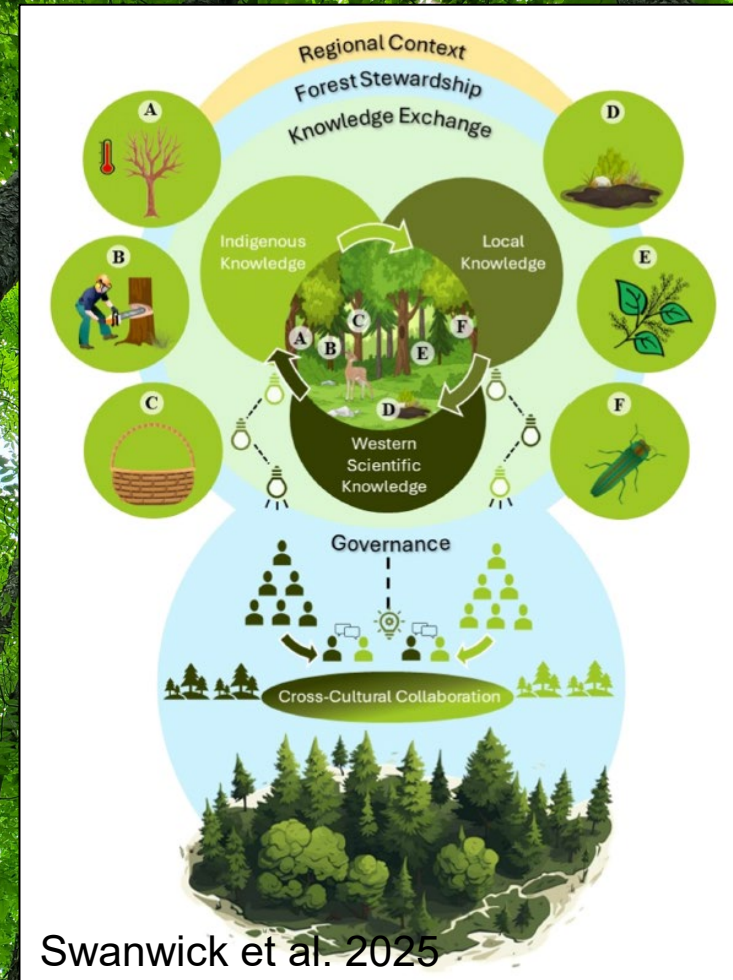
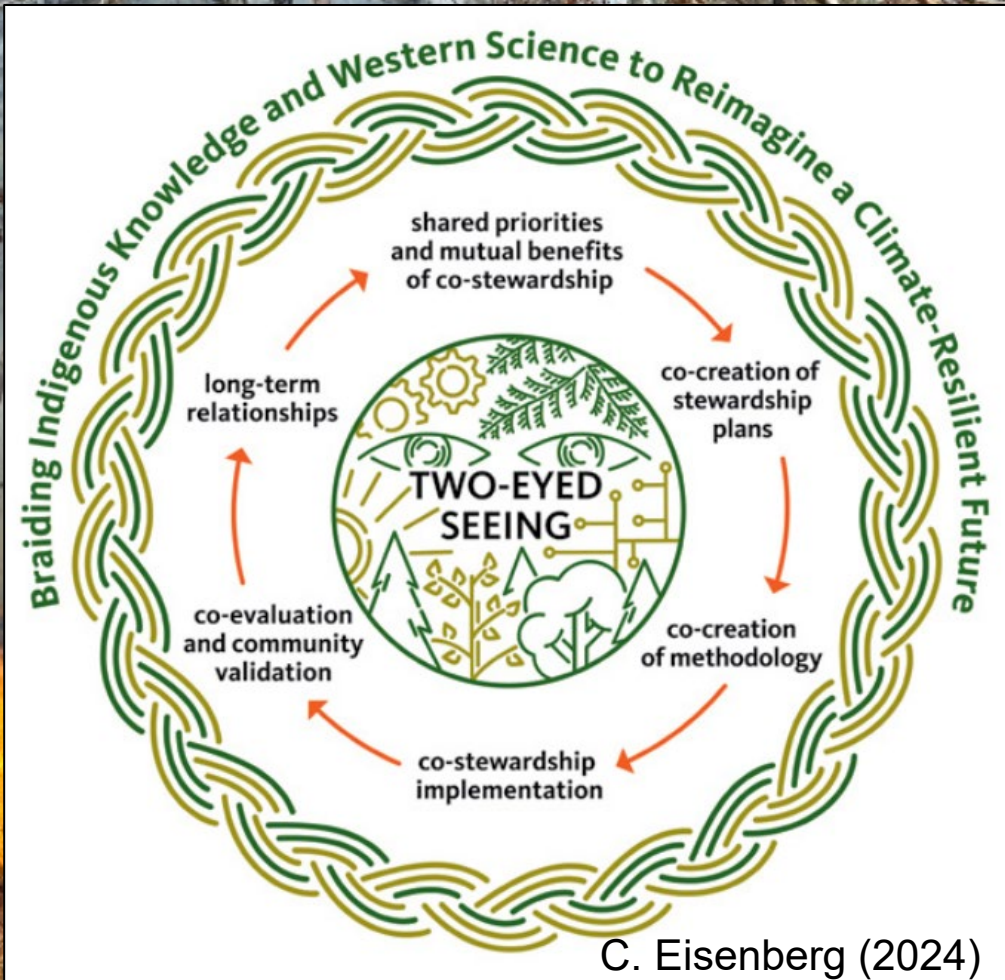
Co-produced forest research is inherently place-based, interdisciplinary, and solutions focused



Pivot Towards Actionable and Inclusive

Moving beyond ***Broader Impacts*** statements....

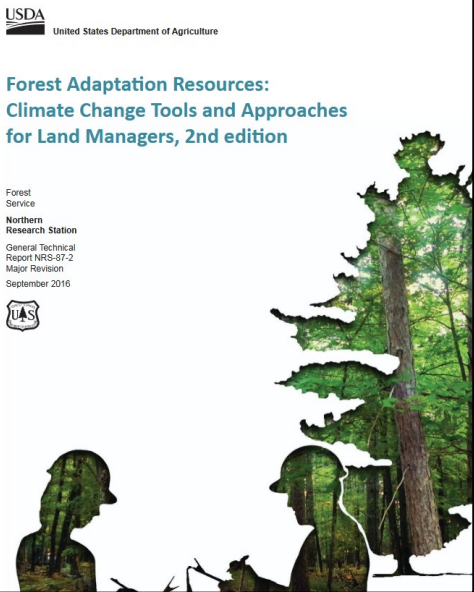
Honoring place-based stewardship and connections of people to forests by braiding Western Science with Indigenous Knowledge



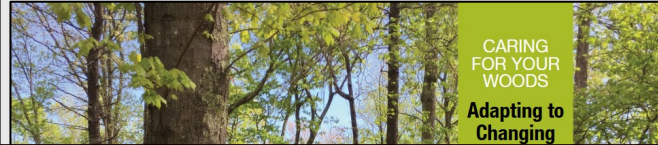
Supporting Forests into the Future

We're ecological, adaptive, collaborative, action-oriented, and cognizant of our place in the forest, but should we actively engage in stewardship to address changing conditions?

Supporting Species and Resilience?



Creating and Maintaining Resilient Forests in Vermont: Adapting to Climate Change



PERSPECTIVE

The importance of natural forest stewardship in adaptation planning in the United States

Edward K. Faison¹ | Susan A. Masino² | William R. Moomaw³

May 2015



A Landowner Guide from the Massachusetts Department of Conservation and Recreation



frontiers | Frontiers in Forests and Global Change

TYPE Policy and Practice Reviews
PUBLISHED 09 January 2023
DOI 10.3389/ffgc.2022.1073677

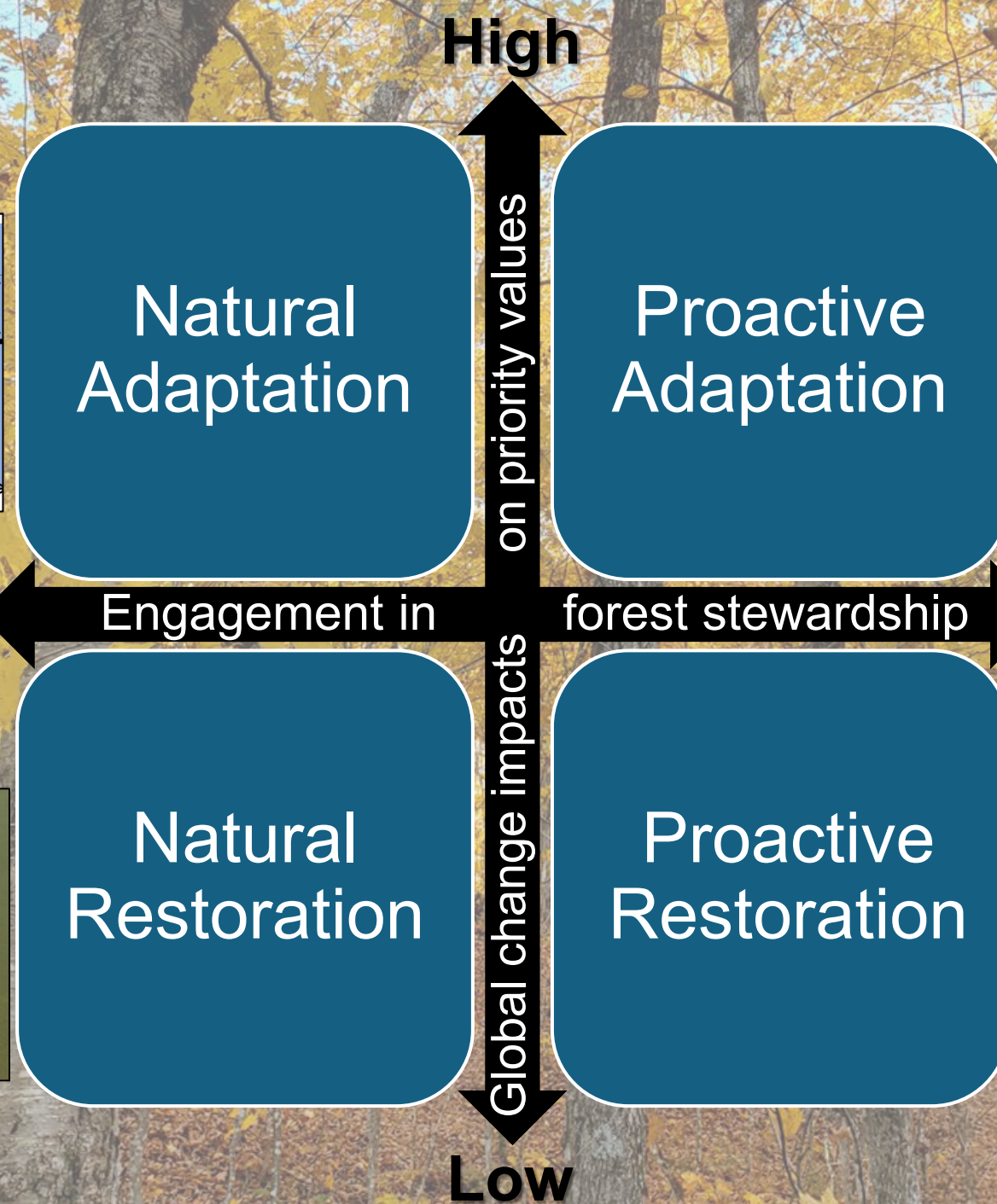
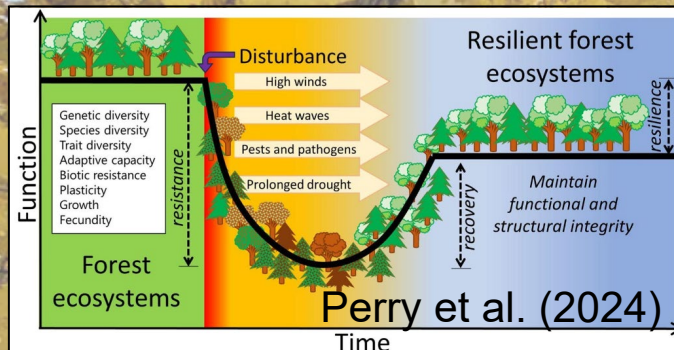
Forest-clearing to create early-successional habitats: Questionable benefits, significant costs

Michael J. Kellett^{1*}, Joan E. Maloof², Susan A. Masino³, Lee E. Frelich⁴, Edward K. Faison⁵, Sunshine L. Brosi⁶ and David R. Foster⁷



Supporting Values into the Future





Forests are changing due to climate change

Climate change is impacting our forests, but you can take action now to prepare forests for change and reduce risks.

 **CLIMATE CHANGE RESPONSE FRAMEWORK** [> Learn More](#)

Rewilding the Northeast

At Northeast Wilderness Trust, we do conservation differently. Our forever-wild approach ensures every acre we protect will be a future old growth forest—bolstering biodiversity and storing carbon naturally. Join us on our mission to conserve forever-wild landscapes for nature and people.

 [Learn about Rewilding](#)

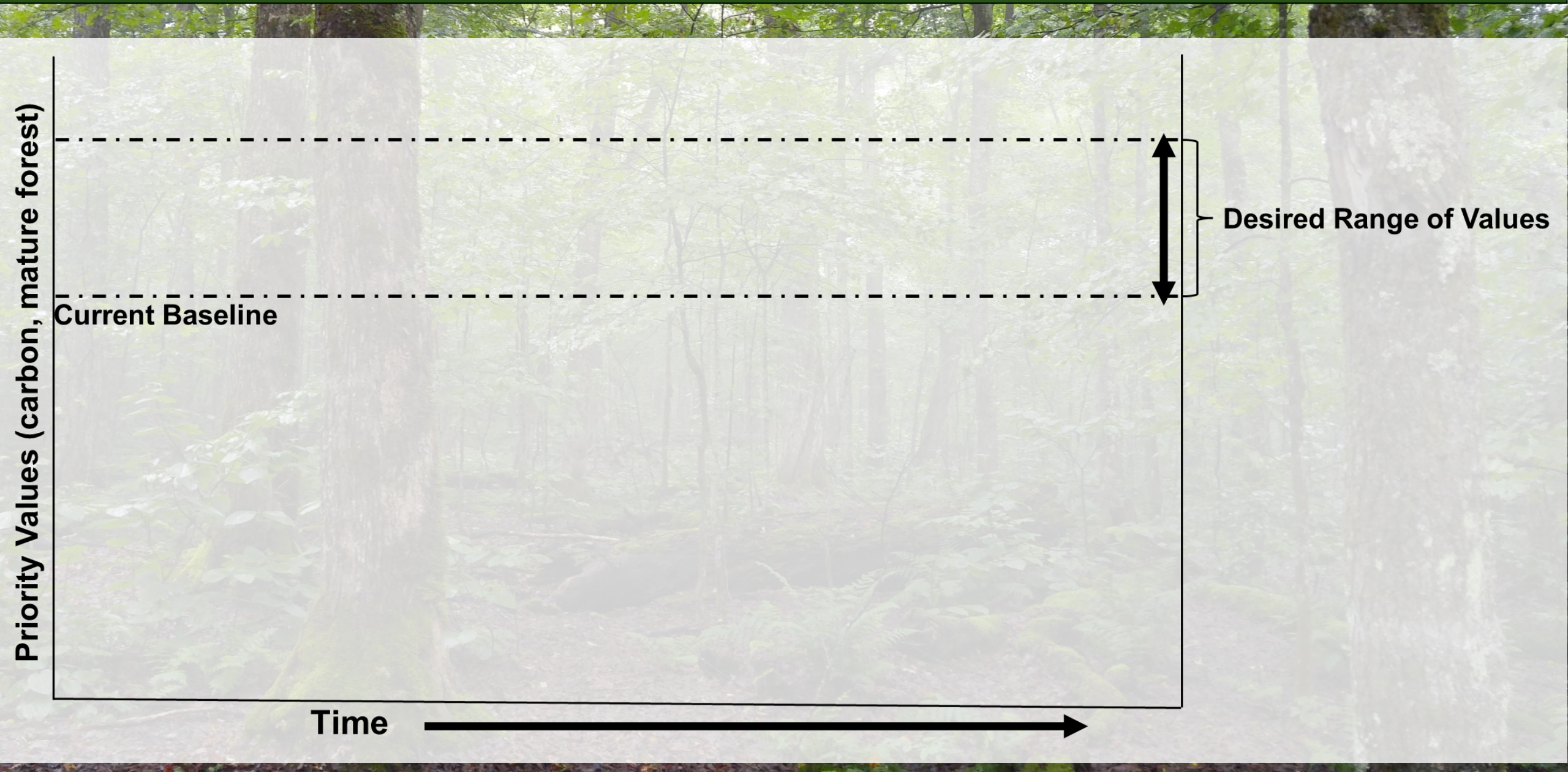
[Home](#) / [Stewarding Your Forest](#) / [Forest Health](#)

Restoring Old-growth Characteristics

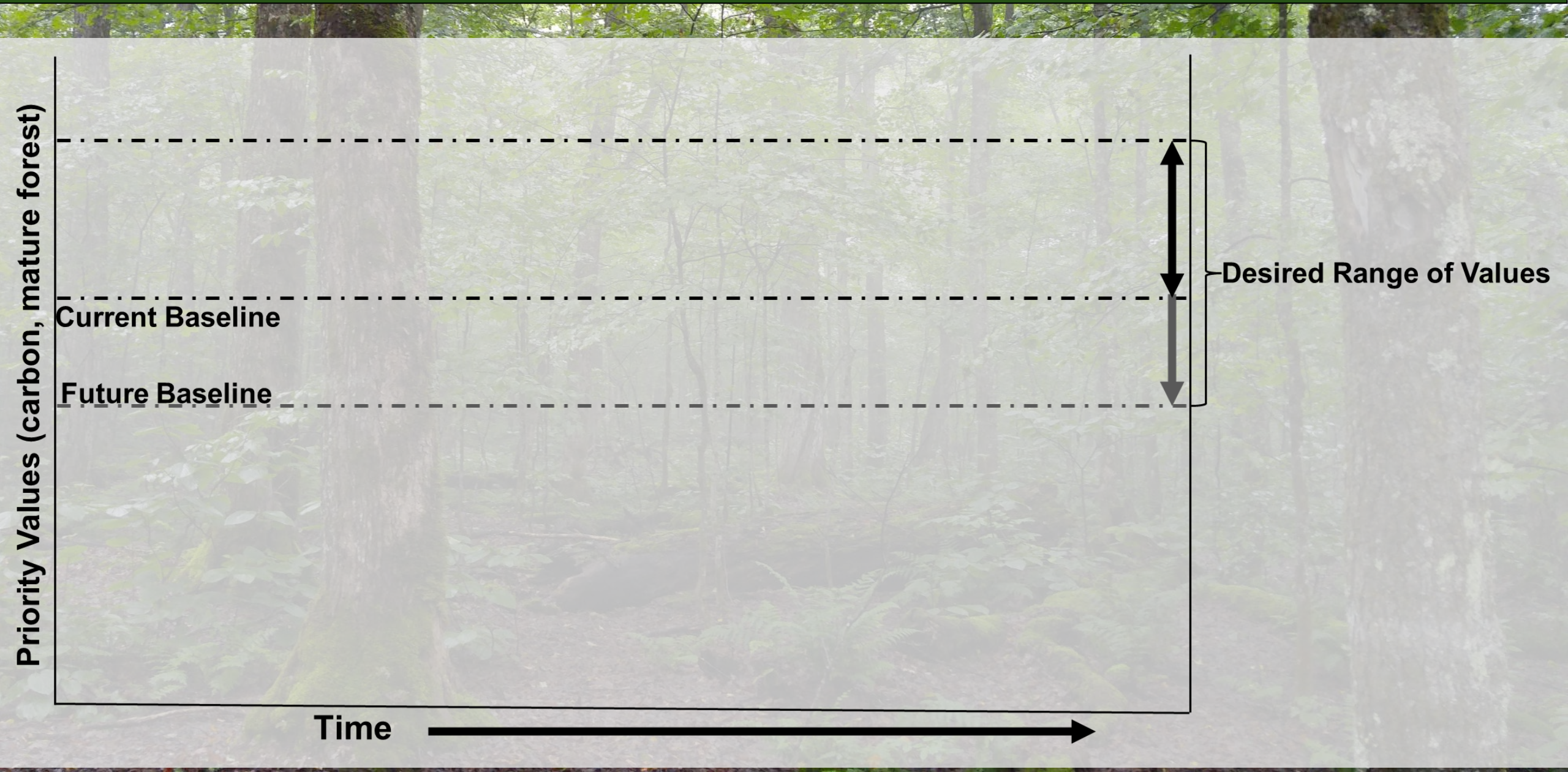
MassWoods
Learn your options. Find local contacts.



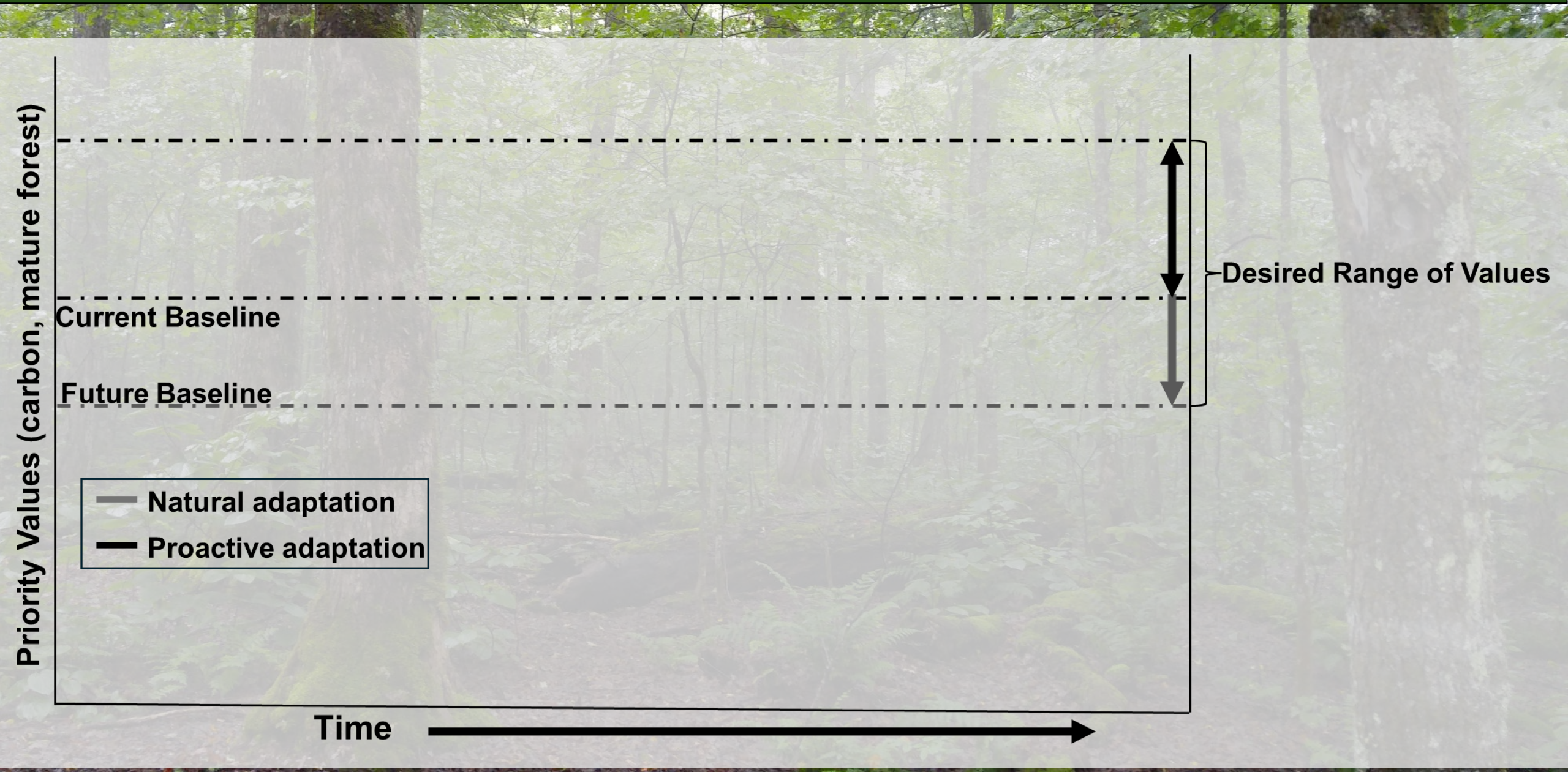
Sustaining Values into the Future



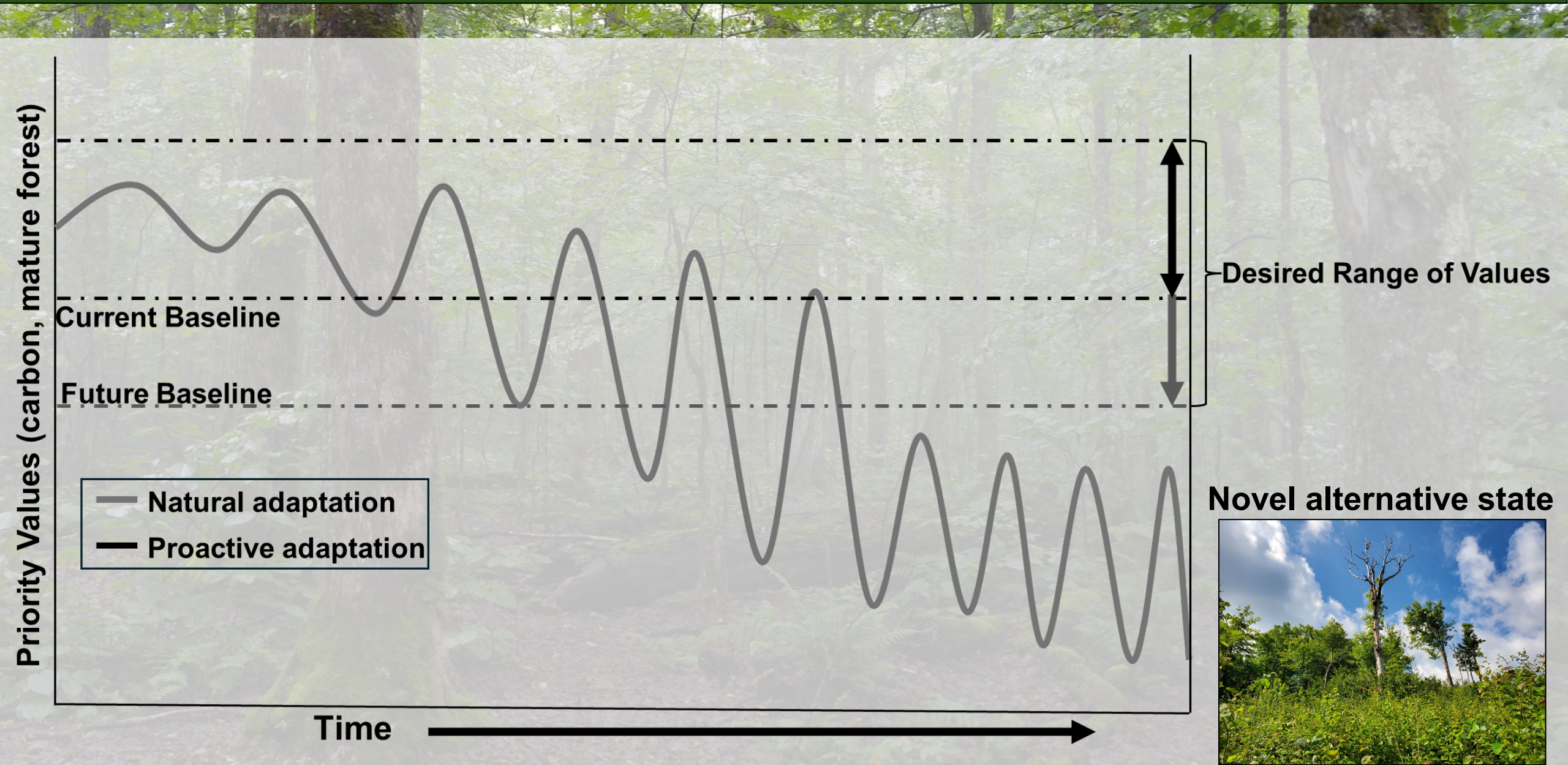
Sustaining Values into the Future



Sustaining Values into the Future



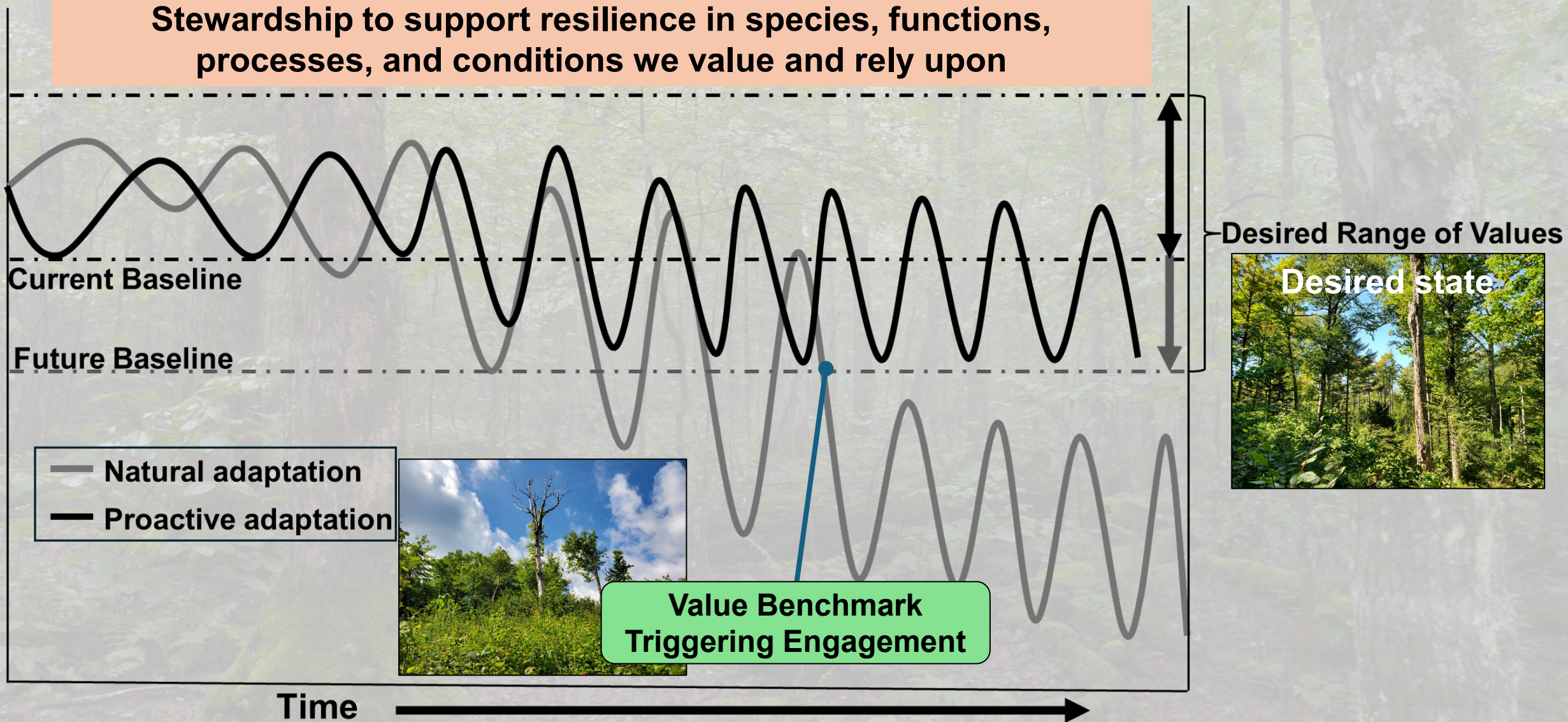
Sustaining Values into the Future



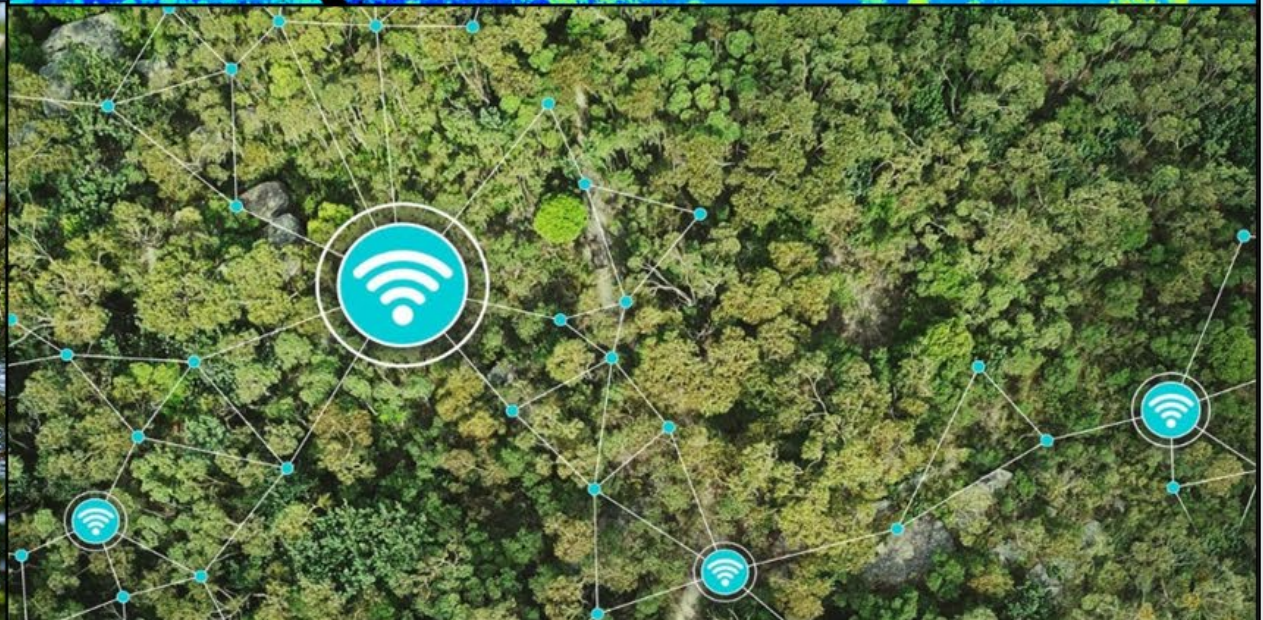
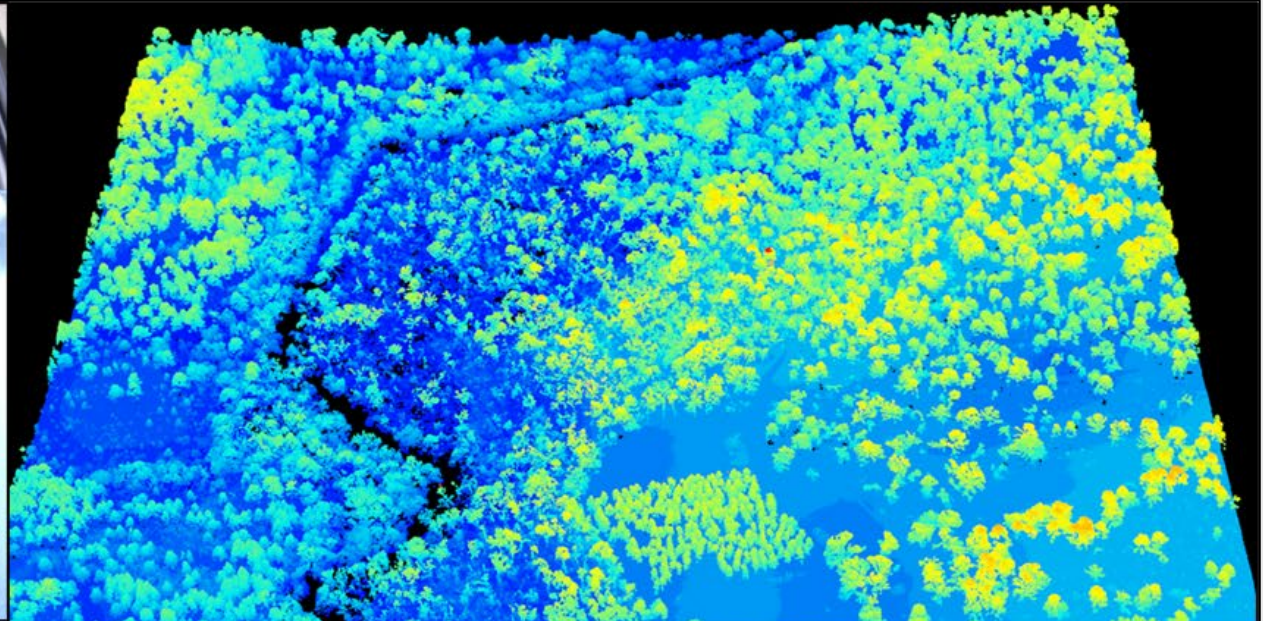
Sustaining Values into the Future

Stewardship to support resilience in species, functions, processes, and conditions we value and rely upon

Priority Values (carbon, mature forest)



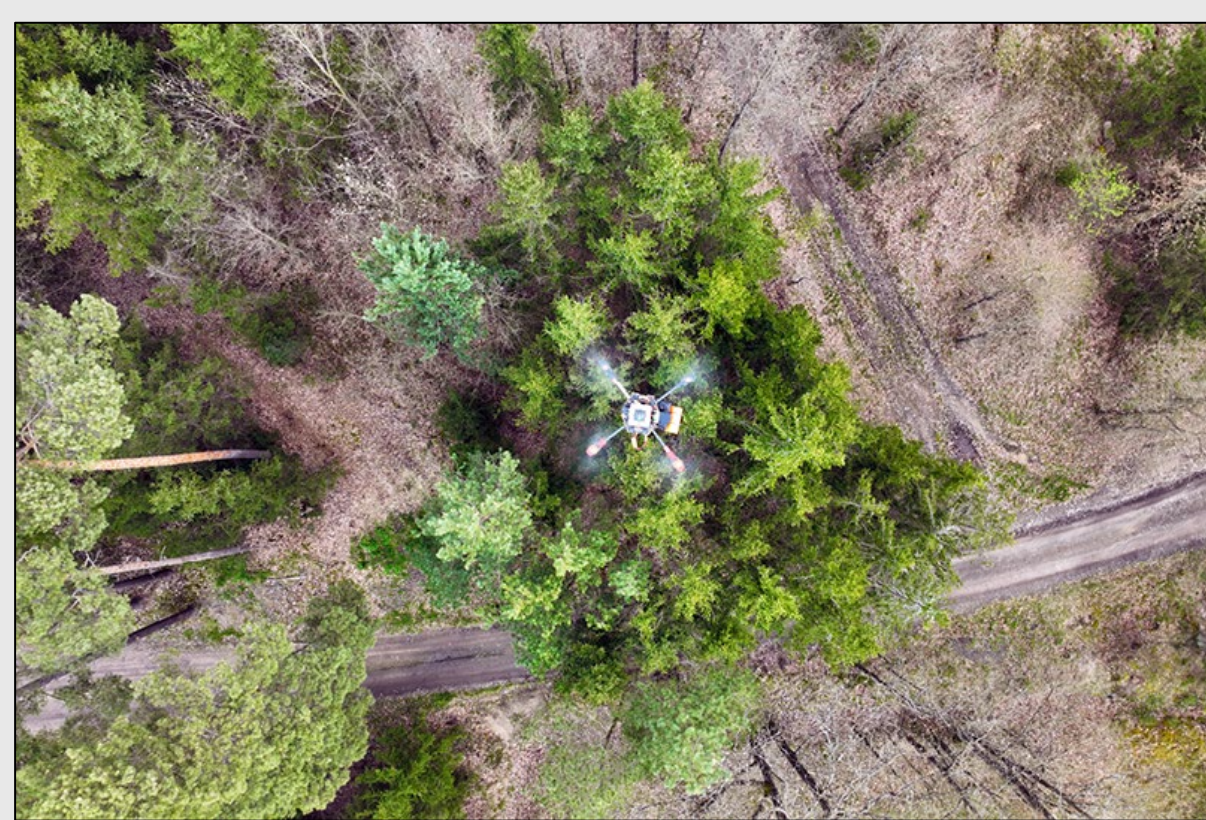
Science Guiding Future Stewardship



Science Guiding Future Stewardship

Emerging **digital forestry** tools (UAVs, LiDAR, AI) provide powerful opportunities for monitoring and adapting to change

- Continuous learning and fine-tuning through rapid feedback, with opportunities for rapid, scalable solutions through co-production



Whip-poor-will abundance & LiDAR derived canopy height

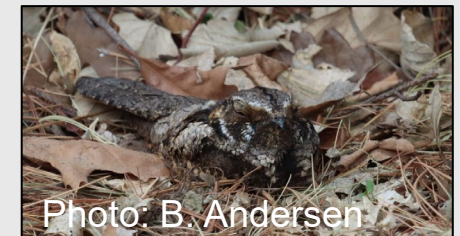
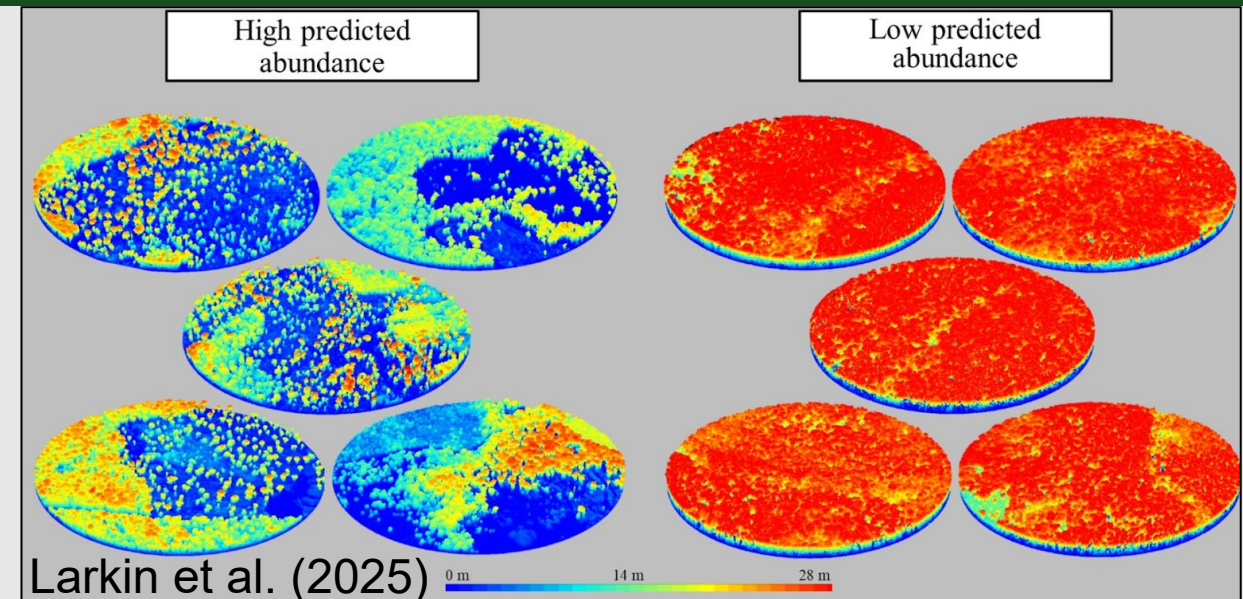


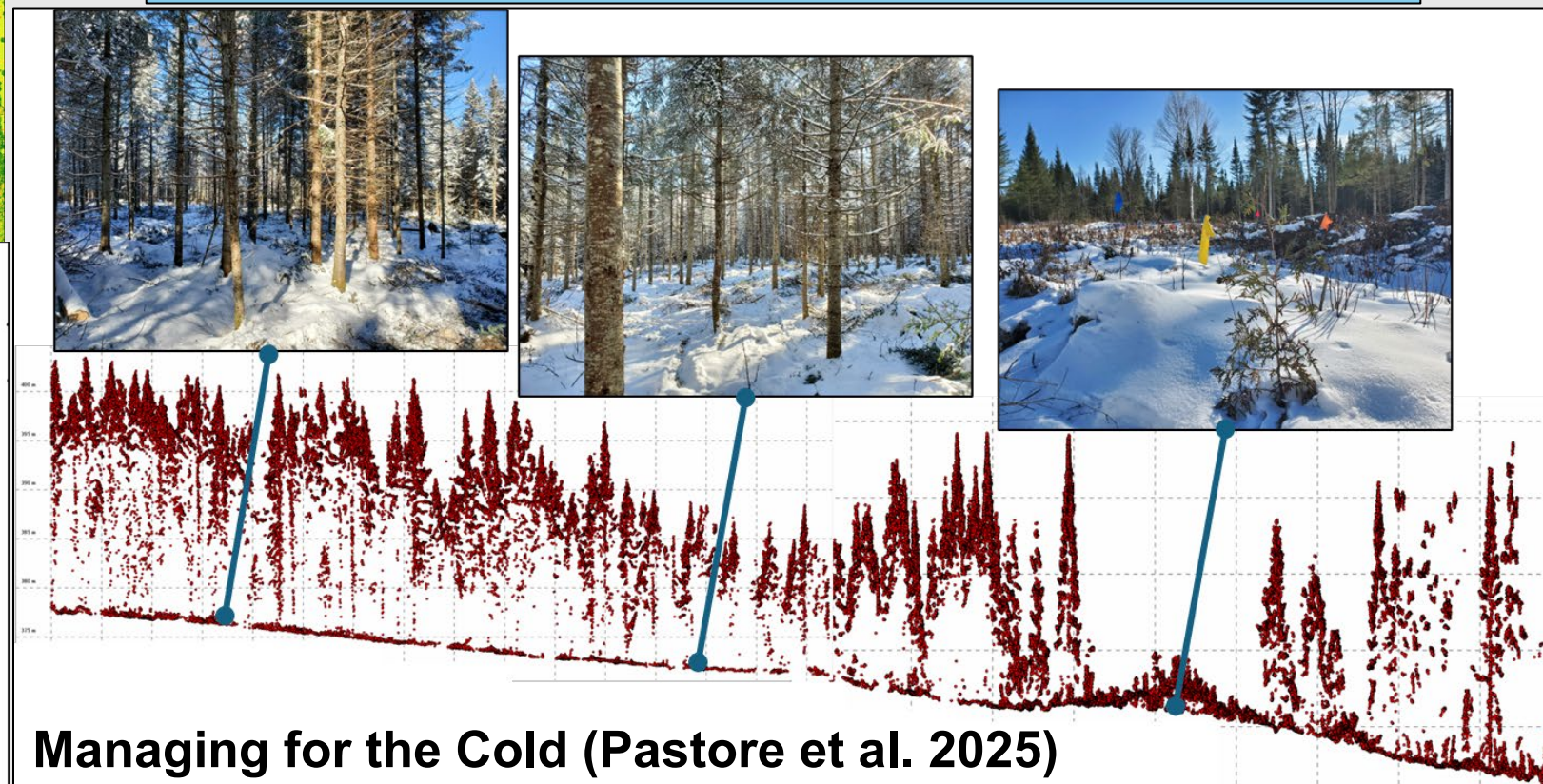
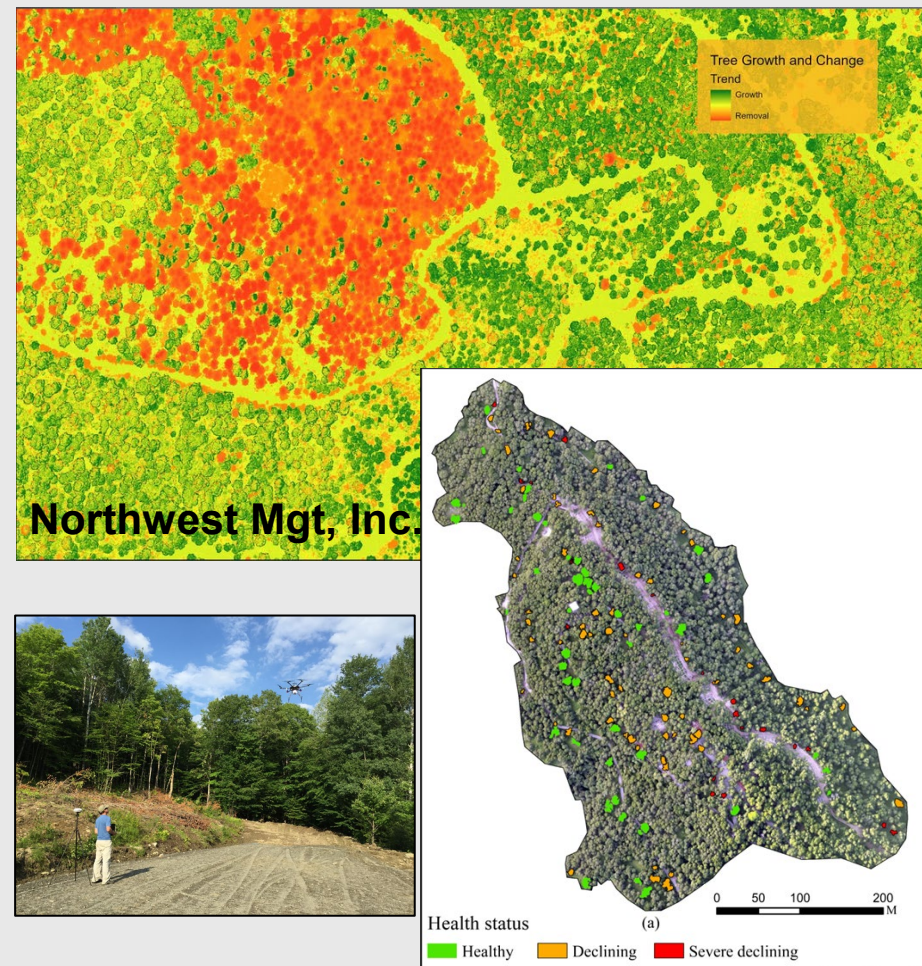
Photo: B. Andersen

Science Guiding Future Stewardship

Data acquisition and processing to keep pace with actual changes in environment

- Support adaptation and test effectiveness of outcomes across multiple dimensions

Adaptive management for sustaining snow depth



Science Guiding Future Stewardship

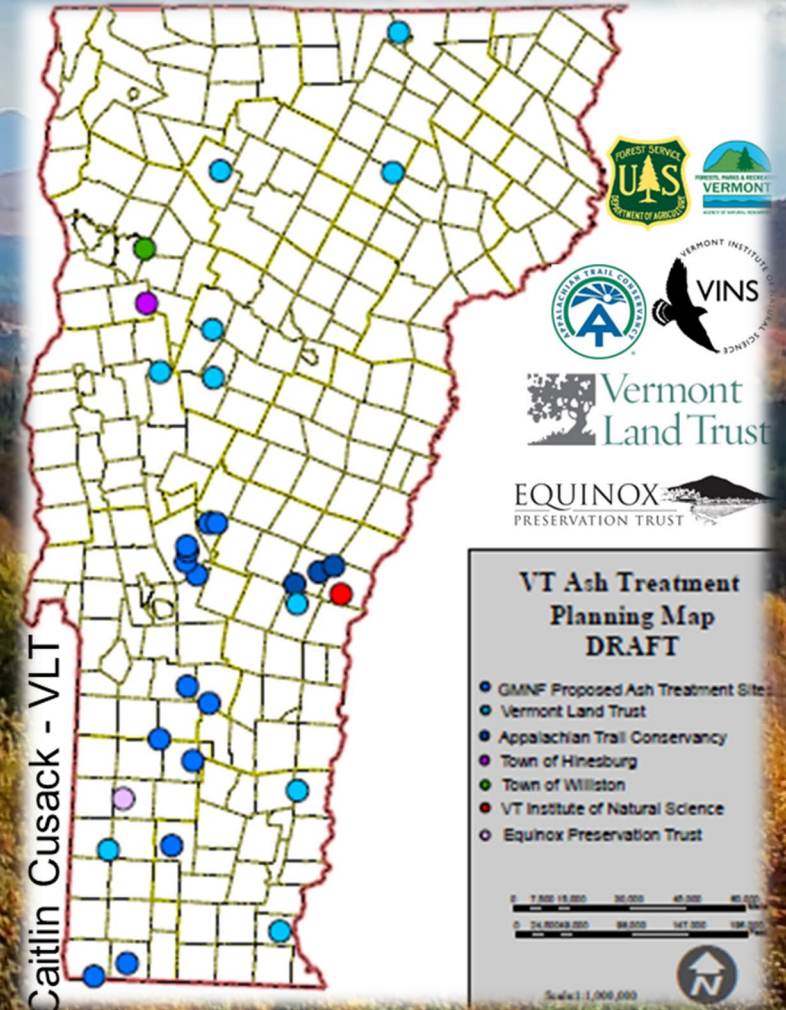
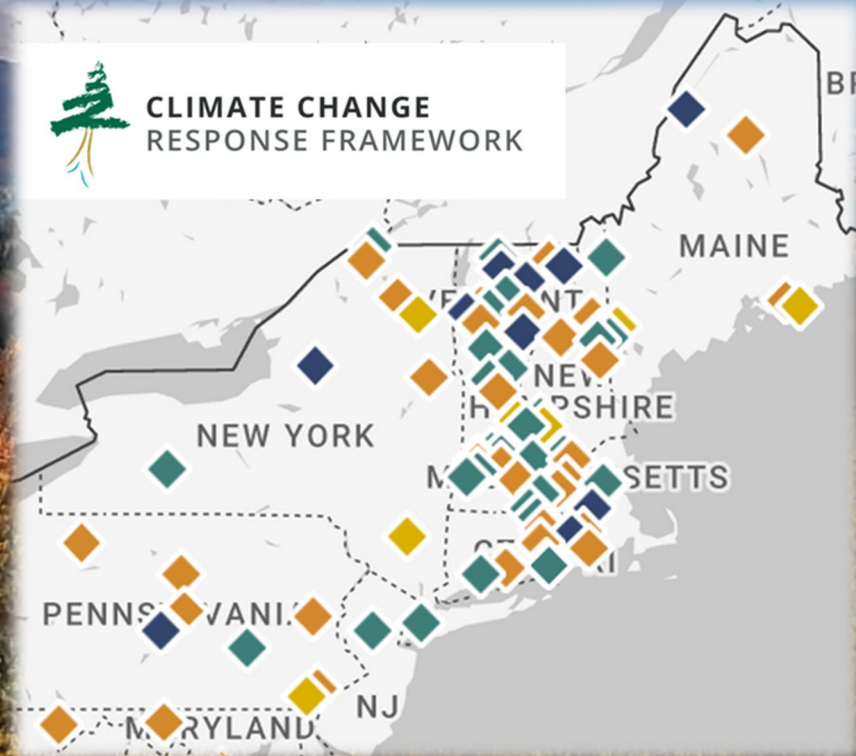
Digital forestry tools can enhance understanding of human relationships with the forest and one another, but they can't replace them



Resilient Forest Partnerships



Resilient Forest Partnerships



Caitlin Cusack - VLT

Stability & Resilience through Diverse Partnerships



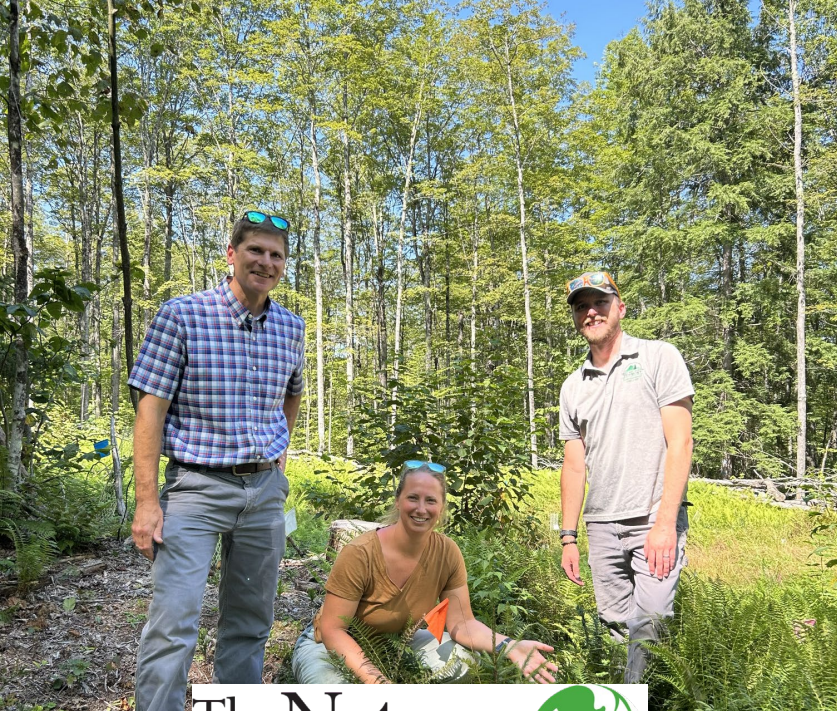
**Forest
conservation,
stewardship, &
adaptation**

Stability & Resilience through Diverse Partnerships



Stability & Resilience through Diverse Partnerships





The Nature Conservancy



44,404 seedlings planted
thanks to resilient, caring,
real connections





Acknowledgements

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A few reminders...

- SAF credits (5.5) and ISA credits (5.75) are available –see registration desk
- Vote for the best poster! Voting is open until 5pm, QR codes to vote are posted throughout the 4th floor (and in the virtual poster session description, for virtual attendees)
- Keep an eye out for the post-conference survey in your email tomorrow

Enjoy the day!

