



Planning for our resilient future
Testimony on H606

Zack Porter
Director, Standing Trees



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Standing Trees works to protect and restore forests on New England's public lands.





“The forest is us. We have to treat it that way. It’s Family.”

- Rich Holschuh, Elnu Abenaki, Director of the Atowi Project





PLANTS

Thousands of Tree Species Remain Unknown to Science

New research suggests there are 14 percent more tree species out there than previously believed

By Stephanie Pappas on January 31, 2022



Biodiversity ignorance and ecological amnesia:
A perilous combination

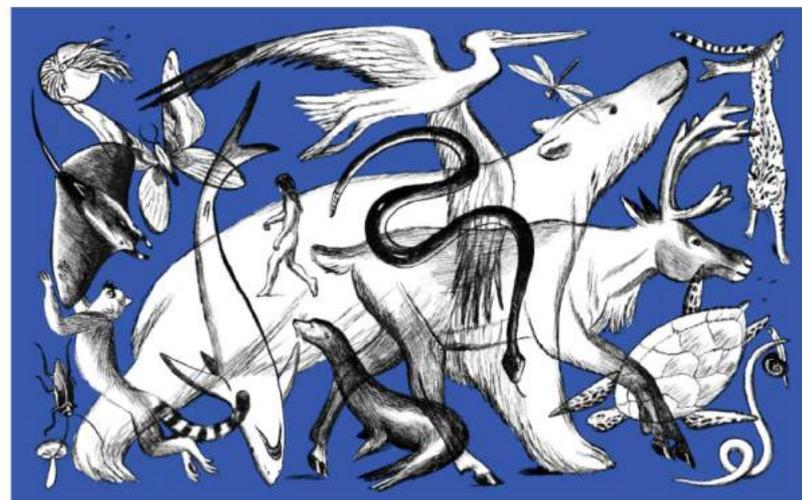
Opinion

OPINION

The 8 Million Species We Don't Know

By Edward O. Wilson

March 3, 2018



Jillian Tamaki

The history of conservation is a story of many victories in a losing war. Having served on the boards of global conservation organizations for more than 30 years, I know very well the sweat, tears and even blood shed by those who dedicate their lives to saving species. Their efforts have led to major achievements, but they have been only partly successful.

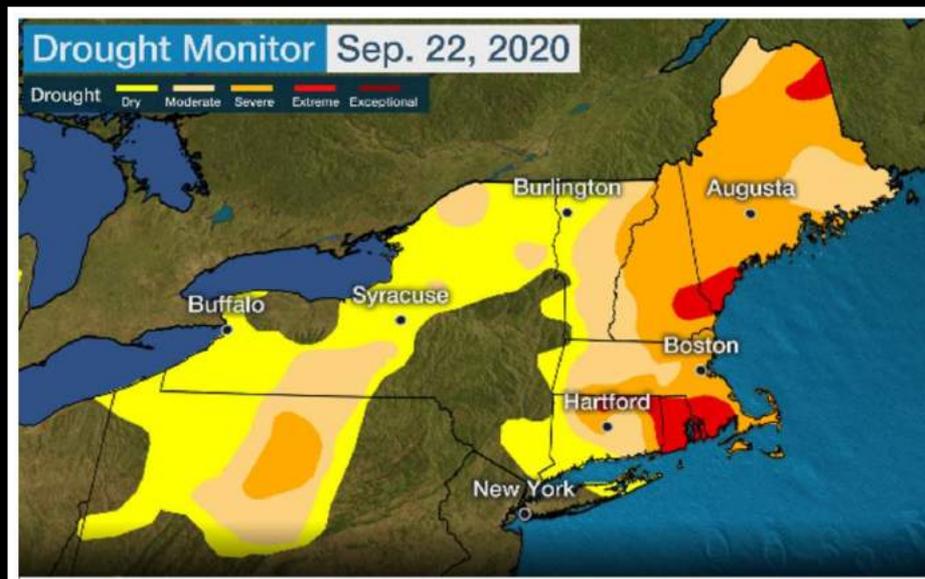


Source: VT Fish and Wildlife



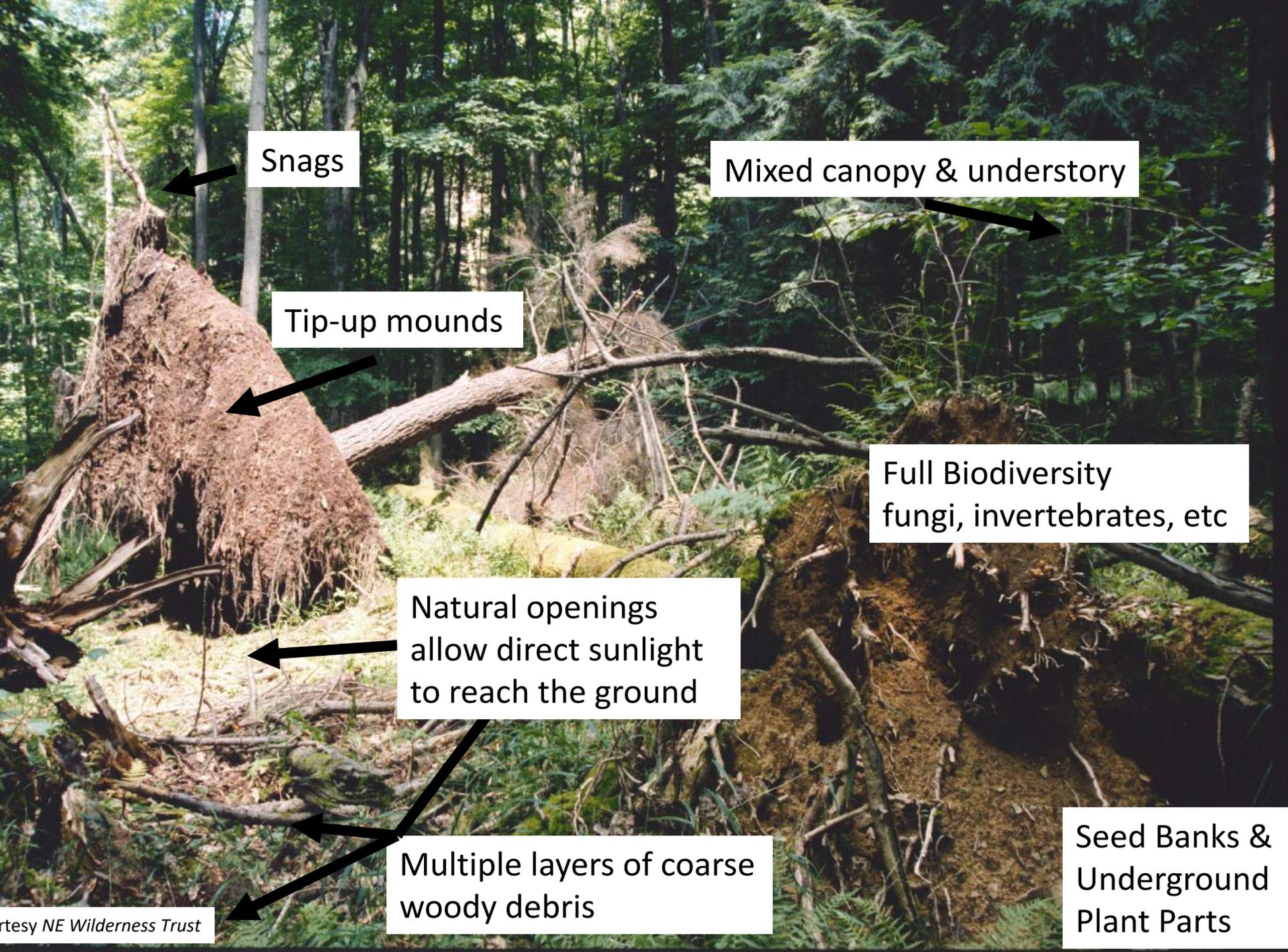
We are living through three great crises in VT:

- Extinction
- Water Quality
- Climate





- Trees grow quickly in Vermont. ***Forests grow slowly.***
- A forest does not produce high levels of ecosystem services until it ***begins*** to acquire the characteristics of an older forest, on average ***after*** 100-125 years of age.



Snags

Mixed canopy & understory

Tip-up mounds

Full Biodiversity
fungi, invertebrates, etc

Natural openings
allow direct sunlight
to reach the ground

Multiple layers of coarse
woody debris

Seed Banks &
Underground
Plant Parts



Enhancing Flood Resiliency of Vermont State Lands

30 June 2015 FINAL DRAFT

Prepared under contract to
Vermont Forests, Parks & Recreation
Montpelier, Vermont



Prepared by:
Kristen L. Underwood, PG, MS Geosciences
South Mountain Research & Consulting
Bristol, Vermont



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Bristol, Vermont

INITIAL VERMONT CLIMATE ACTION PLAN

Vermont Climate Council
DECEMBER 2021

VERMONT CONSERVATION DESIGN

PART 2: NATURAL COMMUNITIES AND HABITATS
TECHNICAL REPORT



March 2018

Robert Zano, Eric Sorenson, Doug Morris, Jess Hike – Vermont Fish and Wildlife Department
Keith Thompson – Vermont Department of Forests, Parks and Recreation



Natural Solutions

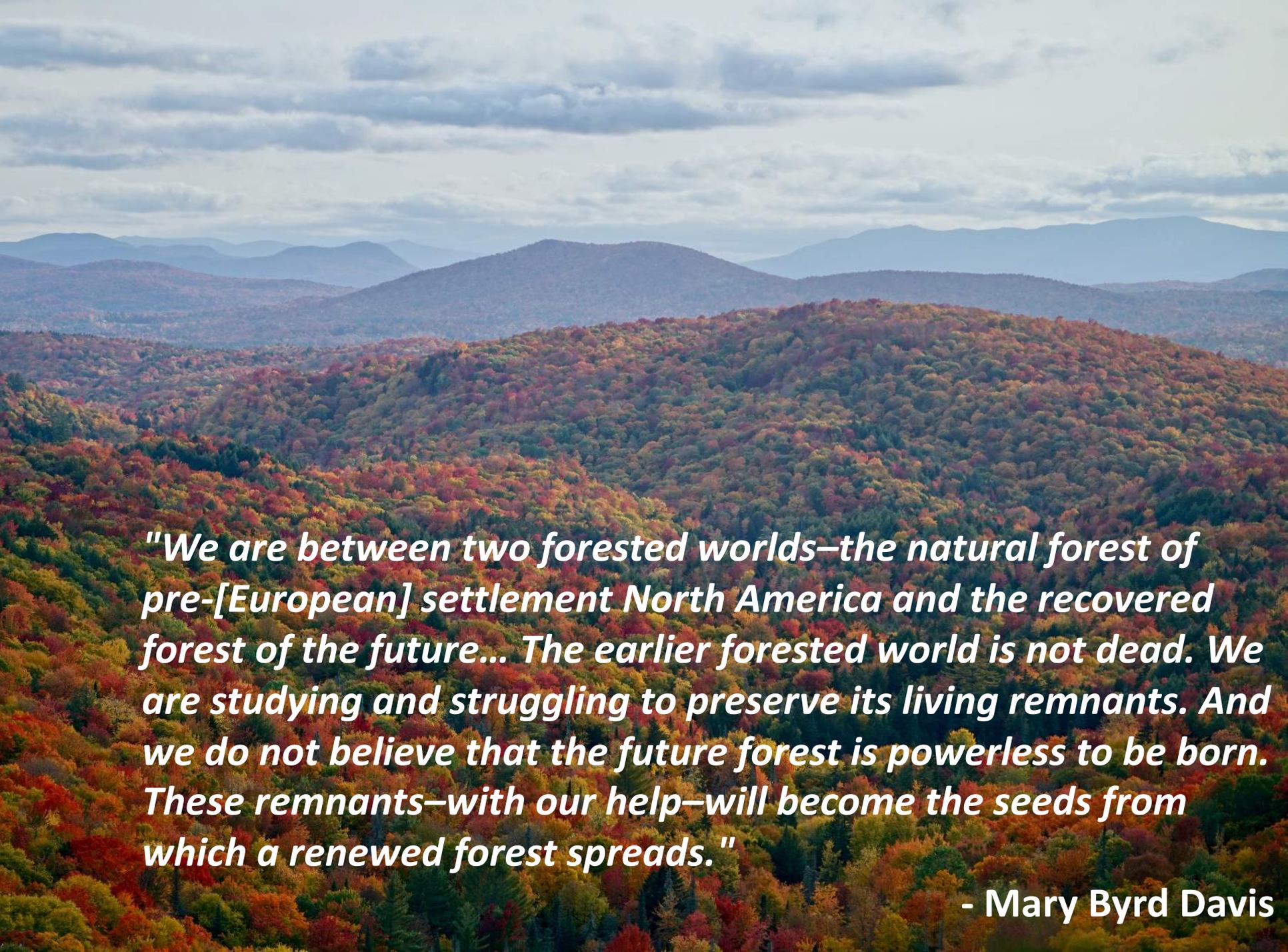
Phosphorus TMDLs for Vermont Segments of Lake Champlain

June 17, 2016



2018 Vermont State Hazard Mitigation Plan

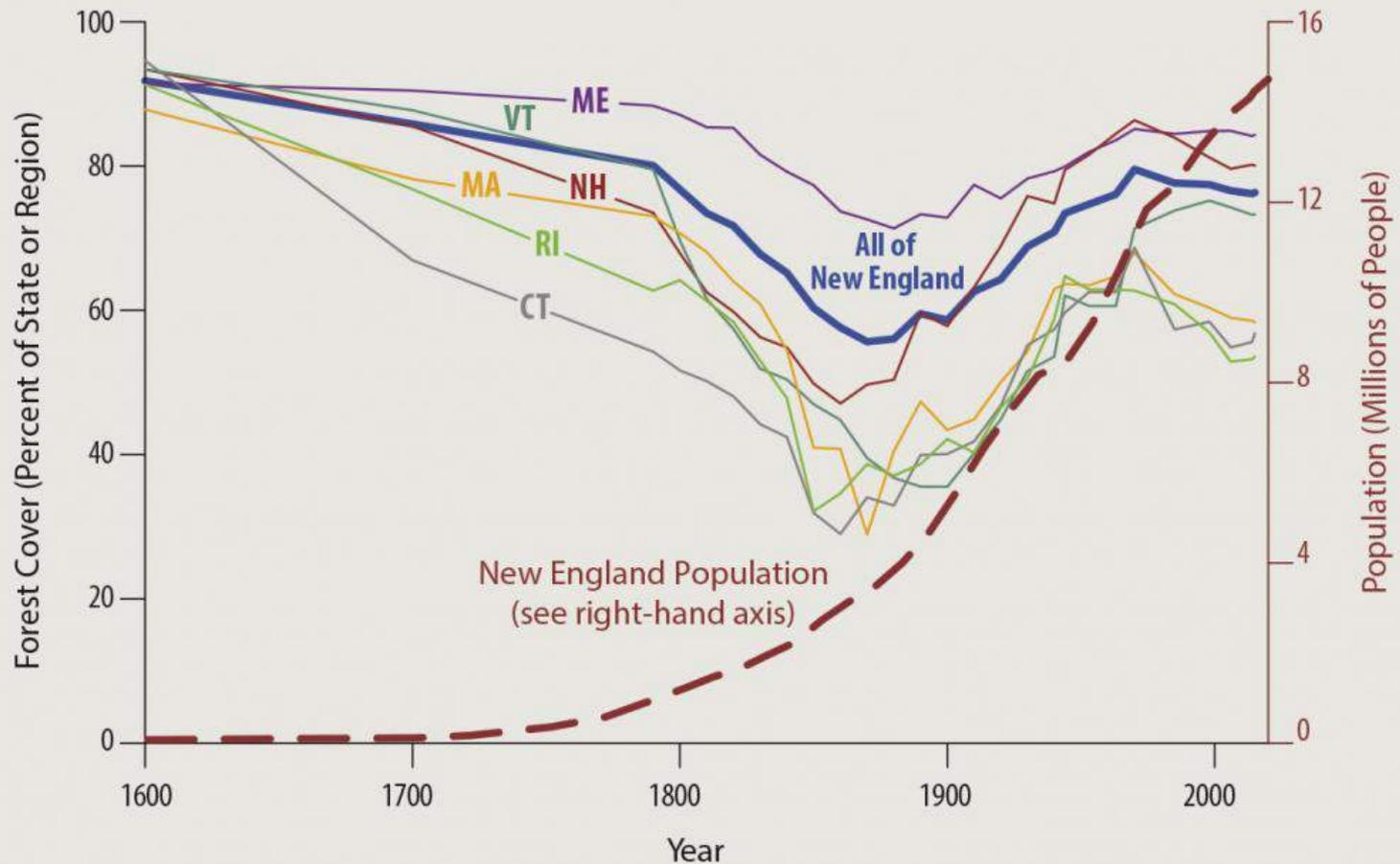
*Making Vermont safer and more resilient in the
face of climate change and natural disasters*



"We are between two forested worlds—the natural forest of pre-[European] settlement North America and the recovered forest of the future... The earlier forested world is not dead. We are studying and struggling to preserve its living remnants. And we do not believe that the future forest is powerless to be born. These remnants—with our help—will become the seeds from which a renewed forest spreads."

- Mary Byrd Davis

New England Forest Cover and Human Population



The second wave of forest loss now under way in New England jeopardizes the region's environmental success story, which has been characterized by the return of forests following the decline in agriculture in the East.

Source: "Wildlands and Woodlands"

VERMONT CONSERVATION DESIGN

PART 2: NATURAL COMMUNITIES AND HABITATS TECHNICAL REPORT



March 2018

Robert Zaino, Eric Sorenson, Doug Morin, Jens Hilke – Vermont Fish and Wildlife Department
Keith Thompson – Vermont Department of Forests, Parks and Recreation



“The native species of Vermont evolved in a landscape dominated by old forest...the closer the target is to the historic old forest condition, the greater the likelihood that the landscape will support all of Vermont’s native forest species and fully provide the forest’s ecological services.”

“Although there are small patches of old growth scattered around the state, old forest is absent in Vermont as a functional component of the landscape. In most forests, passive restoration will result in old forest conditions.”



“Habitat disturbance, often resulting from timber extraction, is still a major threat to [marten]: activities that reduce forest patch size, remove large and senescent trees, and simplify forest structure may severely compromise the long-term viability of their populations.”

Evans and Mortelliti 2022 – “Effects of forest disturbance, snow depth, and intraguild dynamics on American marten and fisher occupancy in Maine, USA”

- “Northern Long-Eared Bats (NLEB) typically roost singly or in maternity colonies underneath bark or more often in cavities or crevices of both live trees and snags”
- “The availability of ample suitable roosts may be one of the most limiting resources for bats.”
- “Mature forests are an important habitat type for foraging NLEBs...”

U.S. Fish and Wildlife Service. 2022. Species Status Assessment Report for the Northern long-eared bat (*Myotis septentrionalis*), Version 1.1. March 22, 2022. Bloomington, MN.



SPECIAL FEATURE: SCIENCE FOR OUR NATIONAL PARKS' SECOND CENTURY

National parks in the eastern United States harbor important older forest structure compared with matrix forests

KATHRYN M. MILLER,^{1,2,†} FRED W. DIEFFENBACH,³ J. PATRICK CAMPBELL,⁴ WENDY B. CASS,⁵
JAMES A. COMISKEY,⁶ ELIZABETH R. MATTHEWS,⁴ BRIAN J. MCGILL,² BRIAN R. MITCHELL,⁷
STEPHANIE J. PERLES,⁸ SUZANNE SANDERS,⁹ JOHN PAUL SCHMIT,⁴ STEPHEN SMITH,¹⁰ AND AARON S. WEED¹¹



Contents lists available at [ScienceDirect](#)

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

Eastern national parks protect greater tree species diversity than unprotected matrix forests

Kathryn M. Miller^{a,b,*}, Brian J. McGill^b, Brian R. Mitchell^c, Jim Comiskey^d, Fred W. Dieffenbach^e, Elizabeth R. Matthews^f, Stephanie J. Perles^g, John Paul Schmit^f, Aaron S. Weed^e

“Results of this study indicate that park forests, where logging is largely prohibited, preserve areas of regionally significant older forest habitat. Park forests consistently had greater proportions of late-successional forest, greater live tree basal area, greater densities of live and dead large trees, and considerably larger volume of coarse woody debris.” – Miller et al 2016

The climate sensitivity of carbon, timber, and species richness covaries with forest age in boreal–temperate North America

Dominik Thom^{1,2}  | Marina Golivets¹ | Laura Edling¹ | Garrett W. Meigs³ | Jesse D. Gourevitch^{1,2} | Laura J. Sonter⁴ | Gillian L. Galford^{1,2}  | William S. Keeton^{1,2}

“[Older forests] simultaneously support high levels of carbon storage, timber growth, and species richness. Older forests also exhibit low climate sensitivity...compared to younger forests... Strategies aimed at enhancing the representation of older forest conditions at landscape scales will help sustain [ecosystem services and biodiversity] in a changing world.”





Enhancing Flood Resiliency
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Bristol, Vermont

*“There may be a tendency to assume that lands in forest cover are resilient to the effects of flooding simply by virtue of their forested status. **However, forest cover does not necessarily equate to forest health and forest flood resilience.** Headwater forests of Vermont include a legacy of human modifications that have left certain land areas with a heightened propensity to generate runoff, accelerate soil erosion, and sediment streams. These legacy impacts affect forest lands across the state [emphasis added]...”*

*“**The quality of [today’s] forests is not the same as the pre-Settlement old growth forests.** The legacy of early landscape development and a history of channel and floodplain modifications continue to impact water and sediment routing from the land [emphasis added].”*

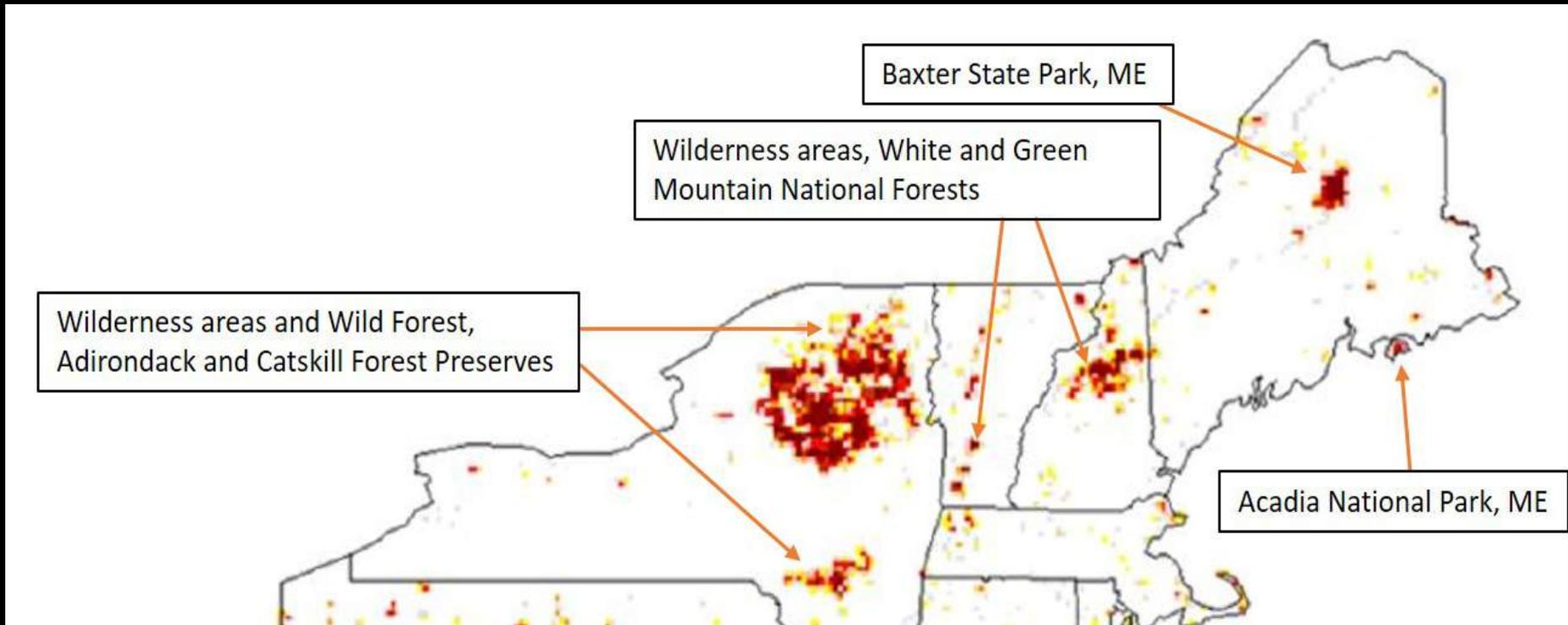


Aboveground carbon storage in the contiguous US. Dark green = highest levels.

Large trees store a disproportionate amount of carbon

The largest
1%
of trees in the US store
30%
of all aboveground
forest carbon

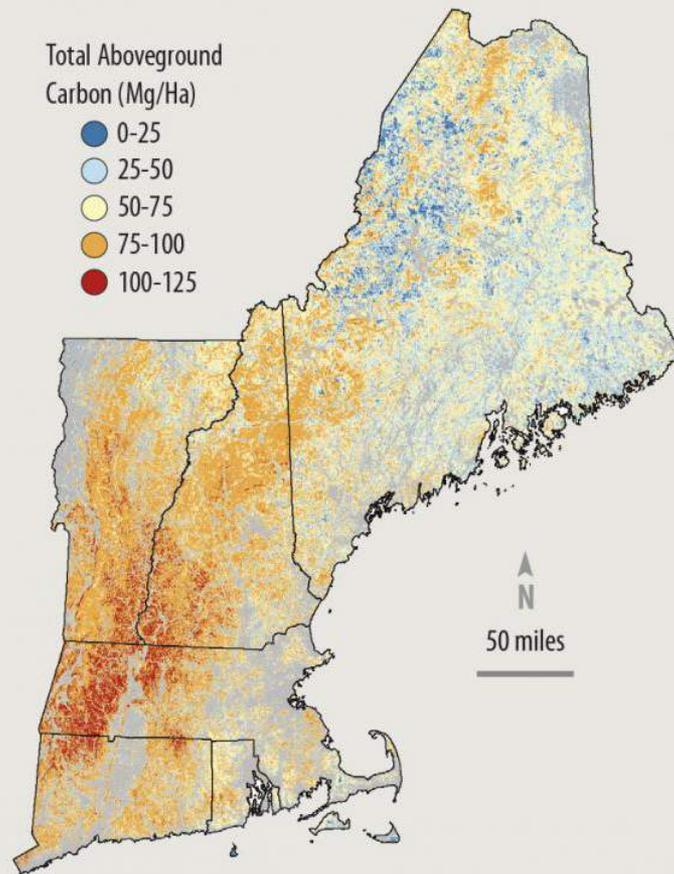




30% of *all* aboveground carbon in the Northeastern US is stored in protected areas that cover just 5% of the land area

From "A Contemporary Carbon Balance for the Northeastern Region of the United States."
(Lu et al 2013)

Forests Store Carbon

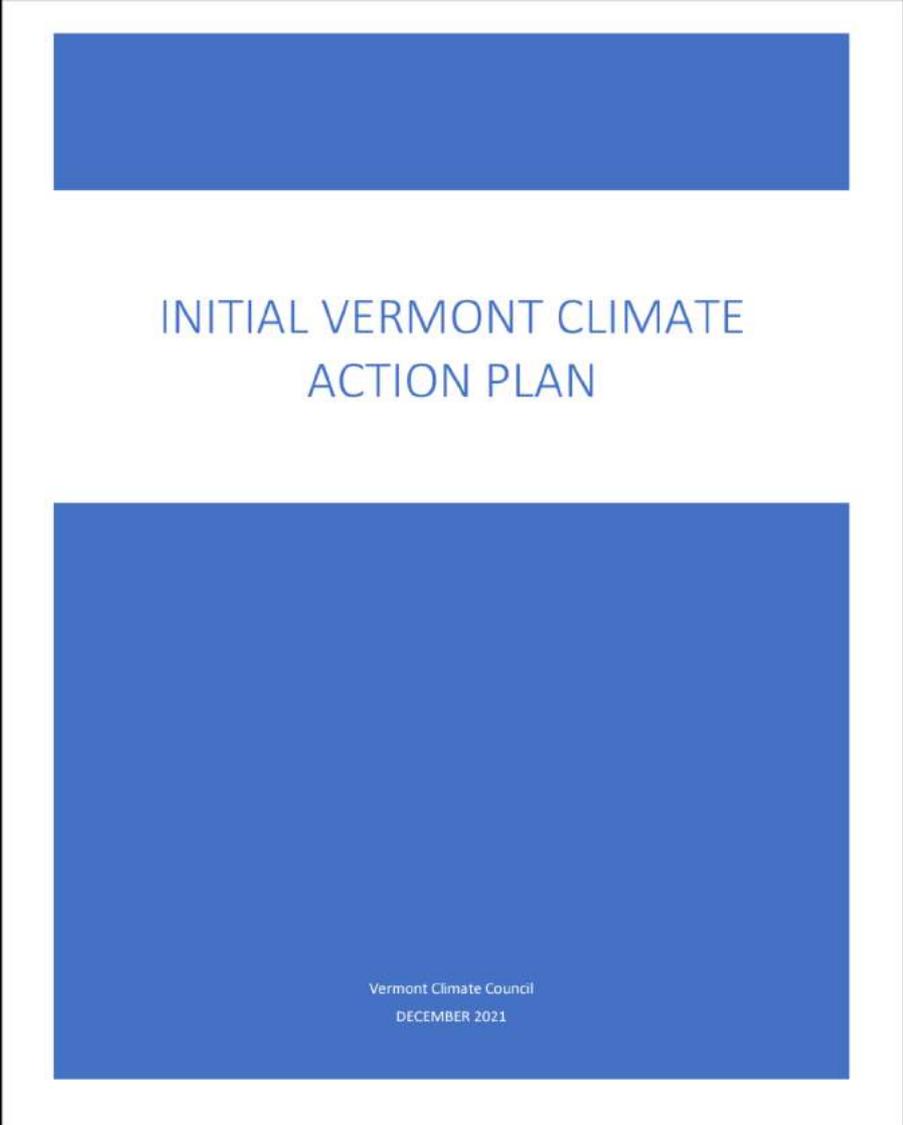


New England's forests provide a vast store-house of carbon that helps mitigate global climate change. Variation in the amounts of carbon, wood, and the size of trees across the region is largely due to the history of timber harvesting. Data are not represented for gray areas that are predominantly agricultural or densely populated.

Source: *Wildlands and Woodlands* 2017

VT Forest Carbon Facts:

- Vermont forests sequester an amount of carbon each year equal to approximately half of the state's annual emissions
- Studies by UVM researchers show that New England's forests could store 2-4 times more carbon than present levels if allowed to grow old.



INITIAL VERMONT CLIMATE
ACTION PLAN

Vermont Climate Council
DECEMBER 2021

“Invest in strategic conservation in order to increase the pace of permanent conservation towards 30x30 targets (described in federal report “Conserving and Restoring America the Beautiful”), with Vermont Conservation Design acting as the guiding plan for prioritization of efforts.”

“Through permanent conservation coupled with both active and passive restoration efforts on both public and private lands, allow approximately 9% of Vermont's forest to become (or be maintained as) old forest, specifically targeting 15% of the matrix forest within the highest priority forest blocks identified in Vermont Conservation Design to achieve this condition.”

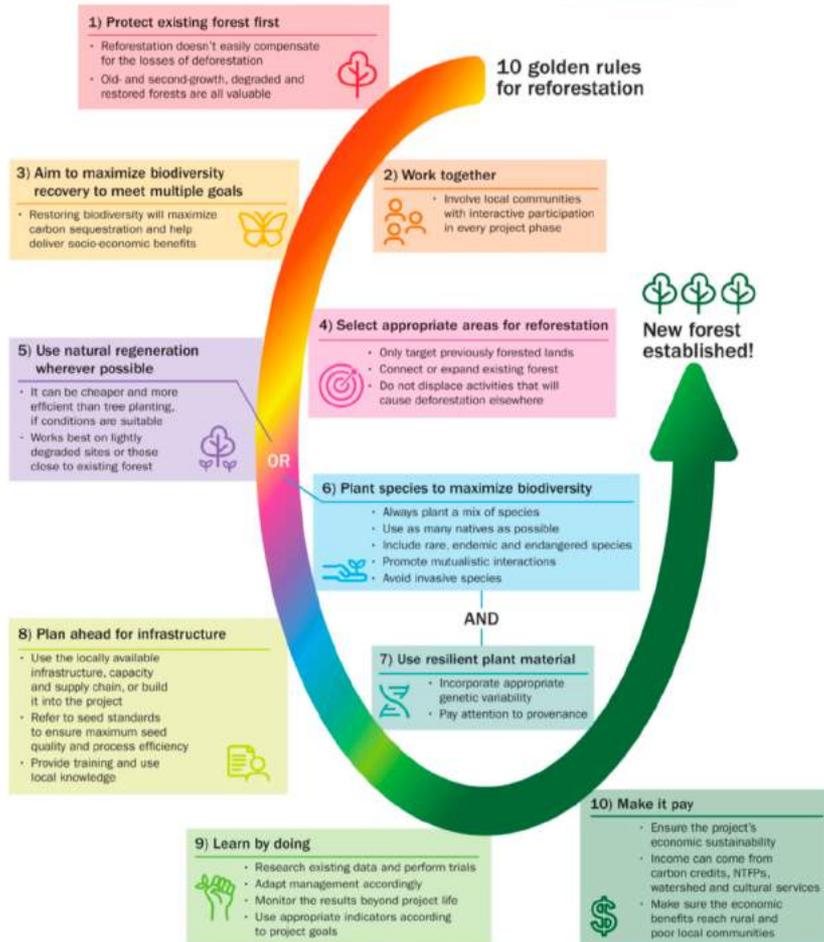


FIGURE 2 Ten golden rules for a successful reforestation project. The order of the rules matches the order in which tasks should be considered during project planning and implementation, although some are interdependent and should be considered in parallel. See text for details

Protect, manage and then restore lands for climate mitigation

Susan C. Cook-Patton^{1,2,3}, C. Ronnie Drever², Bronson W. Griscom³, Kelley Hamrick¹, Hamilton Hardman¹, Timm Kroeger¹, Pablo Pacheco⁴, Shyla Raghav³, Martha Stevenson⁴, Chris Webb⁵, Samantha Yeo¹ and Peter W. Ellis⁶

Limited time and resources remain to constrain the climate crisis. Natural climate solutions represent promising options to protect, manage and restore natural lands for additional climate mitigation, but they differ in (1) the magnitude and (2) immediacy of mitigation potential, as well as (3) cost-effectiveness and (4) the co-benefits they offer. Counter to an emerging preference for restoration, we use these four criteria to propose a general rule of thumb to protect, manage and then restore lands, but also show how these criteria explain alternative prioritization and portfolio schemes. This hierarchy offers a decision-making framework for public and private sector actors to optimize the effectiveness of natural climate solutions in an environment in which resources are constrained, and time is short.

Received: 25 August 2020 | Accepted: 13 October 2020

DOI: 10.1111/gcb.15498

GCB REVIEWS

Global Change Biology WILEY

Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits

Alice Di Sacco¹ | Kate A. Hardwick¹ | David Blakesley^{2,3} | Pedro H. S. Brancalion⁴ | Elinor Breman¹ | Loic Cecilio Rebola^{1,5} | Susan Chomba⁶ | Kingsley Dixon^{7,8} | Stephen Elliott⁹ | Godfrey Ruyonga¹⁰ | Kirsty Shaw¹¹ | Paul Smith¹¹ | Rhian J. Smith¹ | Alexandre Antonelli^{1,12,13}

CONSERVING AT LEAST 30% OF THE PLANET BY 2030 –

What should count?



Tribal leaders: 'Support the '30 by 30 initiative' to protect 30 percent of US lands and waters'

President-elect Joe Biden and Congresswoman Deb Haaland are taking direct action to safeguard our environment through an initiative called 'Thirty by Thirty'

ICT OPINION • DEC 17, 2020

SCIENCE ADVANCES | RESEARCH ARTICLE

SCIENCE POLICY

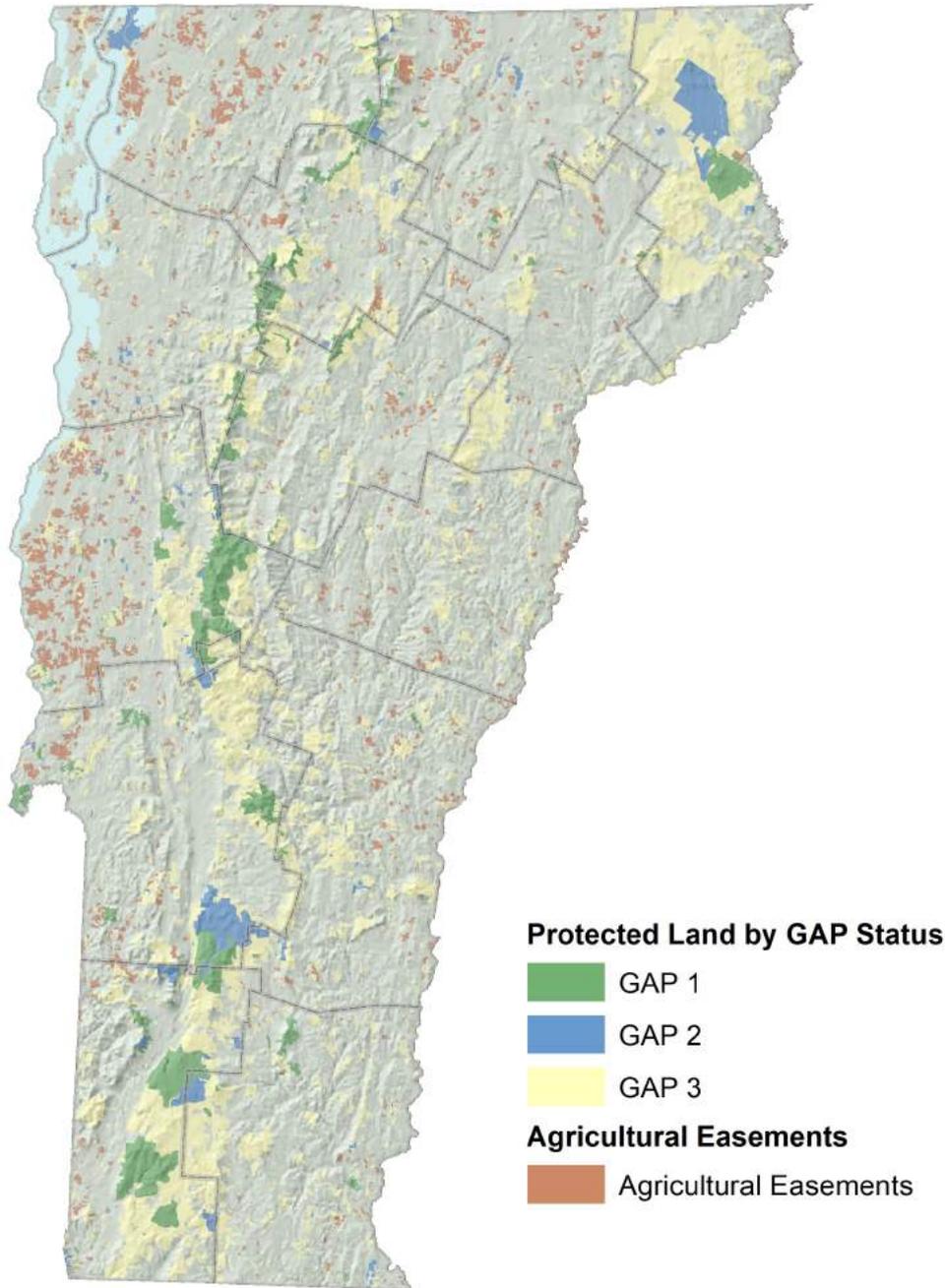
A "Global Safety Net" to reverse biodiversity loss and stabilize Earth's climate

E. Dinerstein^{1*}, A. R. Joshi², C. Vynne¹, A. T. L. Lee¹, F. Pharand-Deschênes^{3,4}, M. França⁴, S. Fernando¹, T. Birch⁵, K. Burkart⁶, G. P. Asner⁷, D. Olson⁸

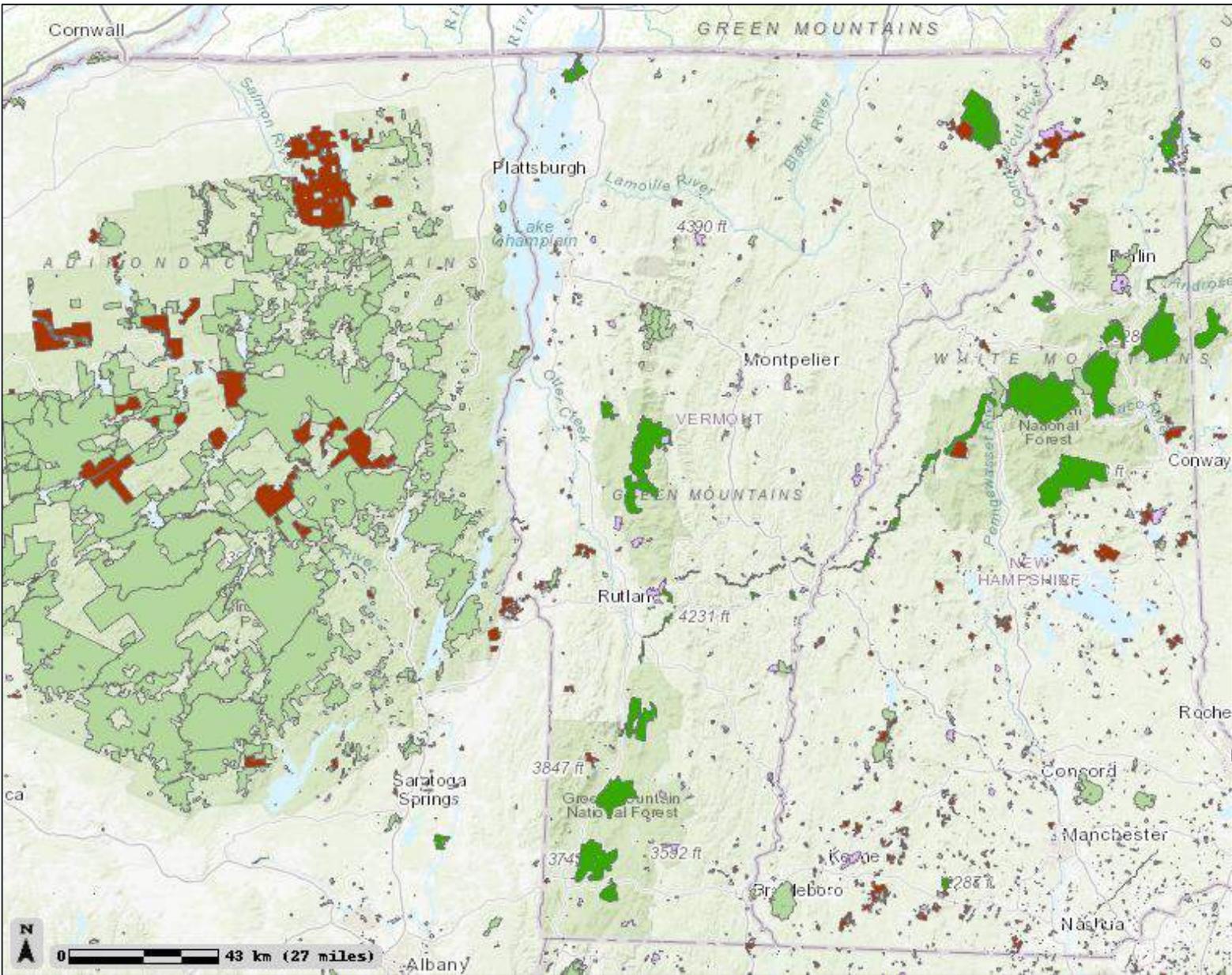
Global strategies to halt the dual crises of biodiversity loss and climate change are often formulated separately, even though they are interdependent and risk failure if pursued in isolation. The Global Safety Net maps how expanded nature conservation addresses both overarching threats. We identify 50% of the terrestrial realm that, if conserved, would reverse further biodiversity loss, prevent CO₂ emissions from land conversion, and enhance natural carbon removal. This framework shows that, beyond the 15.1% land area currently protected, 35.3% of land area is needed to conserve additional sites of particular importance for biodiversity and stabilize the climate. Fifty ecoregions and 20 countries contribute disproportionately to proposed targets. Indigenous lands overlap extensively with the Global Safety Net. Conserving the Global Safety Net could support public health by reducing the potential for zoonotic diseases like COVID-19 from emerging in the future.

30x30 Endorsers include:

- Biden Admin
- Increasing number of US States
- Tribal nations across US
- 79 nations around the globe



- Only 3% of Vermont land is managed to restore Vermont's natural forests.
- 10% of New York is managed to restore its natural forests.
- Climate and biodiversity scientists suggest that a minimum of 30% should be managed as GAP 1 and 2 – this is the scientific origin of “30x30”



Legend

GAP 1 and 2

- Federal Land
- State Land
- Joint Ownership
- Local Land
- Native American Land
- Private Conservation Land
- Unknown

Gap 1 and 2 lands by ownership type in Vermont, New Hampshire, and New York

Recommendations:

- Please re-insert the following italicized text from the version that was introduced in the House:

§2802. CONSERVATION GOALS (b) Reaching 30 percent by 2030 and 50 percent by 2050 shall include a mix of ecological reserve areas, biodiversity reserve areas biodiversity conservation areas, and natural resource management areas. In order to support an ecologically functional landscape with sustainable production of natural resources and recreational opportunities, the approximate percentages of each type of conservation category shall be guided by the conservation targets within Vermont Conservation Design, including the use of ecological reserve areas to protect highest priority natural communities and maintain or restore old forests *across at least nine percent of Vermont forestland.*

Recommendations:

Conservation category definitions should include a clear association with its respective GAP status categories

- Ecological reserve area = GAP 1
- Biodiversity conservation area = GAP 2
- Natural resource management area = GAP 3

Proposed amendments as follows:

§ 2801.DEFINITIONS

As used in this section:

- (1) “Ecological reserve area,” **or GAP 1 according to the USGS Status Code Assignment**, means an area having permanent protection from conversion of natural land cover and is managed to maintain a natural state within which natural ecological processes and disturbance events are allowed to proceed with minimal interference.
- (2) “Biodiversity conservation area,” **or GAP 2 according to the USGS Status Code Assignment**, means an area having permanent protection from conversion of natural land cover for the majority of the area and is managed for the primary goal of sustaining species or habitats. These areas may include regular, active interventions to address the needs of particular species or to maintain or restore habitats.
- (3) “Natural resource management area,” **or GAP 3 according to the USGS Status Code Assignment**, means an area having permanent protection from conversion of natural land cover for the majority of the area but that is subject to long-term sustainable forest management.



Thanks

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