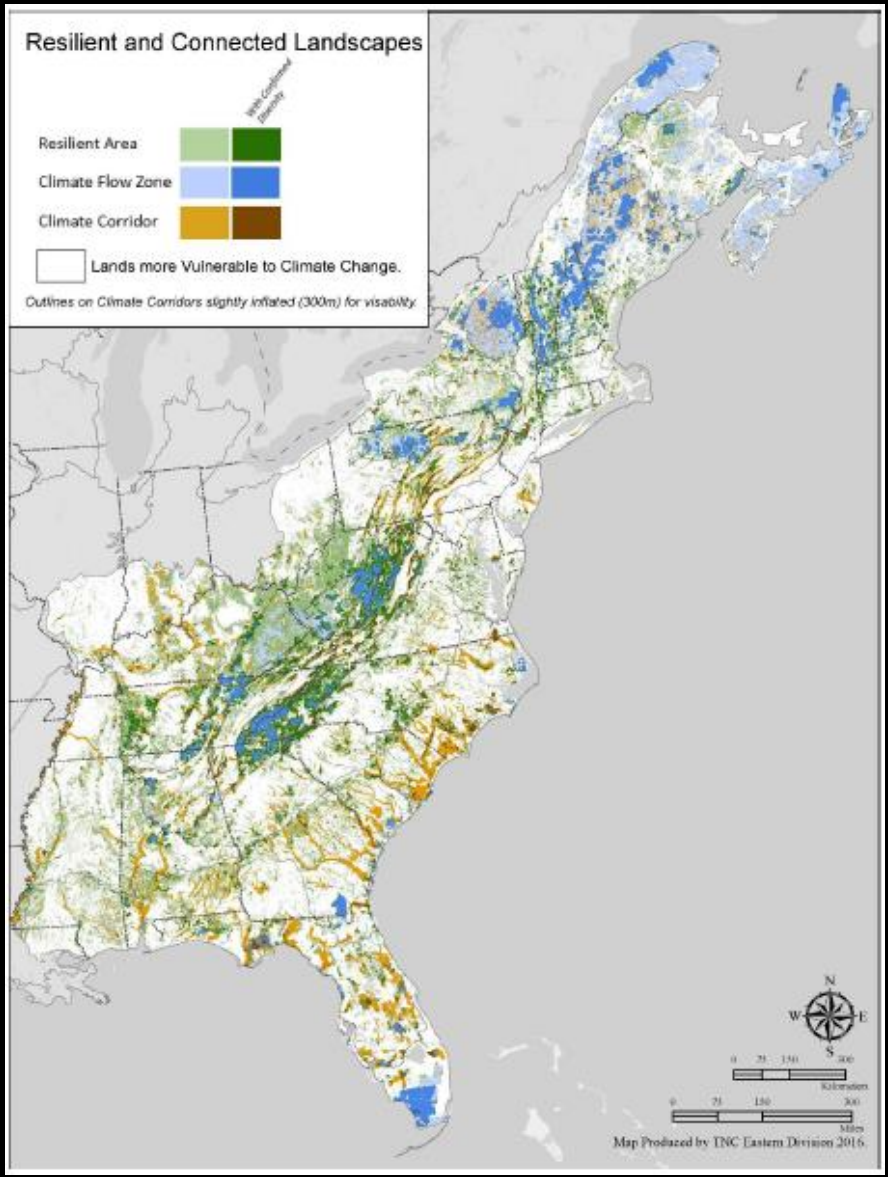
Resilient Landscapes in a Changing Climate

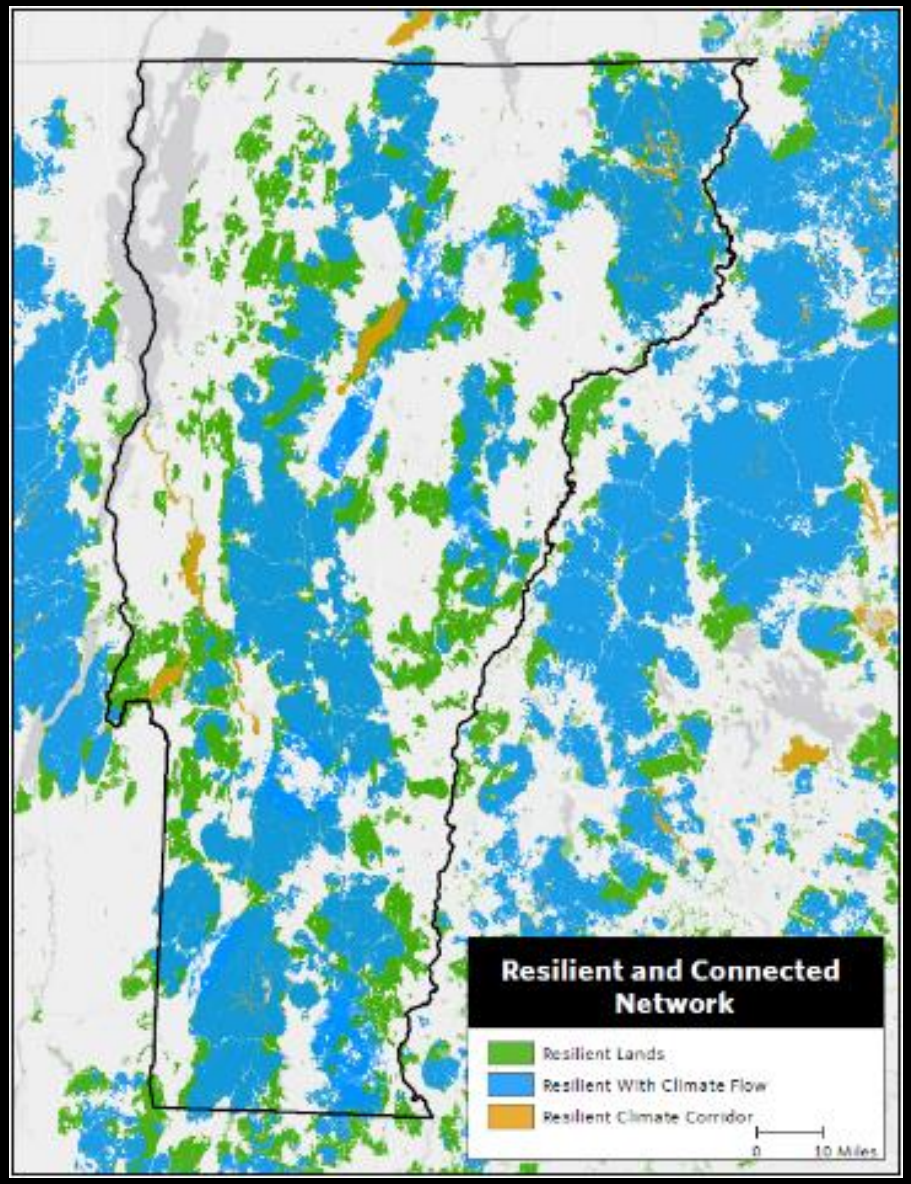
Presentation for the House Committee on Natural Resources, Fish, and Wildlife

January 20, 2022

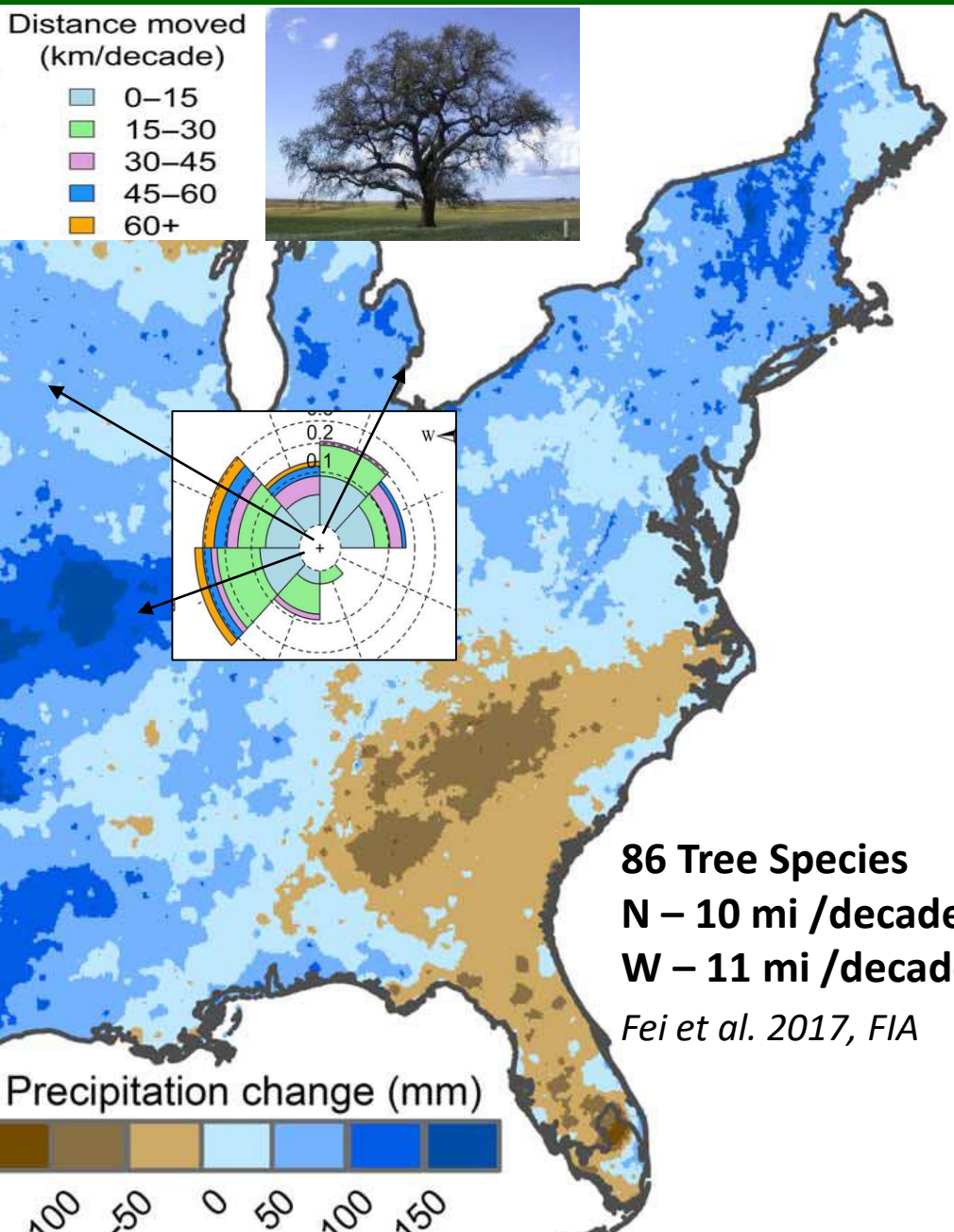
Gus Goodwin
The Nature Conservancy in VT

Bob Klein


Resilient and Connected Landscapes
With Confined Geodiversity
Resilient Area
Climate Flow Zone
Climate Corridor
Lands more Vulnerable to Climate Change.
Outlines on Climate Corridors slightly inflated (300m) for visability.
N
W
E
S
Kilometers
Miles
Map Produced by TNC Eastern Division 2016.


Resilient and Connected Network
Resilient Lands
Resilient With Climate Flow
Resilient Climate Corridor
0
10 Miles

Nature is Dynamic



86 Tree Species
N – 10 mi /decade
W – 11 mi /decade

Fei et al. 2017, FIA

Chen et al. 2015, Science, Review of 51 studies, encompassing nearly 1,000 species

Range Shifts in Response to Climate

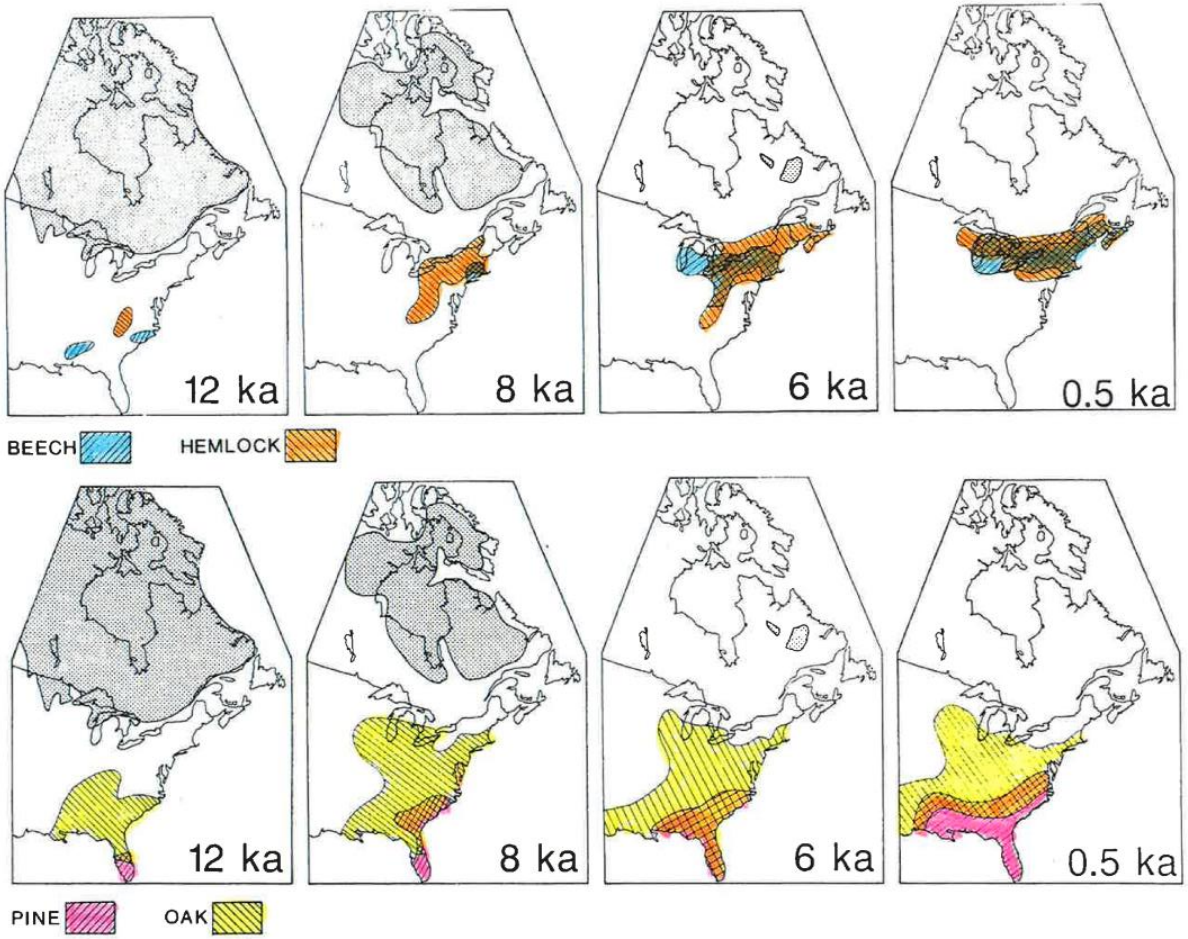


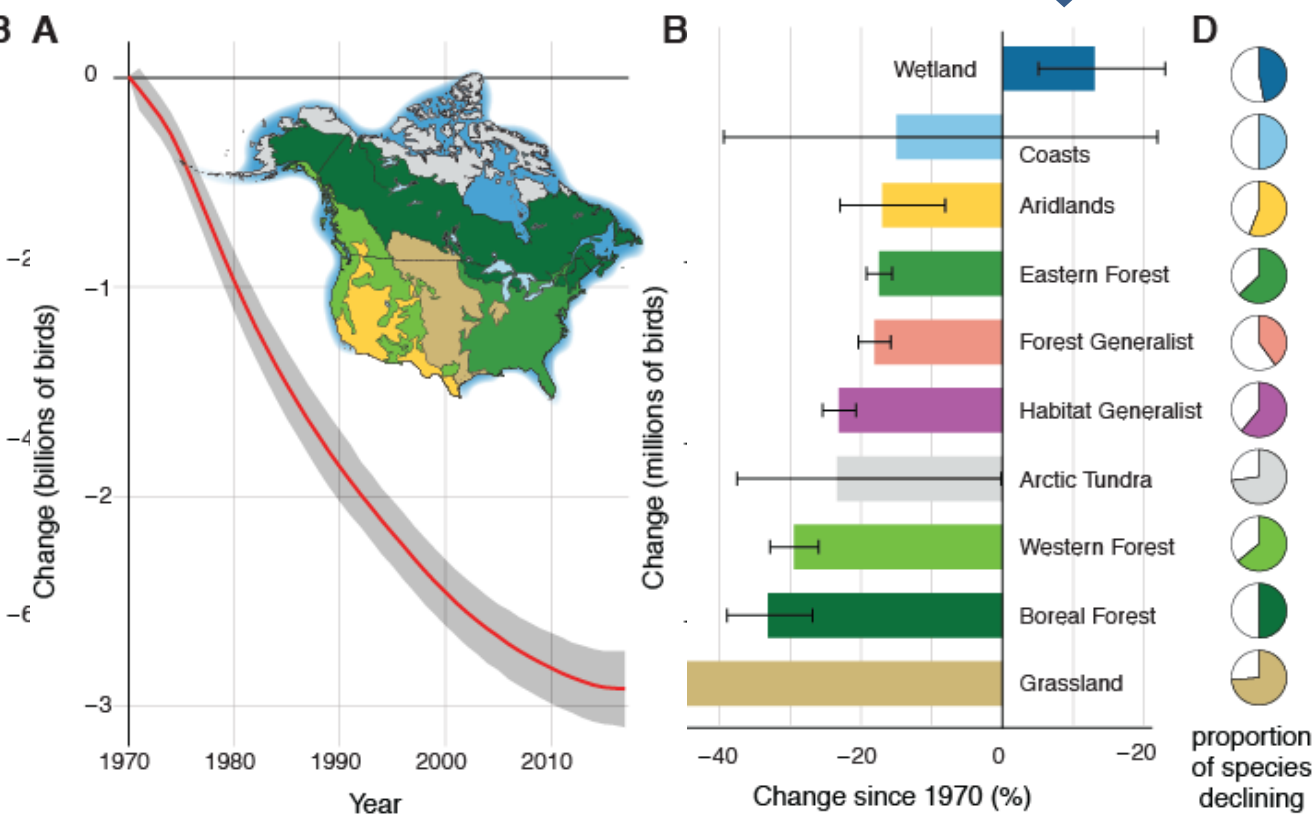
*Figure 1. Location of regions with 5% beech (*Fagus*) pollen and 5% hemlock (*Tsuga*) pollen (in the upper row maps) and 20% southern pine (*Pinus*) pollen and 20% oak (*Quercus*) pollen (in the lower row of maps) at 12,000, 8,000, 6,000, and 500 yr B.P. with the stippled area in the north showing the shrinking Laurentide ice sheet from 12,000 to 6,000 yr B.P.* Source: Modified from Plates 1 and 2 in Jacobson, Webb, & Grimm 1987.

Hunter et al 1988

Abundance Crisis

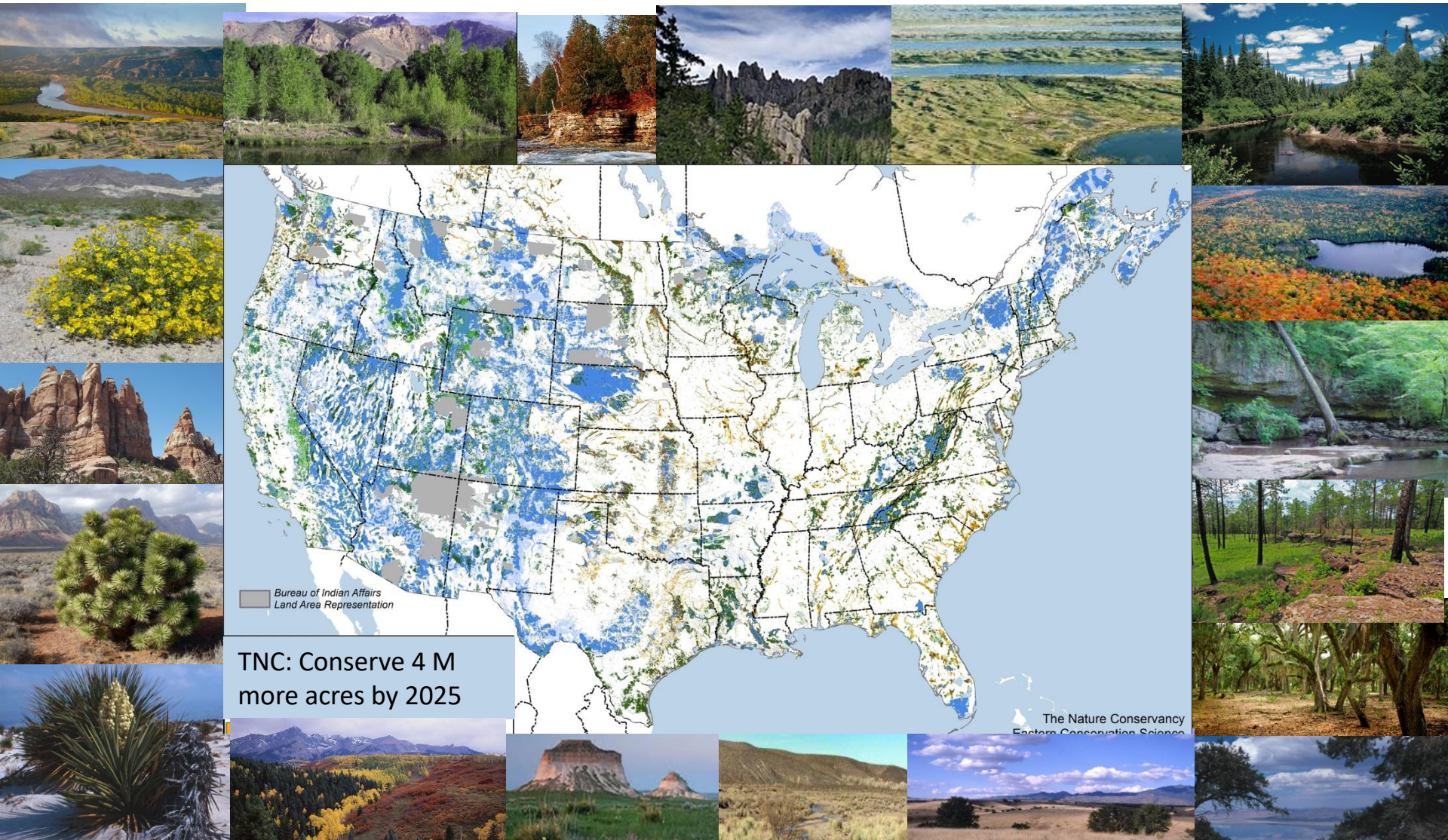
Mammals : Global biomass down 82%
Amphibians: 30% now T &E
Butterflies: Abundance down 35%/ 40 yr
NA Birds: Abundance down 29%
or 3 Billion birds since 1970

Wetland Birds Up: Thanks to Adaptive Harvest Management and billions $ on wetland protection and restoration



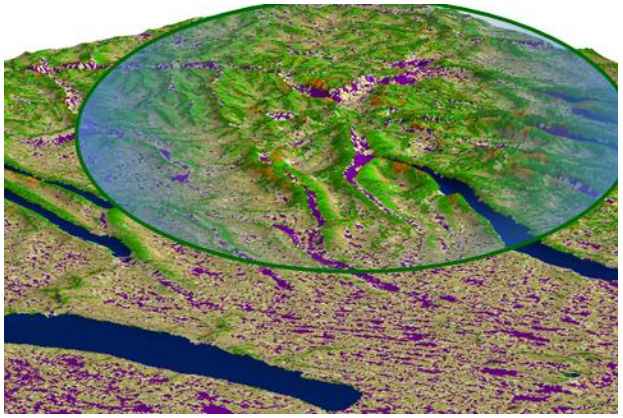
Resilient and Connected Network (RCN)

Conserve a network of resilient sites and connecting corridors that will sustain North America's natural diversity by allowing species to adapt to climate impacts and thrive.



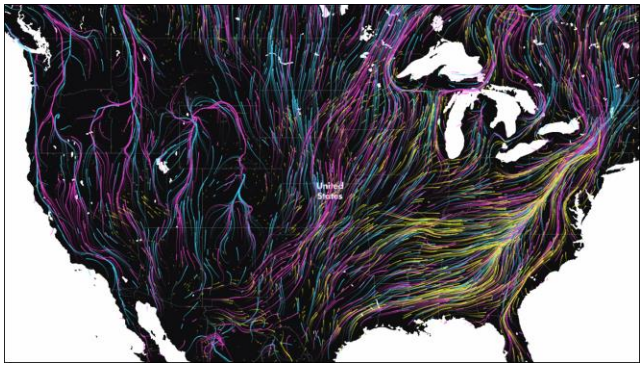
TNC: Conserve 4 M more acres by 2025

Three Ingredients



Resilient Land

Land with many *connected* microclimates representing all physical environments



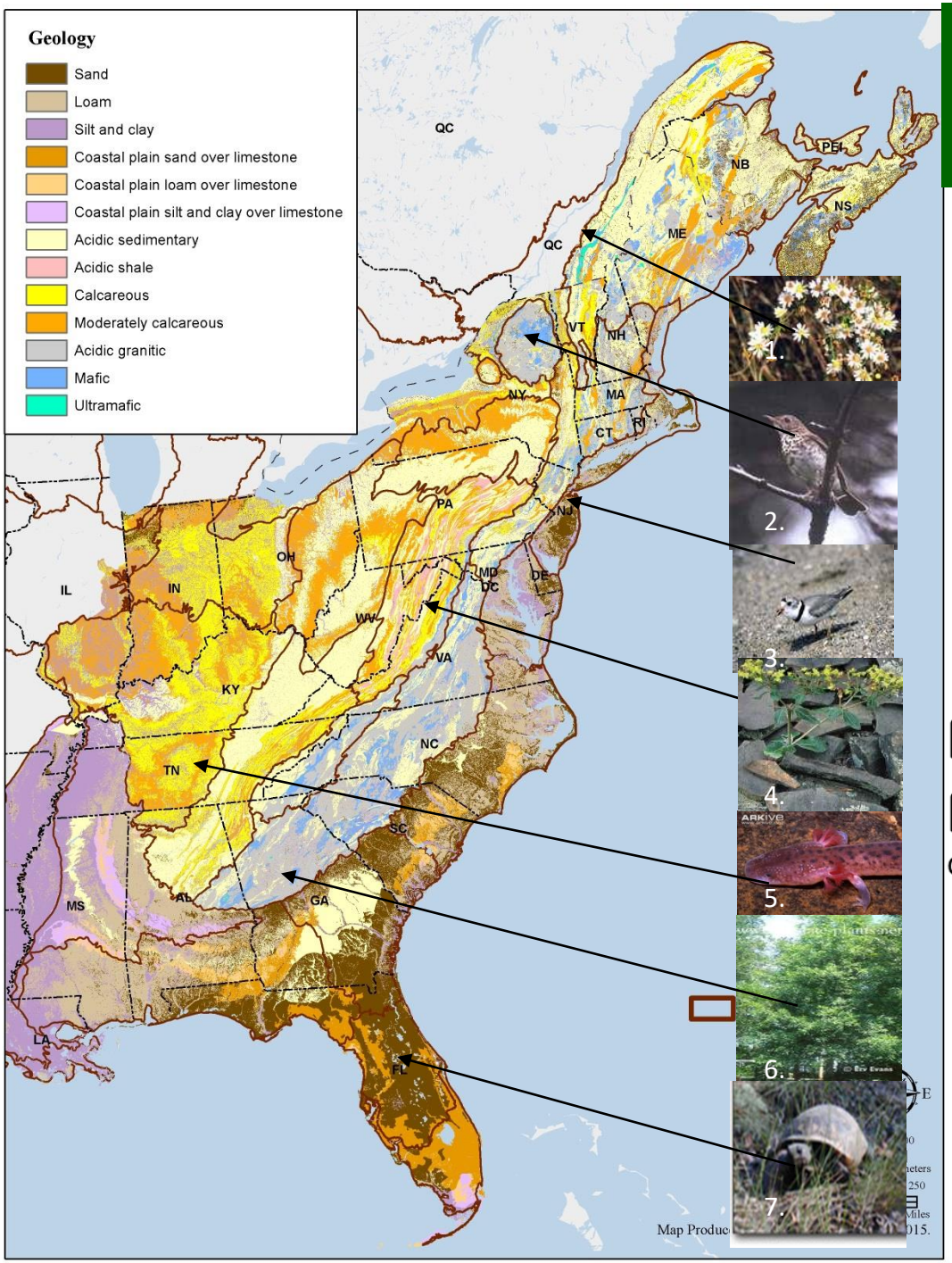
Permeable Landscape

A *connected* landscape that allows movement and facilitates range shifts

Resilient Systems & Species

Intact habitats, unique communities and rare species populations

Resilient Land

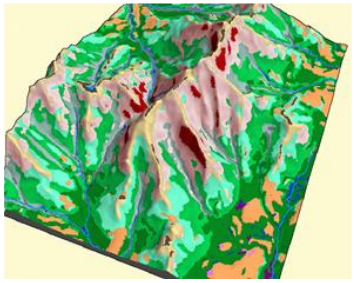


Representative Land

Biological diversity is highly correlated with **Land Properties** (Geology, Soil, Elevation, Topography, Hydrology)

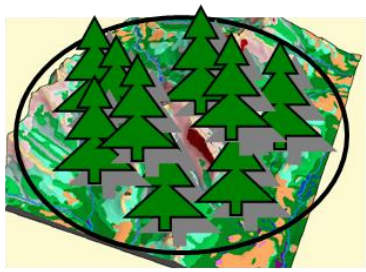
Many Microclimates

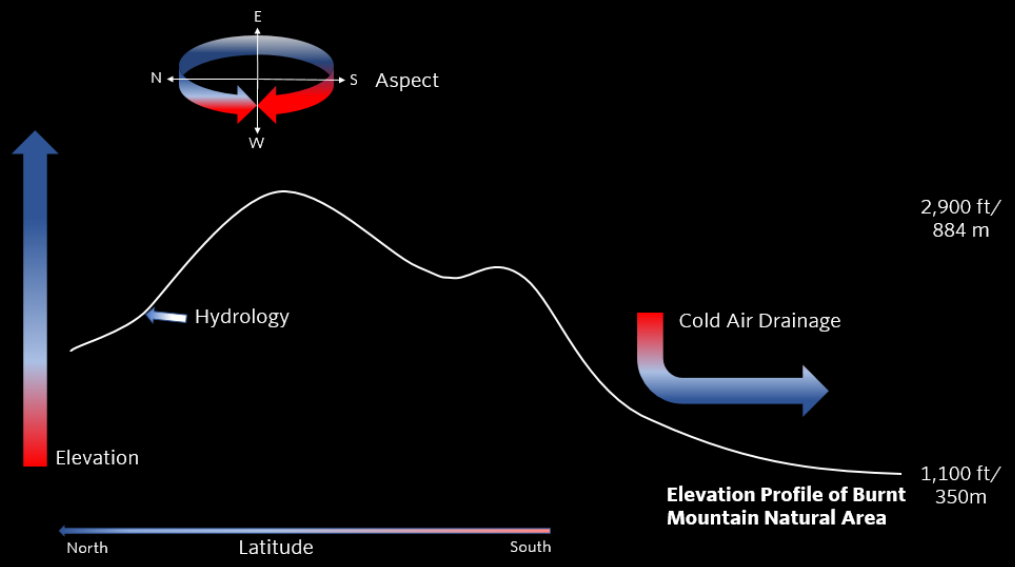
Create climate options



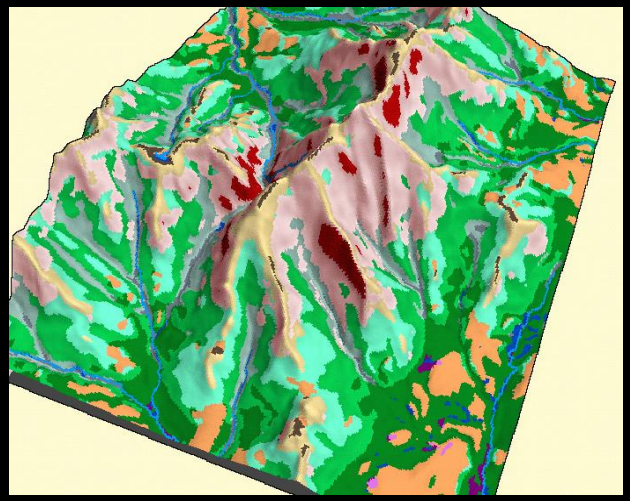
Locally Connected

Allows species to move



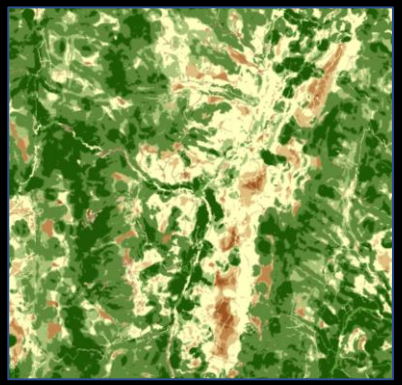


Elevation Profile of Burnt Mountain Natural Area



Climate Resilience

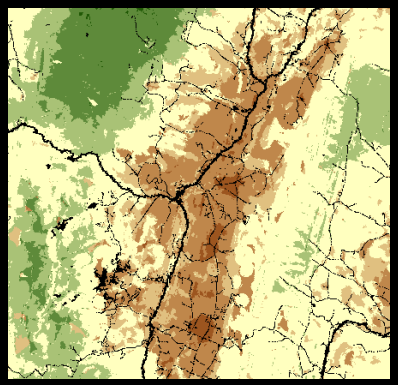
Landscape Diversity (Microclimates)



Create climate options

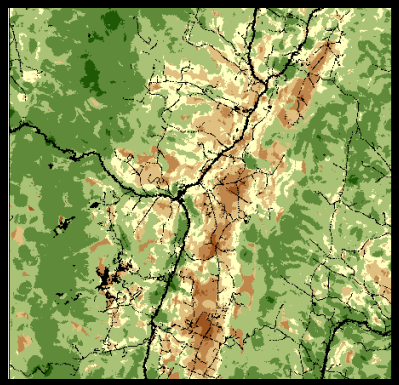
&

Local Connectedness

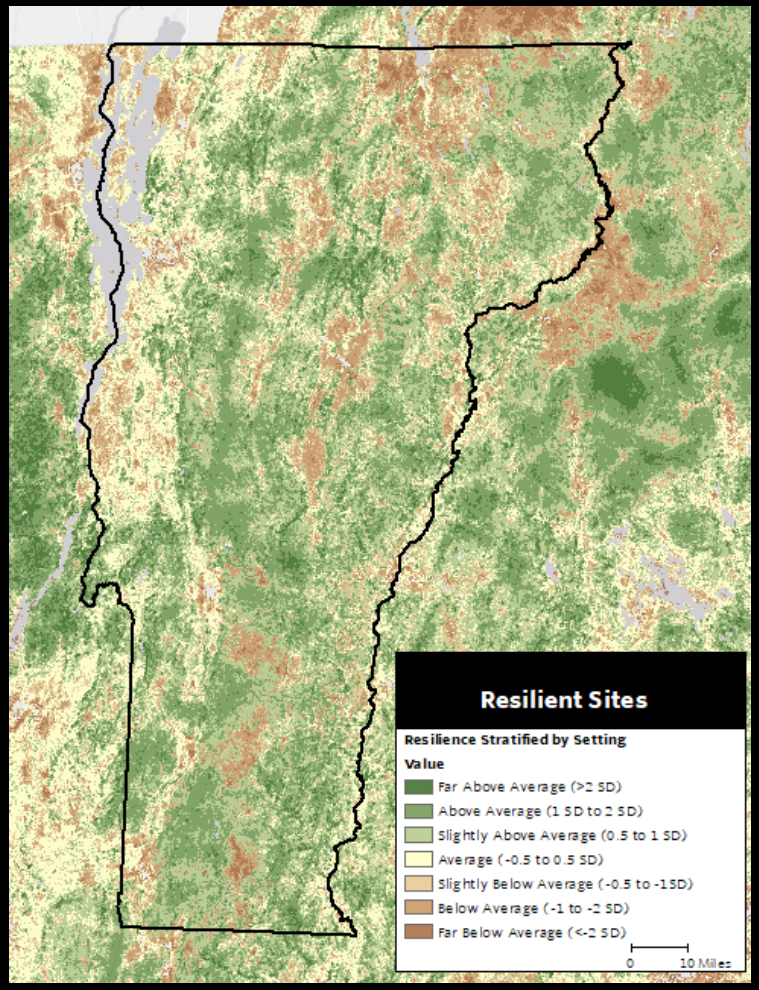


Allow species to move

Resilient Sites

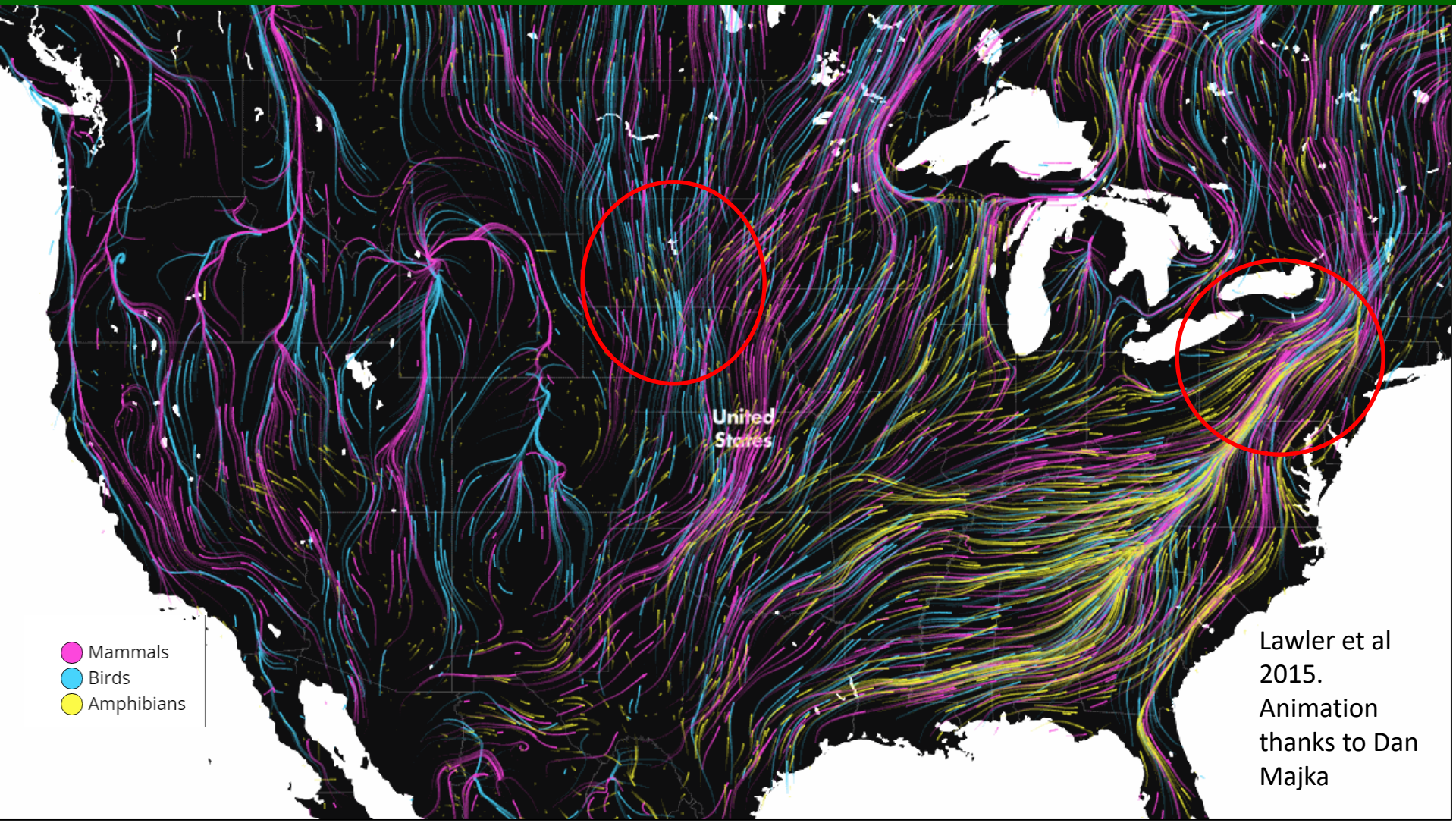


Resilient Sites



Climate Flow

The Gradual Movement of Populations in Response to Climate Change



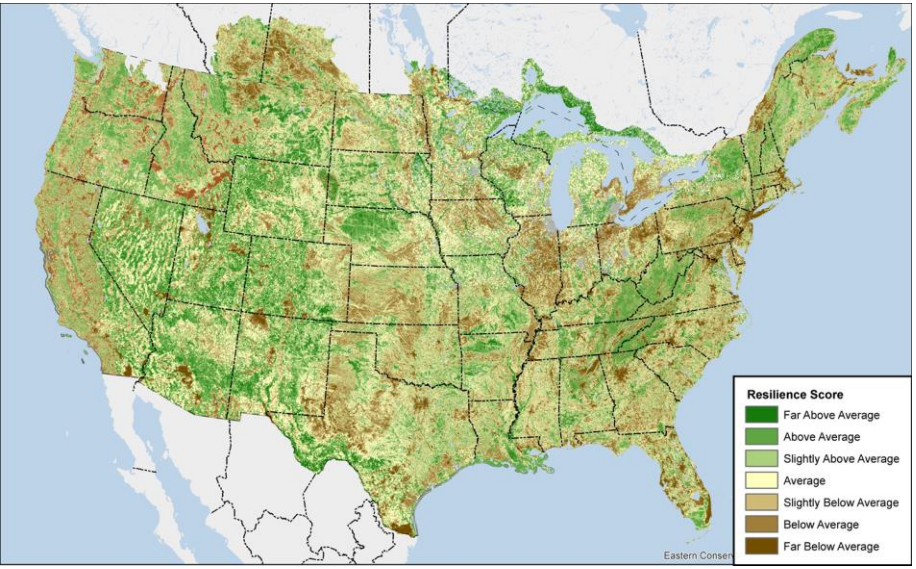
Lawler et al 2015. Animation thanks to Dan Majka

The gradual movement of populations across the landscape in response to climate change

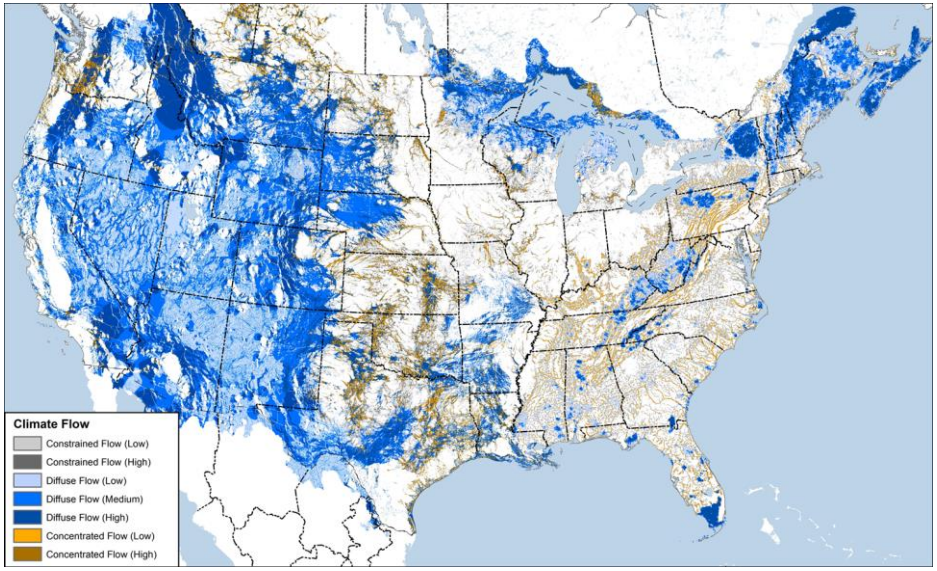
Current Rates: 11 mile per decade North **36 feet** per decade Upslope

Resilient and Connected Network

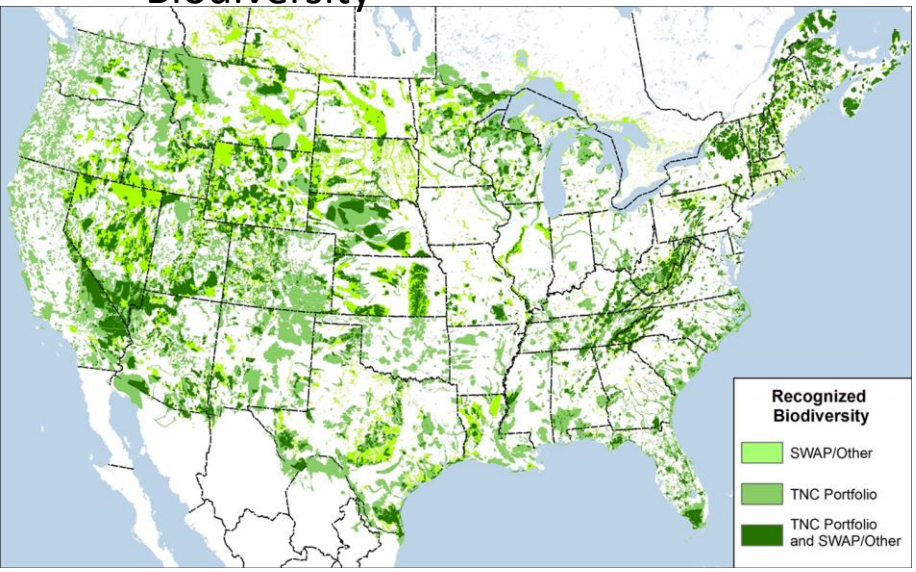
Site Resilience



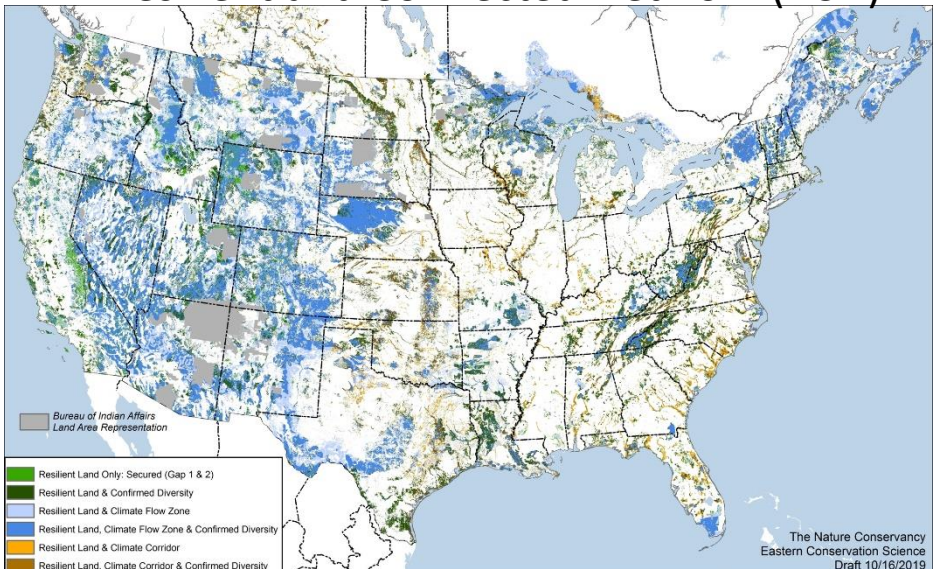
Climate Flow



Biodiversity

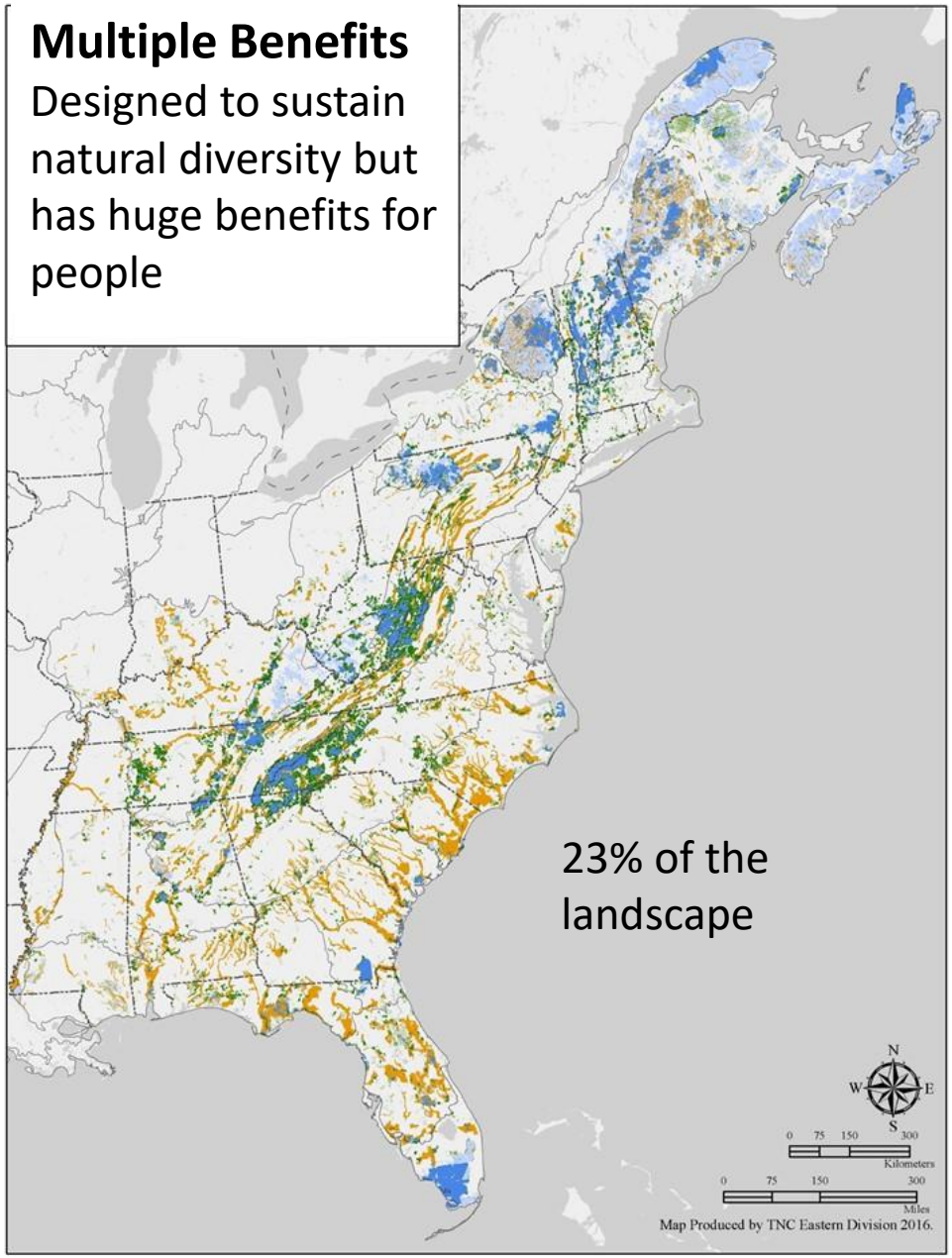


Resilient and Connected Network (RCN)



Multiple Benefits

Multiple Benefits
Designed to sustain natural diversity but has huge benefits for people



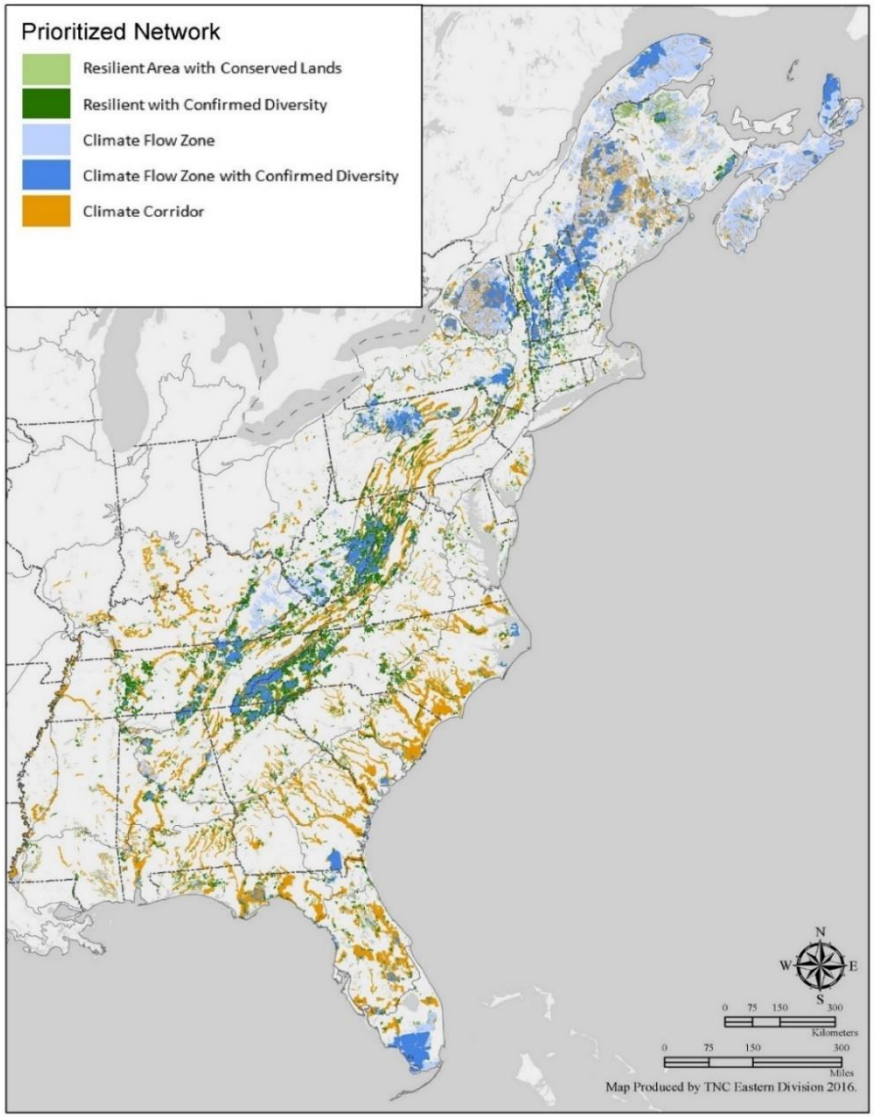
56% of all **Above-Ground Carbon**
(3.9 B tons)

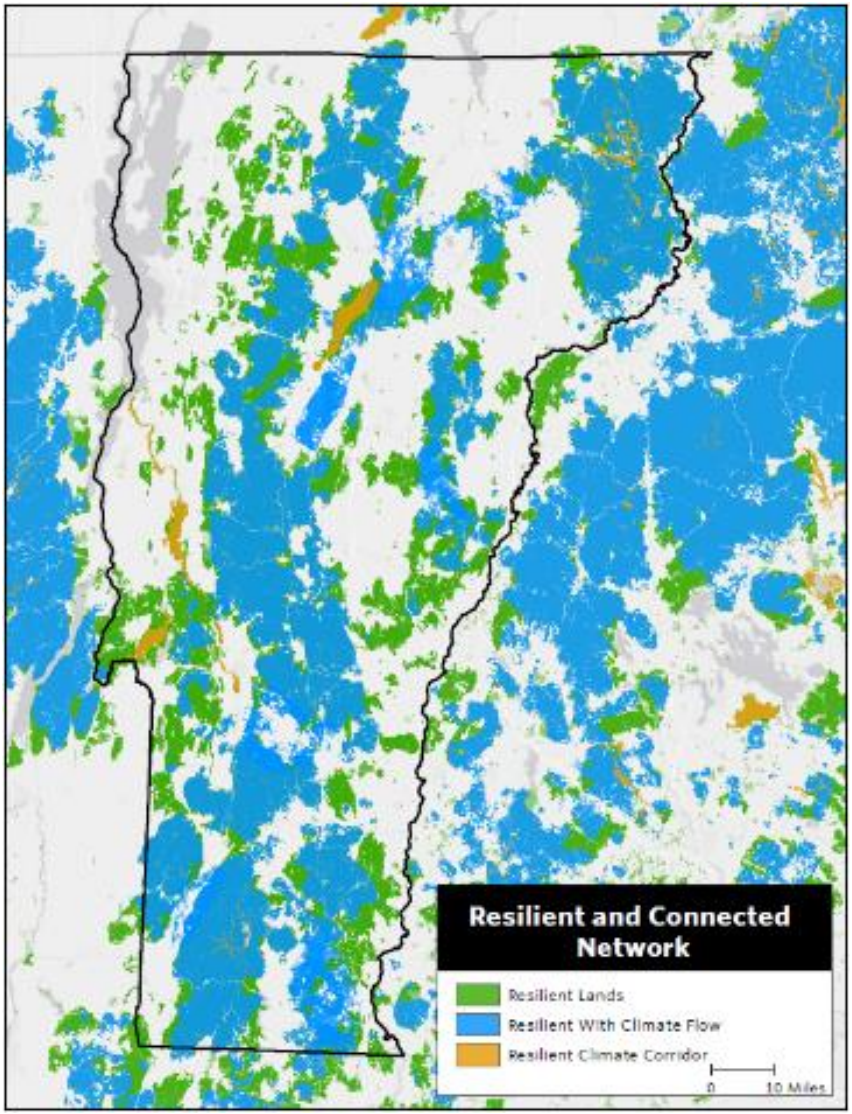
75% of **High Value Source Water**
(66+ M acres)

O2 for **1.8 Billion People**

Mitigates 1.3 M Tons of Pollution
($913 M)

Generates ~$25 Billion - Recreation


Prioritized Network
Resilient Area with Conserved Lands
Resilient with Confirmed Diversity
Climate Flow Zone
Climate Flow Zone with Confirmed Diversity
Climate Corridor
N
W
E
S
0 75 150 300
Kilometers
0 75 150 300
Miles
Map Produced by TNC Eastern Division 2016.


Resilient and Connected Network
Resilient Lands
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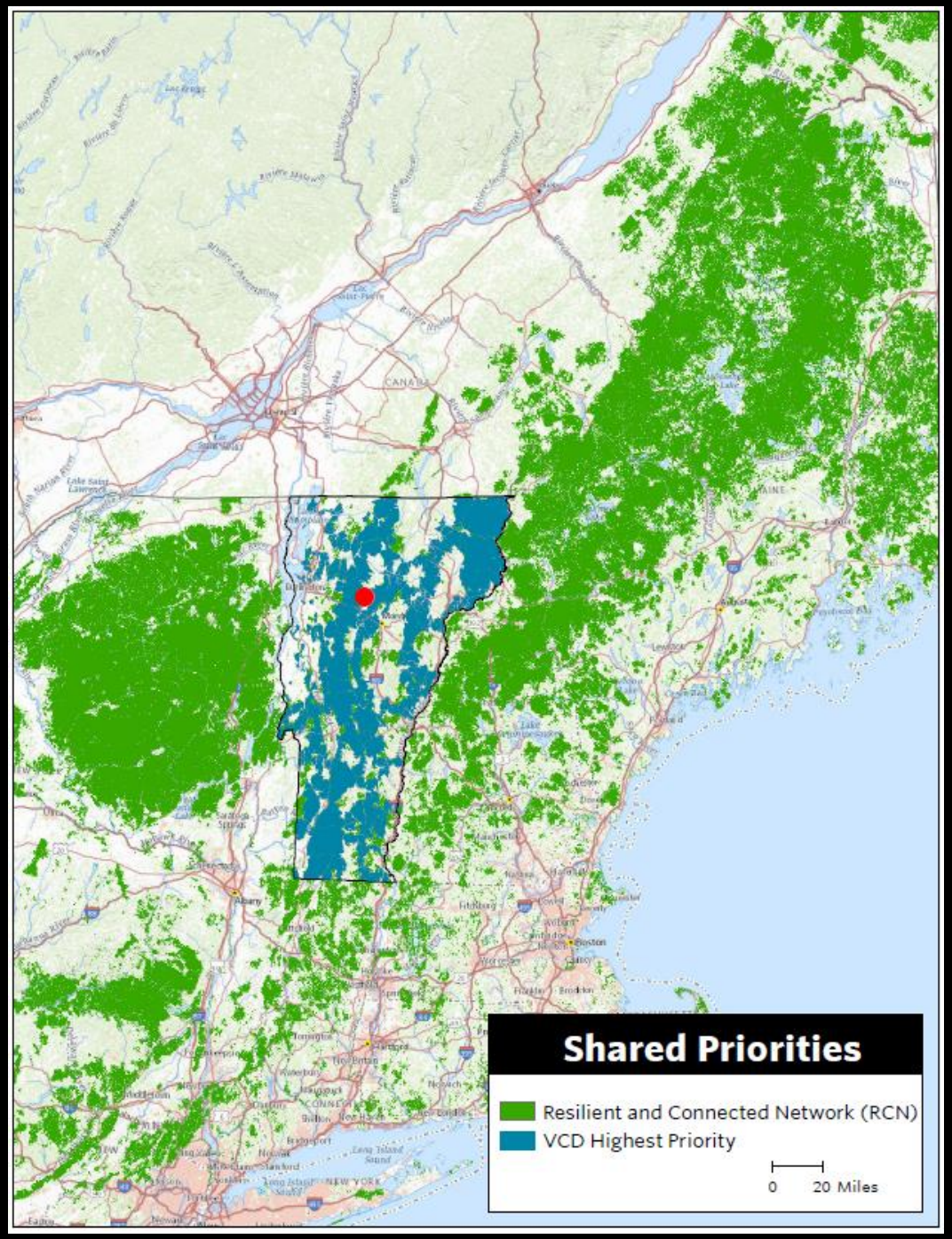
0
10 Miles


Shared Priorities
Resilient and Connected Network (RCN)
VCD Highest Priority
0
20 Miles