VERMONT CONSERVATION DESIGN

A VISION FOR AN ECOLOGICALLY FUNCTIONAL LANDSCAPE

Act 250 Commission
November 8, 2018

Eric Sorenson, ecologist

VERMONT

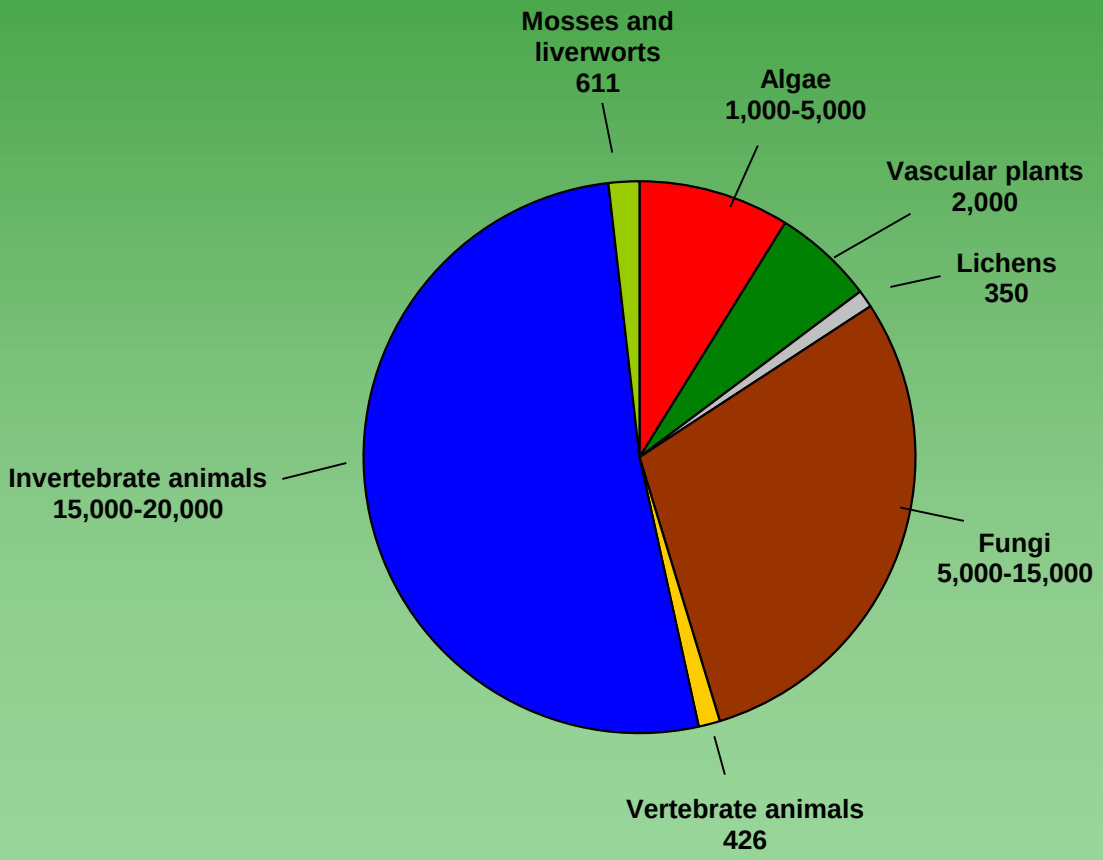
VERMONT FISH & WILDLIFE

Collaborators:

- VT Fish and Wildlife Department
- Vermont Land Trust
- The Nature Conservancy
- VT Department of Forests, Parks & Recreation
- VT Department of Environmental Conservation
- Northwoods Stewardship Center
- USDA Natural Resources Conservation Service

An estimated 24,000 to 43,500 species in Vermont!

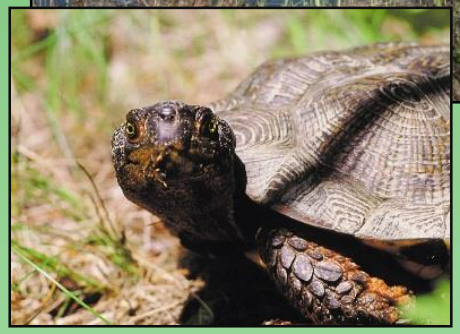
How do we protect them all?



Elfin Skimmer

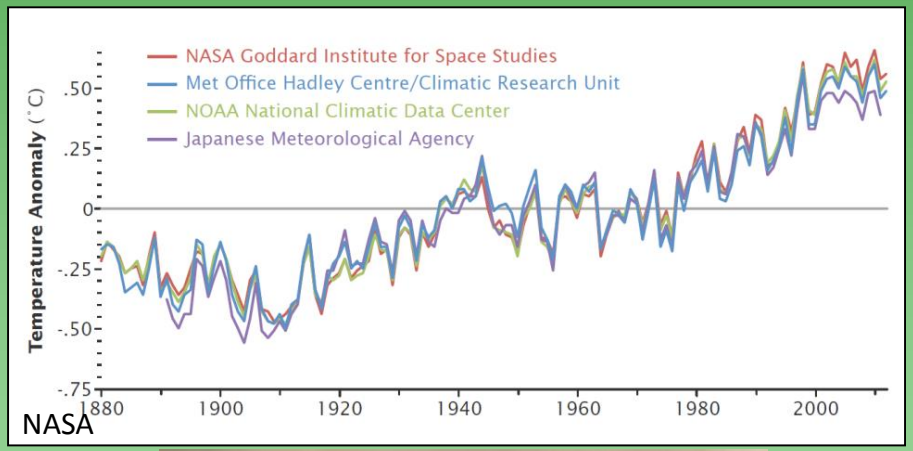
Coarse filter/fine filter approach to conservation

- ***Well-recognized approach to conservation***
- ***Originally a combination of natural communities & species conservation efforts***

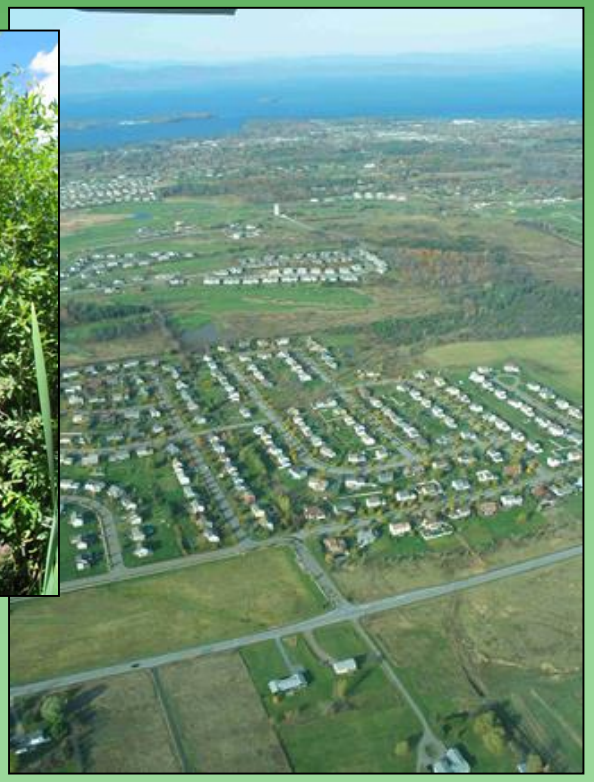


Threats to Biological Diversity

- Population growth
- Habitat loss
- Habitat fragmentation
- Non-native, invasive species
- Climate change – direct and compounding effects



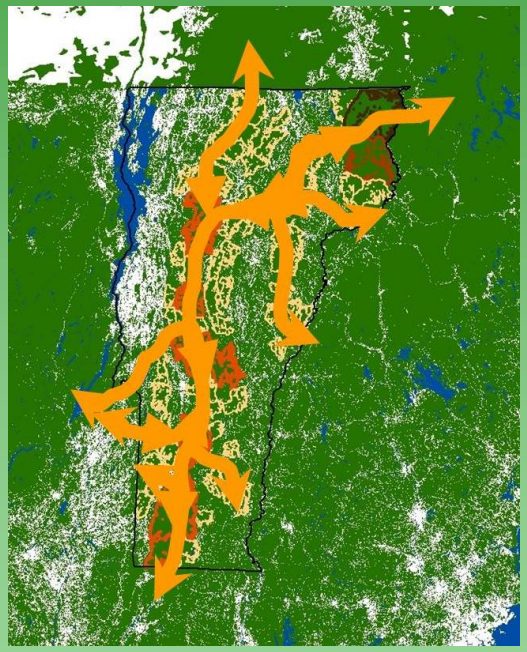
NASA



New!

Climate Change

- rapid and uncertain change
- species will shift independently
- need connectivity – species and processes
- need to “conserve nature’s stage”



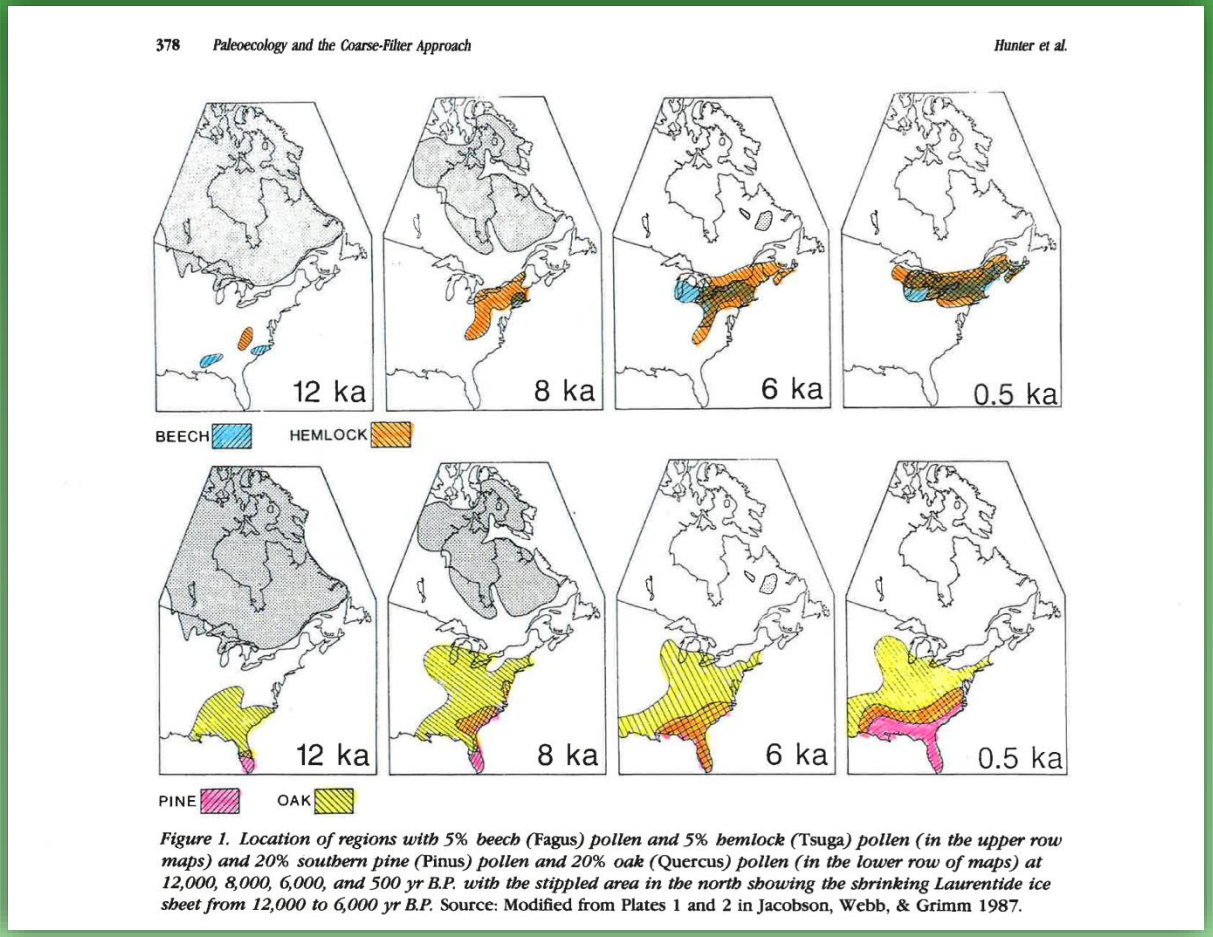


*Figure 1. Location of regions with 5% beech (*Fagus*) pollen and 5% hemlock (*Tsuga*) pollen (in the upper row maps) and 20% southern pine (*Pinus*) pollen and 20% oak (*Quercus*) pollen (in the lower row of maps) at 12,000, 8,000, 6,000, and 500 yr B.P. with the stippled area in the north showing the 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.

We need coarser filters

Vermont Conservation Design

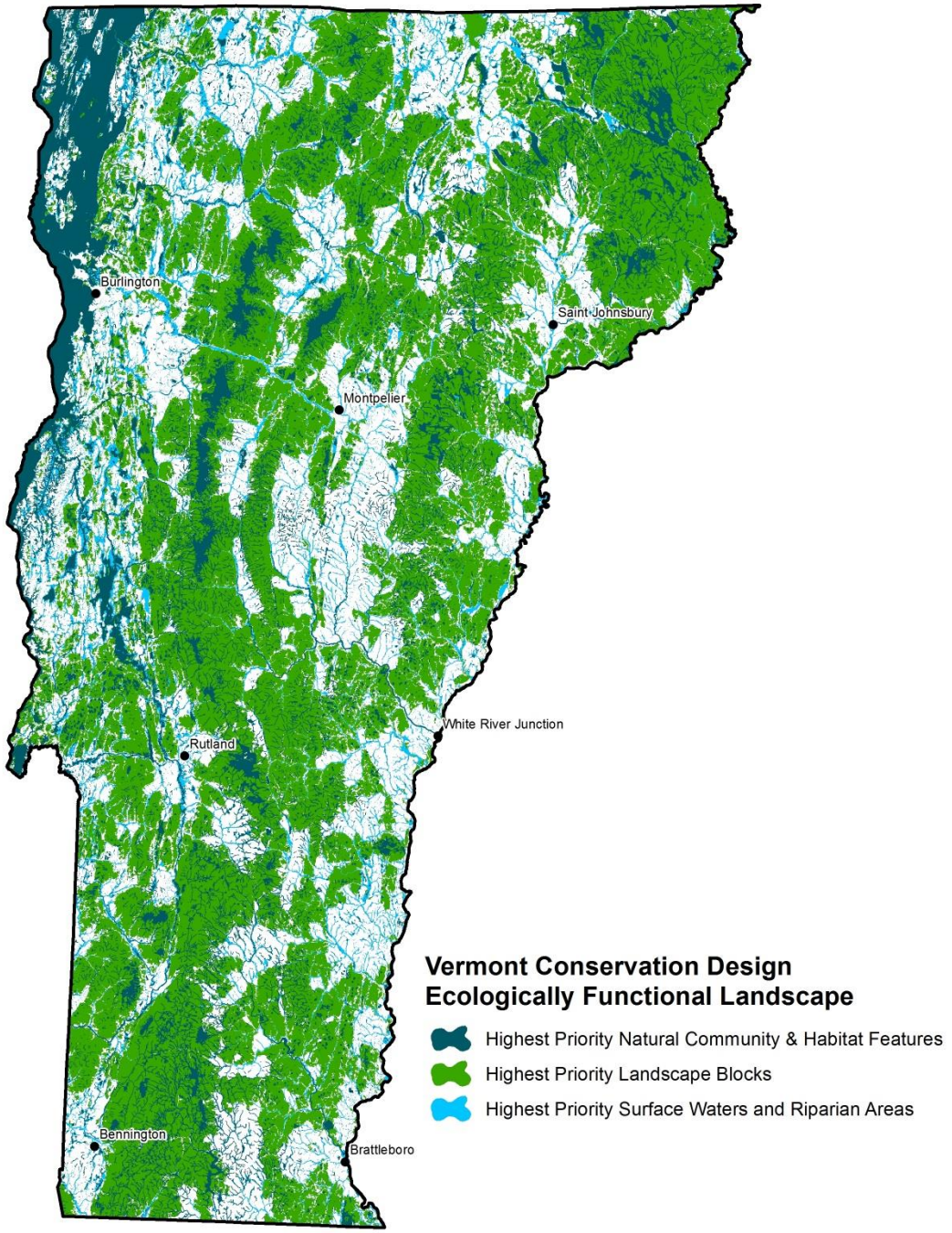
A practical, scientific vision for sustaining Vermont's ecologically functional landscape for the future.

- **Applies the coarse filter-fine filter approach**
- **Uses simple, recognizable features**
- **Depends on thoughtful stewardship and management**

Ecologically Functional Landscape

- **Intact**
- **Connected**
- **Diverse**

A set of coarse-filter features which, if appropriately conserved and managed for their ecological functions, offer high confidence in maintaining biological diversity and ecological processes into the future.



Conservation Design at Three Scales

Landscapes

Interior Forest Blocks
Connectivity Blocks
Surface Waters and Riparian Areas
Riparian Areas for Connectivity
Physical Landscapes
Wildlife Road Crossings

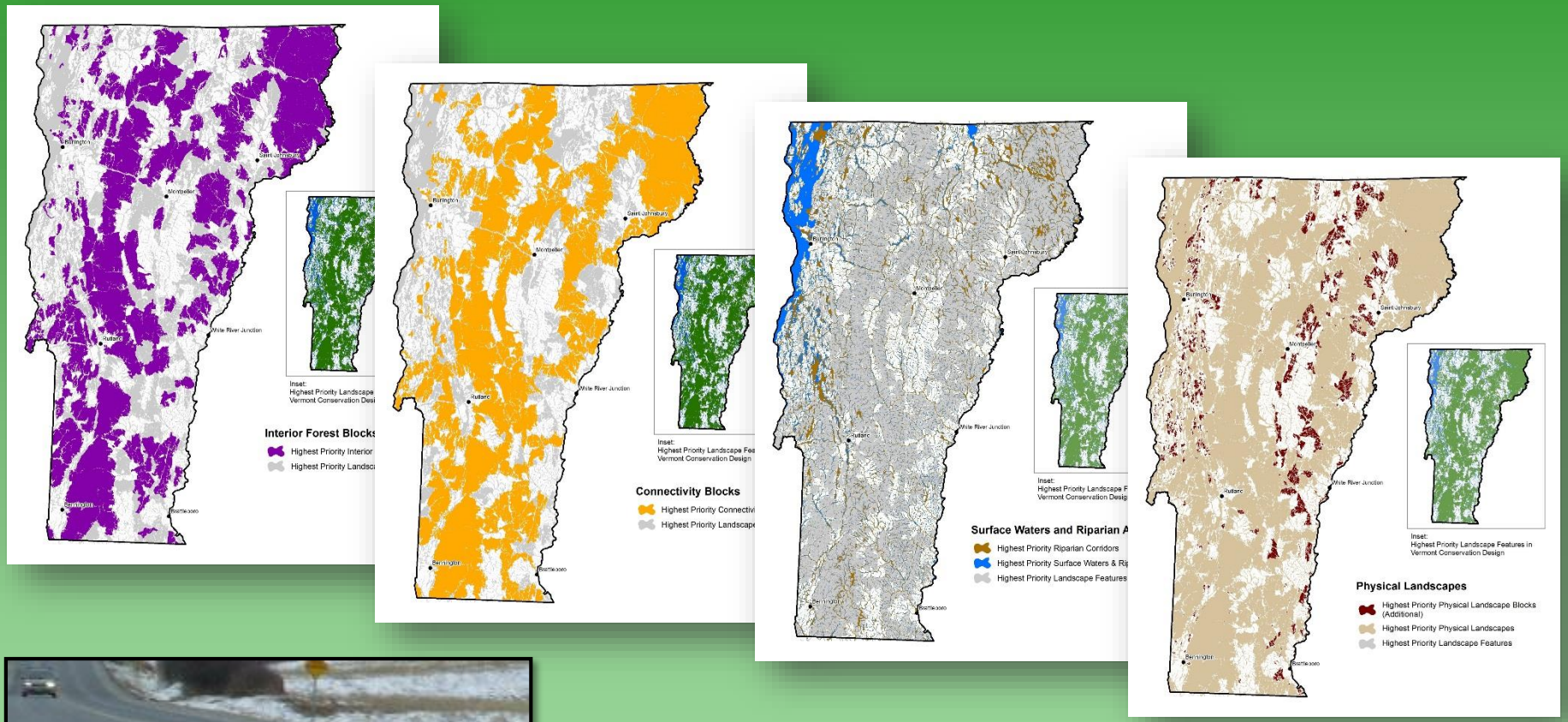
Natural Communities

Natural Communities
Young and Old Forest
Aquatic Habitats
Wetlands
Grasslands/Shrublands
Underground Habitats

Species

Species with very specific biological needs that will likely always require individual attention

Intact and Connected Forest Blocks
Surface Waters and Riparian Areas



Maintain the specific functions of each element

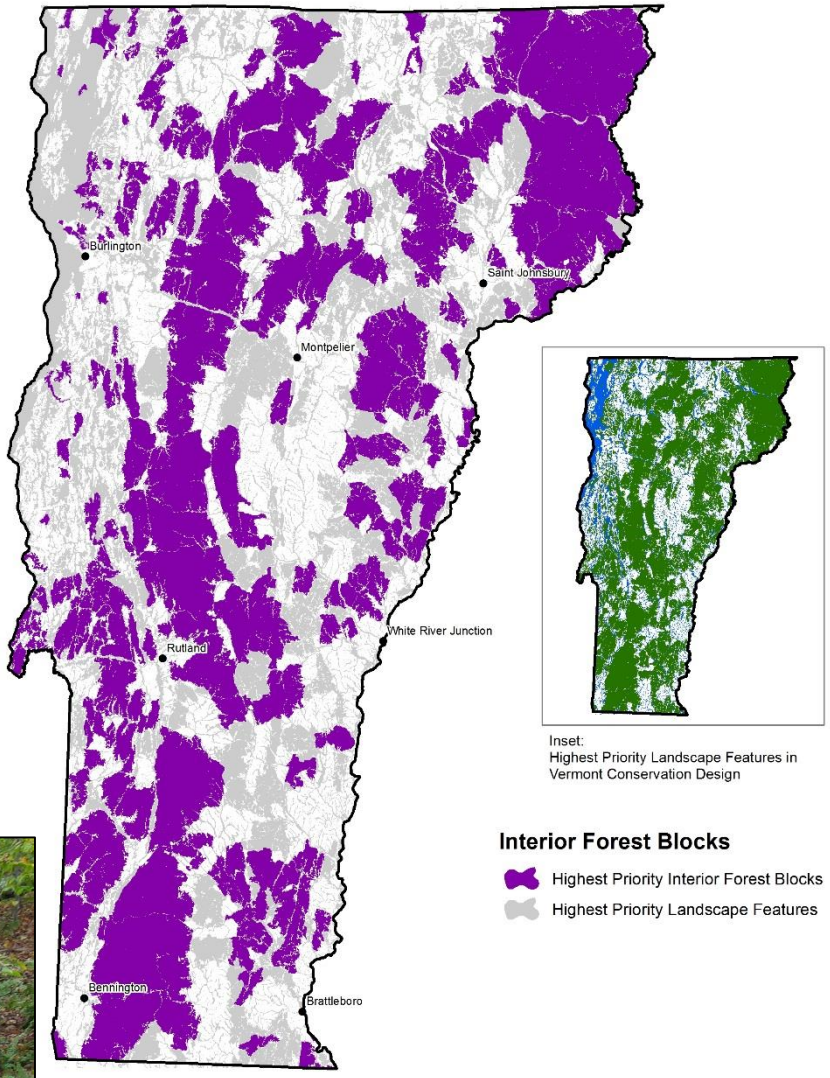
Interior Forest Blocks

The best examples of interior forest in each region of Vermont

Places where species and ecological process exist with minimal disturbance

Ecological functions:

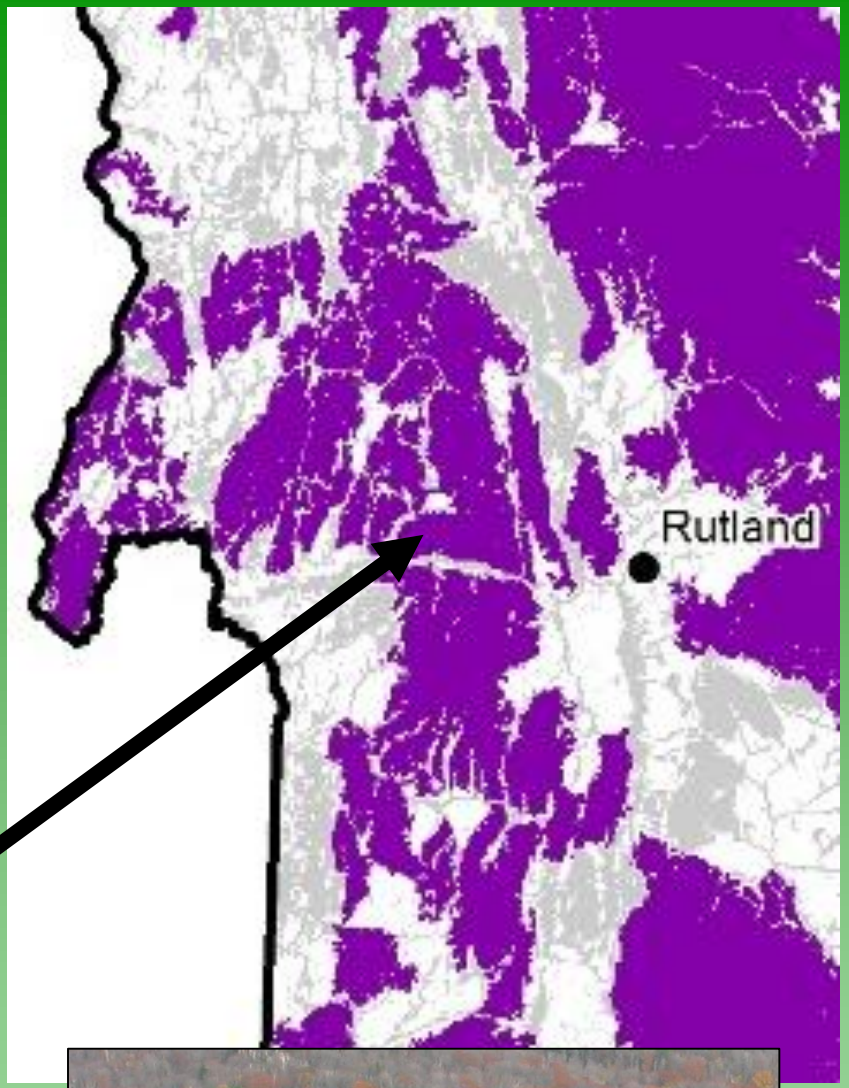
- Interior forest species
- Wide-ranging mammals
- Air and water quality
- Flood resilience
- Ecological processes
- Species can shift and adapt within blocks



Interior Forest Blocks

Guidelines for Maintaining Ecological Function:

- Avoid permanent interior fragmentation
- Limit development to the margins
- Maintain forest structure & distribution of age classes
- Minimize invasive species.



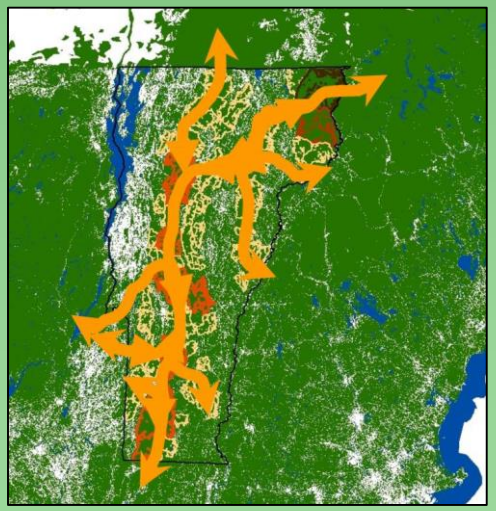
Connectivity Blocks

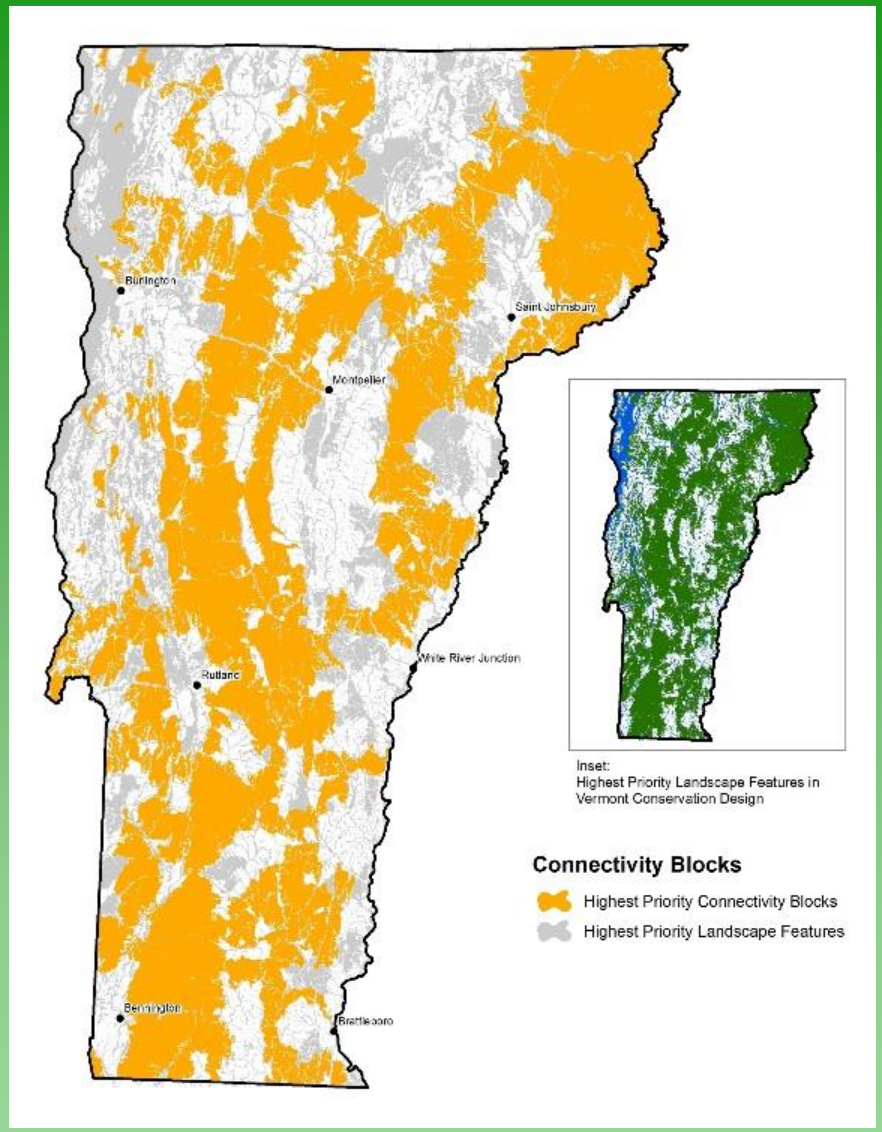
The network of forest blocks that are critical for wildlife movement and species ranges shifts

Connects within Vermont and to adjacent states and Québec

Ecological Functions:

- Wildlife movement and dispersal
- Habitat for wide-ranging mammals
- Genetic exchange
- Plant and animal range shifts in response to climate change
- Reduces extinction risks





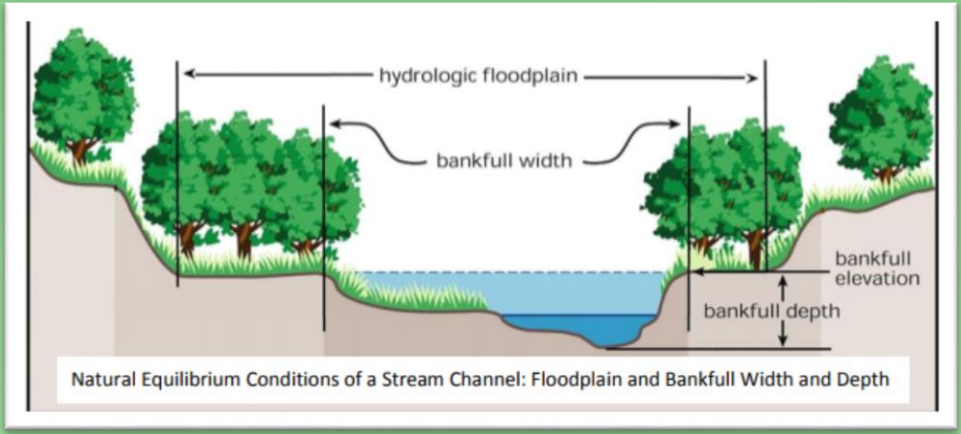
Surface Waters and Riparian Areas

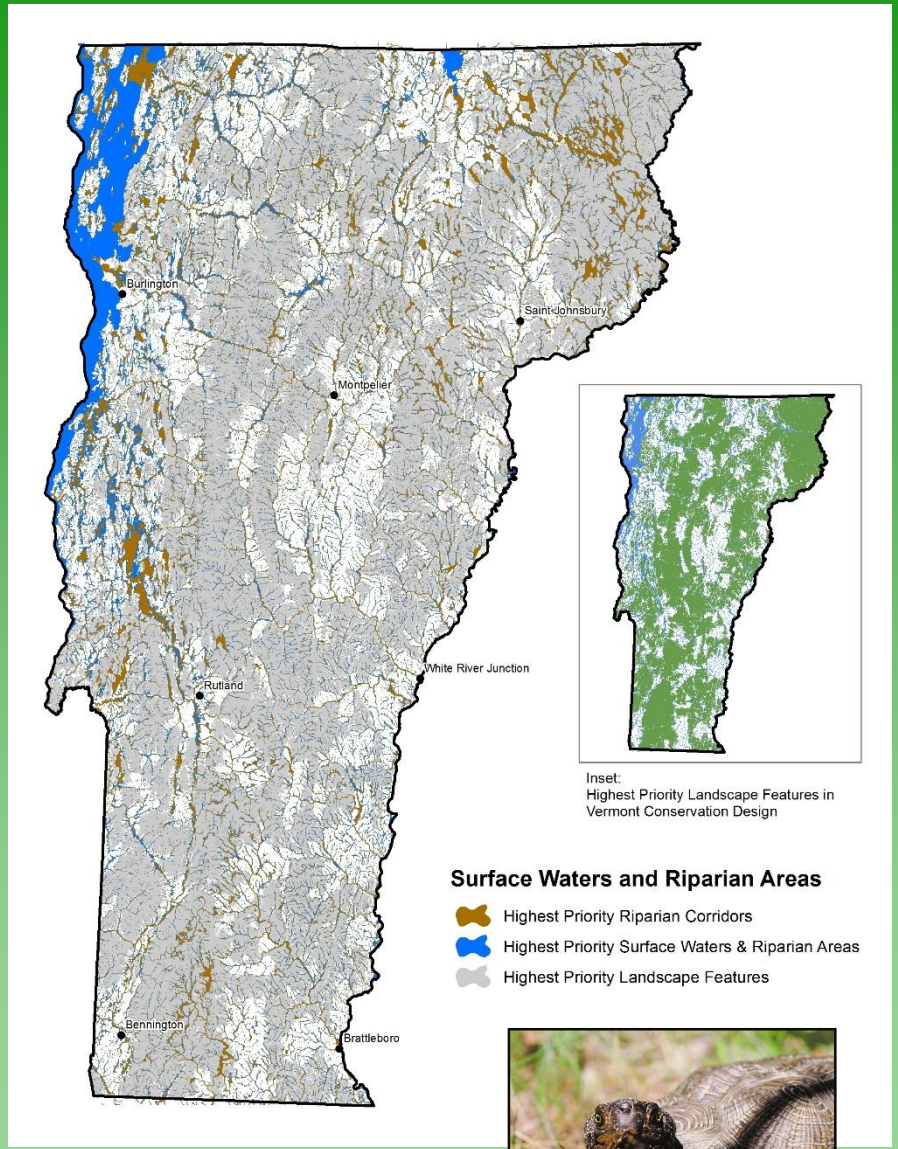
Every river, stream, lake, pond and riparian area in Vermont

Entire network contributes to biodiversity and ecological function

Ecological Functions:

- Habitat for aquatic species
- Water quality
- Flood protection
- Terrestrial species habitat
- Wildlife movement
- Plant and animal range shifts in response to climate change

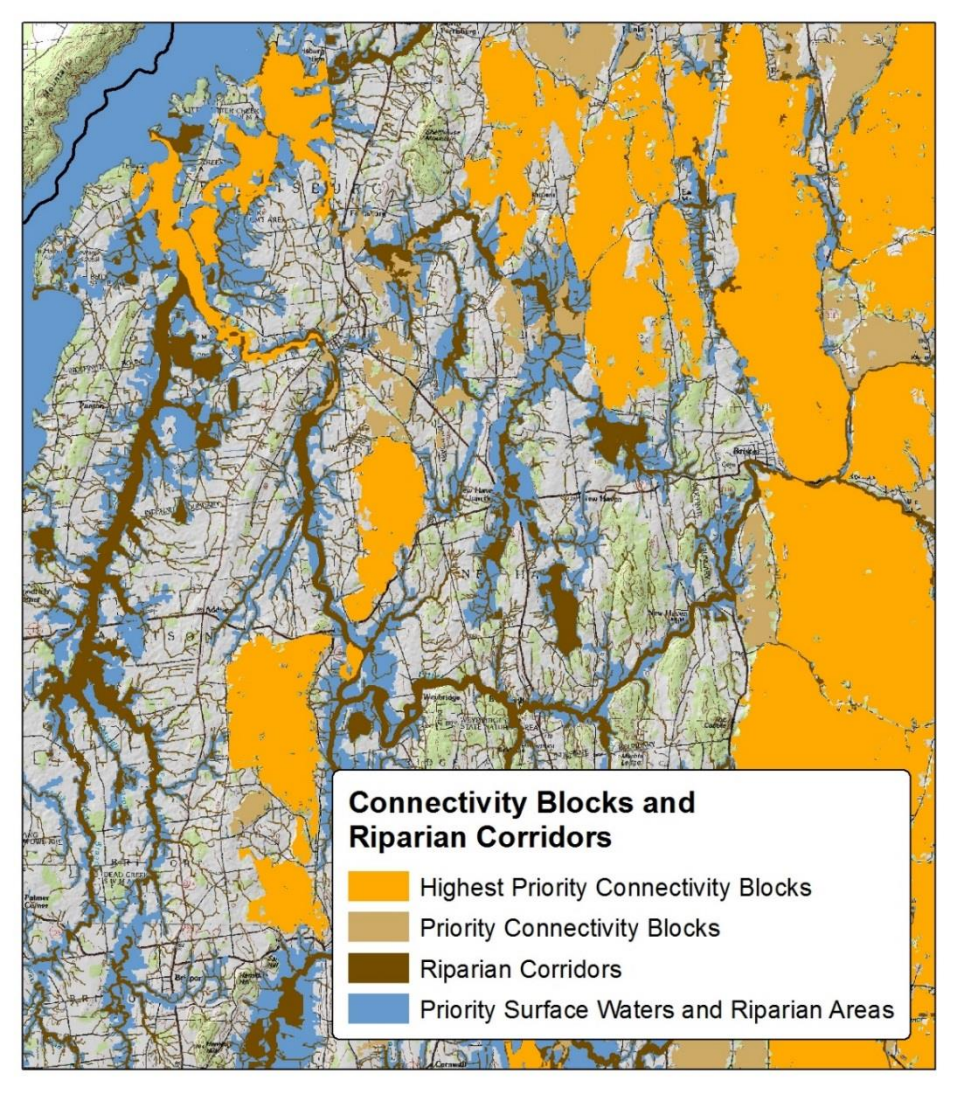




Riparian Connectivity

In parts of the state, riparian areas are the only connections between forest blocks

We need to restore riparian vegetation



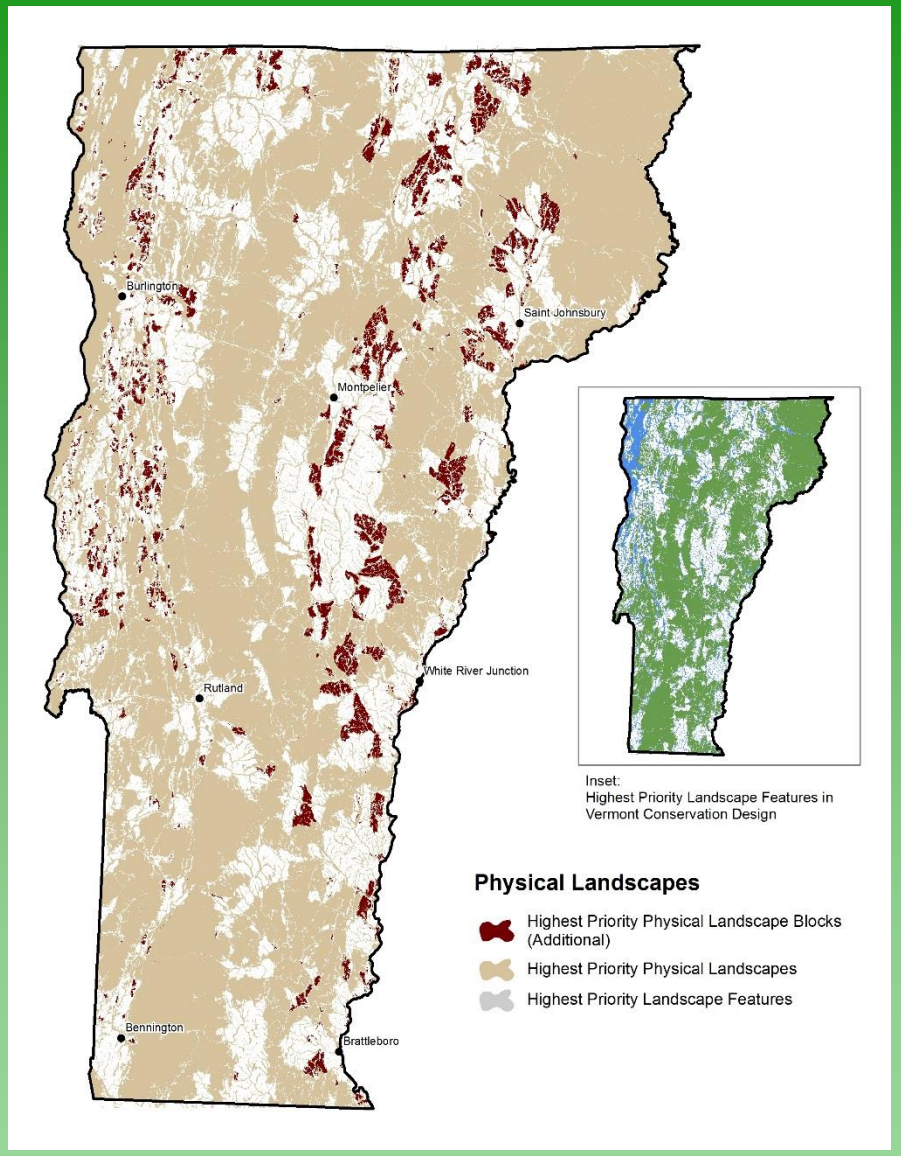
Physical Landscape Diversity

A set of forest blocks that ensure we conserve Vermont's full diversity of elevation, geology, and landforms

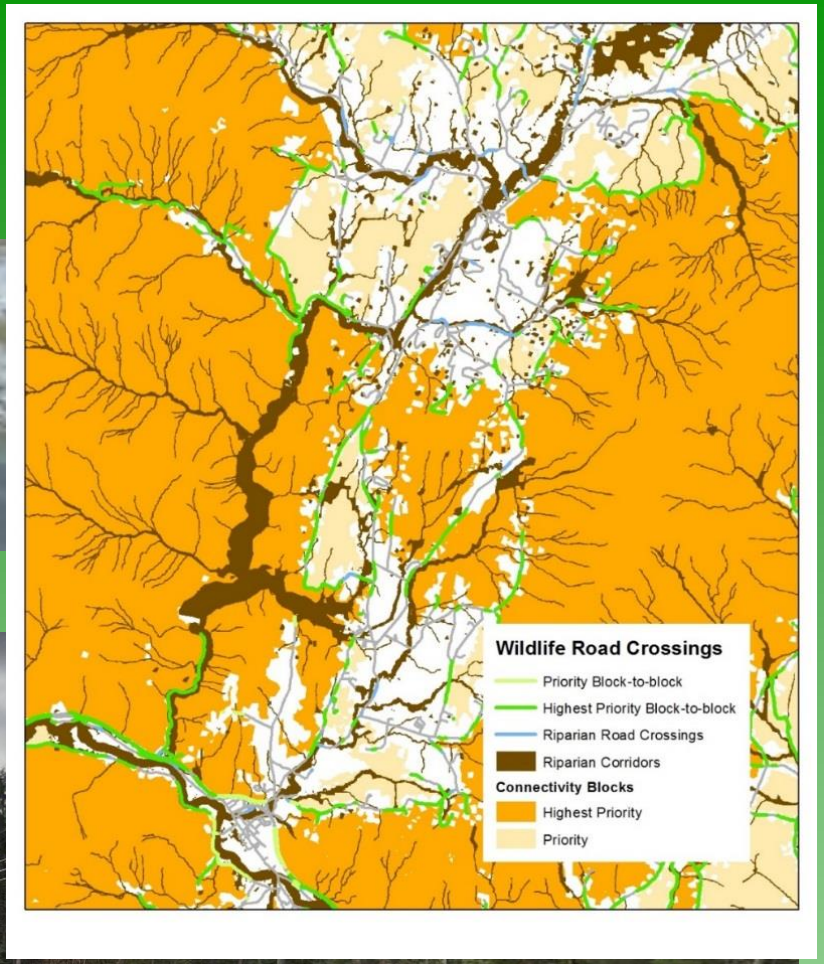
"Conserve nature's stage"

Ecological functions:

- Habitat for species that use specific physical settings (e.g. those found on calcium-rich rock)
- Species can shift to new settings in a changing climate



Wildlife Road Crossings



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Natural Communities

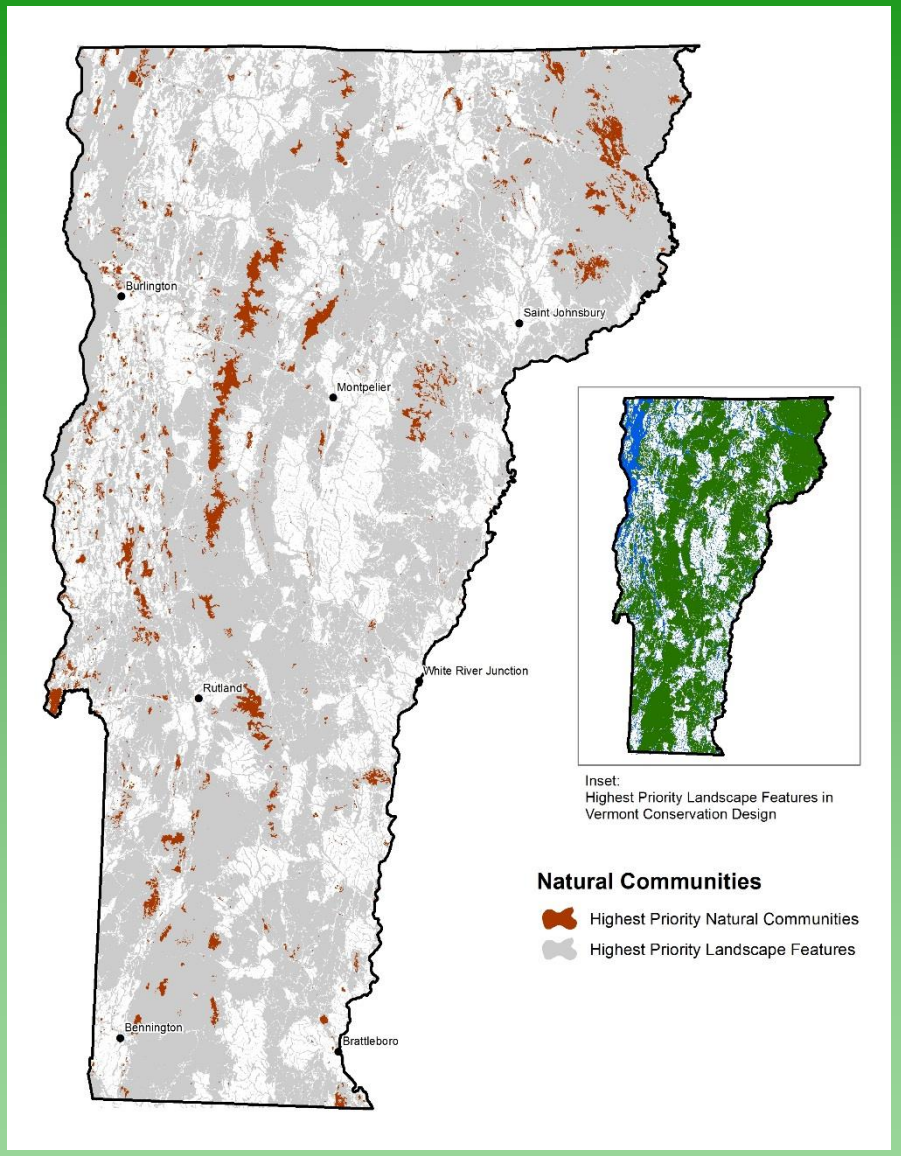
Vermont's original natural habitats

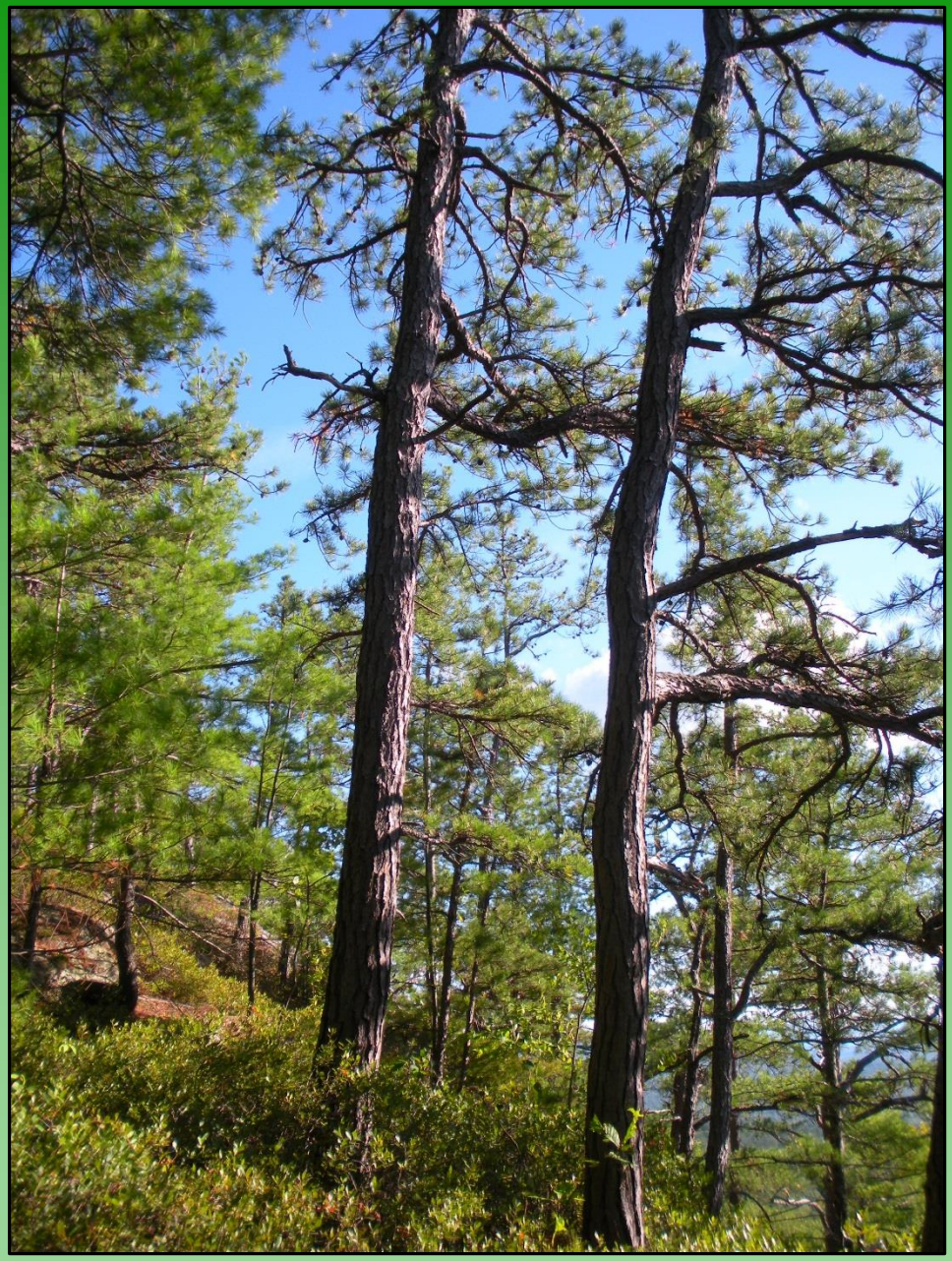
All examples of rare types and 50% of the examples of more common types

Matrix forests conserved by forest blocks and old forests

Ecological Functions:

- Coarse filters for the majority of our native species
- Places that will always support unique assemblages of biodiversity, even in a changing climate





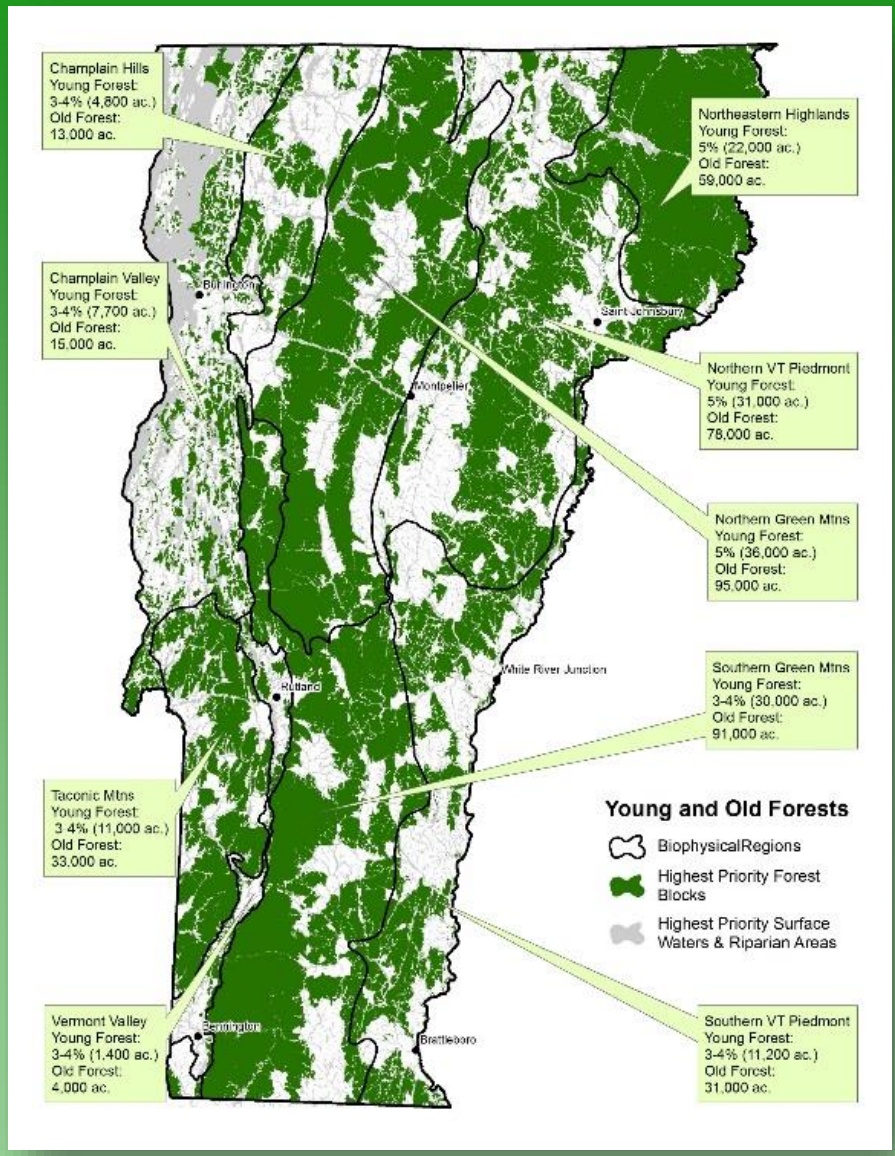
Young and Old Forests

Young and old forests support a great diversity of species and ecological processes

Target of 3-5% young forest and 10% old forest, distributed across Vermont and proportional to matrix forest types

Ecological Functions:

- Young forests are habitat for many wildlife species, especially birds
- Old forests have complex and diverse habitats, contribute to clean air and water, and are particularly resilient to change



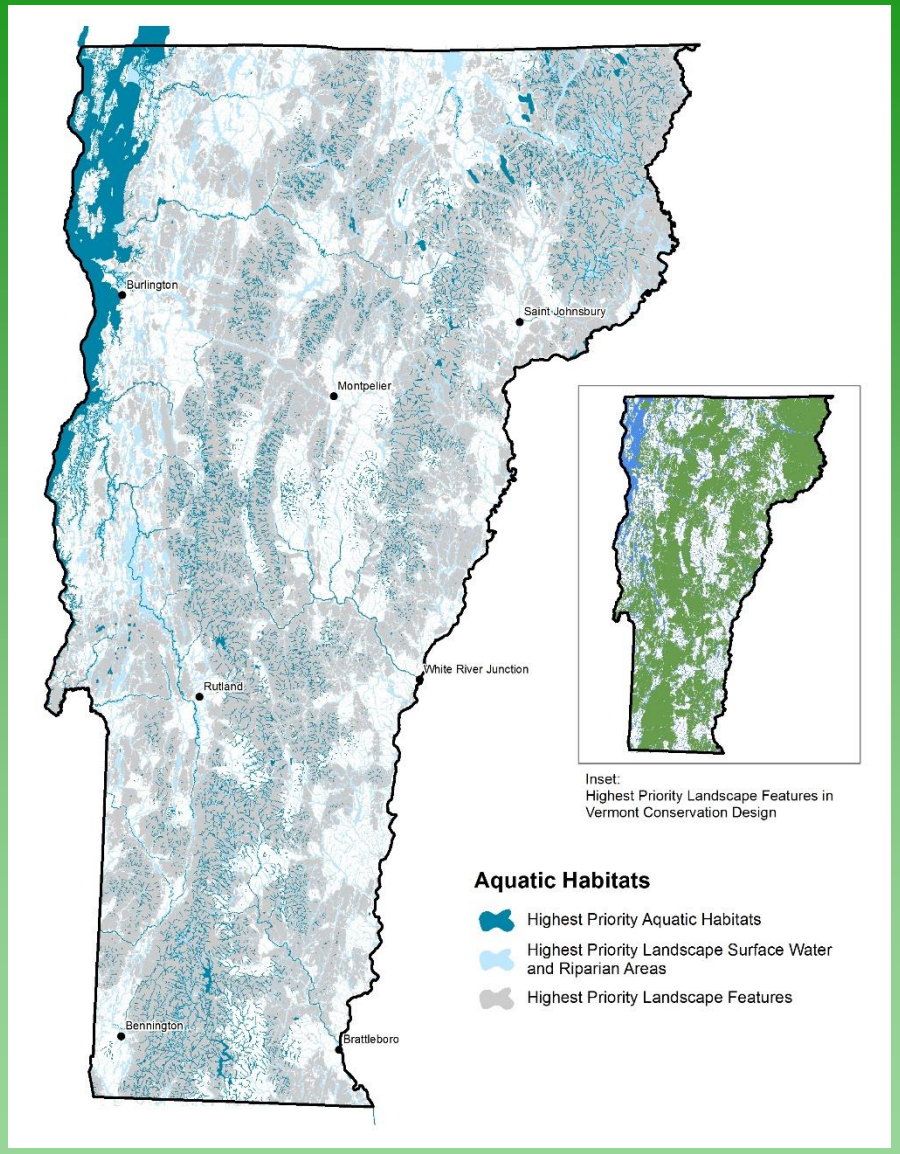
Aquatic Habitats

The river and stream segments, and lakes and ponds that make unique contributions to biological diversity

Need to be conserved as part of the larger network of surface waters and riparian areas

Ecological Functions:

- Habitat for rare and specialist species
- Conserve the stage (physical diversity) of aquatic systems
- Cold water refugia



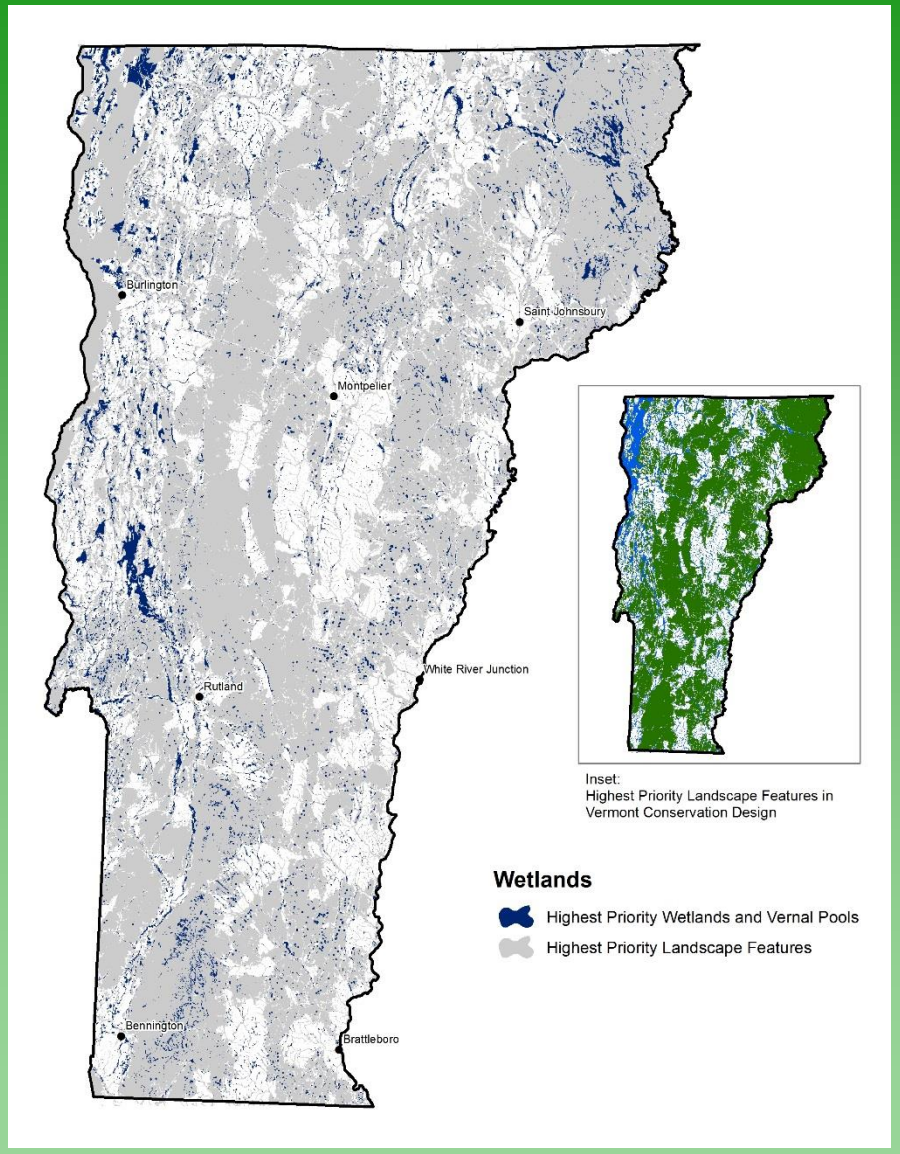
Wetlands

Vermont's wetlands provide irreplaceable habitats and ecological functions

Almost all of Vermont's wetlands and vernal pools are highest priority

Ecological Functions:

- Fish and wildlife habitat
- Many rare species are found only in wetlands
- Flood protection
- Water quality
- Ground water protection



Grasslands and Shrublands

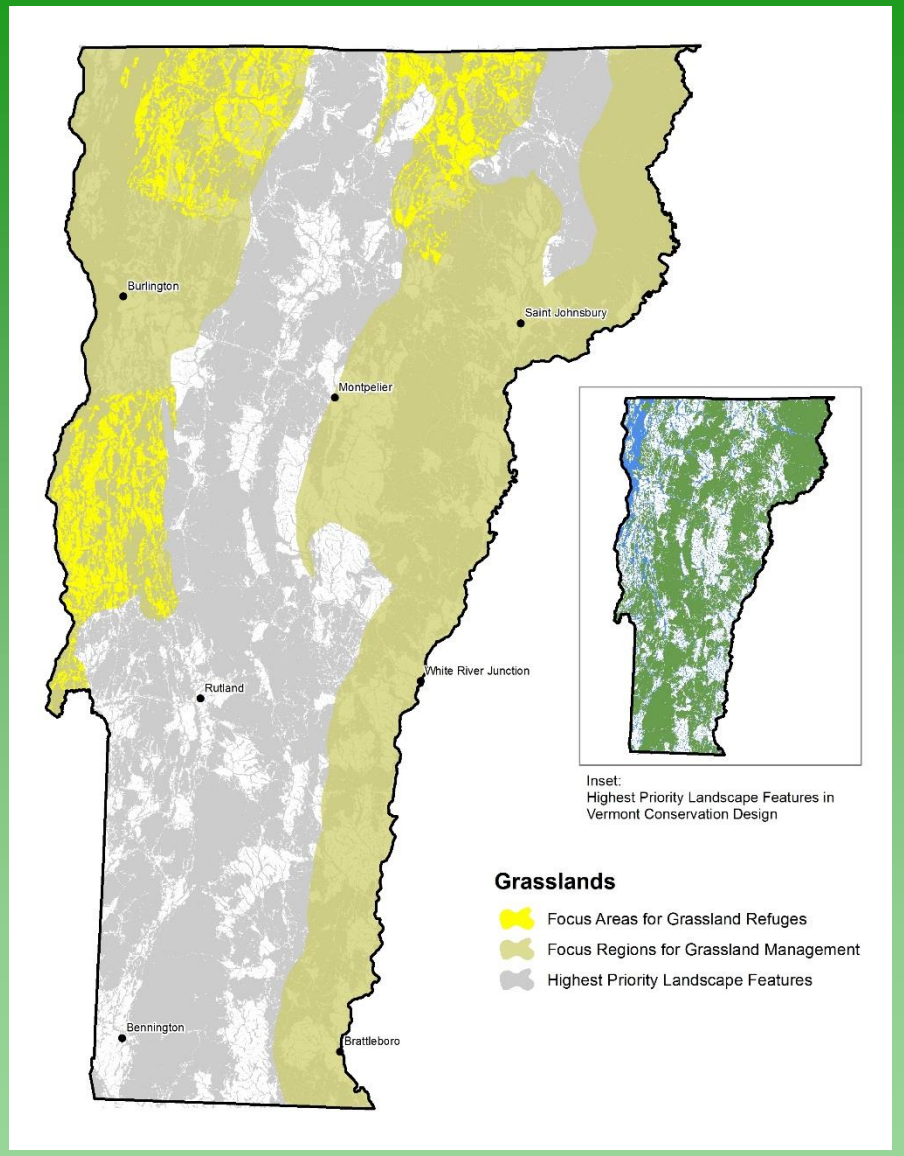
Grasslands and shrublands are man-made habitats that support a unique set of species

Many bird species that need grasslands or shrublands are in regional decline

"Lifeboat" of 7,500 acres to ensure these species remain in Vermont

Ecological Functions:

- Supports a suite of grassland-nesting and shrubland nesting birds
- Habitat that has been lost in other parts of the country



Underground Habitats

Caves and mines are our subterranean natural communities

We know much about the bats that use these places, but invertebrates, fungi, algae, and other species are likely present as well

A set of caves and mines, but not mapped so we can protect sensitive sites

Ecological Functions:

- Supports hibernating bats and likely many other species
- Habitat that has been lost in other parts of the country

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Northern pale painted cup
(*Castilleja septentrionalis*)

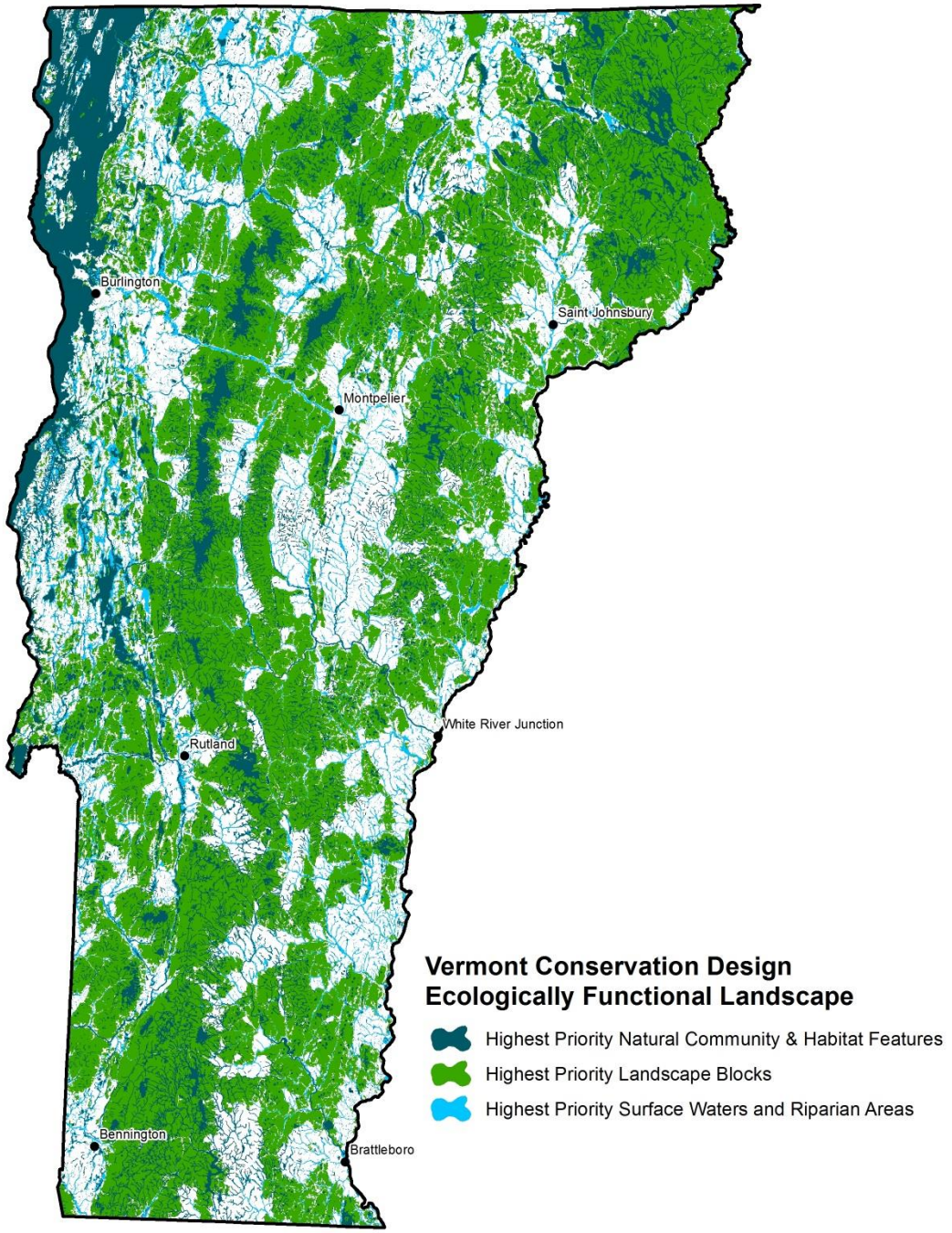
Spiny softshell turtle

Vermont Conservation Design

Maintains an intact, connected and diverse natural landscape

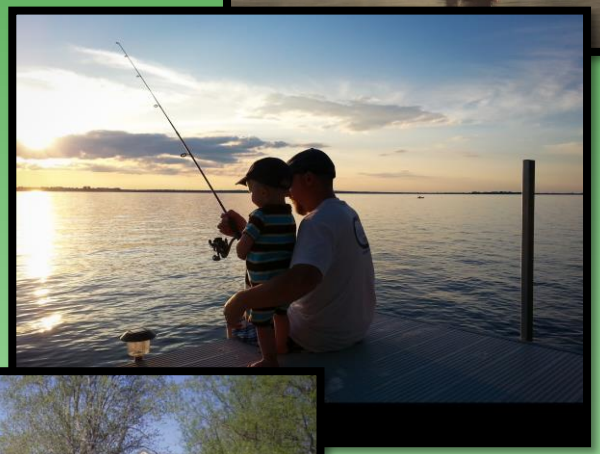
Conserves species and natural communities

Allows nature to adapt to a changing climate



Sustains more than biodiversity

- Outdoor recreation
- Clean water
- Rural character
- Working farms and forests
- Nature's benefits



Some Thoughts and Perspectives

- Vision for the future of Vermont
- Voluntary landowner choices are key
- All the features are needed for ecological function
- Unifies many aspects of conservation
- Conservation success requires ecologically functional landscapes

Photo by Susan Morse

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Act 250 Criterion 1: Floodways, Streams, Shorelines, Wetlands

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Act 250 Criterion 8: Rare and Irreplaceable Natural Areas

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Species

Susan Morse

Species with very specific biological needs that will likely always require individual attention

Act 250 Criterion 8 (A): Necessary Wildlife Habitat and Endangered Species

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Significant Forest Blocks and Significant Landscape Connectivity

Thank you… Questions and discussion?