

# VERMONT CONSERVATION DESIGN

## *A VISION FOR AN ECOLOGICALLY FUNCTIONAL LANDSCAPE*



Forest Economy Study  
Group

July 7, 2021

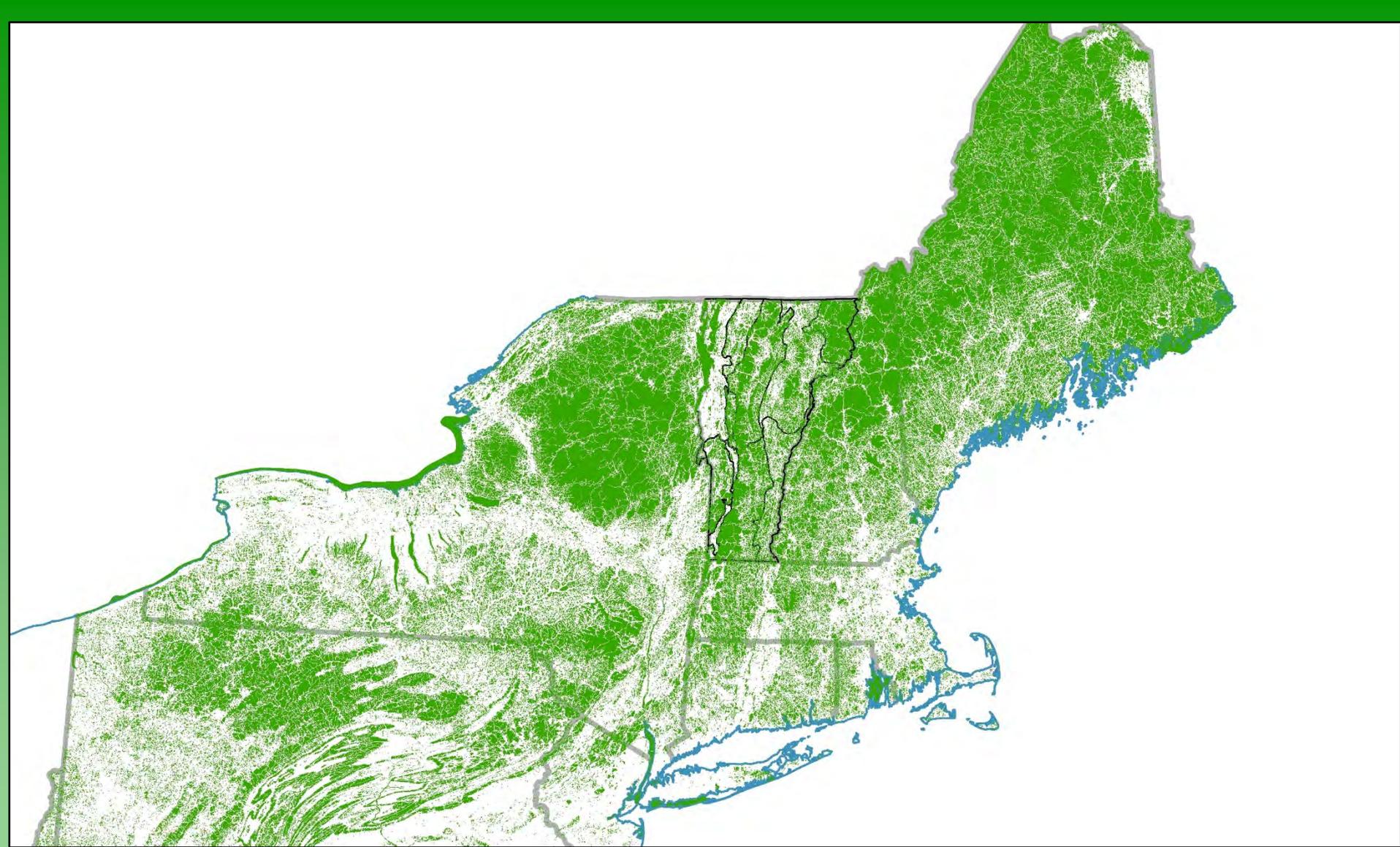
Eric Sorenson  
Ecologist



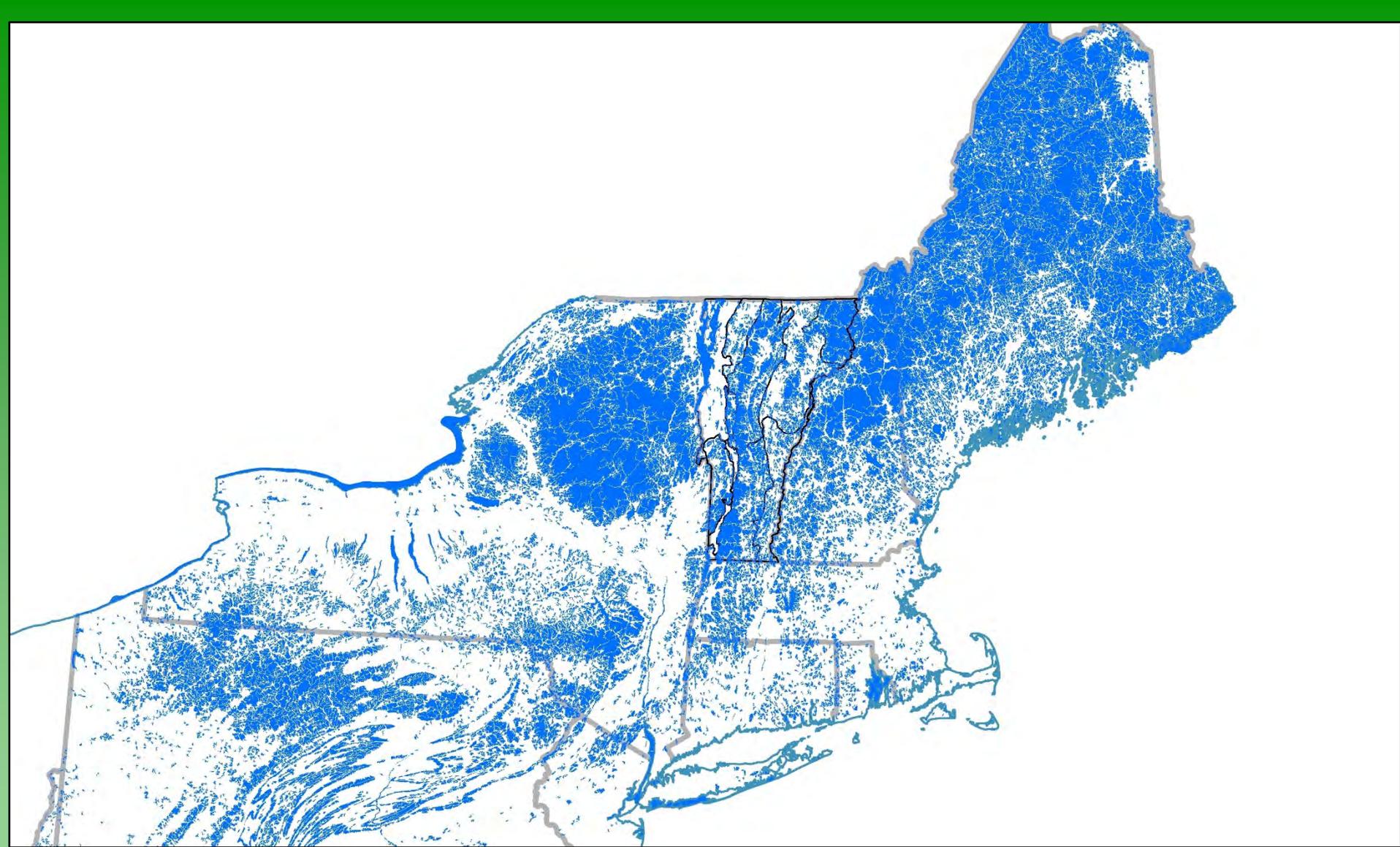


## **Keeping Forests as Forests:**

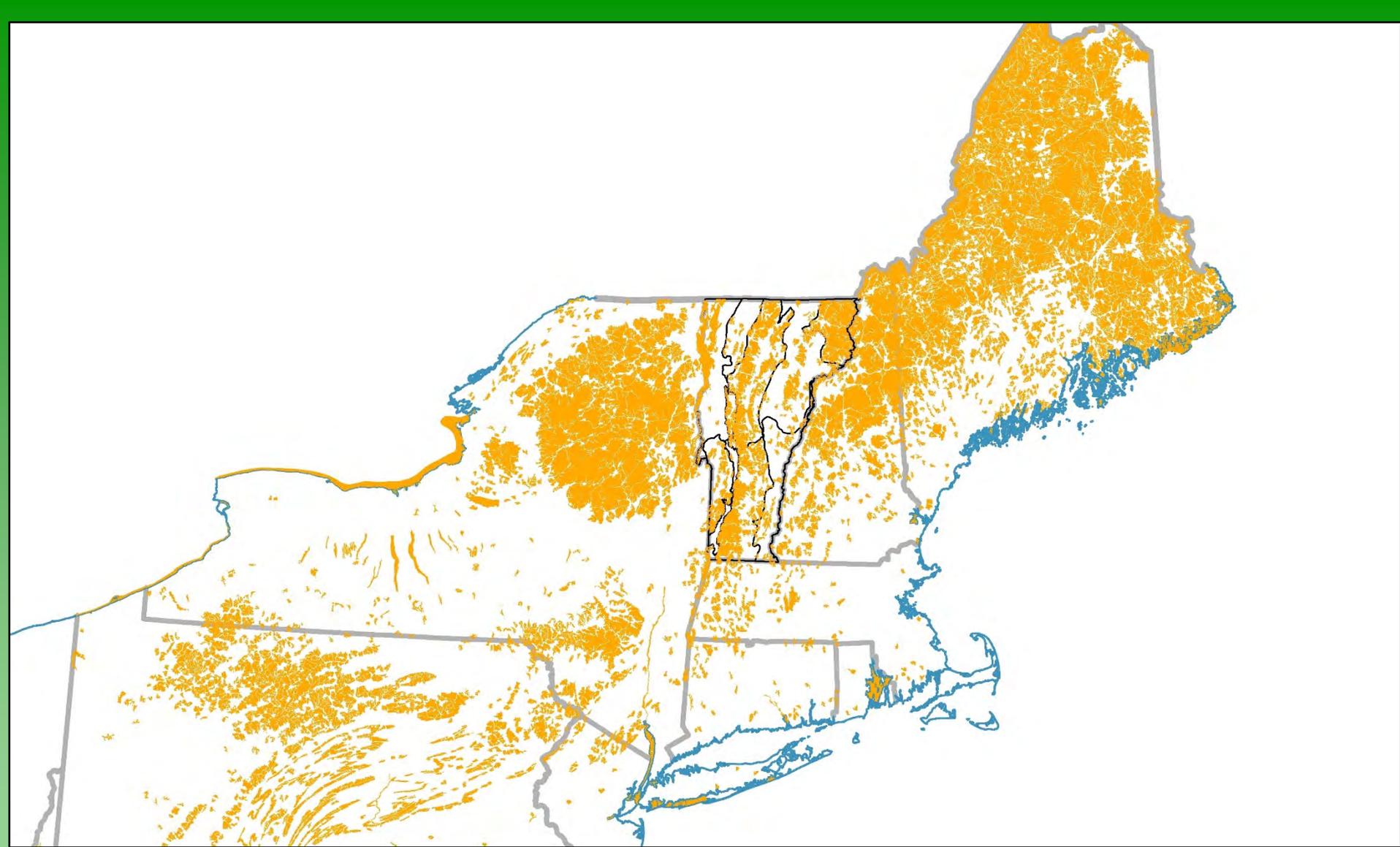
- **ecological functions and services**
- **climate change adaptation and resilience**
- **wildlife habitat**
- **biological diversity – species and communities**
- **forest management opportunities**
- **products we need**
- **forest economies**
- **cultural aesthetic**
- **recreation**
- **sense of place – Vermont's identity**



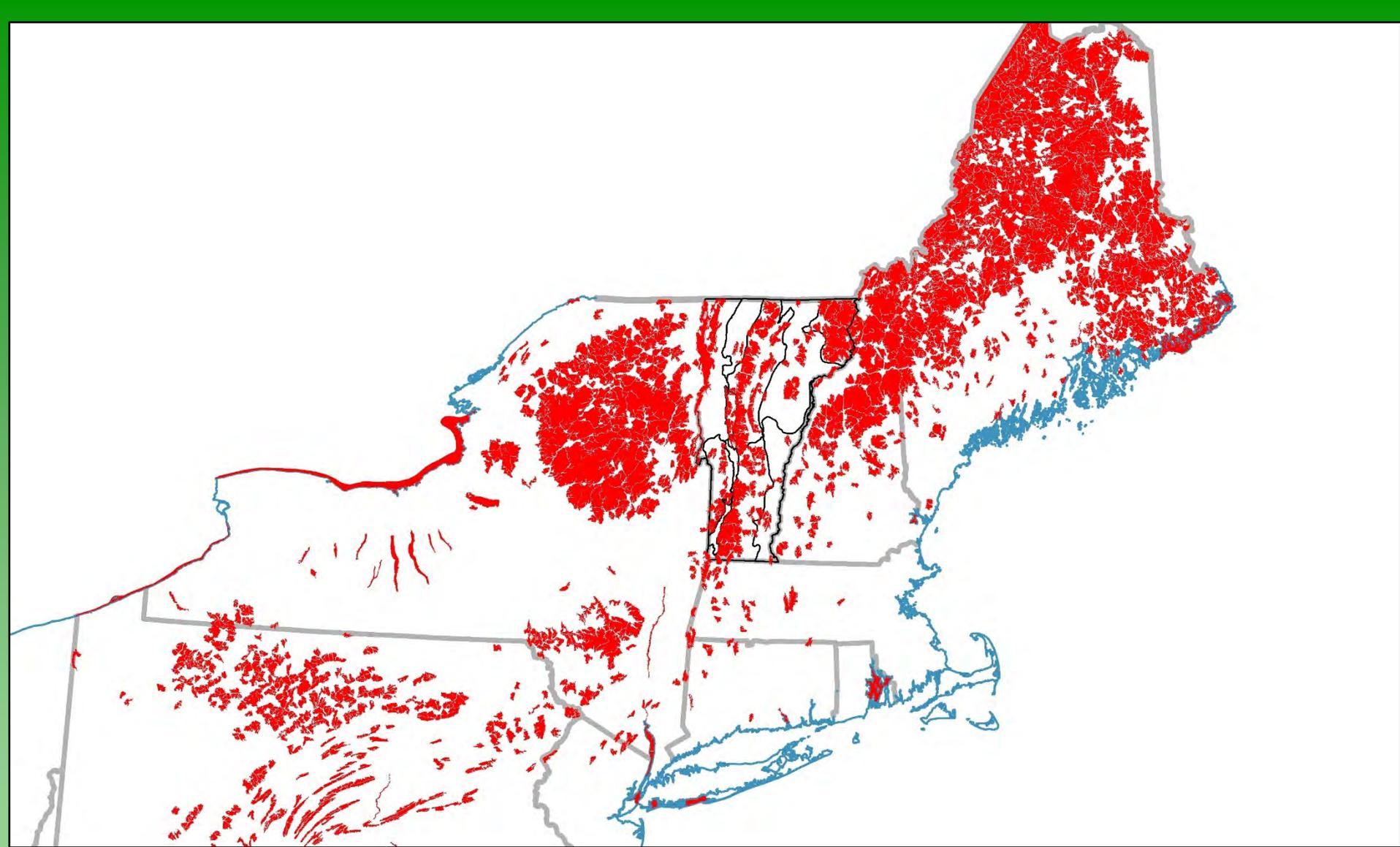
**Blocks of Forest and other Natural Cover  
greater than 20 acres**



**Blocks of Forest and other Natural Cover  
greater than 500 acres**



**Blocks of Forest and other Natural Cover  
greater than 2,000 acres**



**Blocks of Forest and other Natural Cover  
greater than 5,000 acres**



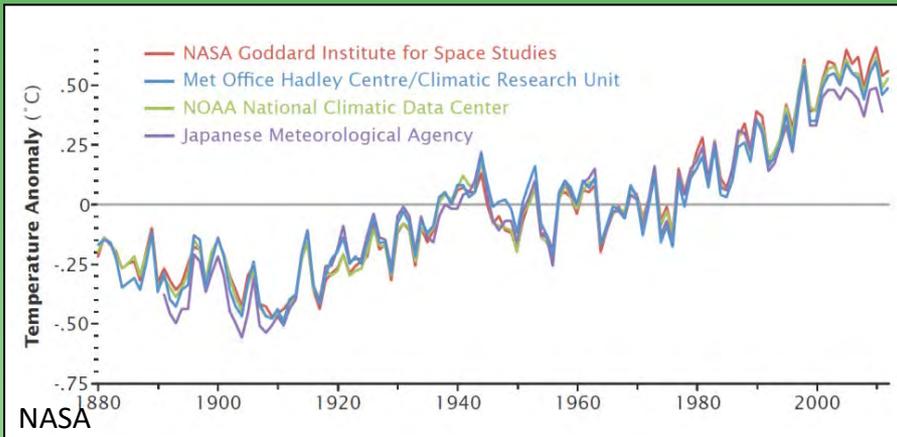
# The Vermont Fish & Wildlife Department

*The mission of the Vermont Fish & Wildlife Department is  
the conservation of our fish, wildlife, plants and their habitats  
for the people of Vermont*



# Threats to Biological Diversity

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



New!

# Climate Change

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

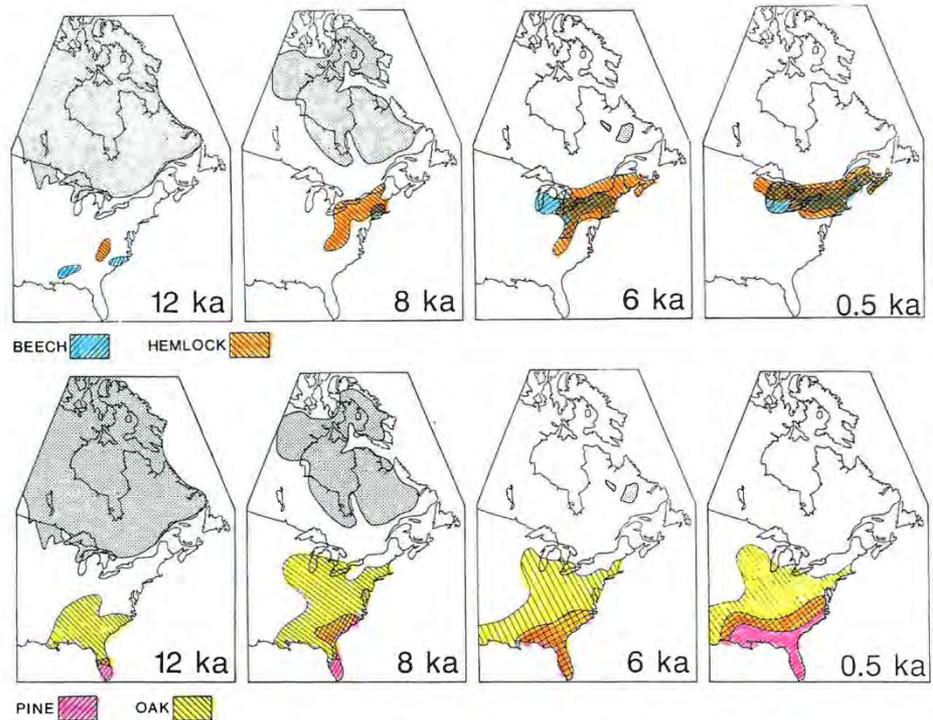
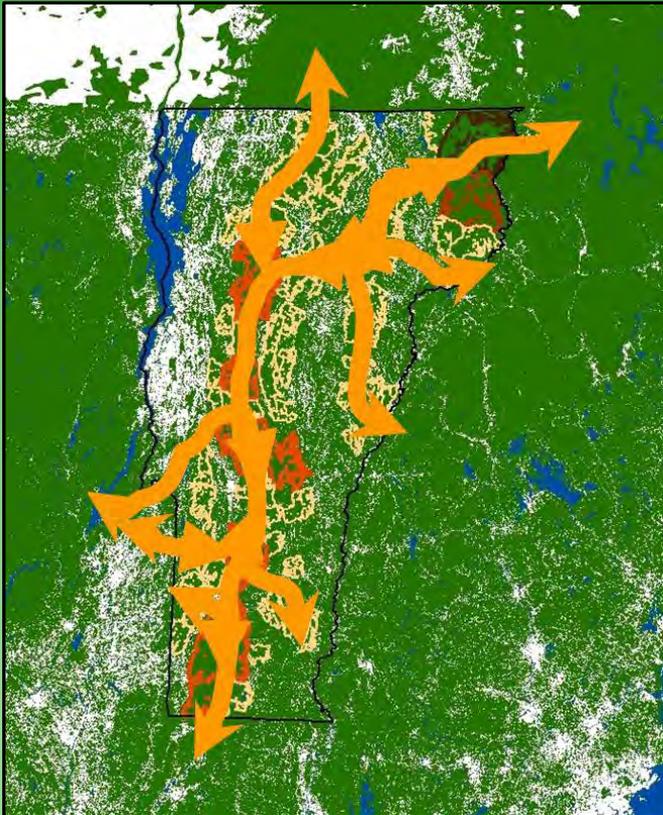
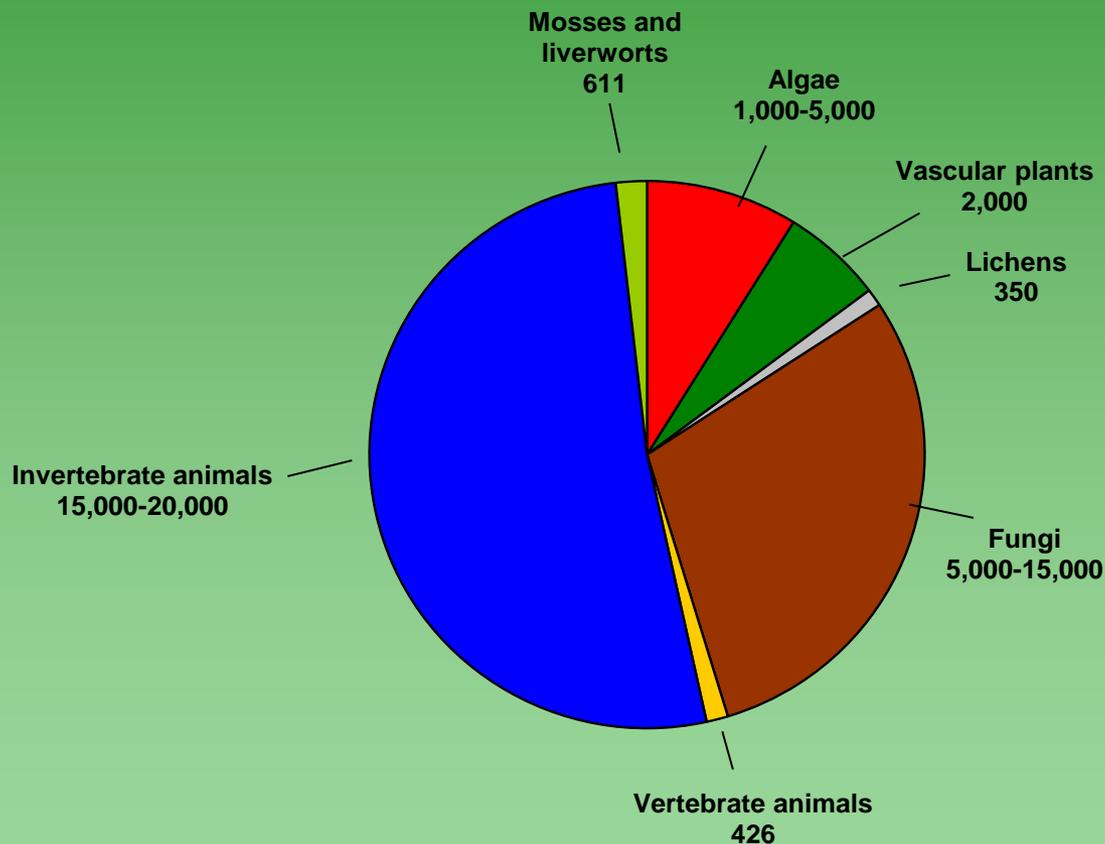


Figure 1. Location of regions with 5% beech (*Fagus*) pollen and 5% hemlock (*Tsuga*) pollen (in the upper row of maps) and 20% southern pine (*Pinus*) pollen and 20% oak (*Quercus*) pollen (in the lower row of maps) at 12,000, 8,000, 6,000, and 500 yr B.P. with the stippled area in the north showing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

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

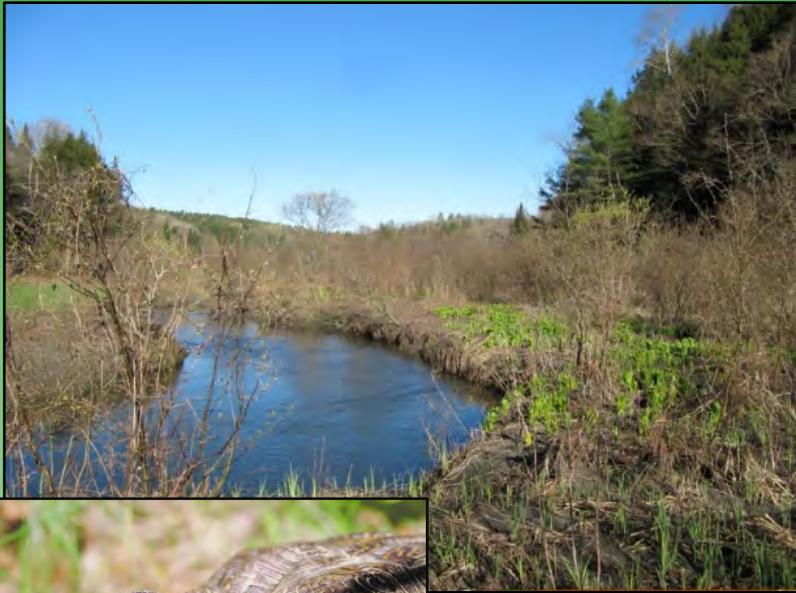
## How do we protect them all?



Elfin  
Skimmer

# Coarse filter/fine filter approach to conservation

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



**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 (forest blocks and riparian areas)
- Depends on thoughtful stewardship and management



## **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**

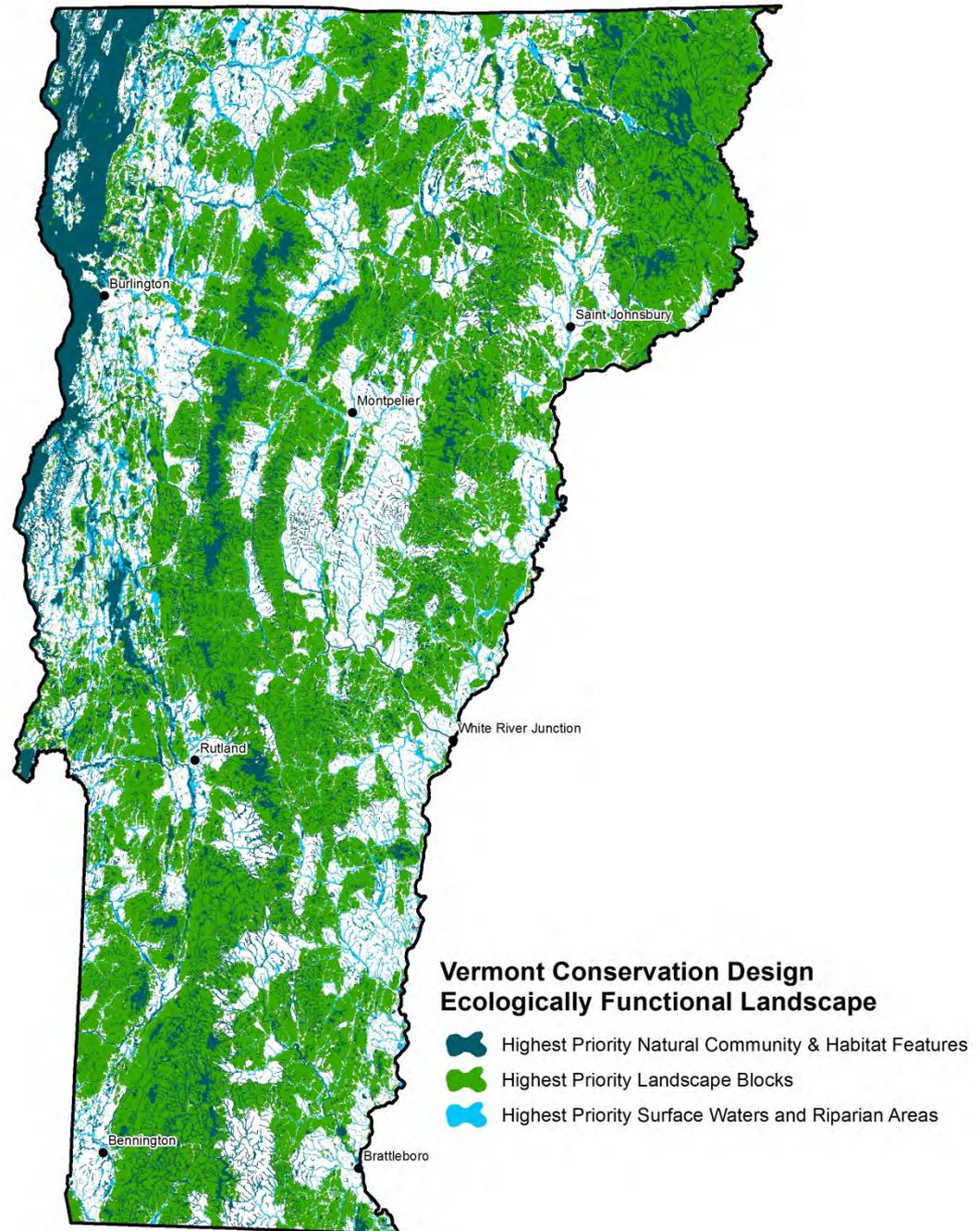
**USDA Natural Resources Conservation Service**



# 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



## Natural Communities



## Species



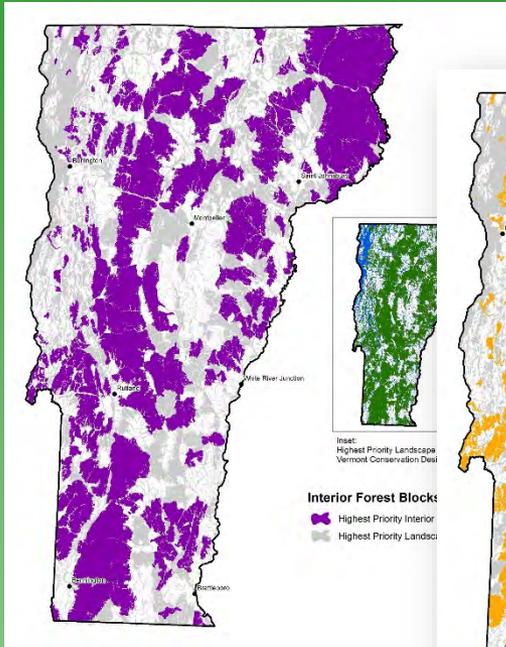
Interior Forest Blocks  
Connectivity Blocks  
Surface Waters and Riparian Areas  
Riparian Areas for Connectivity  
Physical Landscapes  
Wildlife Road Crossings

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

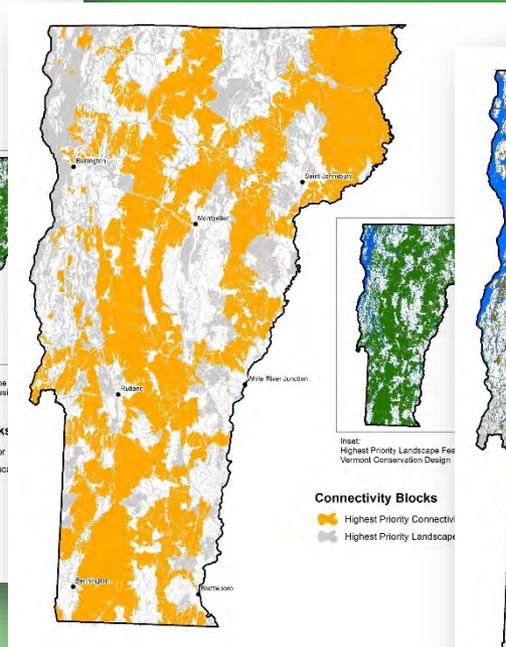
*Species with very specific biological needs that will likely always require individual attention*

# Intact and Connected Forest Blocks Surface Waters and Riparian Areas

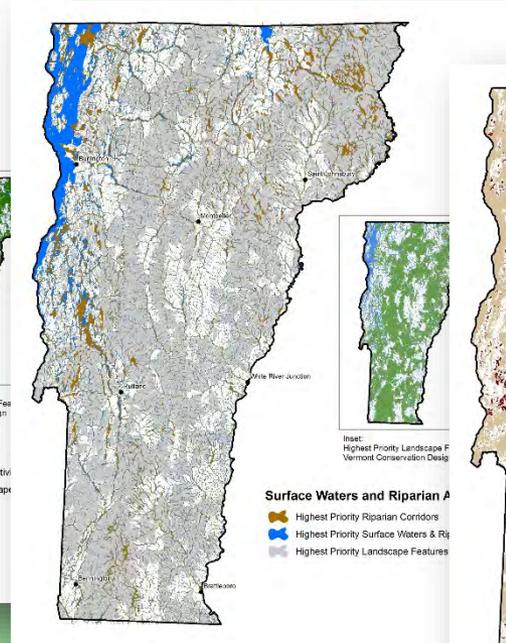
## Interior Forest Blocks



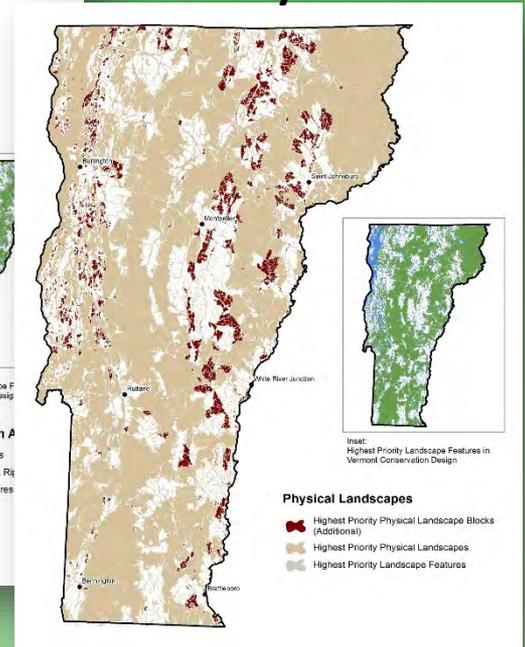
## Connectivity Blocks



## Surface Waters and Riparian Areas



## Physical Landscape Diversity



*Maintain the specific functions of each element*

**Wildlife Road Crossings**

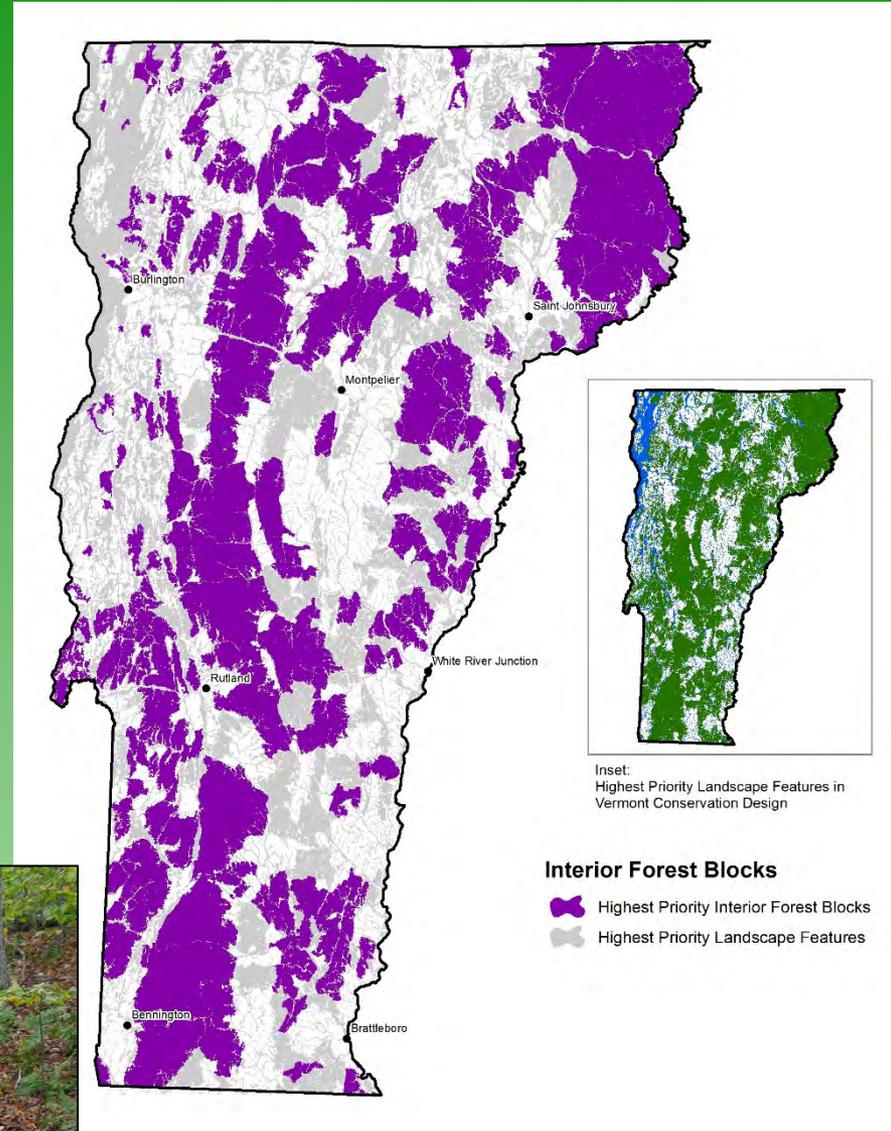
# Interior Forest Blocks

*The best examples of interior forest in each region of Vermont*

*Places where species and ecological process exist with minimal disturbance*

## **Ecological functions:**

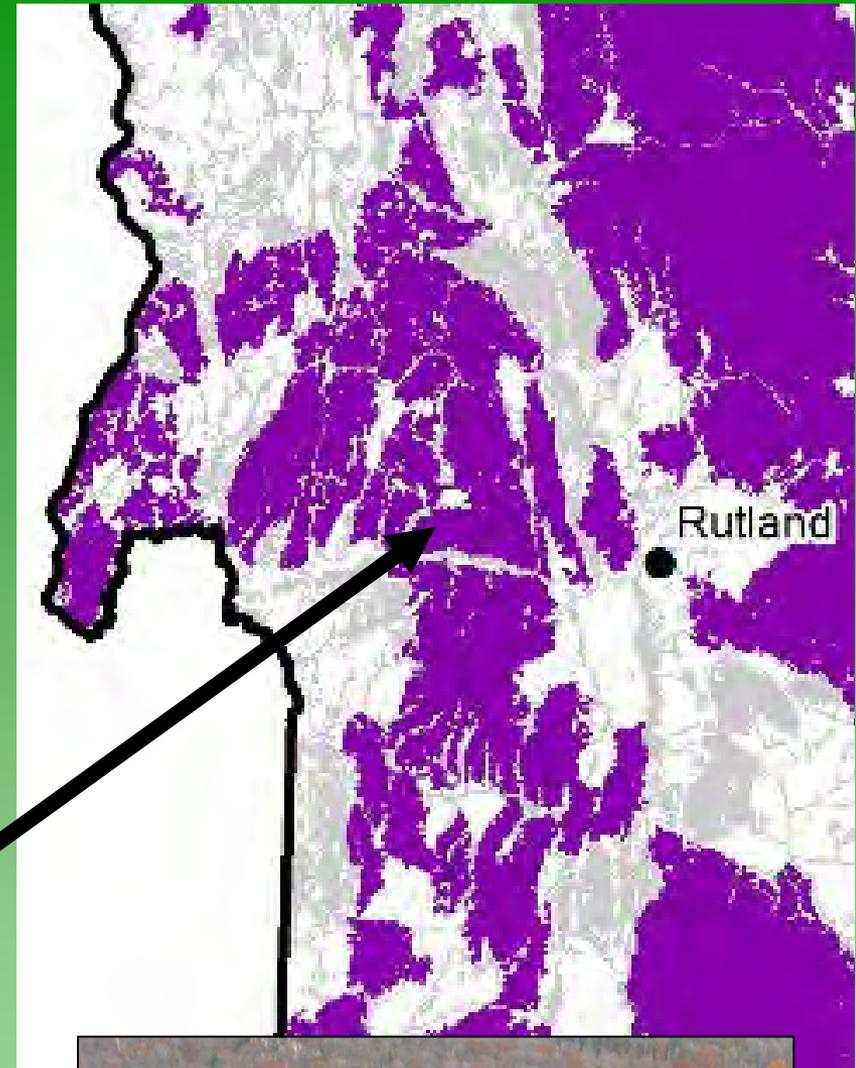
- Interior forest species
- Wide-ranging mammals
- Air and water quality
- Flood resilience
- Ecological processes
- Species can shift and adapt within blocks



# 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



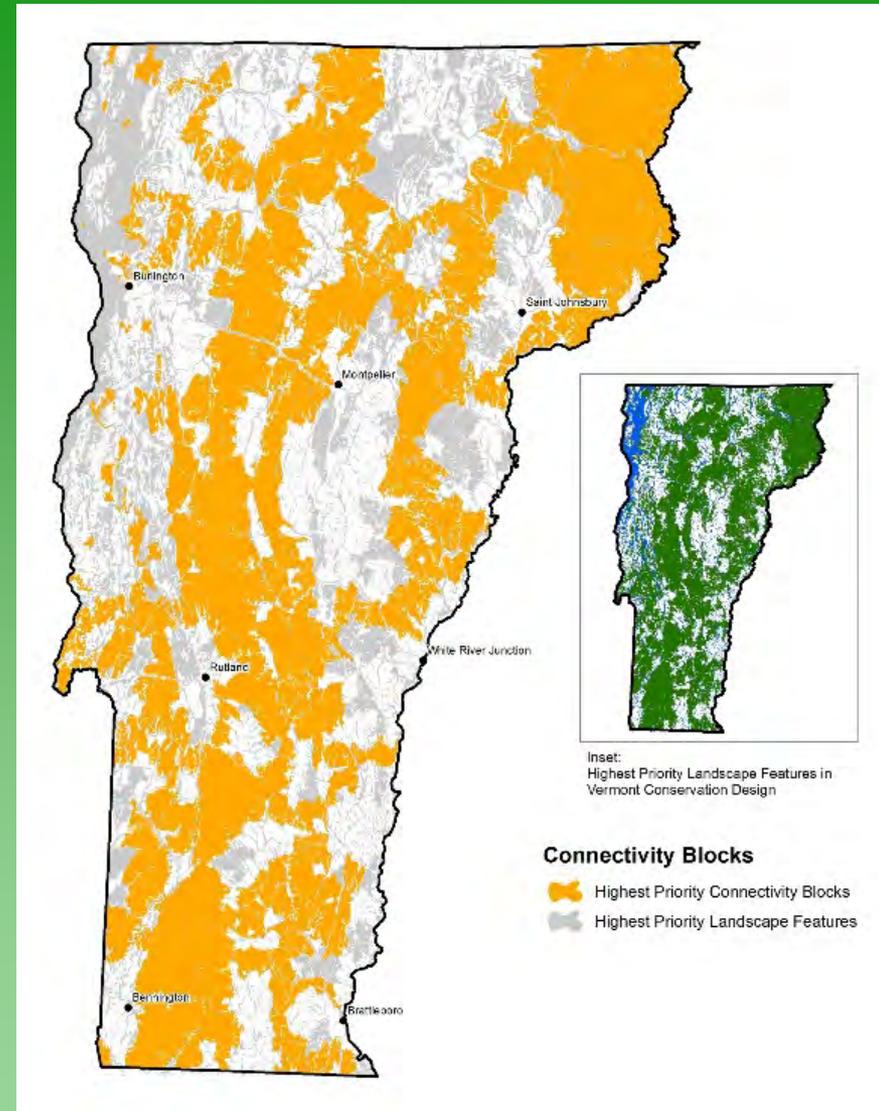
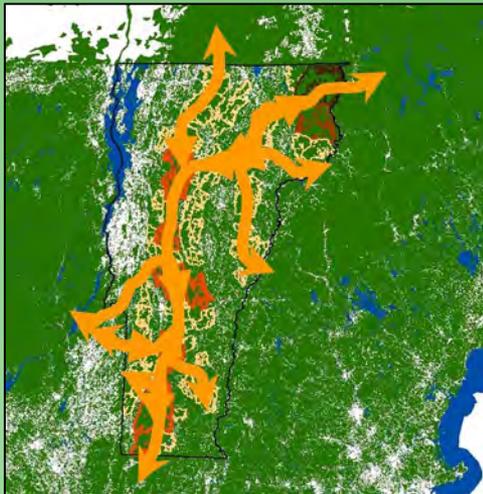
# Connectivity Blocks

*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



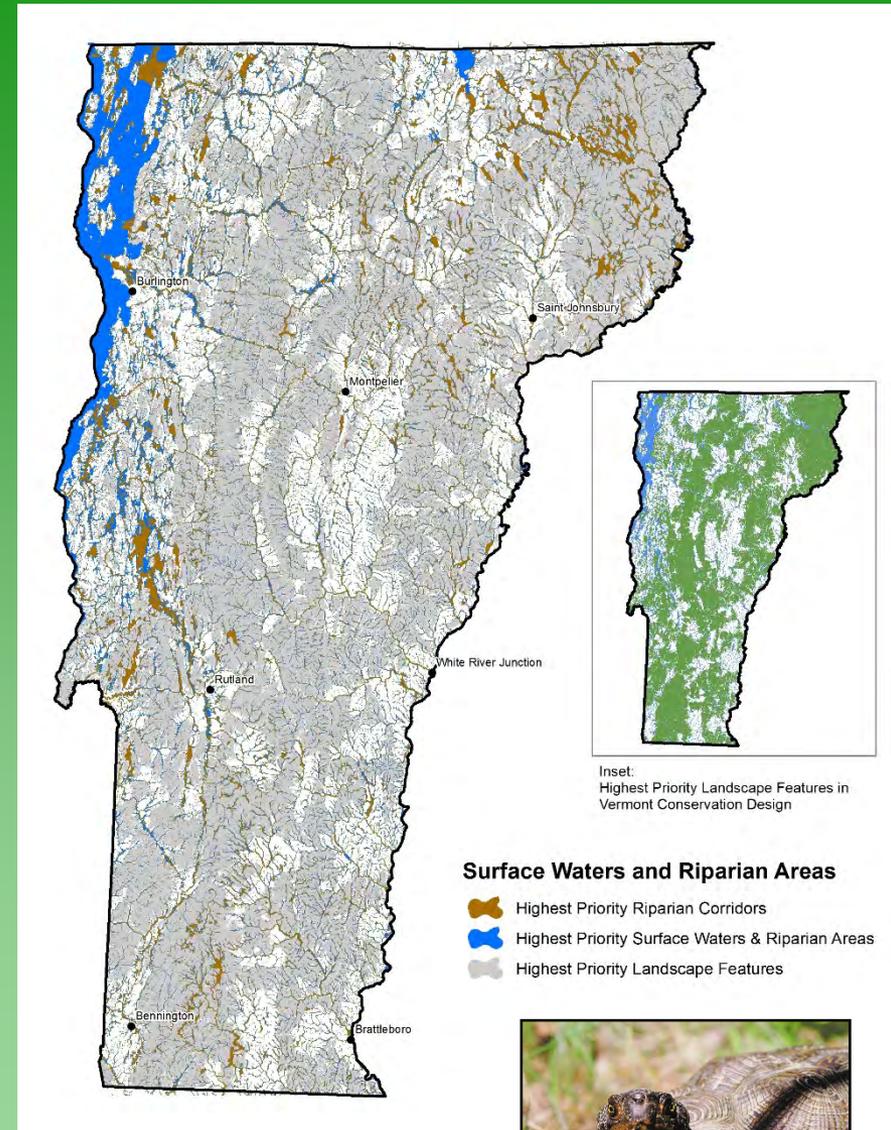
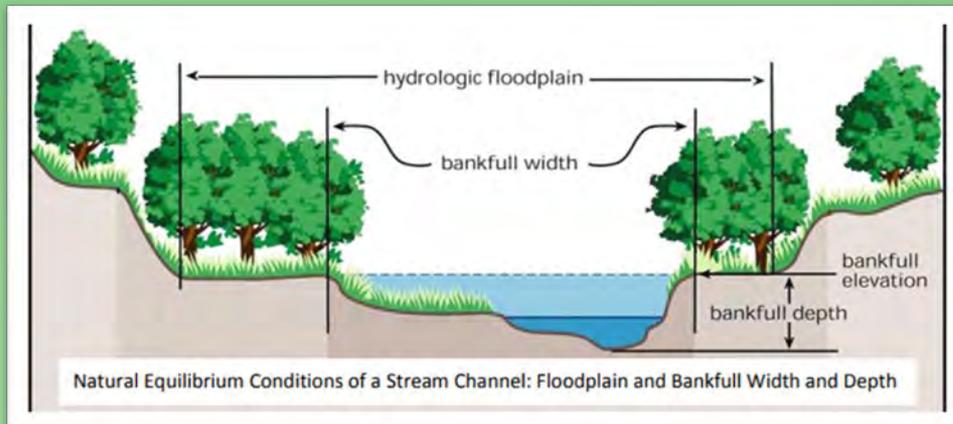
# Surface Waters and Riparian Areas

*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

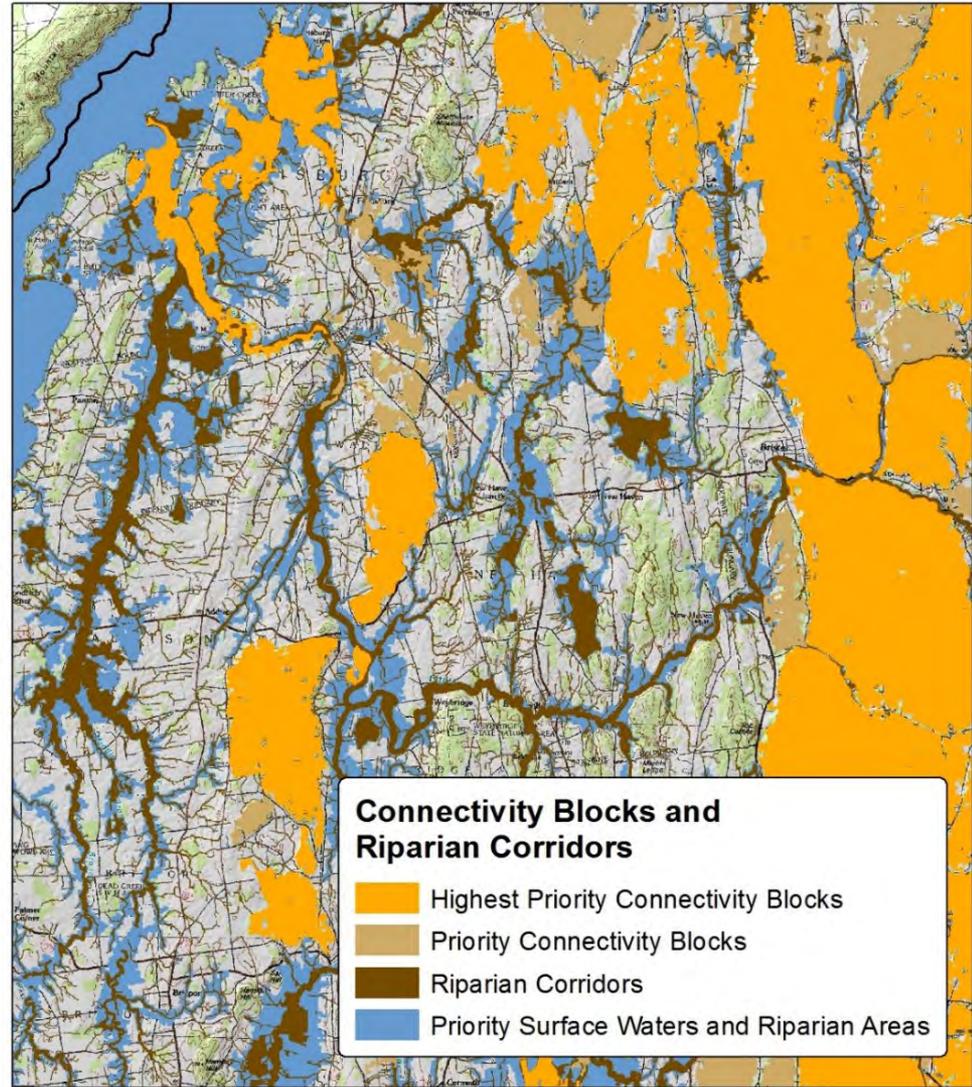


# Riparian Connectivity



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

*We need to restore riparian vegetation.*



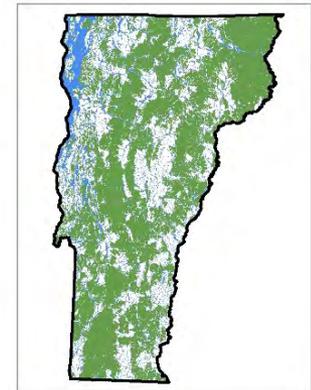
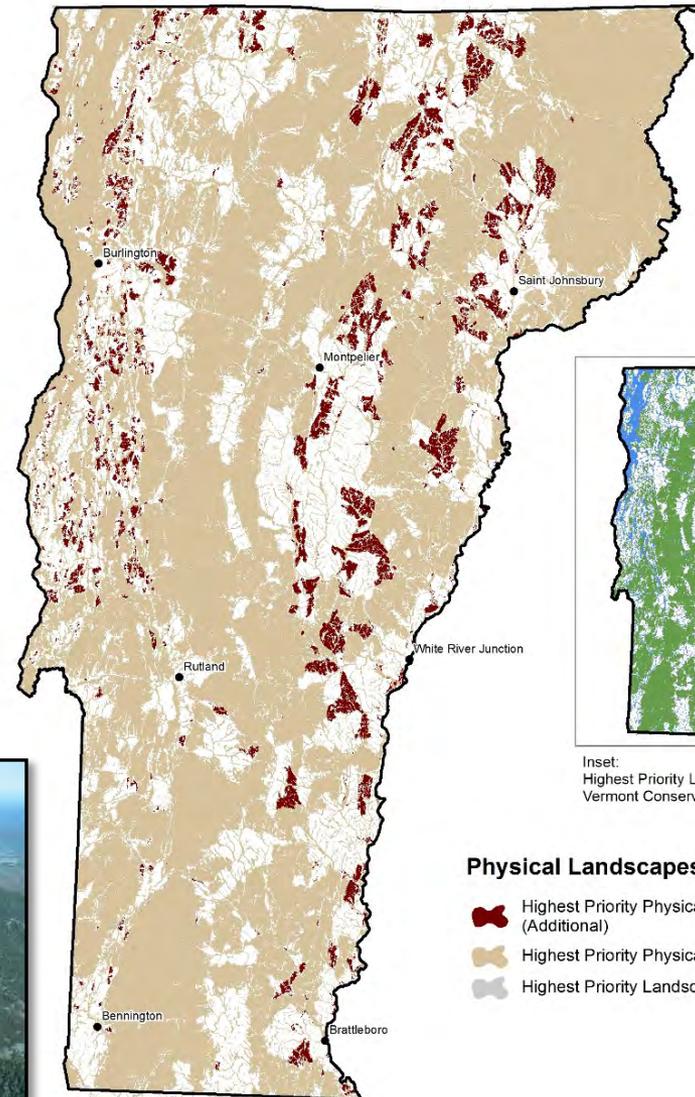
# Physical Landscape Diversity

*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



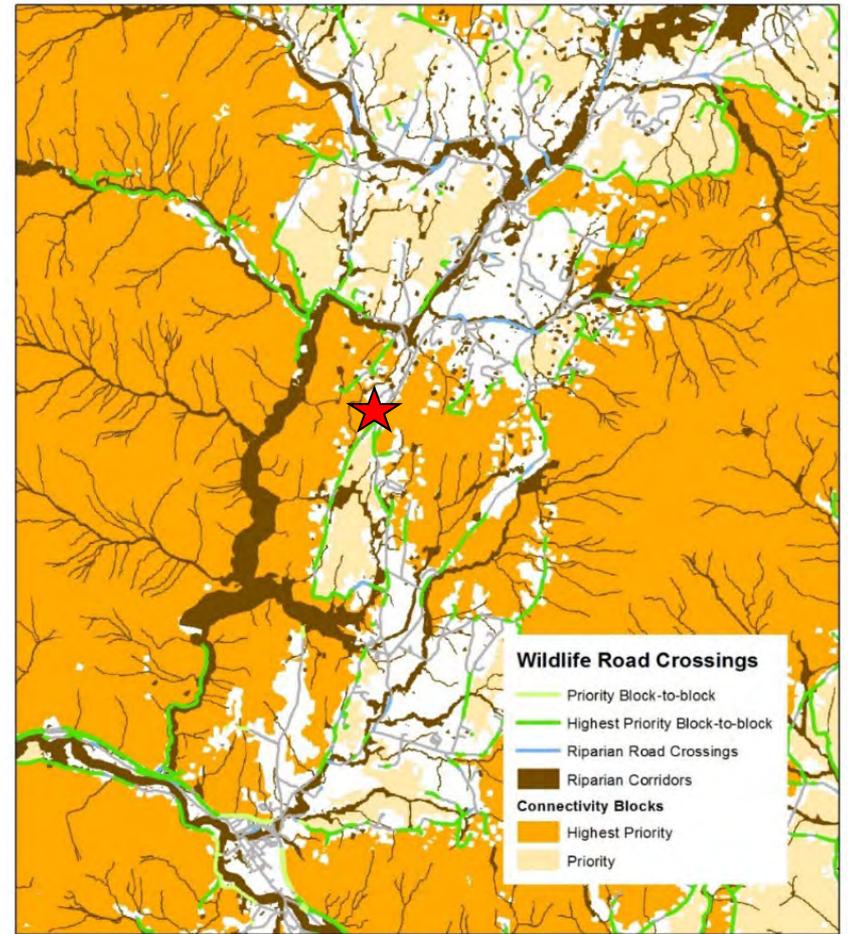
Inset:  
Highest Priority Landscape Features in Vermont Conservation Design

## Physical Landscapes

-  Highest Priority Physical Landscape Blocks (Additional)
-  Highest Priority Physical Landscapes
-  Highest Priority Landscape Features



# Wildlife Road Crossings



# Conservation Design at Three Scales

## Landscapes



## Natural Communities



## Species



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

# Natural Communities

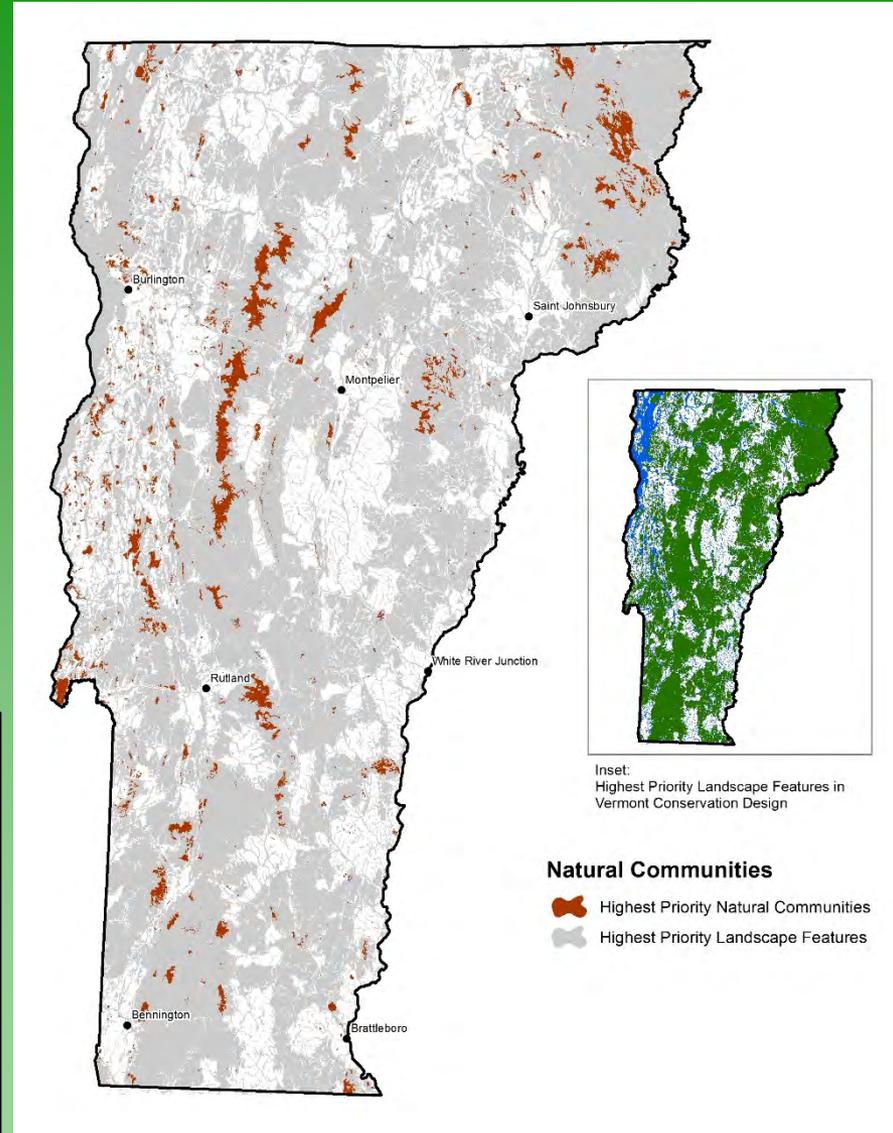
*Vermont's original natural habitats*

*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 most 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*

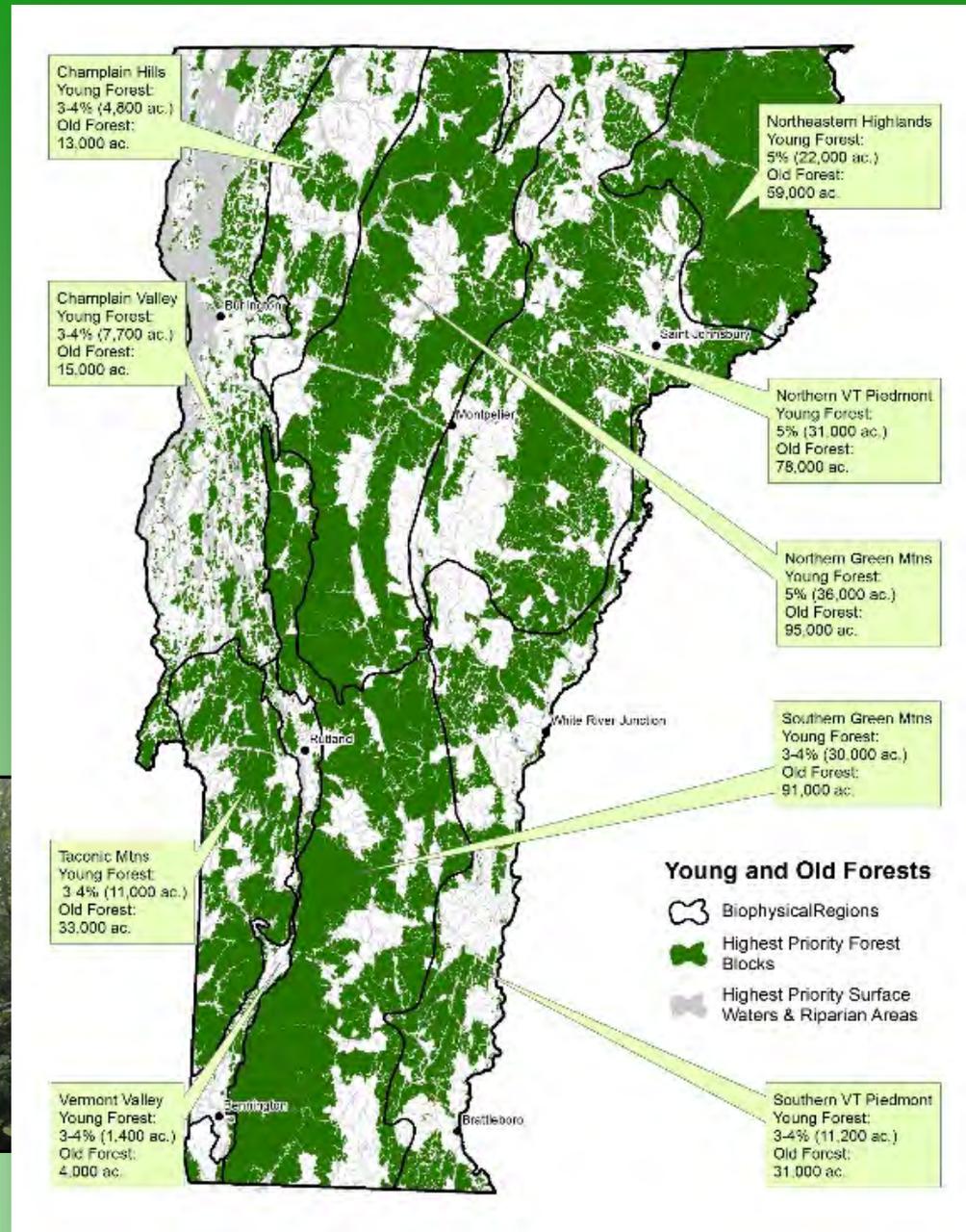
*Target of 3-5% young forest and 9% old forest, distributed across Vermont and proportional to matrix forest types*

## 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



**Balance!**



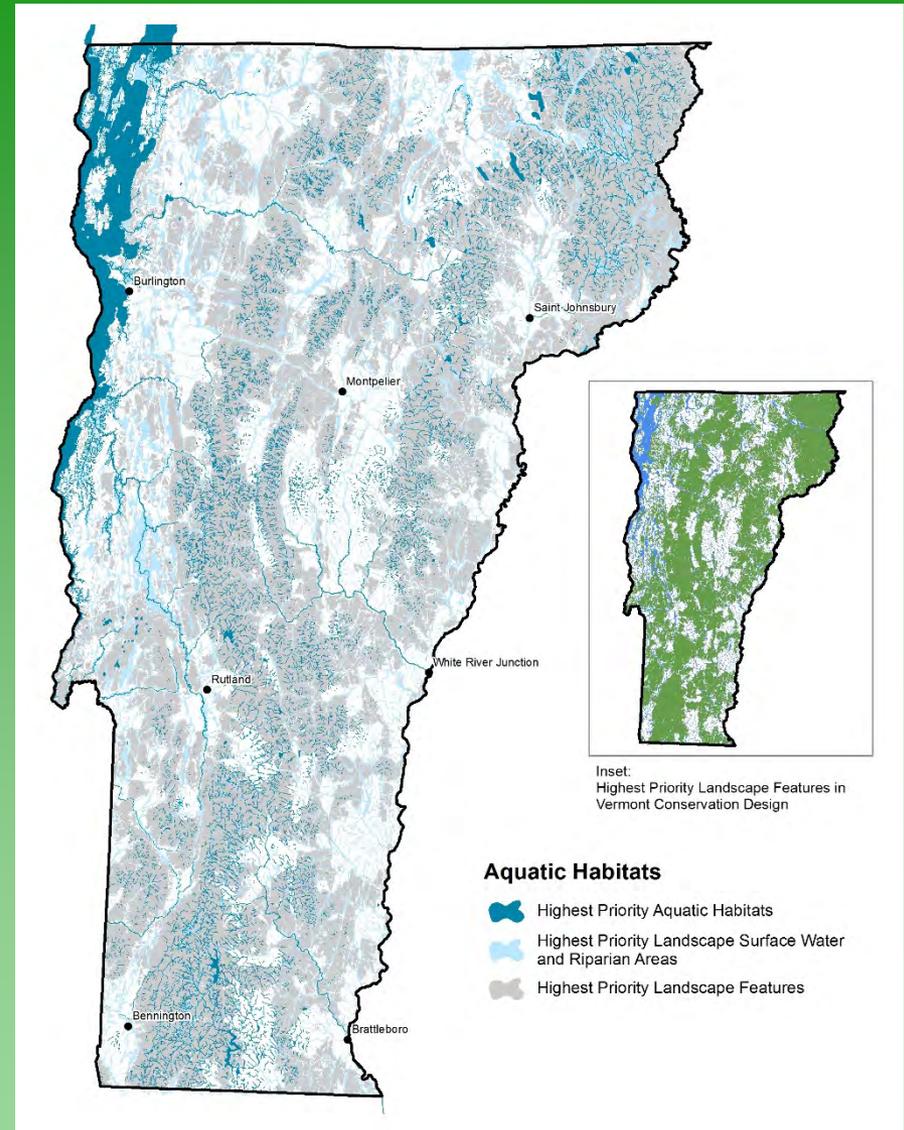
# Aquatic Habitats

*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
- Physical diversity of aquatic systems
- Cold water refugia



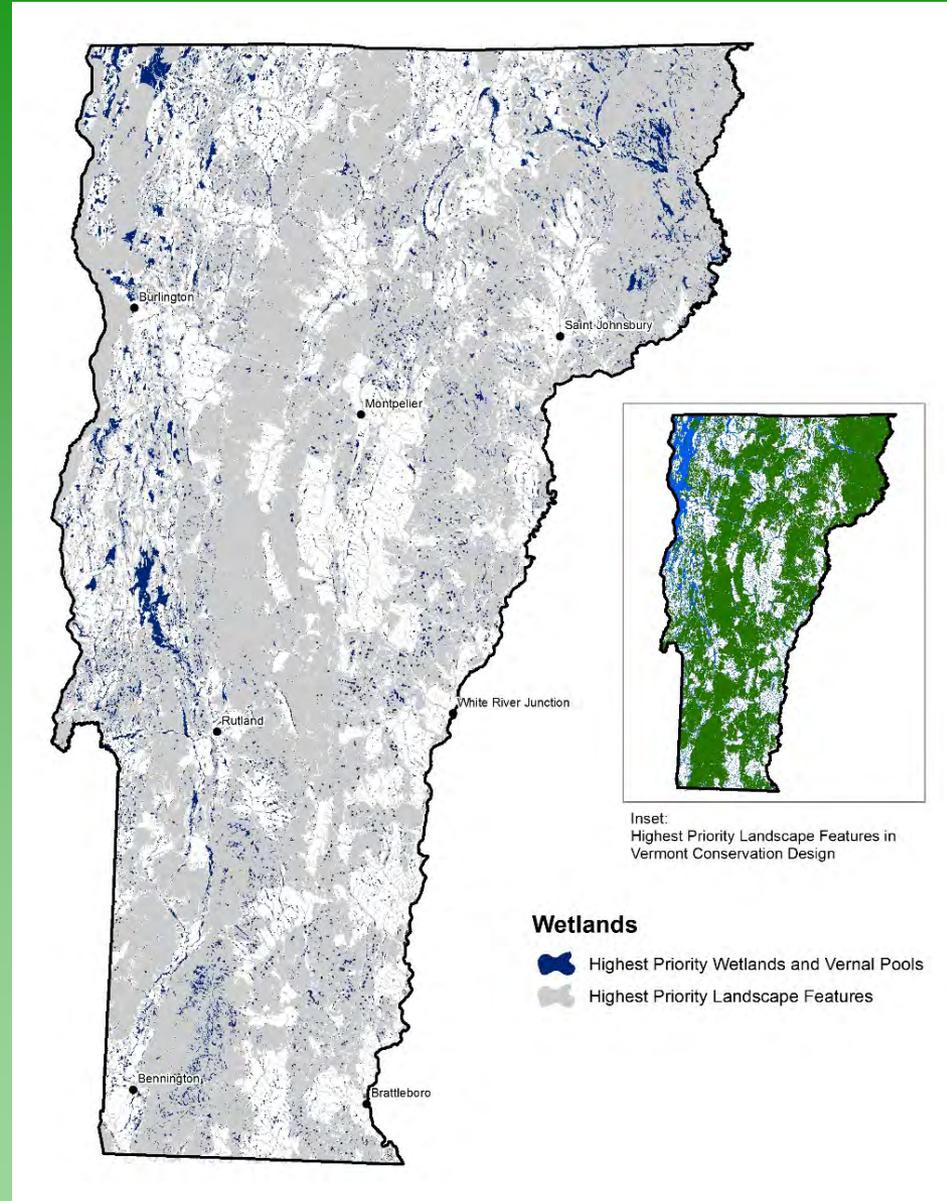
# Wetlands

*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

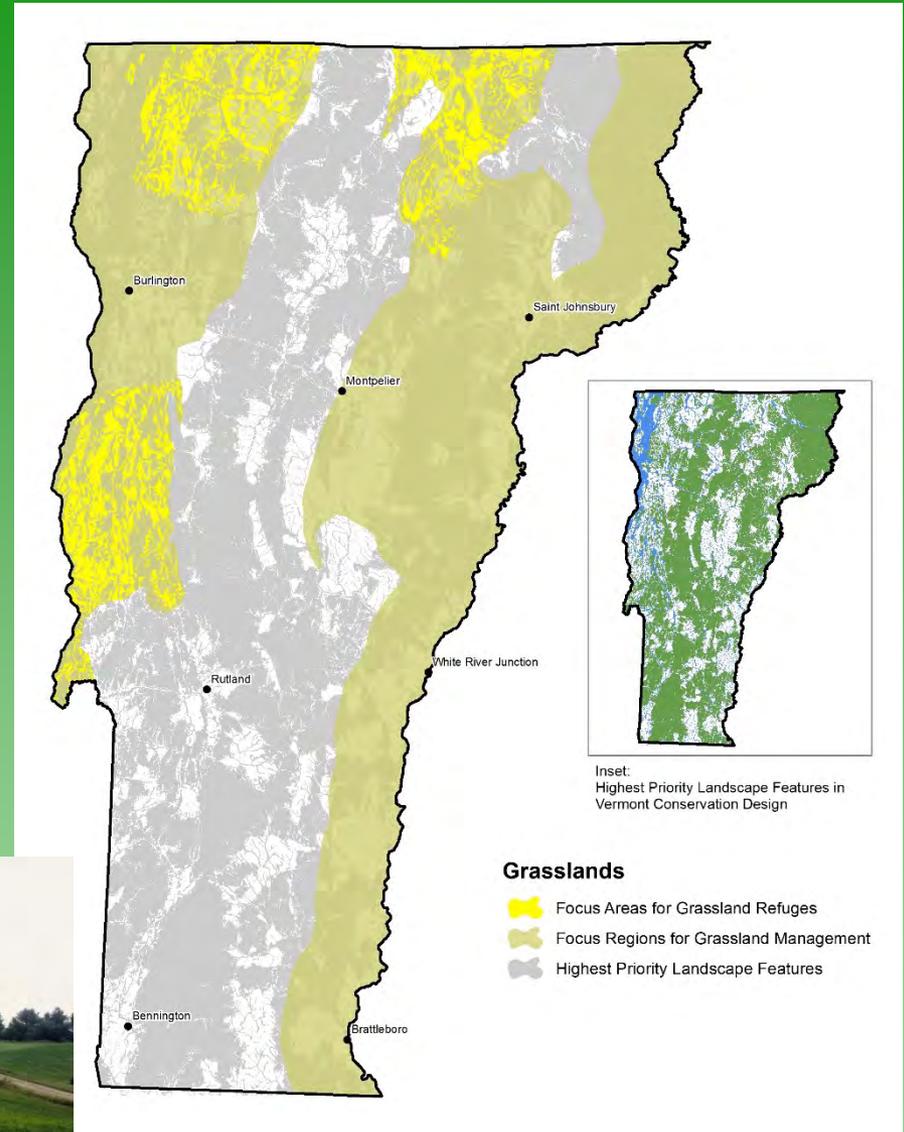
*Grasslands and shrublands are man-made habitats that support a unique set of species*

*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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## Landscapes



## Natural Communities



## Species



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



**Northern pale painted cup**  
*(Castilleja septentrionalis)*



## Spiny softshell turtle

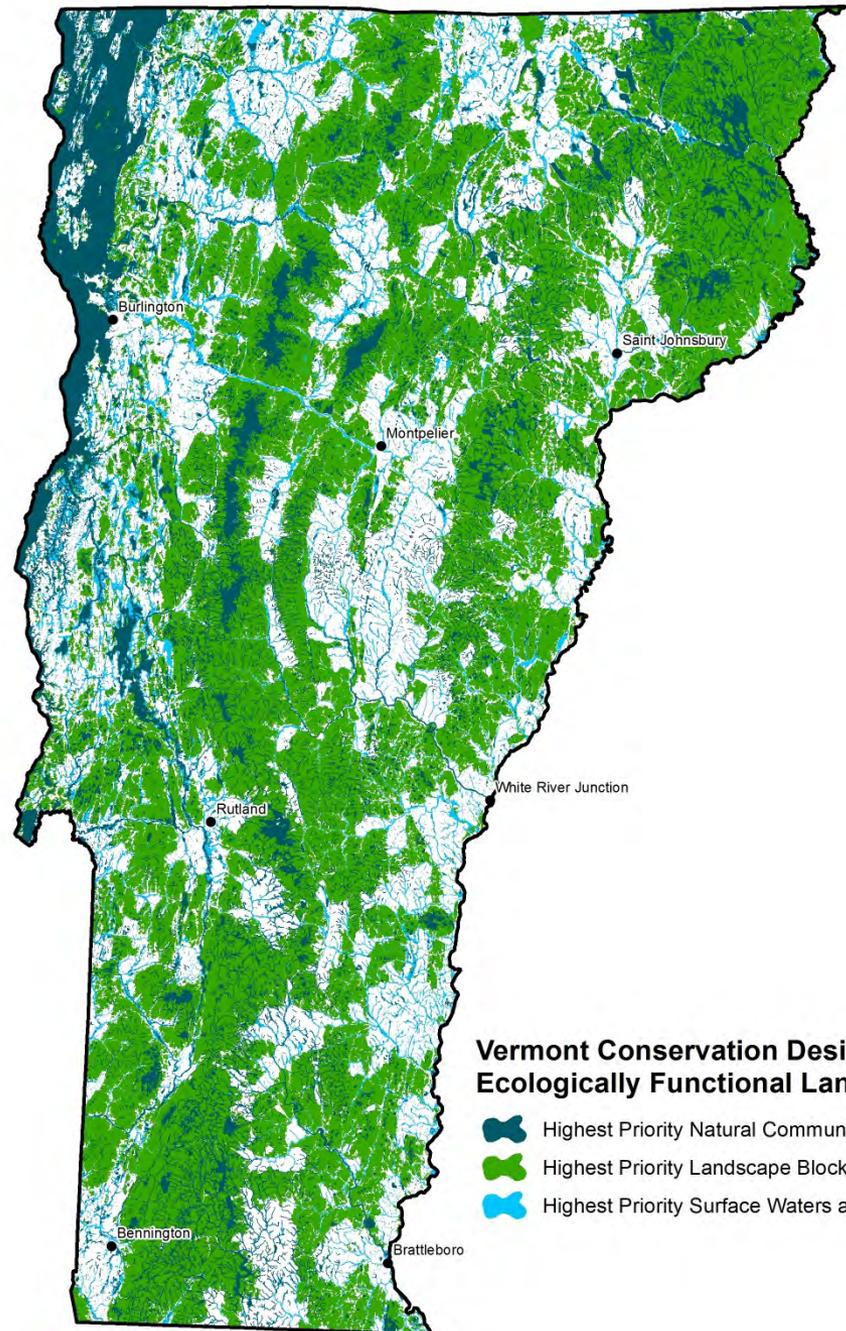


# Vermont Conservation Design

Maintains an intact, connected and diverse natural landscape

Conserves species and natural communities

Allows nature to adapt to a changing climate



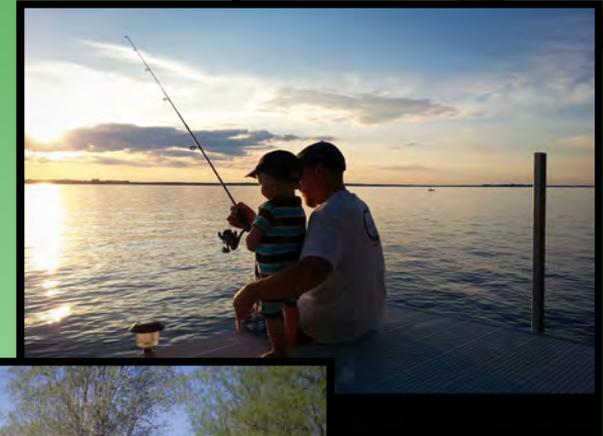
# How is Vermont Conservation Design Being Used

- VT Wildlife Action Plan (2015) and Big Game Management Plan
- 2017 VT Forest Action Plan
- Land acquisition priorities
- State lands management
- Municipal planning technical assistance
- Regulatory review
- Riparian areas/floodplain restoration priorities
- Natural Heritage Inventory landscape condition assessment
- Inform regional landscape connectivity efforts



# Sustains more than biodiversity

- Outdoor recreation
- Clean water
- Sense of place and rural character
- Working farms and forests
- Nature's benefits



# Some Thoughts and Perspectives

- Vision for the future of Vermont.
- Landowners and their decisions are key to success.
- All the features are needed for ecological function.
- Unifies many aspects of conservation, without being prescriptive.
- Supports Vermont's social and economic values.
- More reasons to keep forests as forests!



Photo by  
Susan  
Morse

**Thank you... Questions?**

