

# VERMONT CONSERVATION DESIGN

## MAINTAINING AND ENHANCING AN ECOLOGICALLY FUNCTIONAL LANDSCAPE

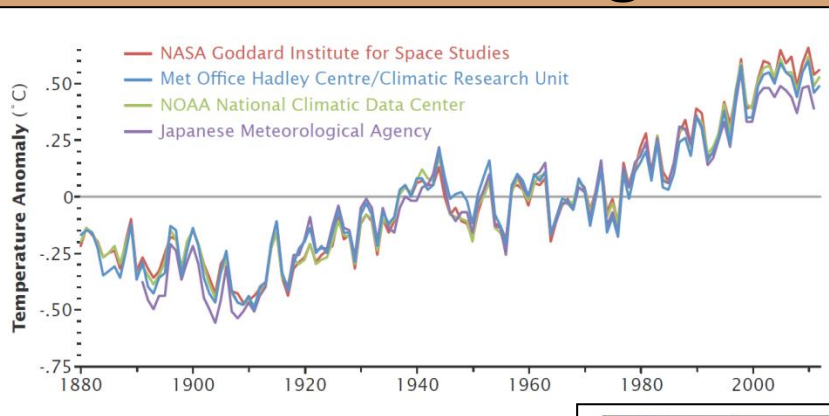


E. Sorenson, R. Zaino  
J. Hilke & E. Thompson



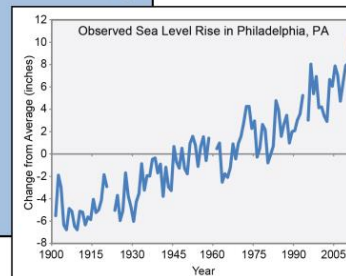
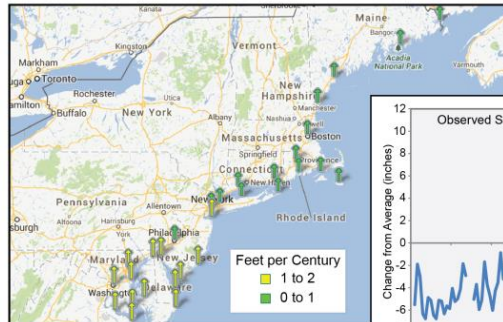
# Primary Threats to Biological Diversity

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



Climate Change Impacts in the US, 2014

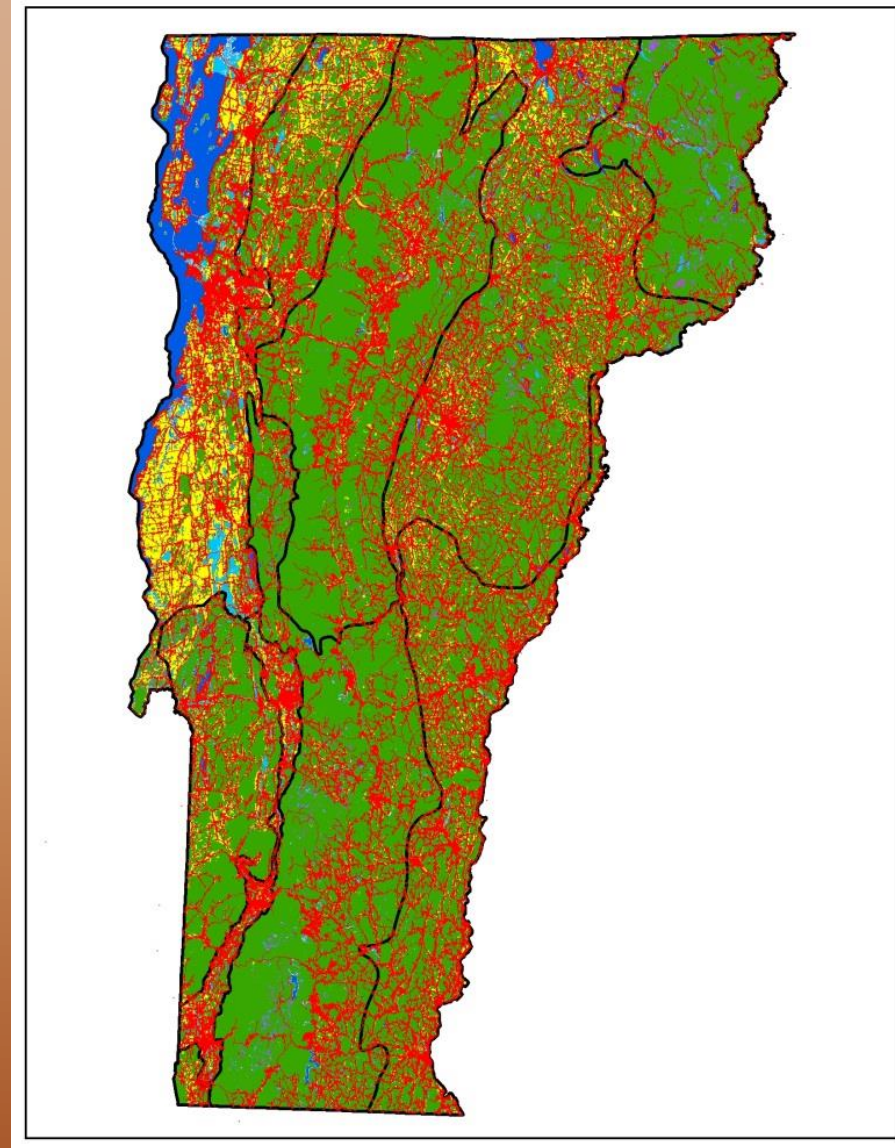
NASA





**Much of Vermont is dominated by natural systems and we have a lot of opportunity to conserve biodiversity and facilitate climate change adaptation.**

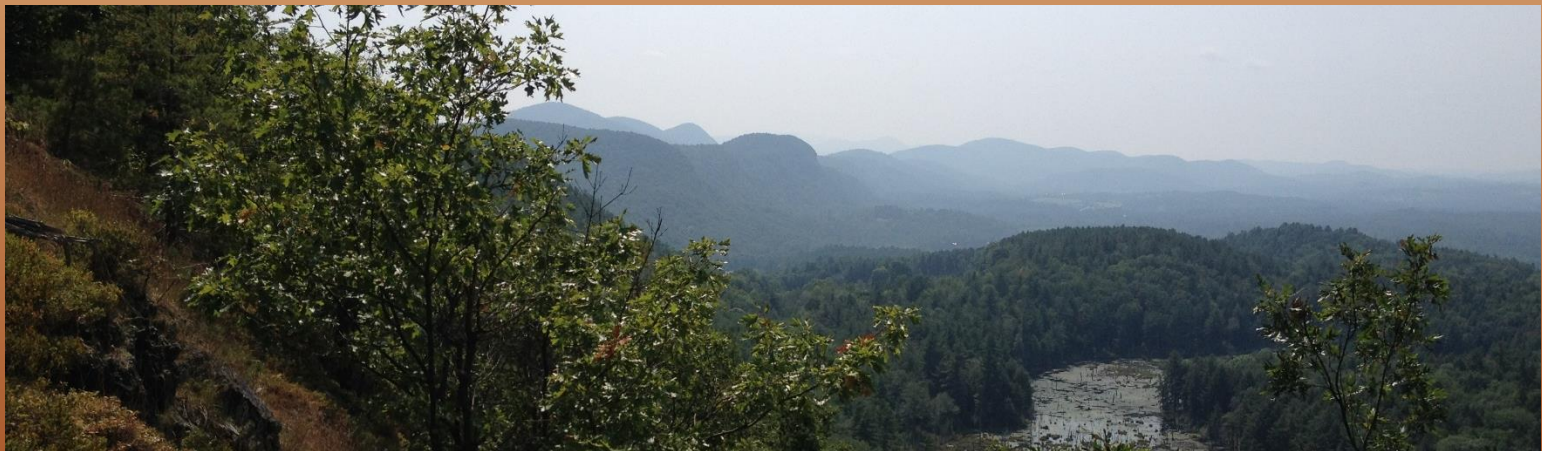
- **78 percent forested (but fragmented)**
- **abundant lakes and wetlands**
- **limy bedrock**
- **diverse topography**
- **low human population**
- **cultural interest in wildlife  
and rural character**
- **But, also a lot of roads and  
development**



# VERMONT CONSERVATION DESIGN

***A practical approach to protecting and enhancing an ecologically functional landscape into the future.***

- **Uses best available science and data.**
- **Uses two key landscape features: forest blocks and riparian areas.**
- **Applies the coarse filter-fine filter approach to conservation.**





## **Collaborators:**

**VT Fish and Wildlife Department**

**Vermont Land Trust**

**The Nature Conservancy**

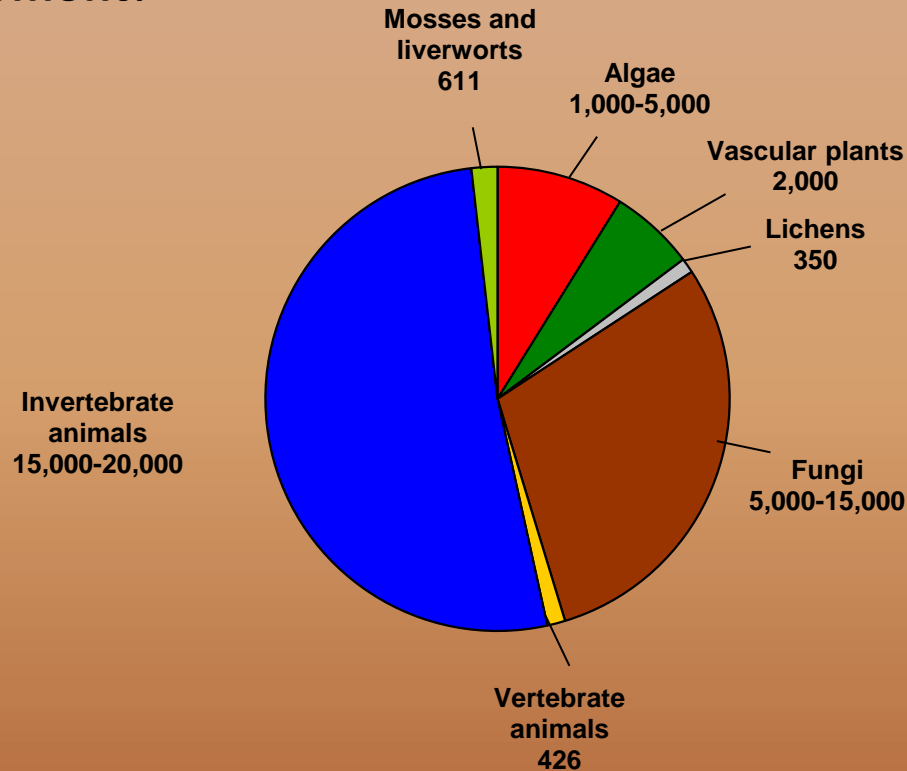
**VT Department of Forests, Parks & Recreation**

**NorthWoods Stewardship Center**



# Given a broad goal of conserving biological diversity in Vermont...

And, an estimated 24,000 to 43,500 species in Vermont!



How do we protect them all?



Elfin  
Skimmer



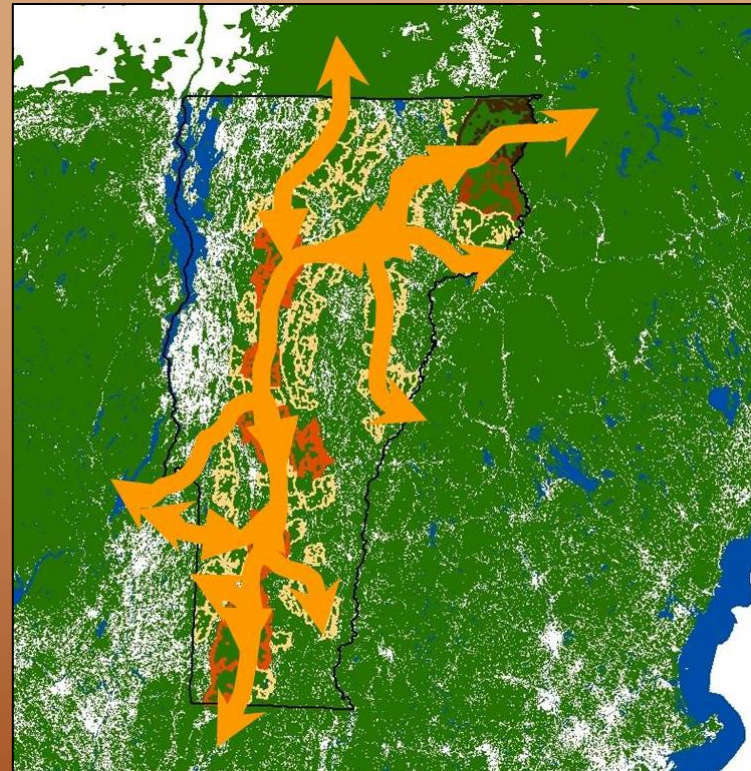
# Coarse filter/fine filter approach to conservation

*If examples of all coarse-filter elements are conserved at the scale at which they naturally occur, most of the species they contain – trees, mammals, birds, insects – will also be conserved. Some species will always need special attention.*



## Climate Change Considerations

- climate change has happened before
- rapid and uncertain changes
- our fragmented landscape
- need connectivity
- need to “conserve nature’s stage”



# Conservation Design with Targets at Three Scales

## Landscapes



Champlain Valley

## Natural Communities



Dry Oak-Hickory-Hophornbeam Forest

## Species



Southern Twayblade (*Listera australis*)

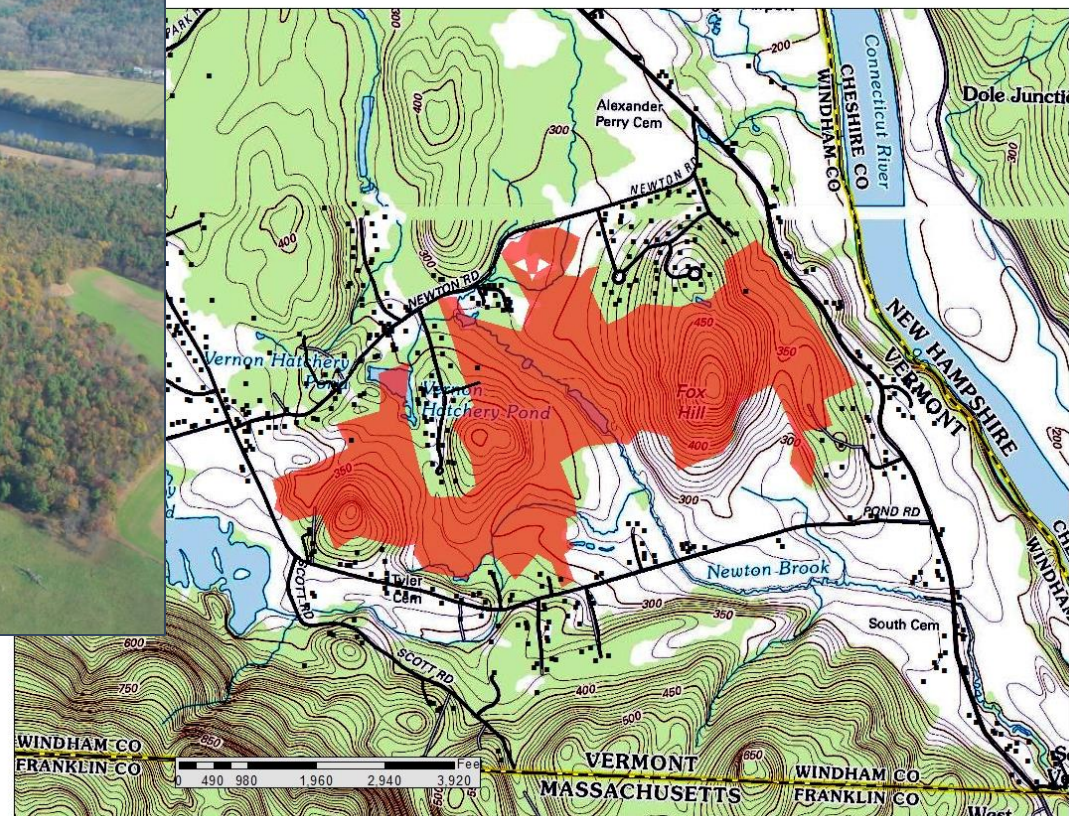
**Interior Forest Blocks**  
**Connectivity Blocks**  
**Surface Waters and Riparian Areas**  
**Riparian Areas for Connectivity**  
**Physical Landscape Diversity Blocks**  
**and Wildlife Road Crossings**

**Upland and Wetland**  
**Aquatic**  
**Vernal Pools...**  
**(next two years)**

**Rare Species**  
**Grasslands**  
**Spp of Greatest Cons. Need**  
**Deer**  
**Pollinators...**  
**(next two years)**

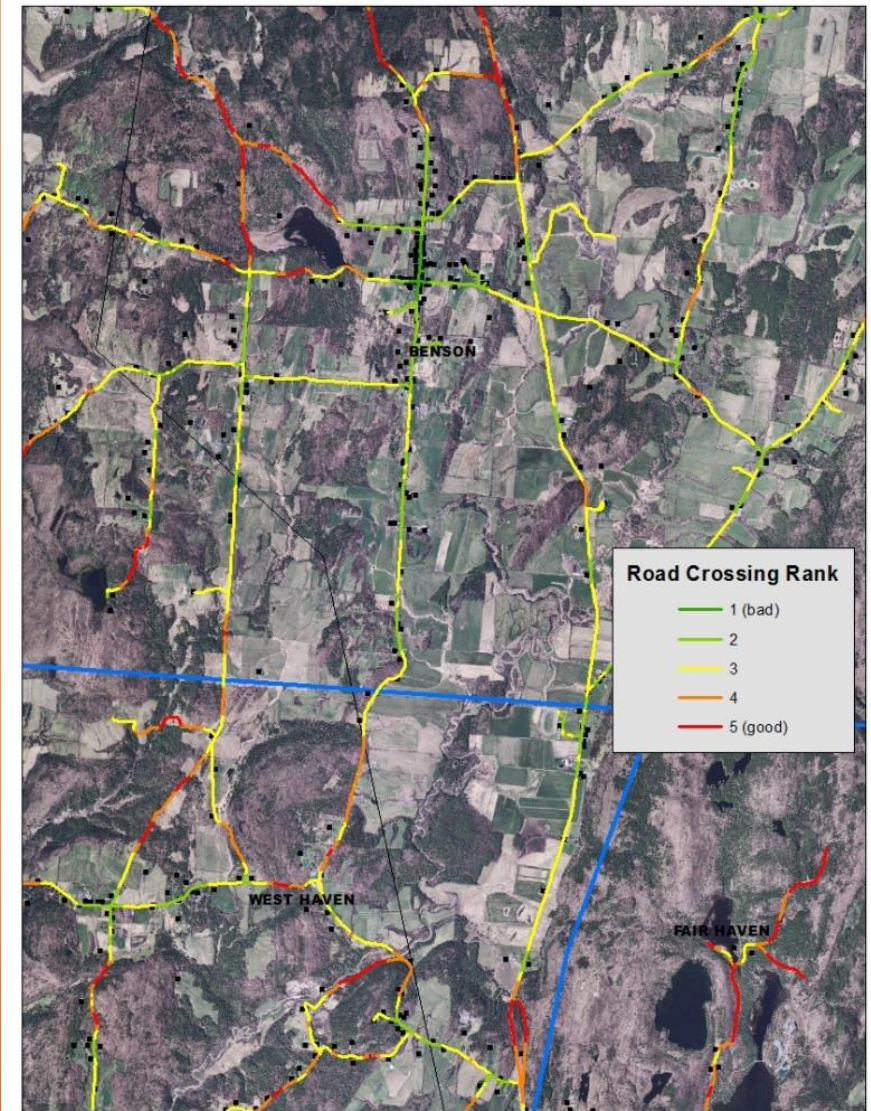
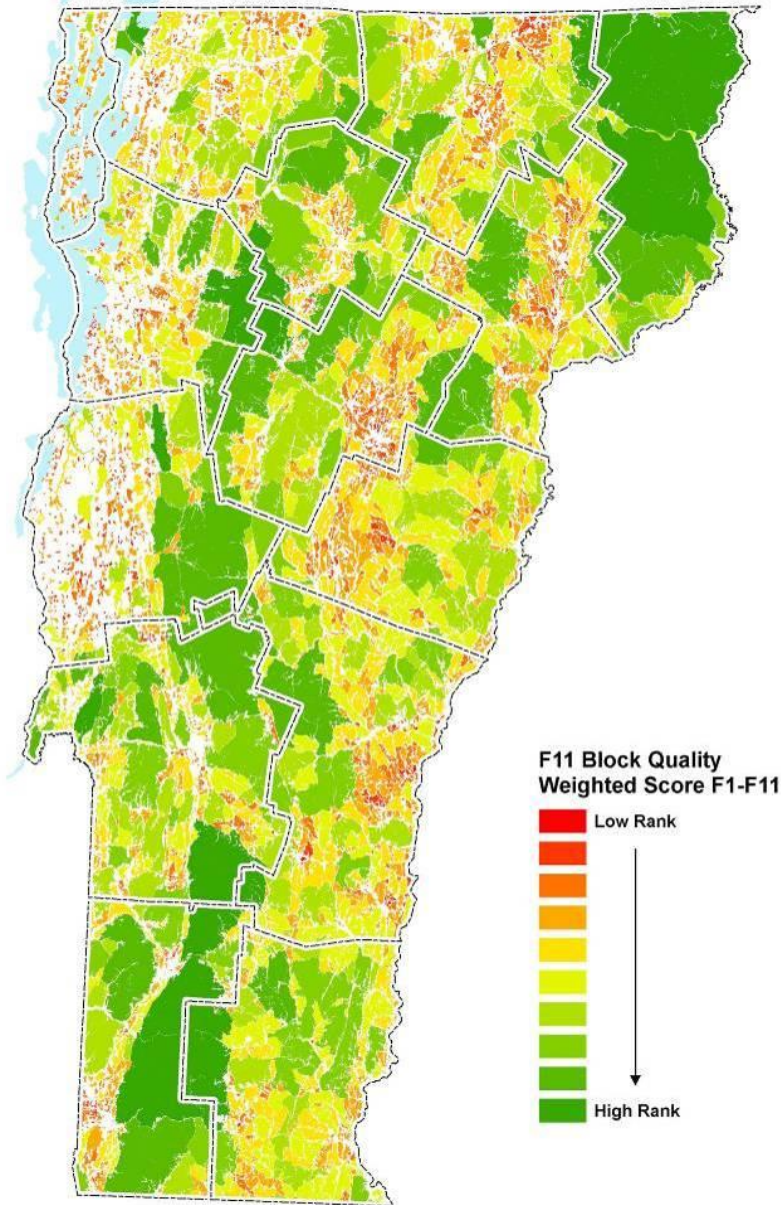


**Forest Blocks**: areas of contiguous forest and other natural habitats (wetlands, ponds, cliffs,...) that are unfragmented by roads, development, or agriculture.





# Forest Block project



- 4,055 forest blocks identified
- Each block ranked for 11 biological and physical factors and total weighted score



## Requirements for Maintaining an Ecologically Functional Landscape

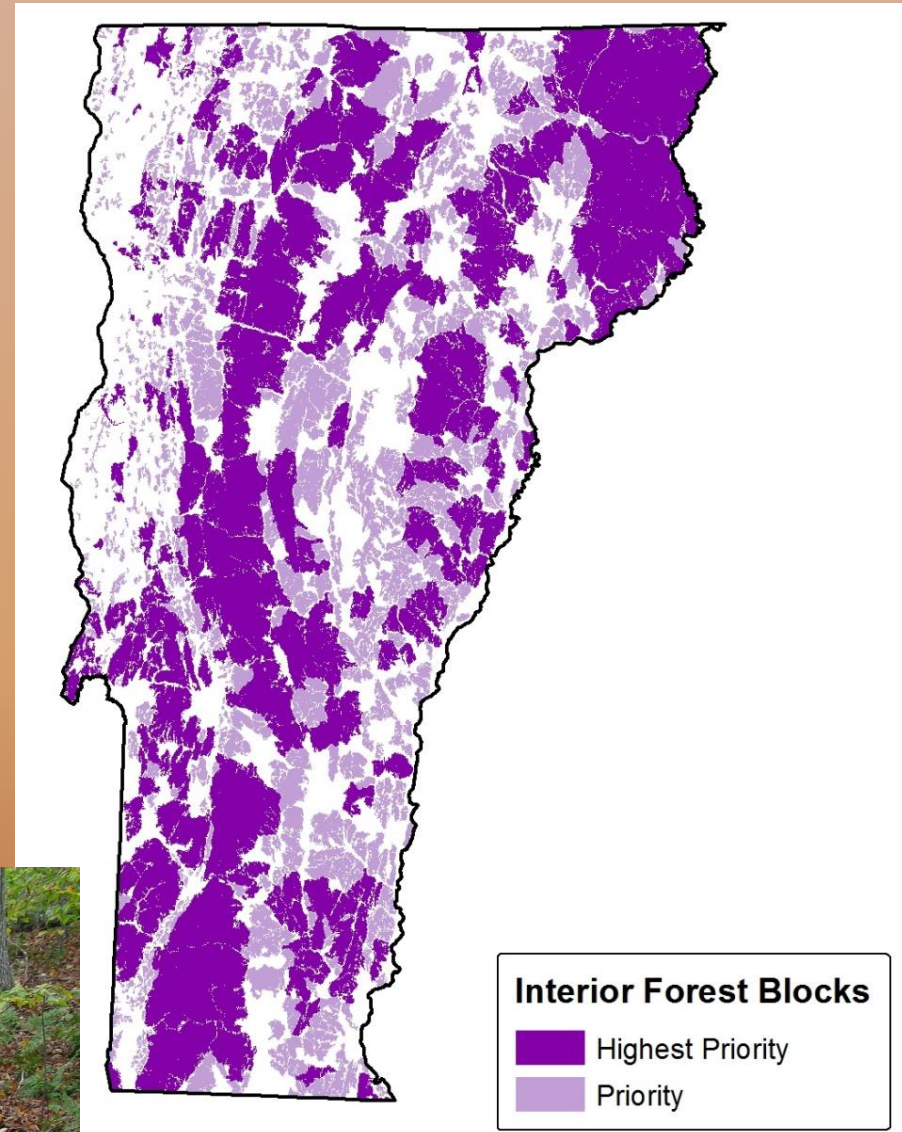
- Maintain ecological functions of each landscape feature.
- Need the combined functions of all the landscape features.
- Fine filter conservation planning for species and habitats that need special attention.
- What is conservation?... all methods available to maintain the ecological functions of the feature.
- “Guidelines for maintaining ecological function” and “further prioritization” are provided for each landscape element.
- BioFinder website will be updated (<http://biofinder.vermont.gov/>)

# Interior Forest Blocks

**Definition:** Areas of contiguous forest and other natural communities and habitats that are unfragmented by roads, development, or agriculture.

**Ecological Function:**

- Ecological processes
- Air and water quality
- Flood resilience;
- Interior forest species
- Wide-ranging mammals
- Source populations
- Large, topographically diverse forest blocks allow species to shift in response to climate change.



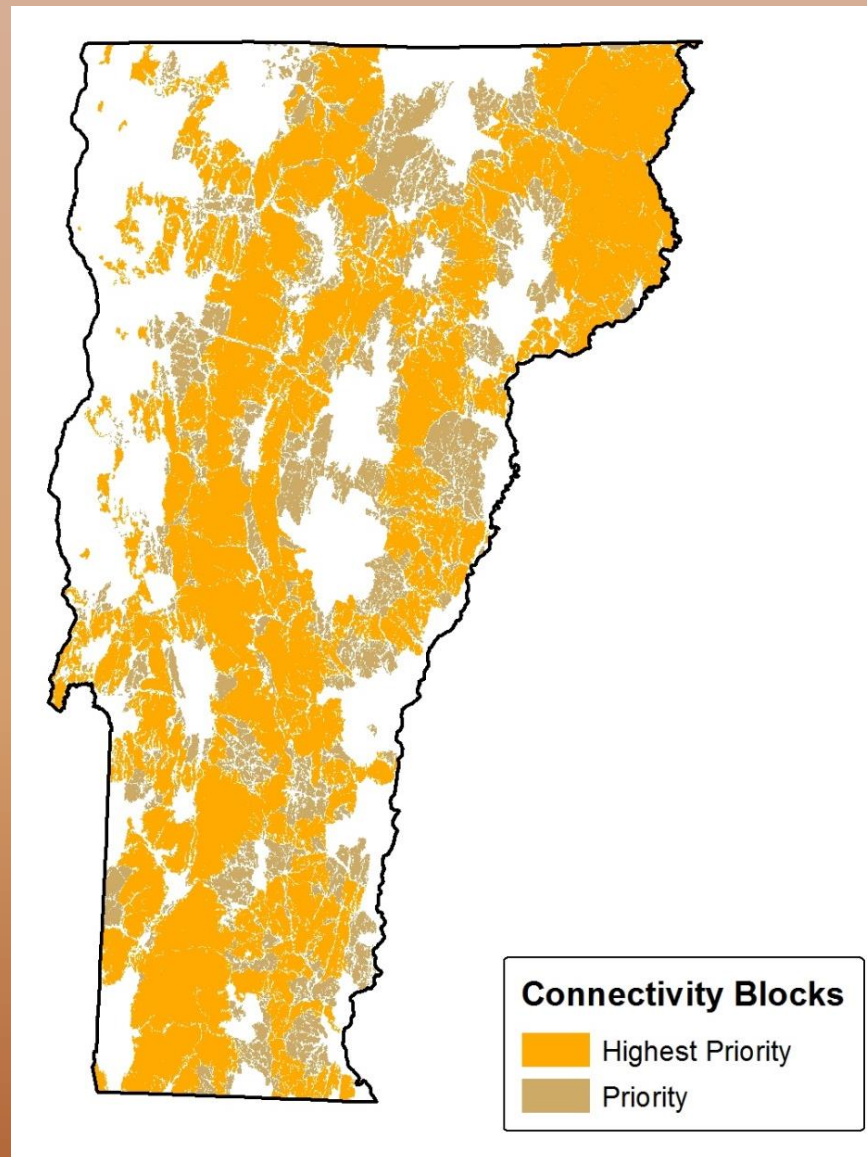


# Connectivity Blocks

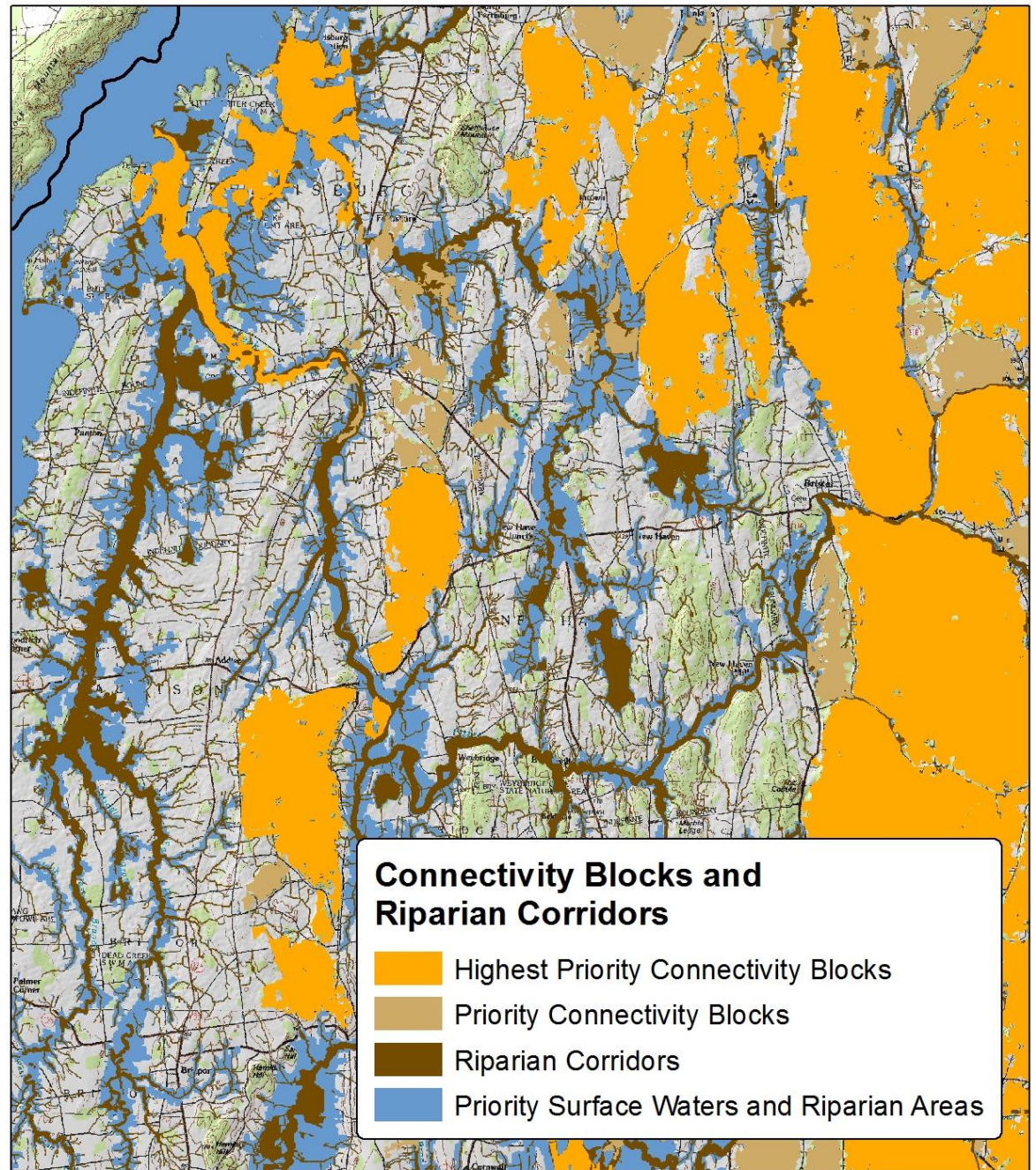
**Definition:** The network of forest blocks that together provide terrestrial connectivity at the regional scale (across Vermont and to adjacent states and Québec) and connectivity between all Vermont biophysical regions.

**Ecological Function:**

- Wide-ranging animal ranges
- Daily and annual habitat needs
- Young animal dispersal
- Plant and animal species range shift with climate and land uses change
- Genetic exchange and other processes



Connectivity Blocks and Riparian Corridors showing how the two landscape elements function together to provide connectivity in the fragmented Champlain Valley.



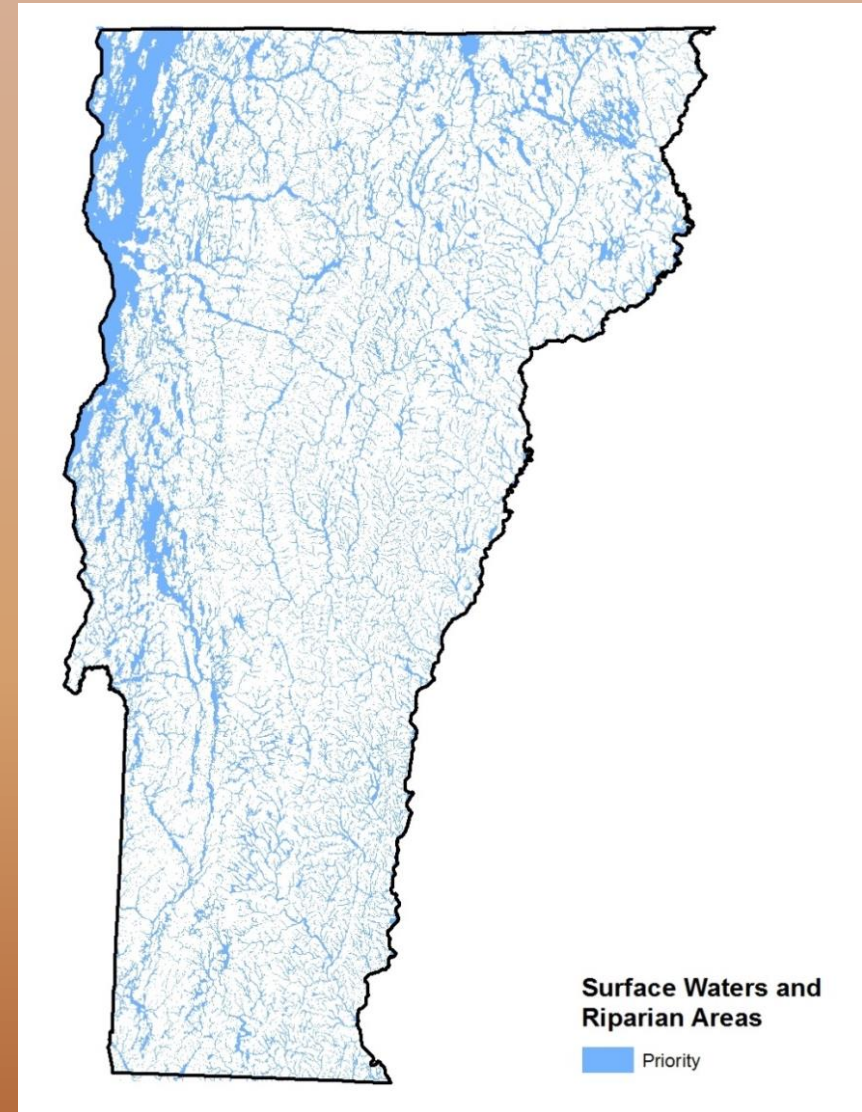


# Surface Waters and Riparian Areas

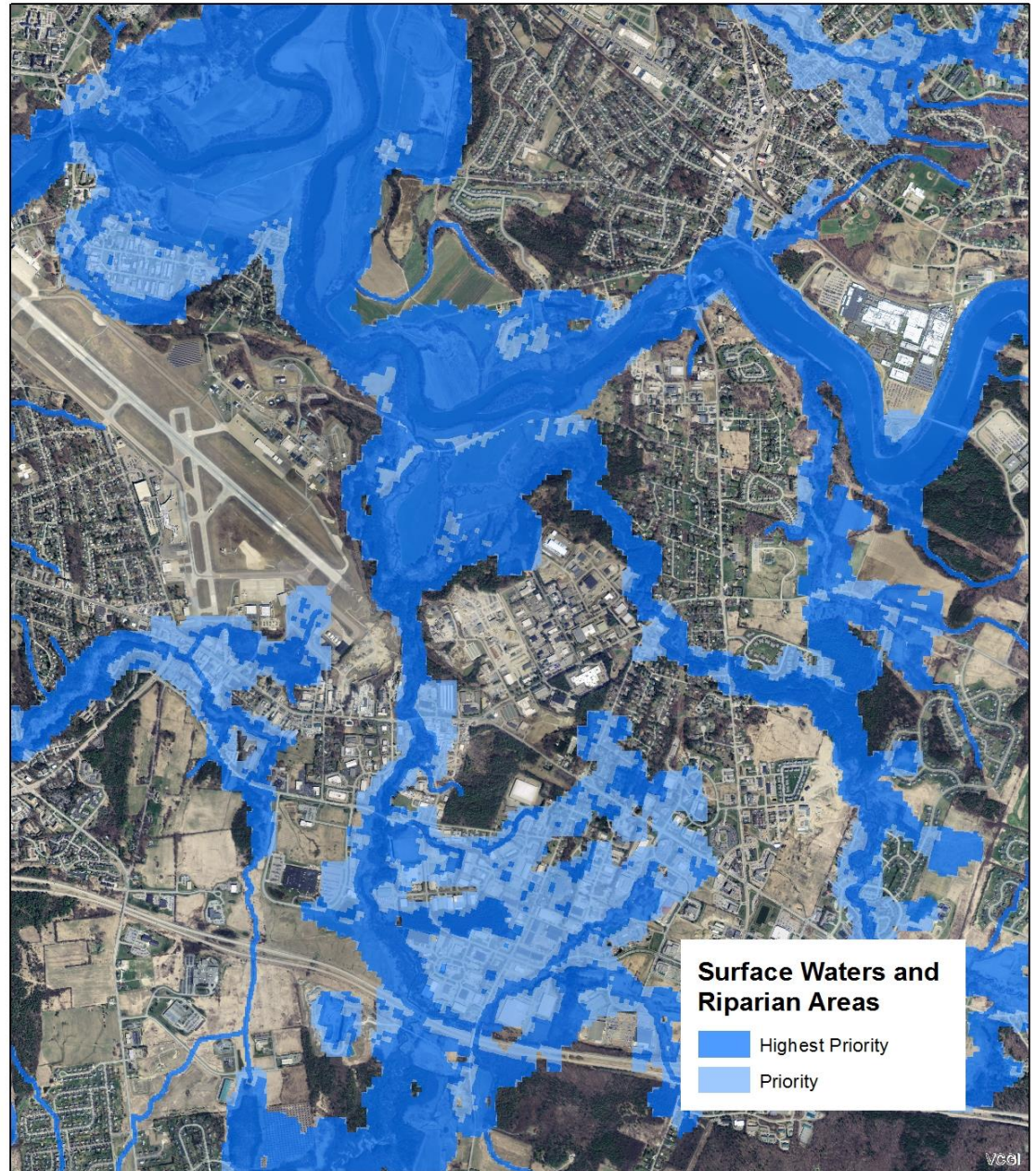
**Definition:** The network of all lakes, ponds, rivers, and streams, their associated riparian zones and valley bottoms in which geophysical processes occur, and their connections to groundwater.

## **Ecological Function:**

- Aquatic species habitat
- River geomorphic stability and floodplain access
- Stabilize shorelines, store flood waters, filter and assimilate sediments and nutrients, shade adjacent surface water, and contribute organic matter
- Biodiversity – species and communities
- Wildlife corridors
- Plant and animal range shifts in response to climate change



Surface Waters and  
Riparian Areas for the  
South Burlington, Essex,  
and Williston area.



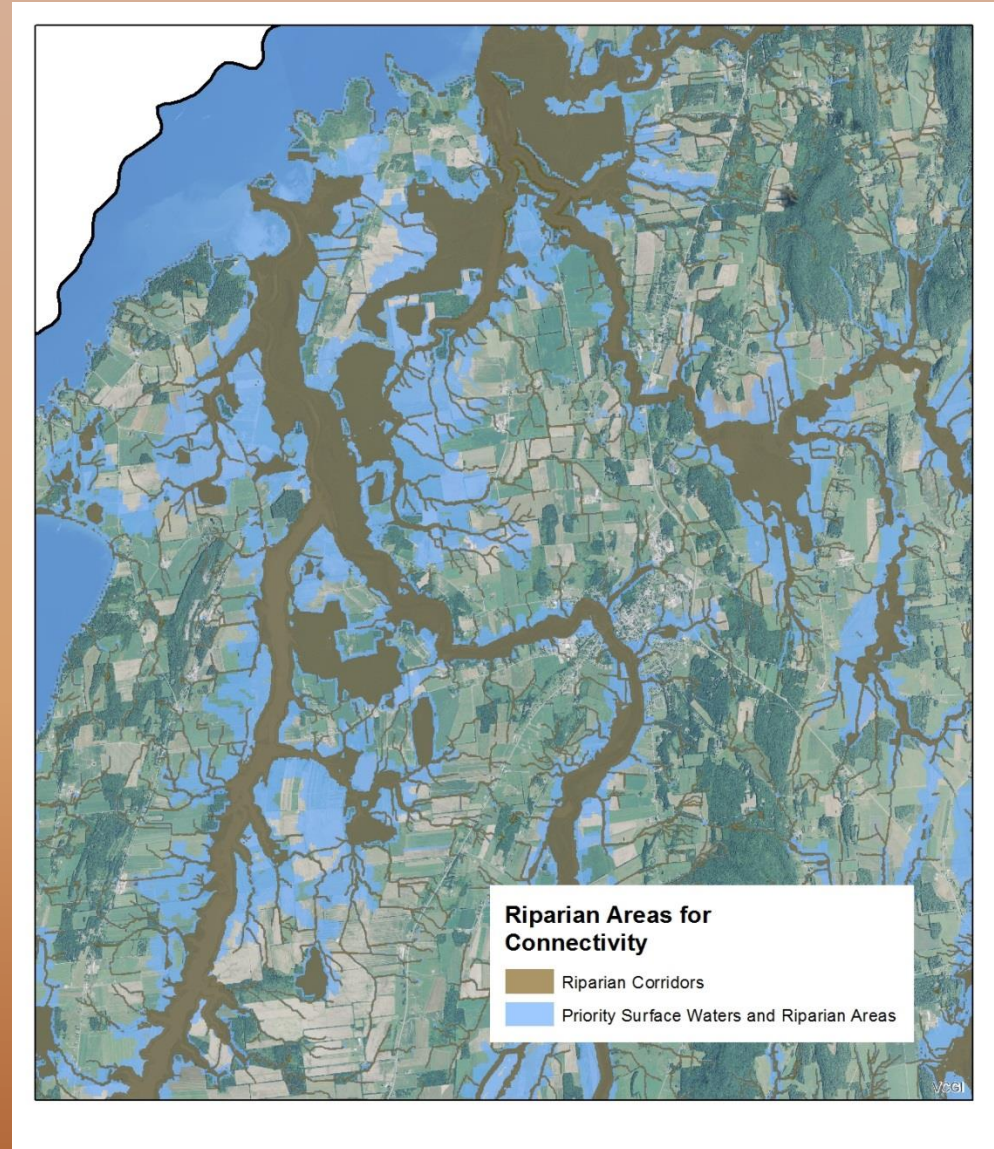


# Riparian Areas for Connectivity (Riparian Corridors)

**Definition:** The connected network of riparian areas in which **natural vegetation occurs**, providing natural cover for wildlife movement and plant migration.

**Ecological Function:**

- Integrity of the lakes, ponds, rivers, and streams
- Wildlife cover movement
- Obligate habitat for mink, otter, beaver, and wood turtle
- Riparian areas and Connectivity Blocks together form a functional network.



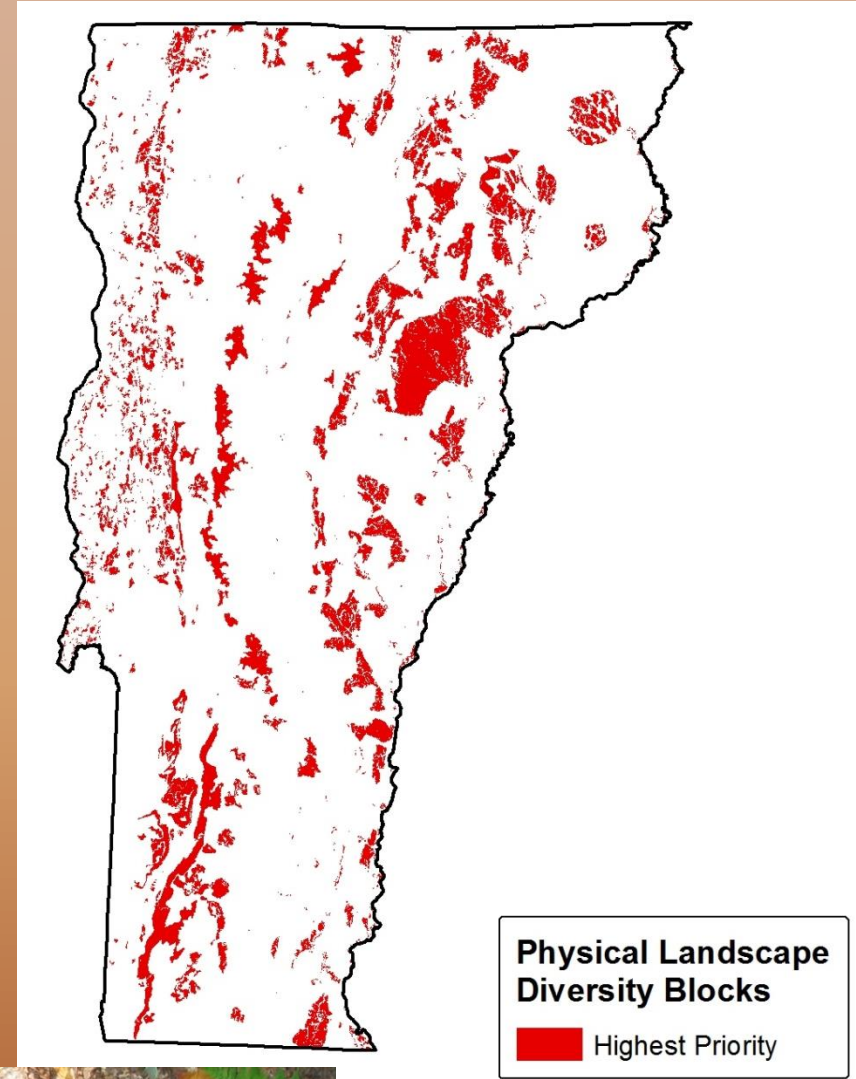
Vicinity of Ferrisburgh, Panton, and Vergennes.

# Physical Landscape Diversity Blocks

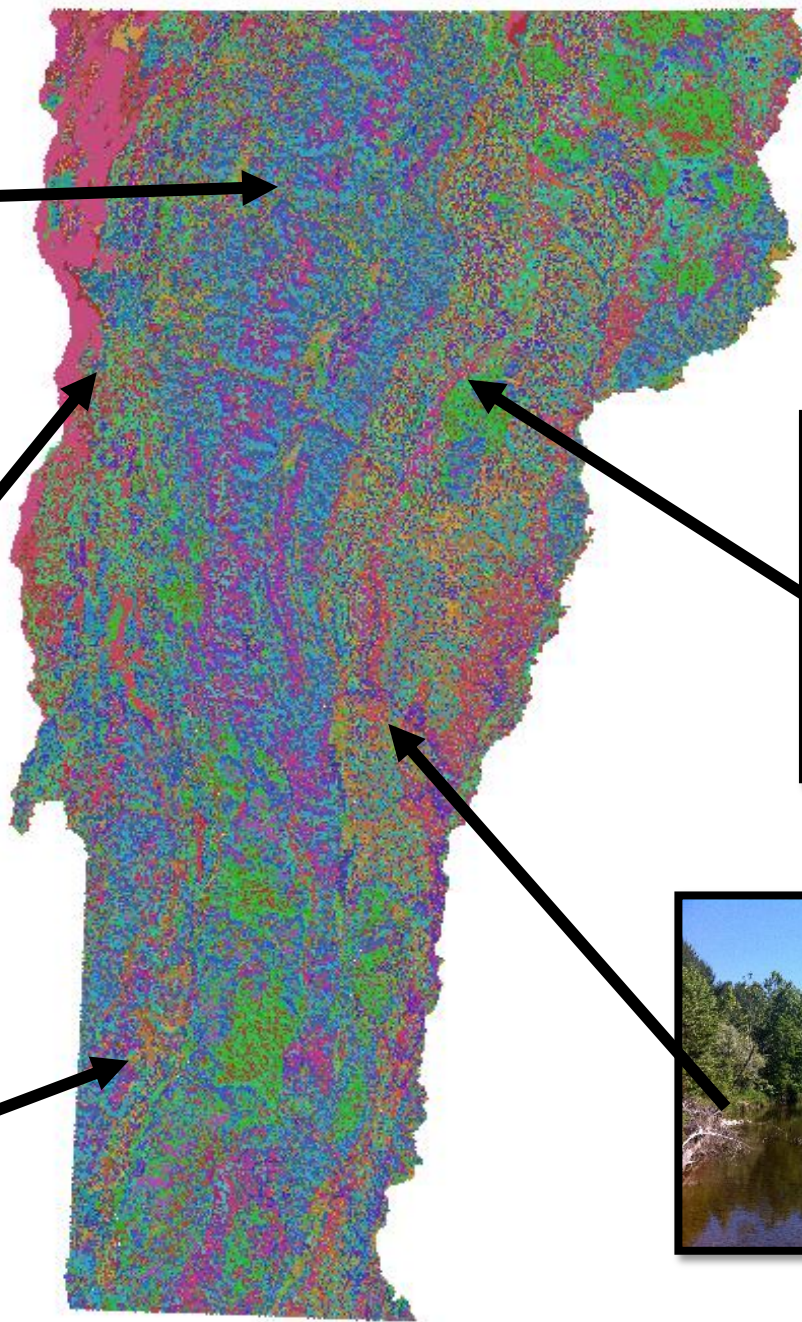
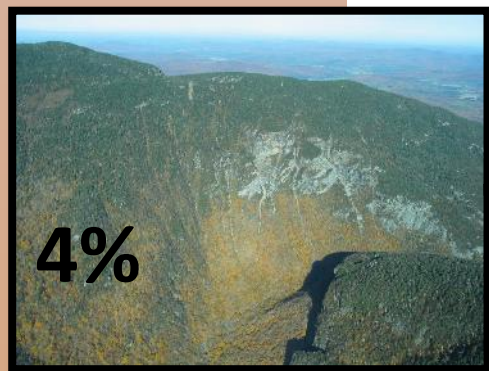
**Definition:** A set of forest blocks and other areas of natural vegetation that include physical landscape diversity features that are either rare in Vermont or under-represented in the other landscape elements.

**Ecological Function:**

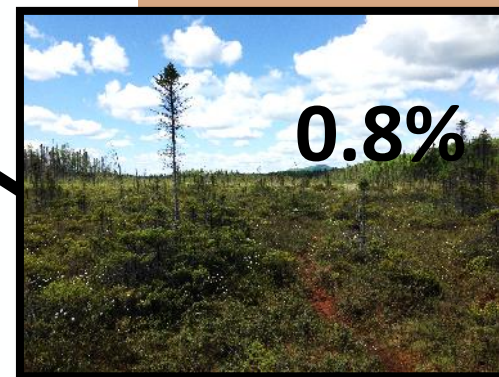
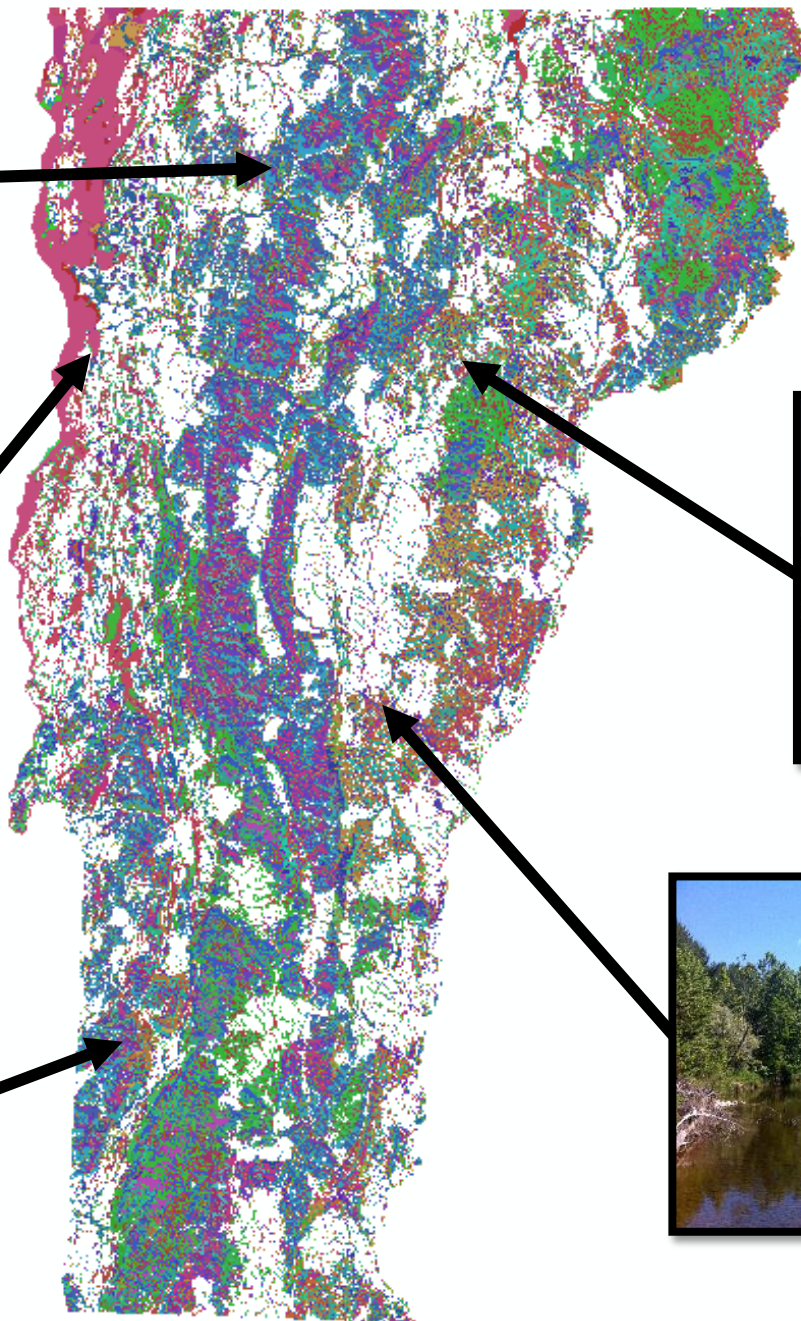
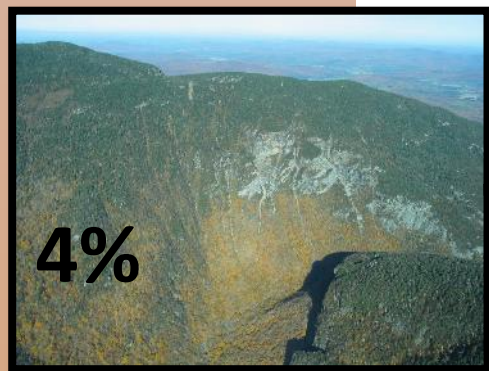
- Physical landscape diversity (bedrock, soils, elevation, landform,...) represents potential biological diversity.
- “Conserving Nature’s Stage” – representing all elements of physical landscape diversity in a conservation design will conserve biological diversity and *the capacity to adapt to climate change*.











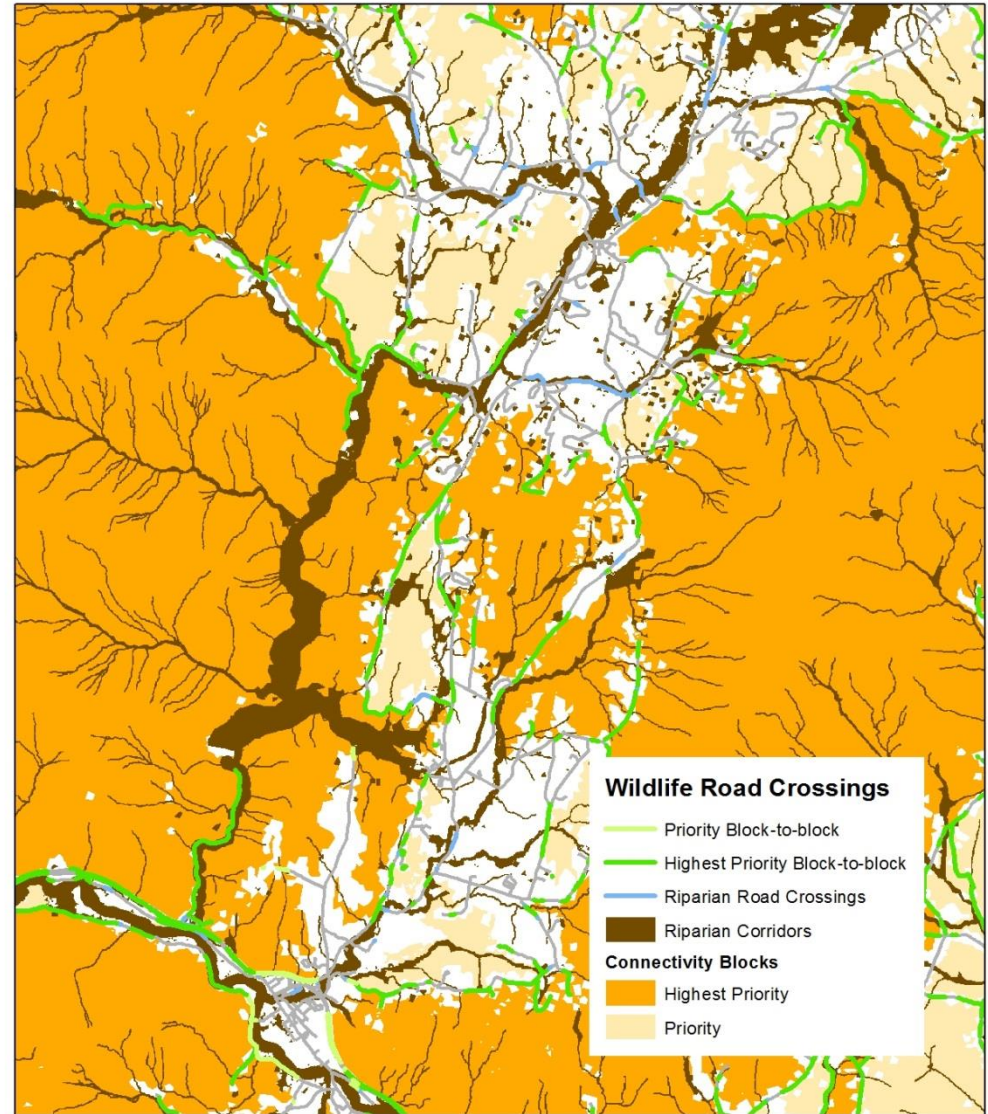


# Wildlife Road Crossings

**Definition:** A section of road that crosses a wildlife corridor where the adjacent habitat quality is high, usually because the road is adjacent to a forest block; the road is the primary impediment to animal movement.

**Ecological Function:**

- Provide the best opportunity for wildlife movement and dispersal of other species across roads
- Wildlife road crossings over or under roads are critically important between adjacent forest blocks and along linear riparian area networks.



Waterbury-Stowe area

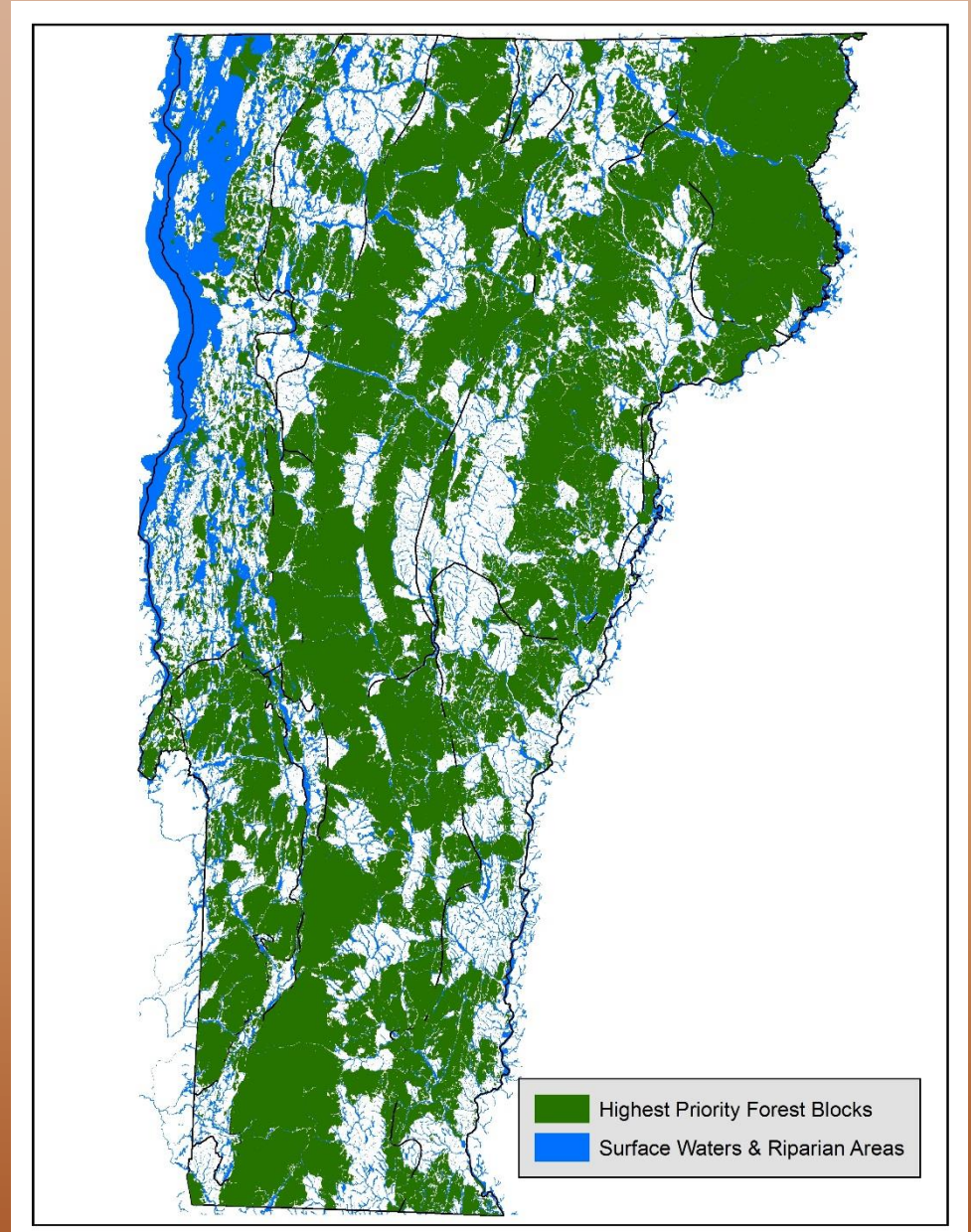
# Putting it All Together: The Ecologically Functional Landscape

**Requires conservation of all the landscape elements together.**

**The lands and waters identified are the areas of the state that are of highest priority for maintaining ecological integrity.**

**A connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features.**

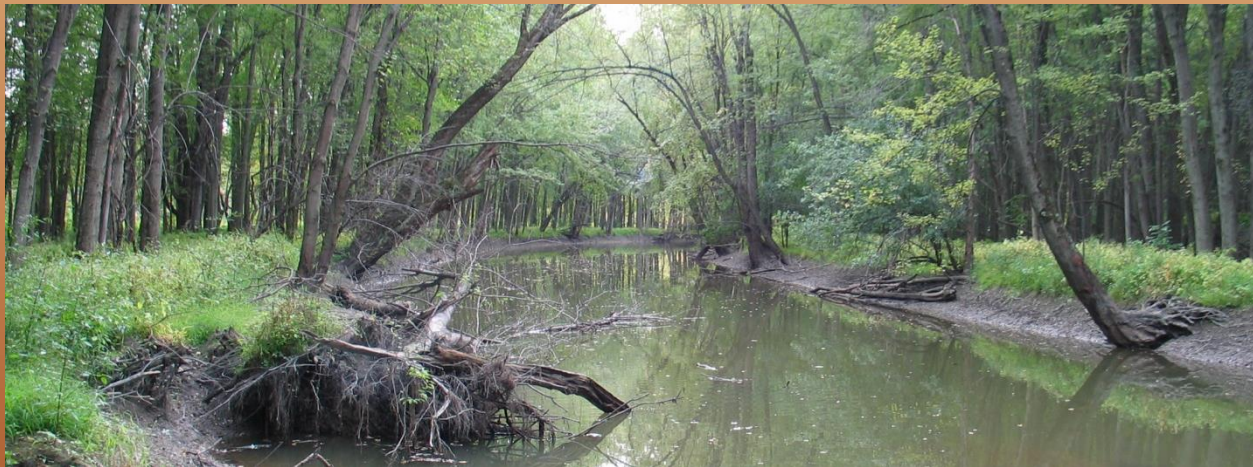
**Long term conservation of much of Vermont's biological diversity and the capacity of species and natural communities to adapt to climate change.**





# Some Thoughts and Perspectives

- We should expect some decline in function – we cannot conserve it all.
- 80 percent of Vermont is privately owned. Landowners decisions on management and stewardship hold the key.
- Can focus permanent conservation on key features.







## **Keeping Forests as Forests maintains:**

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



**Thank you... Questions? Discussion...**

