

# The Status of Current and Future Old Forests in Vermont

*Robert Zaino*

*Vermont Fish and Wildlife Department*



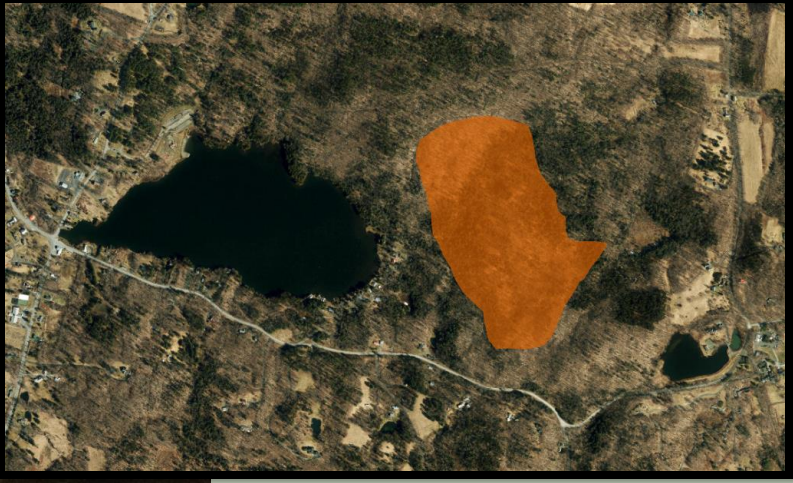
# Old Forests

- Natural species composition
- Old trees typically >150 years
- Evidence of natural disturbance processes and regeneration
- Abundant dead and downed trees in a variety of size and decay classes
- Minimal evidence of past timber harvesting or other land uses

***OLD FORESTS ARE VERY RARE IN VERMONT***



Gifford Woods State Park

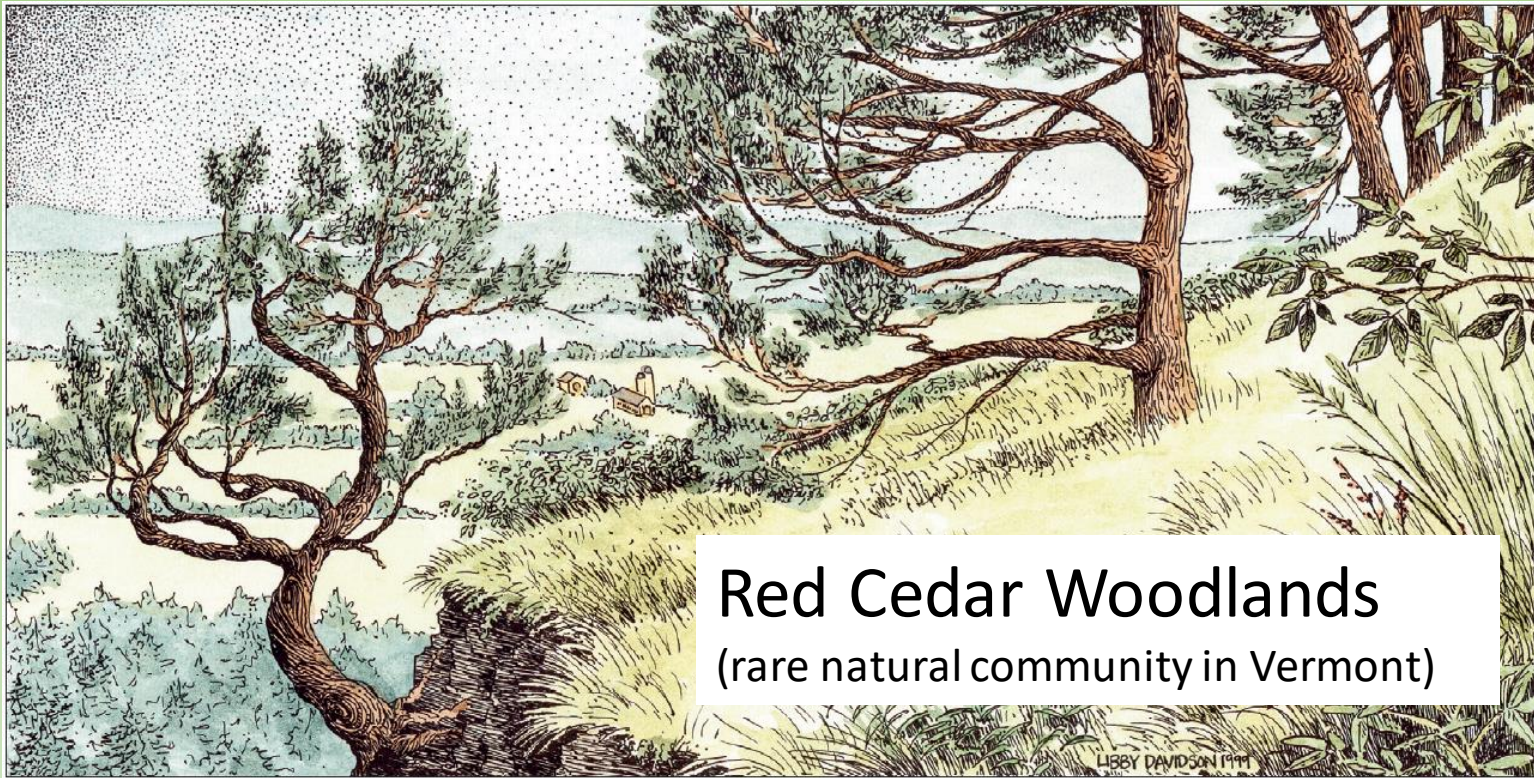


**Silver Lake Old Forest**  
70 acres of Hemlock-Northern Hardwood Forest



## Blue Ridge Mountain Green Mountain National Forest

600+ acres of old forest  
found during inventories



Red Cedar Woodlands  
(rare natural community in Vermont)



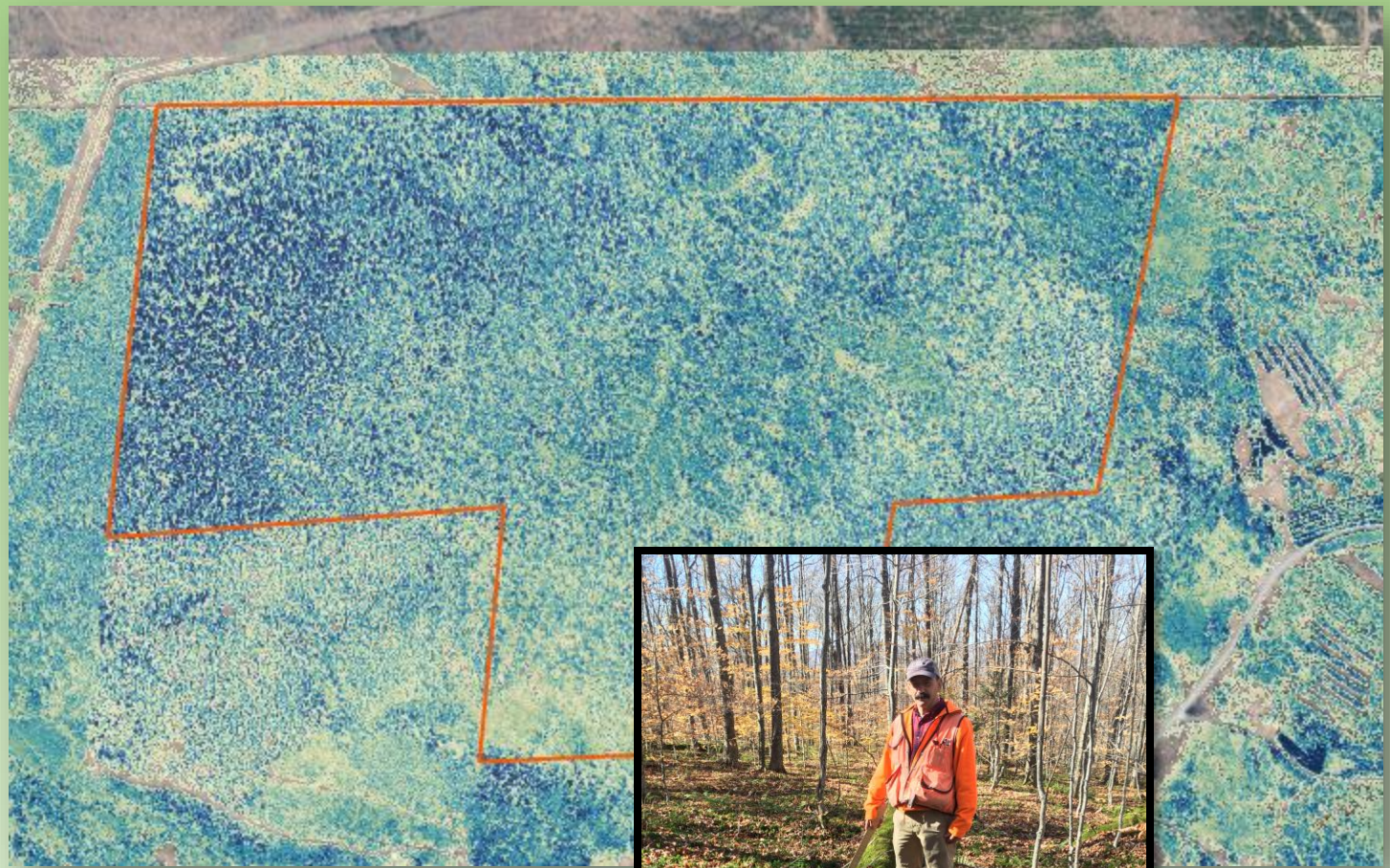
287 y/o (est. 1734)  
Austin Hill - TNC

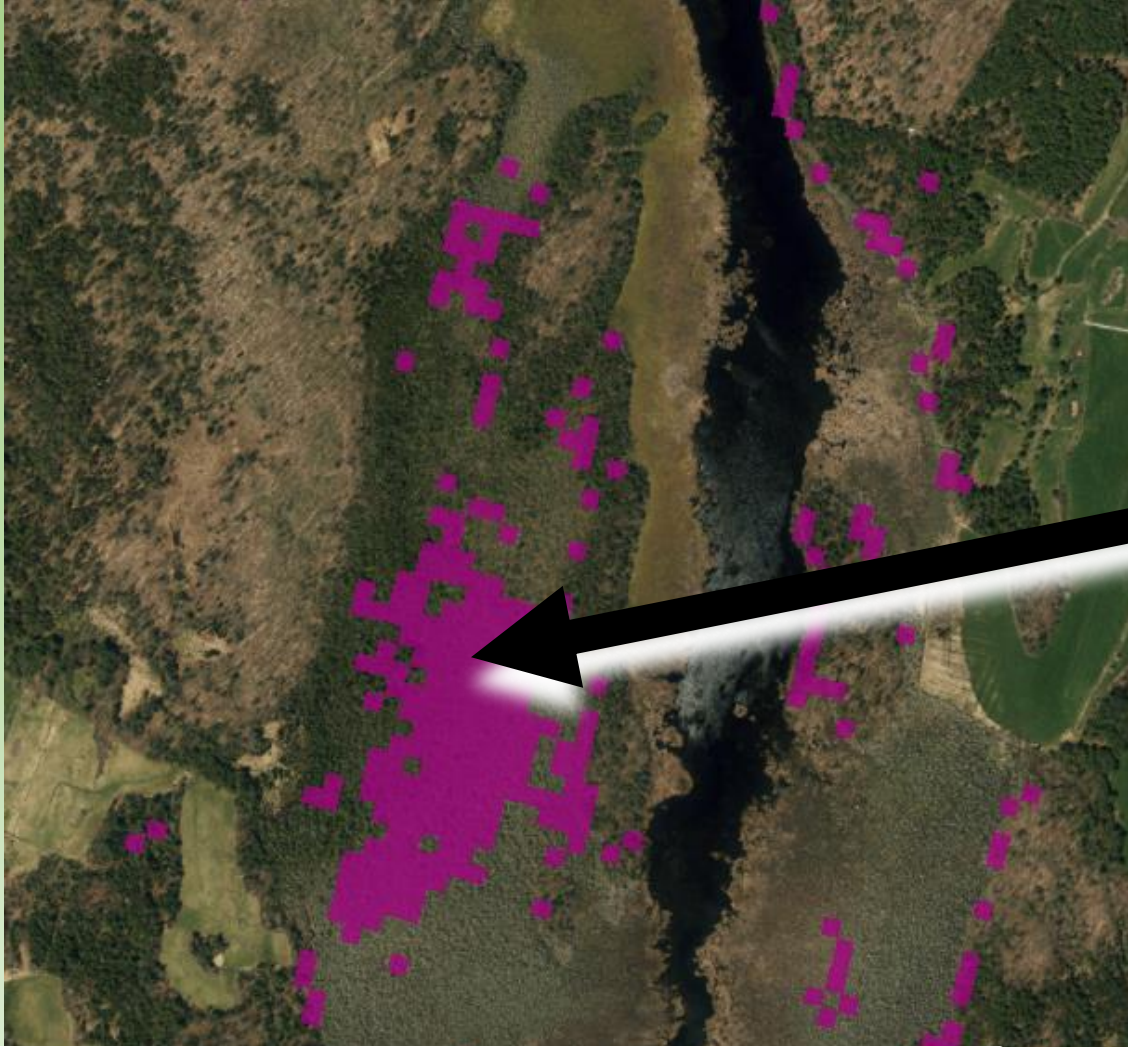


445 rings  
Private land

## Inventory of old forests in Vermont

- Following up on anecdotal leads in the Natural Heritage Database – “*Mature forest, maybe old growth.*”
- Improving mapping and documentation of known old forest sites
- Lidar canopy height (normalized digital surface model)





- NDVI (normalized difference vegetation index)
- LANDFIRE canopy bulk density (2016)
- LANDFIRE canopy base height (2016)
- % canopy cover from NLCD (2016)
- Forest height from GEDI, NASA's LiDAR satellite (2019)



**Related Record Menu**

- Identifiers
- Site/Directions
- Relationship to Standard
- Locators
- Mapping
- Representation Extent
- Source Features
- Survey Information
- EO Rank
- Description
- Environment
- Composition

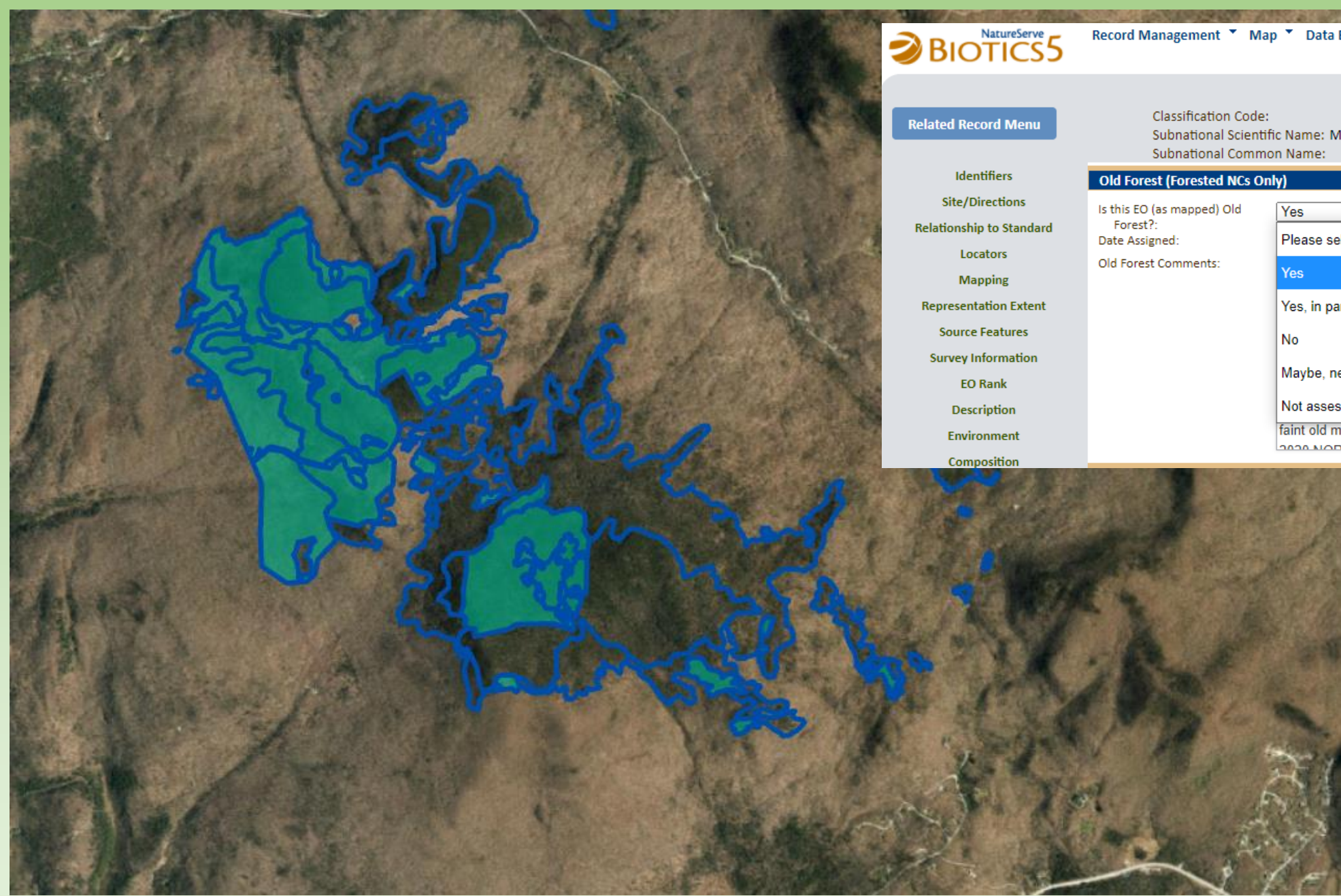
Classification Code:  
Subnational Scientific Name: Montane Spruce-Fir Forest  
Subnational Common Name:

**Old Forest (Forested NCs Only)**

Is this EO (as mapped) Old Forest?:  
Date Assigned:  
Old Forest Comments:

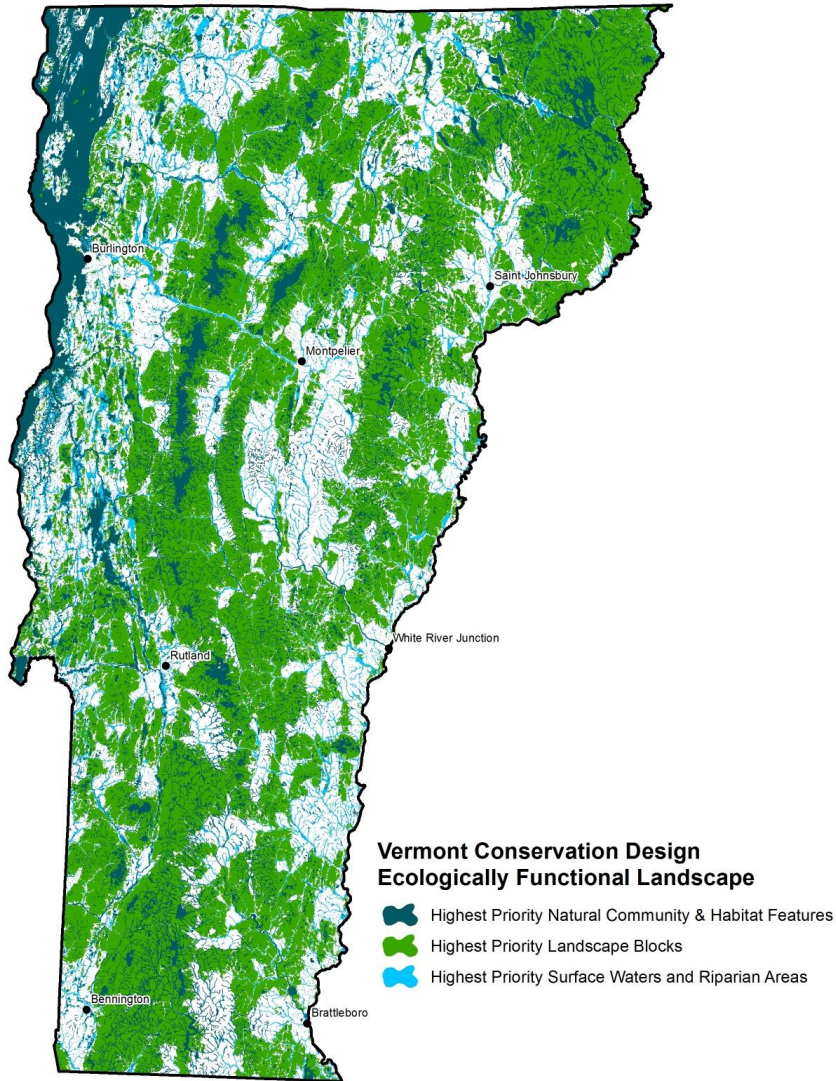
Yes ▾  
Please select a value  
Yes  
Yes, in part  
No  
Maybe, needs more inventory  
Not assessed

determined with Marcus and Sorenson  
in the broader record needs to be grou  
220 acres has been ground truthed to b  
also more young forest. This applies to  
forest on the South summit complex that  
faint old minor access roads in places on the LIDAR.





# "FUTURE OLD FORESTS" - VERMONT CONSERVATION DESIGN



## Ecologically Functional Landscape

- Intact
- Connected
- Diverse

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



# Conservation Design at Three Scales

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## Landscapes



**Interior Forest Blocks**  
**Connectivity Blocks**  
**Geological Diversity Blocks**  
**Surface Waters and Riparian Areas**  
**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*

# Young and Old Forest Targets

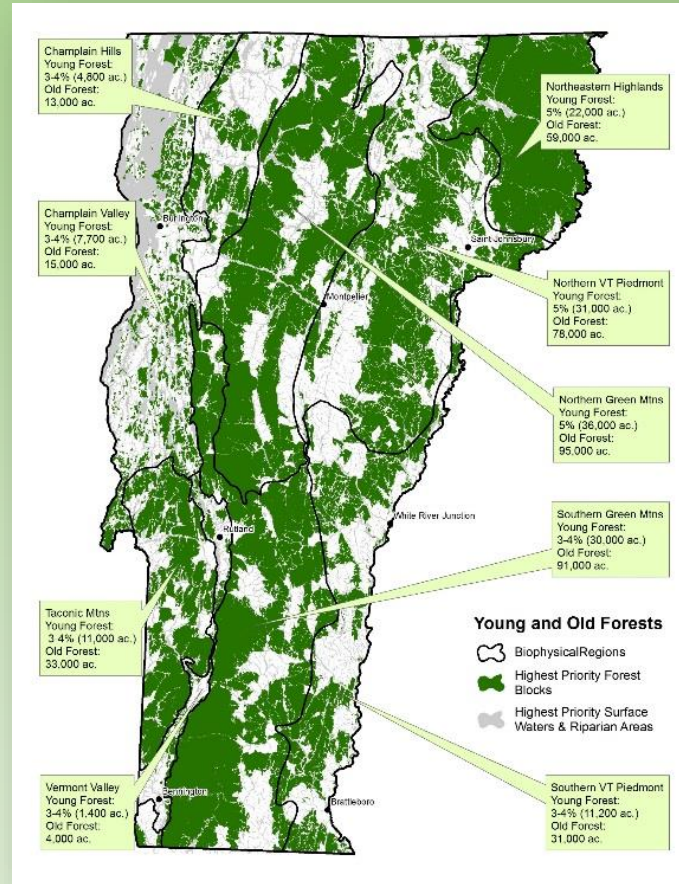
## Targets:

- 3-5% young forest
- ≈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.



**Champlain Hills**

**Champlain Valley**

**Taconic Mountains**

**Vermont Valley**

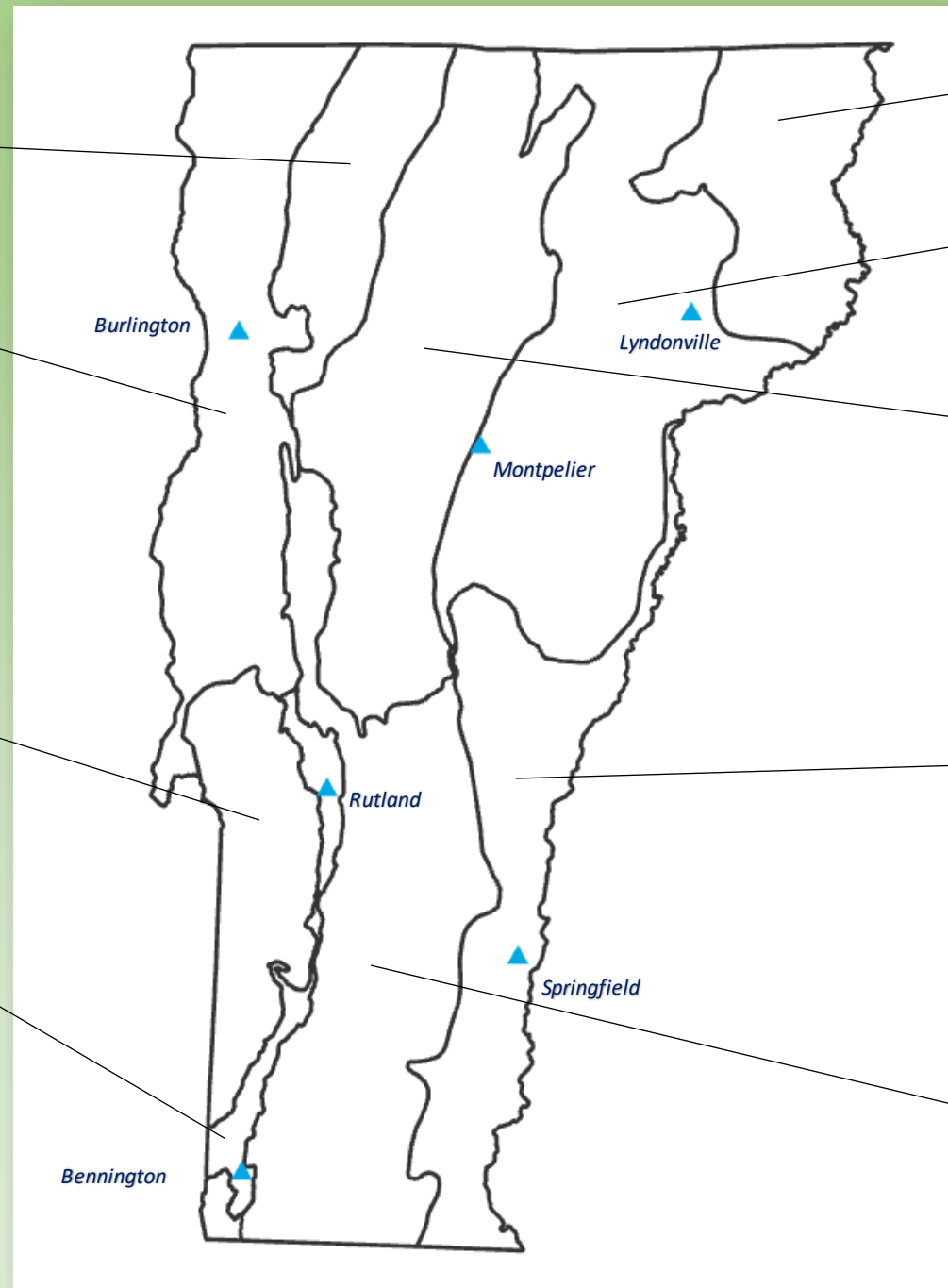
**Northeastern Highlands**

**Northern Vermont Piedmont**

**Northern Green Mountains**

**Southern Vermont Piedmont**

**Southern Green Mountains**



*Burlington*

*Lyndonville*

*Montpelier*

*Rutland*

*Springfield*

*Bennington*

## 15% of the Matrix Forest within Highest Priority Forest Blocks in each Biophysical Region

### Region – Acres/Minimum Patch Size

Champlain Hills - 13,000/1,000

Champlain Valley - 15,000/500

Northeastern Highlands - 59,000/4,000

Northern Green Mountains - 95,000/4,000

Northern Vermont Piedmont - 78,000/1,000

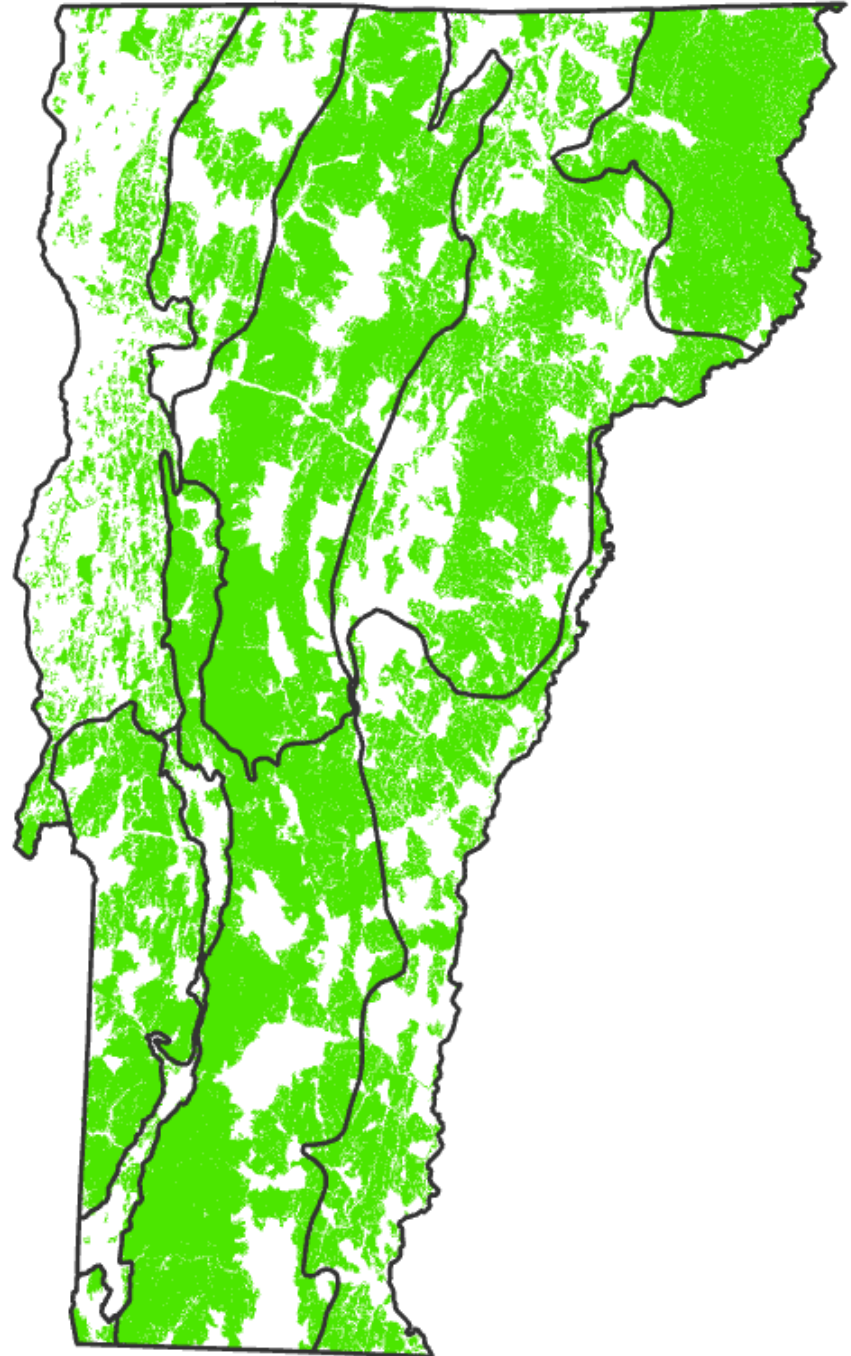
Southern Green Mountains - 91,000/4,000

Southern Vermont Piedmont - 31,000/1,000

Taconic Mountains - 33,000/1,000

Vermont Valley - 4,000/500

**TOTAL – 419,000 acres**





**DISTRIBUTION/  
ABUNDANCE**

Northern Hardwood Forests are found throughout the state at elevations below 2,700 feet, although the upper elevation limit is lower in the north.



**ECOLOGY AND PHYSICAL SETTING**

This is Vermont's most abundant forest, the forest that truly characterizes the Northern Hardwood Forest Formation. It blankets hills in every biophysical region of the state and creates a background setting, a so-called matrix, for the smaller communities—the swamps, fens, outcrops, and meadows. It is a broadly defined community type, encompassing a great deal of variation. But there are some things that all expressions of this community share in common. Beech and yellow birch are almost always present. Sugar maple is usually present, but in some cases red maple is more prominent. Most soils are derived from till and are loamy, cool, and moist. These forests are found at elevations below 2,700 feet on gentle to steep slopes.

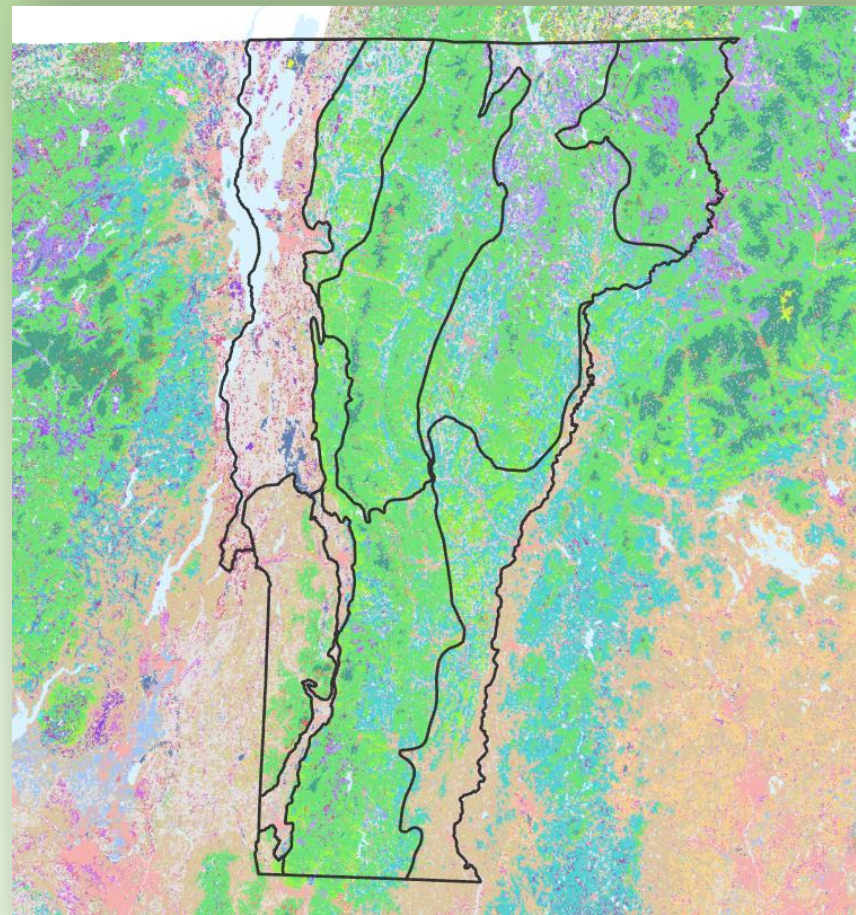
Northern Hardwood Forests are generally absent from warmer climate areas, such as the Champlain Valley and the lower elevations of extreme southeastern and southwestern Vermont. They are also absent from other places where soils support specialized communities. Such places include clayplains, alluvial soils along streams and rivers, glaciofluvial deposits of sand or gravel terraces, rocky or bedrock-controlled soils, and wet soils in depressions.

The variations within this community type stem from differences in climate, slope, landscape position, chemistry of the underlying bedrock and till, stoniness, depth to hardpan or bedrock, and past land use. Upper-elevation Northern Hardwood Forests have lower overall species diversity, smaller trees, and sometimes dense fern patches. Forests on convex slopes tend to have more beech and red maple, whereas concave slopes yield more sugar maple and white ash. Yellow birch is dominant where stony soils and natural disturbance provide the right conditions for that species to germinate and grow. White pine occurs in areas of shallow or sandy soils. These variations are often small in scale; for example, a beech-dominated knob may only be a few hundred square feet within a forest otherwise dominated by sugar maple. A large area, then, may be mapped as Northern Hardwood Forest, with the recognition that there is variability within it. Foresters may find it useful to map the

# A Map of Terrestrial Habitats of the Northeastern United States: Methods and Approach

The Nature Conservancy, Eastern Conservation Science

Charles Ferree and Mark G. Anderson



Acadian Low Elevation Spruce-Fir-Hardwood Forest  
*Lowland Spruce-Fir Forest*  
*Red Spruce-Northern Hardwood Forest*

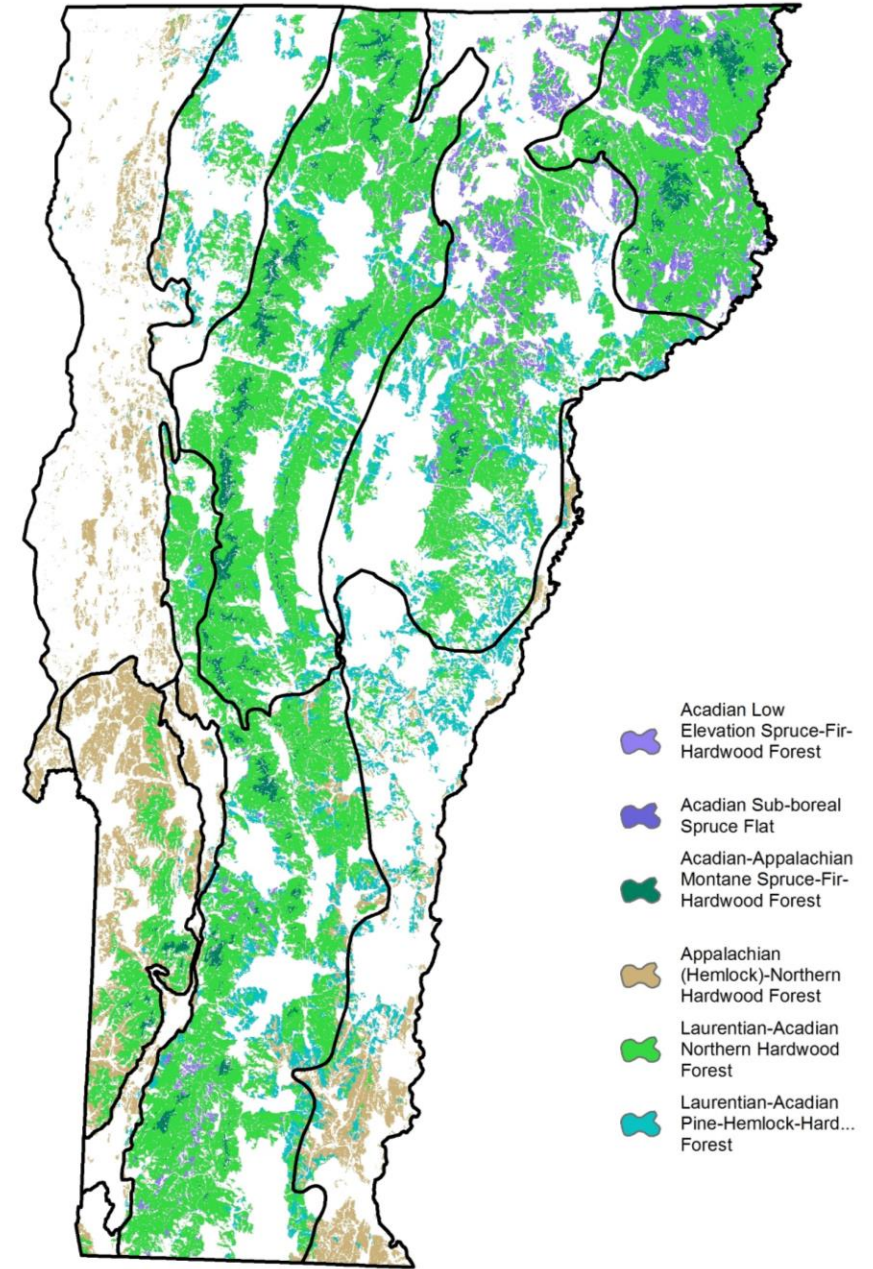
Acadian Sub-boreal Spruce Flat  
*Lowland Spruce-Fir Forest*

Acadian-Appalachian Montane Spruce-Fir-Hardwood Forest  
*Montane Spruce-Fir Forest*  
*Montane Yellow Birch-Red Spruce Forest*

Appalachian (Hemlock)-Northern Hardwood Forest  
*Hemlock-Northern Hardwood Forest*  
*Mesic Maple-Ash-Hickory-Oak Forest*  
*Temperate Hemlock-Hardwood Forest*  
*Temperate Hemlock Forest*  
*Mesic Red Oak-Northern Hardwood Forest*

Laurentian-Acadian Northern Hardwood Forest  
*Northern Hardwood Forest*  
*Red Spruce-Northern Hardwood Forest*  
*Montane Yellow Birch-Red Spruce Forest*

Laurentian-Acadian Pine-Hemlock-Hardwood Forest  
*Hemlock-Northern Hardwood Forest*

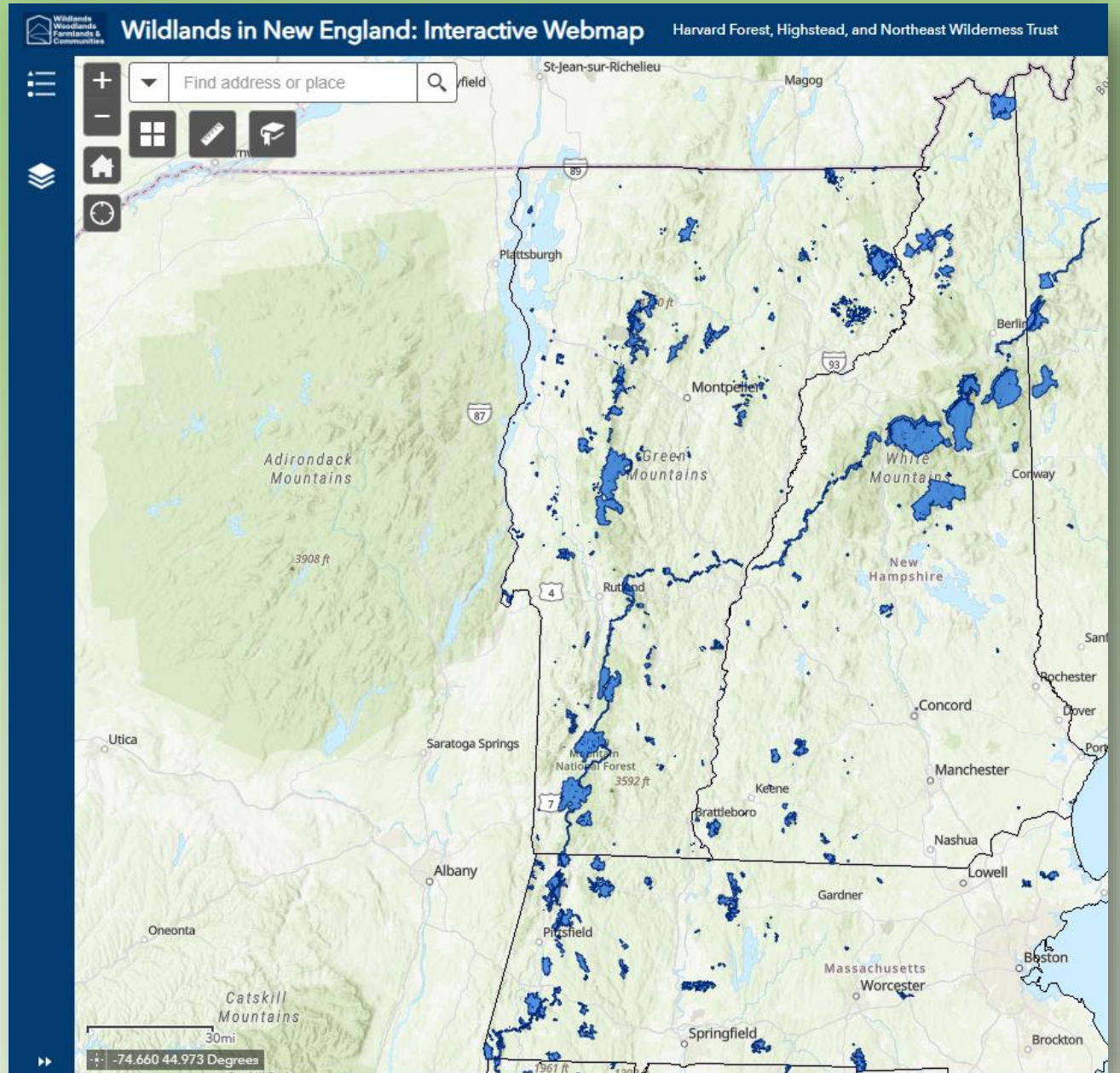


# Wildlands in New England

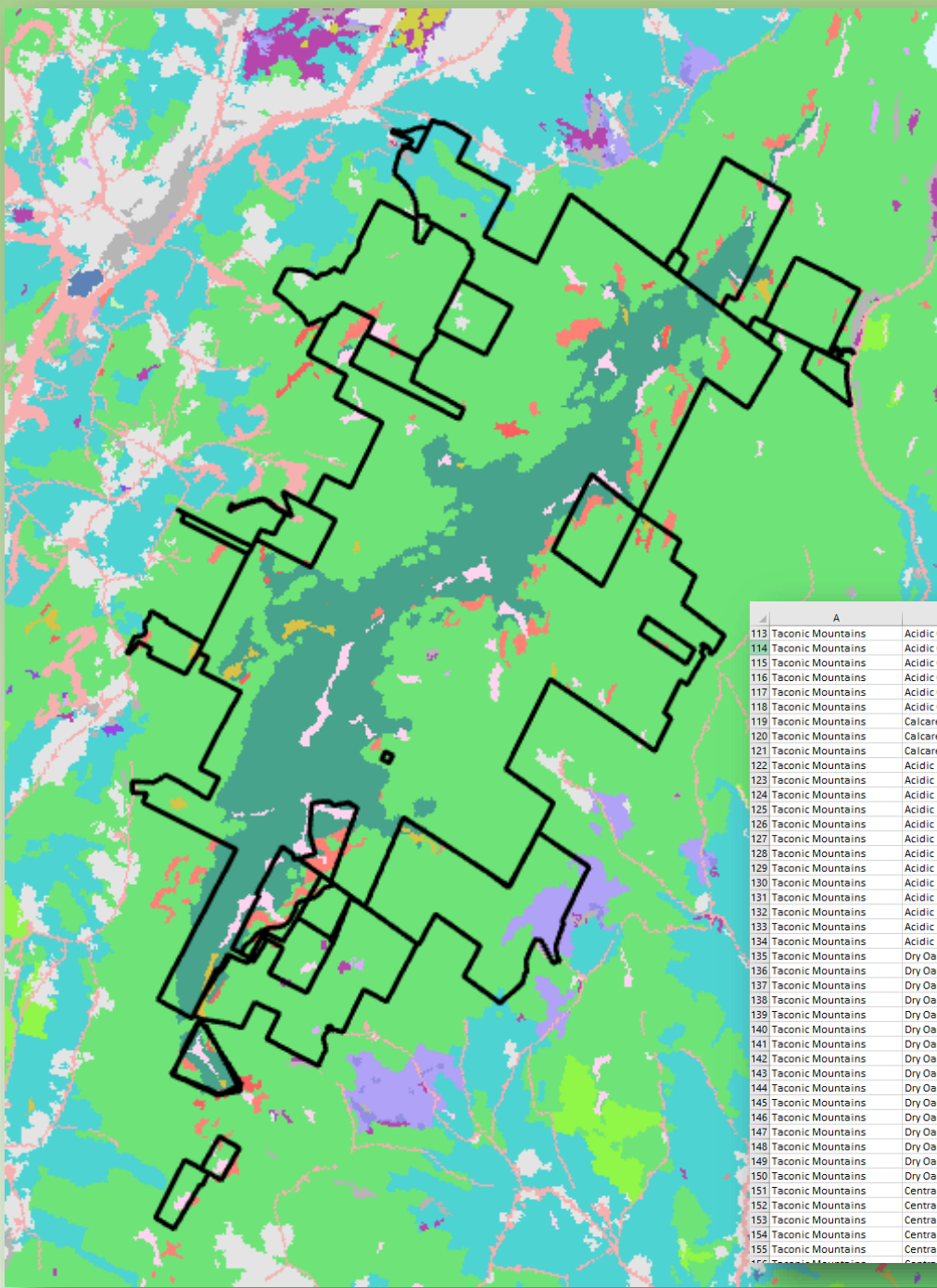
*Past, Present, and Future*



An Integrated Conservation Initiative

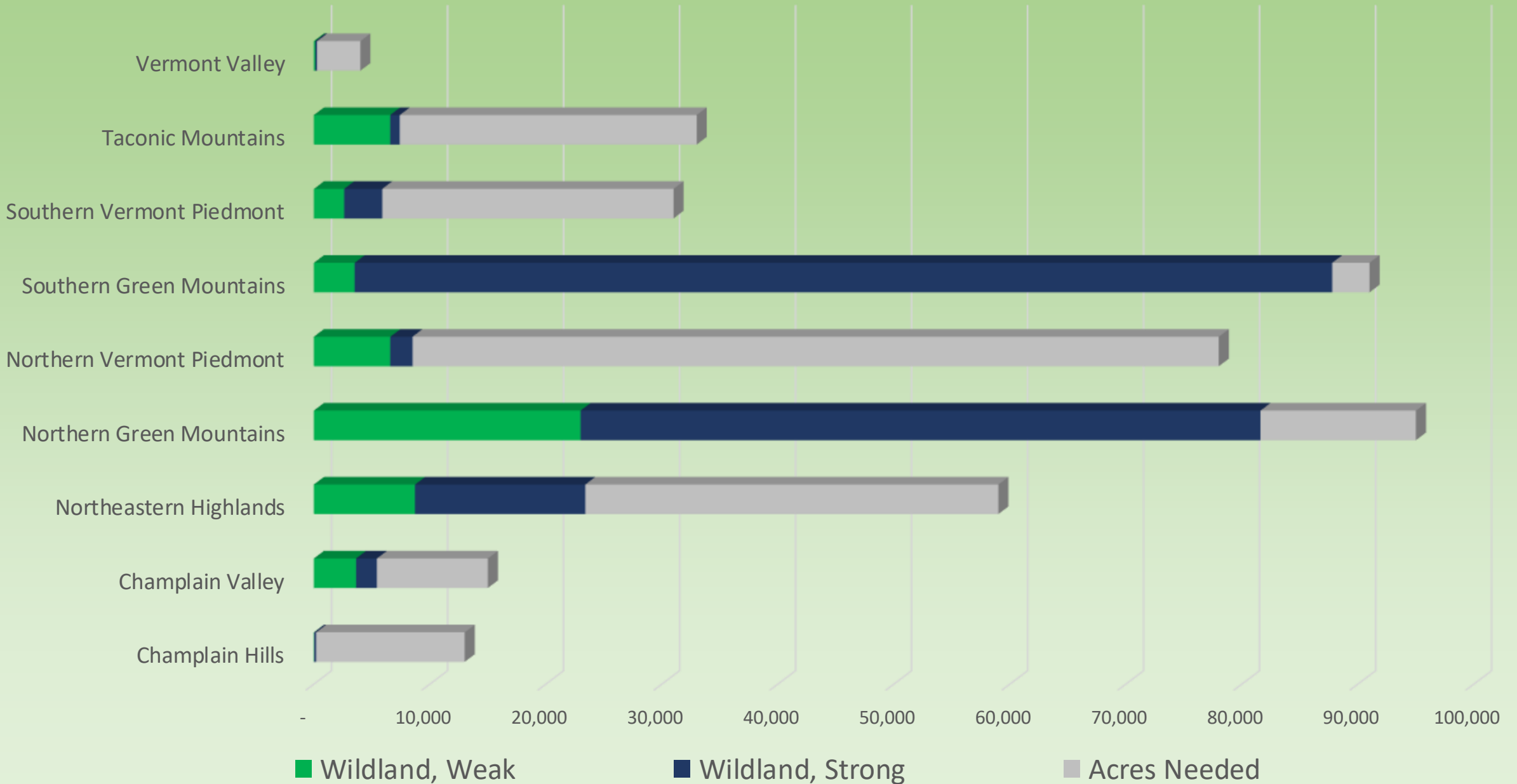






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# Wildlands and the Vermont Conservation Design Old Forest Targets

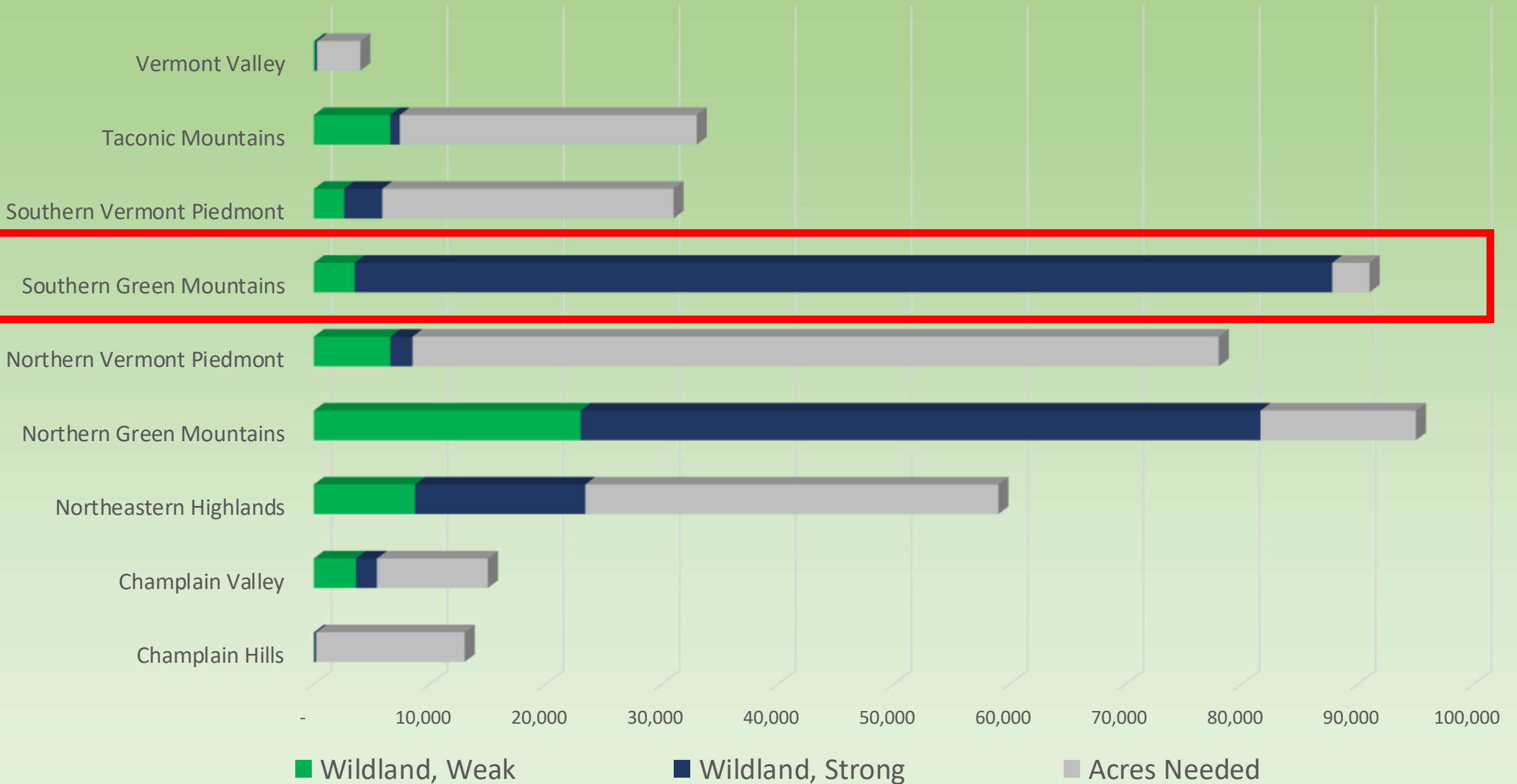




Worcester Range Natural Area, CC Putnam State Forest

Mount Mansfield Highly Sensitive Management Area, Mount Mansfield State Forest

# Wildlands and the Vermont Conservation Design Old Forest Targets



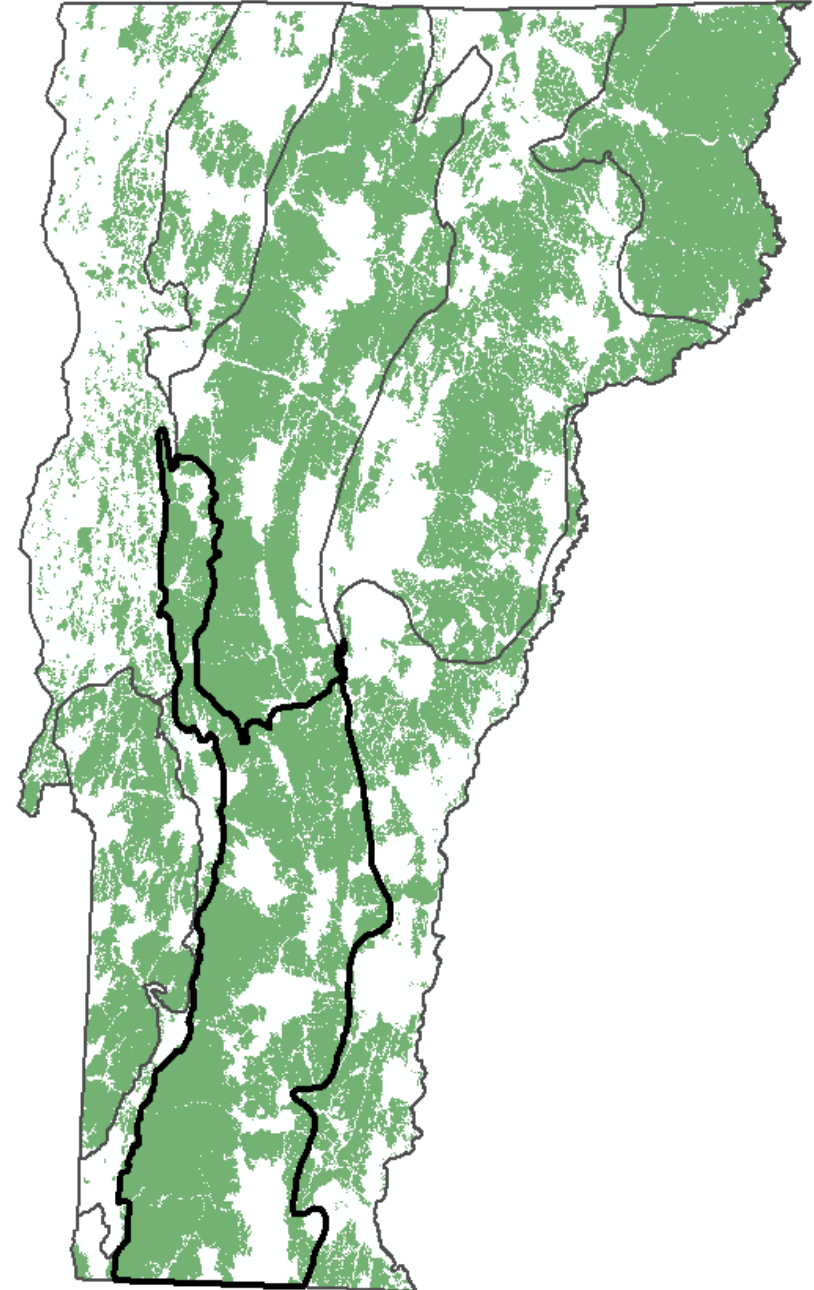
# Southern Green Mountains

## Vermont Conservation Design

old forest target: 91,000 acres

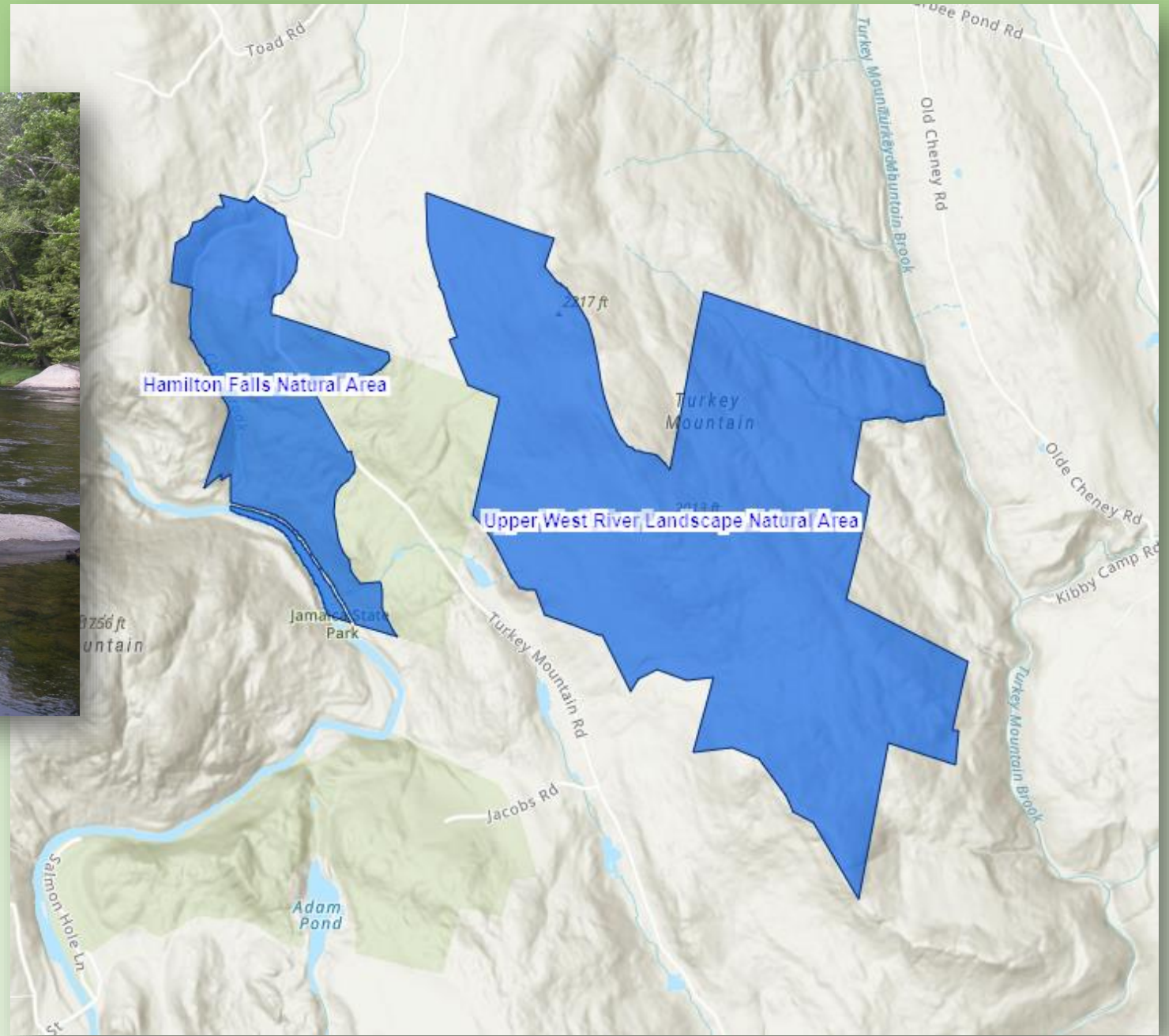
Acres of Wildlands: 87,780 acres (96%)

*Preferred minimum patch size: 4,000 acres*

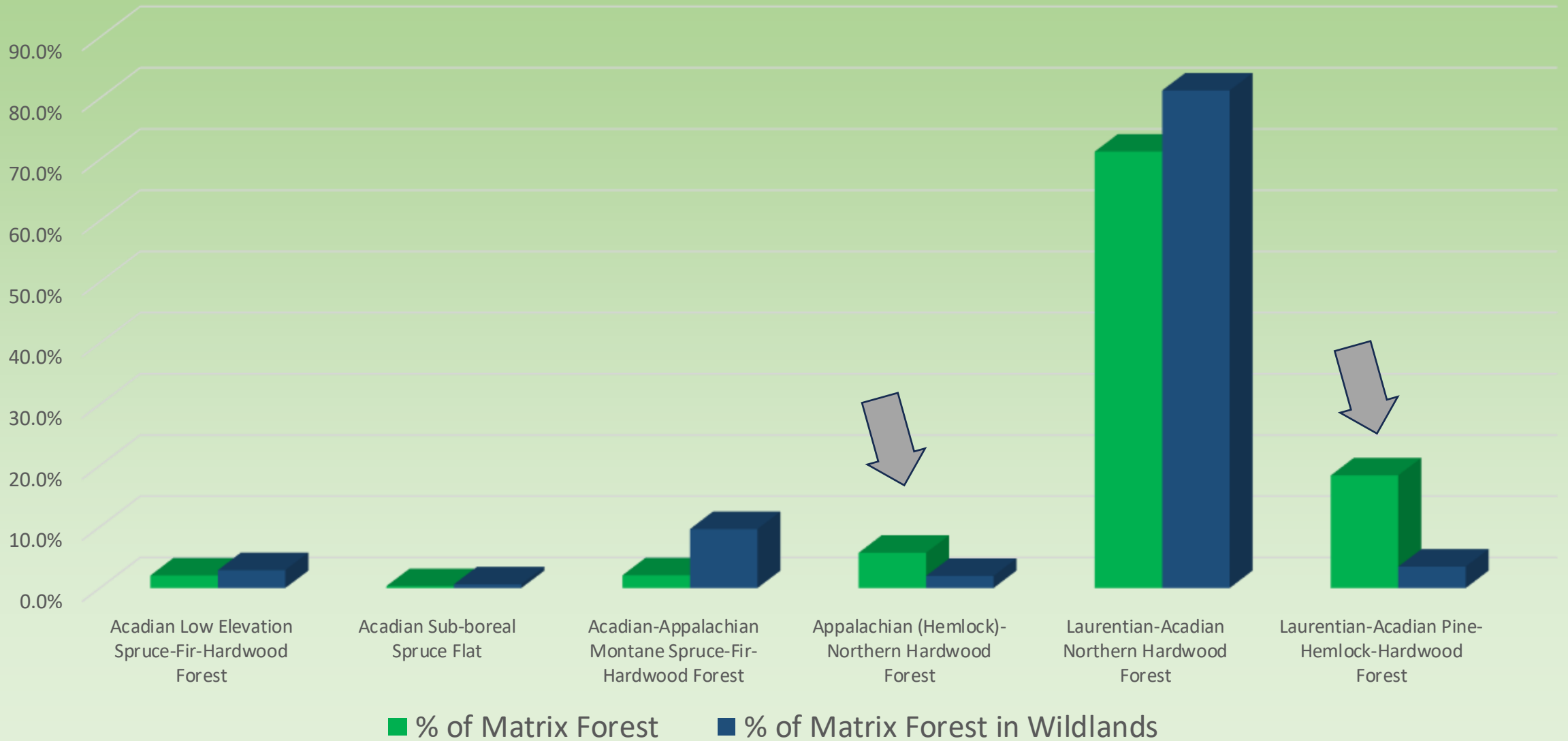




Bourne Pond, Lye Brook Wilderness (18,000 acres), Green Mountain National Forest  
Photo: Scott Wixsom



# Representation of Matrix Forest Types – Southern Green Mountains Wildlands





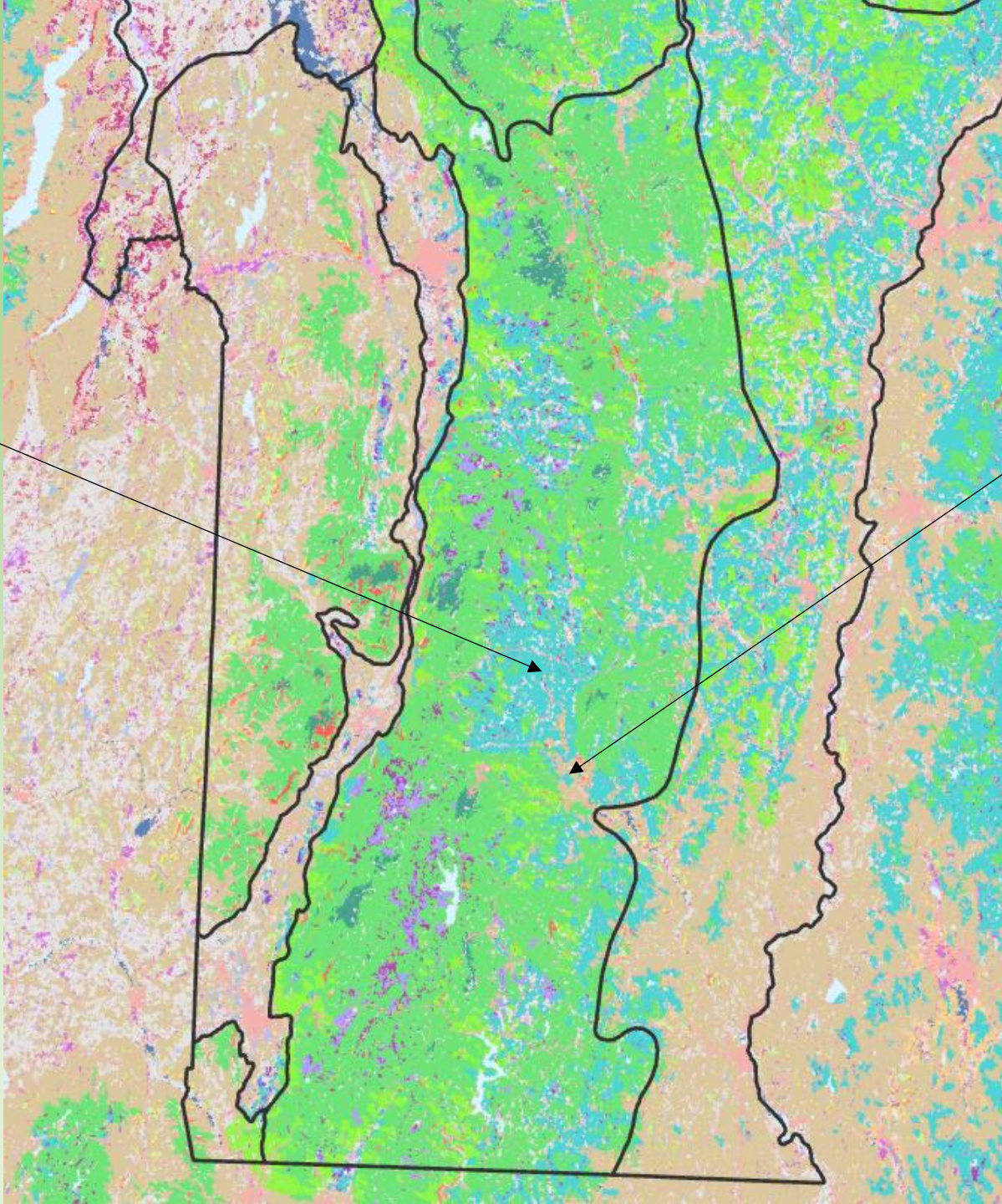


**Acadian-Appalachian Montane Spruce-Fir  
Forest**



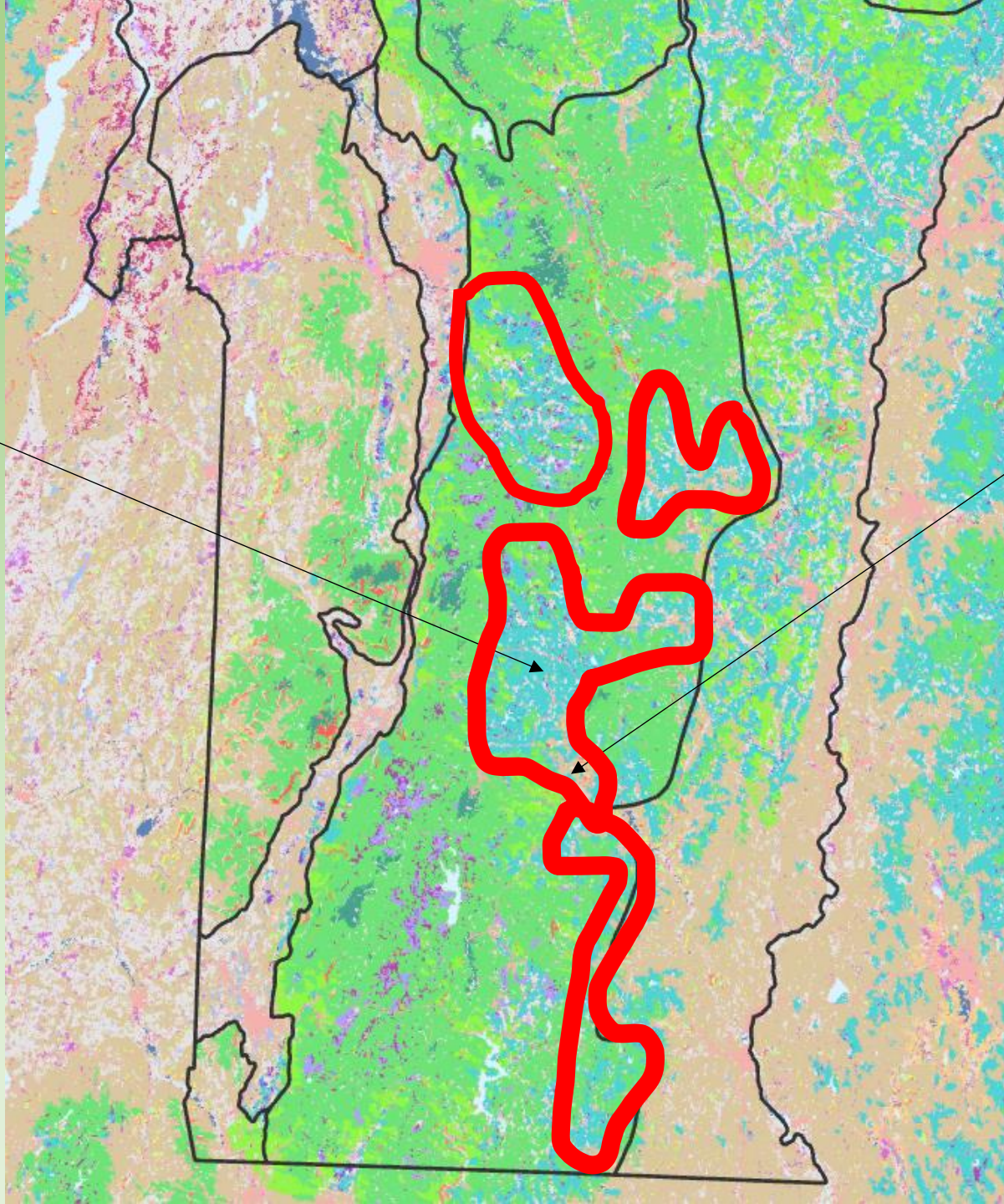
**Appalachian (Hemlock)-Northern Hardwood  
Forest**

**Laurentian-Acadian  
Pine-Hemlock-  
Hardwood Forest  
(blue-green)**



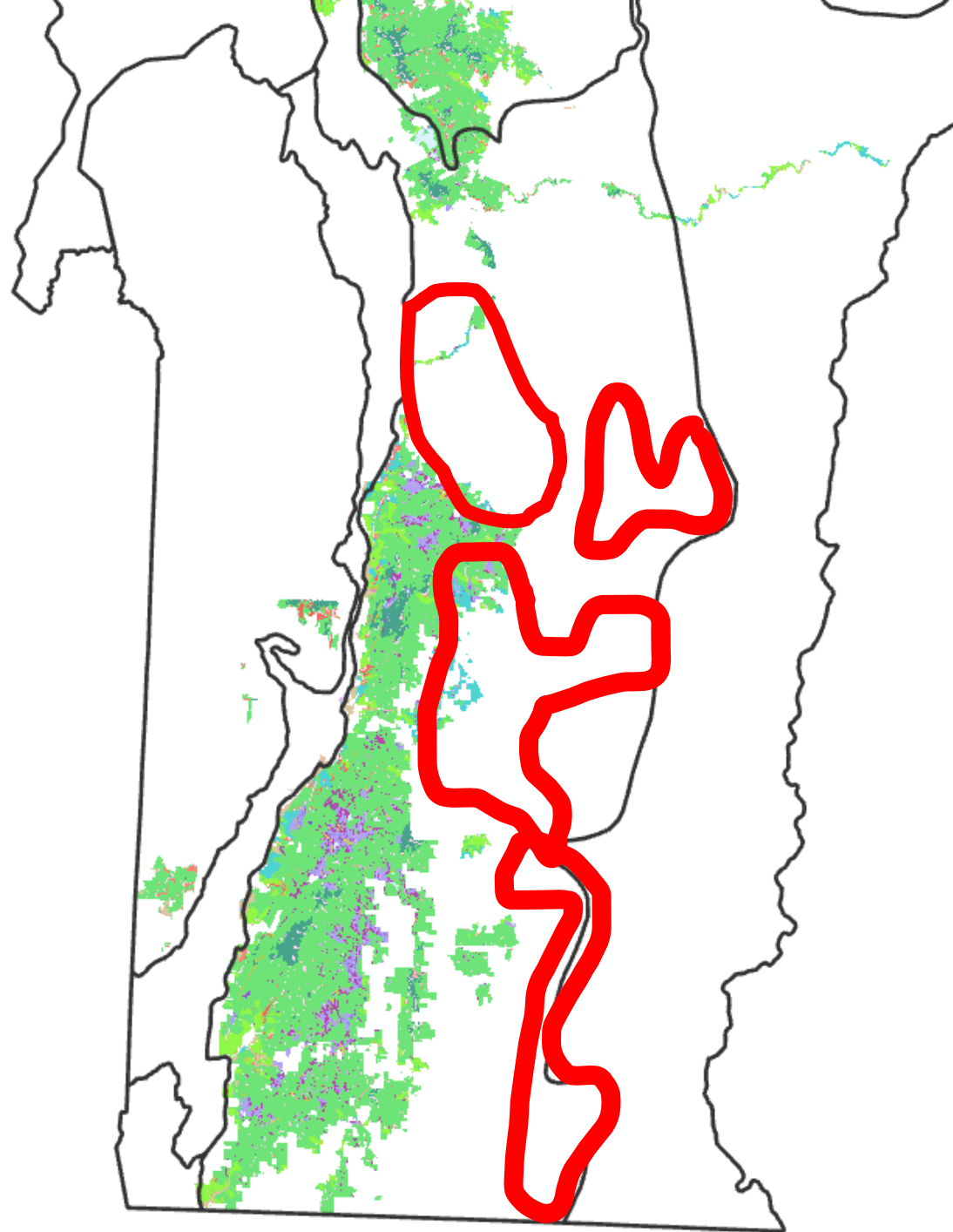
**Appalachian  
(Hemlock)-  
Northern  
Hardwood Forest  
(brown-pink)**

**Laurentian-Acadian  
Pine-Hemlock-  
Hardwood Forest  
(blue-green)**

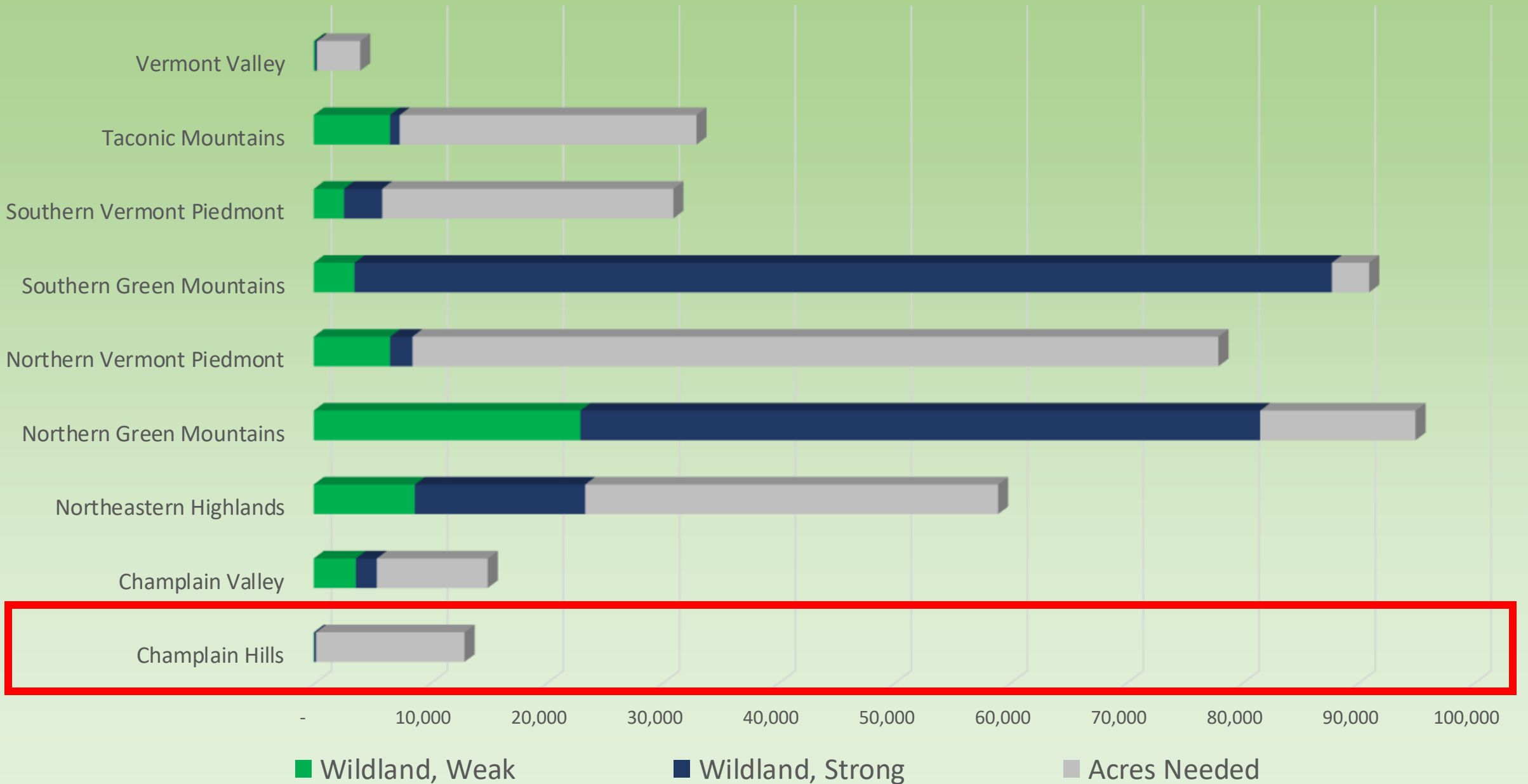


**Appalachian  
(Hemlock)-  
Northern  
Hardwood Forest  
(brown-pink)**

**Green Mountain  
National Forest**



# Wildlands and the Vermont Conservation Design Old Forest Targets



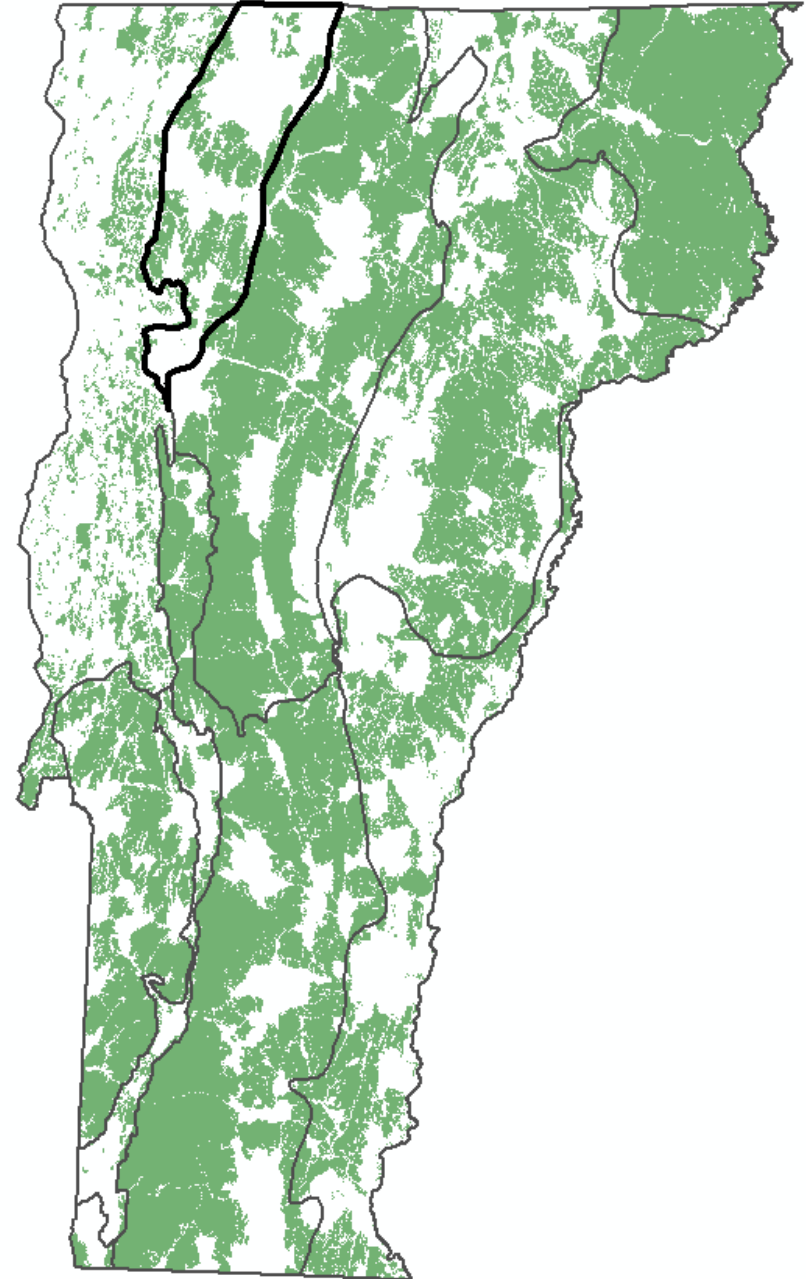
# Champlain Hills

## Vermont Conservation Design

old forest target: **13,000 acres**

Acres of Wildlands: **184 (1.4%)**

*Preferred minimum patch size: 1,000 acres*



Franklin Bog Natural Area, The Nature Conservancy



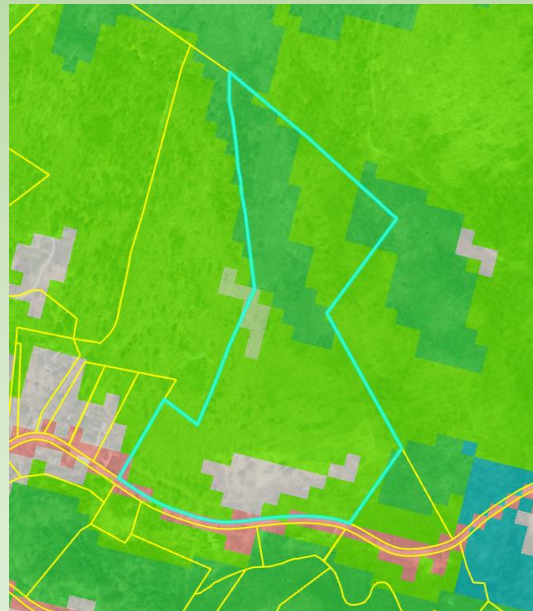
# Champlain Hills

Vermont Conservation Design  
old forest target: **13,000 acres**

Acres of Wildlands: **184 (1.4%)**

*Preferred minimum patch size: 1,000 acres*

<b><i>Unprotected</i></b>	<b>206,653</b>
<b><i>Protected, Not Wildland</i></b>	<b>28,886</b>
<b><i>Wildland, Weak</i></b>	<b>24</b>
<b><i>Wildland, Strong</i></b>	<b>161</b>



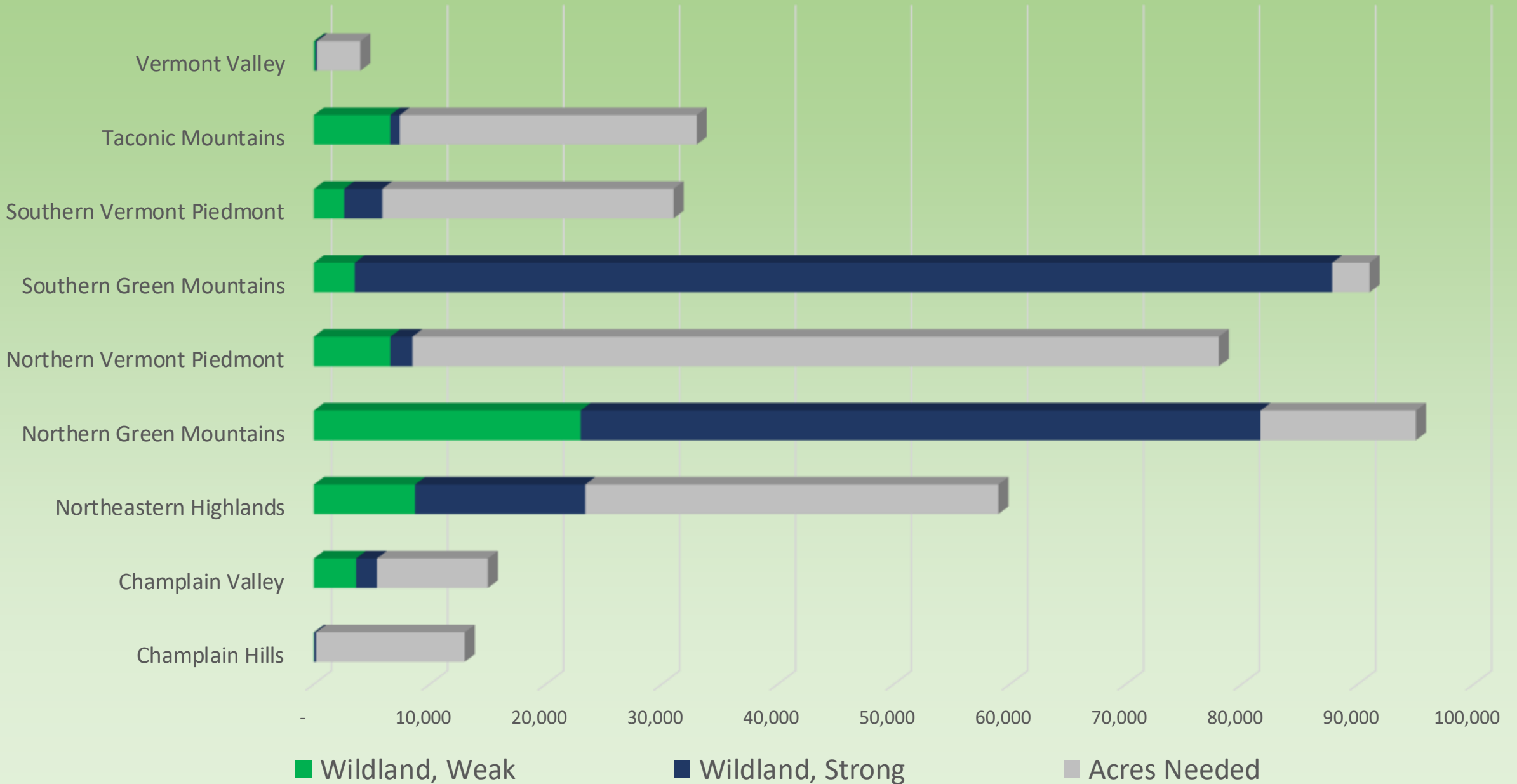
Private Lands Easement



Lake Carmi Bog Natural Area



# Wildlands and the Vermont Conservation Design Old Forest Targets



## Conclusions and next steps

- Old Forests are rare in Vermont, but there are still examples awaiting discovery
- Future old forests (wildlands) are well-represented in the Green Mountains
- Future old forests (wildlands) are generally poorly represented in other regions of Vermont

