

Introduction to Connectivity & Road Crossings

Jens Hilke, Conservation Planner



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





Community Wildlife Program



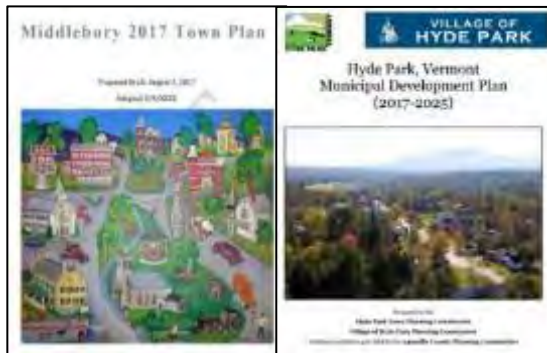
Presentations & Workshops



Support for Planning



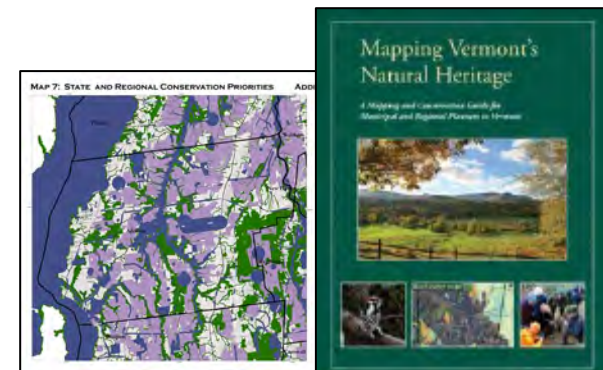
Support for Conservation



Connecting Communities
to Each Other



Understanding Ecological
and Community Context



Creation/Interpretation of
Resources

Webinars



Webinars

The Department's Community Wildlife Program has offered a biannual webinar series for the municipal, land use and conservation audience since 2020. Scroll down to see our current offerings or visit our [Video Library](#) to see recordings of previous episodes. All our webinars are live online events that last approximately one hour and offer participants a chance to learn and ask questions to natural resource experts.

We also offer the [Environmental Leadership Training](#) each spring and fall.

Fall 2024 Webinars



Understanding Vermont Conservation Design: The data behind BioFinder

Vermont Conservation Design is the data and the vision that powers the BioFinder website. It is a prioritization tool that identifies the lands and waters most important for maintaining Vermont's ecologically functional landscape— one that conserve current biological diversity and allows species to move and shift in response to climate and land-use change. Vermont Conservation Design allows users to see patterns in Vermont's forests and waterways, and identify the places that connect both into a functional network. The Design was just updated with new landscape scale components and Wildlife Road Crossings. It now features more accurate edges of the habitat blocks, that allow for a better understanding of the pattern and network of connected forests. Join us to learn more about this important conservation science.

Presenters:

- Jens Hille, Conservation Planner, VT Fish and Wildlife Department
- David Moroney, Conservation Planning Specialist, VT Fish and Wildlife Department

Repeat sessions of this webinar will be offered on the following three dates:

- Session 1: Wednesday, October 9, 2024 11:00am-12:00pm. [Register](#)
- Session 2: Friday, November 8, 2024 10:00am-11:00am. [Register](#)
- Session 3: Thursday, December 5, 2024 10:00am-11:00pm. [Register](#)



Sharing Like Cats and Dogs: Bobcats & Coyotes on the Vermont Landscape

Bobcats and coyotes compete for resources across Vermont. Yet they go about it with very different styles and have settled into an equilibrium since coyotes first appeared in our state in the mid 20th century. Bobcats tend to be more elusive, while their canine counterparts are much more public. Together, these mid-sized mammals occupy a niche in Vermont's ecology that teaches us about the need for an inter-connected landscape. Join FurBearer Project Leader Drew Farley for an exciting deep dive into the biology, ecology and landscape needs of these two iconic species. We'll also discuss land-use planning strategies that your town can use to ensure their continued presence throughout Vermont.

Presenters:

- Drehan Farley, Wildlife Biologist, VT Fish and Wildlife Department
- Jens Hille, Conservation Planner, VT Fish and Wildlife Department

Repeat sessions of this webinar will be offered on the following two dates:

- Session 1: Tuesday, October 15th, 2024 10:00am-11:00am. [Register](#)
- Session 2: Tuesday, December 3, 2024 2:00pm-3:00pm. [Register](#)



Gray and Green Infrastructure: How Vermont's bridges and culverts add to our network of connected lands and waters.

Roads can act as barriers to wildlife movement, and yet our bridges and stream culverts are potential passage for Vermont's fish and wildlife to move underneath without danger. In addition to giving fish and other aquatic species plenty of space to swim through, many of these structures are designed to accommodate large floods and move debris during extreme rainfall. This means that at normal flow levels, wildlife can walk through the structure alongside the stream. However, some of our older structures are undersized and possess a constriction for floodwaters as well as for fish and wildlife movement. A team of researchers has created the Terrestrial Passage

Street Tool that is now available on BioFinder to assess the "passability" of bridges and culverts on the state road system and help in prioritizing which structures might be best replaced to facilitate wildlife movement. Join Conservation Planner Jens Hille from Vermont Fish & Wildlife to learn the science behind this new tool and learn how it may be used to help prioritize structures for replacement to facilitate wildlife movement.

Presenters:

- Jens Hille, Conservation Planner, VT Fish and Wildlife Department

Repeat sessions of this webinar will be offered on the following two dates:

- Session 1: Wednesday, October 30, 2024 10:00am-11:00am. [Register](#)
- Session 2: Monday, December 16, 2024 3:00pm-4:00pm. [Register](#)

Environmental Leadership Trainings



Environmental Leadership Training

Unit 1: From Science to Planning

This training will introduce participants to important scientific concepts involved in planning for natural resources and focus on skills leaders need to operate effectively.

Environmental Leadership Training

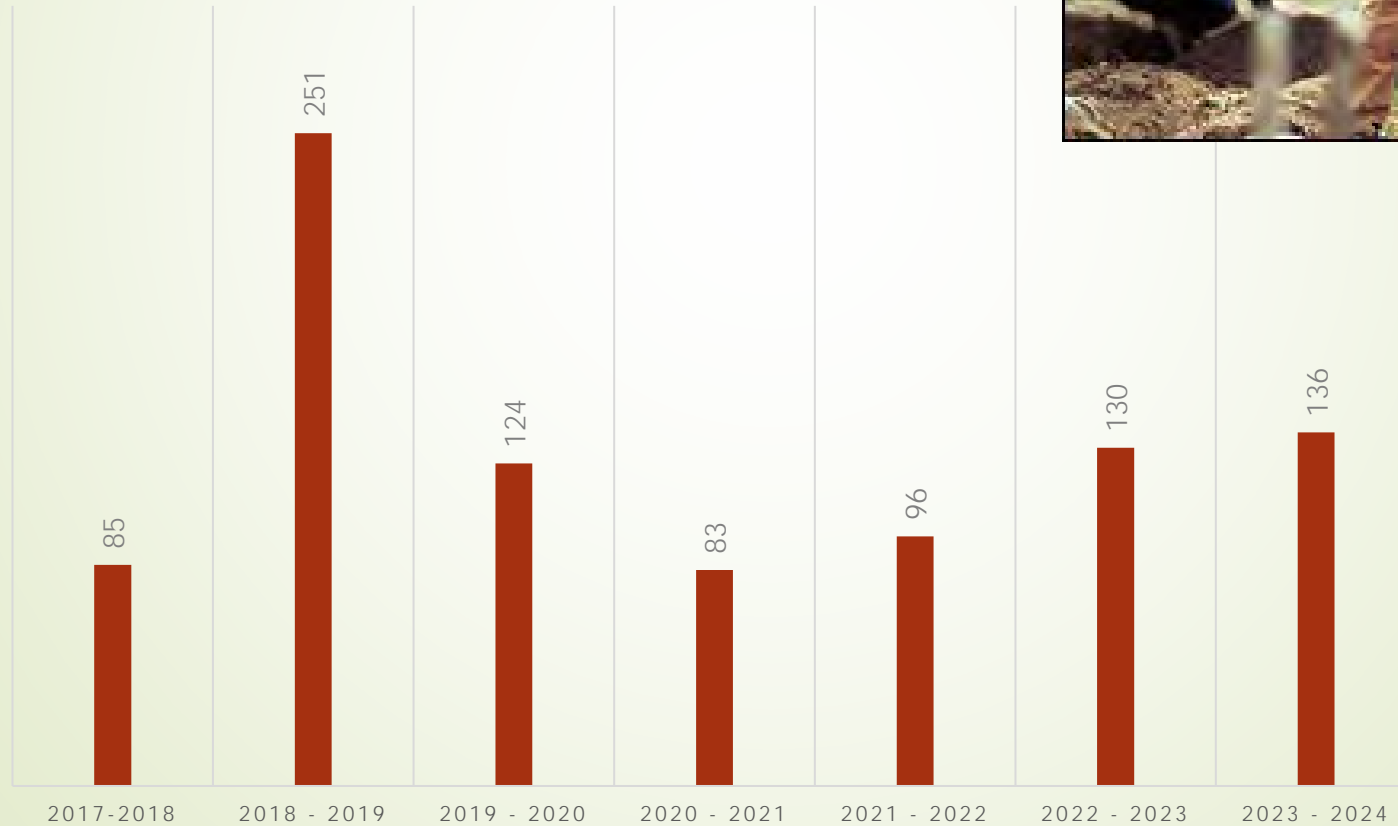
Unit 2: From Planning to Action

This training will help you choose locally appropriate land use planning strategies for conserving natural resources and explore how leaders can best work with groups to move ideas forward in a municipal context.

Municipal Technical Assistance



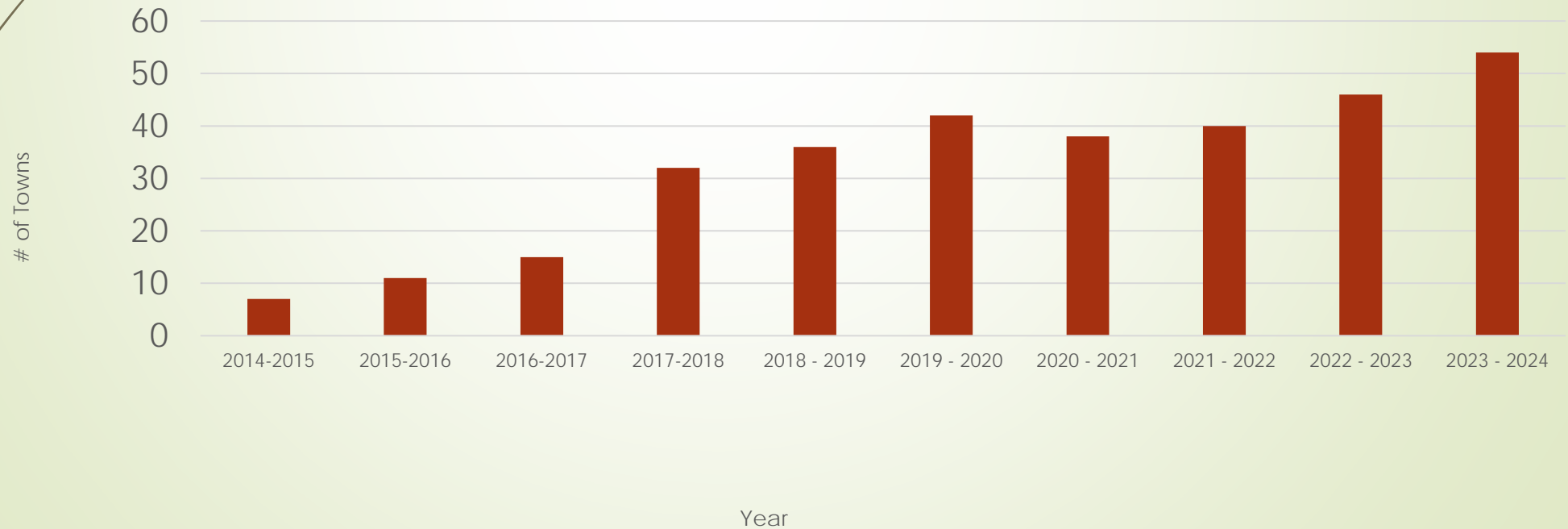
TOWN CONTACT



Municipal Technical Assistance



In-depth Technical Assistance to Towns





**Prevent erosion and
reduce flooding**

**Sequester carbon and
absorb harmful gases**

**Shade
(for buildings and rivers)**

**Clean air &
water**

Vermonters value forests

**Health: Forests prevent
respiratory ailments**

**Places for
recreation**

**Intact forests transmit
fewer tick-borne
illnesses**

Scenery

**Undeveloped
landscapes and
rural character**

Timber production



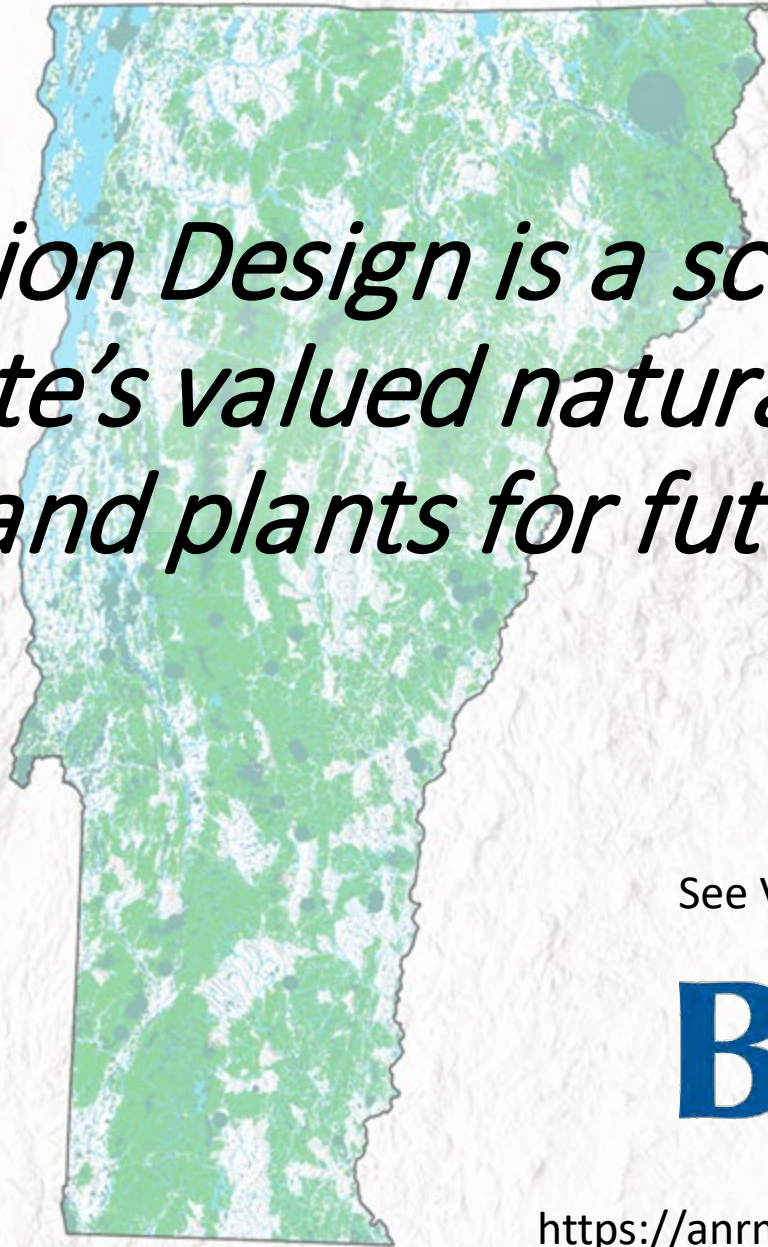
Experience
**A VIBRANT, WELCOMING
COMMUNITY**



Healthy Forests, Healthy Economy
Healthy Community



Vermont Conservation Design is a science-based vision to sustain the state's valued natural areas, forests, waters, wildlife, and plants for future generations



See VCD on

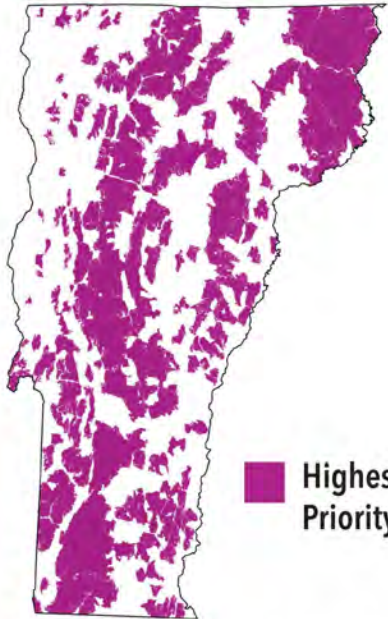


<https://anrmaps.vermont.gov/websites/BioFinder4/>

LANDSCAPE SCALE

COMPONENTS

INTERIOR FOREST

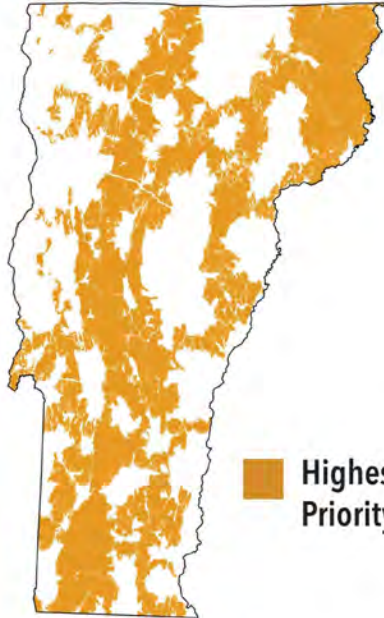


 Highest Priority

The largest forest blocks in each biophysical region. These are areas of contiguous forest and other natural communities and habitats (such as wetlands, ponds, and cliffs) that are unfragmented by roads, development, or agriculture.

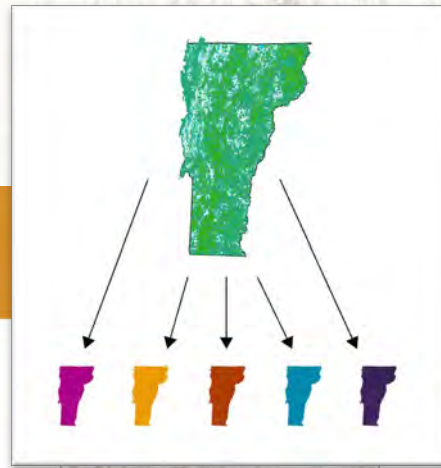


CONNECTING FOREST

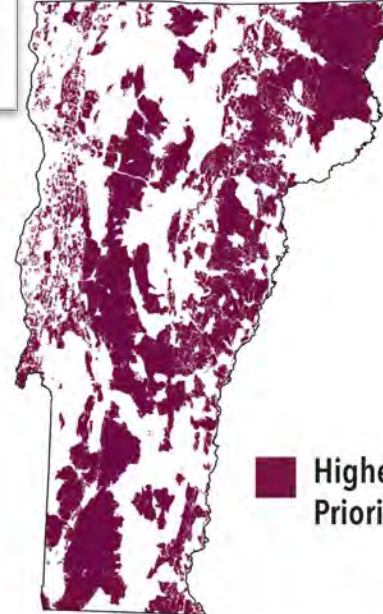


 Highest Priority

The network of forest blocks that together provide terrestrial connectivity at the regional scale (across Vermont and to adjacent states and Québec) and connectivity with surface waters and areas of geological diversity.



GEOLOGICAL DIVERSITY

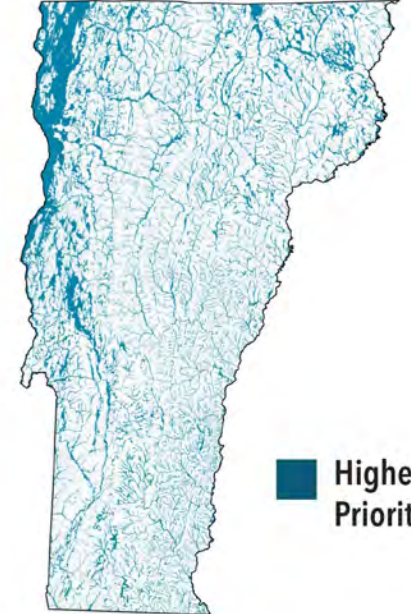


 Highest Priority

A set of forest blocks that reflect the full diversity of Vermont's bedrock, soils, elevations, and landforms (features such as slopes, ridges, flats, and coves). Diversity in the physical landscape is linked to biological diversity, and places that contribute to physical diversity will be important for biological diversity even as the climate changes.



SURFACE WATERS & RIPARIAN AREAS



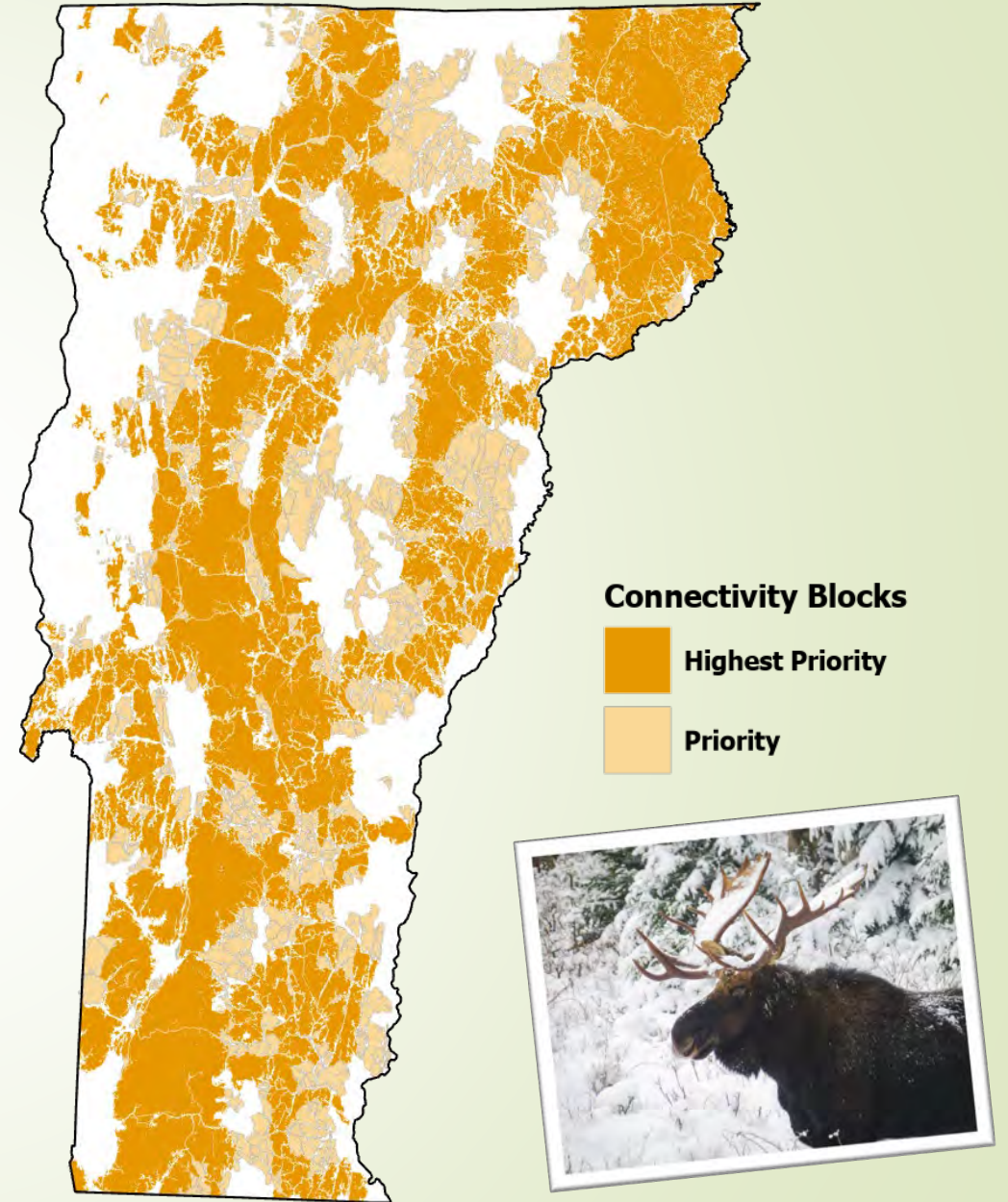
 Highest Priority

The network of all lakes, ponds, rivers, and streams, their associated riparian zones, valley bottoms, and river corridors in which geophysical processes occur.



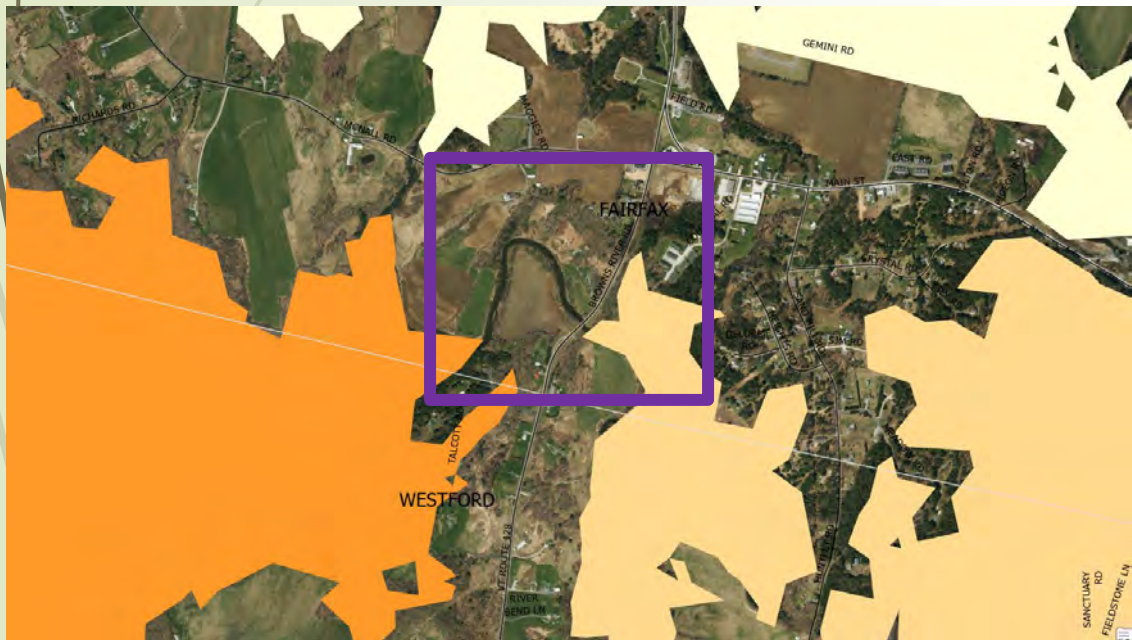
CONNECTIVITY BLOCKS

- A network of habitat blocks selected to promote **landscape connectivity** across Vermont
- Priority is established by habitat block size and landscape context



FOUNDATIONAL CONNECTIVITY SCIENCE

Ability to detect
connecting land



2011

Leads to better
Wildlife Road
Crossings



2023

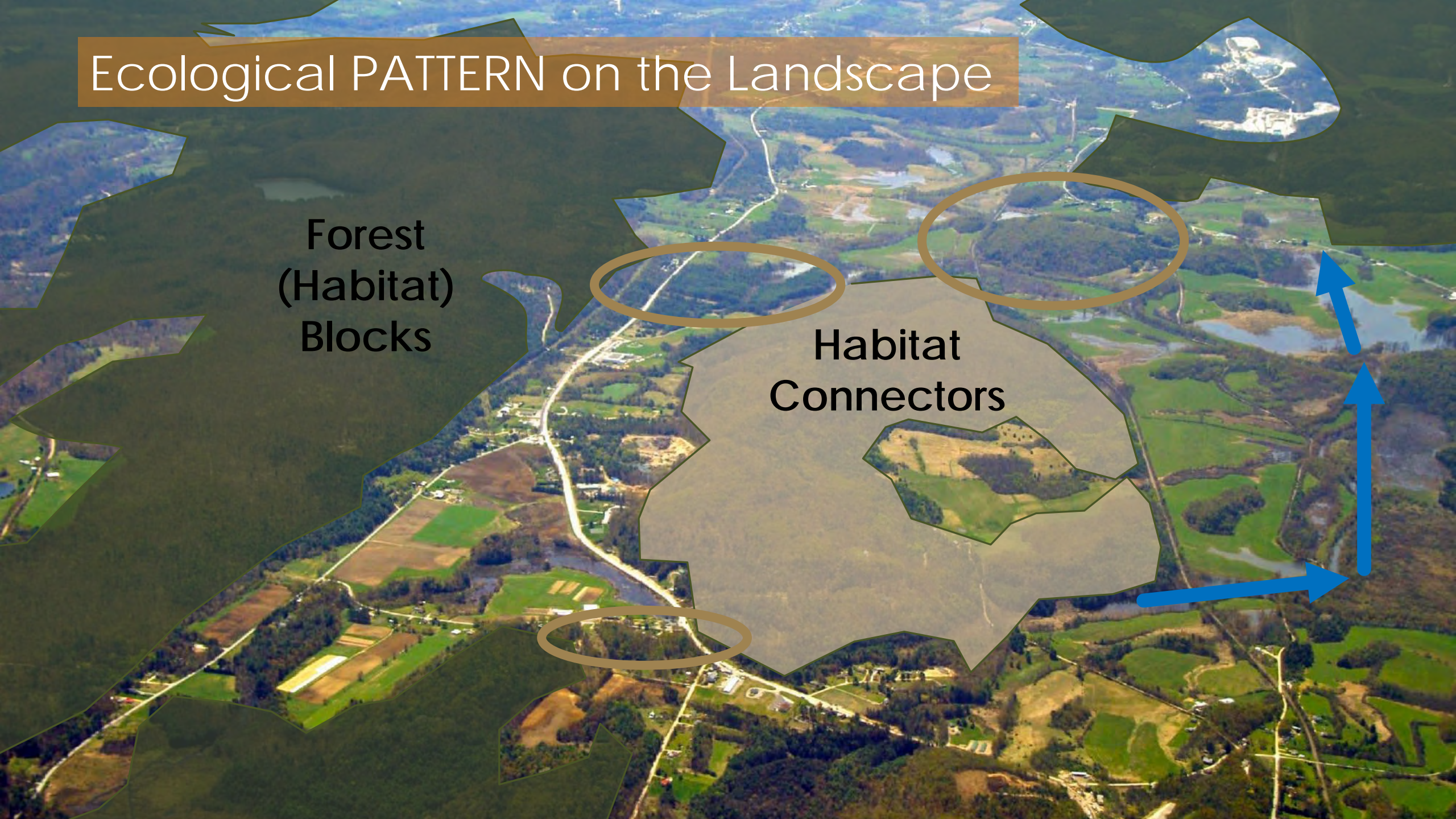


2023

Ecological PATTERN on the Landscape

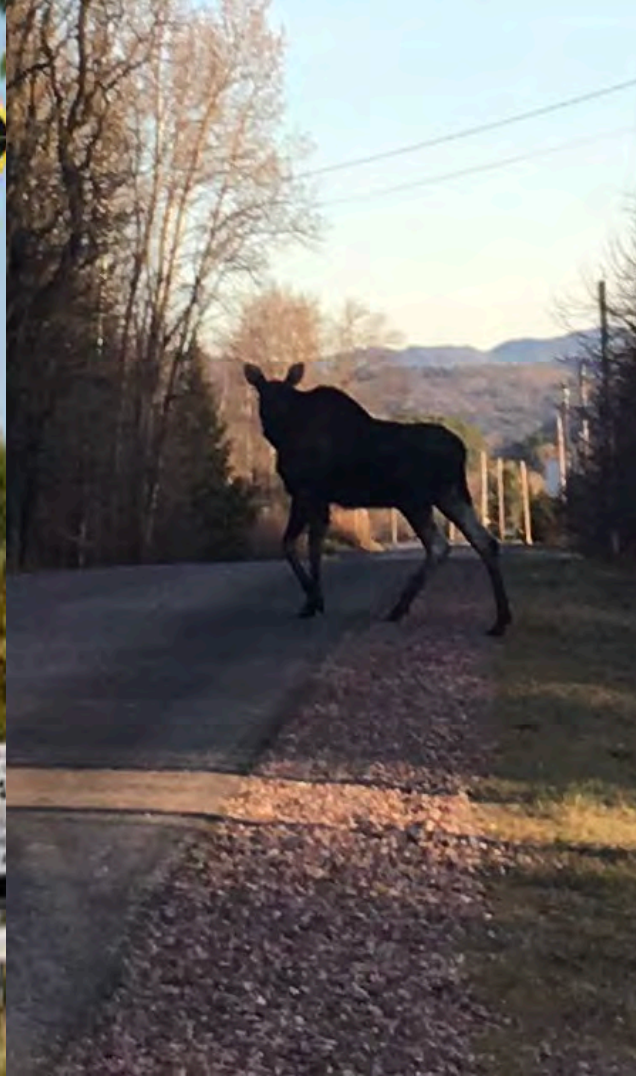
Forest
(Habitat)
Blocks

Habitat
Connectors



Wildlife Road Crossings

(a habitat-scale element)



Overlapping Issues



Flood Resilience Policy #3:

Encourage the use of conservation and river easements consistent with Act 171 guidance for the protection of habitat for wildlife and to promote flood resiliency.

– Grafton Town Plan



Case Study: Addison



The VCD Overall Priorities layer helps us understand the larger context within which your town exists:

Species and Community Scale

 HIGHEST PRIORITY

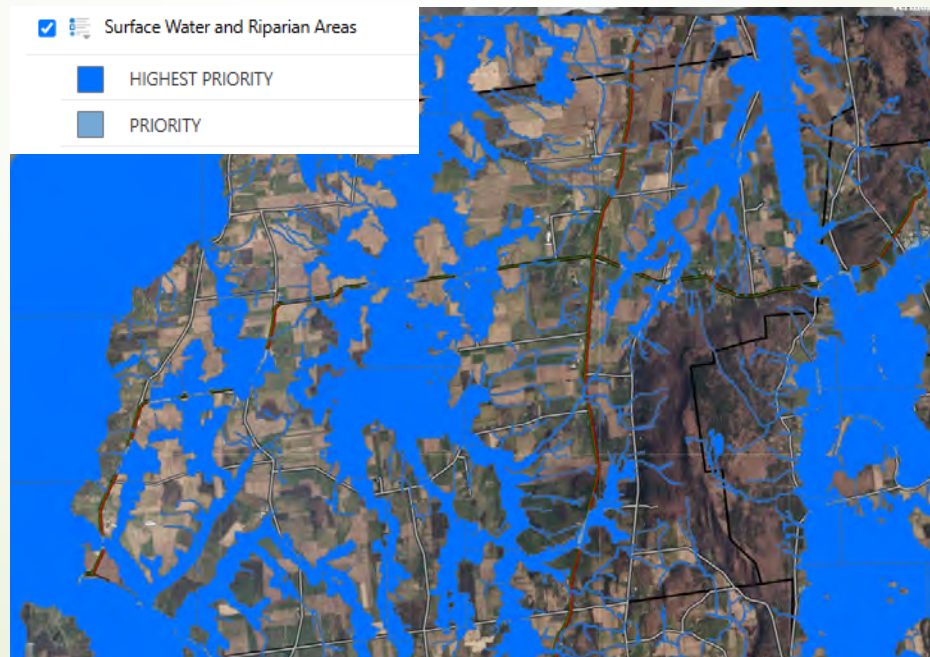
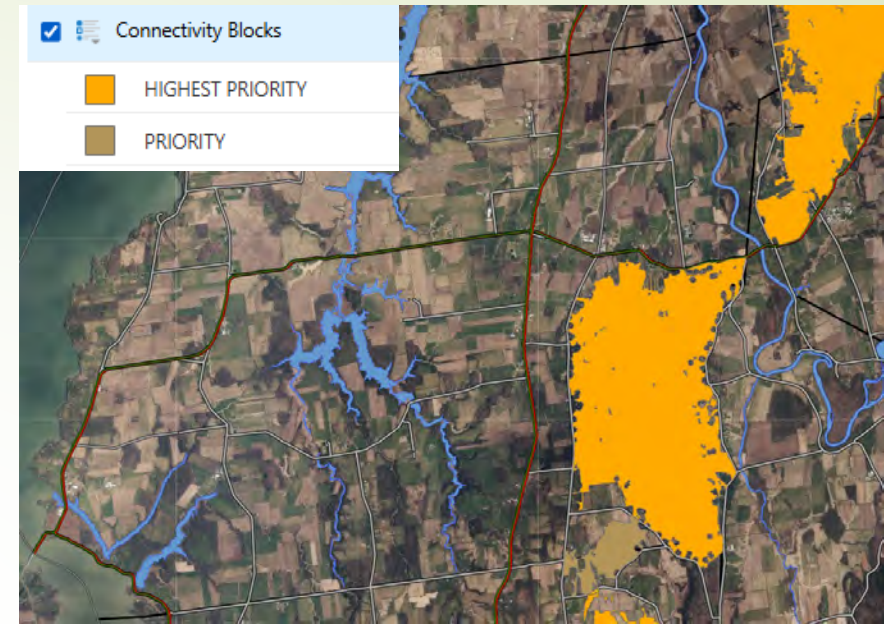
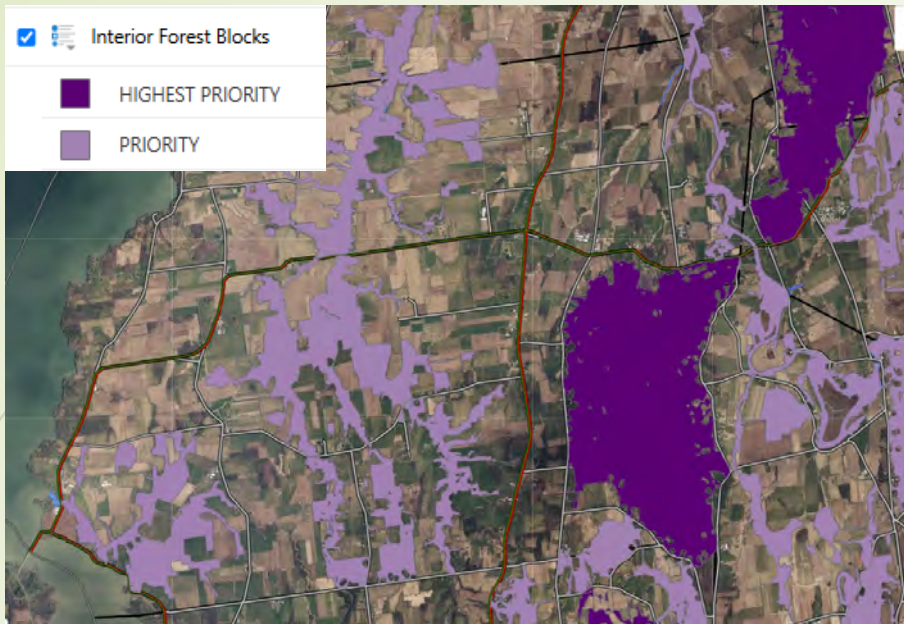
 PRIORITY

Landscape Components

 HIGHEST PRIORITY

 PRIORITY

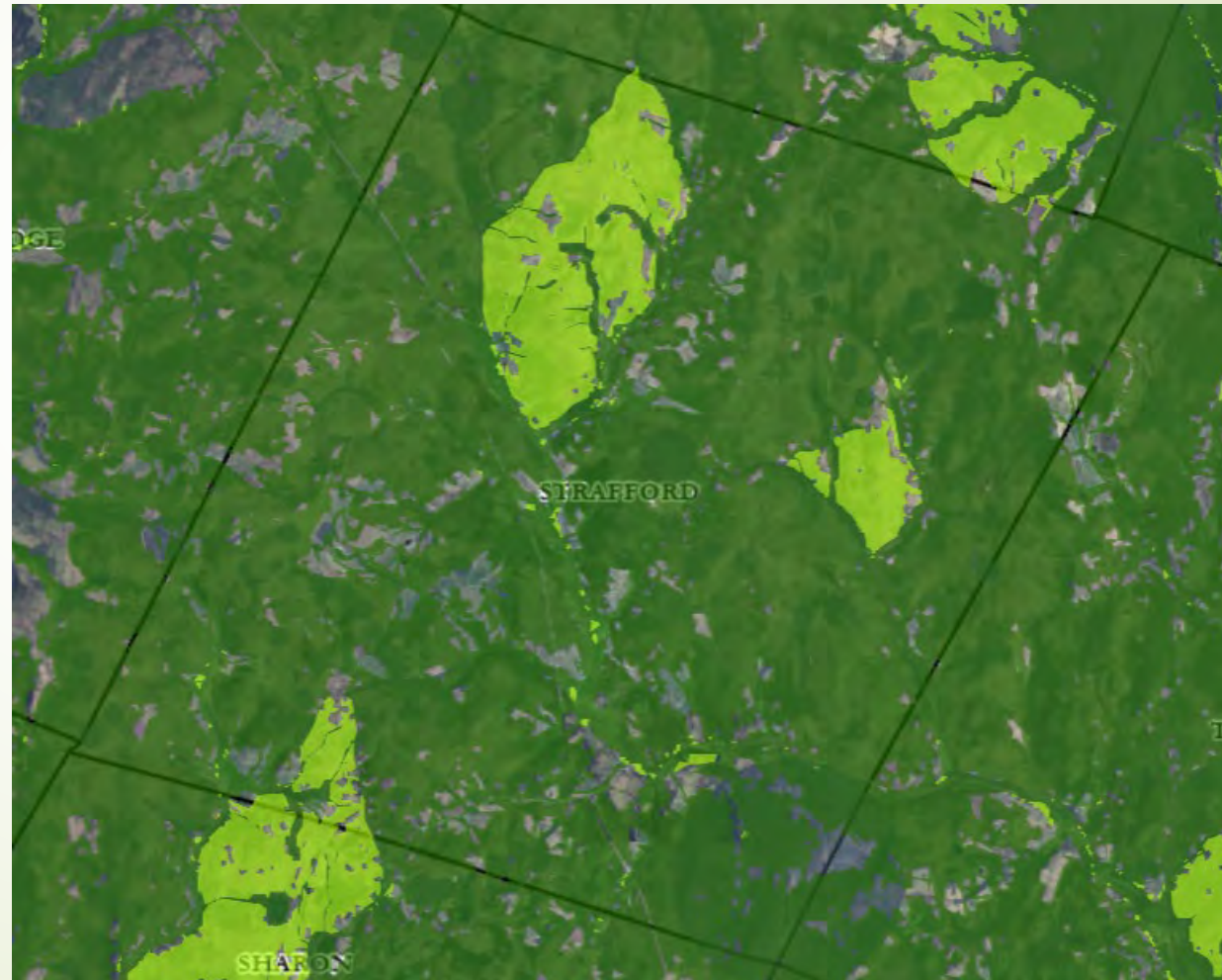
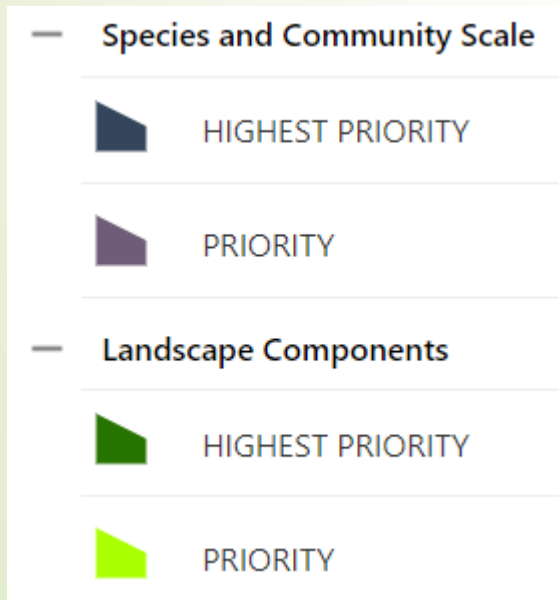




Contrast: Strafford

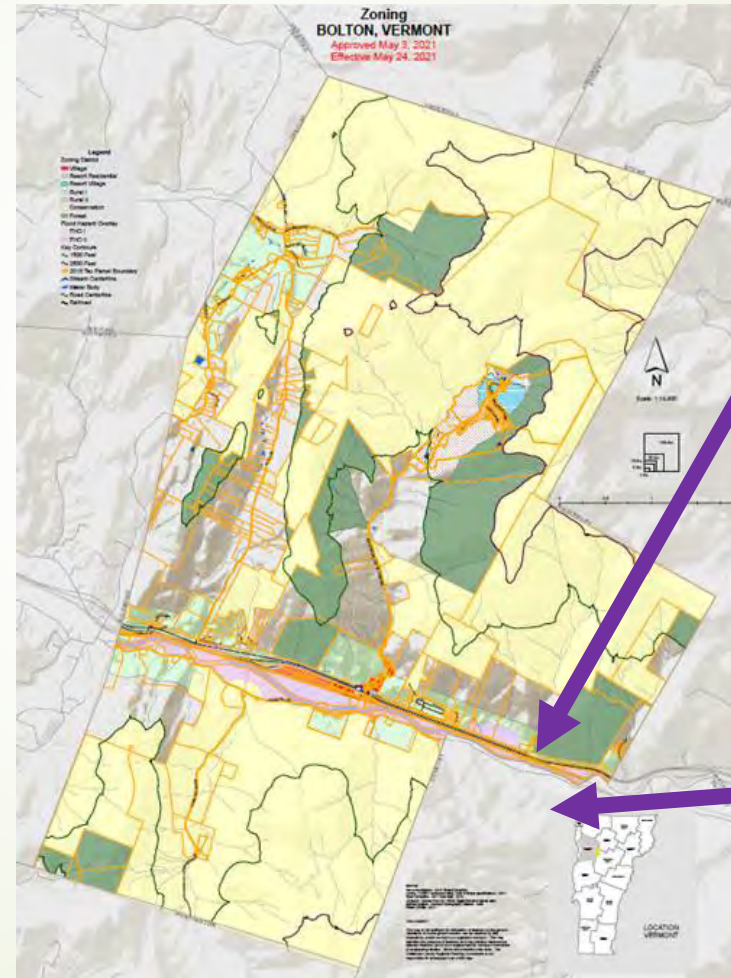
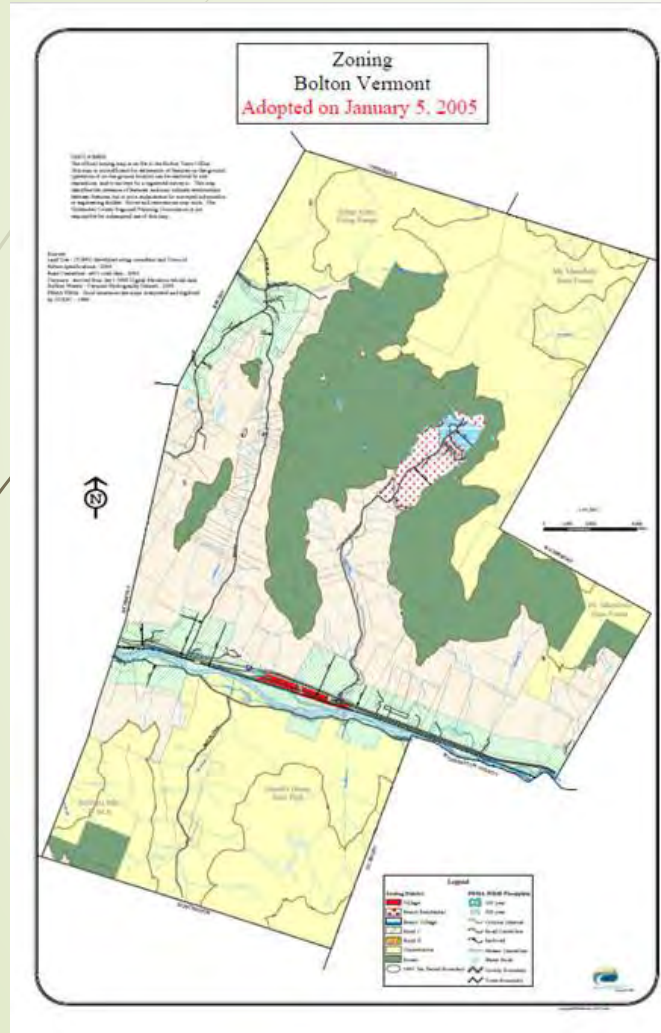


How is this pattern of Overall Priorities different?



Land Use Regulation

Transportation Infrastructure



Conserved Land



New Zoning,
2021
Bolton, VT

Old Zoning,
2005
Bolton, VT



Transportation Technical Assistance



Highways & Habitats Trainings

Tier 1

Format: One hour Online: Website with videos, webinars etc. available anytime

Tier 2

Format: In Person 3 day training.

Tier 3

Format: In person training over six field days (1/month for 6 months. December - June)

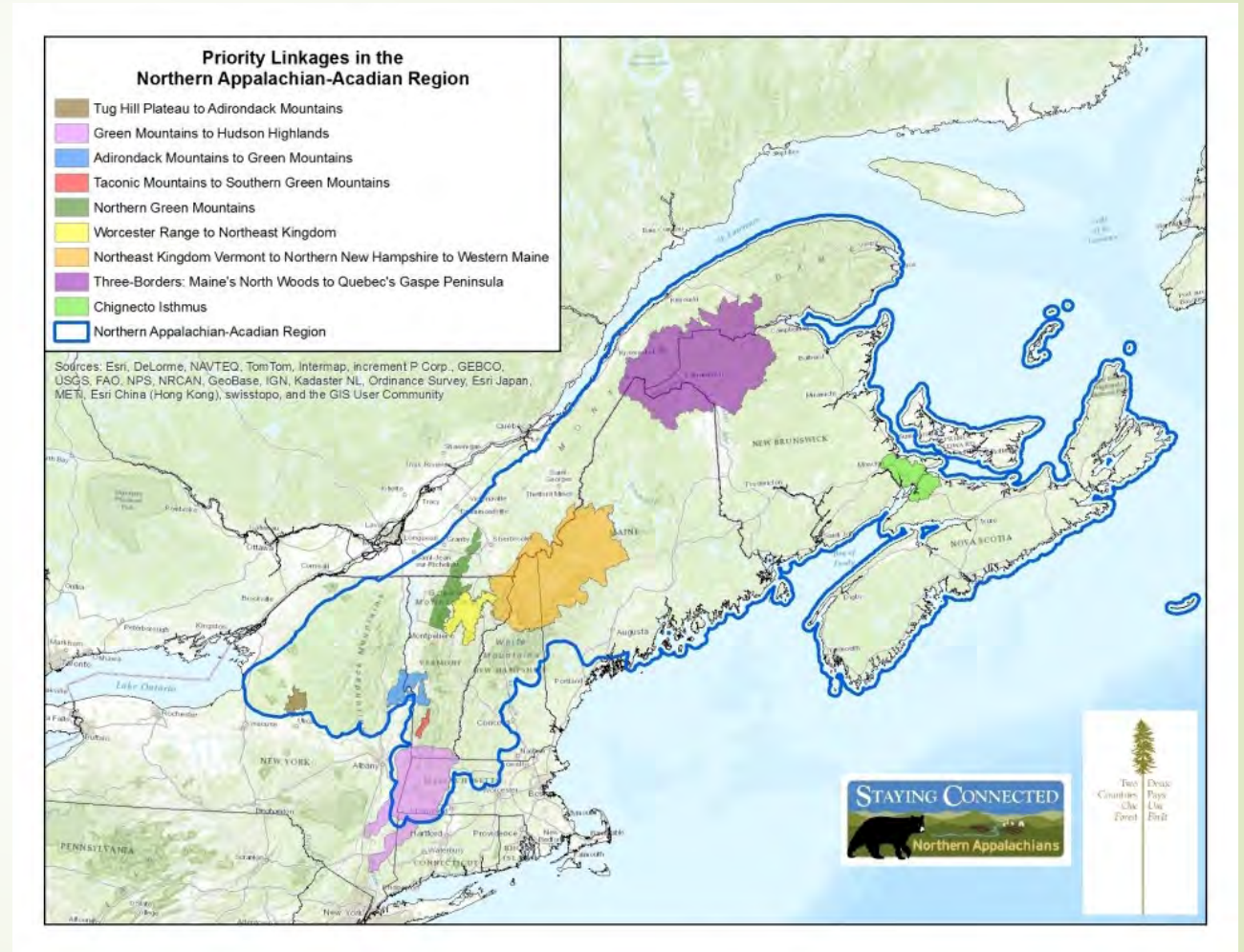


Collaborative partnerships

► Staying Connected Initiative



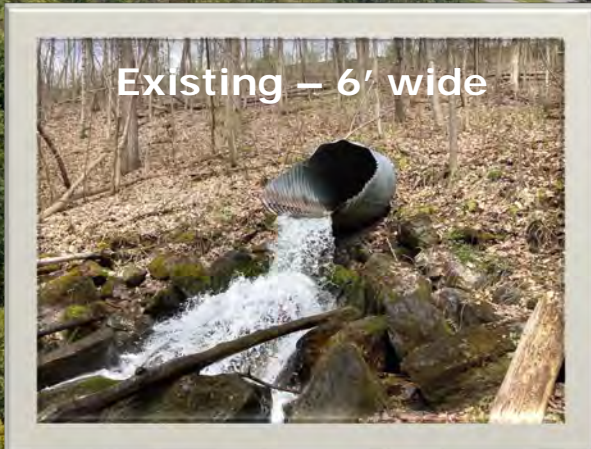
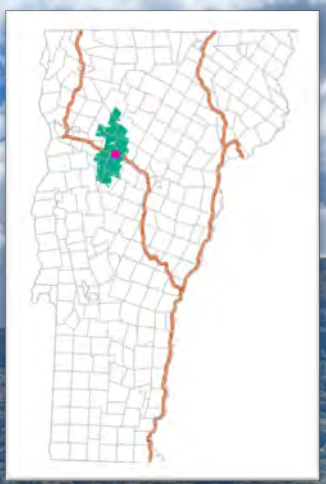
- Conservation science
- Land protection
- Land use planning
- Road barrier mitigation
- Outreach & engagement



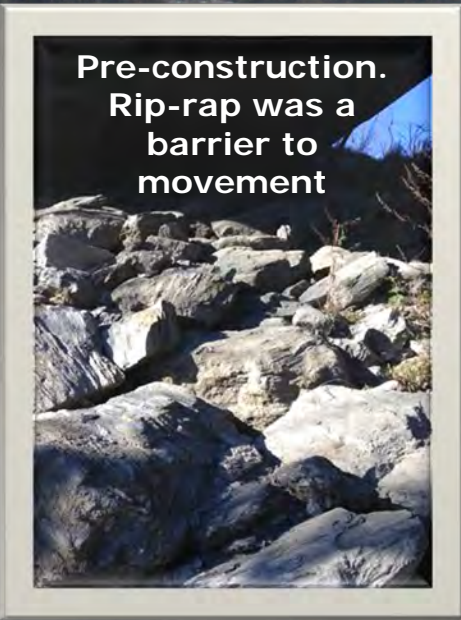
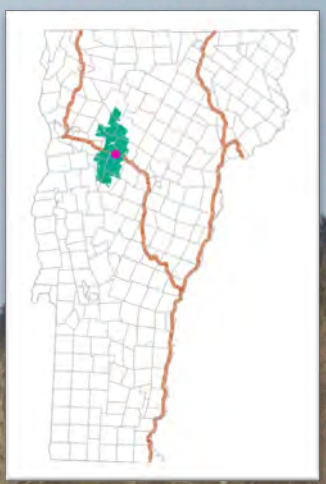
Reconnecting The Green Mountains

Proposed Wildlife Underpass at Interstate 89

- FY '24 recipient of WCPP Grant to design the underpass
- Current investments in adjacent land protection and land use planning



Little River Wildlife Shelf Built in 2014. Waterbury, VT





The Worcesters to Northeastern Highlands Wildlife Linkage

A Multi-Pronged Conservation Approach along Vermont Route 12

Conservation Planning

January 26, 2023

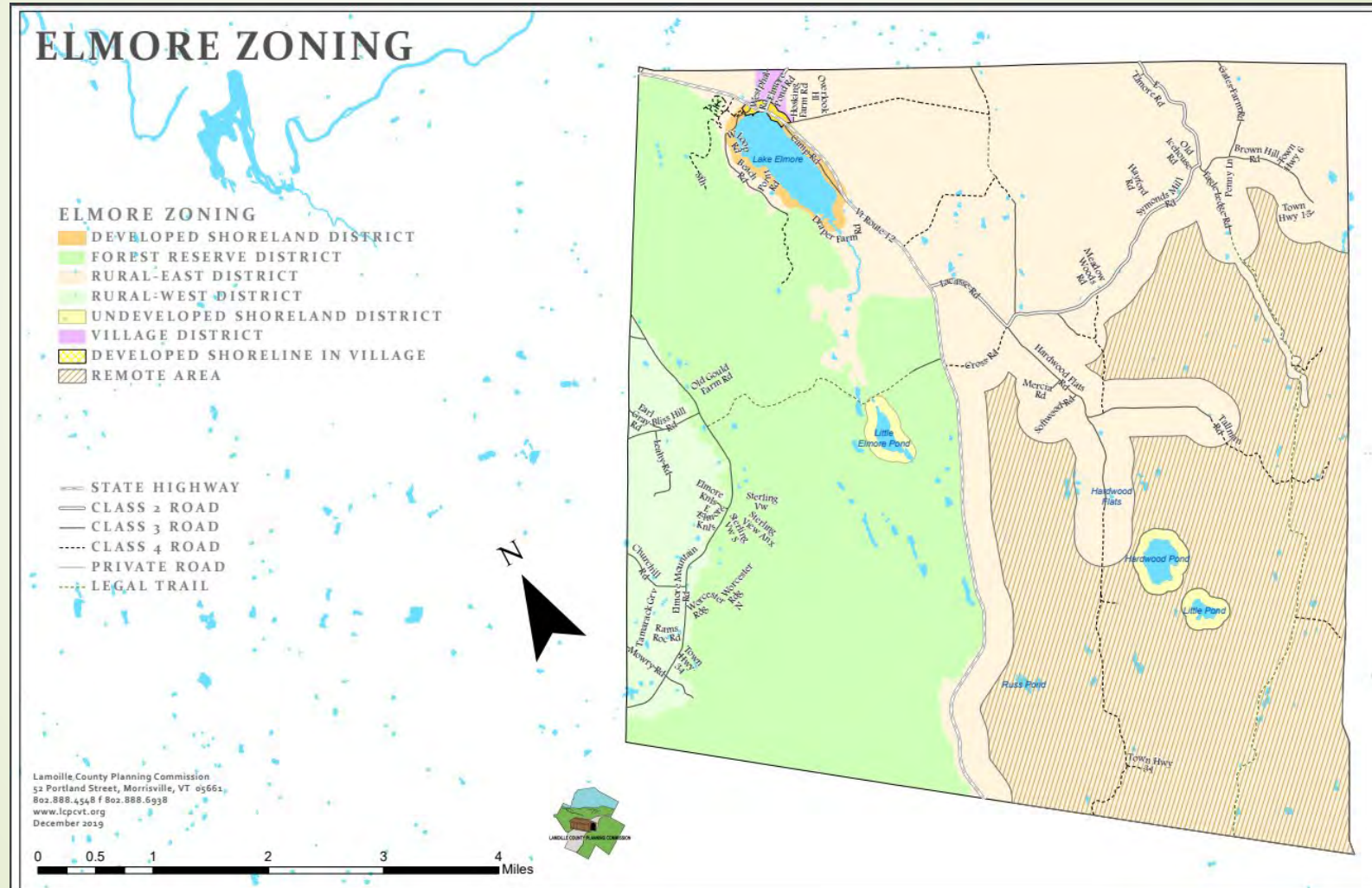
➤ [Storymap](#)

Land Protection

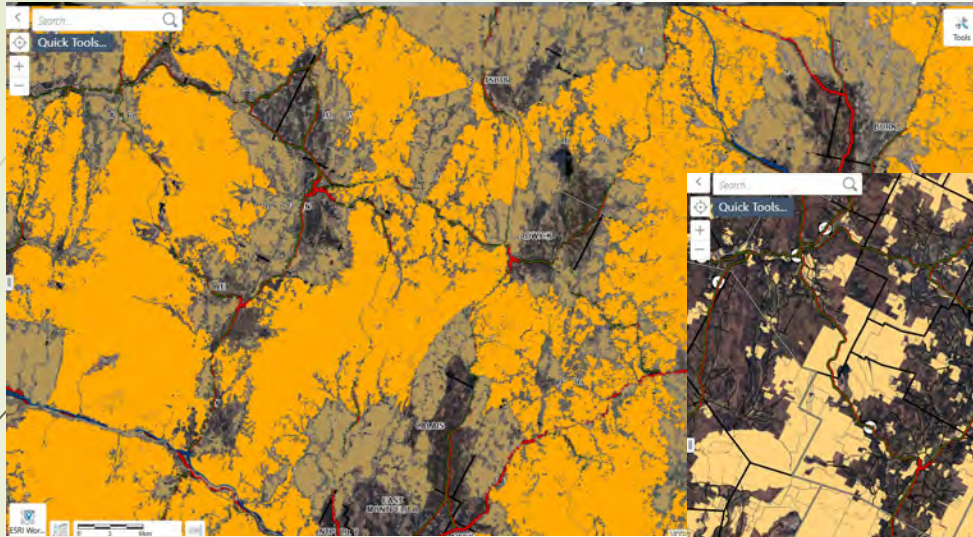


State Land & Conservation Easements

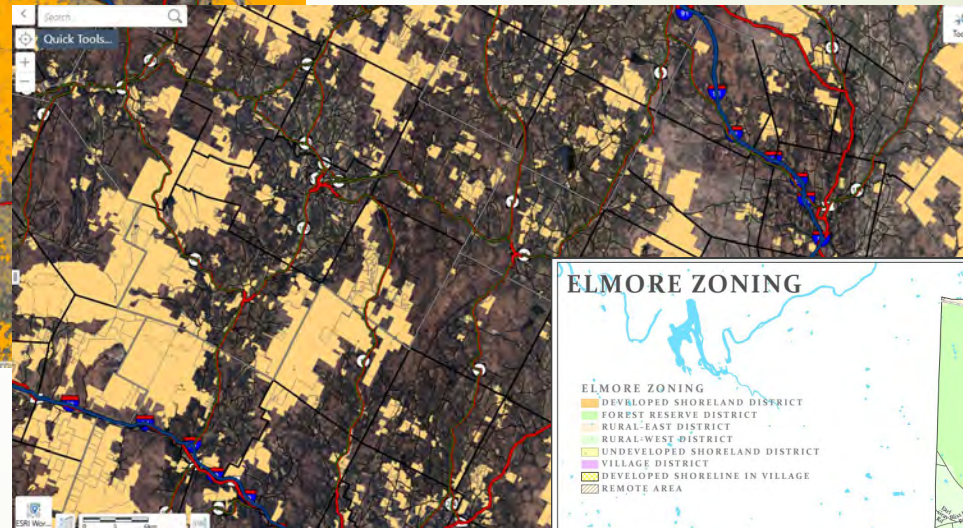
Land Use Planning



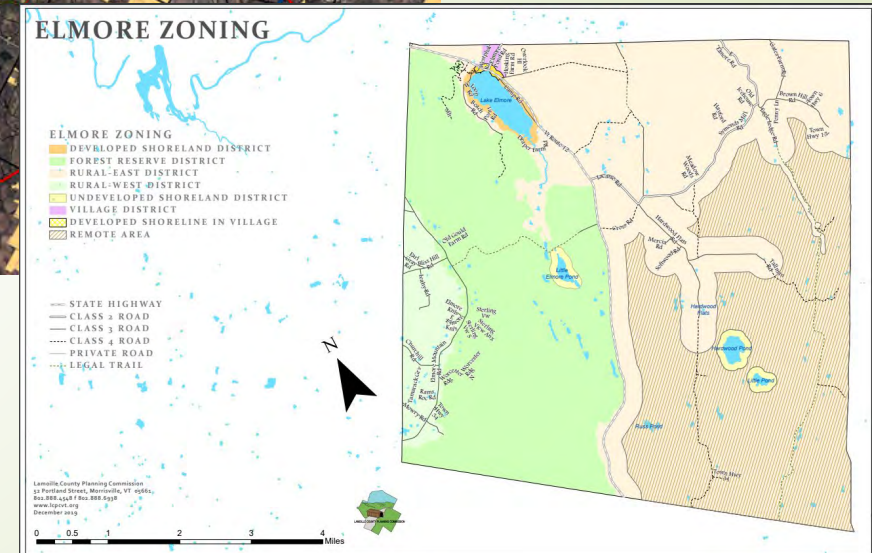
Planning for *PATTERN* on the landscape



Ecological Function requires connected habitats



Land Protection works with willing landowners



Land Use Planning can address pattern

Road Barrier Mitigation



- ▶ VT ROUTE 12 BRIDGE NO. 94
 - ▶ Current Structure: steel culvert 6' wide
 - ▶ Replacement Structure: 11-ft +- span box culvert
- ▶ VT ROUTE 12 BRIDGE NO. 90
 - ▶ Current Structure: steel culvert 6' wide
 - ▶ Replacement Structure: 80-ft +- span bridge
- ▶ VT ROUTE 12 BRIDGE NO. 89
 - ▶ Current Structure: steel culvert 15'
 - ▶ Replacement Structure: 45-ft +- span bridge
- ▶ VT ROUTE 12 BRIDGE NO. 87
 - ▶ Current Structure: steel culvert 14'
 - ▶ Replacement Structure: 20-ft +- precast box culvert
- ▶ VT ROUTE 12 BRIDGE NO. 84
 - ▶ Current Structure: steel bridge 82' span
 - ▶ Replacement Structure: 80-ft +- bridge

Vermont Agency of Transportation will replace five bridges and culverts along Rt 12 in 2025. The new structures will greatly benefit wildlife passage!



Coordination



Structure #90 in Elmore is a 6' culvert that will be replaced with an 80' Bridge!
Construction will begin in 2025.



Conserved Lands & New Transportation Infrastructure match up to ensure connectivity into the future

Wildlife on the Move

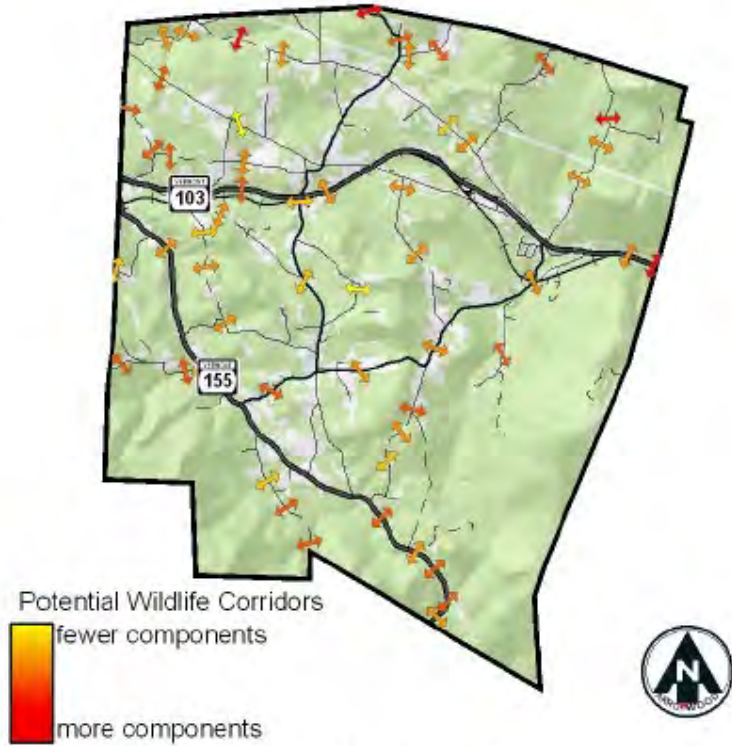
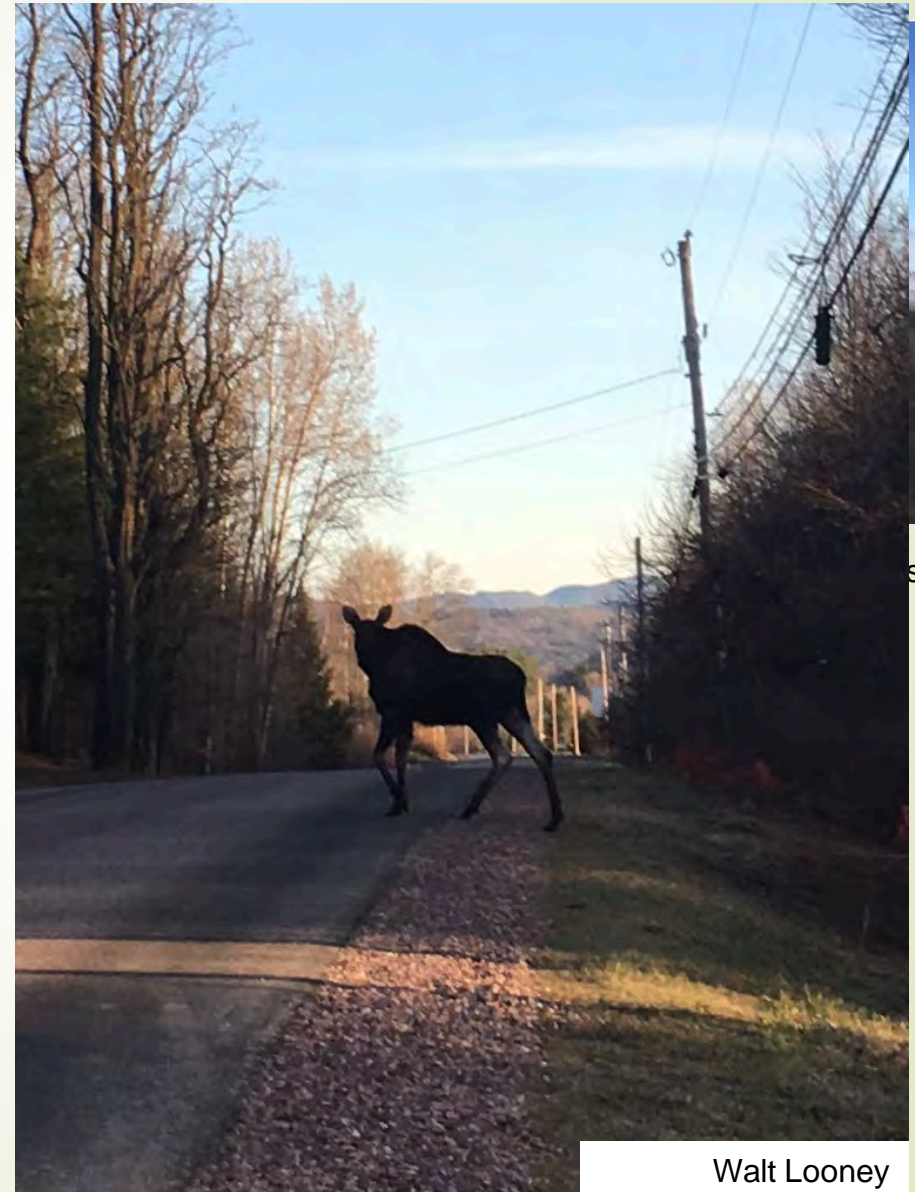


Figure Z. Possible Wildlife Corridors Map



Walt Looney

Underpasses vs. Overpasses



The Trans-Canada Highway wildlife crossings in Banff National Park.
<https://www.nationalgeographic.com/animals/article/wildlife-overpasses-underpasses-make-animals-people-safer>





Connectivity Research & Data in VT

- ▶ 2004 – Wildlife Suitability Analysis & Wildlife Crossing Values
- ▶ 2009 – Staying Connected Initiative Linkage Areas
- ▶ 2014 – Habitat Blocks, Cost Surface & Linkage Ratings (Model of road segments on State Roads)
- ▶ 2012 – BioFinder Network of Connected Lands
- ▶ 2016 – Vermont Conservation Design Connectivity Blocks
- ▶ 2016 – Vermont Conservation Design Wildlife Road Crossings
- ▶ 2016 – Bolton Waterbury Camera & Tracking Study
- ▶ 2016 – Phase 1 Camera Study
- ▶ 2018 – Vermont Conservation Design - Wildlife Road Crossings
- ▶ 2019 – Phase 2 Camera Study
- ▶ 2022 – Terrestrial Passage Screening Tool
- ▶ 2023 – Refined Vermont Conservation Design, Connectivity Blocks, Wildlife Road crossings & connecting lands

Terrestrial Passage Screening Tool

Improving roadway conservation investments in Vermont: Developing a prioritization screening framework for reducing road wildlife mortality and improving wildlife movement through bridges and culverts



[2021 Final Report](#)

Road Ecology



Road Ecology



Black Bear under US 4 in Bridgewater

VT 30 in Poultney, Bridge 84



Type	bridge span
Length	33.5'
Width	23.5'
Height	8'
AADT	1700

Coyote	0
Deer	161
Moose	0
Black bear	0
Bobcat	1
Fisher	0
Grey fox	0
Otter	0
Red fox	8
Skunk	2
Small weasel ¹	11
Total	183
# days ²	477





Contact Us

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