

# Project Management: How to Identify Strong Barrier Removal Projects



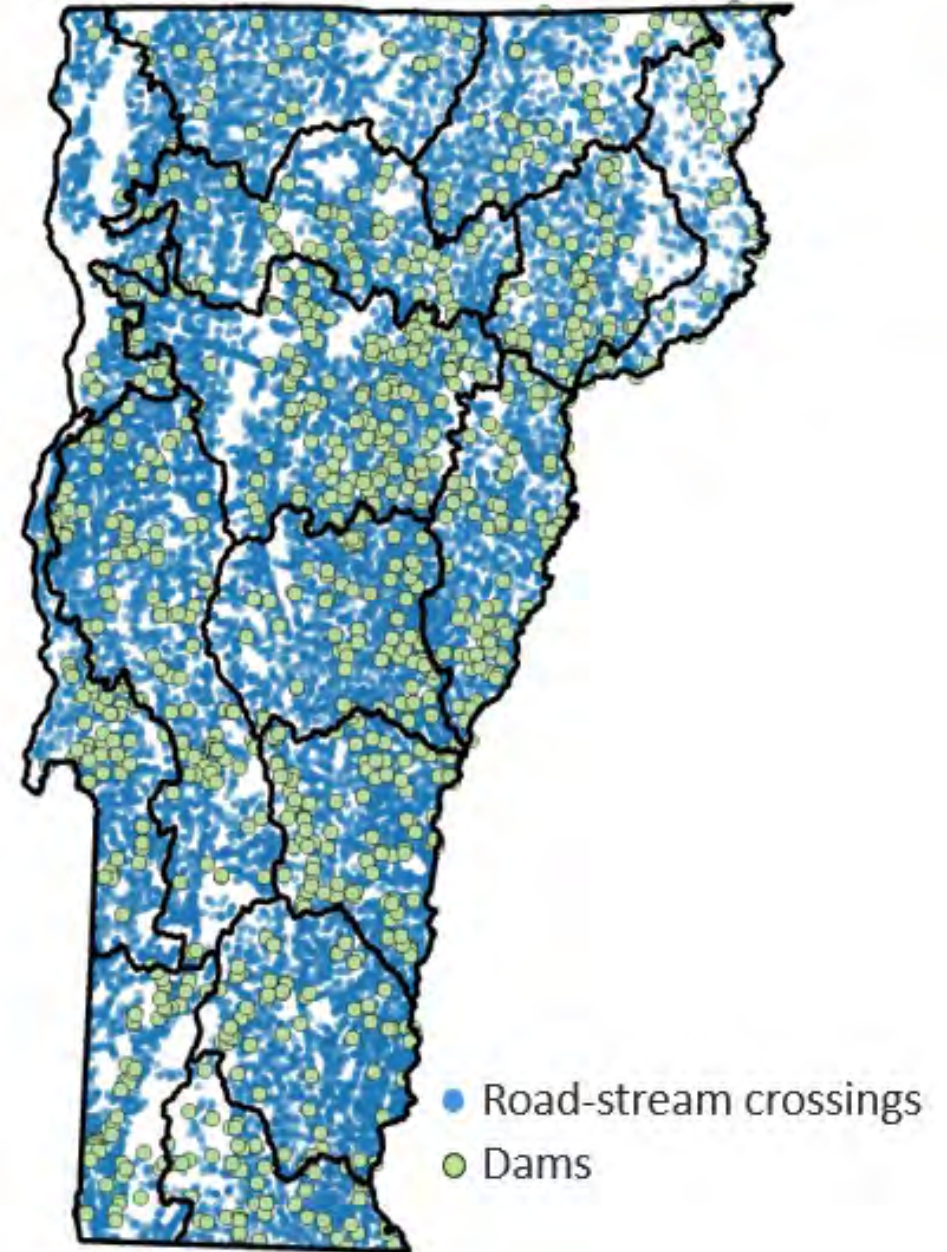
White River Partnership

**Reconnecting Waterways Workshop | December 5<sup>th</sup> 2024 | South Burlington, VT**

**Mary Russ, White River Partnership; David Minkoff, US Fish and Wildlife Service; Keith Fritschie, VT DEC**

# Session Outline

1. Conceptual framework for project selection
2. On-the-ground examples of the selection process
3. Questions/discussion



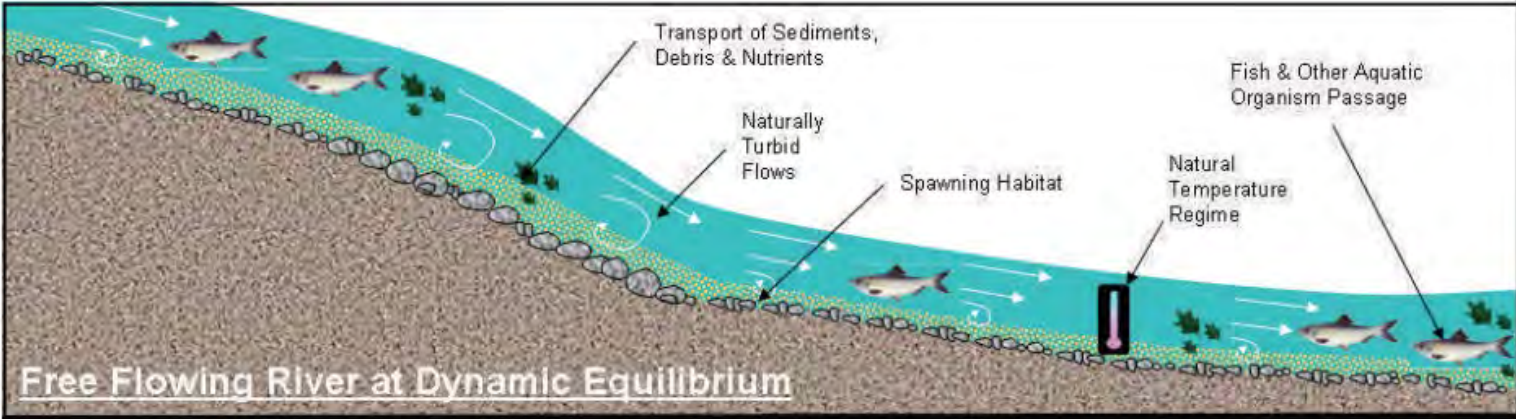


# Why prioritize?

- **Identify and develop projects**
- Engage partners early for future coordination success
- Quickly assess the benefit of emerging barrier removal opportunities in relation to your org's goals
- Develop competitive funding proposals



# Environmental impacts shape restoration goals

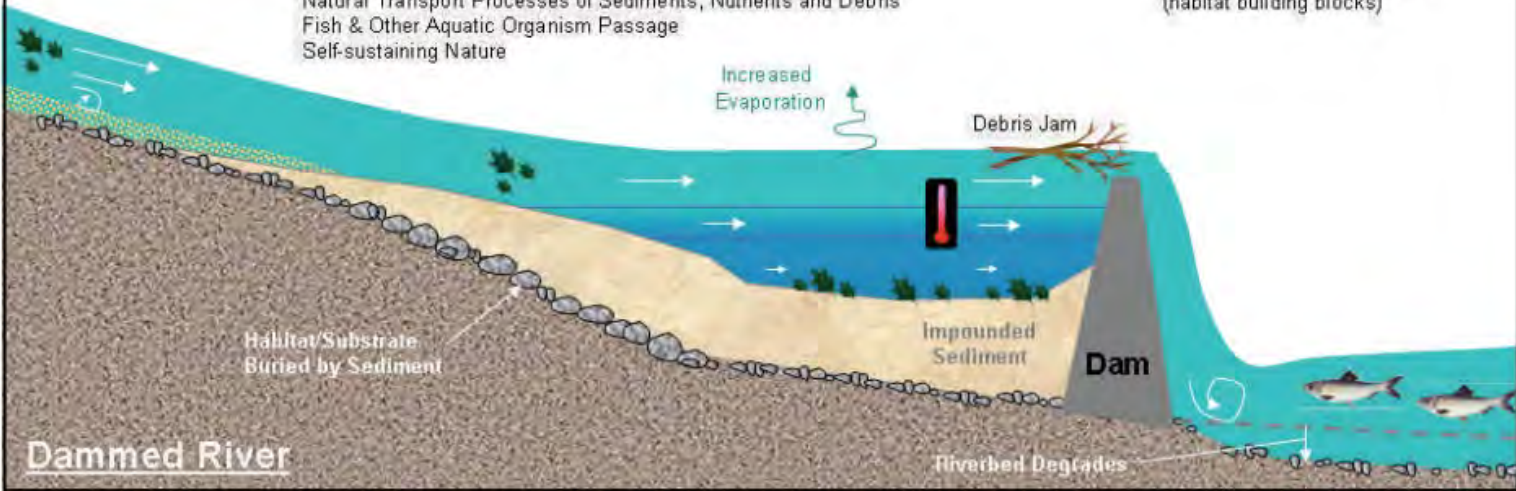


**UPSTREAM IMPACTS:**

- Reduced:  
Natural Function, Water Quality, Oxygen, Turbid Flow, Circulation, Available Habitat  
Rivers ability to adjust horizontally and vertically (reduced resilience to change)
- Increased:  
Pollutant Accumulation, Stratification, Temperatures, Algae Blooms
- Loss of:  
Natural Transport Processes of Sediments, Nutrients and Debris  
Fish & Other Aquatic Organism Passage  
Self-sustaining Nature

**DOWNSTREAM IMPACTS:**

- Reduced:  
Water Quality & Riverbed Elevation
- Altered:  
Flow Regime & Temperatures
- Starved of:  
Sediment, Nutrients & Debris  
(habitat building blocks)



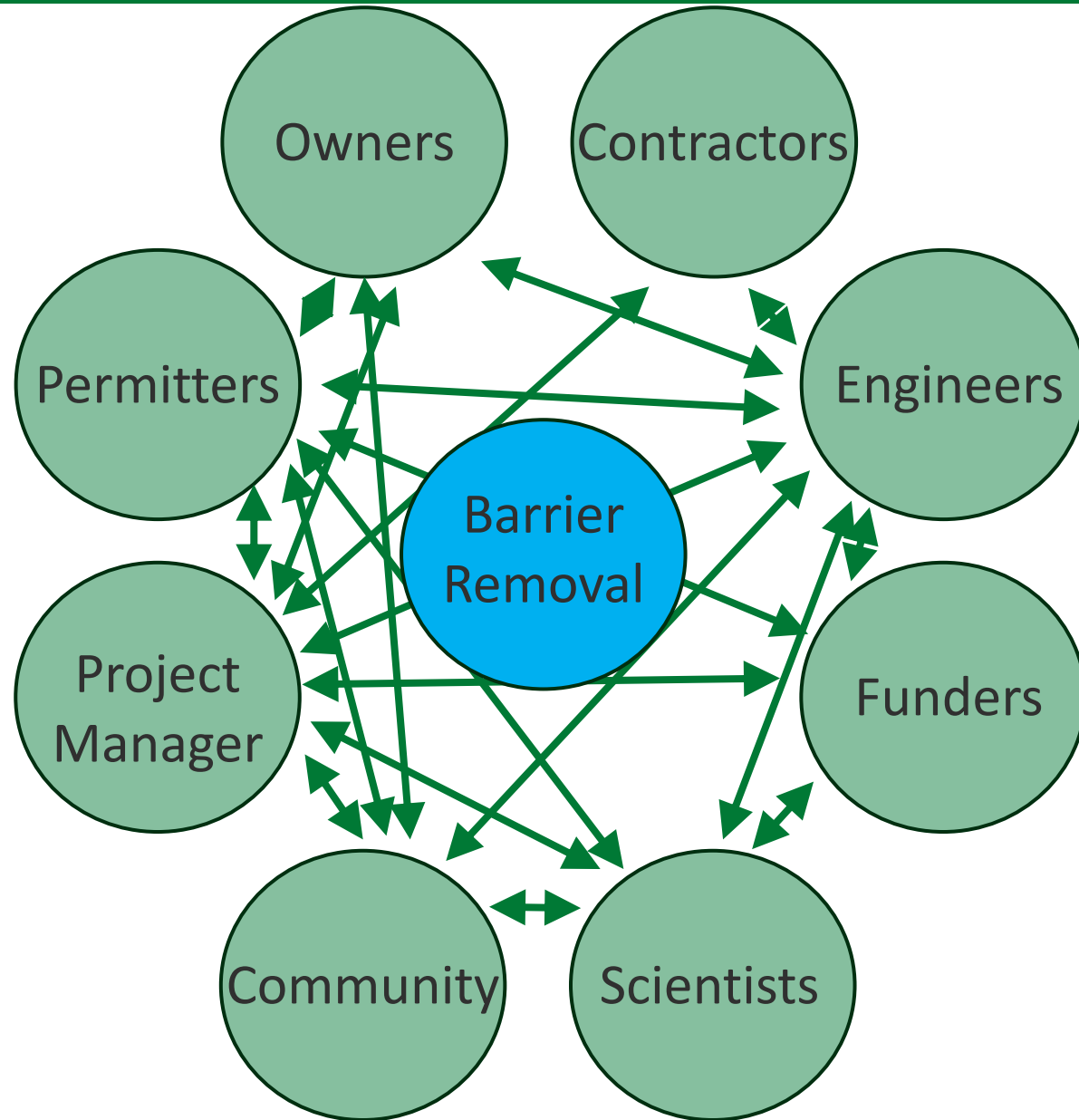
**Restoration Goals**



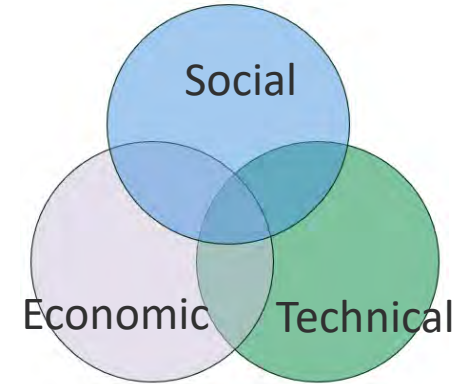
Graphic courtesy of American Rivers



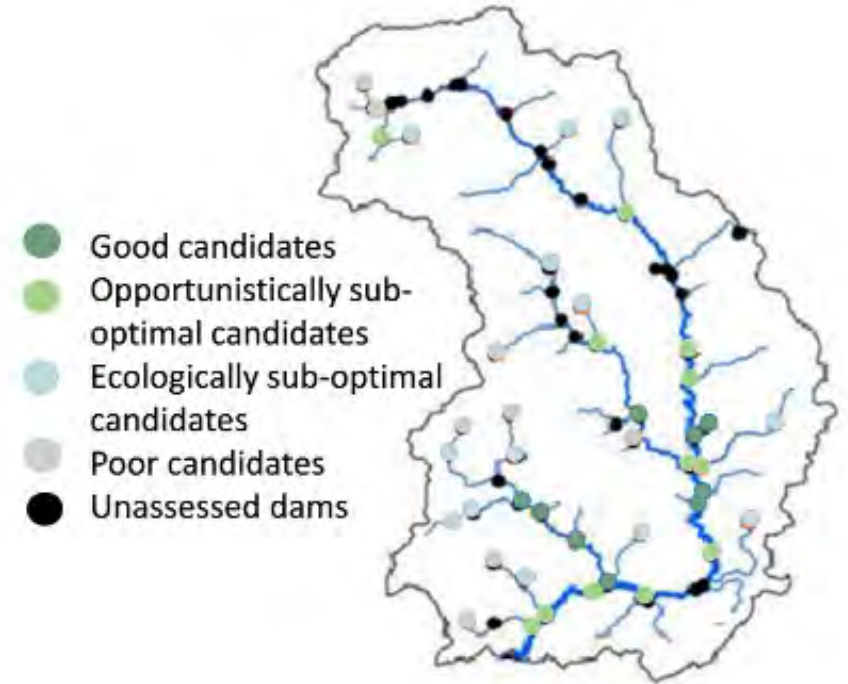
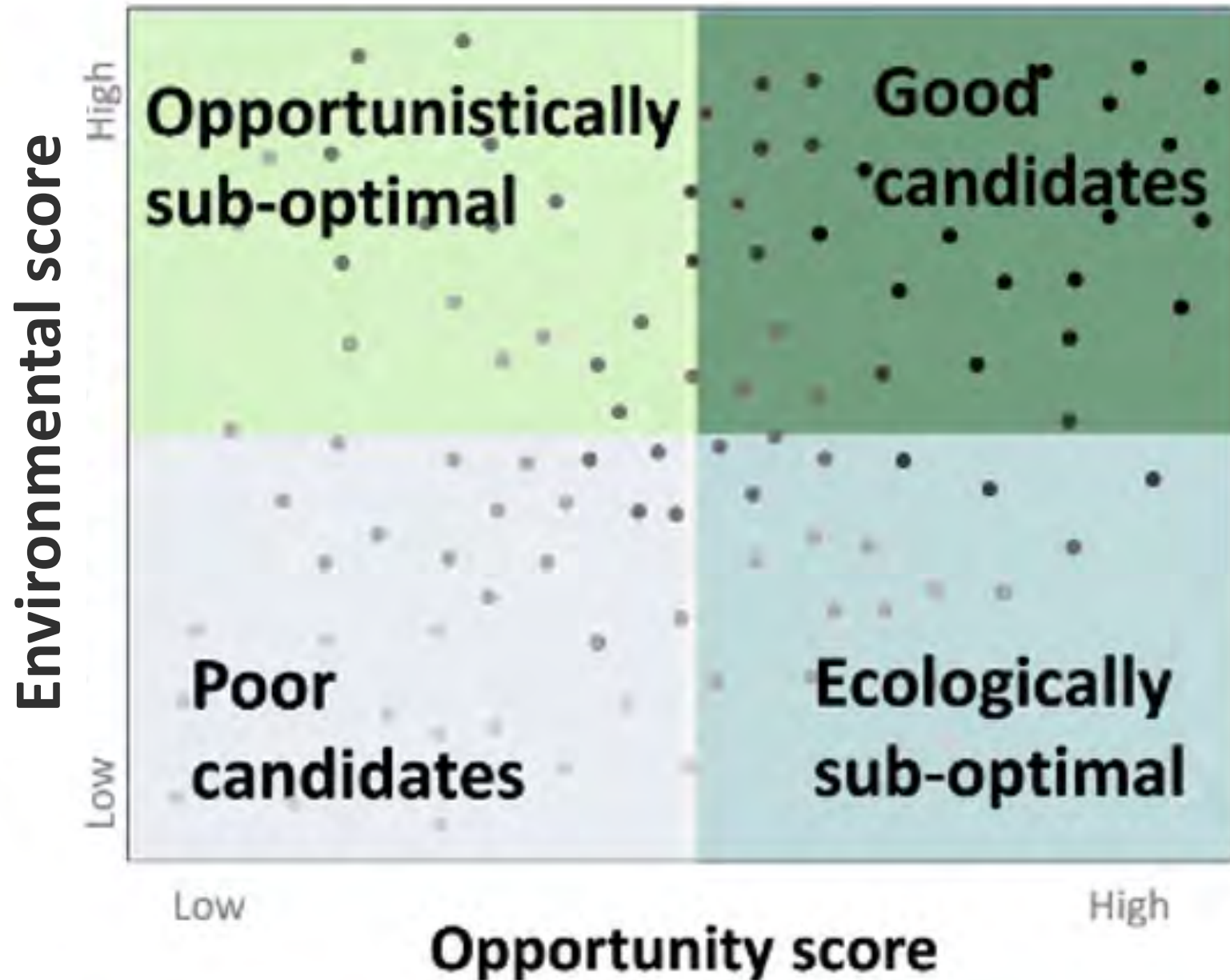
# Complexity shapes opportunities/constraints



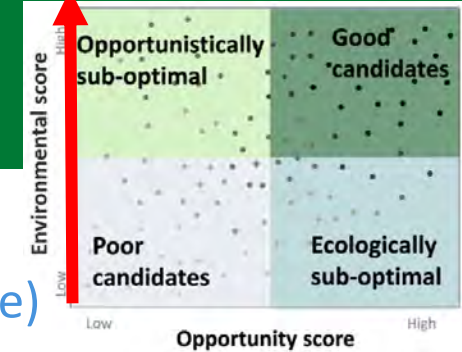
Restoration  
Opportunities/Constraints



# A framework for balancing benefits and opportunities



# Potential Environmental Benefit Factors



## Habitat Goal

Access to critical adjacent habitats

Local water quality impacts

Mileage restored

Barrier Passability

Species of concern (threatened or invasive)

Upstream climate resilience

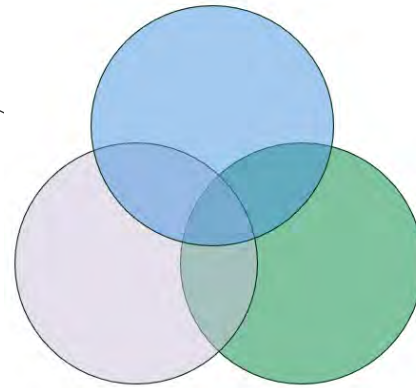
Catastrophic flooding below failed structures

Backwatering/inundation flooding above dam

Natural flow regime vs. flow regulation

Downstream incision and loss of floodplain access

## Flood Resilience Goal



Geomorphology/sediment transport

Microbial communities (e. coli, cyanobacteria)

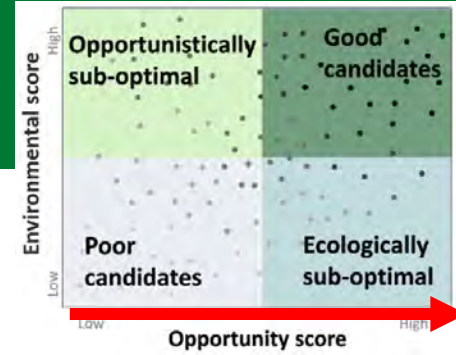
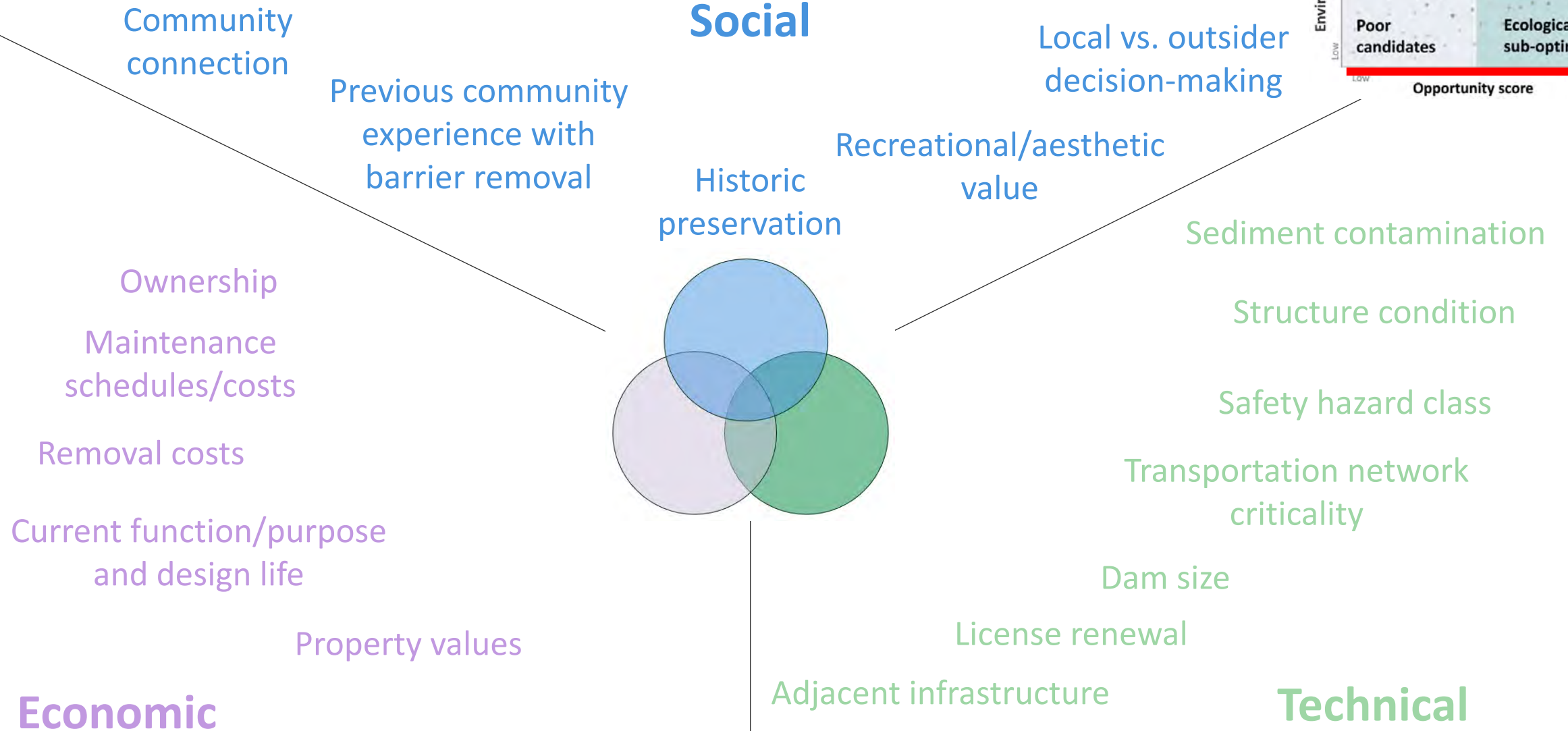
Nutrients

Temperature

Dissolved Oxygen

## Water Quality Goal

# Potential Opportunity Factors





# Example VT Datasets or Prioritization Tools

## Environmental Goals/Factors

## Opportunity Goals/Factors

Habitat

Water Quality

Flood  
Resilience

Technical

Economic

Social

Northeast Barrier Removal Tool

VT Functioning Floodplain Initiative

VTrans TRP Tool

LCBP Comms with Disadvantages

TNC Dam Screening Tool

Temp/DO

Local Hazard Mitigation Plans

Dam Removal Cost Calculator

Community support

CT MEF Report

Nutrients

VT Culverts

Culvert rplcmnt costs

Owner support

VT AOP and Geomorph Screening Tools

VT Dam Inventory

Maintenance Costs

Historic status

USGS ICE

VNRC Dam Mapper

Functional life

Property value  $\Delta$

TU BKT Cons. Portfolio

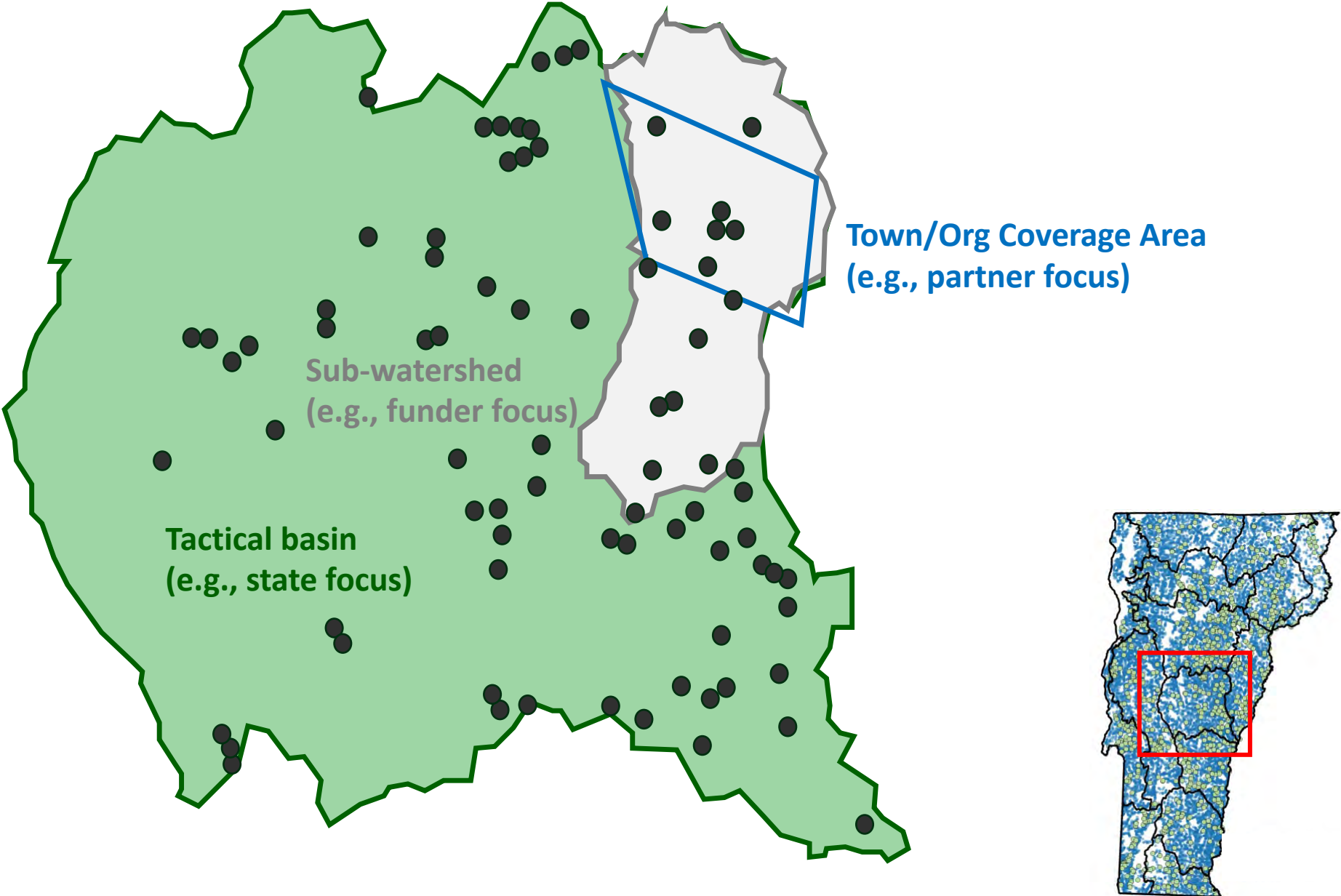
TBPs (HQ or Impaired Waters)

Sediment mgmt needs

Explicit Barrier Prioritization Tool/Report  
Raw Data/Some Factor Rankings Available  
Data Gaps – or places for project development

USGS Temperature

# Prioritization at what scale?



# White River watershed examples



Mary Russ, Executive Director  
White River Partnership  
[mary@whiteriverpartnership.org](mailto:mary@whiteriverpartnership.org)



# Overview



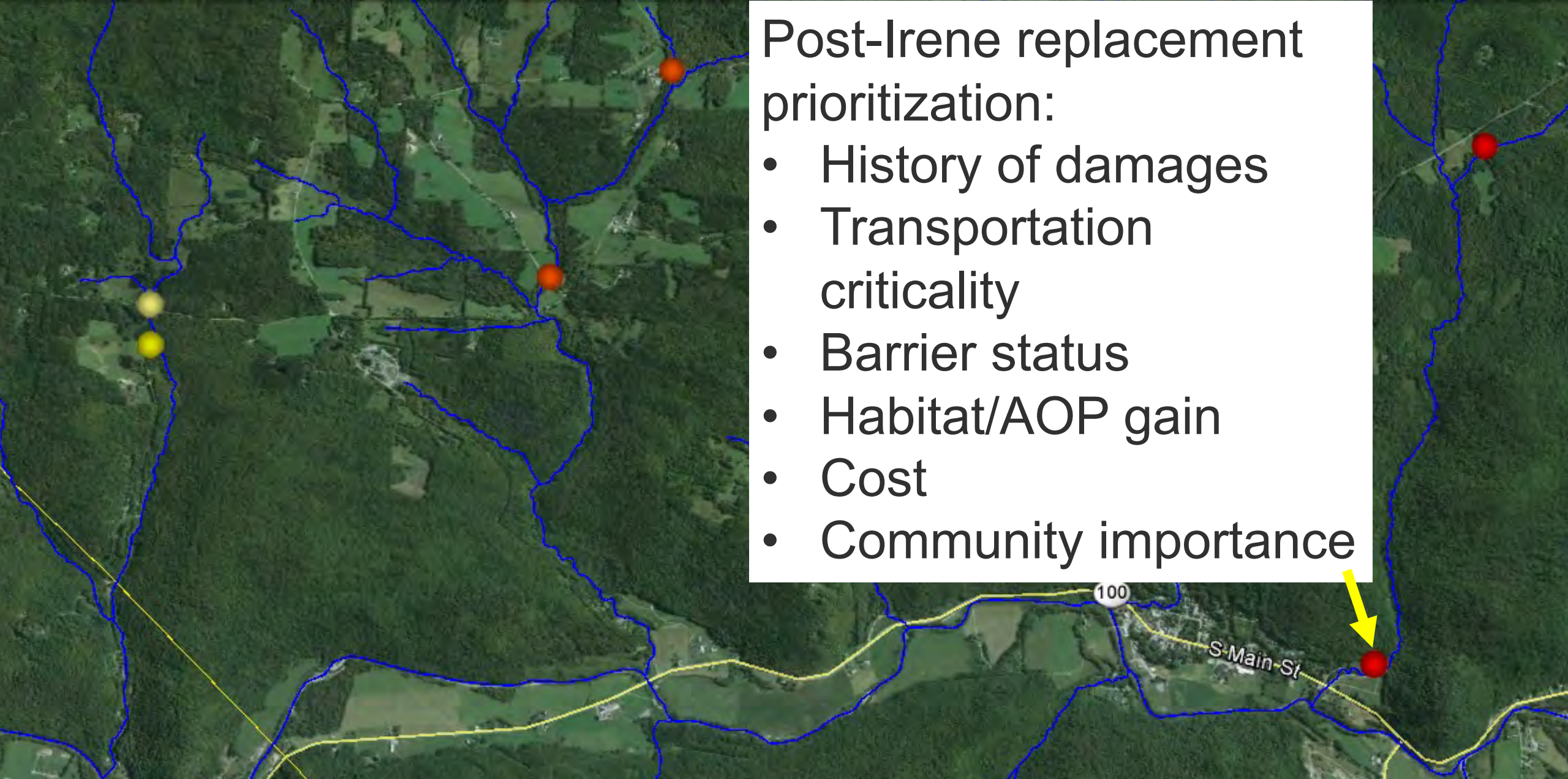
- Post-Irene culvert replacement prioritization
- Upper White culvert prioritization
- First/Second/Third Branches dam removal prioritization



# Post-Irene culvert replacements in Rochester

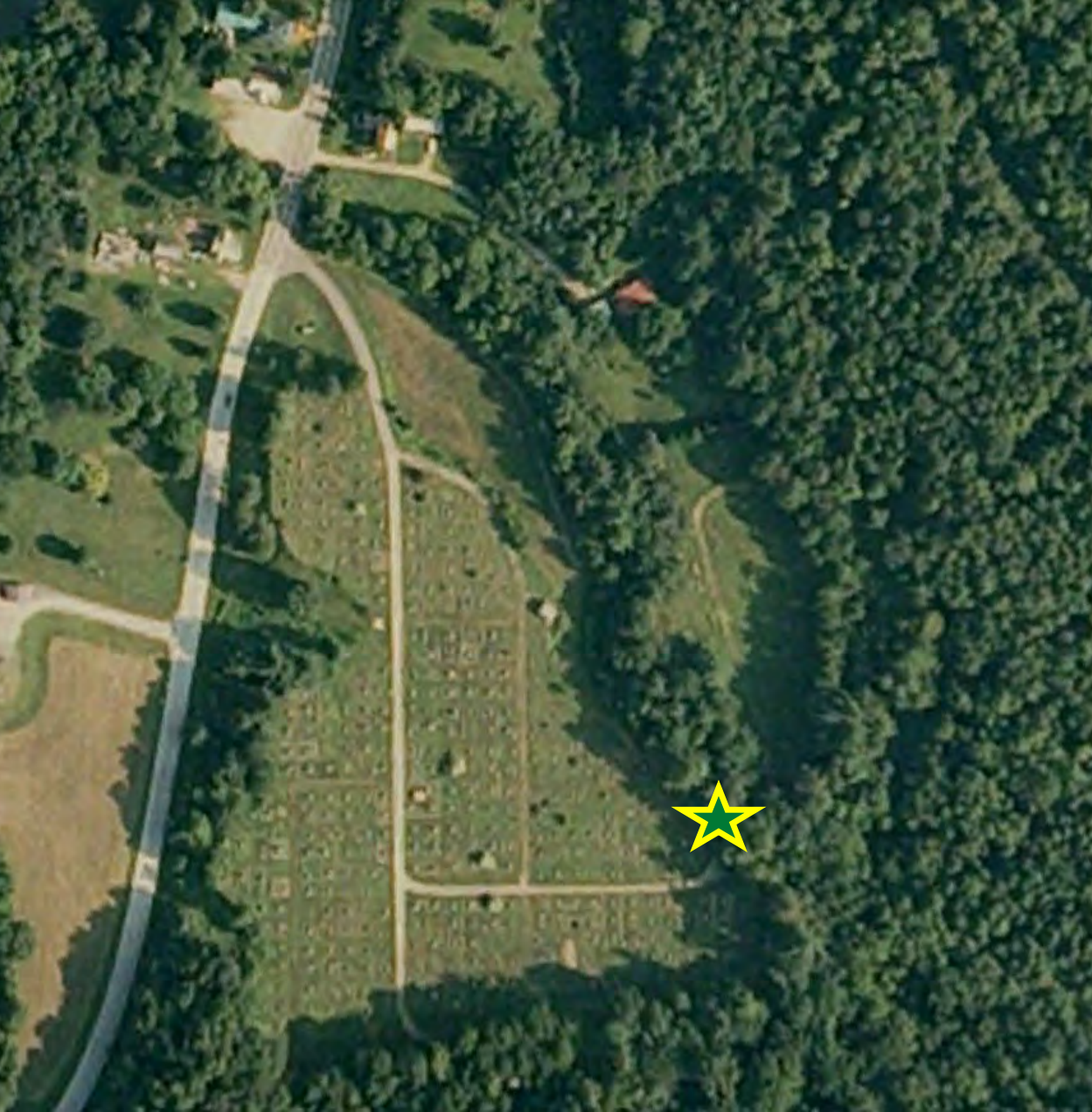
Post-Irene replacement prioritization:

- History of damages
- Transportation criticality
- Barrier status
- Habitat/AOP gain
- Cost
- Community importance



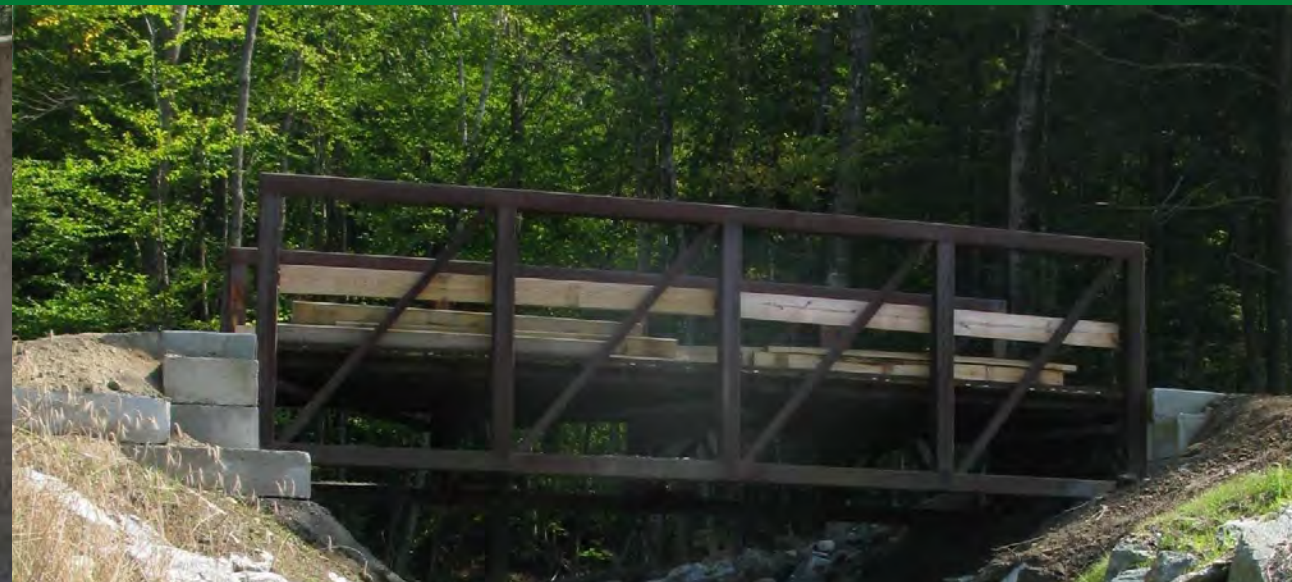


# Nason Brook at Woodlawn Cemetery, Rochester, VT





# Nason Brook at Woodlawn Cemetery, Rochester, VT



Before: 11-foot pipe arch

After: 34-foot bridge



# Lesson Learned #1: Community relationships



Quintown Collabortive: Preparing for the next flood together



Share



Larry Straus

Former Selectboard Chair & Road Commissioner  
Rochester, VT

MORE VIDEOS

1:40 / 2:39

CC Settings YouTube



# Upper White culvert replacement prioritization: Tool 1



Vermont Stream Geomorphic Assessment

## Appendix G



Bridge and Culvert Assessment



# Upper White culvert replacement prioritization: Tool 2

**VERMONT** Natural Resources Atlas  
Vermont Agency of Natural Resources

Layers ☰ × < Search... 🔍

Atlas Layers ▾

Filter Layers... × Filter

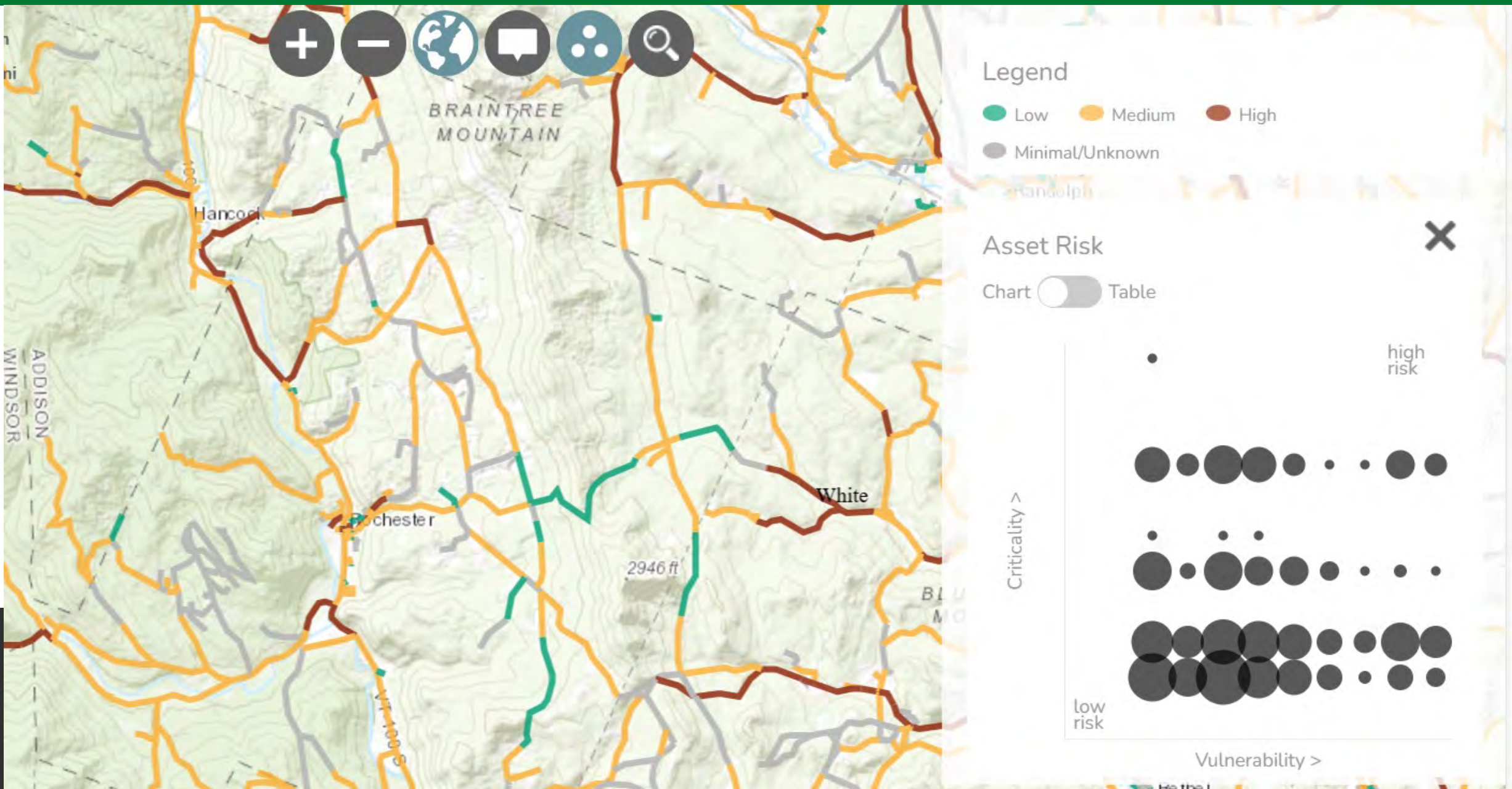
- Fish and Wildlife Facilities >
- Stream Crossings >
- Fishing Access Areas >
- Parking >
- Gates and Barriers >
- Invasive Plant Atlas >
- Designated Public Sites >
- Rare Threatened and Endangered Species >

ESRI Wor... 0 20 40m 1:500

The screenshot shows a web-based GIS application. The main map area displays an aerial view of a road labeled 'MIDDLE HOLLOW RD' with a red dot marking a specific location. The interface includes a search bar at the top right, a 'Quick Tools...' button, and a vertical toolbar with navigation icons. On the left, a 'Layers' panel is open, showing a list of map layers with checkboxes and expandable arrows. The bottom of the screen features a scale bar (0 to 40 meters) and a scale indicator (1:500).

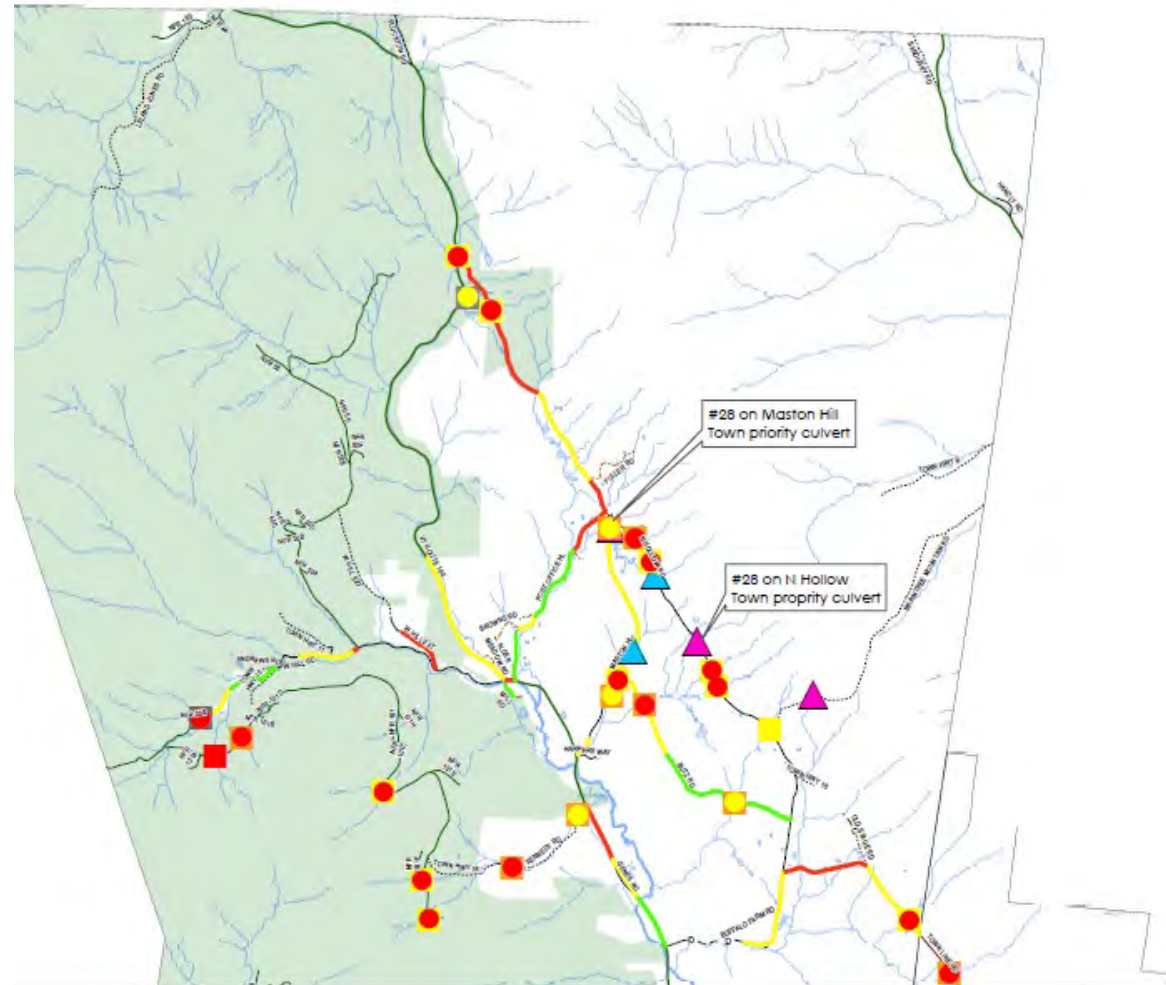


# Upper White culvert replacement prioritization: Tool 3



# Upper White culvert prioritization: Tool 4

- Habitat criteria
  - Habitat gain
    - >1 mile
  - AOP screening priorities
    - Red / Orange / Yellow
- Geomorphic criteria
  - Bankfull width
    - >10 feet
  - Geomorphic compatibility screening priorities
    - Red / Orange / Yellow
- Condition criteria
  - TRORC assessment
    - Critical / Poor
  - Town replacement priority
    - High / Medium / Low
- Transportation criticality
  - Critical road segment
    - Yes / No
  - Flood resilience/safety concern
    - Yes / No



## Legend

### WRP Culvert Condition

#### AOP Coarse Screen

- Impaired Passage
- Passable
- Strong Swimmers Only
- Impassable

#### Geomorphic

- Compatible-mostly
- Compatible-partially
- Incompatible-fully
- Incompatible-mostly

#### TRORC Stream Crossing Culverts

- ▲ Critical
- ▲ Poor

#### Road Criticality: 50 Year Flood

- High
- Medium
- Low
- Water
- Conserved Land



# Lesson Learned #2: Partners = Capacity



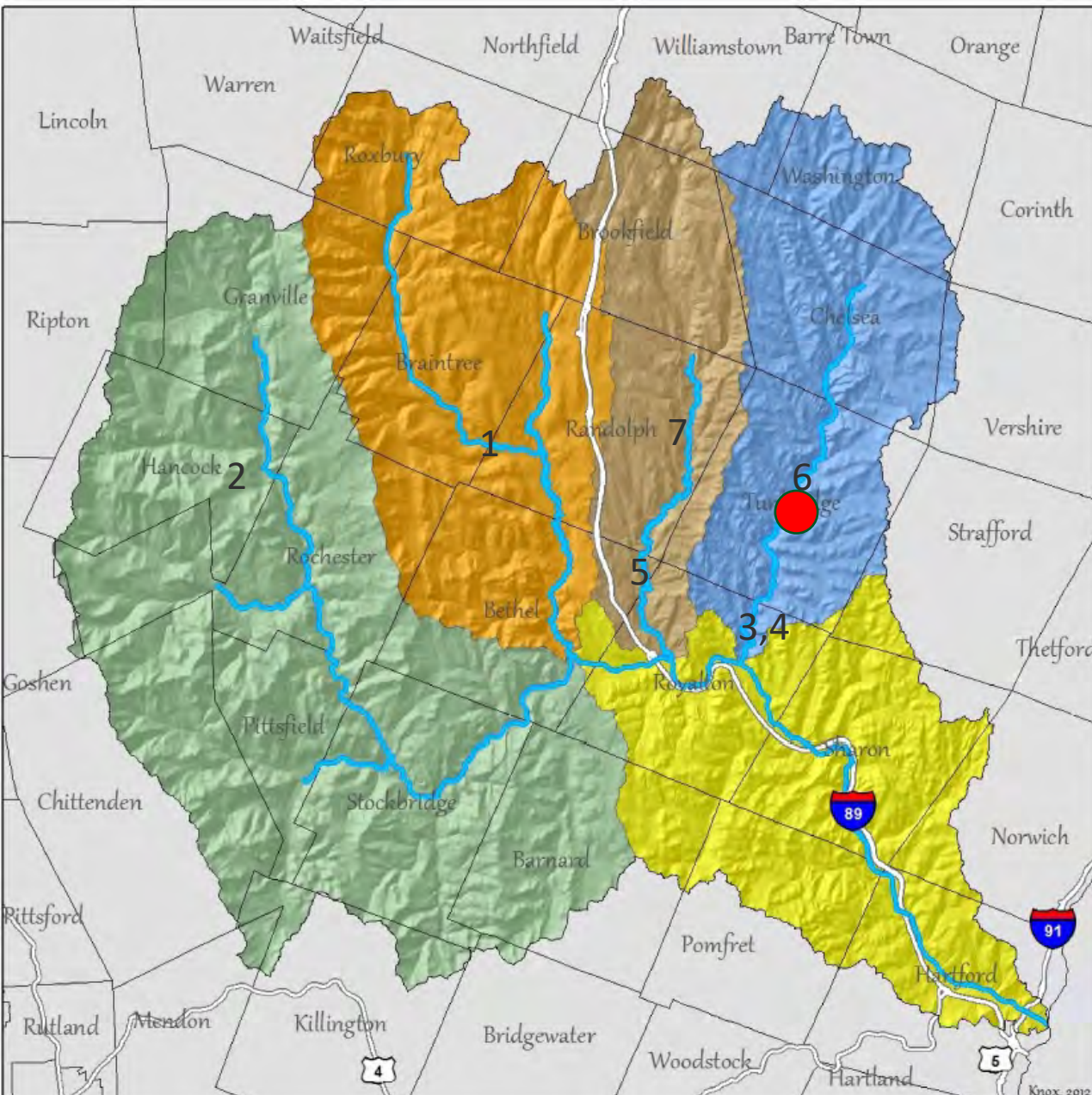


# White River dam removal prioritization





# White River dam removal prioritization



## Dam removal prioritization:

- Opportunity
- Habitat, AOP gain
- Water quality impacts



# White River dam removal prioritization: Tool 1

River Name (Stream Order)	Dam State Id No.	Dam Name (H - Hydroelectric Dam)	Total Miles Upstream of Dam (A)	Total Miles Down- stream of Dam (B)	Migratory Miles (A + B)	Number of Dams, Culverts, and or Waterfalls Downstream to the CT River	Down- Stream Fish Passage	Contains Identified In- stream Resident Resources
Ompompanoosuc River-TR (4)	206.01	Lake Fairlee	14	2	16	5	no	no
Jail Brook (4)	47.04	Lyons Mill	13	2	15	7	no	no
Ammonoosuc River (5)	017.02	Ammonoosuc River Dam (H)	12	5	17	1	yes	yes
Pearl Lake (3)	138.06	Pearl Lake Dam	12	4	16	3	no	yes
Ricker Pond-TR (4)	88.05	Lake Groton	12	1	13	3	no	no
Passumpsic River (6)	179.01	Arnold Falls (H)	11	2	13	3	yes	no
Passumpsic River (6)	12.03	Passumpsic (H)	11	5	16	1	yes	no
Marden Brook (3)	131.30	Marden Brook Hydro	10	7	17	1	no	no
Ogontz Brook (3)	145.04	Ogontz Camp Dam	10	3	13	4	no	yes
First Branch White River (5)	171.03	Eaton (Upper)	10	0.1	10	1	no	no

# White River dam removal prioritization: Tool 2



©B. Besaw/TNC



©Margaret Pizer/



CRCS

Land

Freshwater

## Freshwater Resilience

The Nature Conservancy & Northeast Association of  
Fish and Wildlife Agencies

### Northeast Aquatic Connectivity

An Assessment of Dams on Northeastern Rivers



## ICE | STREAM TEMPERATURE AND BROOK TROUT OCCUPANCY IN THE NORTHEAST U.S.



# White River dam removal prioritization: Tool 3

STATE OF VERMONT

2022

## 303(d) LIST OF IMPAIRED WATERS

VT09-04	01	First Branch White River, Mouth to rm 15.2 CR	ESCHERICHIA COLI (E. coli)
VT09-05	01	Second Branch White River, Mouth to rm 9.8 CR	ESCHERICHIA COLI (E. coli)
VT09-06	01	Smith Brook (Mouth to rm 0.3) AES, ALS	IRON
	02	Third Branch White River, Mouth to rm 4.3 CR	ESCHERICHIA COLI (E. coli)

STATE OF VERMONT

2020

- DRAFT -

## Stressed Rivers and Streams List

VT09-04	01	First Branch White River, Mouth to rm 15.2 ALS, CRB	TEMPERATURE, SEDIMENTATION/SILTATION
VT09-05	02	Kingsbury Brook ALS	NUTRIENTS, TEMPERATURE
VT09-06	02	Third Branch White River, Mouth to rm 4.3 AES, ALS	SEDIMENTATION/SILTATION, NUTRIENTS
	04	Third Branch White River, River Mile 4.3 to Ayers Brook AES, ALS	NUTRIENTS, SEDIMENTATION/SILTATION



# White River dam removal prioritization: Tool 4

## FIRST BRANCH WHITE RIVER WATERSHED

### STREAM GEOMORPHIC ASSESSMENT and RIVER CORRIDOR PLAN

2012-2013

July 17, 2014

<i>Reach Priority</i>	<i>Watershed Priority</i>	<i>Completed Independent of Other Practices</i>	<i>Next Steps and Other Project Notes</i>
Low	Low	Y	Create/protect buffer, then probably enough currently existing to allow natural regeneration if excluded from mowing; recommend Royalton NFIP Floodway map for minimum width (additional 65 ft; recommend 100 ft min), clarify stable planform (FEH zone ) is even further out; treat honeysuckle
High	High	N	Removal of bridge abutment on US end and two dams at DS end would all be likely to affect development within corridor; removal of Lower Eaton dam has been extensively discussed in the past - social constraints (landowner priorities, Historic Register); constraints increase value of floodplain and corridor protection in US reaches





# Lesson Learned #3: Timelines

Eaton: 2002-2020



Hyde: 2016-2024





# Project ID & Prioritization: USFWS Priorities/Methods



David Minkoff, Fish Biologist  
US Fish & Wildlife Service,  
Lake Champlain Field Office  
[david\\_minkoff@fws.gov](mailto:david_minkoff@fws.gov)



# USFWS Prioritization: Species Driven



## Lake Champlain Basin

- Brook Trout
- Landlocked Atlantic salmon
- American eel
- Lake sturgeon
- Wood turtle



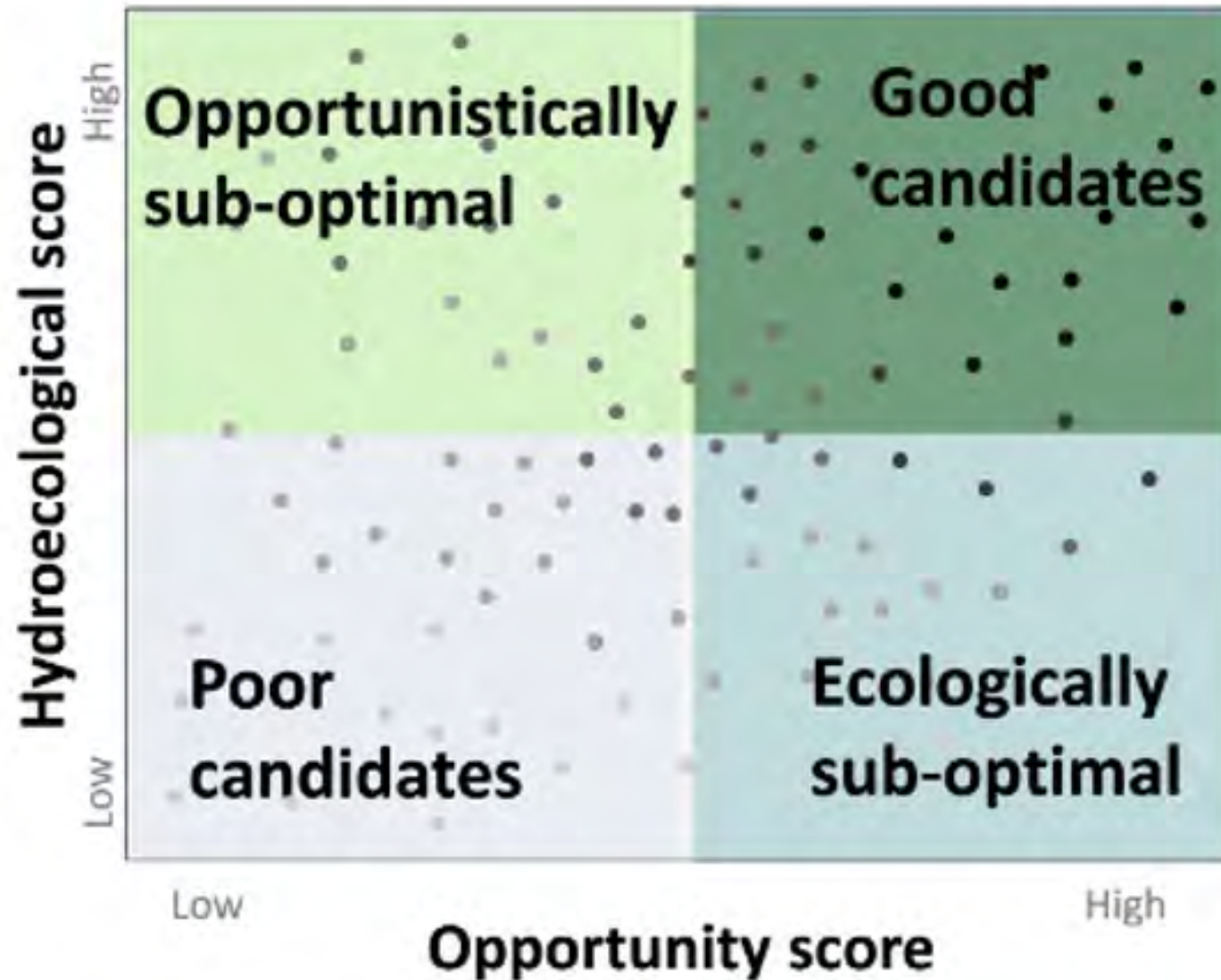
# Outline

1. Project scoping tools
2. Partnerships
3. Example prioritization SOP

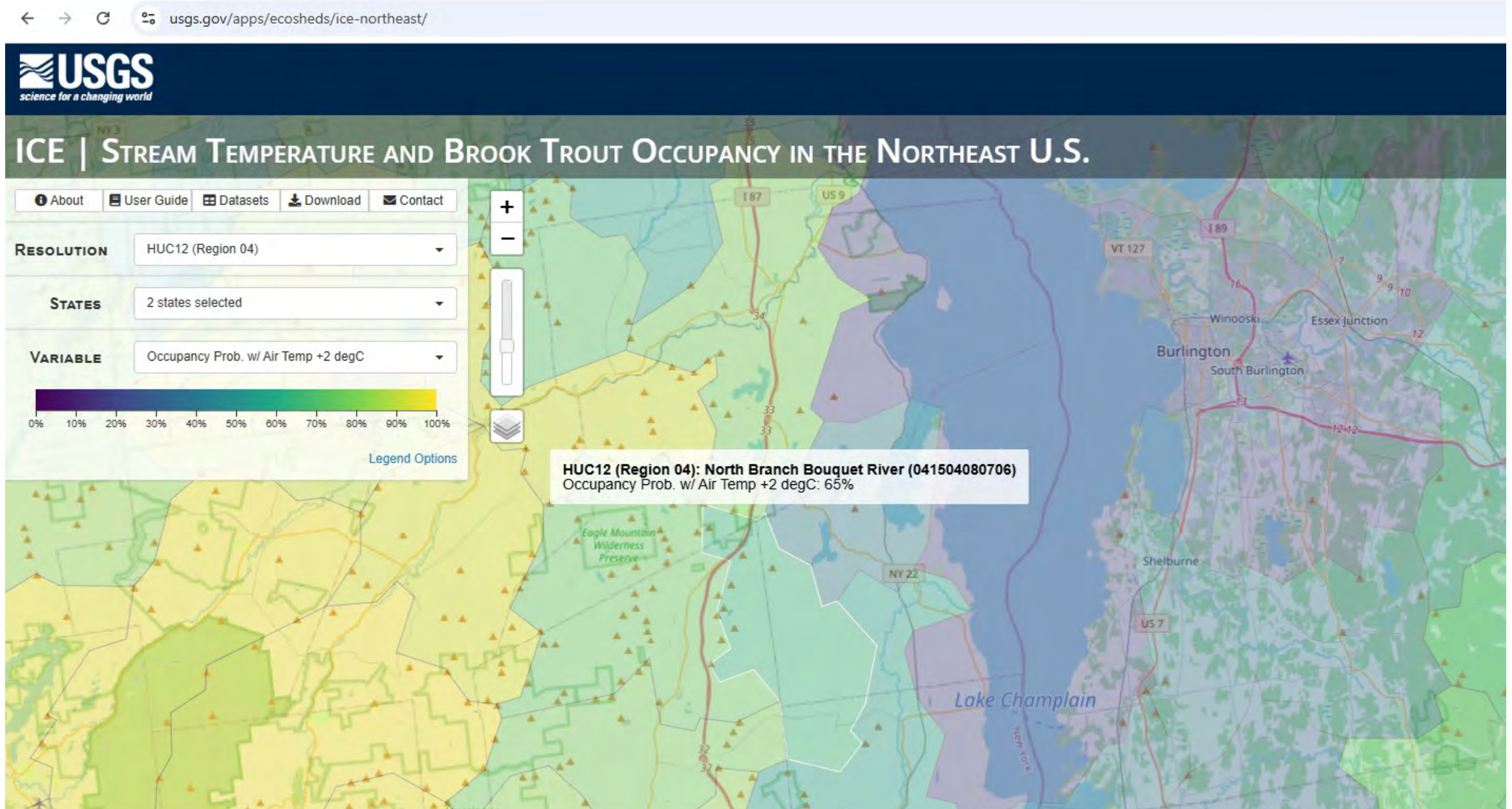




# “Good” Projects



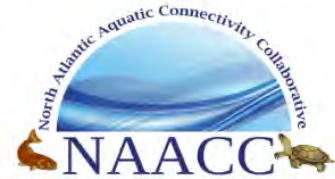
# Tools: USGS Interactive Catchment Explorer (ICE)





# Tools: NAACC Data Center

naacc.org/naacc\_search\_crossing.cfm?sp=2



## NAACC Data Center

[Search Crossings](#) [Login](#)

### Stream Crossing Explorer (SCE):

To analyze search results with the SCE, check the box before choosing your search parameters.  
Note that **only** parameters still showing after checking the box will be used for your search.

**Location** (choose multiple towns, watersheds):

New York [37480]

Esperance [6]  
Essex [77]  
Evans [0]  
Exeter [3]

All NY Watersheds  
Ausable River  
Black  
Bronx

**Personnel:**

not available for the dataset(s) you selected

**Other:**

"Survey Id" not available for SCE or 5 Aquatic datasets.  
"Crossing Code" not available for the SCE or 5 Aquatic datasets.  
Evaluation is not available for the dataset(s) you selected.

**Dates:**

"Last updated" is not available  
"Date observed" is not available

**Choose Data Sets** (choose multiple):

datasets are chosen by default when using SCE

Search

**Your search returned 172 records.**  
(results may include multiple surveys of some locations)

Map With SCE



# Tools: NAACC Data Center



Select Baselayer Select Overlay Layers

Search map...



**Crossings**

Mapped: Impassability Score

0.00 0.17 0.33 0.50 0.67 0.83

Transparency

Display unsurveyed crossings on map

Select Attributes

**Feature Attributes**

Show Selected Show All

Attribute	Value
Impassability Score	0.99
AOP Classification	None

Aquatic

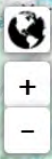
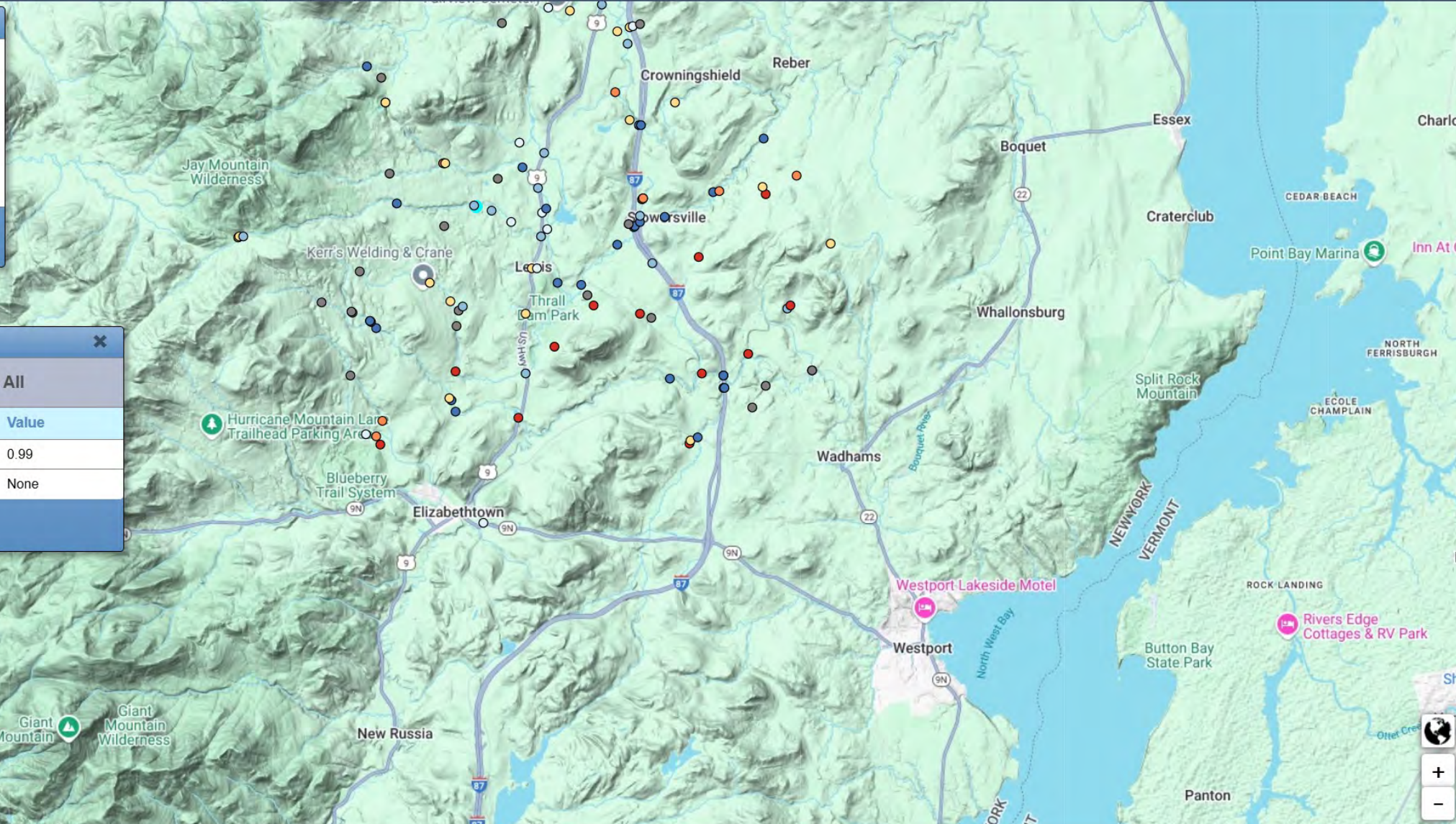
**Status**

Attribute	Progress
Unsurveyed Crossings	Complete
Trout Habitat Suitability	Complete

44.24618 : -73.25855

5 km

3 mi





# Tools: NAACC Data Center



[xy4428927073584253\(downstream\)8-20-2019.jpg](#)



[xy4428927073584253\(inlet\)8-20-2019.jpg](#)



[xy4428927073584253\(outlet\)8-20-2019.jpg](#)



[xy4428927073584253\(upstream\)8-20-2019.jpg](#)

## Non-tidal Aquatic Connectivity Crossing Data

**Database Entry By:** Daniel Sinopoli

**Coordinator:** Luke McNally

**GPS to Crossing Distance (meters):** 20.0

**Crossing Code:** xy4428927073584253

**Date Observed:** 08-20-2019

**Town/County:** Lewis (Essex), NY

**Road:** Wells Hill Road

**GPS:** Lat: 44.28939, Long: -73.58444

**Location Description:** About quarter mile past intersection with Goff Rd

**Crossing Type:** Culvert

**Flow Condition:** Typical low-flow

**Tidal Site:** No

**Road Fill Height (feet) :** 5

**Bankfull Width Confidence:** No data

**Tailwater Scour Pool:** Large

**Crossing Comments:** No data

**Entry Date:** 08-20-2019

**Last Updated:** 08-20-2019

**NHD-HUC8 Watershed:** Lake Champlain

**Local ID:** No data

**Lead Observer:** Elizabeth Metzger

**Stream/River:** Spruce Mill Brook

**Type:** Paved

**Number of Culverts/Bridge Cells:** 1

**Crossing Condition:** OK

**Alignment:** Flow-Aligned

**Bankfull Width (feet):** No data

**Constriction:** Severe

**Evaluation of this stream crossing is estimated as:** SEVERE BARRIER







# Tools: TU LCB, NY Barrier Prioritization Tool

Lake Champlain Basin, New York  
Barrier Prioritization Tool



### Filter Barriers

Filter barriers by type or watershed

Barrier type includes  
0 Selected

Subbasin includes  
0 Selected

Watershed includes  
0 Selected

Filter barriers by Reconnection Potential

Composite Reconnection Potential Rank includes  
1 Selected  
*(1 = High potential, 5 = Low potential)*

Trout community category rank includes  
0 Selected

Population estimate category rank includes  
0 Selected

Available habitat category rank includes  
0 Selected

Atlantic salmon category rank includes  
0 Selected

Invasive species category rank includes  
0 Selected

Flood Risk Rank includes  
0 Selected  
*(1 = High risk, 5 = Low risk)*

Impoundment use: Water Supply (dams only)

Impoundment use: Fish & wildlife (dams only)

### Filter Patches

Filter patches by Brook Trout Portfolio

Brook trout portfolio includes  
0 Selected

Filter patches by Habitat Condition

Composite Habitat Condition Rank includes  
0 Selected  
*(1 = Good condition, 5 = Poor condition)*

% agriculture category rank includes  
0 Selected

% urban development category rank is any of  
0 Selected

% riparian buffer forested category rank includes  
0 Selected

Stream temperature category rank includes  
0 Selected

Water quality standard category rank includes  
0 Selected

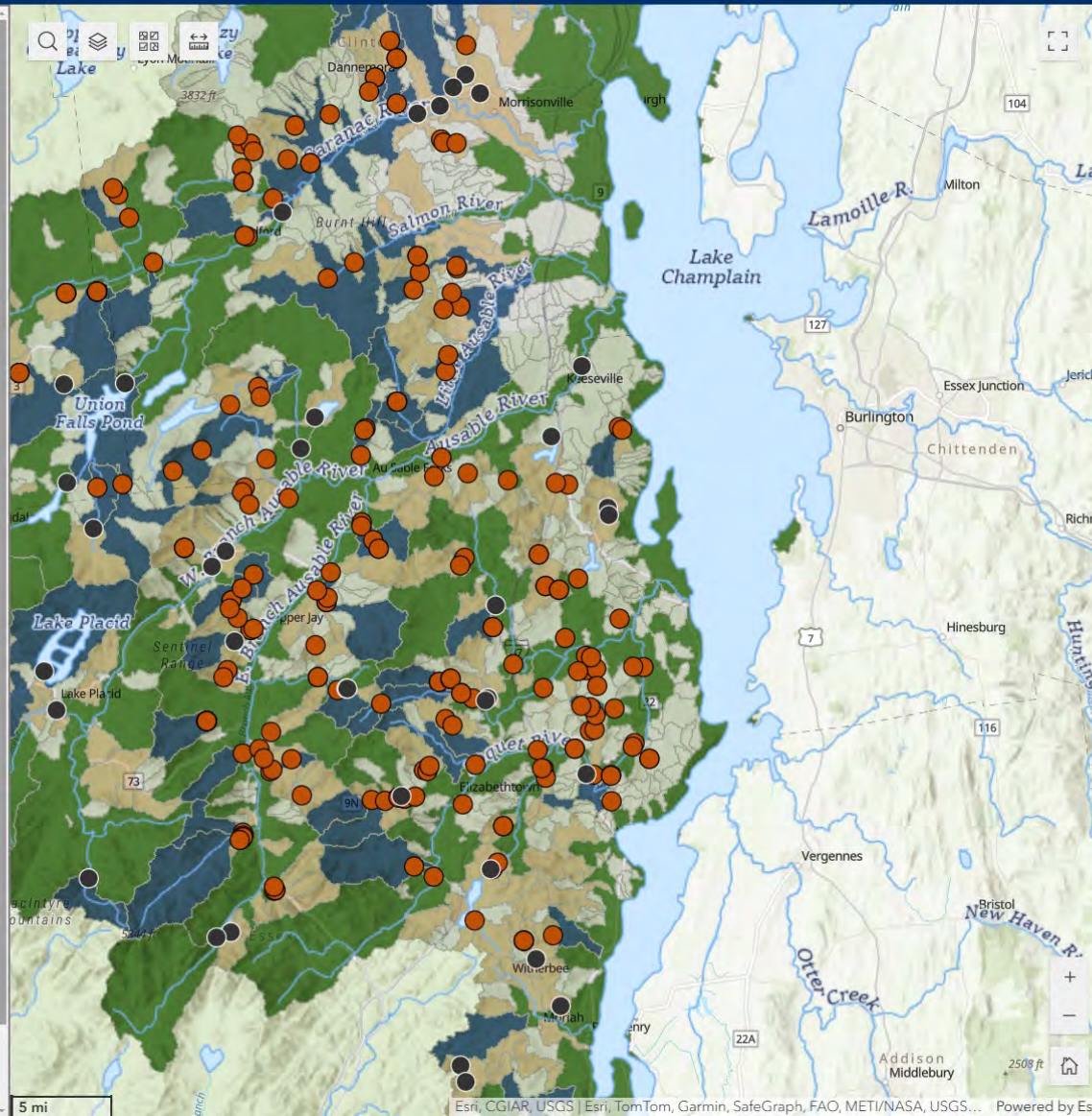
Filter patches by Climate Change Resiliency

Composite Climate Change Resiliency Rank includes  
0 Selected  
*(1 = High resiliency, 5 = Low resiliency)*

Probability of brook trout decline, 2062 category rank includes  
0 Selected

Probability of restoration benefit, 2062 category rank includes  
0 Selected

Probability of brook trout occurrence, 2087 category rank includes  
0 Selected



[+ App Resources](#)

### Barriers

- NY dams
- NAACC road-stream crossings

Reconnection Potential rank

- > 5
- 4
- 3
- 2
- < 1

### Reference hydrography

Layers

RGB

- Red: Band\_1
- Green: Band\_2
- Blue: Band\_3

### Habitat Patches

- Stronghold
- Persistent
- Other populations
- Not a brook trout population

[+ Export Records](#)

Esri, CGIAR, USGS | Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS... Powered by Esri



# Tools: USFWS Service Watershed Investment Map

## SWIM Priority Watersheds Public

Chris Castiglione  
U.S. Fish & Wildlife Service

Records: 121








### Summary

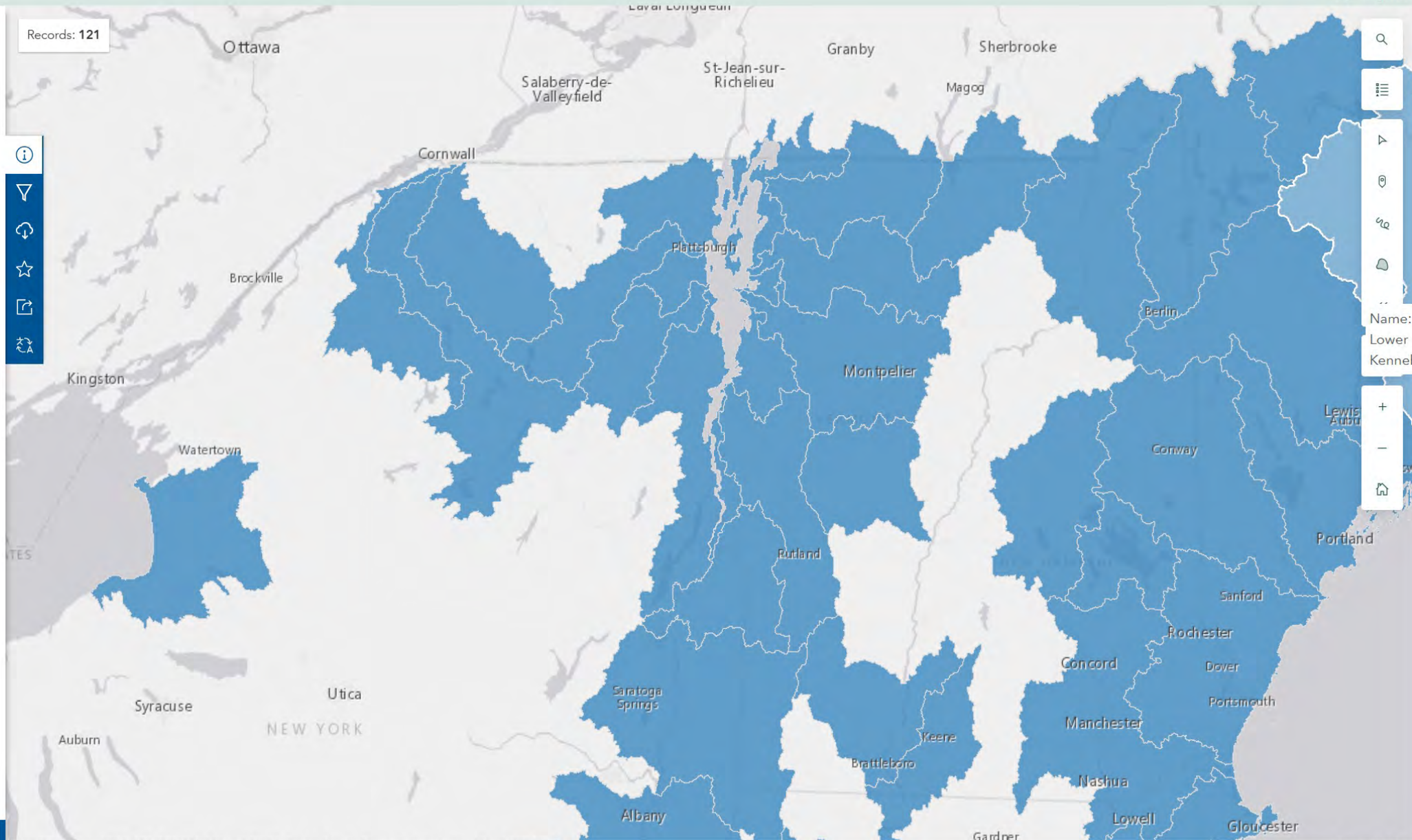
The Service Watershed Investment Map (SWIM) identifies watersheds in the U.S. Fish and Wildlife Service's North Atlantic-Appalachian Region where aquatic connectivity restoration can have the greatest benefits for trust species and habitats

[View Full Details](#)

[Download](#)

### Details

-  **Dataset**  
Feature Layer
-  **May 9, 2023**  
Info Updated
-  **January 18, 2023**  
Data Updated
-  **April 19, 2021**  
Published Date
-  **Records: 121**  
[View data table](#)
-  **Public**  
Anyone can see this content
-  **Custom License**  
[View license details](#)





# Partnerships are Critical!





# Partnerships are Critical!



## NY State Partners included:

- NY State DEC
- Patriot Hydro
- NY State Electric & Gas
- Trout Unlimited (LC Chapter, NY)
- Trout Unlimited (Regional)
- SLR Engineering
- USFWS – LC Field Office
- USFWS – Ecological Services
- Lake Champlain Basin Program
- FERC (Fed. Energy Reg. Commission)
- City of Plattsburgh
- Town of Plattsburgh
- GW Tatro Construction Inc
- Ward Logging LLC
- Rugar Self Storage
- Northern Forest Canoe Trail
- The Nature Conservancy
- SUNY Plattsburgh
- Essex and Clinton Counties
- Adirondack Explorer



# Partnerships made this possible





# SOP Created by Upper Missisquoi AOP Workgroup



## Partners include:

- Luke Briccetti & Katherine Helmer, Eco Americorps
- Lauren Weston, Franklin County NRCD
- Sarah Damsell, Ted Sedell, Orleans NRCD
- Lee Simard & Will Eldridge, VT FWD
- Staci Pomeroy, VT DEC
- Lindsey Wight, Missisquoi River Basin Association
- Bethany Remmers, Northwest Regional Planning Commission
- Nicky Paquette, Chase Whiting, Clark Amadon, TU
- David Minkoff, Chris Smith, USFWS

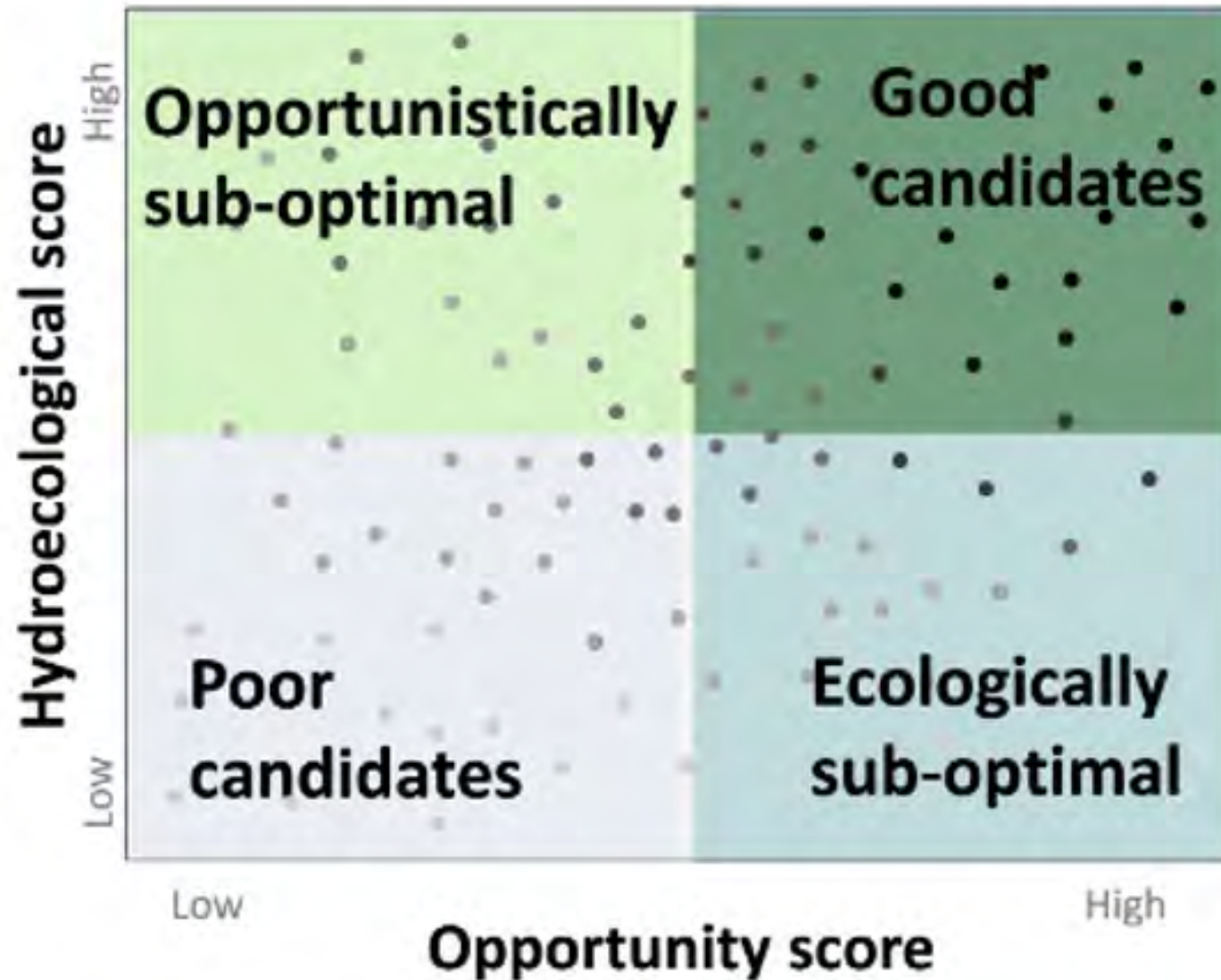


# Resources

- USFWS SWIM Map: [https://gis-fws.opendata.arcgis.com/datasets/6acf5fd506e04cf5a1d0f143b8851e98\\_0/explore?location=44.027337%2C-73.418935%2C8.43](https://gis-fws.opendata.arcgis.com/datasets/6acf5fd506e04cf5a1d0f143b8851e98_0/explore?location=44.027337%2C-73.418935%2C8.43)
- TU Lake Champlain Basin, New York Barrier Prioritization Tool: <https://experience.arcgis.com/experience/e91d759ca472438398c8c51edabb5135/page/Barrier-Screening-Tool/?views=View%202%2CView%203%2CView%202%2CView%203>
- TNC Lake Champlain Basin Road-Stream Crossing Assessment: <https://tnc.maps.arcgis.com/apps/webappviewer/index.html?id=7fad86b436f848379a2d469750430613>
- USGS Interactive Catchment Explorer: <https://www.usgs.gov/apps/ecosheds/ice-northeast/>
- North Atlantic Aquatic Connectivity Collaborative (NAACC) Database: [https://naacc.org/naacc\\_data\\_center\\_home.cfm](https://naacc.org/naacc_data_center_home.cfm)
- The Vermont Culvert Aquatic Organism Passage Screening Tool: [https://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/rv\\_VTAOPScreeningTool.pdf](https://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/rv_VTAOPScreeningTool.pdf)



# Wrap Up





# Questions?





# Questions?

1. Do you/partners prioritize before pursuing barrier removal projects?
2. What are the general goals that you/partners most often pursue?
3. Are any datasets/prioritization tools particularly helpful?
4. Are datasets and prioritization tools missing but needed (e.g., for any factors listed earlier in the presentation)?
5. How does prioritization differ for you between dams and culverts?