

“Profiling” road segments: building a basic understanding of how wildlife are impacted by roads

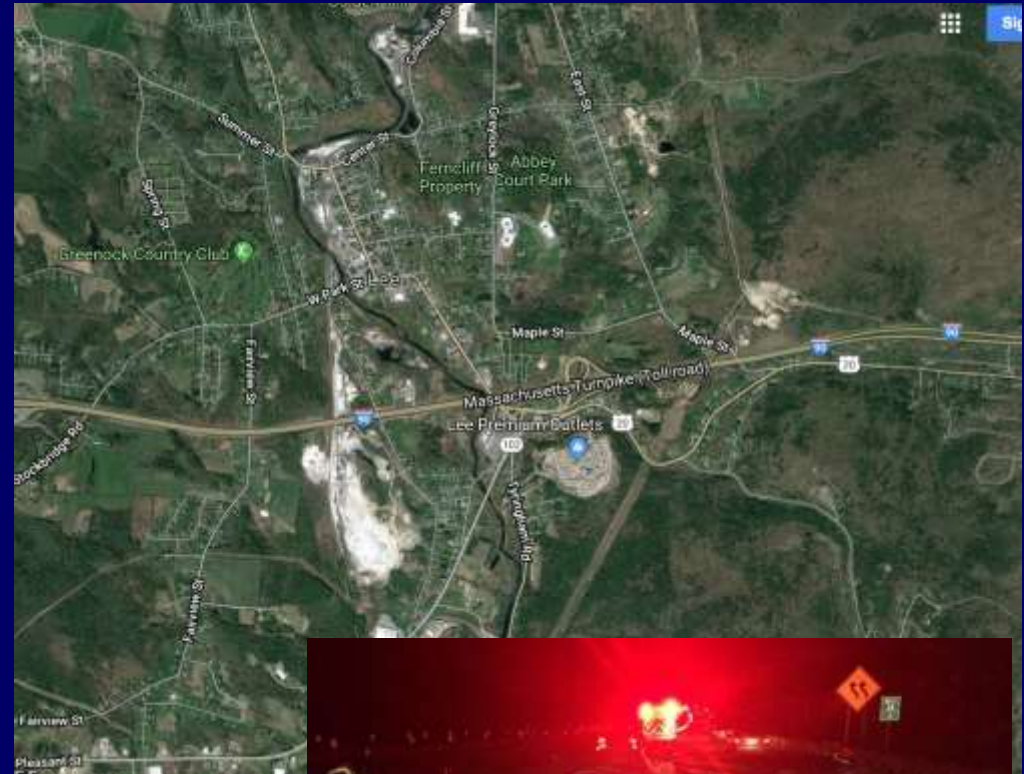
Dave Paulson, Mass. Division of Fisheries and Wildlife

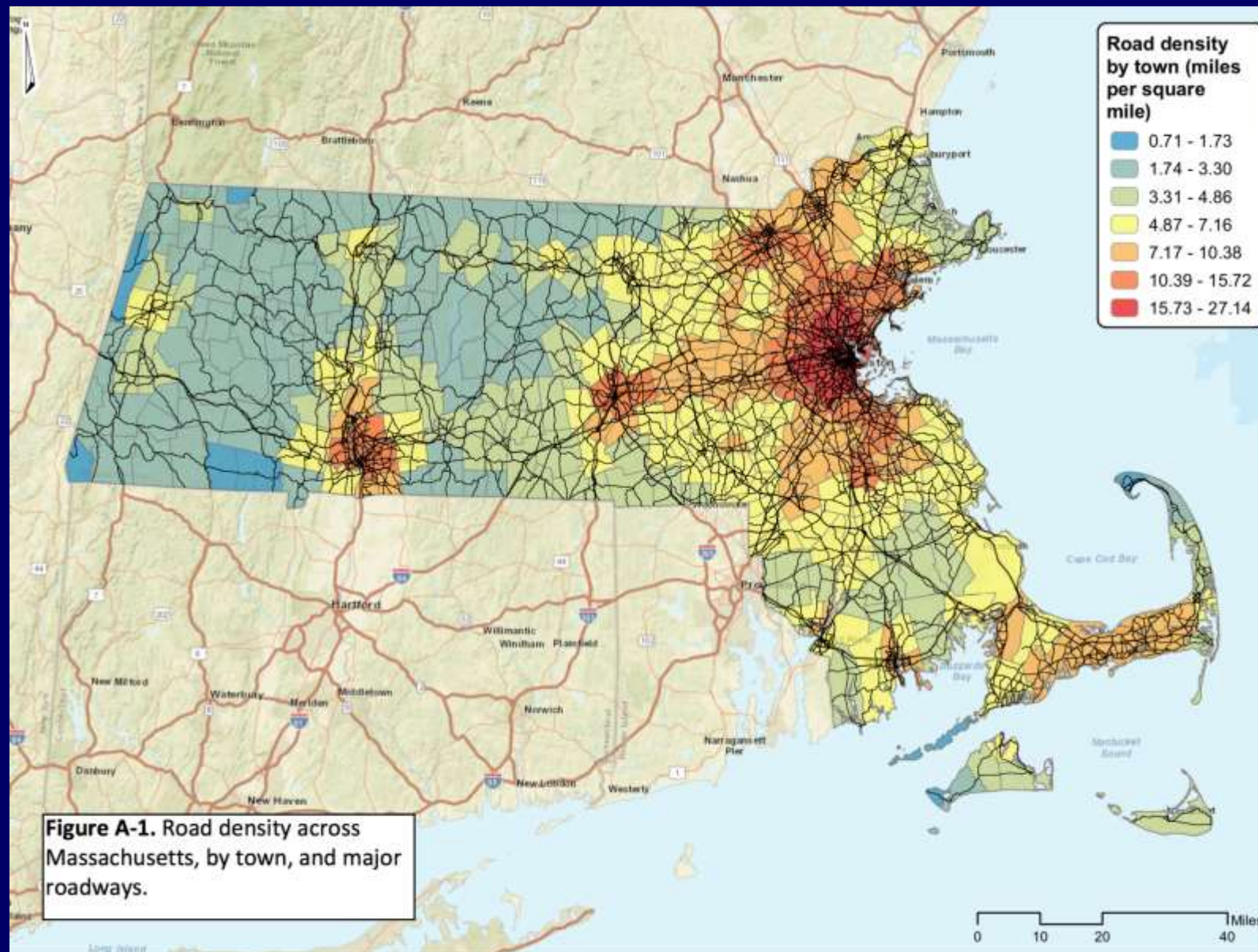
Laura Marx, The Nature Conservancy – Massachusetts

NETWC 2018

Roads and Wildlife: Road Ecology 101

- Habitat Fragmentation
- Habitat Degradation
- Direct Mortality/Injury (Additive mortality)
 - Skewed population demographics/ratios
 - Population Decline/Viability
 - Loss of genetic exchange between populations
- Public safety concerns!





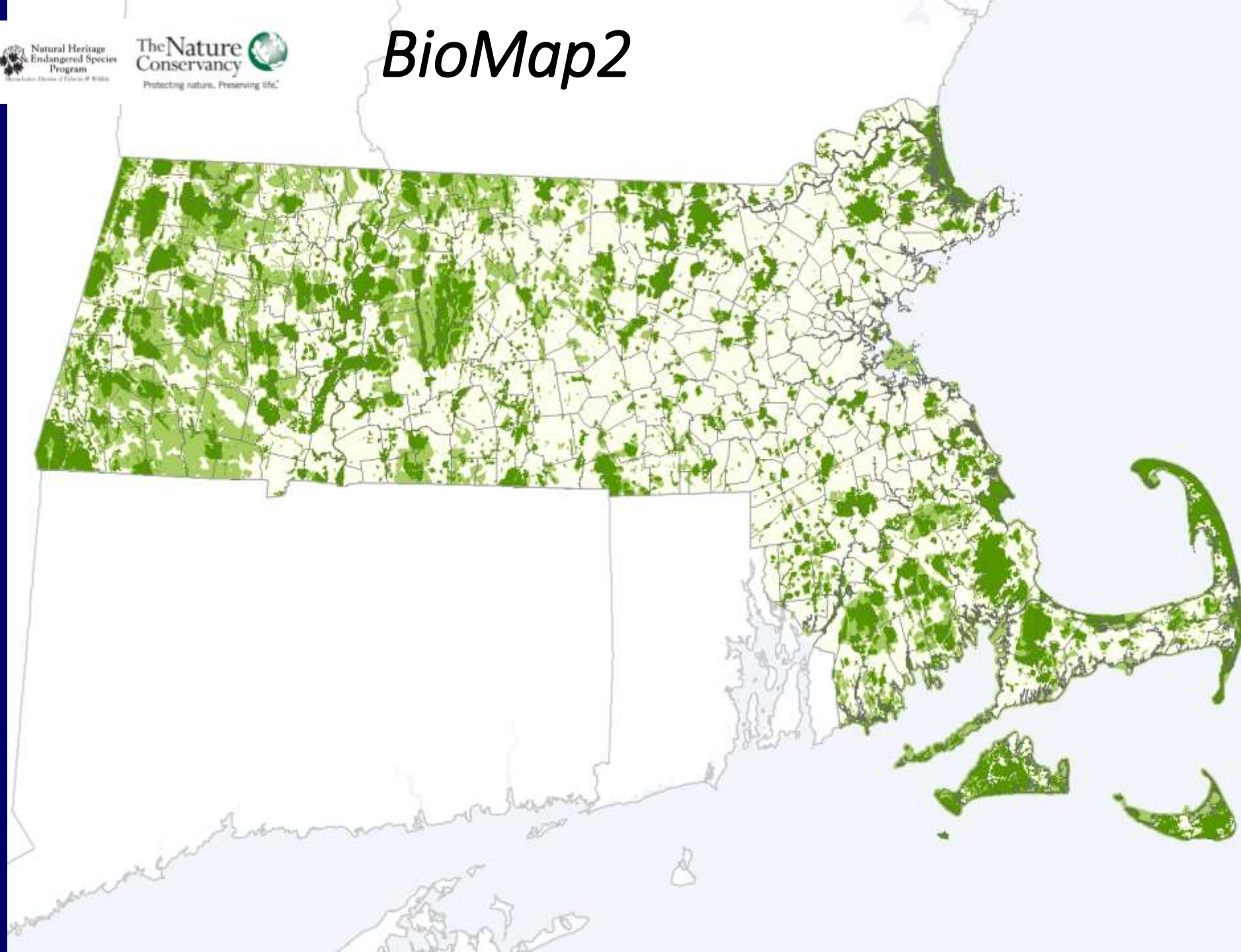
The Commonwealth contains 16,534 km (10,274 mi) of highways and other major roads and 62,101 km (38,588 mi) of minor roads.



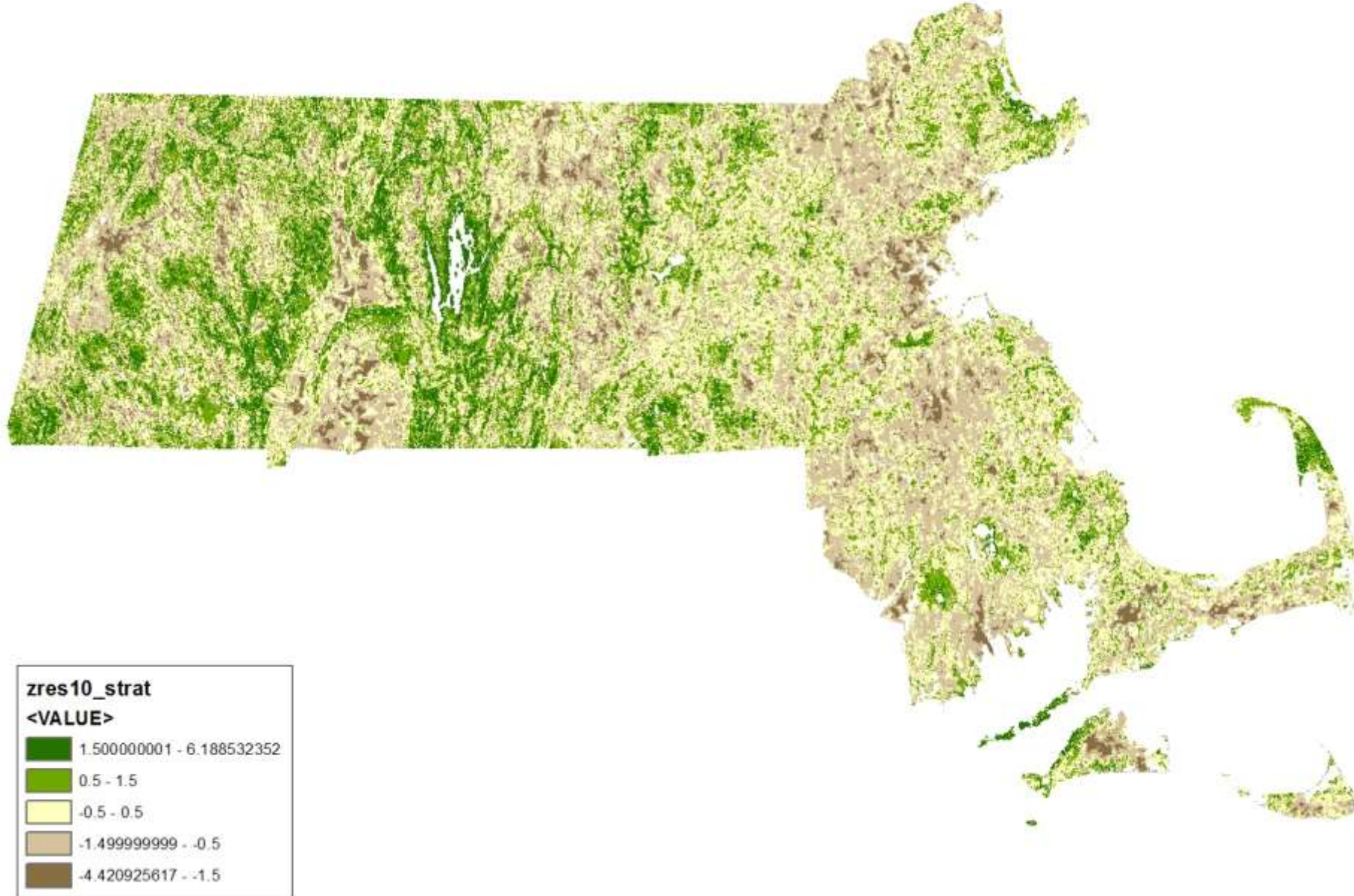
Natural Heritage
& Endangered Species
Program
Massachusetts Division of Fisheries & Wildlife

The Nature
Conservancy 
Protecting nature. Preserving life.™

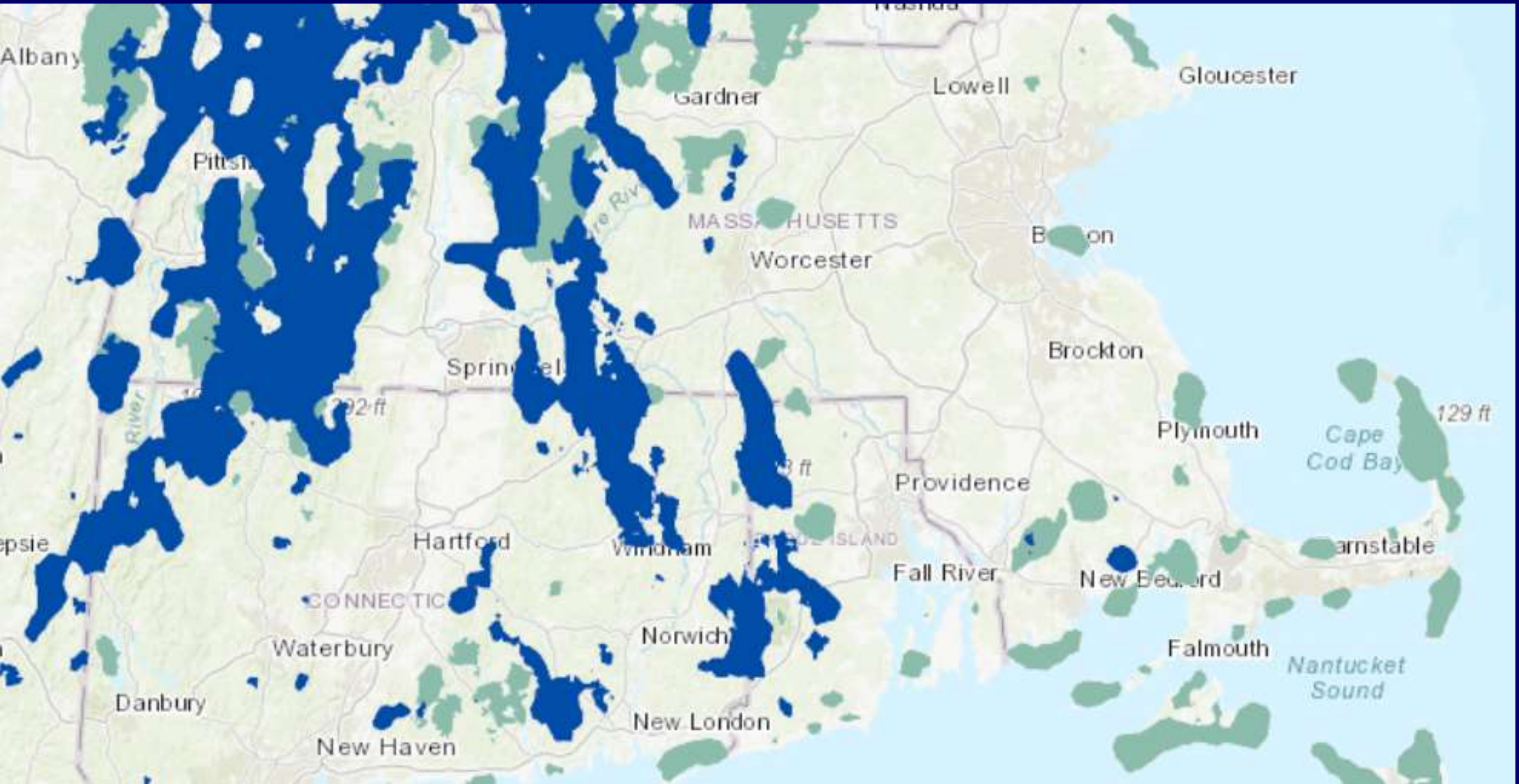
BioMap2



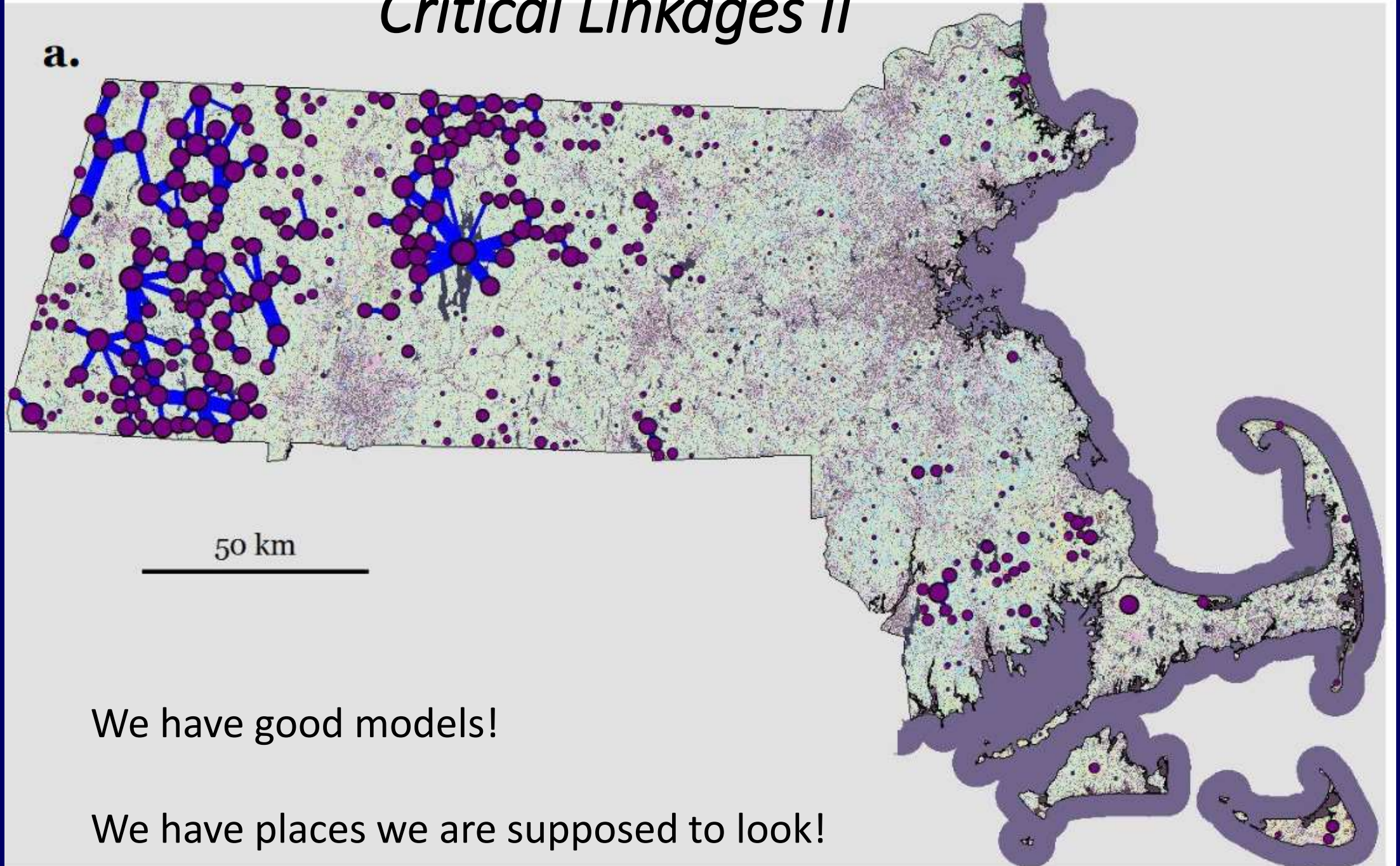
Resilient and connected lands



Regional flow (based on Circuitscape)

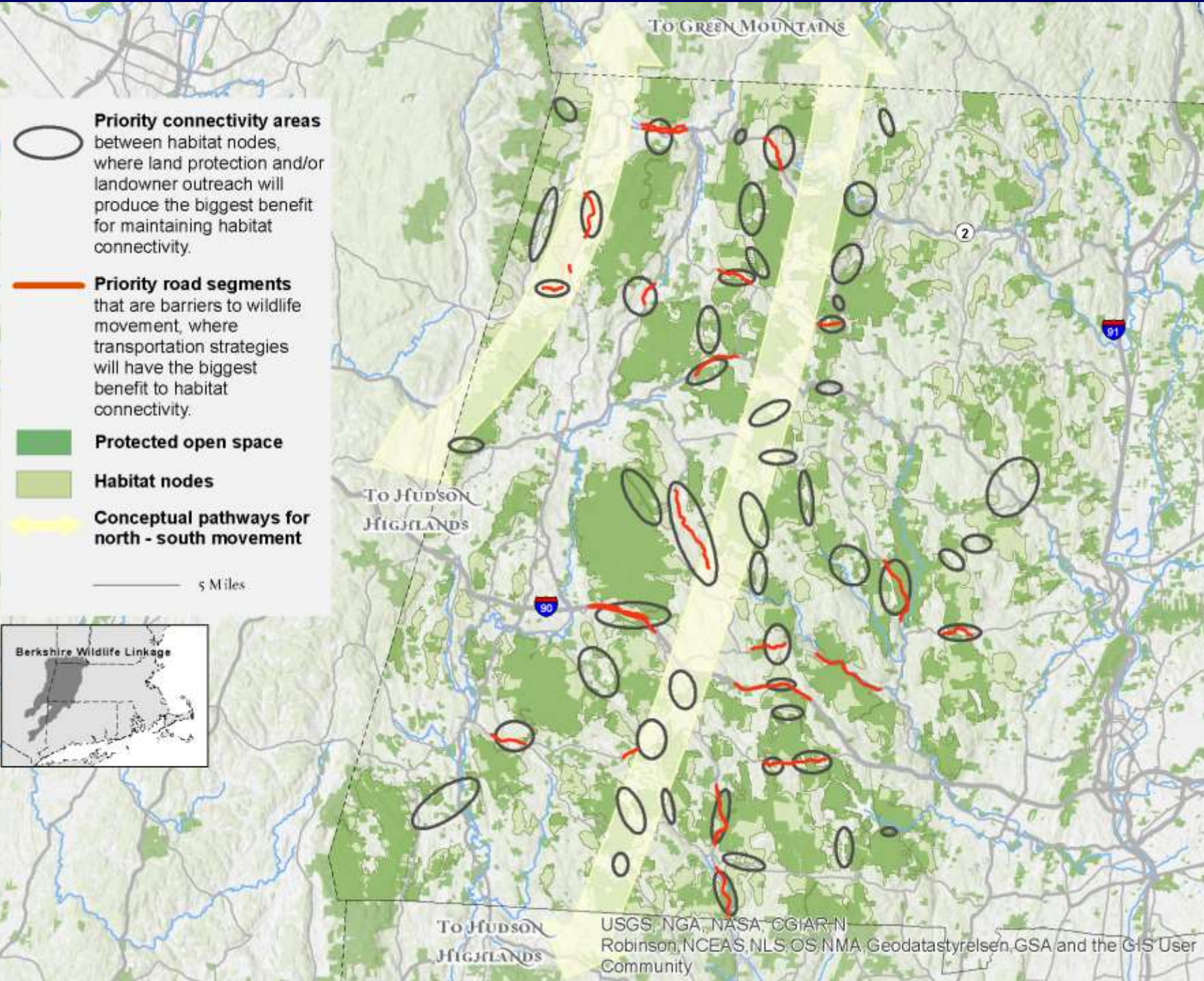


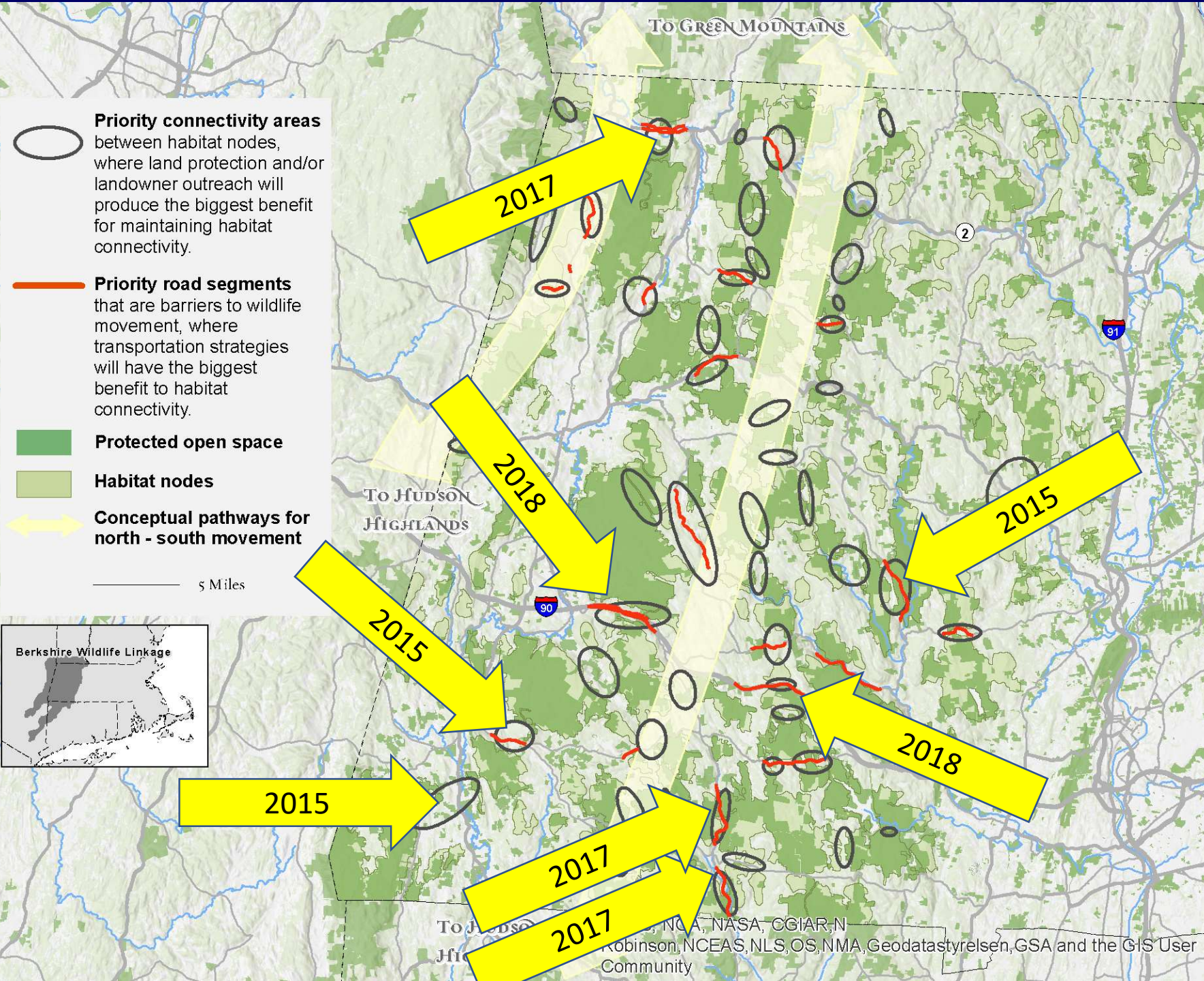
Critical Linkages II






Models are Only the 1st Step!

- Cannot tell how wildlife are actually interacting with road segments
- Where are there bridges or culverts or even underpasses on road segments?
- Where are animals trying to cross the road?
- Where are they successfully getting across?
- How do we investigate these areas further?
- Get out there!

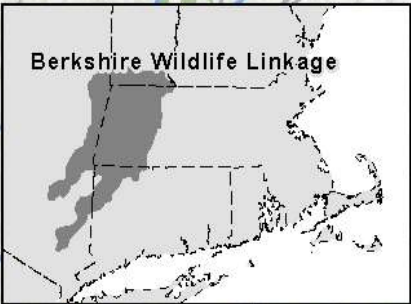




that are barriers to wildlife movement, where transportation strategies will have the biggest benefit to habitat connectivity.

-  Protected open space
 -  Habitat nodes
 -  Conceptual pathways for north - south movement
- 5 Miles

Berkshire Wildlife Linkage



Are roads
barriers to
wildlife?

```
graph TD; A("Are roads barriers to wildlife?") --- B("Roadkill"); A --- C("Crossings"); A --- D("Behavior");
```

Roadkill

Crossings

Behavior

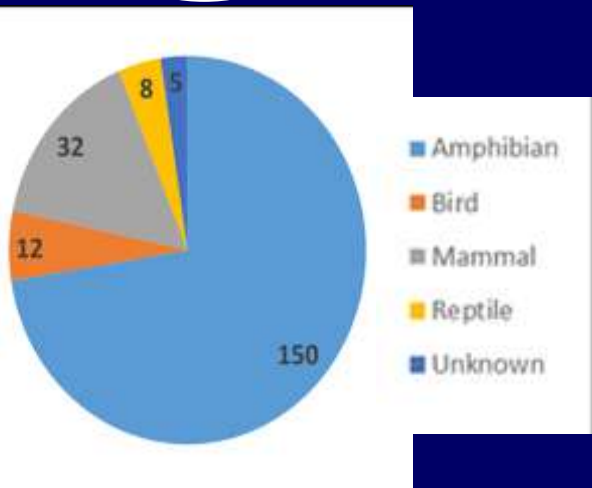
Are roads barriers to wildlife?

Roadkill

Crossings

Behavior

Species	Total number	Number along road transects	Number along perp transects	Road crossings	Road avoidance	Movt. parallel to road	Movt. perpendicular to road	In road	Other
Bear	5	5	0	3	0	2	0	0	0
Bobcat	3	3	0	3	0	0	0	0	0
Canid	6	5	1	1	0	3	0	0	2
Coyote	51	40	11	20	3	2	13	3	10
Deer	53	28	25	17	1	5	8	0	22
Fisher	23	19	4	14	0	2	0	2	5
Gray fox	3	3	0	2	0	1	0	0	0
Mink	22	17	5	4	0	8	2	0	8
Moose	3	2	1	0	0	1	2	0	0
Mustelidae	1	1	0	0	0	0	0	1	0
Otter	5	5	0	2	0	1	0	0	2
Raccoon	3	3	0	0	0	3	0	0	0
Red fox	39	34	5	19	0	5	5	1	9
Skunk	1	1	0	0	0	0	0	0	1
Turkey	1	0	1	0	0	0	1	0	0
Unid	26	19	7	5	0	4	2	2	13
Weasel	52	34	18	9	1	10	10	1	21
Total	297	219	78	99	5	47	43	10	93



Route 8, 2017



Map Author
Andy Wood
Field Naturalist Graduate Program
December 2017

- | TAXGROUP | |
|---------------------|---------|
| Amphibian | Mammal |
| Bird | Reptile |
| State Route 8 North | Unknown |
| State Route 8 South | |

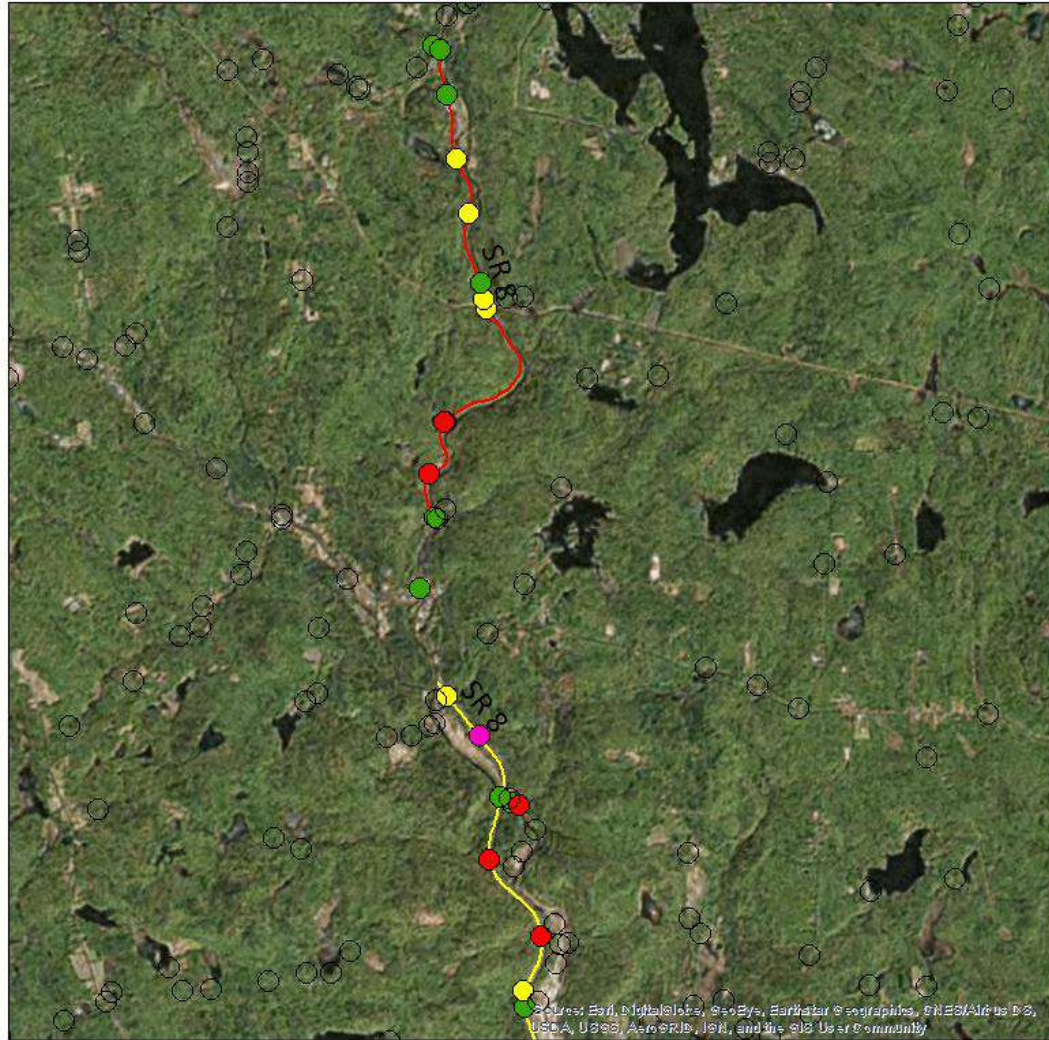
0

0.5

1 Miles



NAACC Road-Stream Crossings: Route 8 Priority Segments



Aquatic Organism Passage Ranking

- Unassessed
- Full AOP
- No AOP
- Reduced AOP
- No score - Missing Data

Priority Road Segments

- Tier 1
- Tier 2



Overhead
clearance

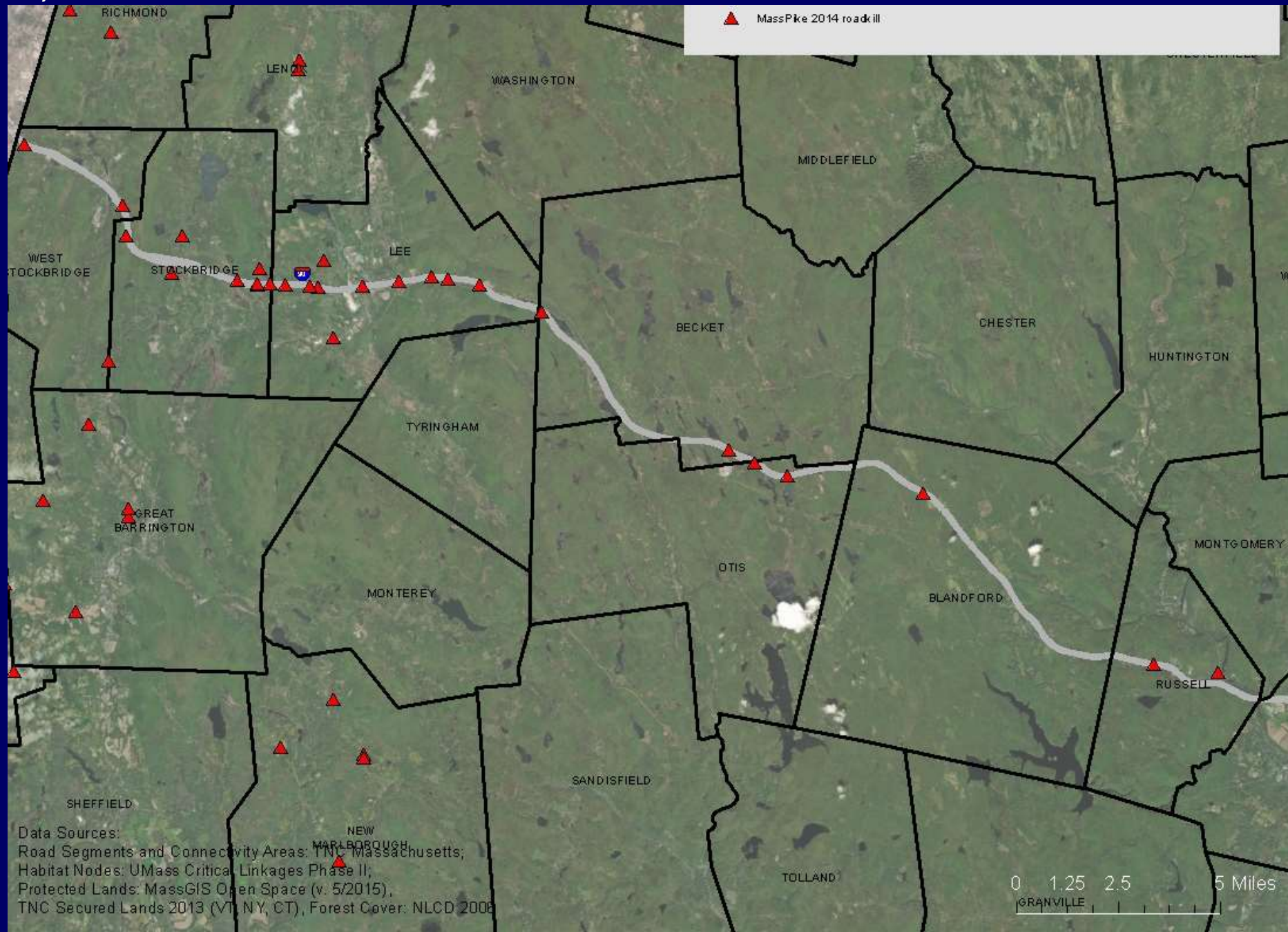


~3m width of
dry passage

Veg.
cover
near inlet
and outlet

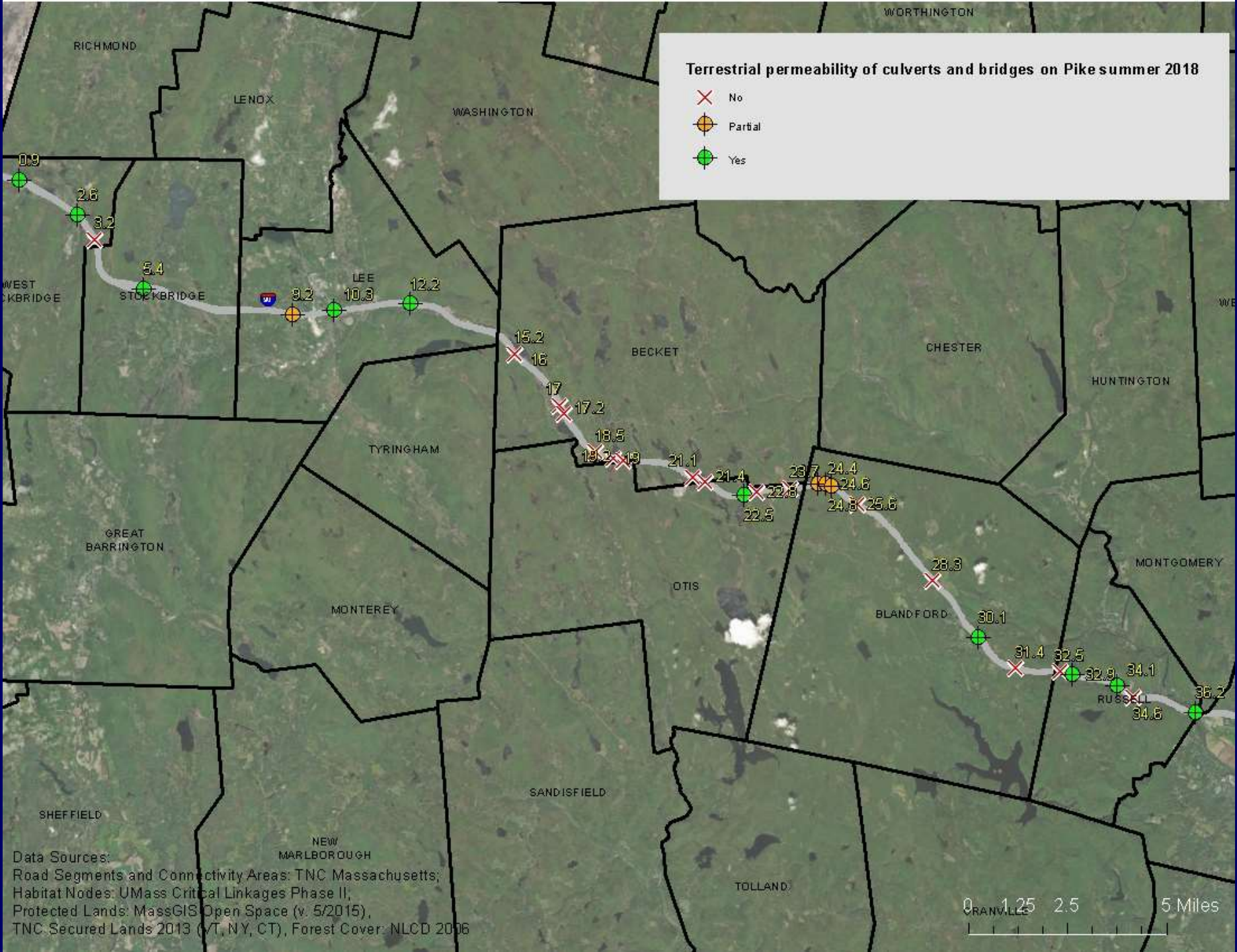
Rock and
soil
substrate

I-90, 2018



Terrestrial permeability of culverts and bridges on Pike summer 2018

- ✕ No
- ⊕ Partial
- Yes

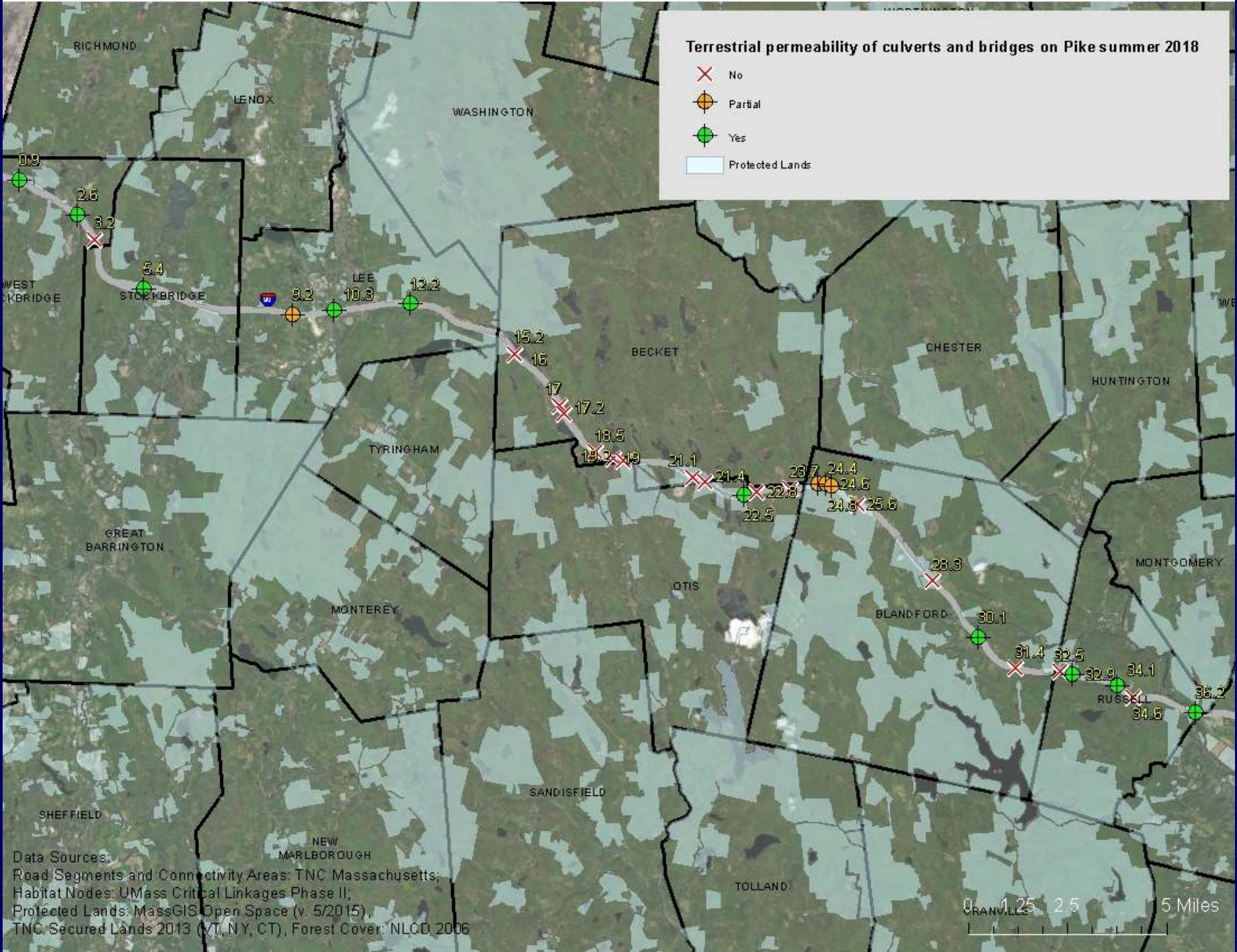


Data Sources:
Road Segments and Connectivity Areas: TNC Massachusetts;
Habitat Nodes: UMass Critical Linkages Phase II;
Protected Lands: MassGIS Open Space (v. 5/2015),
TNC Secured Lands 2013 (VT, NY, CT), Forest Cover: NLCD 2006



Terrestrial permeability of culverts and bridges on Pike summer 2018

- ✕ No
- ⊙ Partial
- ⊙ Yes
- Protected Lands



Data Sources:
 Road Segments and Connectivity Areas: TNC Massachusetts;
 Habitat Nodes: UMass Critical Linkages Phase II;
 Protected Lands: MassGIS Open Space (v. 5/2015),
 TNC Secured Lands 2013 (VT, NY, CT), Forest Cover: NLCD 2006

0 1.25 2.5 5 Miles



**So you
want to
profile a
road
segment**

Collecting Data

- For each survey, fill out a Roadkill Data Sheet (Fig. 67). Take special care to complete the box at the top of the data sheet. Capturing your Name, Email, the Date, Road Name, and Start/End times of your survey is important information.
- If you do not encounter roadkill during a survey, check the box in the top right-hand corner of the datasheet next to I did not observe any roadkill.
- Log the Time you encounter each roadkill. Note the hour, minute, and A.M. or P.M.
- Collect a GPS point and write the coordinates in the Latitude and Longitude fields.
- In most cases*, log each roadkill as a separate observation. First, circle the appropriate taxonomic Group (*Mammal, Bird, Reptile, or Amphibian*). Next, identify it to Species, if possible. If you are 100% sure of your identification, circle *High* in the ID Confidence field. If you are not 100% certain of the species, circle *Low* in the ID Confidence field. It is always better to be cautious about your identification than to be wrong.
- If it is the only carcass in the immediate area, write *1* in the # of Animals field. Note the Sex of the animal by circling the appropriate choice (*M/F*), or circle *Unknown* if you cannot tell. The form will ask: Did it have a radio collar or tag? Circle *Y* or *N* based on your observations.
- Describe your immediate surroundings in the Location Description box. Record nearby landmarks, such as bridges, intersections, driveways, or house numbers. Note anything else you think is relevant for describing the surrounding area.
- Take a photograph of each carcass to help project coordinators verify hard-to-ID roadkill. For each carcass you photograph, circle *Y* to note that you took a photograph, and note the file name from your camera settings next to Photo #. If you were not able to photograph the carcass, circle *N*.



Figure 64. Keep detailed notes from your surveys.

**If you encounter two of the same species very close to each other, you may record them in one observation box, and increase the # of Animals to match the number of carcasses at that location. Since most GPS devices are only accurate to within a few meters, this will save you the trouble of entering numerous GPS coordinates for a cluster of same-species roadkill.*

Entering Your Data

- Once you have completed your survey, carefully check your notes to make sure you completed all fields on the data sheet.
- Visit the online Massachusetts Department of Transportation's Linking Landscapes Wildlife Roadkill Database to upload your observations: <http://www.linkinglandscapes.info/wildlife-roadkill-database.html>
- Enter your data into the appropriate fields. Since there is currently no place to enter information about the animal's Sex or whether it had a collar or tag, enter that information into the Comments section.
- Keep your survey data sheets in a safe place in case project coordinators contact you with questions about your data.



Figure 66. Entering your data into the Linking Landscapes online database will ensure that your data goes directly to transportation planners.

For Project Coordinators

These training materials are designed to help field staff conduct safe, efficient roadkill surveys. However, prior to sending staff into the field, project coordinators should spend time developing research questions and regional priorities. Your organization's needs may differ, and feel free to adapt these resources to your situation.

Walking vs. driving roadkill surveys

Organizations interested in conducting roadkill surveys will need to decide whether to walk or drive. An athletically fit person can walk a mile in 30 minutes on flat terrain. To increase roadkill detection, road walks should cover each lane of traffic. Under these circumstances, one mile of road will take an estimated minimum of 1 hour, assuming no roadkill and a brisk pace. However, documenting each roadkill may take several minutes. If the frequency of roadkill is high, a mile of survey work could take 1-2 hours. This time estimate does not include travel to and from the survey site. Our team found that walking roadkill surveys along ~8 miles of a rural highway regularly took 1-2 days per week, even with a group of interns available for work.

On walking surveys, observers are more likely to encounter a wide range of species sizes. Driving surveys are much faster than walking surveys, although this sampling favors detection of large animals: the



TERRESTRIAL CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY

ENTRY DATE

DATA ENTRY REVIEWED BY

REVIEW DATE

CROSSING DATA

Crossing Code _____ Local ID (Optional) _____

Date Observed (mm/dd/yyyy) _____ Lead Observer _____

Town/County _____ Stream _____

Road _____ Type MULTILANE PAVED UNPAVED DRIVEWAY TRAIL RAILROAD

GPS Coordinates (Decimal degrees) _____ "N Latitude - _____ "W Longitude

Location Description

Crossing Type BRIDGE CULVERT MULTIPLE CULVERT FORD NO CROSSING REMOVED CROSSING Adequate Terrestrial Passage
 BURIED STREAM INACCESSIBLE PARTIALLY INACCESSIBLE

Photo IDs INLET CONTEXT _____ INLET APPROACH _____ OUTLET CONTEXT _____ OUTLET APPROACH _____ OTHER _____

Flow Condition NO FLOW TYPICAL-LOW MODERATE HIGH Tidal Site YES NO UNKNOWN

Road Fill Height (Top of culvert to road surface; bridge = 0) _____ Human Use of Crossing FREQUENT INFREQUENT NONE UNKNOWN

Scour Pool Barrier NONE PARTIAL COMPLETE Livestock Using Crossing YES NO UNKNOWN

Right of Way Fencing (Inlet Side) NONE CHAIN LINK WIRE MESH BARBED WIRE POST AND CABLE OTHER (DESCRIBE BELOW)

Right of Way Fencing (Outlet Side) NONE CHAIN LINK WIRE MESH BARBED WIRE POST AND CABLE OTHER (DESCRIBE BELOW)

Guide Fencing NONE INLET SIDE ONLY OUTLET SIDE ONLY BOTH SIDES Crossing Comments _____

Conditions that may Inhibit Wildlife from Crossing Over the Road
 STEEP EMBANKMENT ROADWAY FENCING RETAINING WALLS NOISE BARRIERS
 JERSEY BARRIERS VERTICAL FACES OF ROAD CUTS
 HIGH TRAFFIC VOLUME (DESCRIBE RIGHT) OTHER (DESCRIBE RIGHT)

m.jotform.com/80573848746976

Terrestrial Passage Assessment

BASE ENTRY BY

ENTRY DATE

Last Name

mm-dd-yyyy

Last Name

Date

ENTRY REVIEWED BY

REVIEW DATE

Last Name

mm-dd-yyyy

Last Name

Date

ng code

Local ID

Date Observed

(Optional)

mm-dd-yyyy

Date

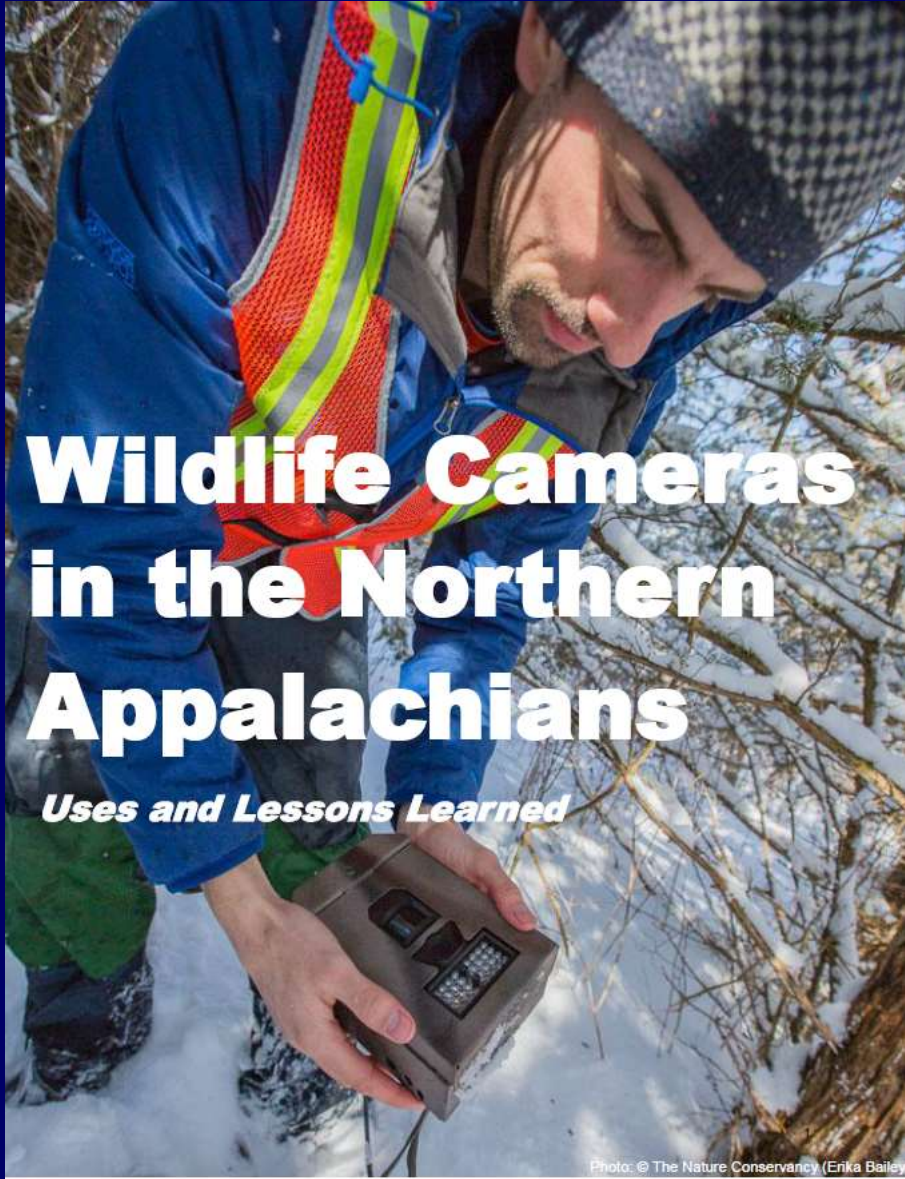
Lead Observer

Town/County

First Name

Last Name

Stream

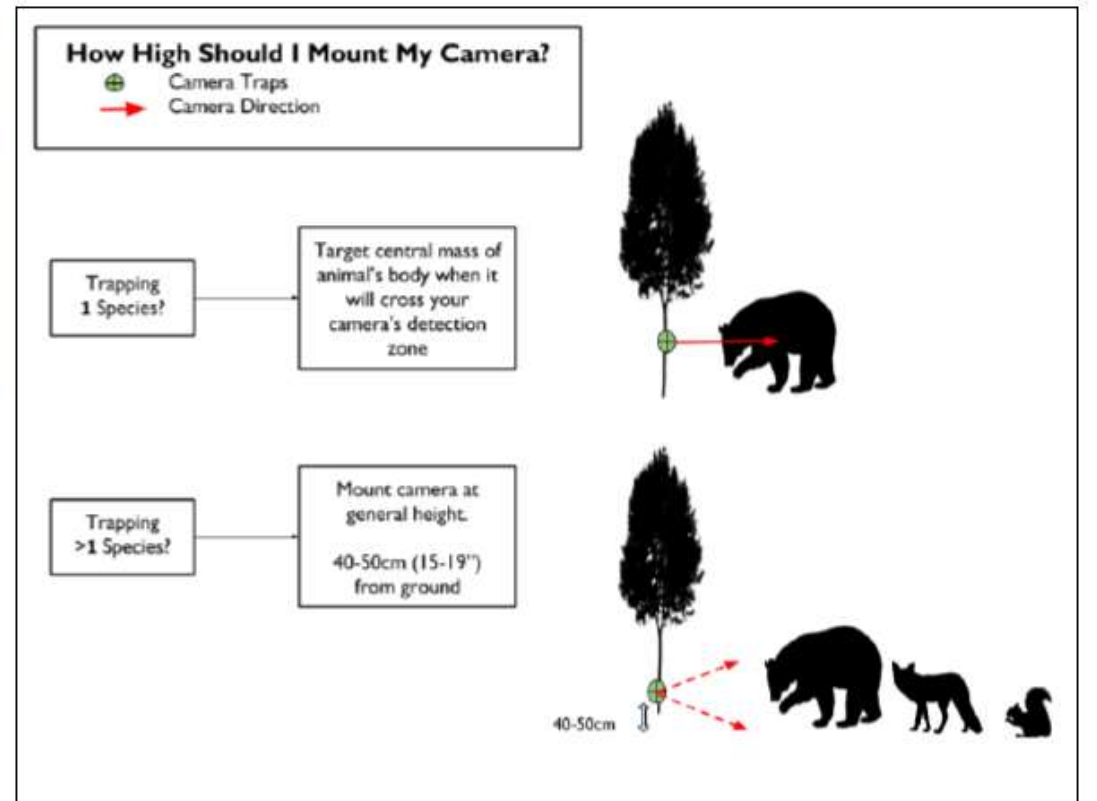


Wildlife Cameras in the Northern Appalachians

Uses and Lessons Learned

Photo: © The Nature Conservancy (Erika Bailey)

Figure 28. Tips for mounting cameras at an appropriate height.



Lessons learned



Partners are essential!!

Mass DOT
MassWildlife

Student and
volunteer field
help from
various sources

Some things can only
come from being on the
ground...



Behavior data are key, because sometimes nature finds a way...

















Future Research & Collaborations

- Continued Refinement and Management of available road mortality data
- Need to understand the biases and limitations



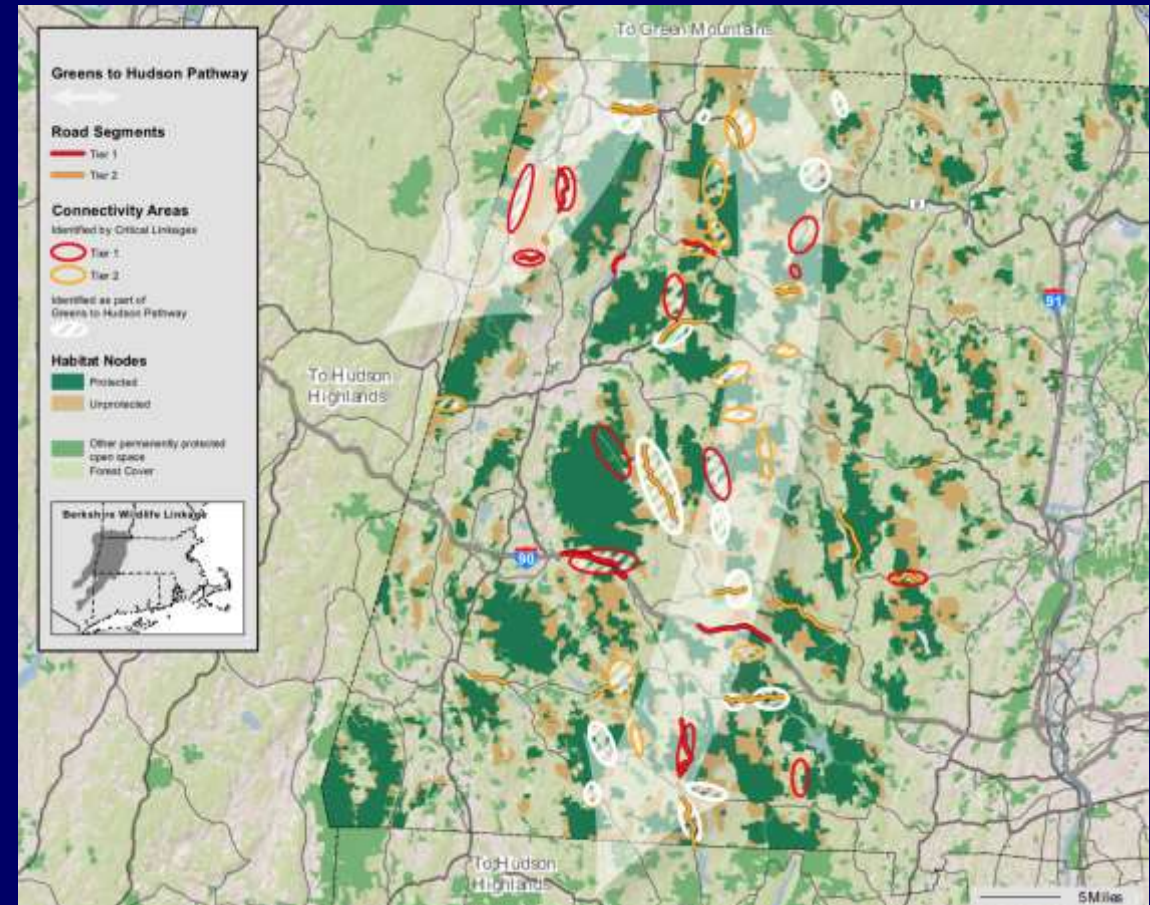
Future Research & Collaborations

- An obvious need and interest is to create a more comprehensive data collection process that reduces bias.
- MassDOT is currently working to deploy a wildlife collision collector application for smartphones/tablets, to reduce bias, simplify the reporting process, and improve reporting by District Maintenance personnel.



Future Research & Collaborations

- Can't do it alone! The power of partnerships!
- Incorporate findings into Transportation and Conservation Planning
 - Ex. MAPIT (MassDOT)
 - Road Mortality “Hotspots”
 - “Roadway Profiles”
 - Land Protection
 - Community Engagement



“The Berkshire Wildlife Linkage: A Corridor for Wildlife and People”

Future Research & Collaborations

- Roadway Improvements and Landscape Connectivity



We are happy to answer questions, share protocols, and help in other ways.

Contact:

Laura Marx

lm Marx@tnc.org

Dave Paulson

david.paulson@state.ma.us

