SPATIOTEMPORAL ASSESSMENT OF WILDLIFE-VEHICULAR COLLISIONS IN NEW HAMPSHIRE

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Animal-Vehicle Collision Avoidance Topical Discussion

PRESENTATION OVERVIEW

- Goals and methods for the project
- Data limitations and any lessons learned
- How to identify a ‘hotspot’
- Online WVC mapper demo

New Hampshire DOT
Department of Transportation

Plymouth State University

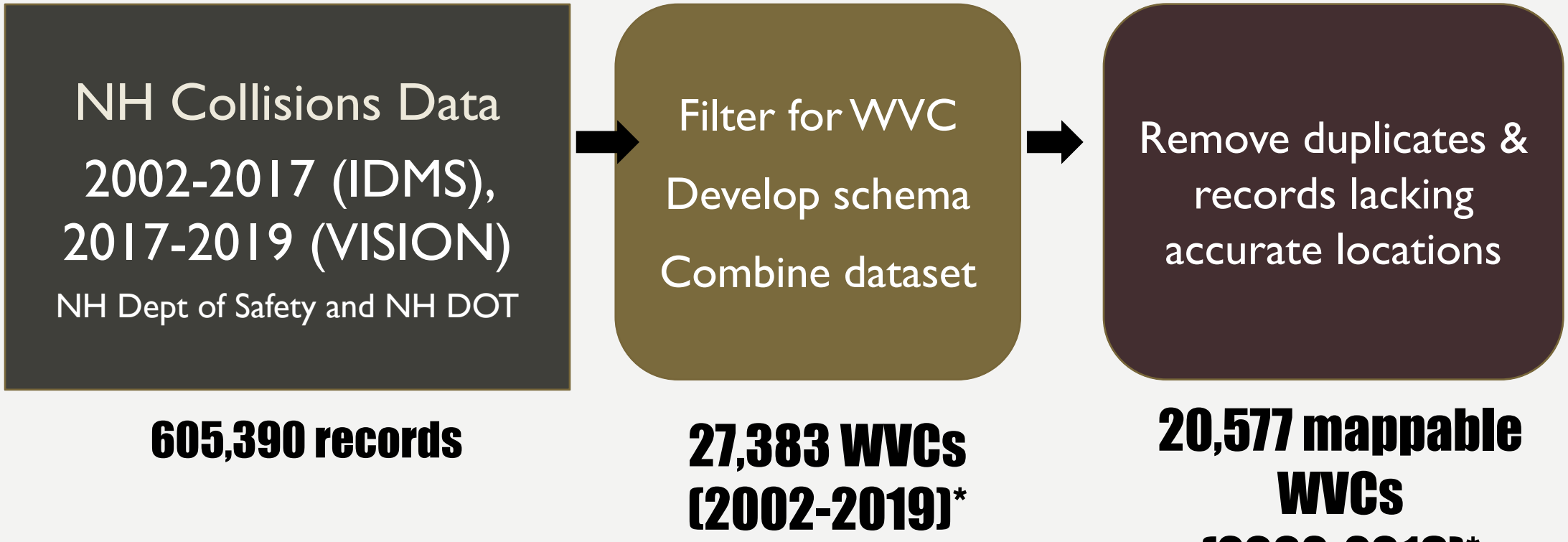
PROJECT GOALS

- Summarize & visualize WVCs over space and time 2002-19
- Assess the effect of road, adjacent land, and wildlife habitat characteristics on probability of WVC occurrence
- Synthesize & evaluate BMPs for mitigation
- Develop decision-support tools (online mapper and StoryMap) for NH DOT, regional planning commissions, and municipalities
- Identify priority roadways maintained by NH DOT for mitigation

New Hampshire DOT
Department of Transportation

Plymouth State University

Analytical Approach



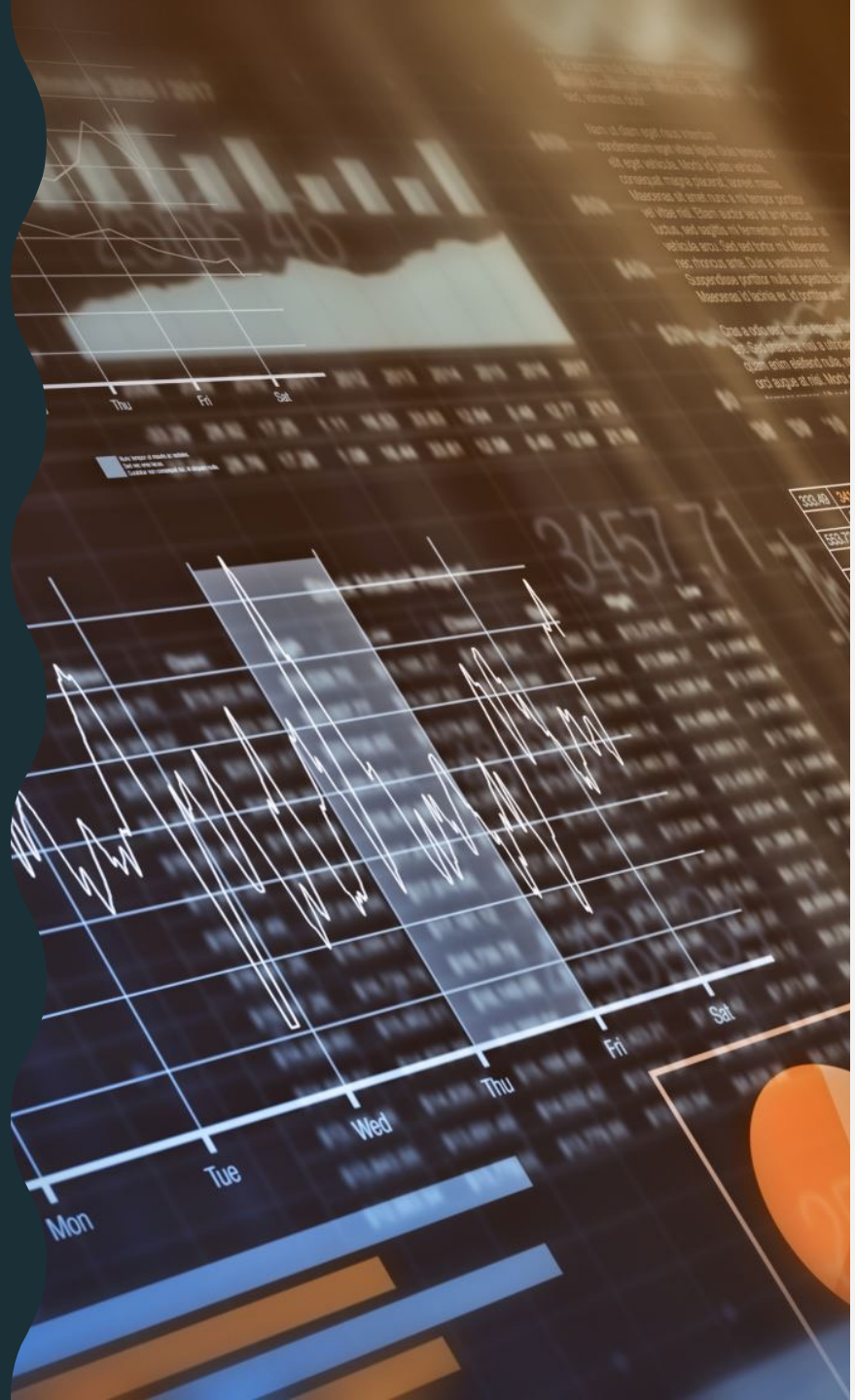
605,390 records

27,383 WVCs (2002-2019)*

20,577 mappable WVCs (2002-2019)*

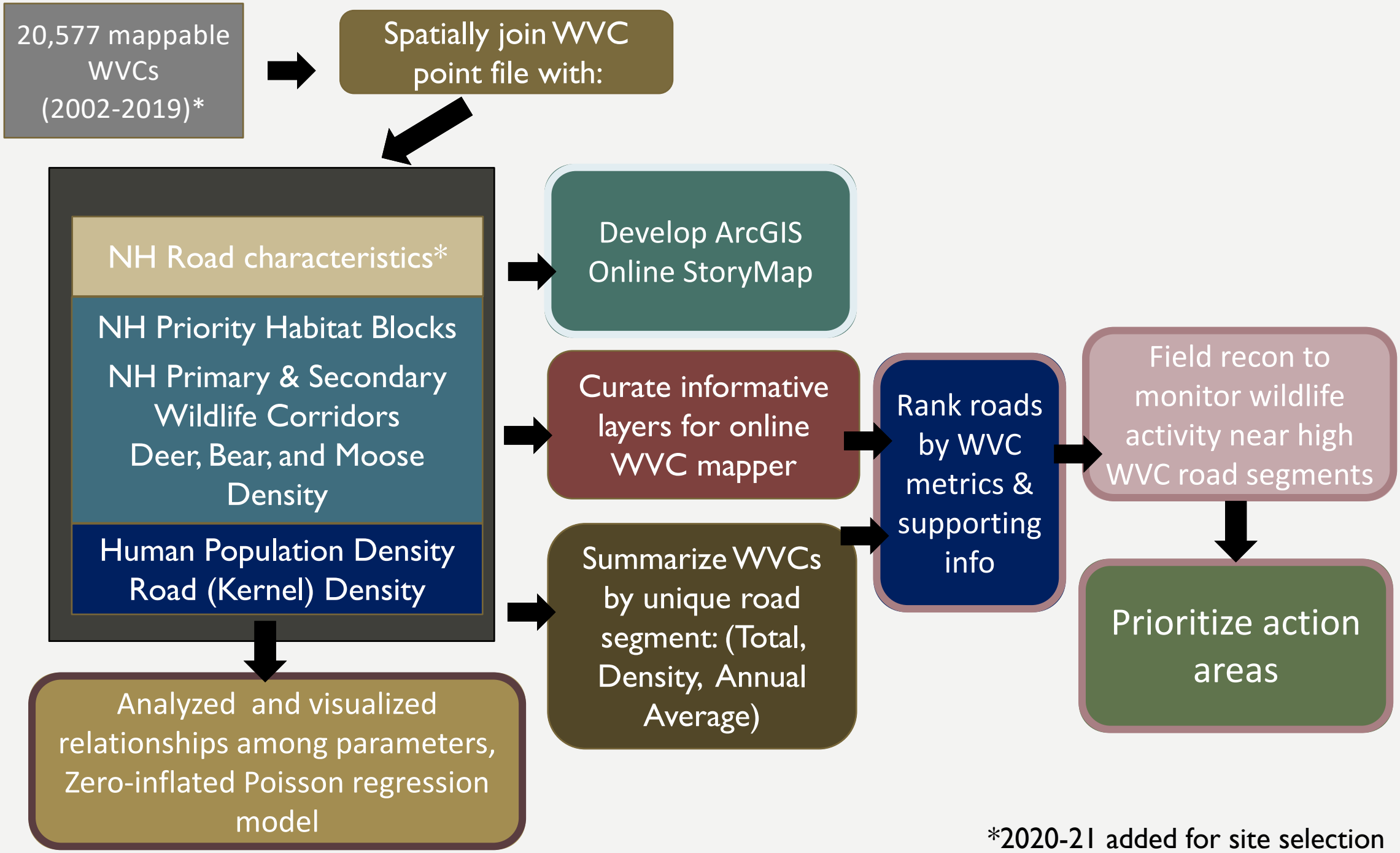
Species only noted for a subset of records in 2017

*2020 & 2021 data added near the end of the project and processed separately.



DATA LIMITATIONS

- Limited information in the collision record regarding road characteristics
- Species matter! No species recorded, except in 2017 for some of the records
- Substantial lack of specific geographic coordinates that could be linked to road network resulted in removing nearly 25% of the collision records from analysis
- No consistent, reliable source of roadkill data to reflect unreported collisions or the severity of collision for wildlife

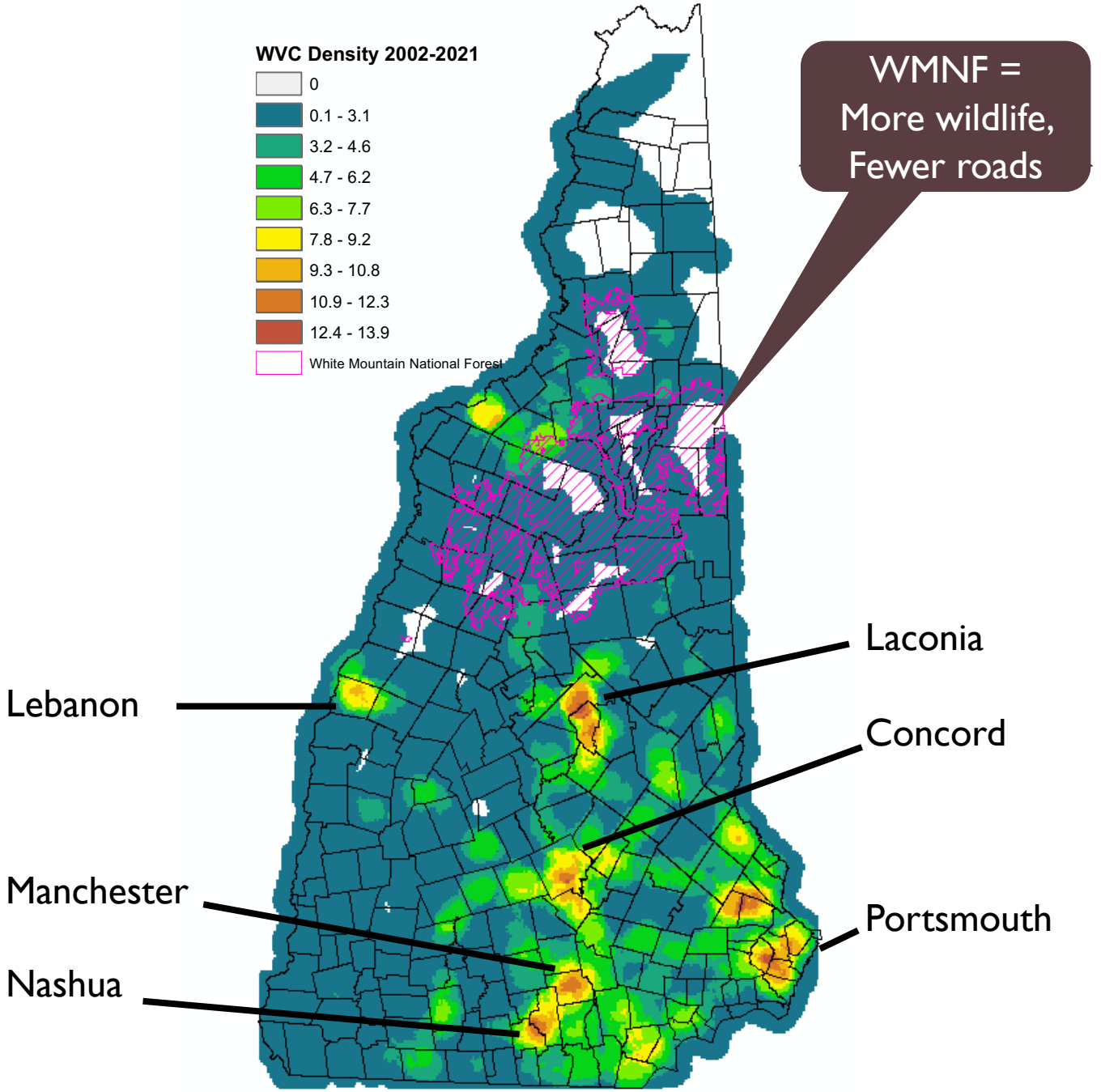


*2020-21 added for site selection

WVCS 2002-2021

HOTSPOTS.

COLDSPOTS.



ROAD-LEVEL "HOTSPOT" CHALLENGES

What spatial unit provides the best resolution for action?

What is the temporal window for assessment?

SPATIAL AND TEMPORAL SUMMARIES

UNIQUE ROAD SEGMENT* METRICS

Total WVCs

Density (WVCs per mile)

Annual Average WVCs

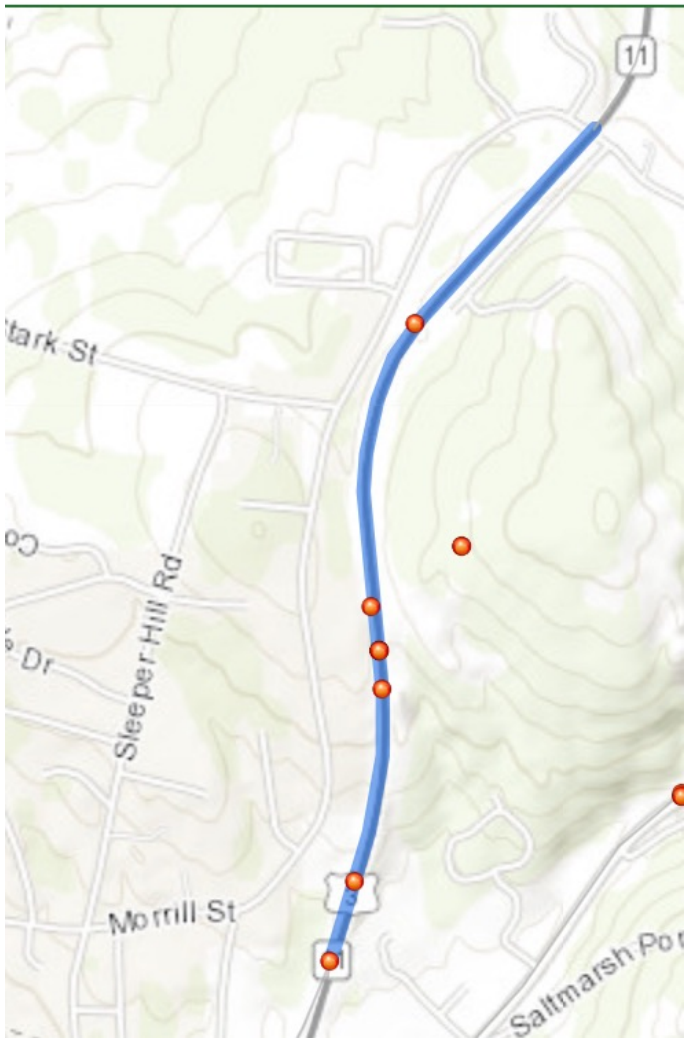
FOUR TIME PERIODS

2020-2021

2015-2019

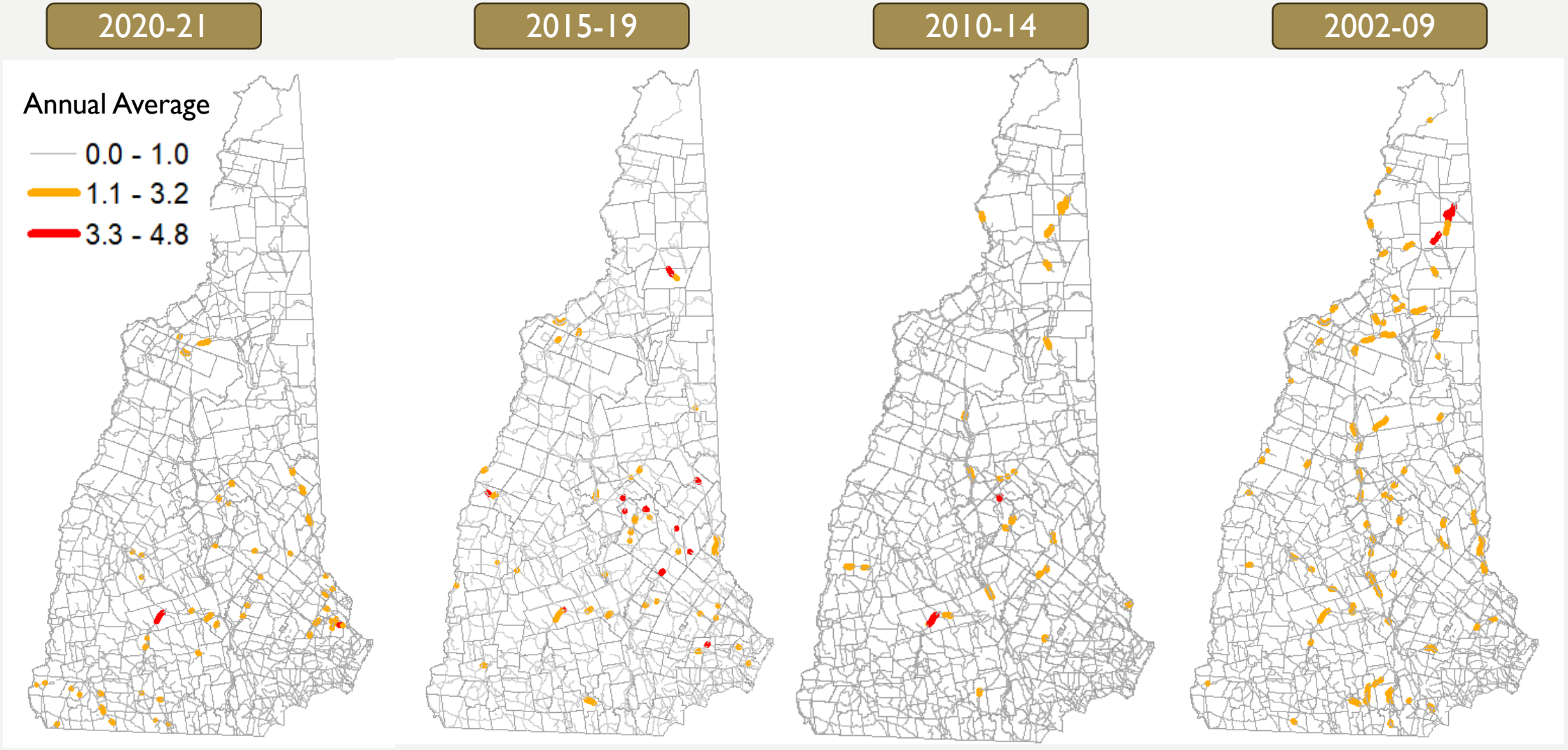
2010-2014

2002-2009



Unique road segments are NOT equal in length

ROAD-LEVEL SUMMARIES OVER TIME



ROAD-LEVEL "HOTSPOT" CHALLENGES

Given no national threshold or guidance…

What constitutes a problem?

Which metric(s) best reflect(s) this problem?

What is the threshold for action?

INFORMATIONAL TRADE-OFFS METRICS

Total WVCs per period | **Annual average per period** | **Density per period**

Depends on defined time period (which can feel arbitrary)

Influenced by length of road segment

Total WVCs: longer roads may look like problems even when WVC distribution is widely dispersed; shorter roads will likely have lower values

Density: shorter roads may have high density values, despite low WVC frequency

Annual Average (over 5 years): roads with one year of high frequency may look the same as five years with consistent but low frequency.

HOTSPOT IDENTIFICATION CRITERIA

GOAL: Identify 30-40 unique road segments that are potential sites for WVC reduction

2015-29 annual average WVCs	2015-19 average WVC density	2020-21 annual average WVCs	2020-21 average WVC density	# Unique Road Segments
Y	Y	Y	Y	0
Y	Y	Y	N	1
Y	Y	N	Y	1
Y	Y	N	N	3
Y	N	Y	Y	1
Y	N	N	N	22
N	Y	N	N	14
N	N	Y	N	22
N	N	N	Y	17

*high density values must also meet minimum WVC criteria: 2020-2021 ≥ 1 per year; 2015-19 ≥ 0.6 per year

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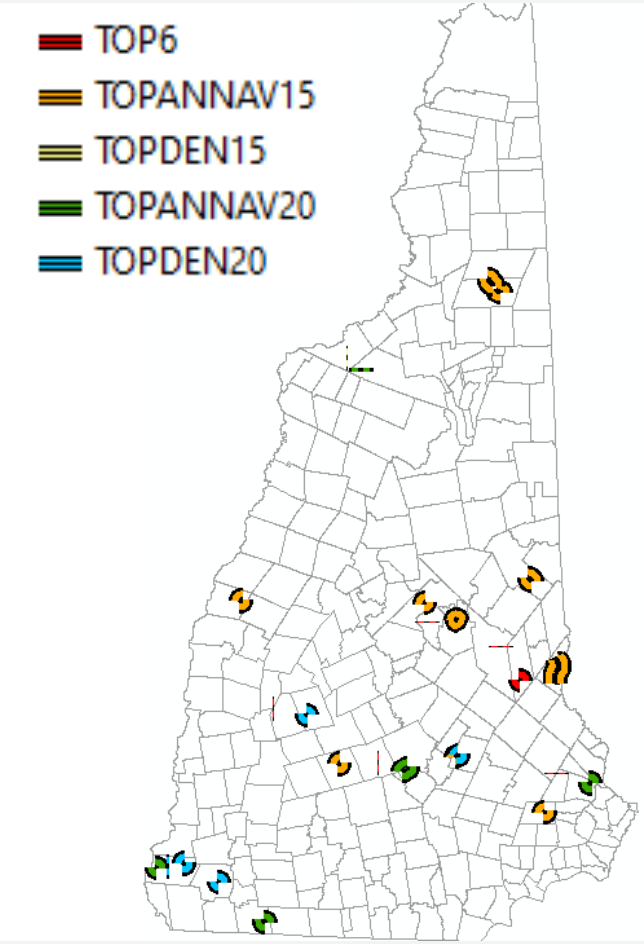


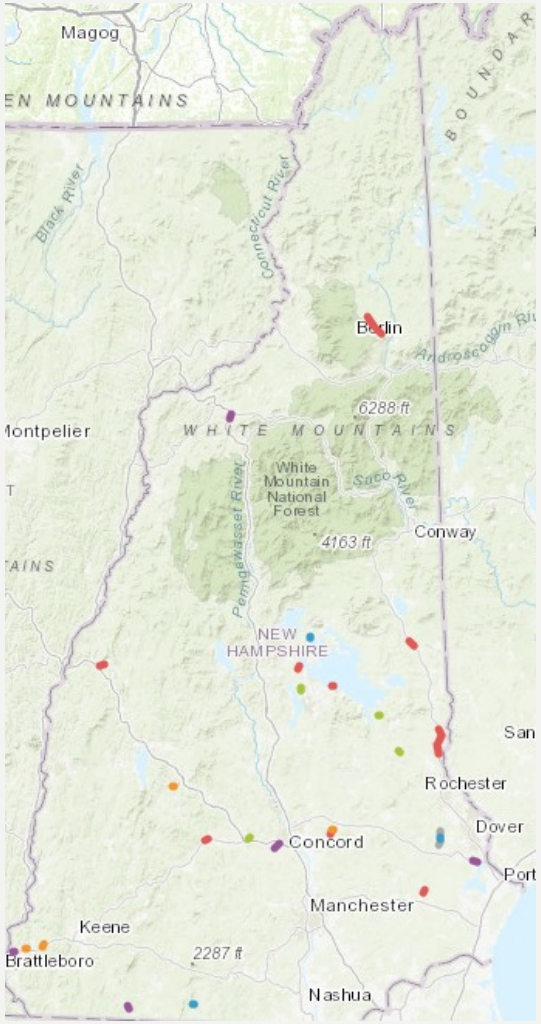
36 Road Segments

WVC Criteria (high to low importance)

- **6 roads that are priorities for both 2015-19 criteria or at least 1 of the 2015-19 criteria and a 2020-21 criteria** TOP6
- **10 highest roads not already included for 2015-19 avg WVCs (n=10)** TOP1ANNAV15
- **10 highest roads not already included for 2015-19 density (n=10)** TOPDEN15
- **5 from the 2020-21 avg WVCs (n=5)** TOPANNAV20
- **5 from the 2020-21 density, *with Ann Avg WVCs ≥2 (n=5)** TOPDEN20

HOTSPOT IDENTIFICATION CRITERIA

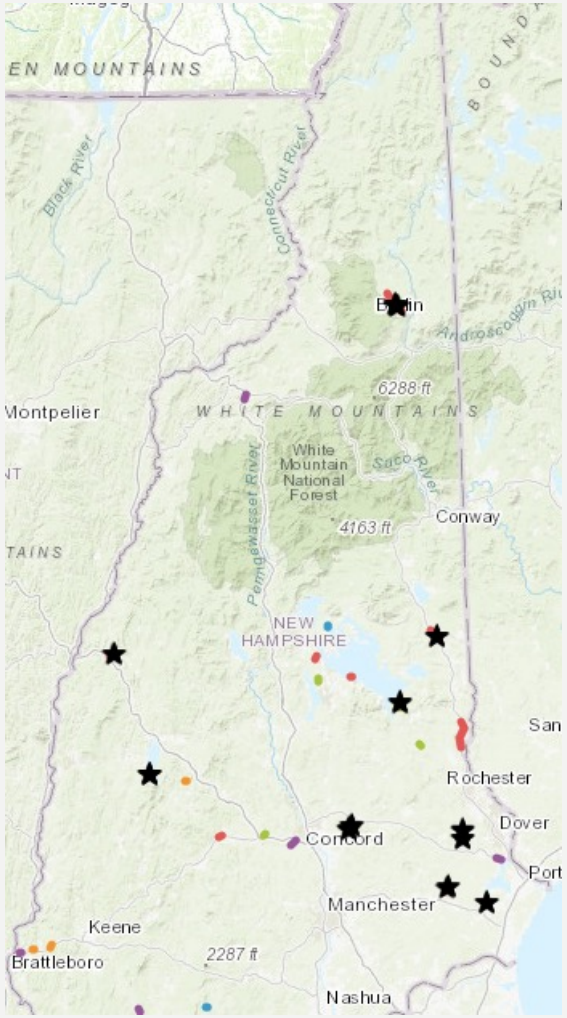
GOAL: Prioritize Hotspots based on Supporting Information



NON-WVC CRITERIA

Predicted wildlife corridors between wildlife habitat blocks > 50 acres

Proximity to existing crossing structures



HOTSPOT IDENTIFICATION CRITERIA

GOAL: Identify 10-15 PRIORITY unique road segments for attainable modification (i.e., those with existing under-road crossings – culverts & bridges)

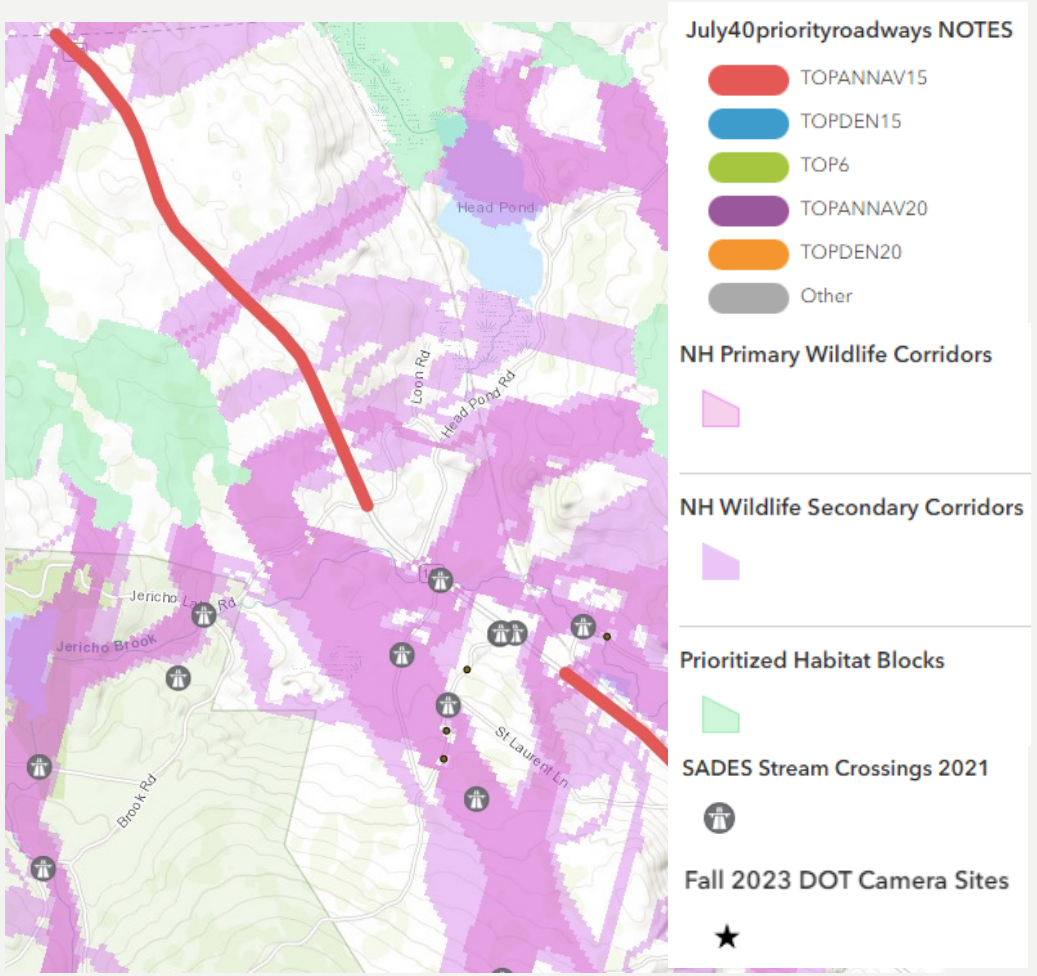
42 Road Segments*

Filtered for existing infrastructure for remediation

22 Road Segments with crossing

Individually assessed and ranked based on proximity to wildlife corridors or habitat blocks and with crossings under area of concern and good logistics for monitoring

12 Road Segments with crossing for activity monitoring



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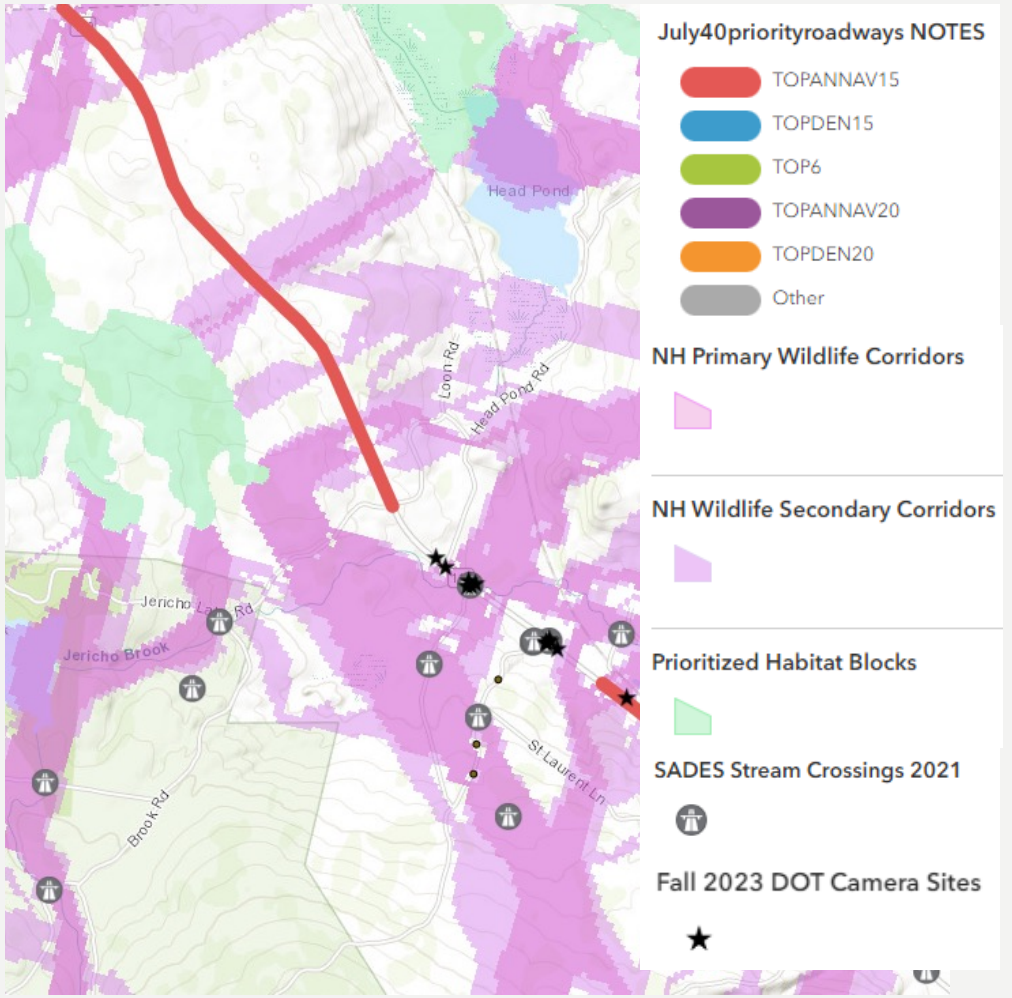
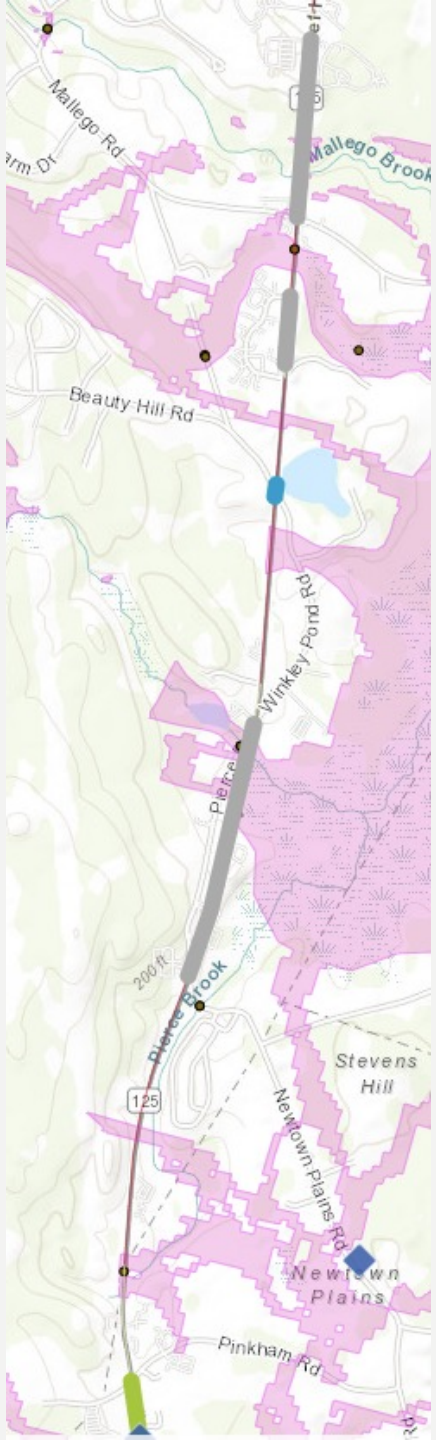
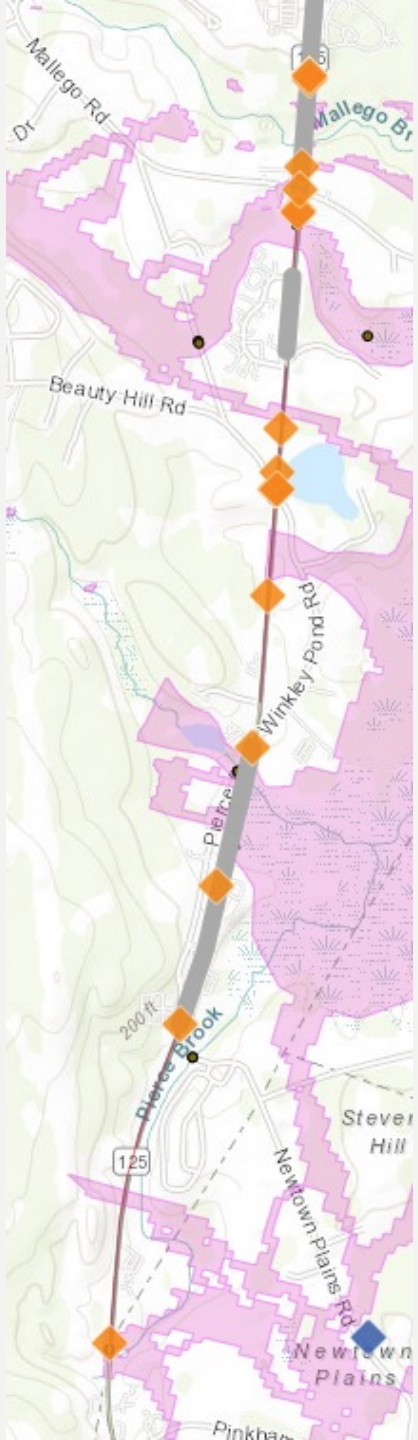
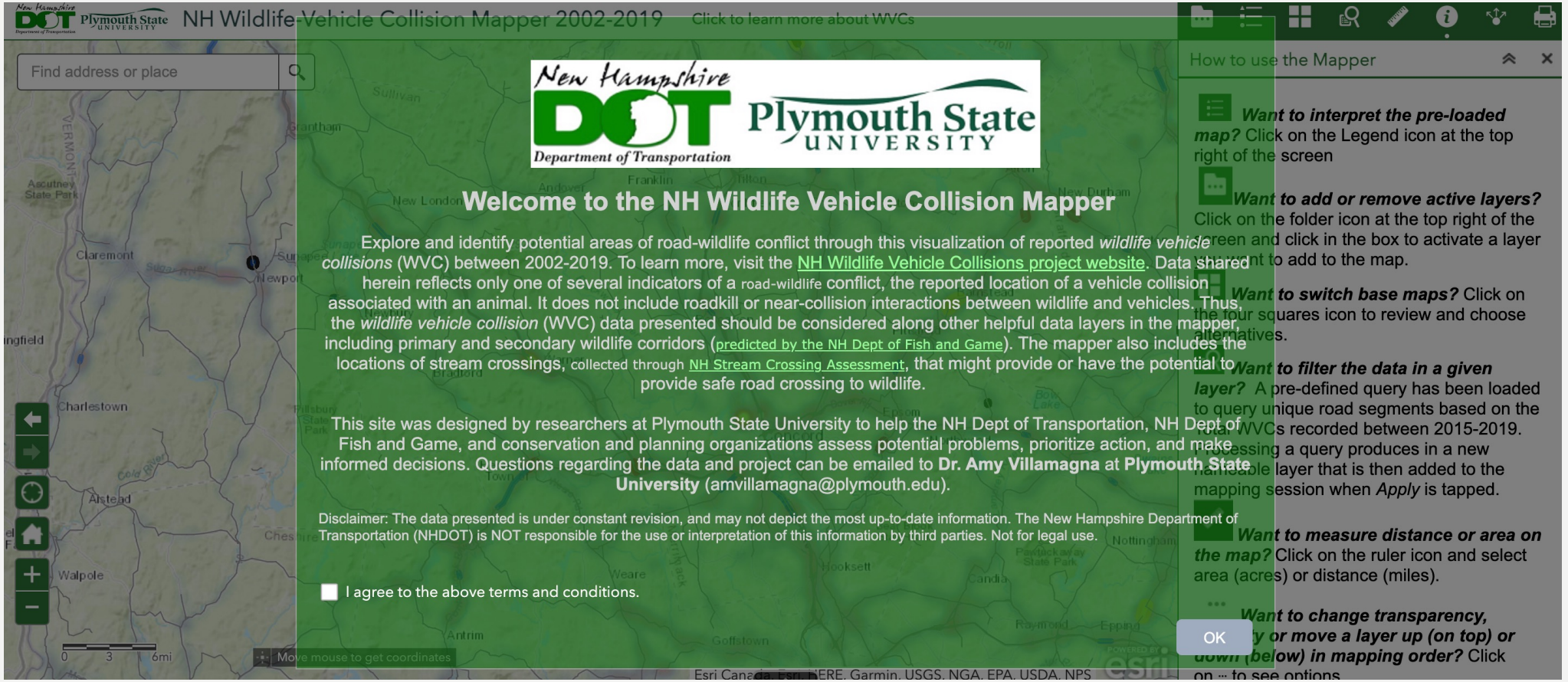


Scrutiny also reveals network opportunity





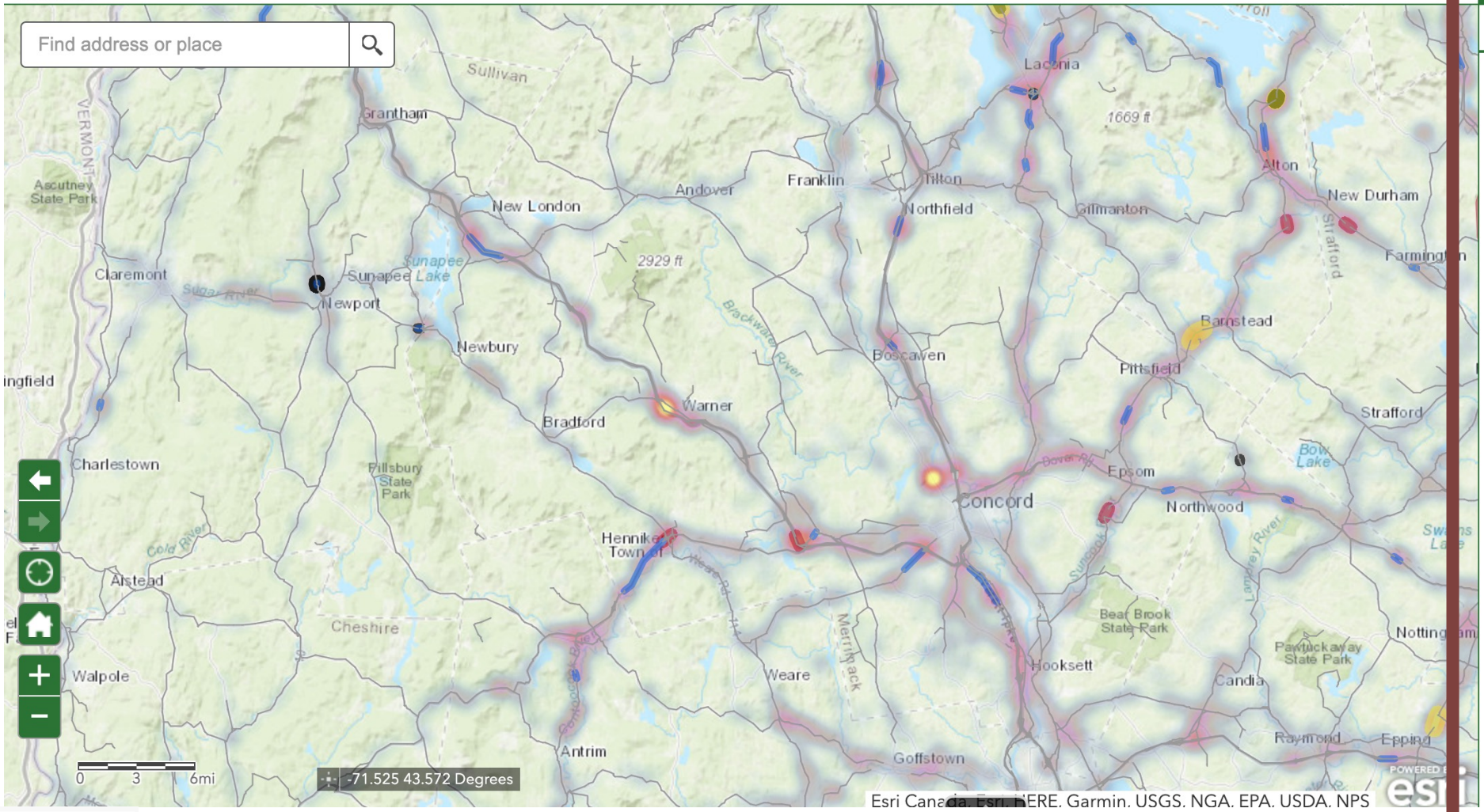
DECISION-MAKING SUPPORT



https://arcg.is/01TP8G0

NH Wildlife-Vehicle Collision Mapper 2002-2019

Click to learn more about WVCs



How to use the Mapper

Want to interpret the pre-loaded map? Click on the Legend icon at the top right of the screen

Want to add or remove active layers? Click on the folder icon at the top right of the screen and click in the box to activate a layer you want to add to the map.

Want to switch base maps? Click on the four squares icon to review and choose alternatives.

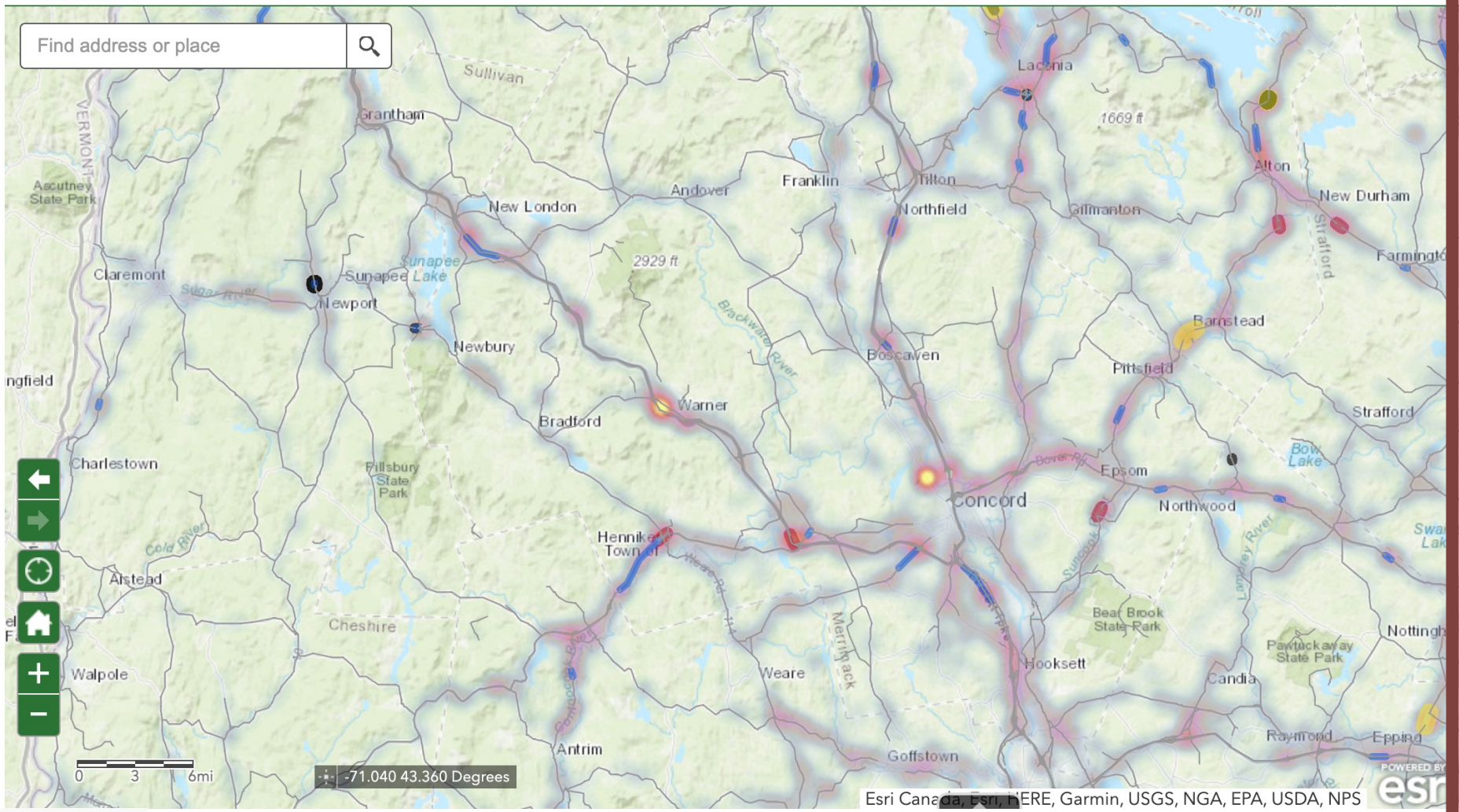
Want to filter the data in a given layer? A pre-defined query has been loaded to query unique road segments based on the Total WVCs recorded between 2015-2019. Processing a query produces in a new nameable layer that is then added to the mapping session when *Apply* is tapped.

Want to measure distance or area on the map? Click on the ruler icon and select area (acres) or distance (miles).

Want to change transparency, visibility or move a layer up (on top) or down (below) in mapping order? Click on ··· to see options

NH Wildlife-Vehicle Collision Mapper 2002-2019

Click to learn more about WVCs



Wildlife-Vehicle Collisions (WVCs)

WVC locations & road summaries (2015-)

Layers

- [x] Total WVCs per road (NHDOT) 2015-2019
- [x] WVC Density per mile road (NHDOT) 2015-2019
- [x] WVC locations 2015-2019

WVCs prior to 2015

Layers

- [ ] WVC Density per mile road (NHDOT) 2002-2019
- [ ] Total WVCs per road (NHDOT) 2002-2019
- [ ] WVC locations 2010-2014

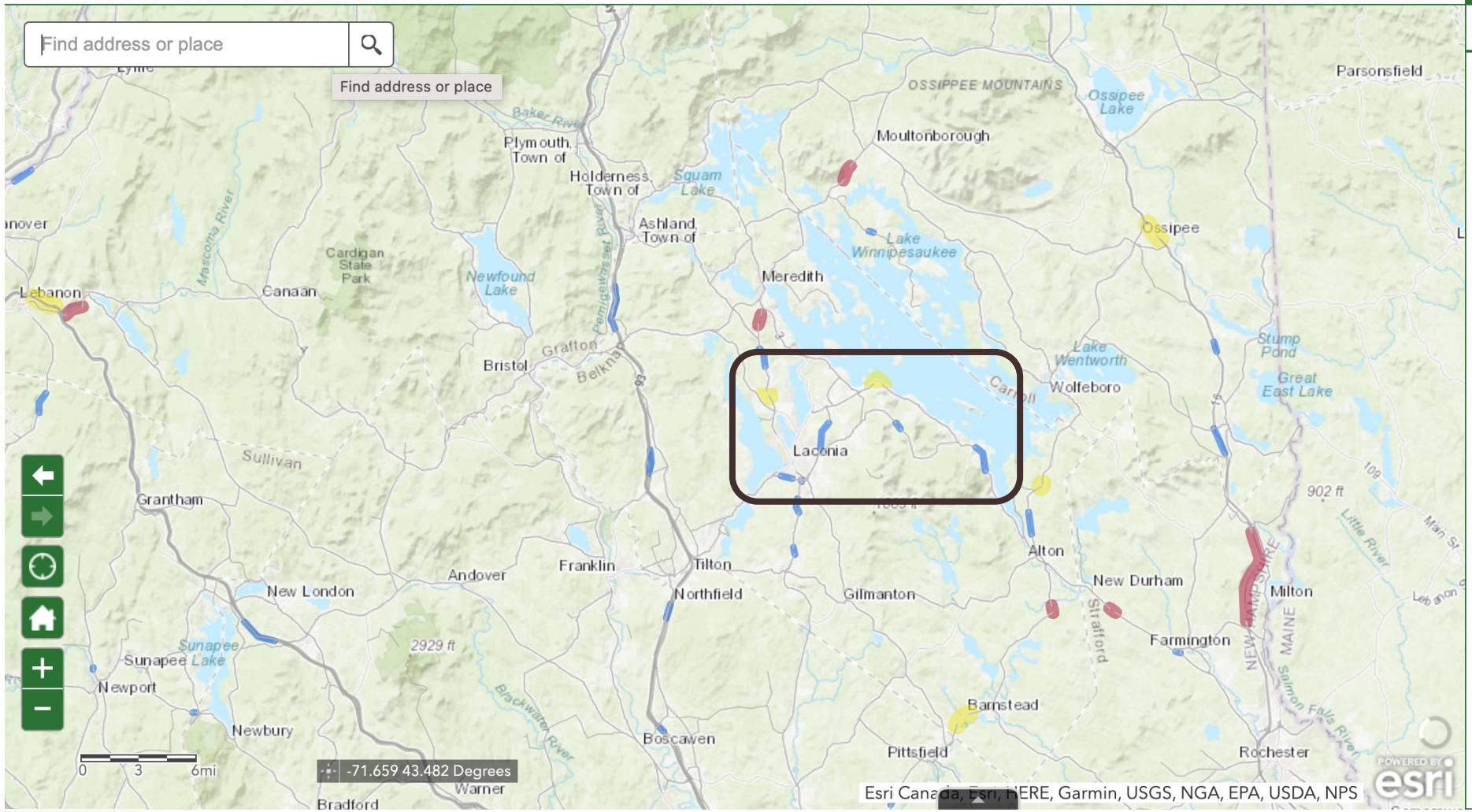
Wildlife & Human Influences

Layers

- [x] Prioritized Habitat Blocks
- [x] Primary Wildlife Corridors
- [x] Secondary Corridors

NH Wildlife-Vehicle Collision Mapper 2002-2019

Click to learn more about WVCs



Legend

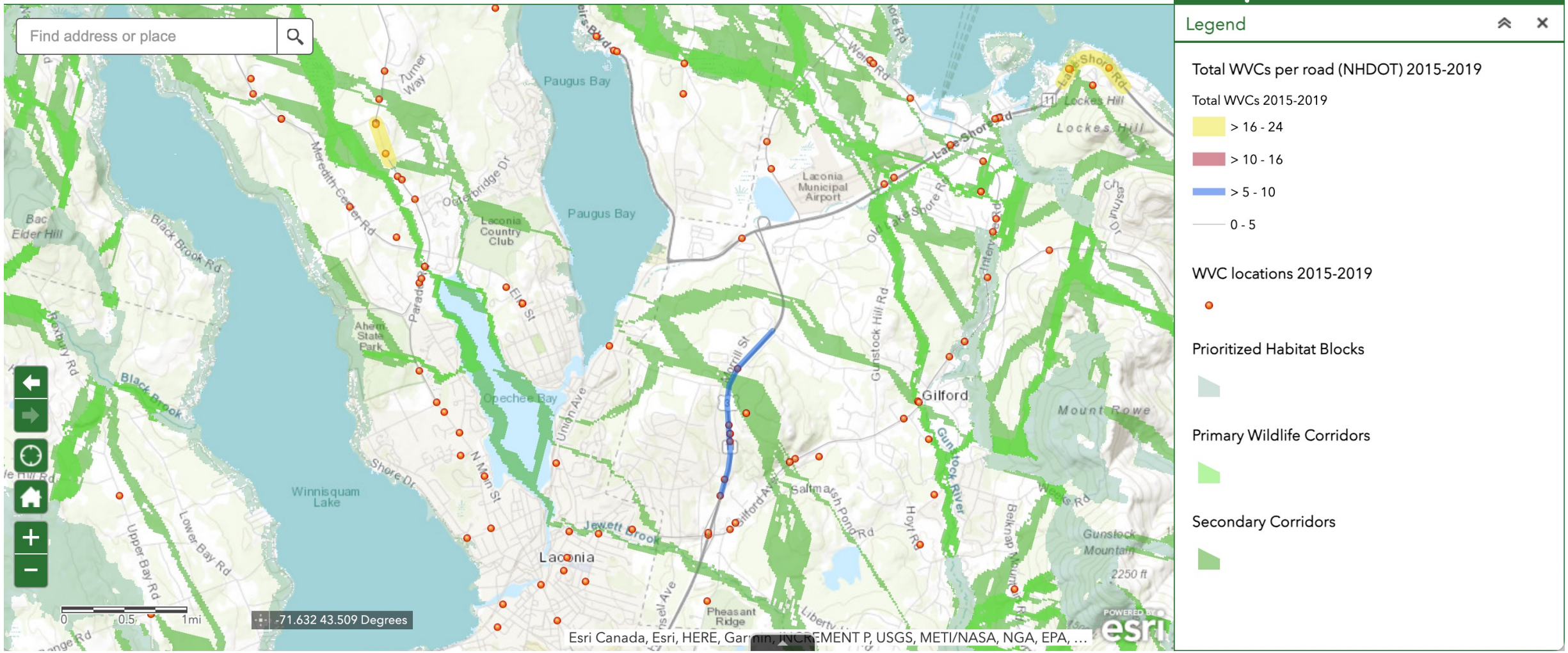
Total WVCs per road (NHDOT) 2015-2019

Total WVCs 2015-2019

- > 16 - 24
- > 10 - 16
- > 5 - 10
- 0 - 5

NH Wildlife-Vehicle Collision Mapper 2002-2019

Click to learn more about WVCs



NH Wildlife-Vehicle Collision Mapper 2002-2019

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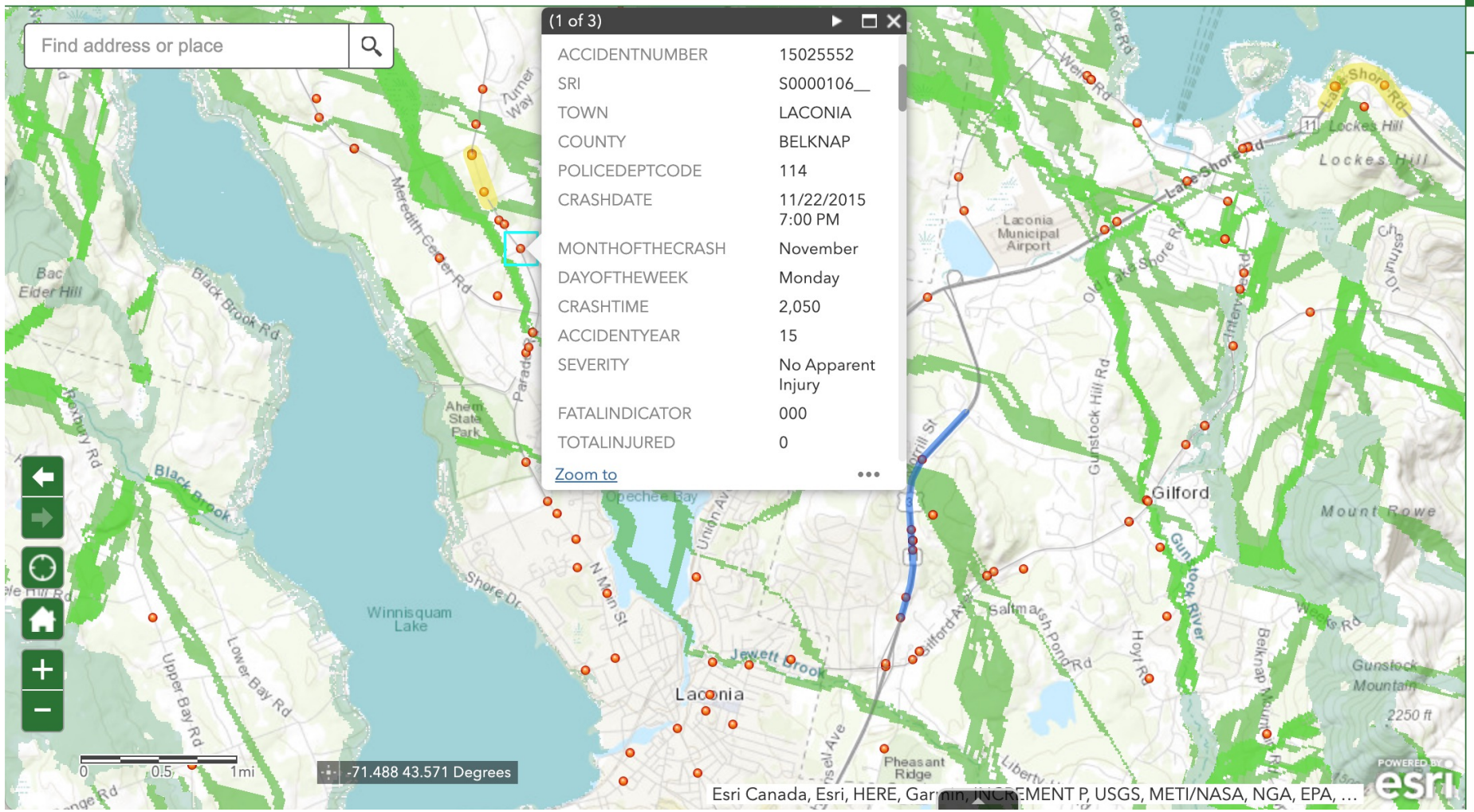

Legend

Total WVCs per road (NHDOT) 2015-2019

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- > 16 - 24
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WVC locations 2015-2019

Prioritized Habitat Blocks

Primary Wildlife Corridors

Secondary Corridors

NH WVC StoryMap

NH WVC Mapper

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