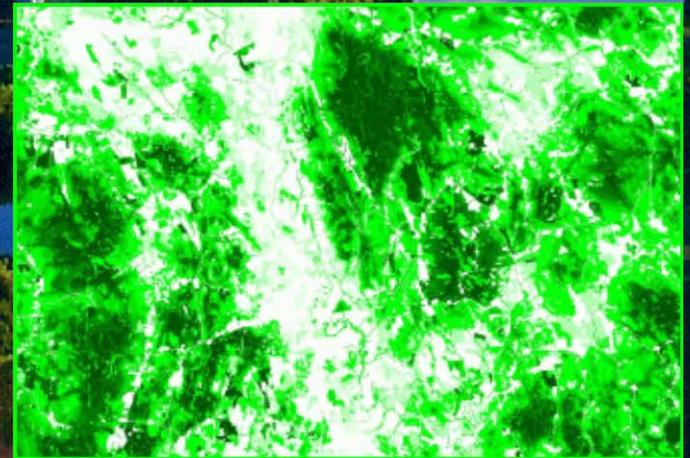
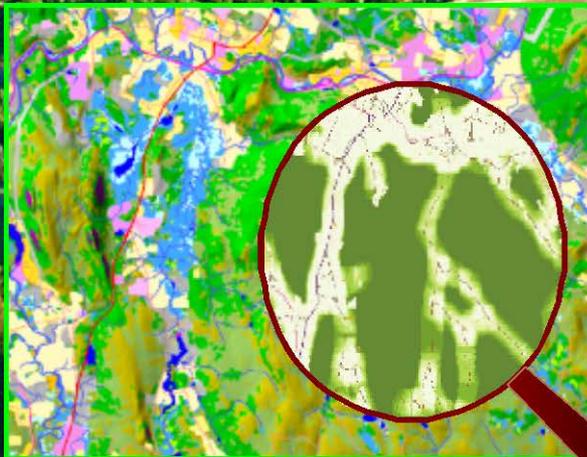


Designing Sustainable Landscapes in the Northeast

*A project of the North Atlantic Landscape
Conservation Cooperative & Northeast
Climate Science Center*

Landscape Conservation Design
September 22, 2014



Landscape Conservation Design

Step 2: Design Conservation Network

Design Steps:

1. Select (tiered) *core* areas
2. Create core area *buffers*
3. Prioritize within buffered cores
4. Assess *connectivity* among cores
5. Prioritize among core areas
6. Prioritize among linkages
7. Prioritize within linkages
8. Identify *restoration* opportunities
9. Determine *management* needs

**Current
focus**

- Field verification at all steps
- Socio-cultural and economic considerations at all steps



Landscape Conservation Design

Step 2: Design Conservation Network

4. Assess connectivity among core areas

Core area scenarios:

- Ecosystem approach (coarse filter)...
based solely on ecosystem conditions
- Species approach...
based solely on focal species
considerations
- Combined ecosystem-species approach...
based on the complement of ecosystems
and focal species

Current
focus

Landscape Conservation Design

Step 2: Design Conservation Network

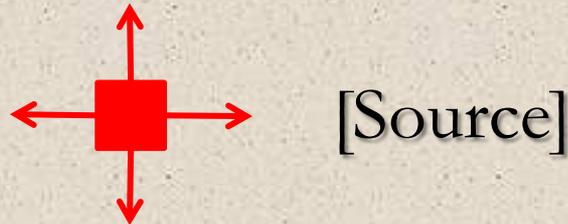
- What is connectivity?
 - Connectivity refers to the facilitation or impedance of ecological flows (e.g., organisms, materials, energy) across the landscape in space and/or time

Landscape Conservation Design

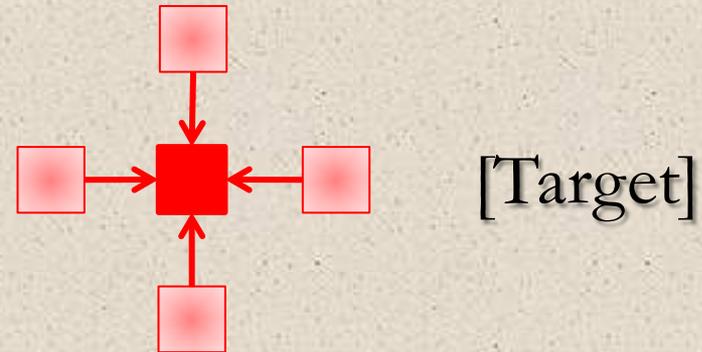
Step 2: Design Conservation Network

- Three faces of connectivity?

- Traversability



- Connectedness



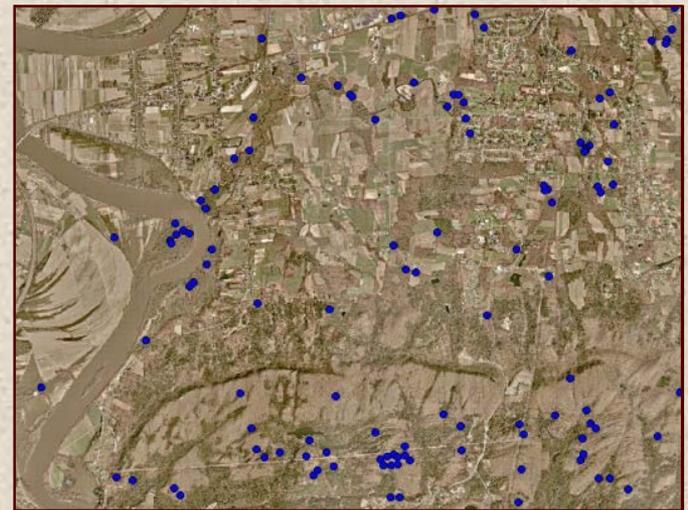
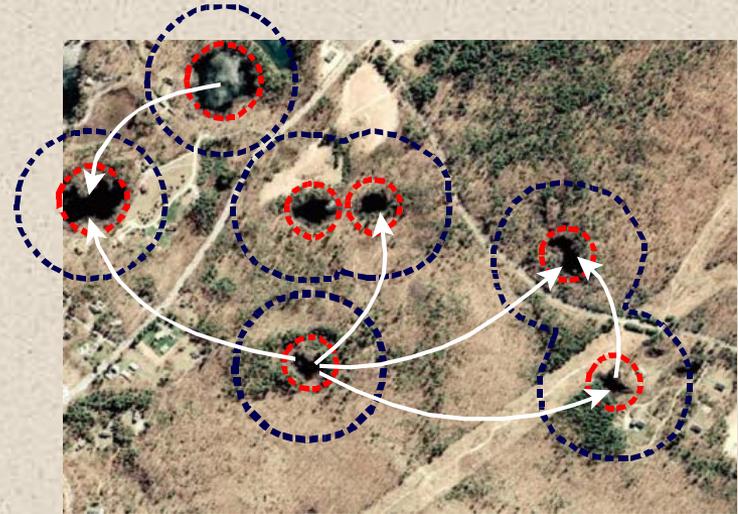
- Conductance



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- Scales of connectivity?
- Local connectivity refers to the spatial scale at which individual organisms interact directly with the landscape via demographic processes such as dispersal and home range movements
- Regional connectivity refers to the scale at which populations through time indirectly interact with the landscape (e.g., through gene flow over multiple generations)

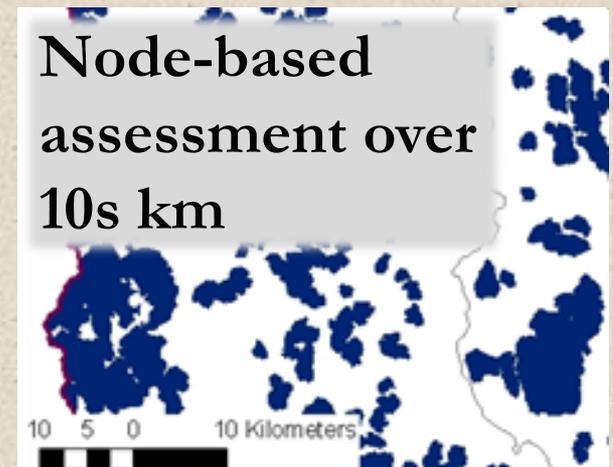
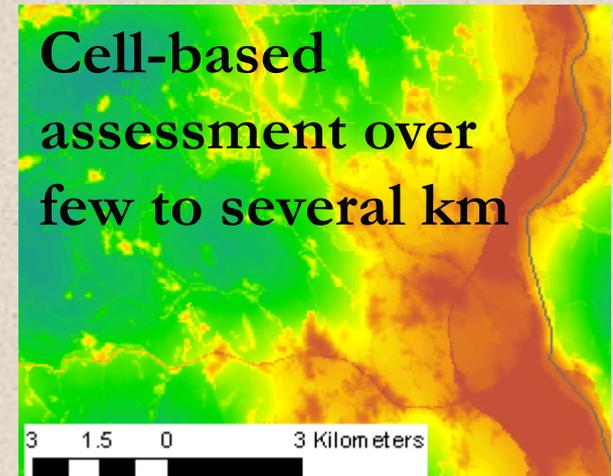


Landscape Conservation Design

Step 2: Design Conservation Network

4. Assess connectivity

- Local connectivity refers to the spatial scale at which individual organisms interact directly with the landscape via demographic processes such as dispersal and home range movements
- Regional connectivity refers to the scale at which populations through time indirectly interact with the landscape (e.g., through gene flow over multiple generations)

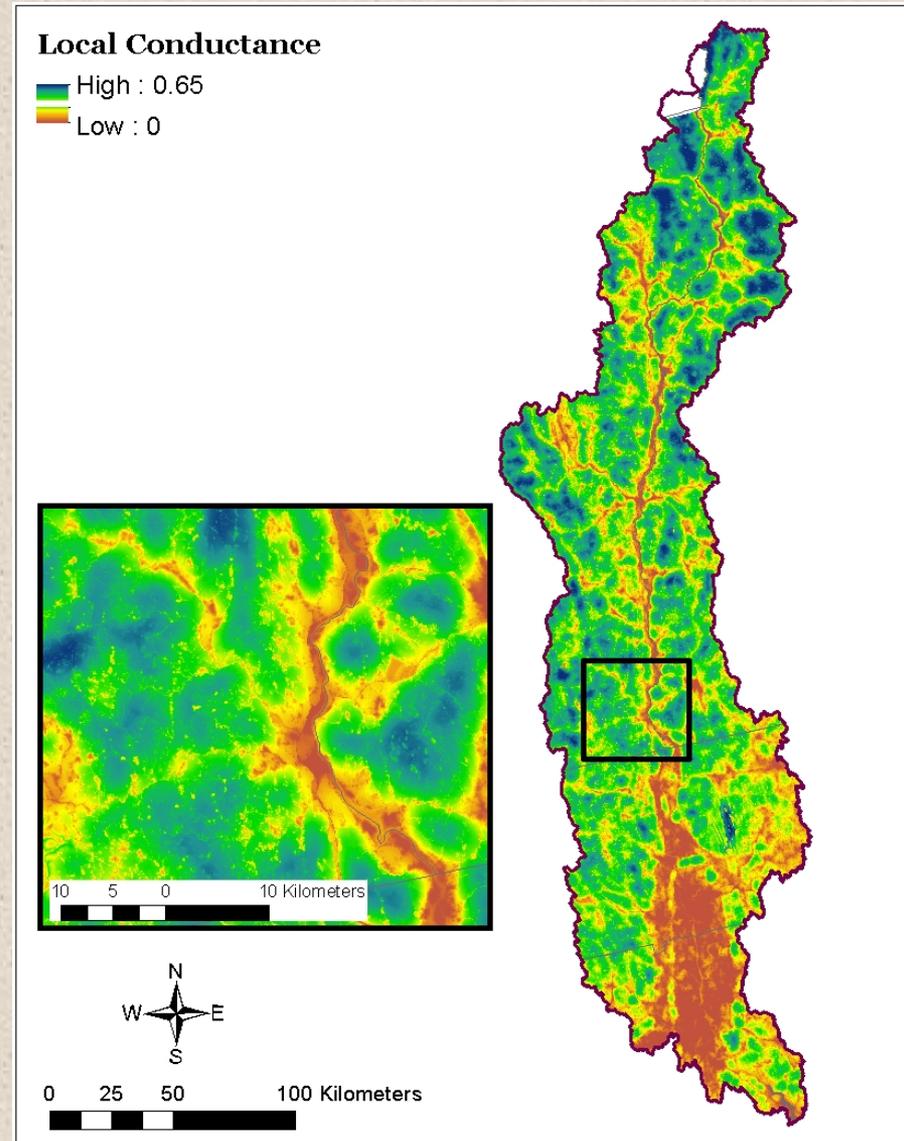


Landscape Conservation Design

Step 2: Design Conservation Network

4. Assess local connectivity

- Local conductance
 - Local vulnerability
-
- Relative probability of flow through a cell from nearby cells (function of local resistance)

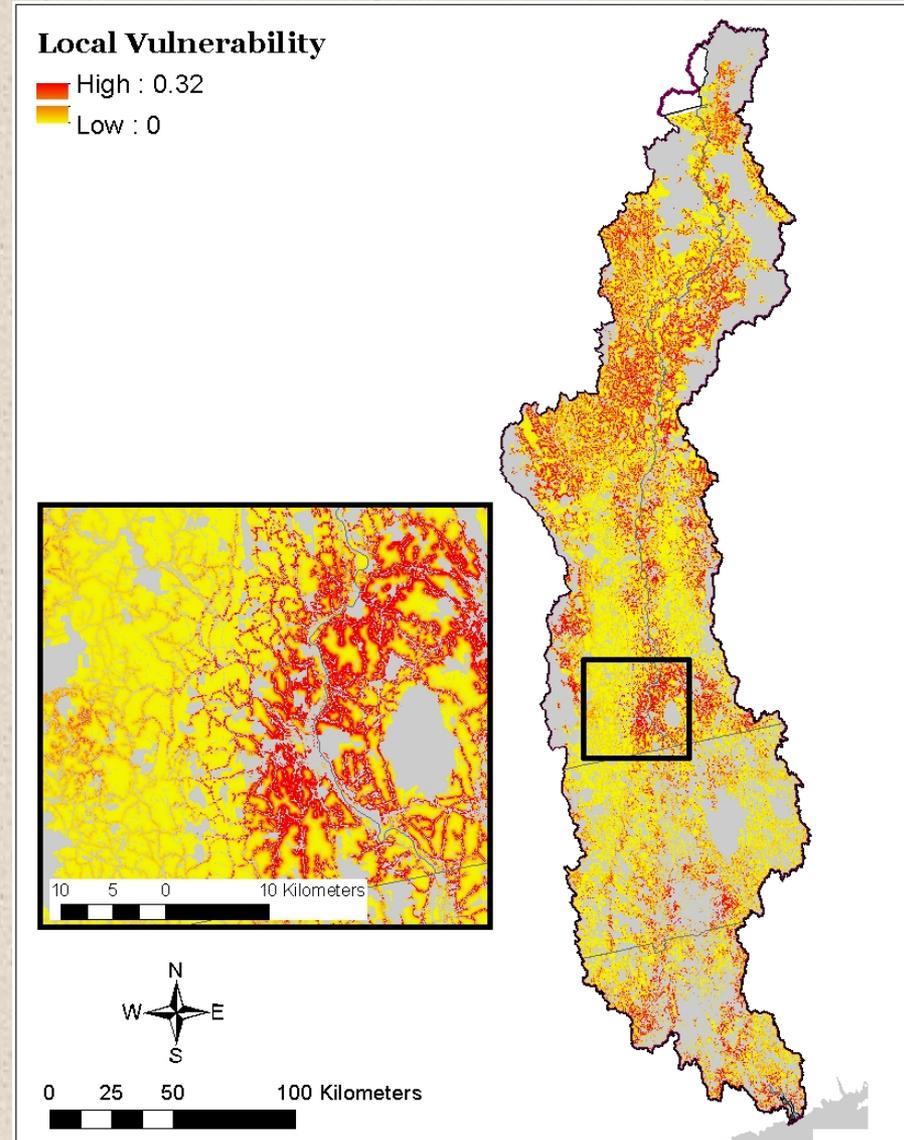


Landscape Conservation Design

Step 2: Design Conservation Network

4. Assess local connectivity

- Local conductance
 - Local vulnerability
-
- Relative probability of developing a cell with high local conductance



Landscape Conservation Design

Step 2: Design Conservation Network

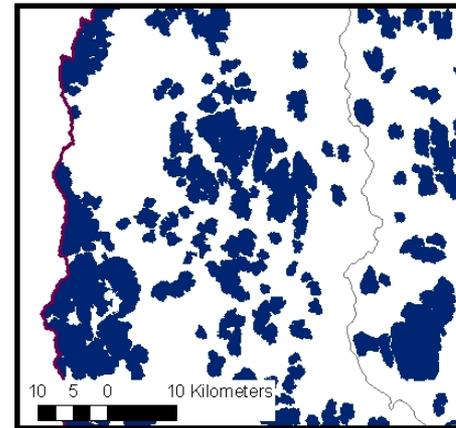
4. Assess regional connectivity among terrestrial core areas

- Connectivity is based on a designated core area network

Terrestrial Core Areas

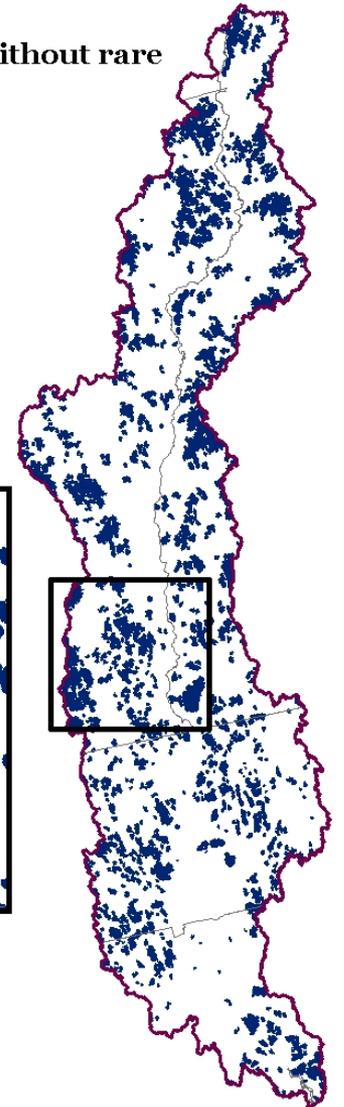
Unweighted selection index without rare
CTR-HUC8 hybrid scaled
25% of landscape included
Fewer/larger cores areas

■ Core areas



0 25 50 100 Kilometers

A scale bar for the main map showing distances of 0, 25, 50, and 100 kilometers.

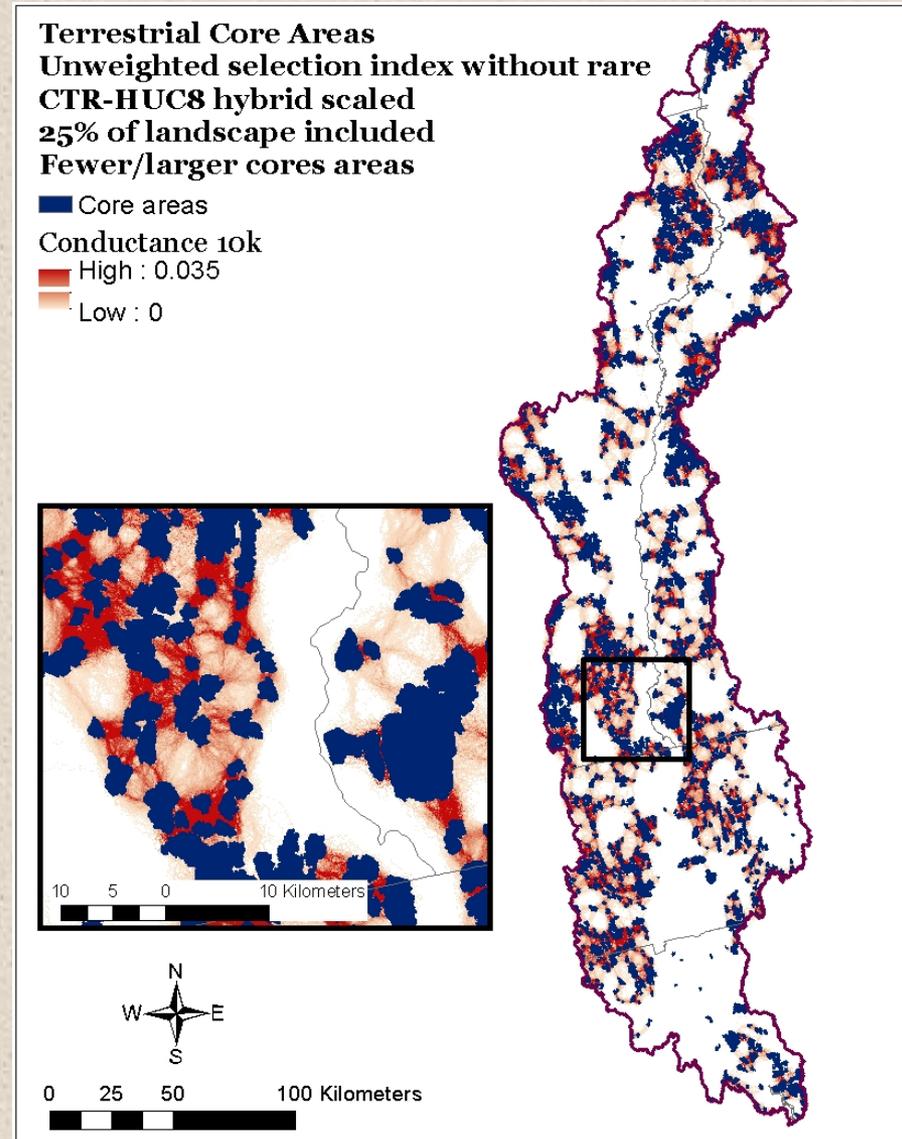
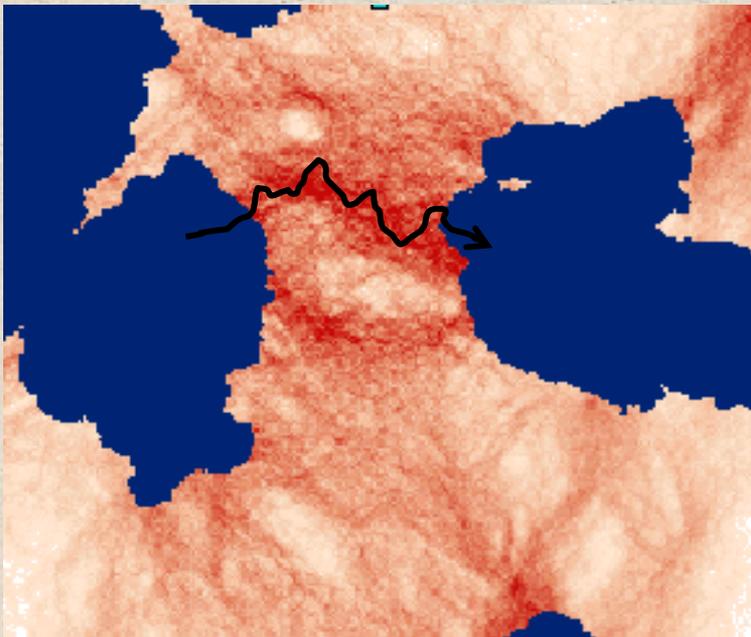


Landscape Conservation Design

Step 2: Design Conservation Network

4. Assess regional connectivity among core areas

- Build random low cost paths between cores



Landscape Conservation Design

Step 2: Design Conservation Network

5. Prioritize among core areas

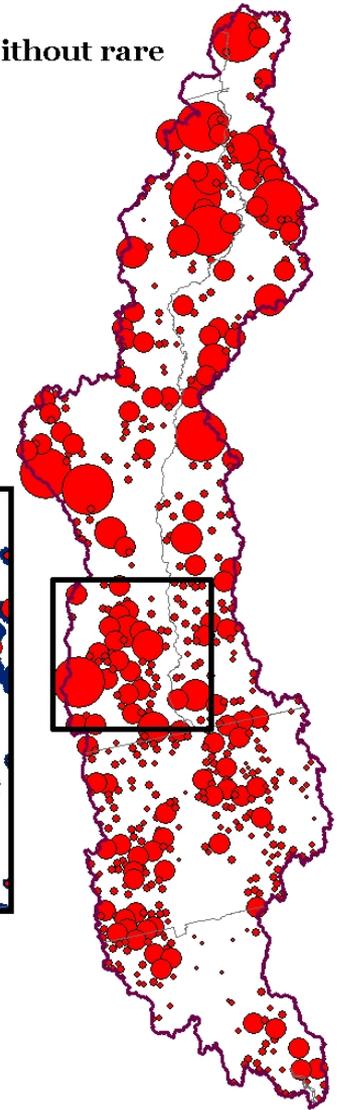
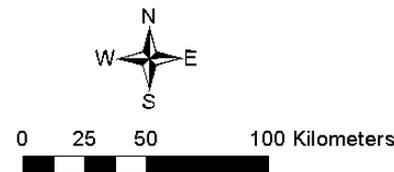
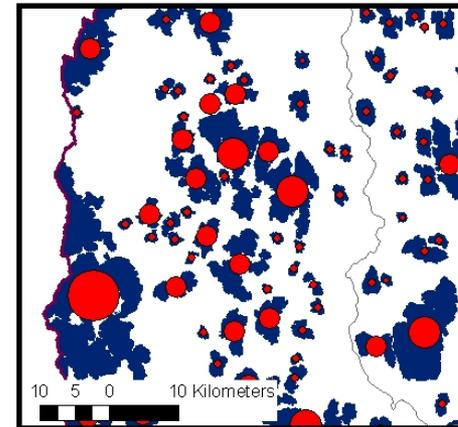
- *Node importance index*
 - Based on node contribution to the probability of connectivity (PC) of the network

Terrestrial Core Areas

Unweighted selection index without rare
CTR-HUC8 hybrid scaled
25% of landscape included
Fewer/larger cores areas

■ Core areas

● Node importance



Landscape Conservation Design

Step 2: Design Conservation Network

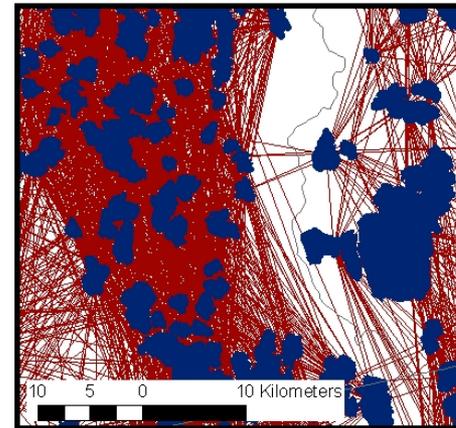
6. Prioritize among linkages

- *Link importance index*
 - Based on link contribution to the probability of connectivity (PC) of the network

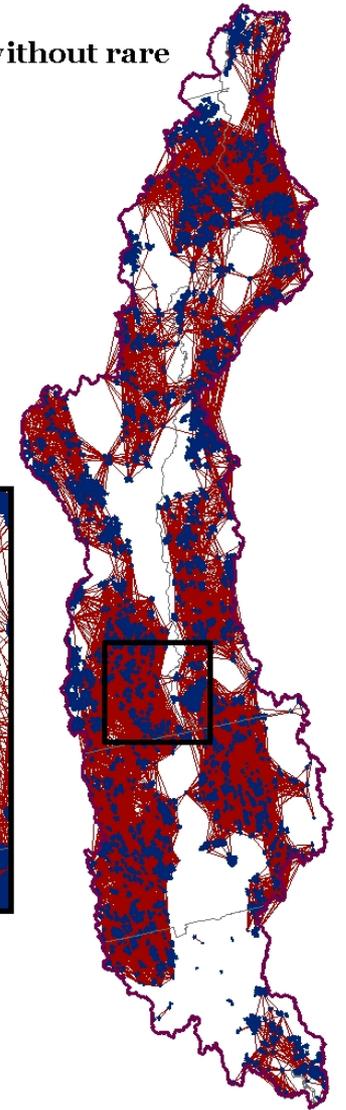
Terrestrial Core Areas
Unweighted selection index without rare
CTR-HUC8 hybrid scaled
25% of landscape included
Fewer/larger cores areas

■ Core areas
— Linkages

All linkages shown



0 25 50 100 Kilometers

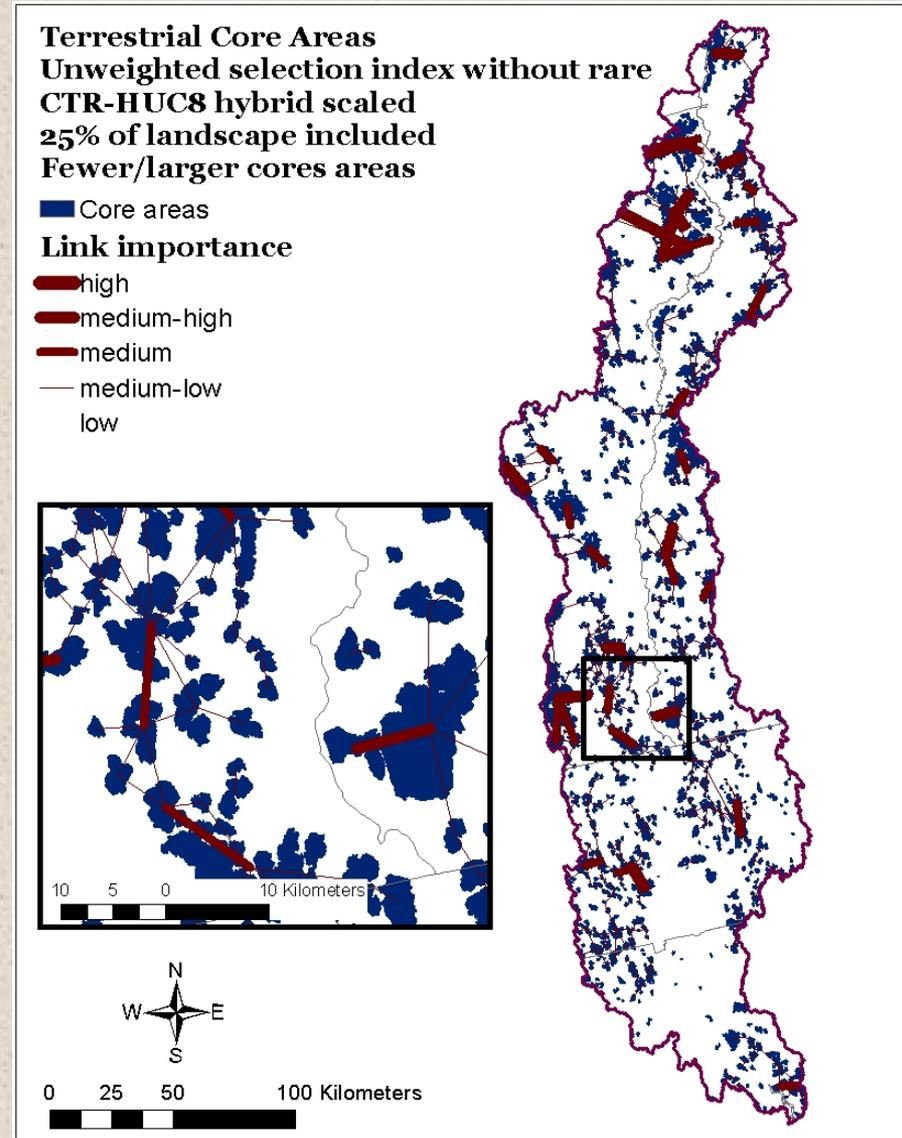


Landscape Conservation Design

Step 2: Design Conservation Network

6. Prioritize among linkages

- *Link importance index*
 - Based on link contribution to the probability of connectivity (PC) of the network

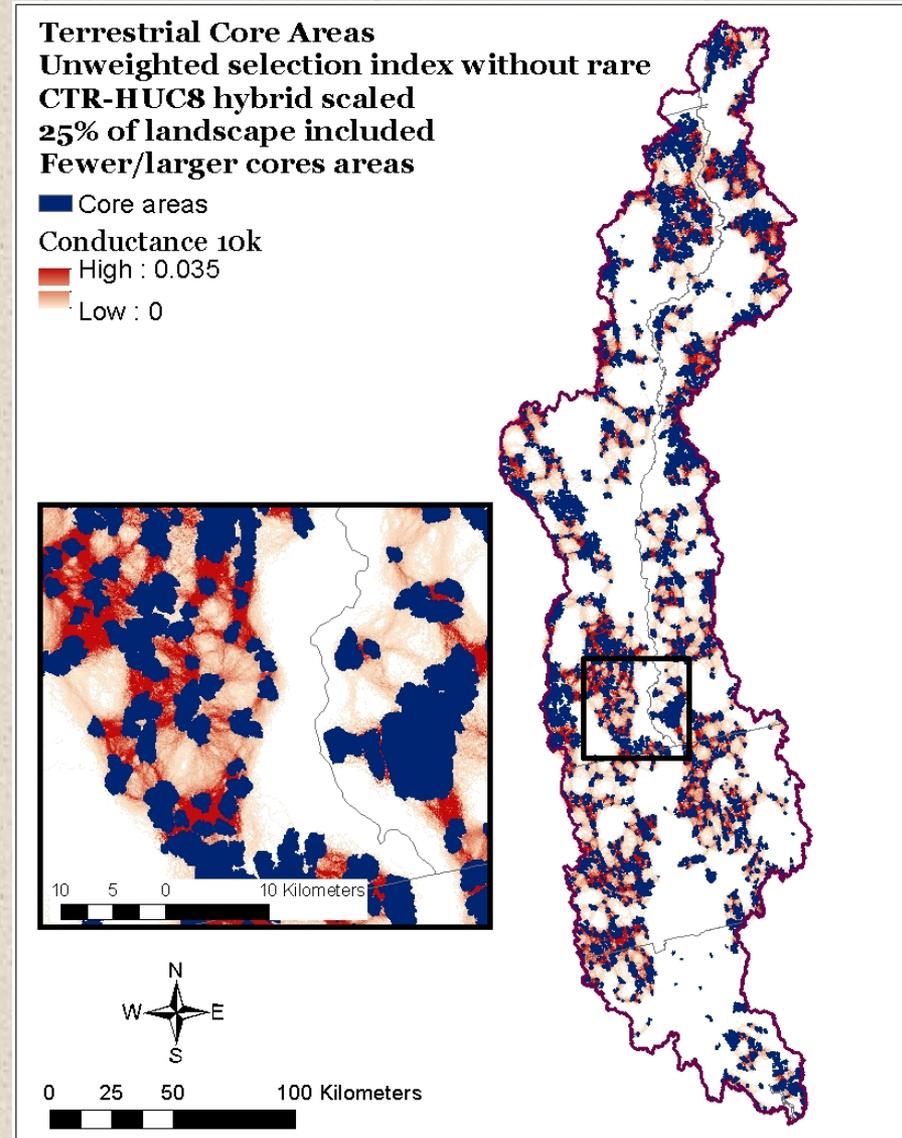


Landscape Conservation Design

Step 2: Design Conservation Network

7. Prioritize within linkages

- Regional conductance
- Irreplaceability
- Regional vulnerability
- Relative probability of flow through a cell (function of local resistance, node size, quality and proximity)

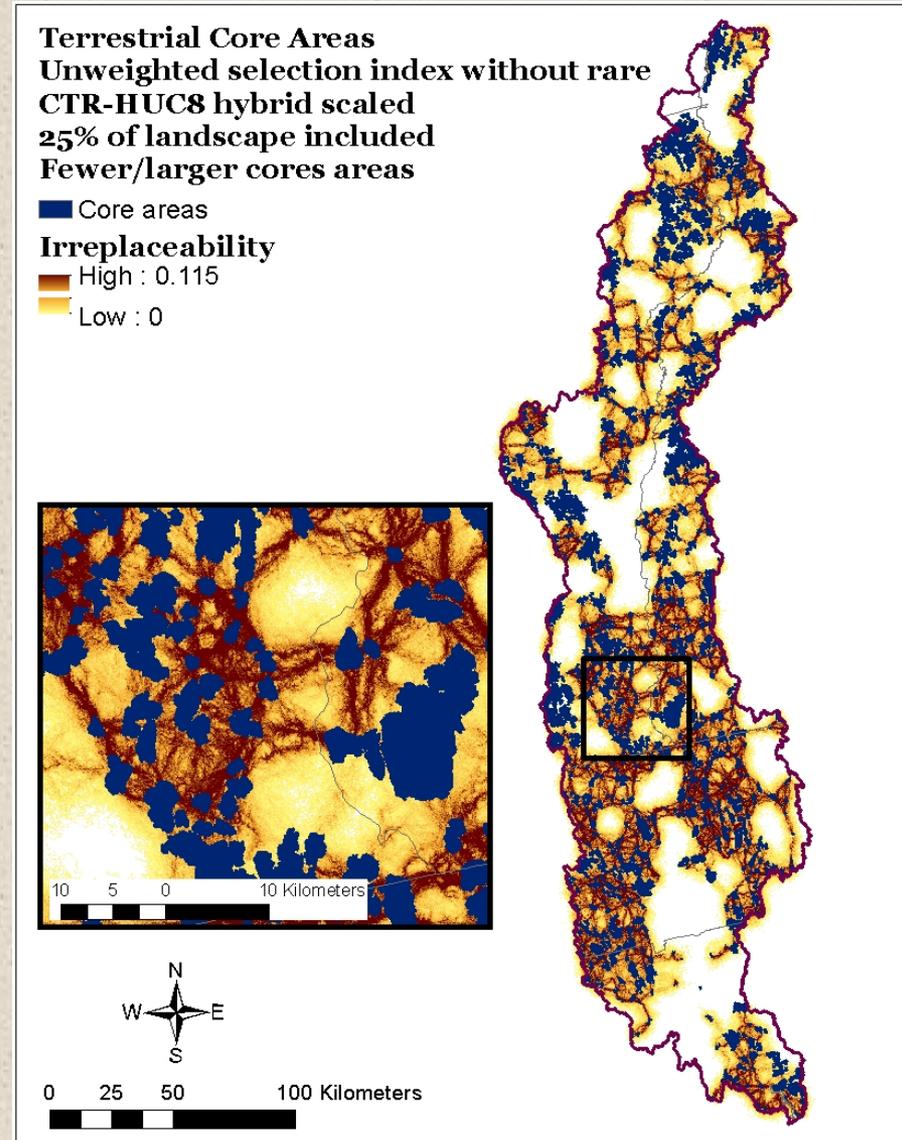


Landscape Conservation Design

Step 2: Design Conservation Network

7. Prioritize within linkages

- Regional conductance
- Irreplaceability
- Regional vulnerability
- Relative concentration of paths through a cell (function of local resistance and path irreplaceability)

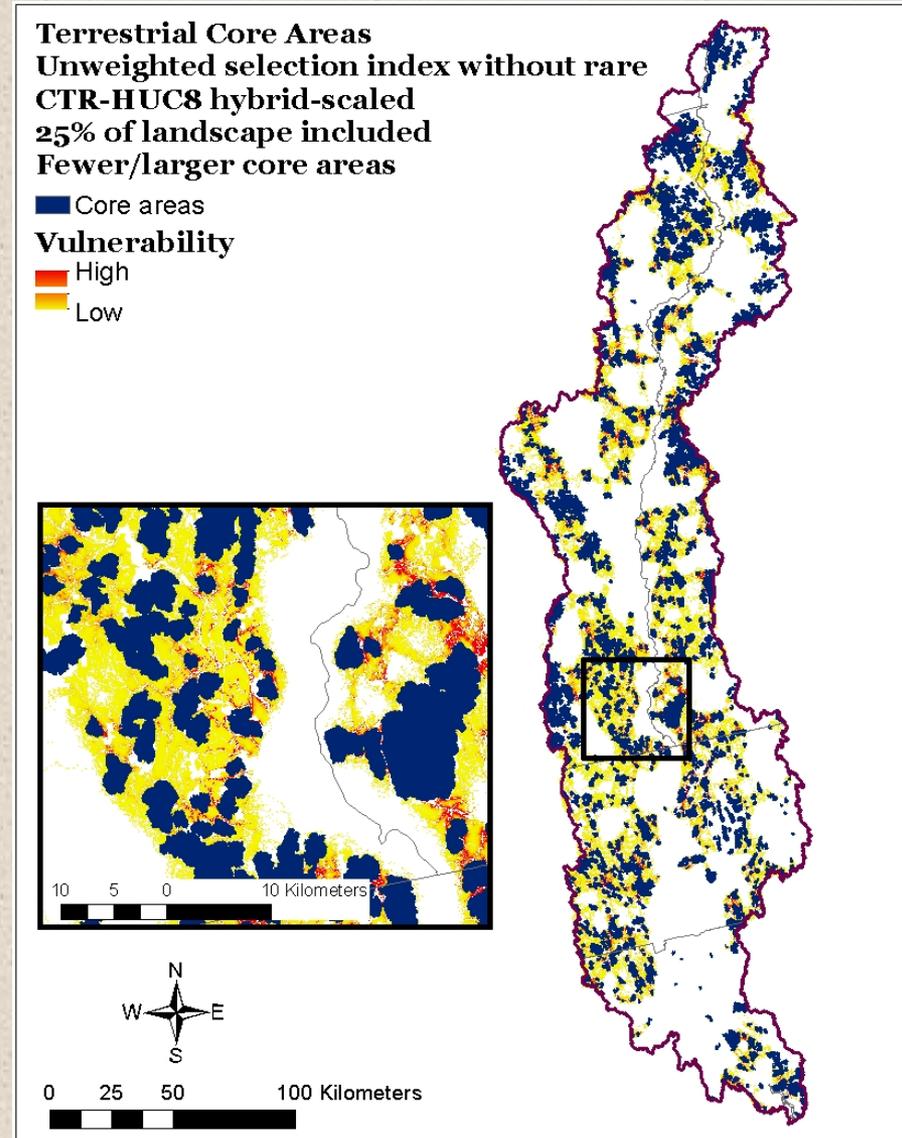


Landscape Conservation Design

Step 2: Design Conservation Network

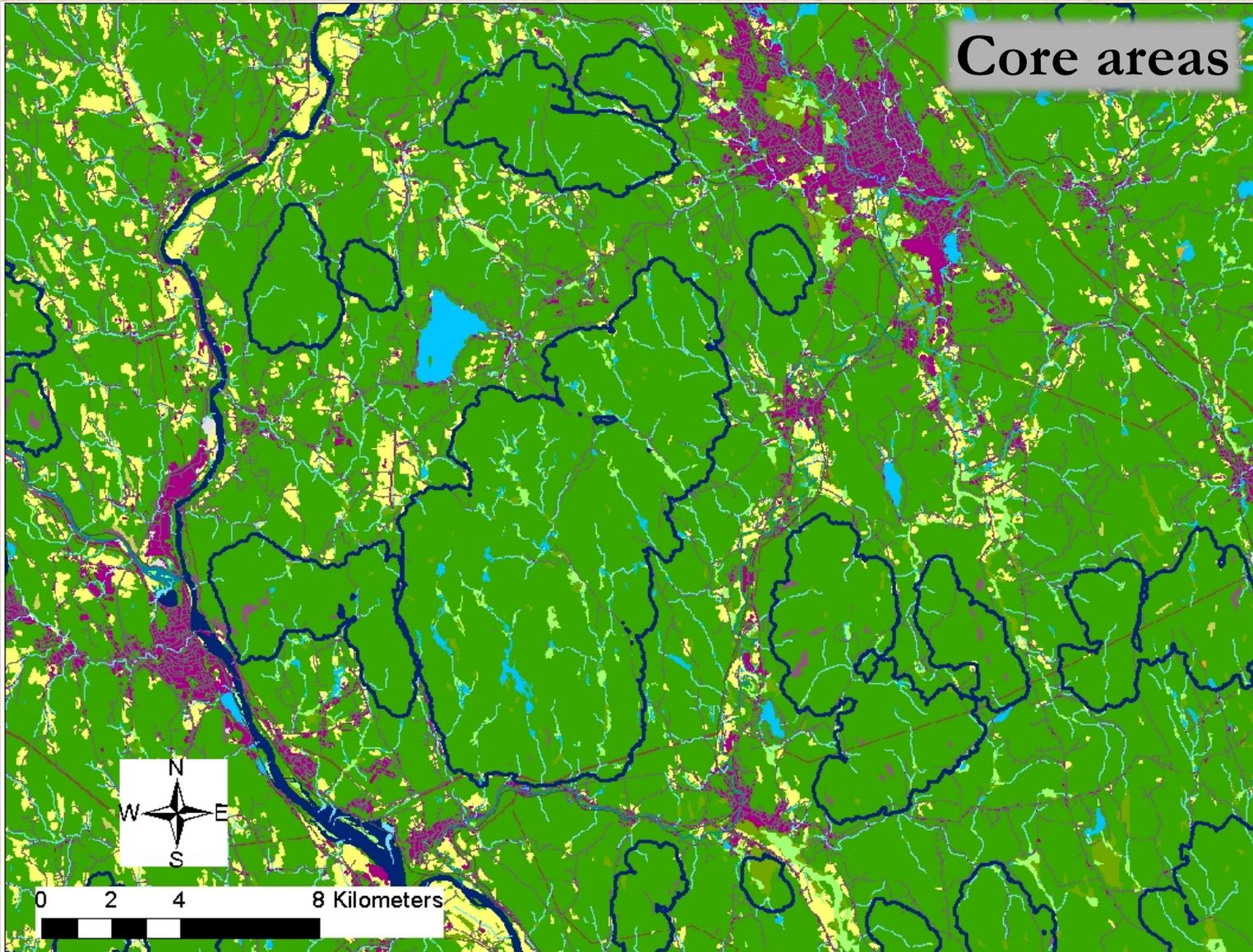
7. Prioritize within linkages

- Regional conductance
- Irreplaceability
- **Regional vulnerability**
- Relative probability of developing an irreplaceable cell that has a high relative probability of use



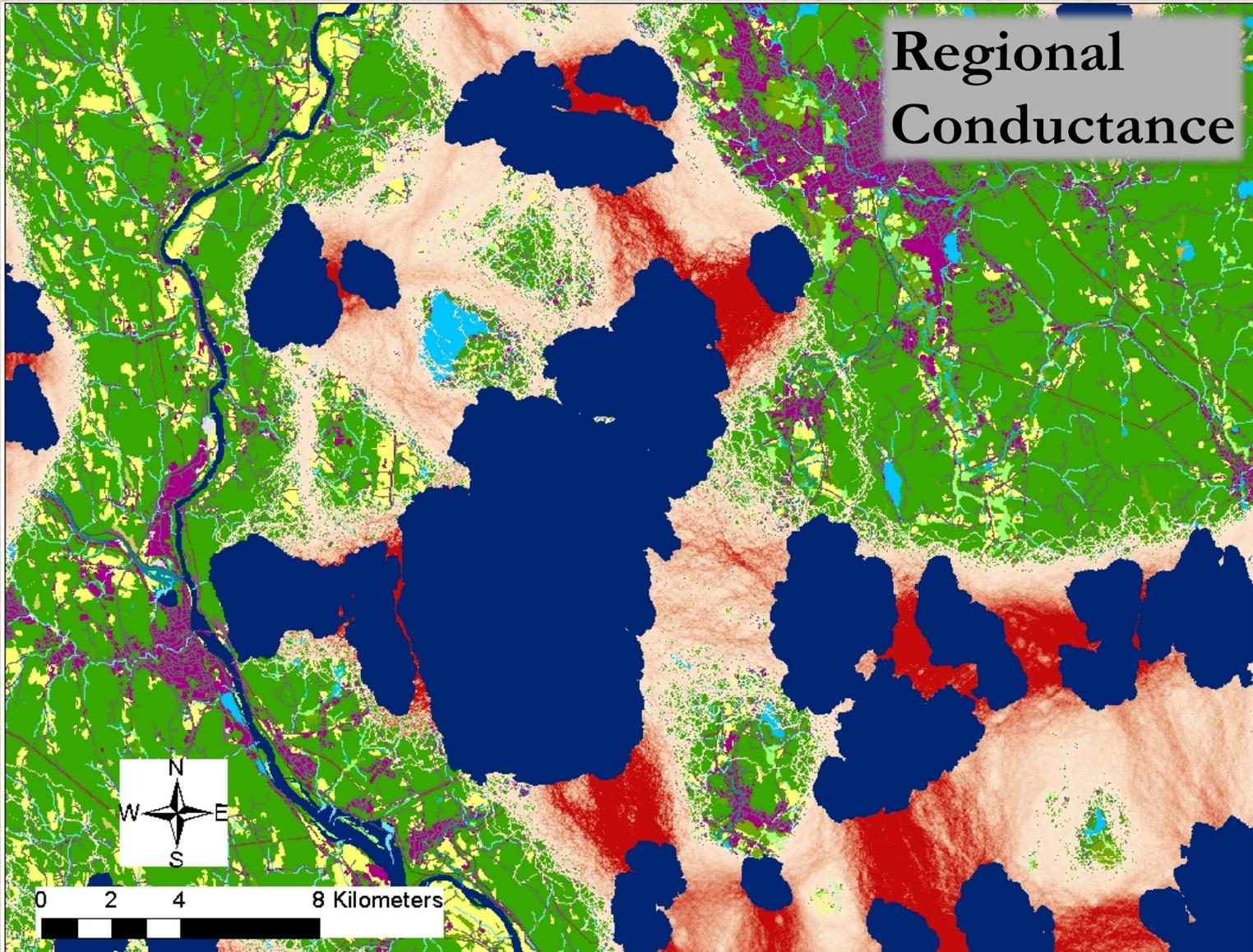
Landscape Conservation Design

Step 2: Design Conservation Network



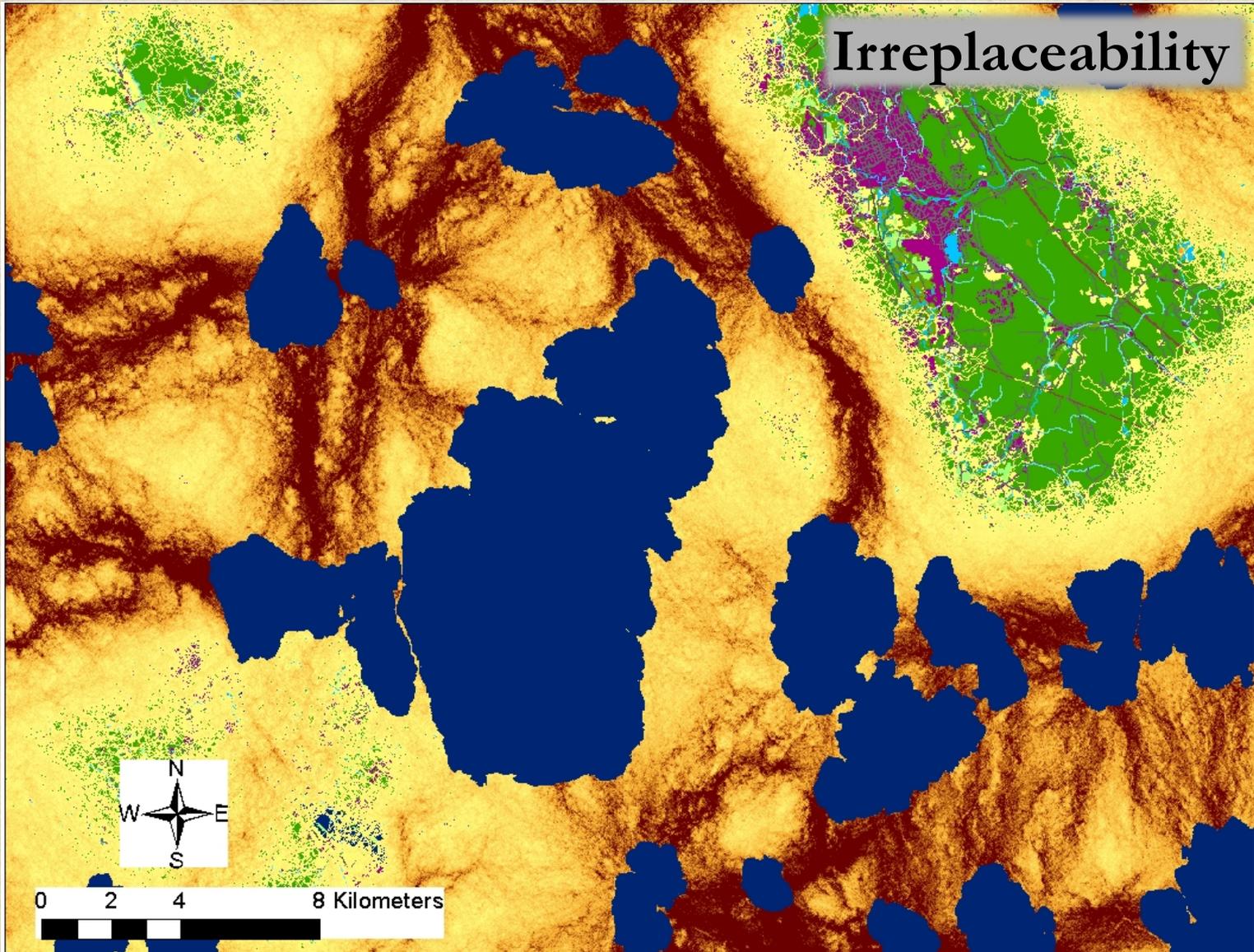
Landscape Conservation Design

Step 2: Design Conservation Network



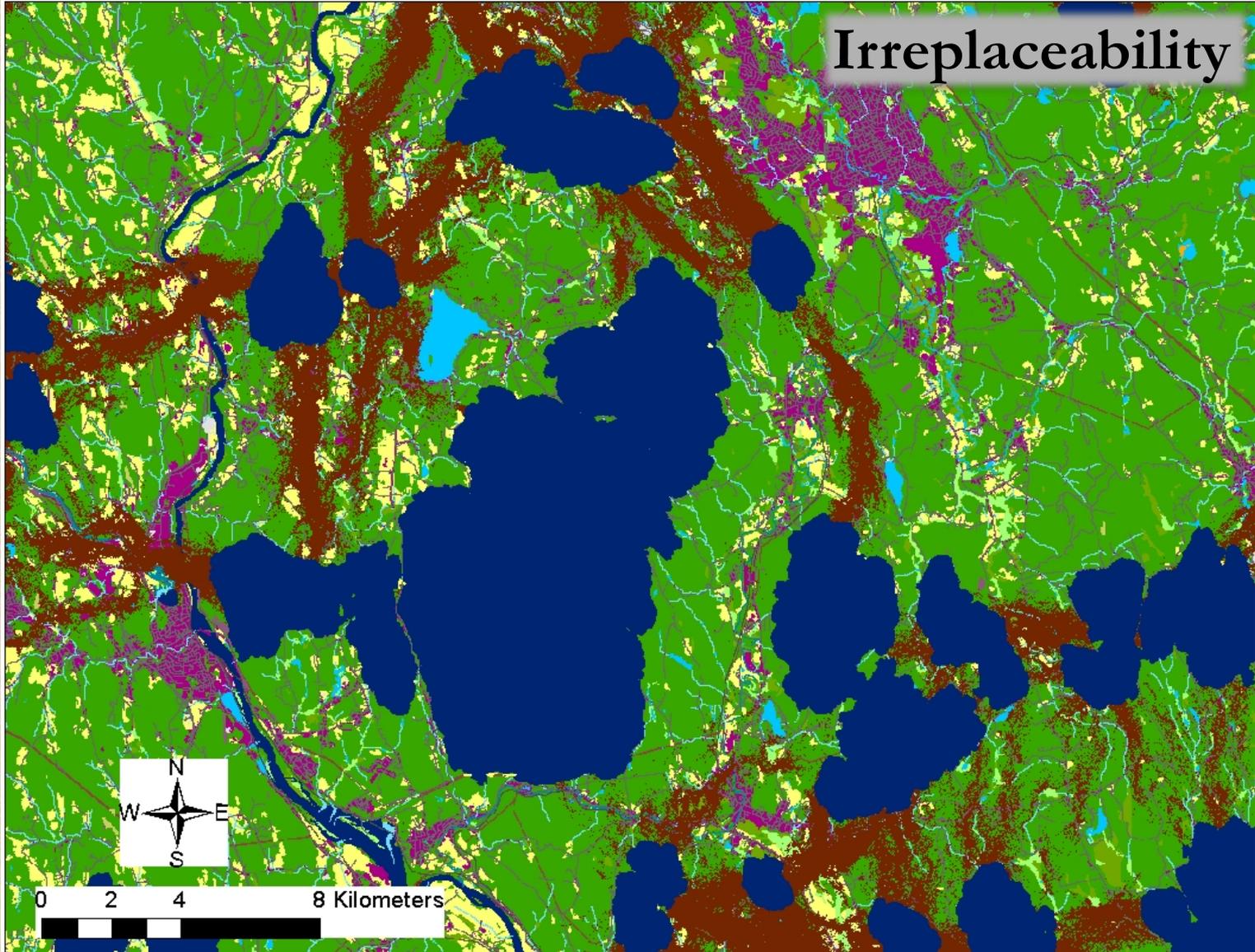
Landscape Conservation Design

Step 2: Design Conservation Network



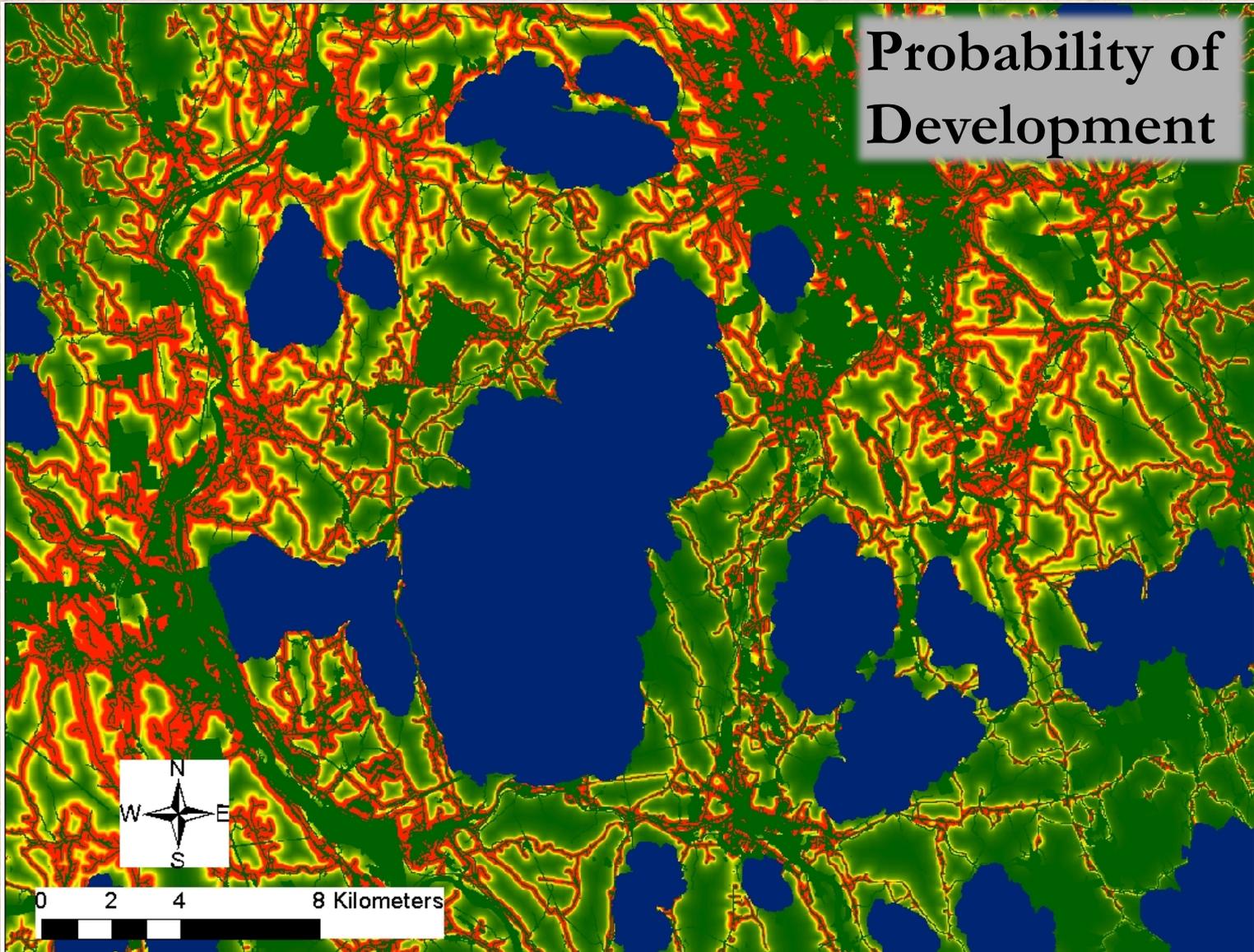
Landscape Conservation Design

Step 2: Design Conservation Network



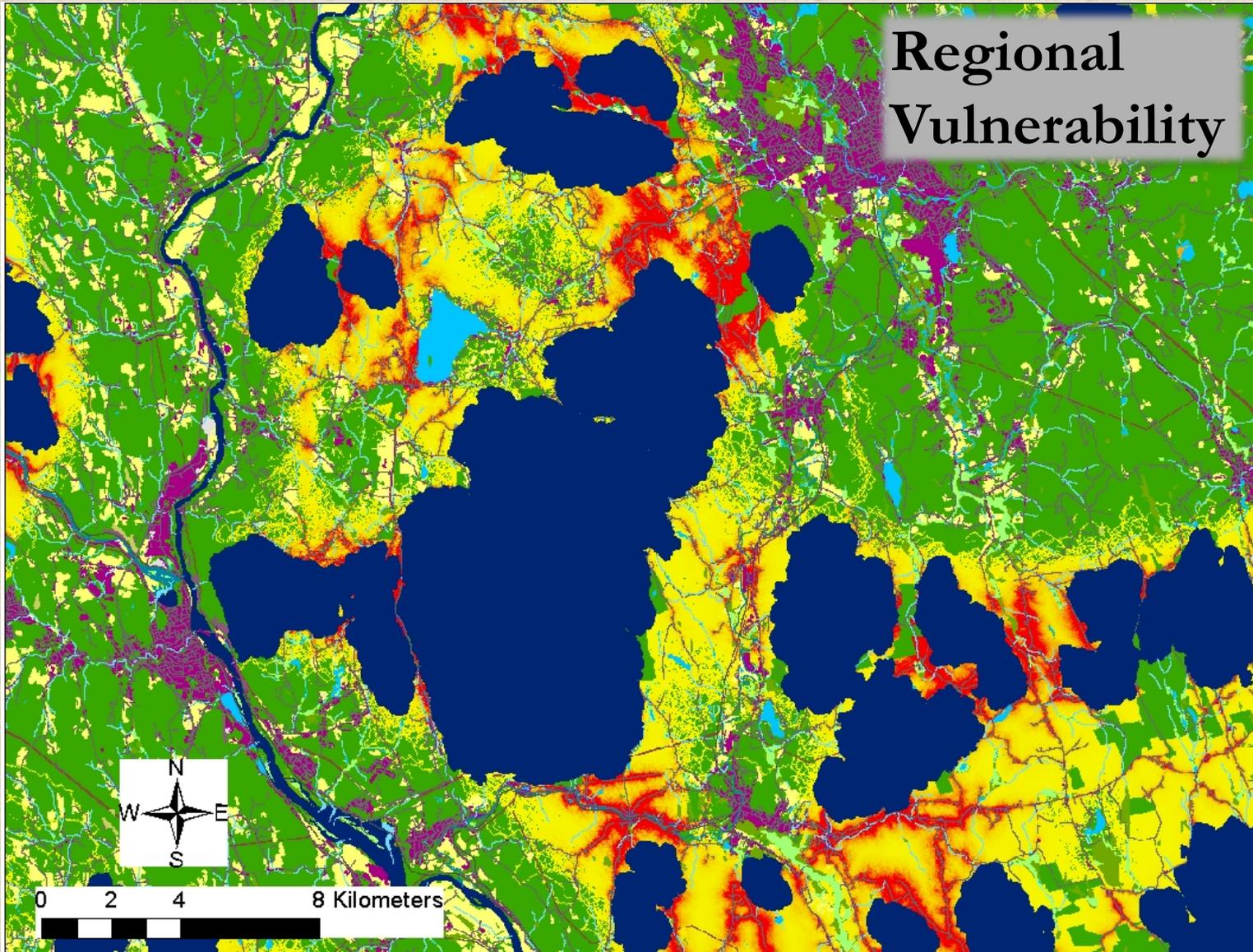
Landscape Conservation Design

Step 2: Design Conservation Network



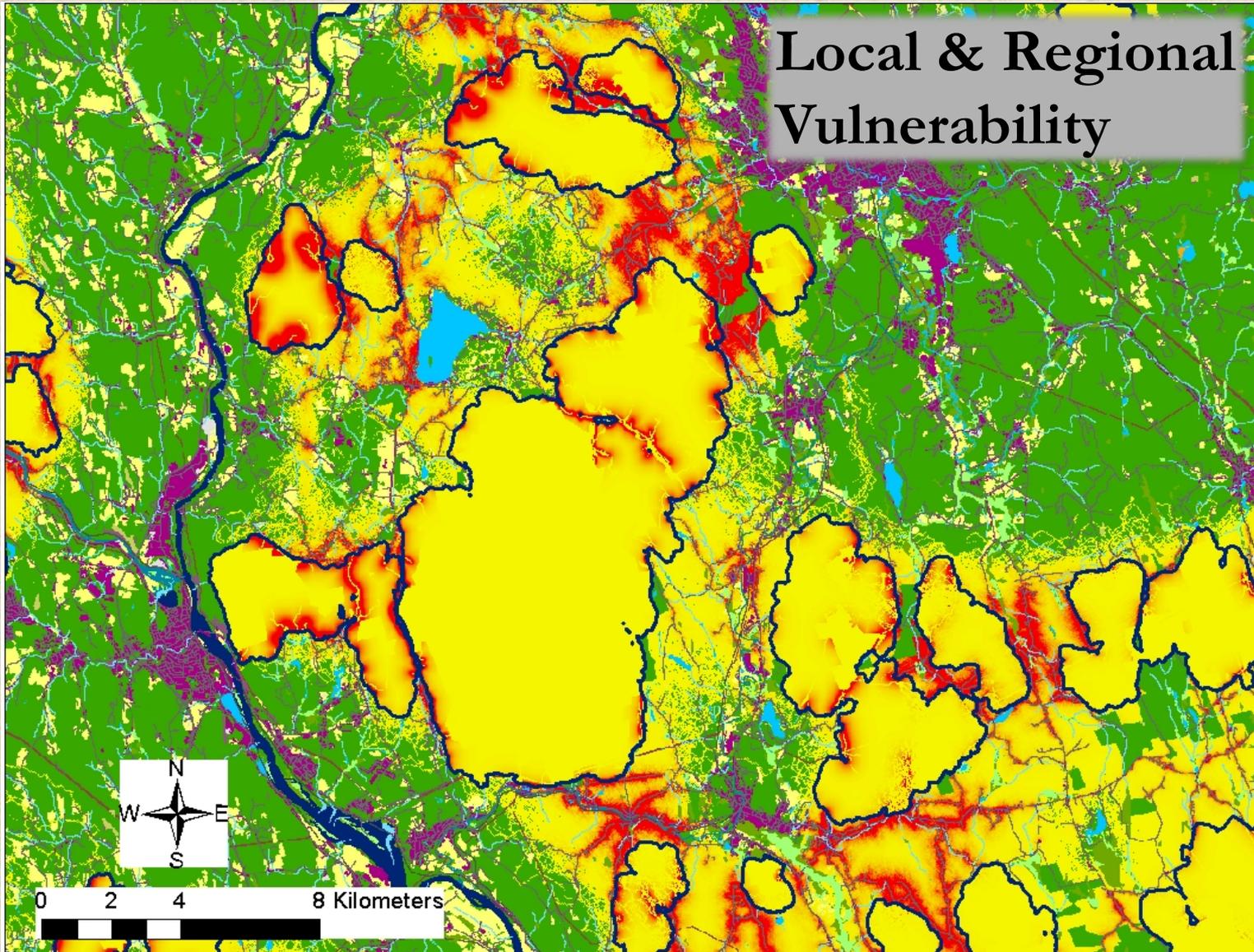
Landscape Conservation Design

Step 2: Design Conservation Network



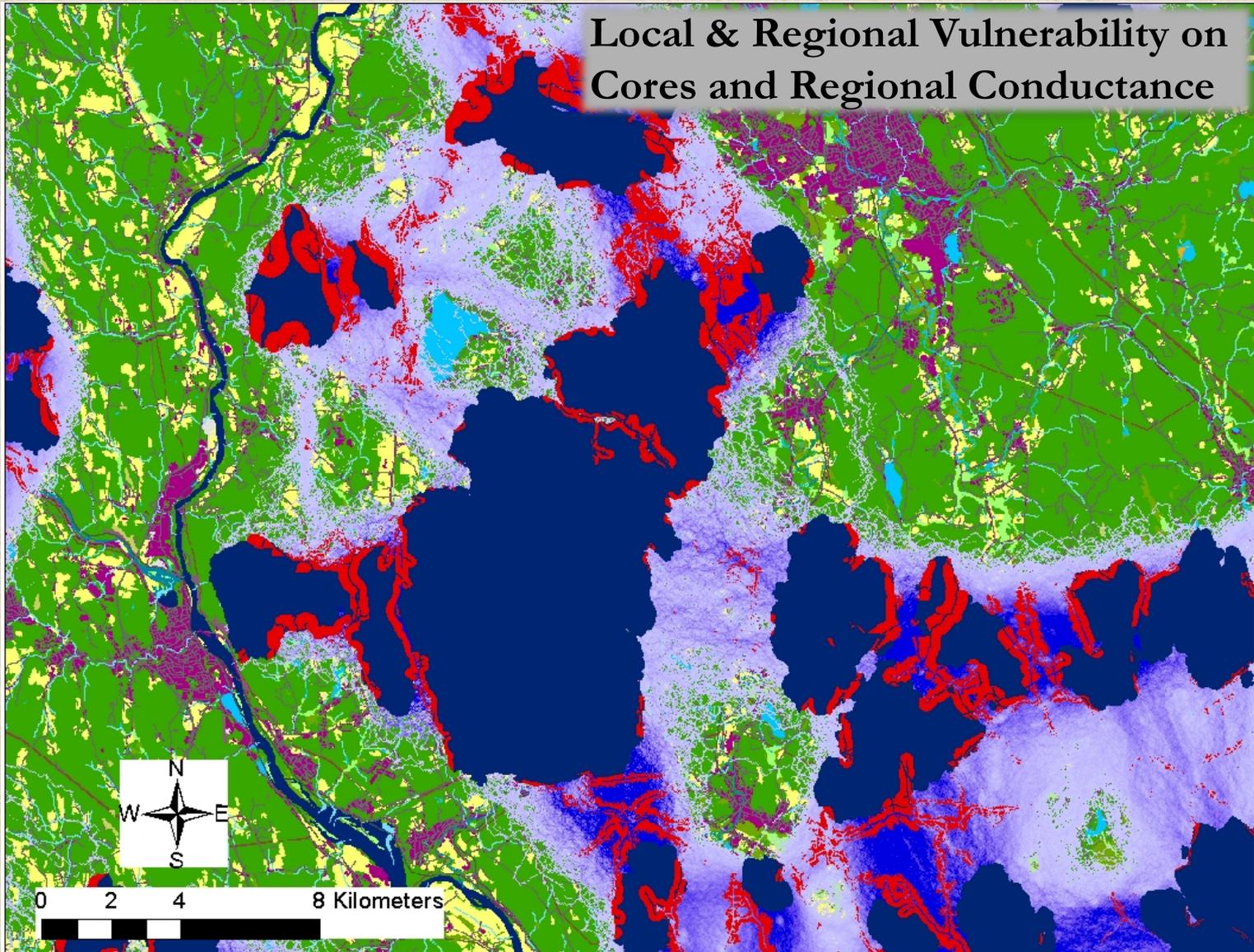
Landscape Conservation Design

Step 2: Design Conservation Network



Landscape Conservation Design

Step 2: Design Conservation Network



Landscape Conservation Design

Step 2: Design Conservation Network

Key Decisions regarding connectivity assessment:

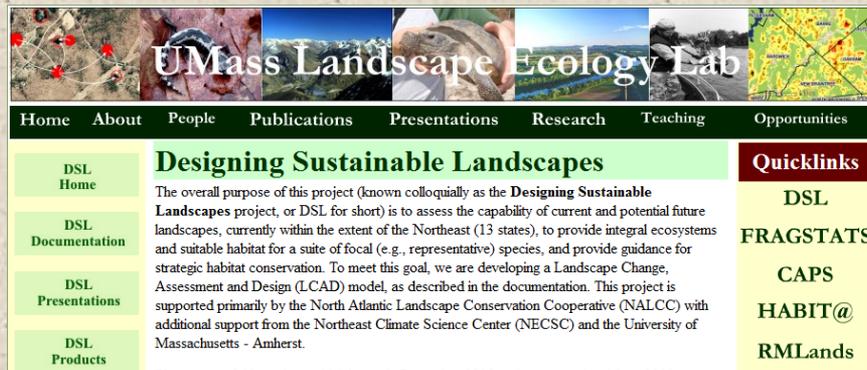
- Search radius for regional conductance [currently set to 10 km]?
- What is the best way to present the results that will be most useful to the users?



For More Information

- Project website:

www.umass.edu/landeco/research/dsl/dsl.html



Feedback:

- Manager online survey

North Atlantic Landscape Conservation Cooperative Designing Sustainable Landscapes (DSL) Project

UMass Landscape Ecology Lab: Kevin McGarigal, Brad Compton, Ethan Plunkett, Bill DeLuca, Liz Willey and Joanna Grand.

Manager Feedback and Questionnaire

This document is intended primarily for participants of the sub-regional workshops being held with partners of the North Atlantic Landscape Conservation Cooperative (NALCC) to review the results and provide feedback on phase 1 of the DSL project, although any NALCC partner is welcome to provide feedback. Specifically, this document includes a set of questions posed to partners concerning how best to package the landscape design information resulting from the Landscape Change, Assessment and Design (LCAD) model applied to the entire Northeast in phase 2.

Criteria for Feedback

The DSL project aims to provide regionally consistent information pertaining to biodiversity conservation planning and management across the Northeast. With this aim in mind, it is important to recognize the following criteria when providing feedback: 1). All LCAD data products must be regional (i.e., Northeast) in extent. There are lots of data that would be useful to LCAD, for example digital parcel land use zoning data, if they were available across the Northeast, but we are restricted to the use of digital data that are consistent across the Northeast. 2). Approaches for modeling landscape change, assessment and design must be technically feasible given available data and current computing resources. There may be ideal approaches that are not computationally feasible given available data and/or computing resources.

General topics

1) When the LCAD model is extended to the entire Northeast in phase 2, what is the best set of geographic ties (units) for rescaling ecological integrity and summarizing the model results?

- By state
- By watershed (indicated preferred HUC level in the comment box below)
- By ecoregion (indicated preferred ecoregion classification and level in the comment box below)
- Other (describe alternative tiling scheme in the comment box below)

Links to products:

- Overview
- Technical docs
- Presentations
- Results

- Personal contact: mccgarigalk@eco.umass.edu
413-577-0655