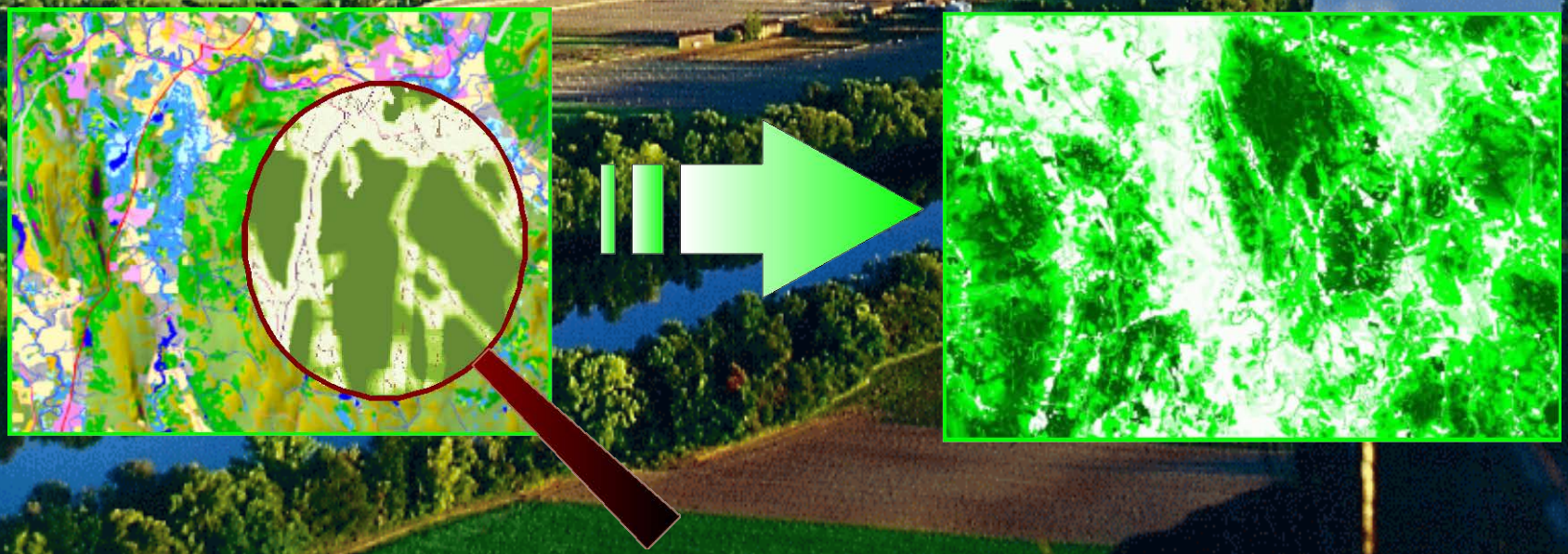
Designing Sustainable Landscapes in the Northeast

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

Landscape Conservation Design

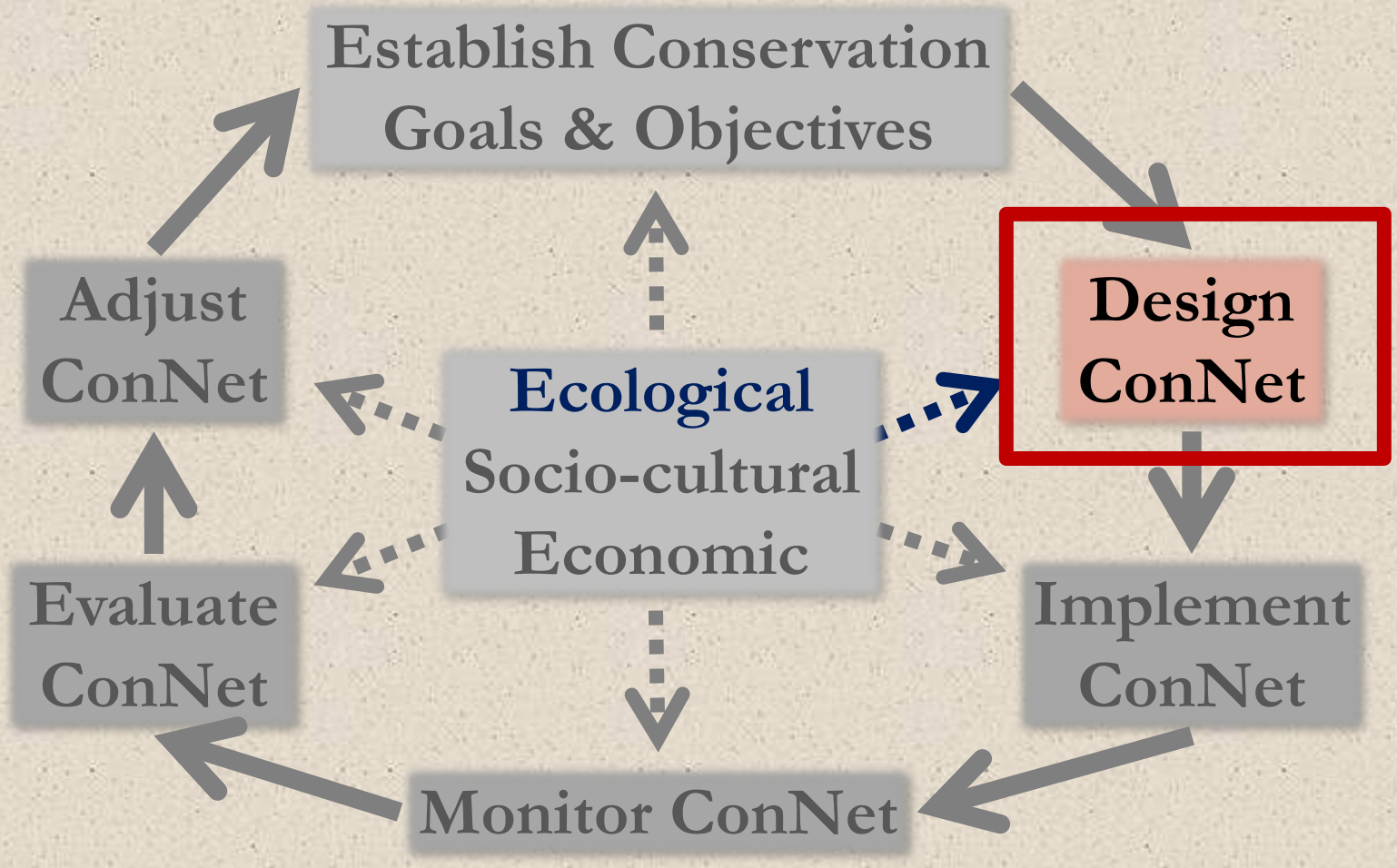
June, 2014



Landscape Conservation Design

Step 2: Design Conservation Network

Adaptive Landscape Conservation Design



Landscape Conservation Design

Step 2: Design Conservation Network

Design Steps:

1. Select (tiered) *core* areas
2. Prioritize within/among cores
3. Create core area *buffers*

Current focus

4. Delineate *corridors* among cores
5. Prioritize within/among corridors
6. Determine *management* needs
7. Identify *restoration* opportunities

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

Step 2: Design Conservation Network

1. Select (tiered) core areas

Three 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 species

Landscape Conservation Design

Step 2: Design Conservation Network

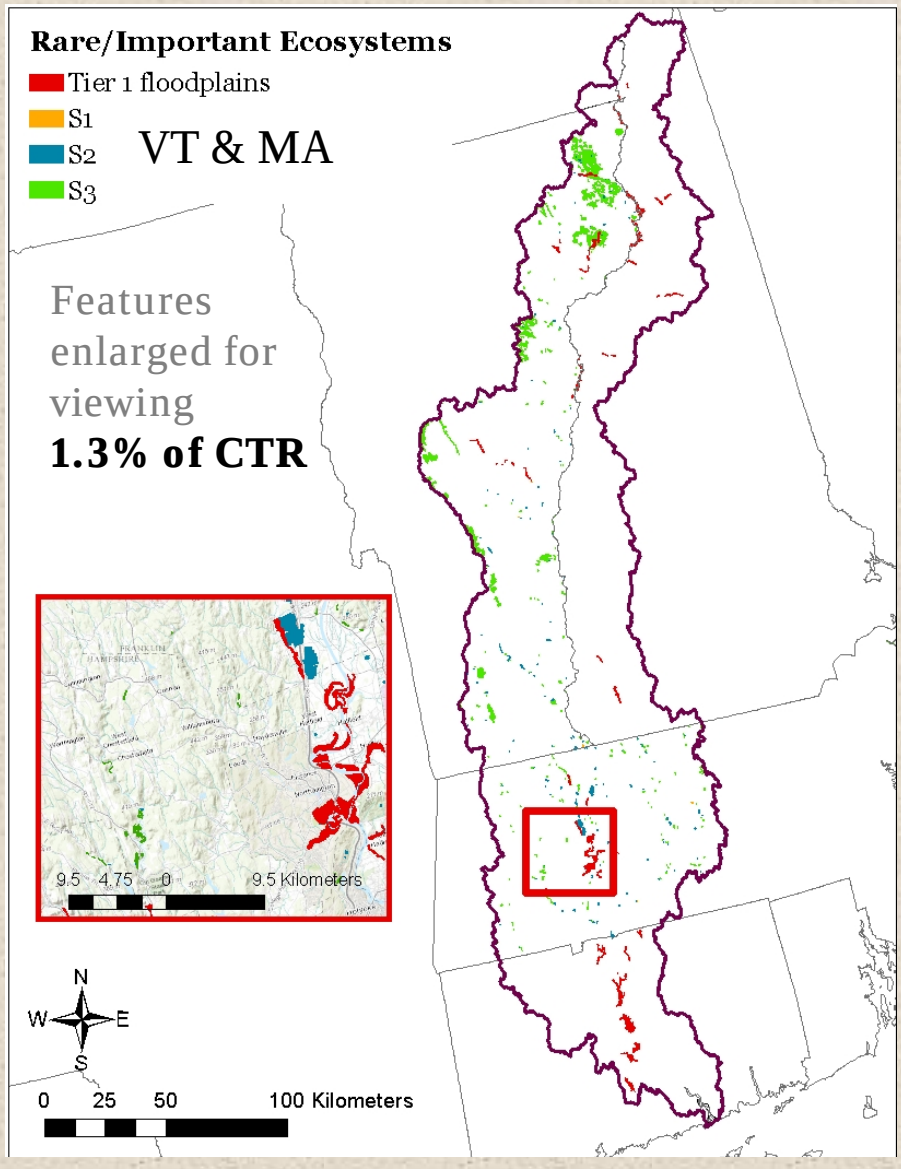
a) **Create core area selection index**

a) Rare/Important systems

b) DSL Index of Ecological Integrity (IEI)

c) TNC Resiliency

d) USGS headwater stream temp sensitivity



Landscape Conservation Design

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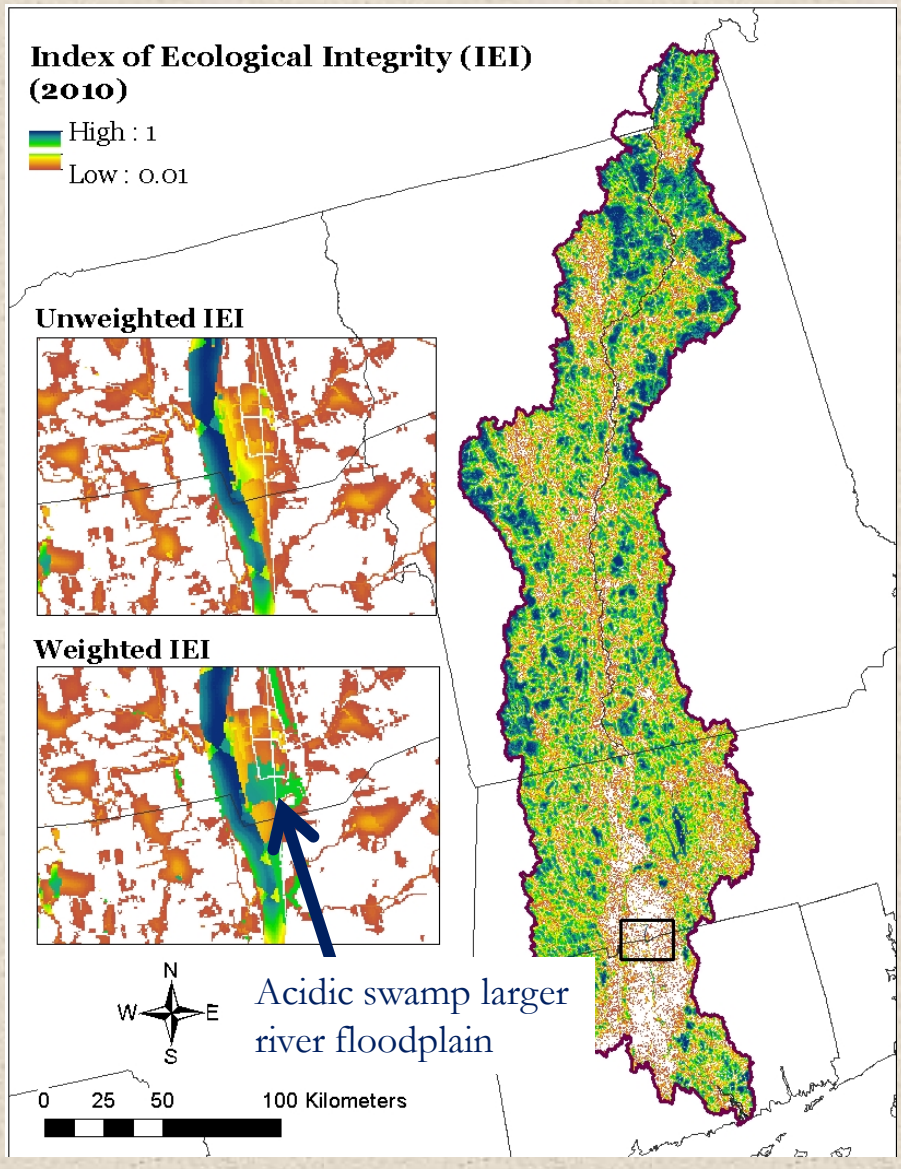

Landscape Conservation Design

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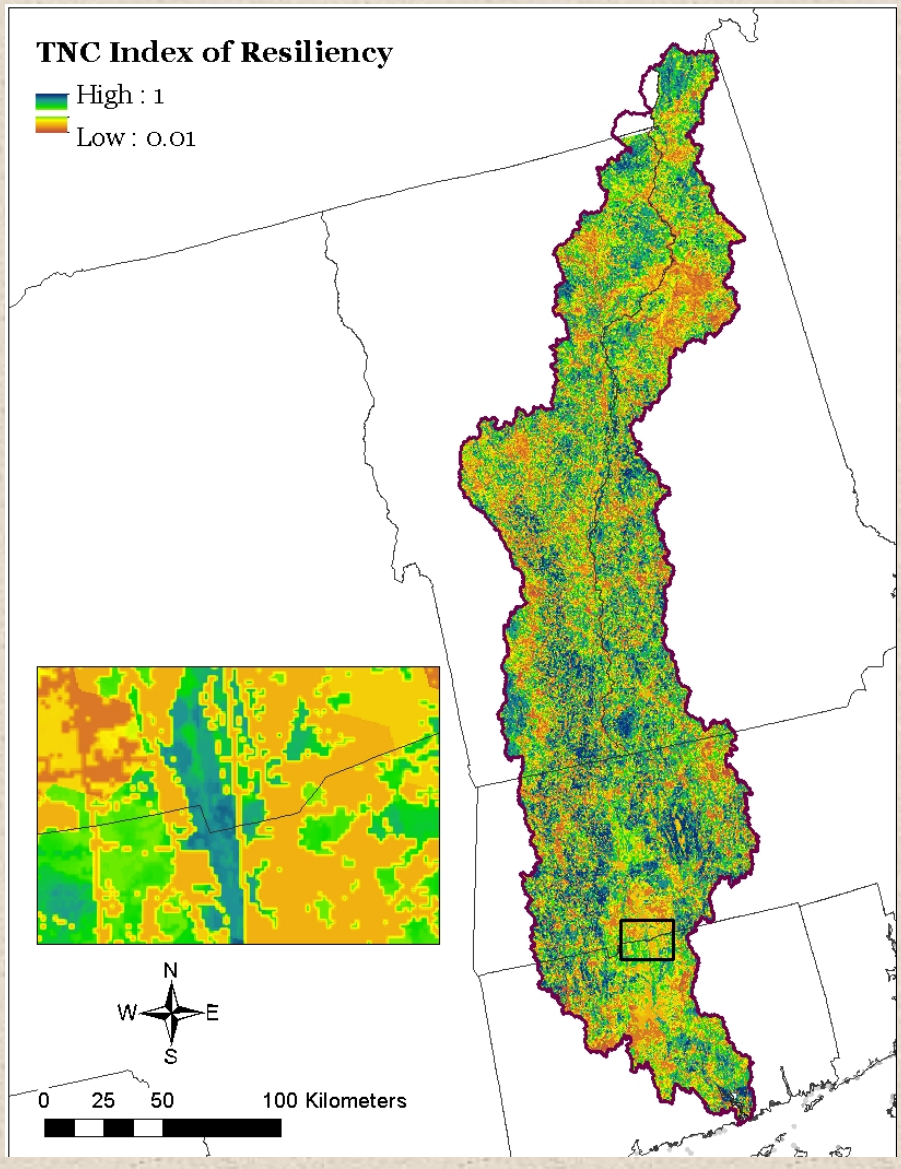

Landscape Conservation Design

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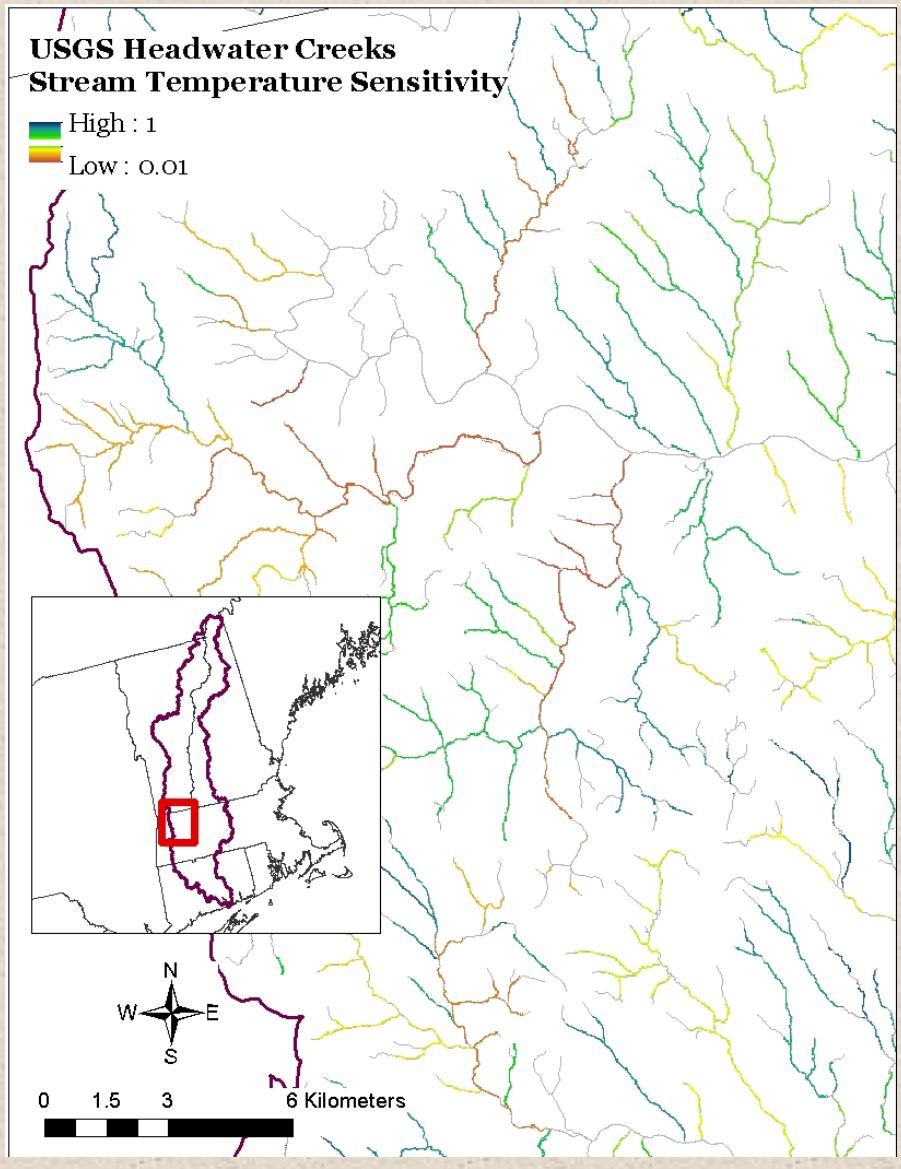

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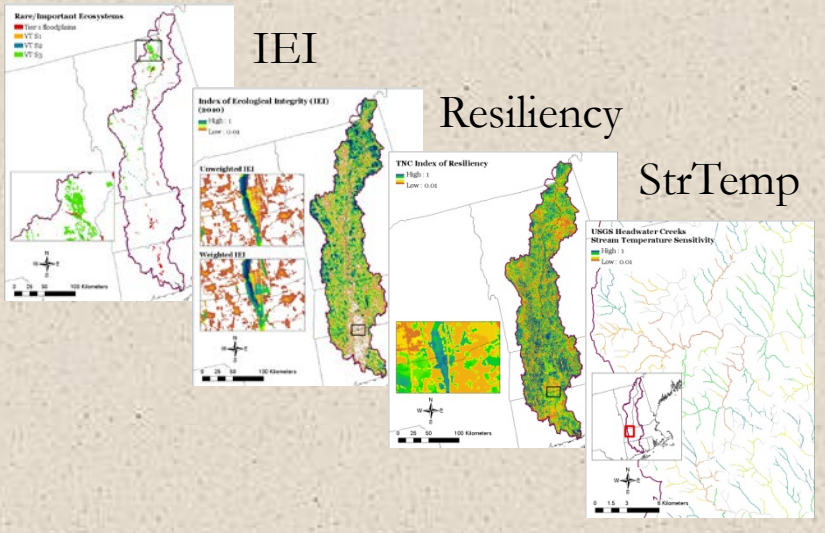
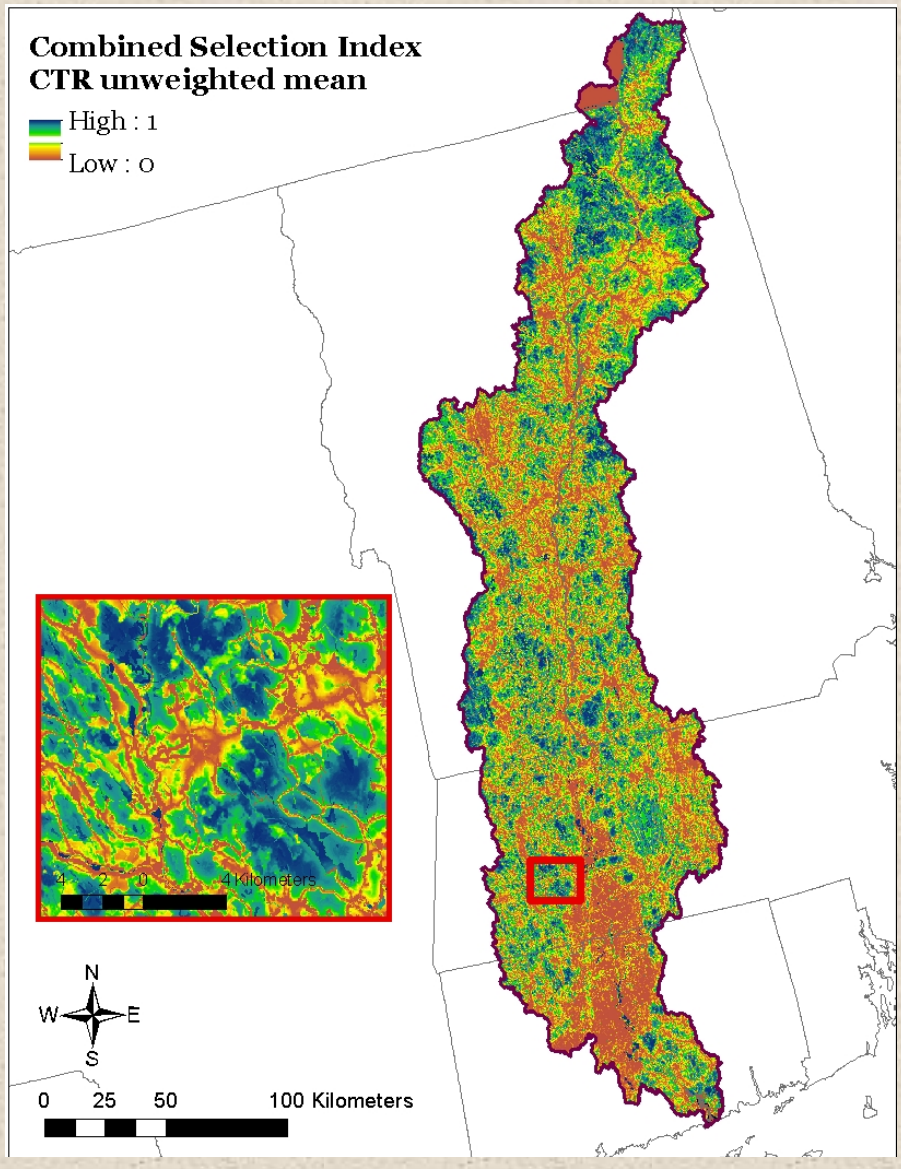
Step 2: Design Conservation Network

a) Create core area selection index

- Combine the products into a single selection index

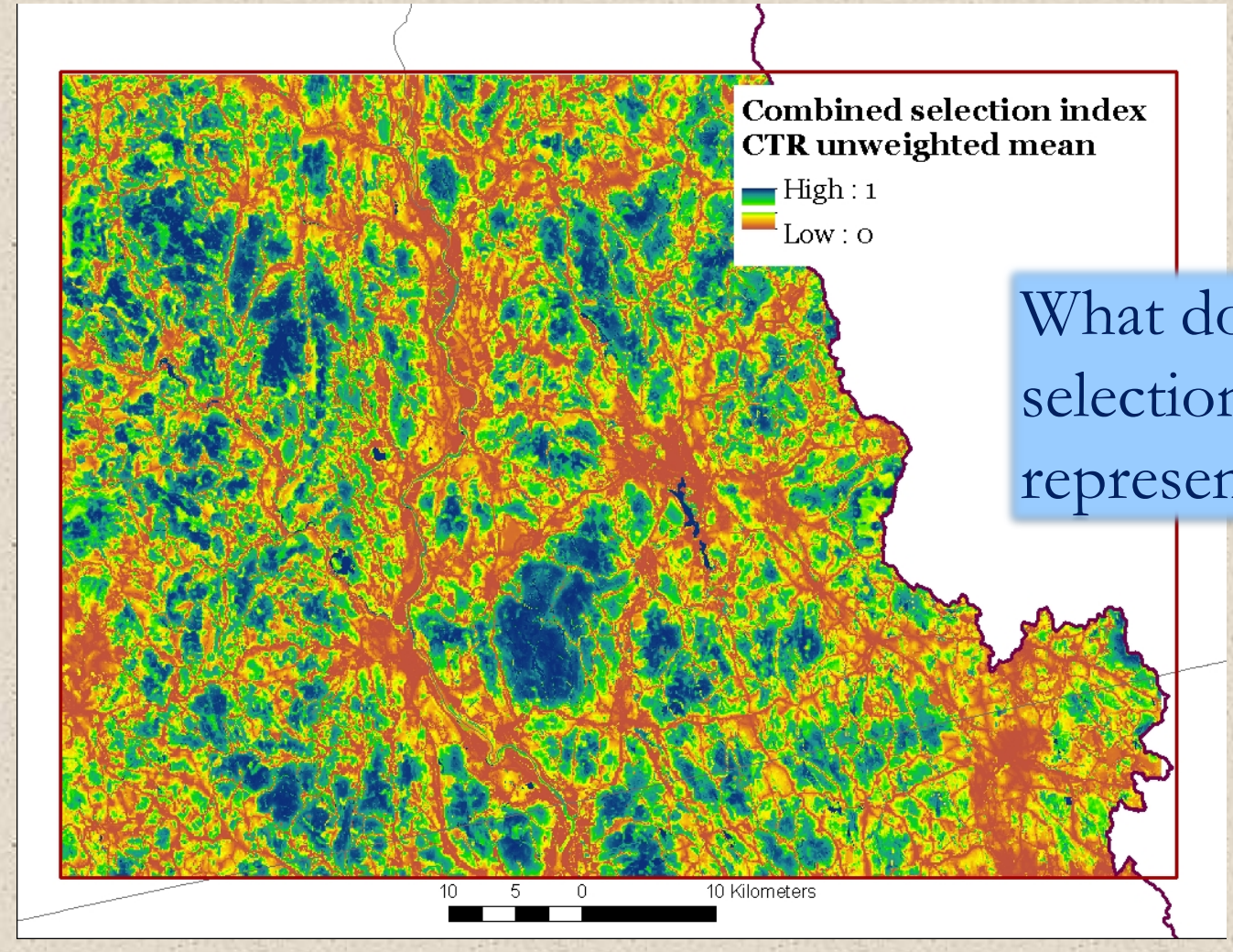
Rare





Step 2: Design Conservation Network

a) Create core area selection index



What does the selection index represent?

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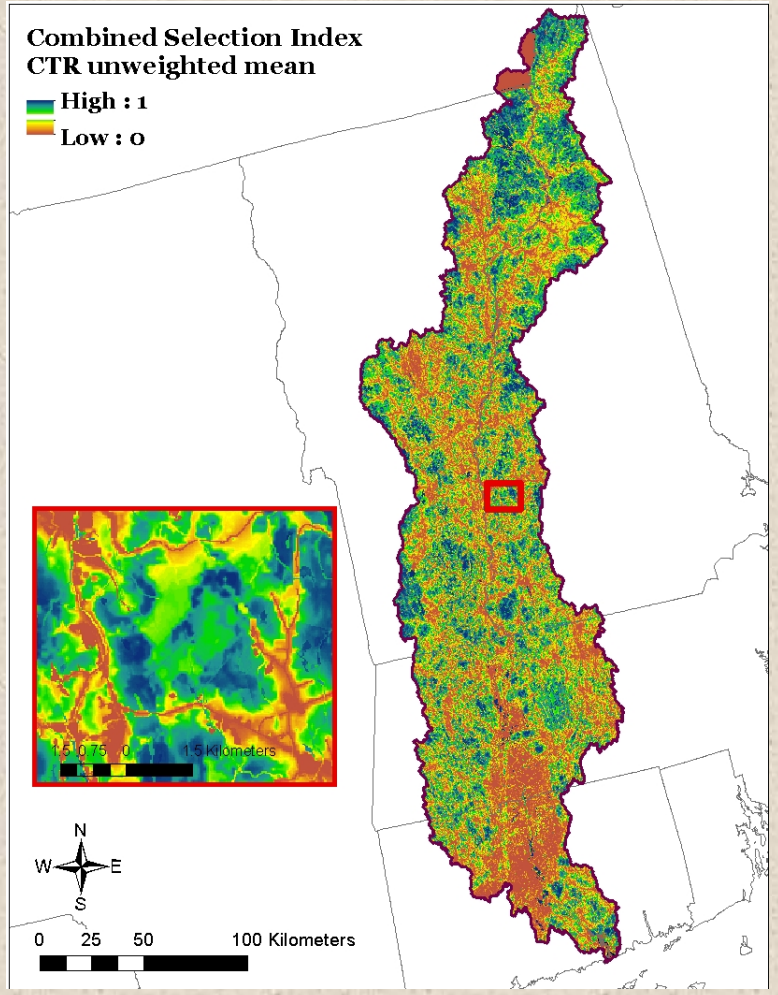
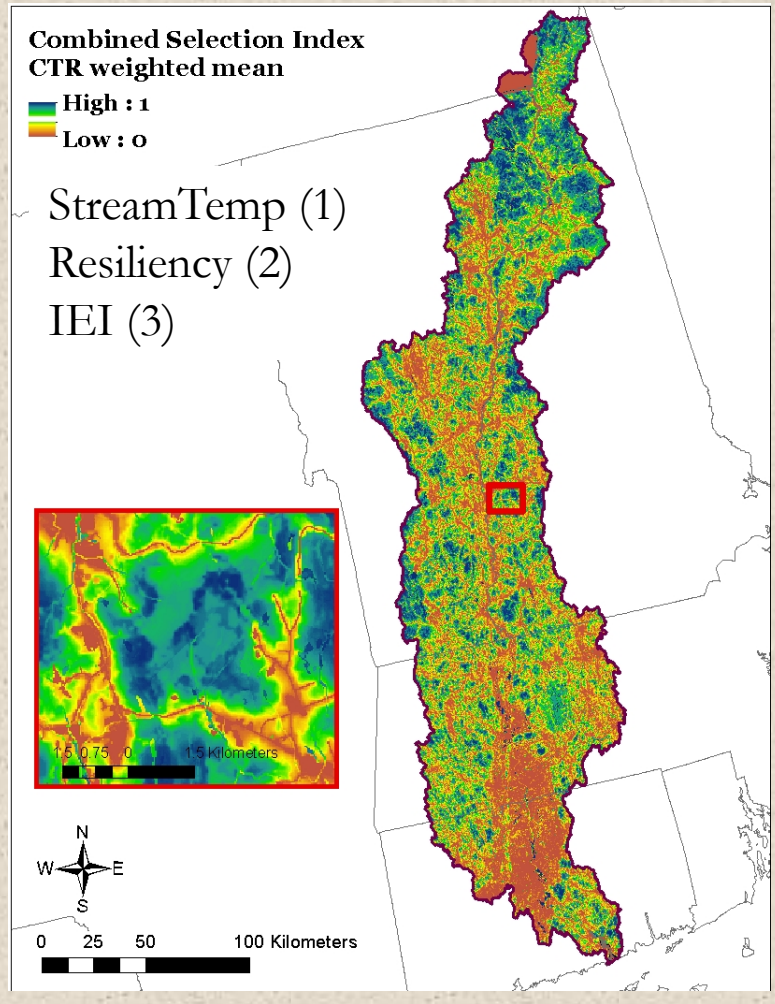
Step 2: Design Conservation Network

- Selection index: unweighted versus weighted mean





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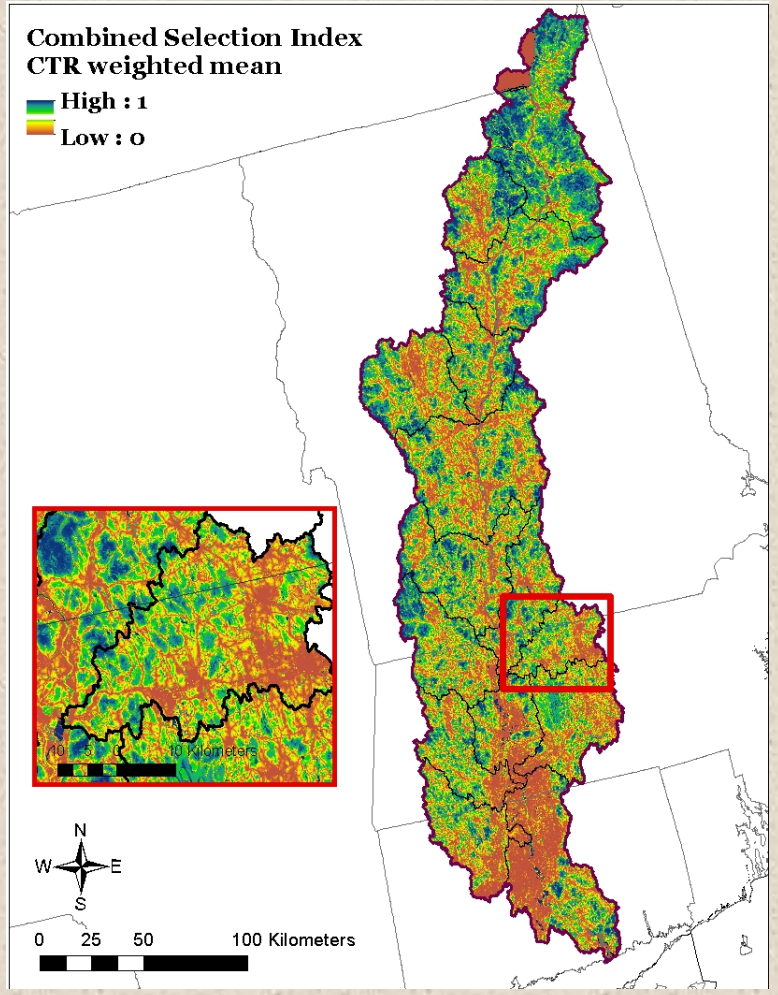
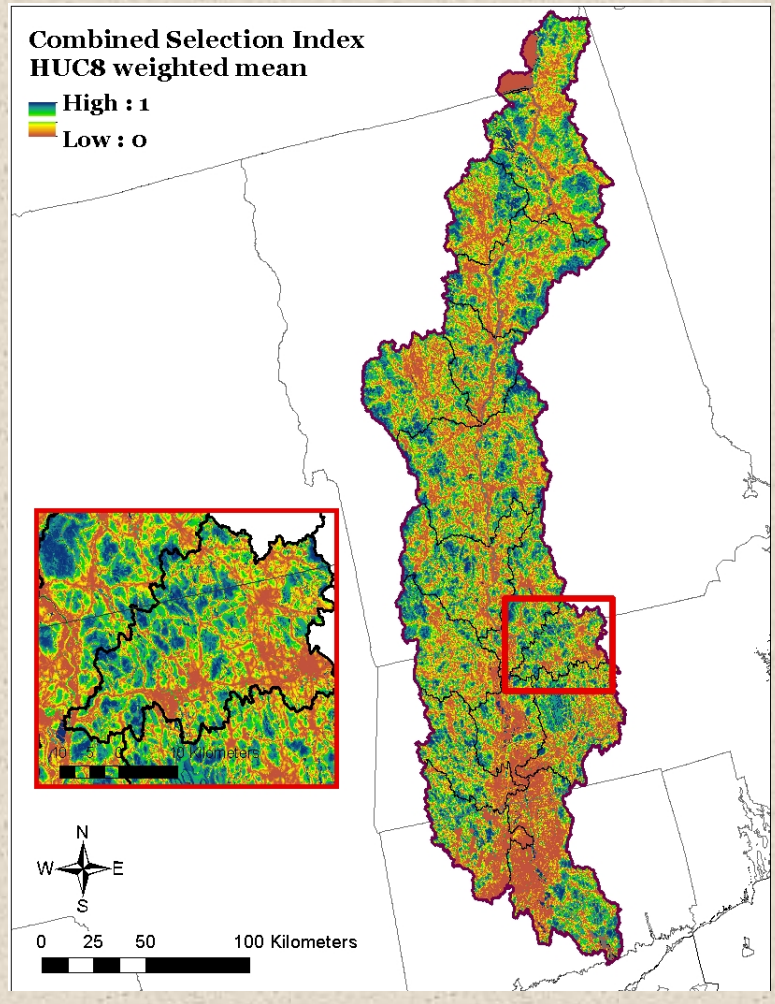
- Selection index: CTR scaled versus HUC8 scaled



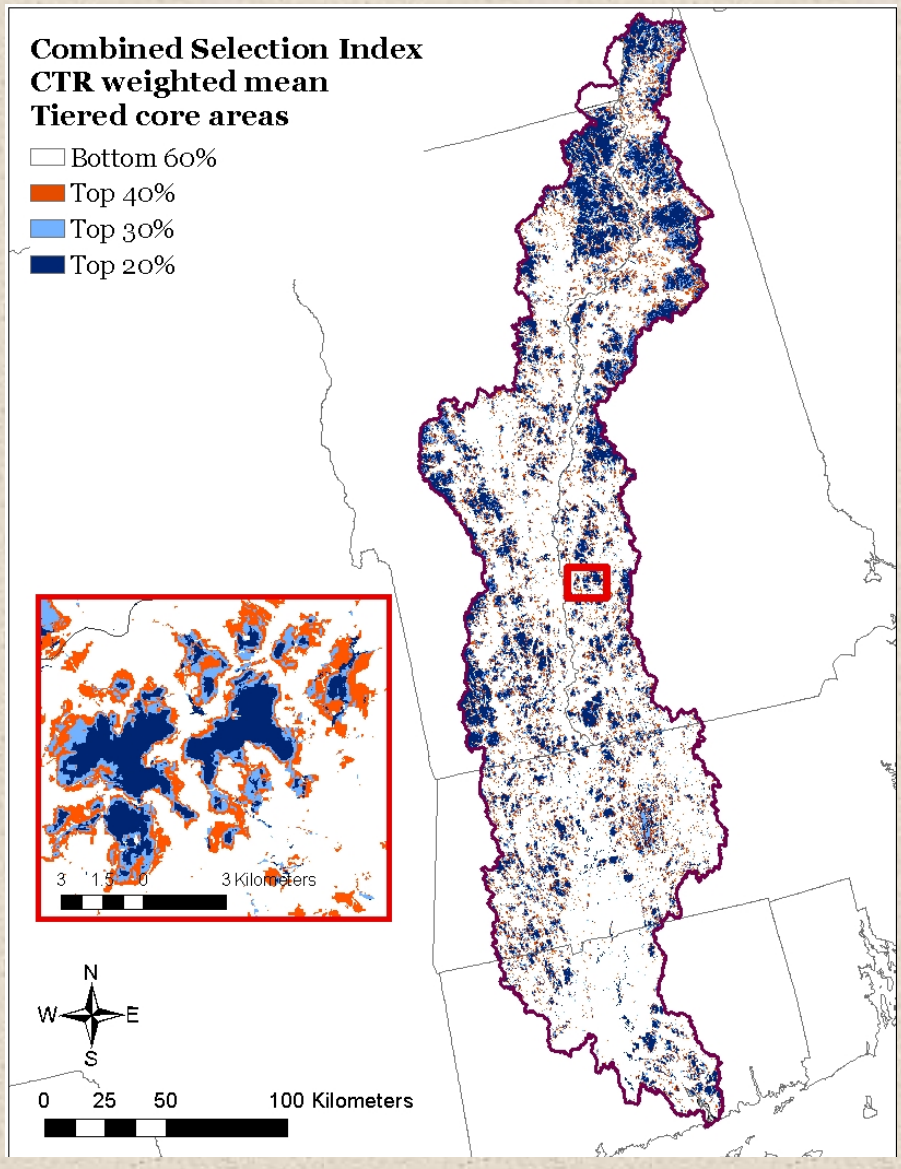


Step 2: Design Conservation Network

b) Delineate core areas

Why bother creating (tiered)core areas?

- Helps target conservation actions
- Useful for establishing corridors to facilitate regional connectivity

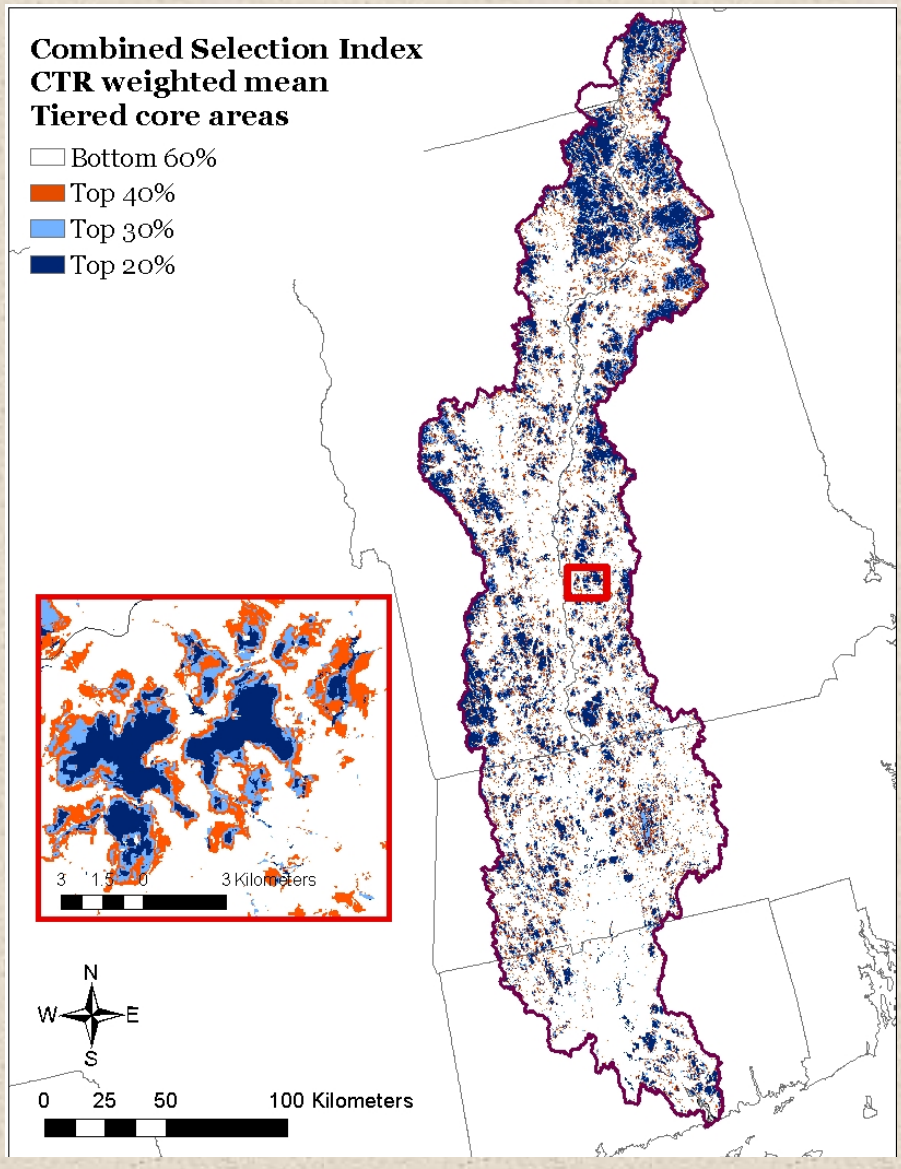


Step 2: Design Conservation Network

b) Delineate core areas

What does it look like if we simply slice the selection index at a specified level(s)?

- Fragmented distribution (too many small cores and complex shapes?)



Landscape Conservation Design

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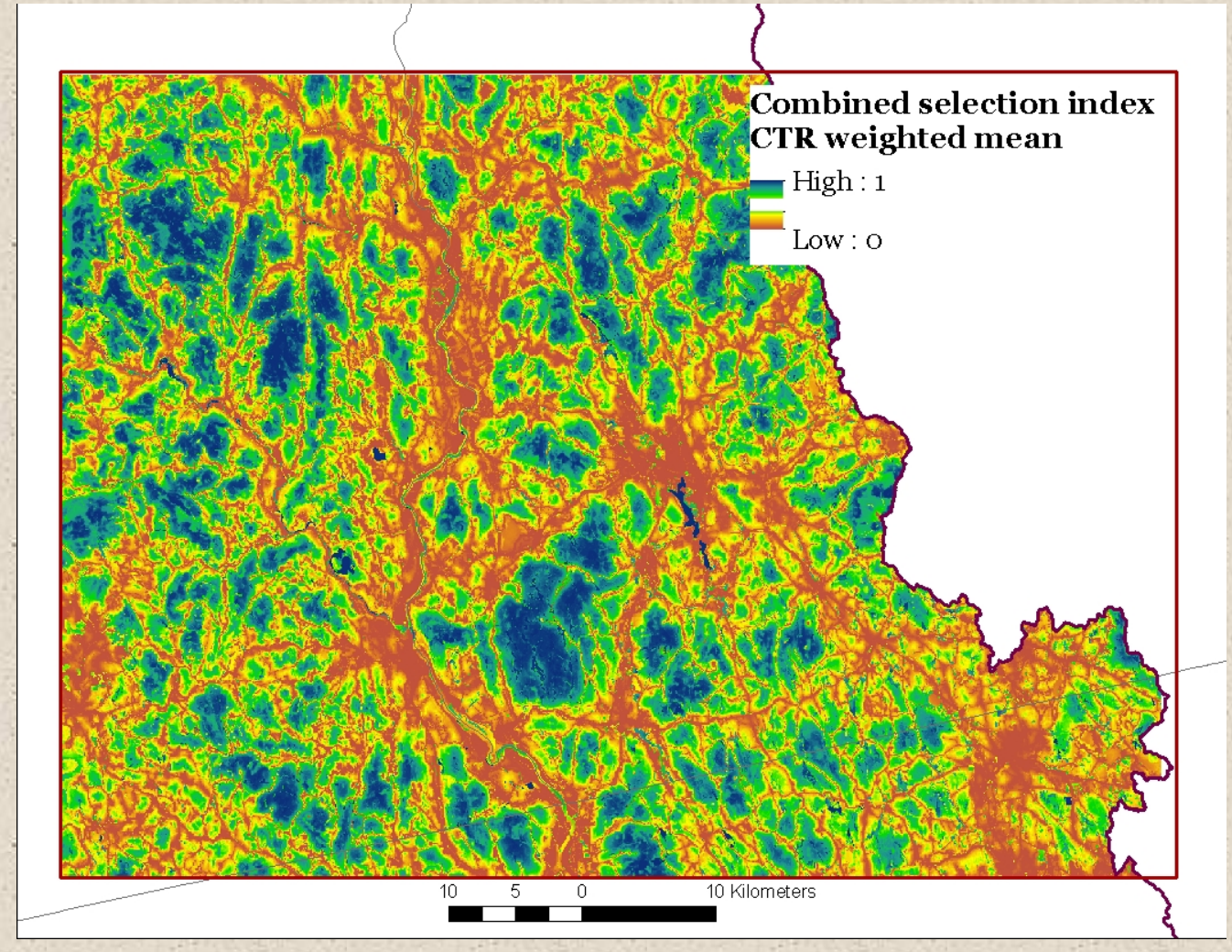

Landscape Conservation Design

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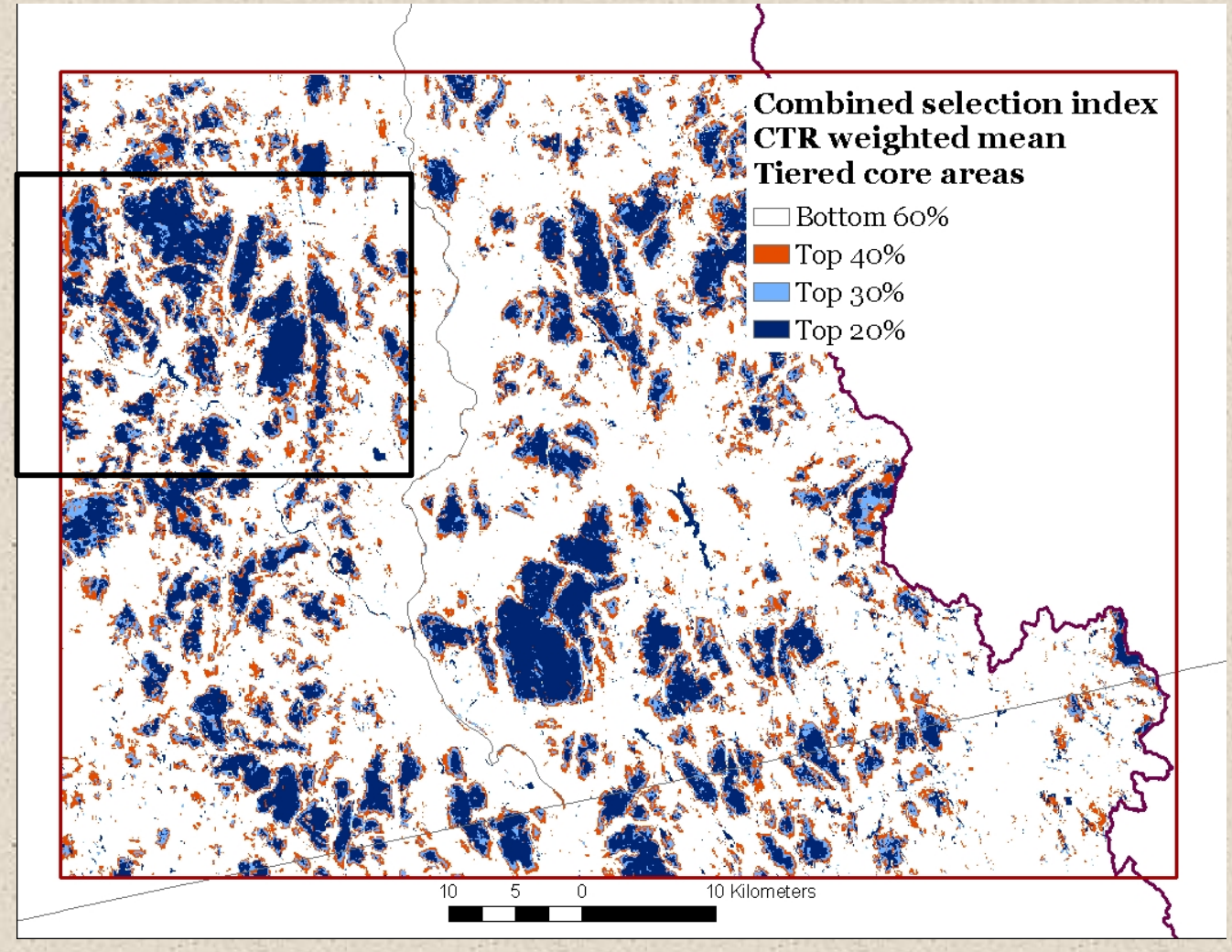

Landscape Conservation Design

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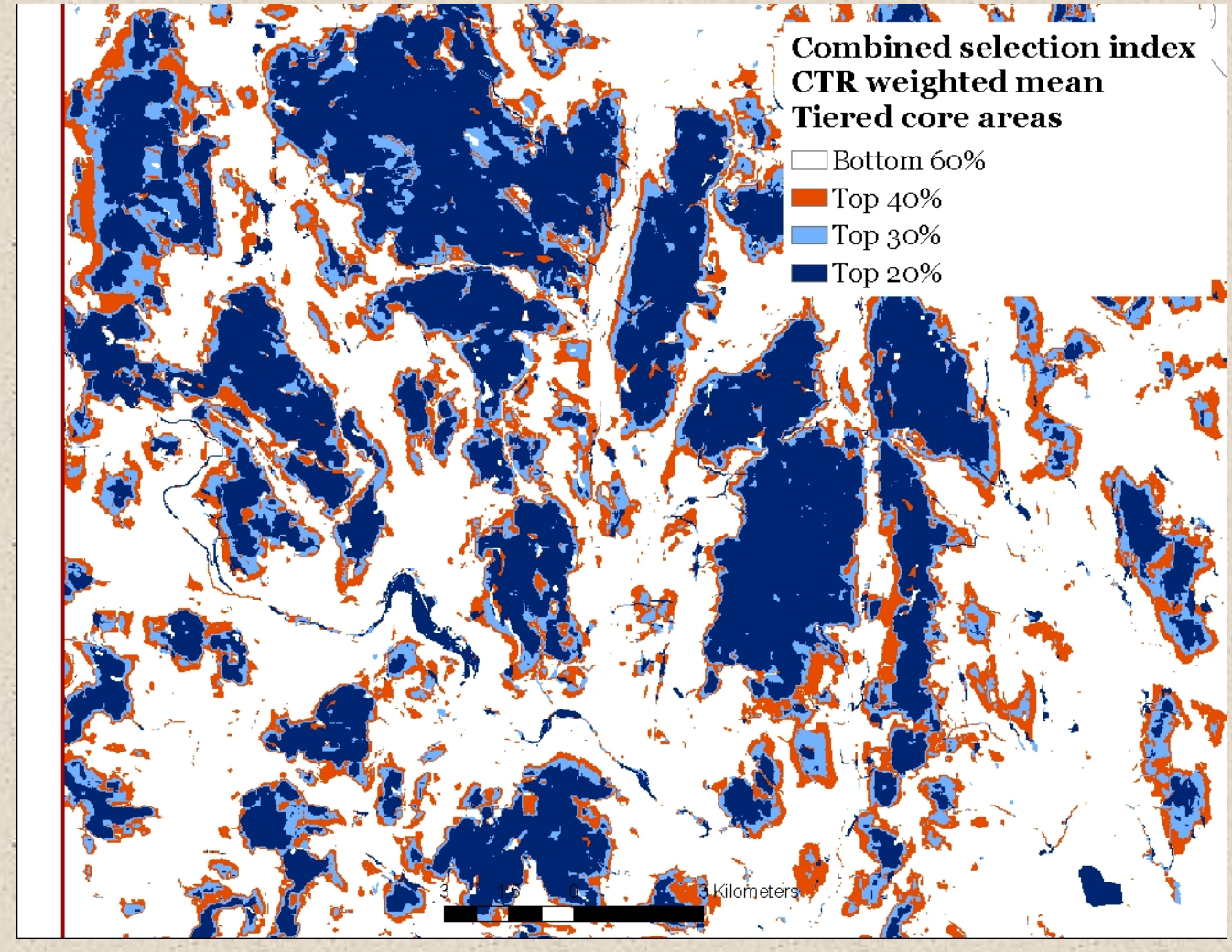

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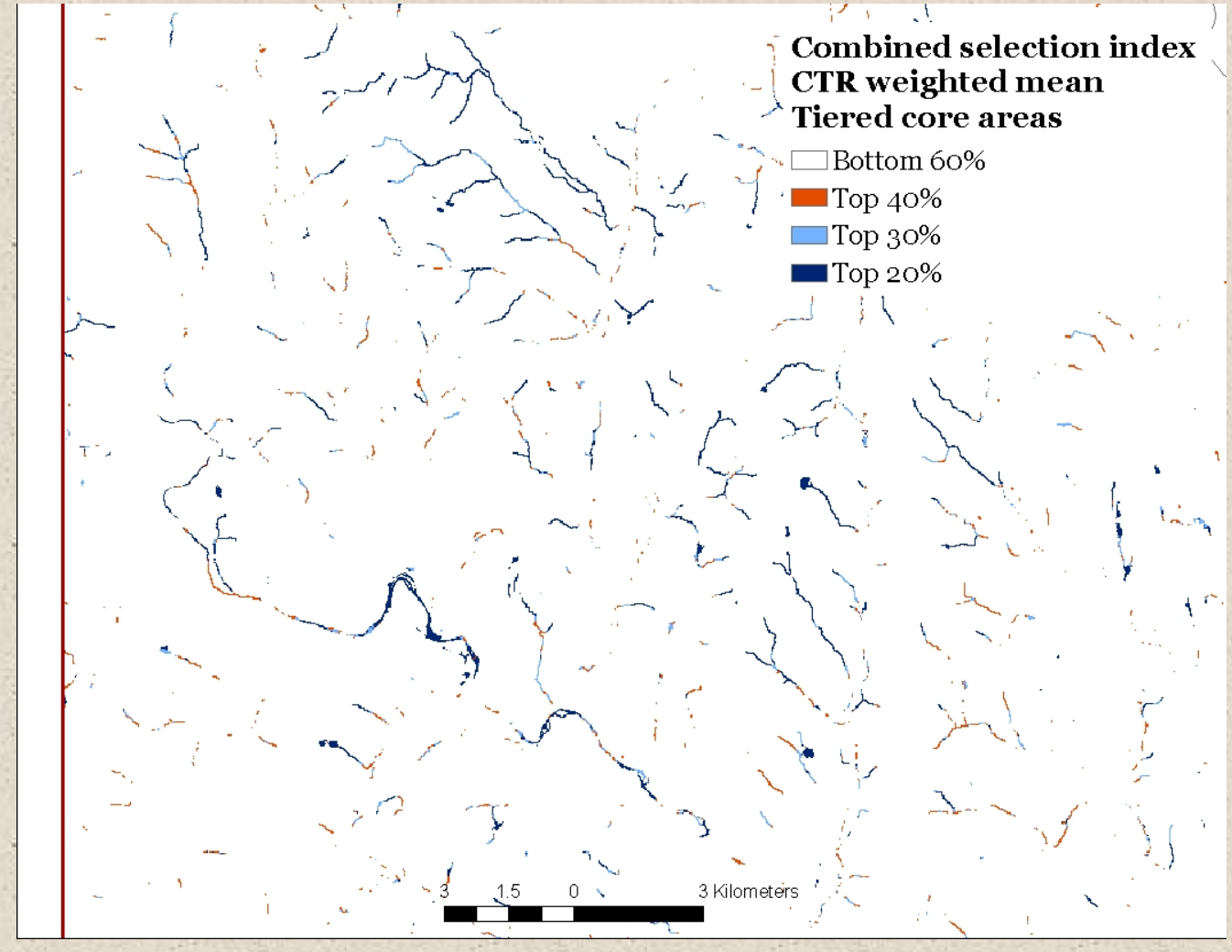

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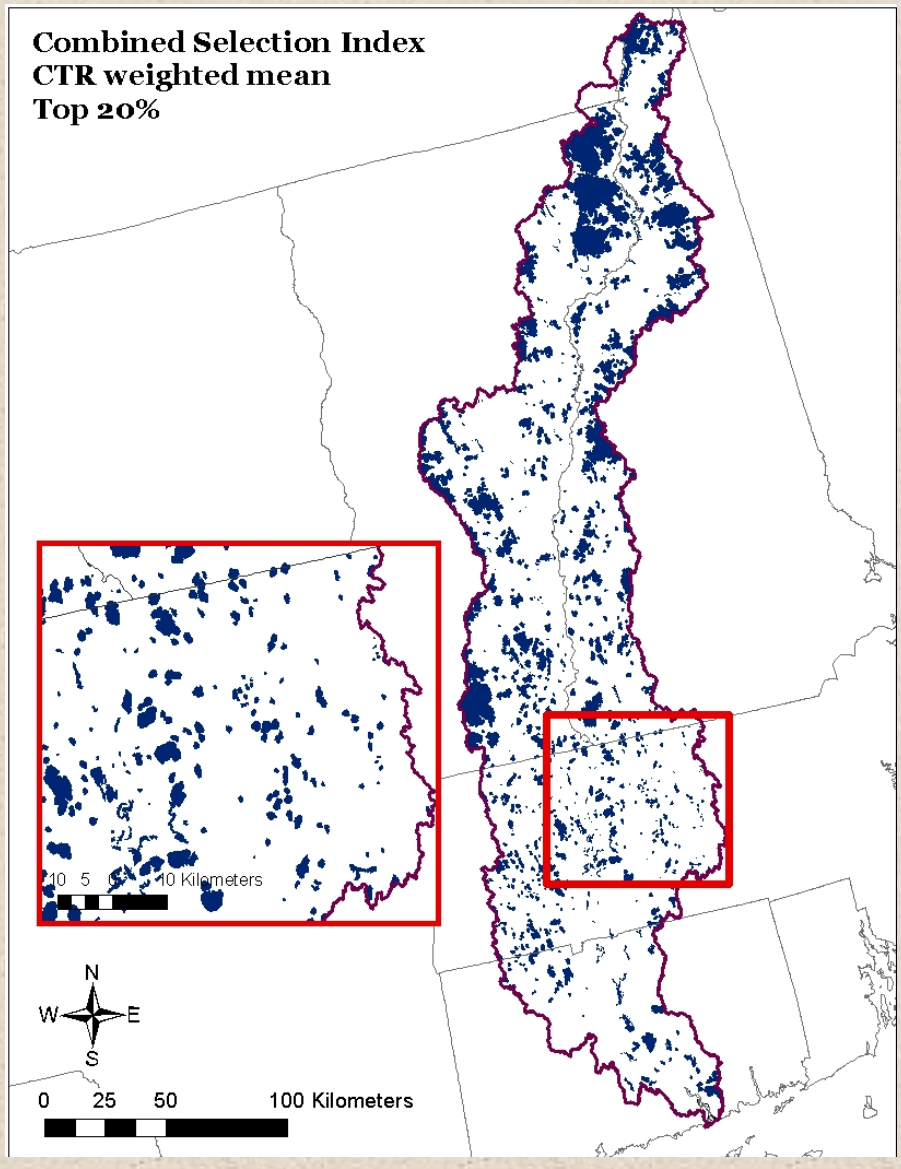
Step 2: Design Conservation Network

b) Delineate core areas

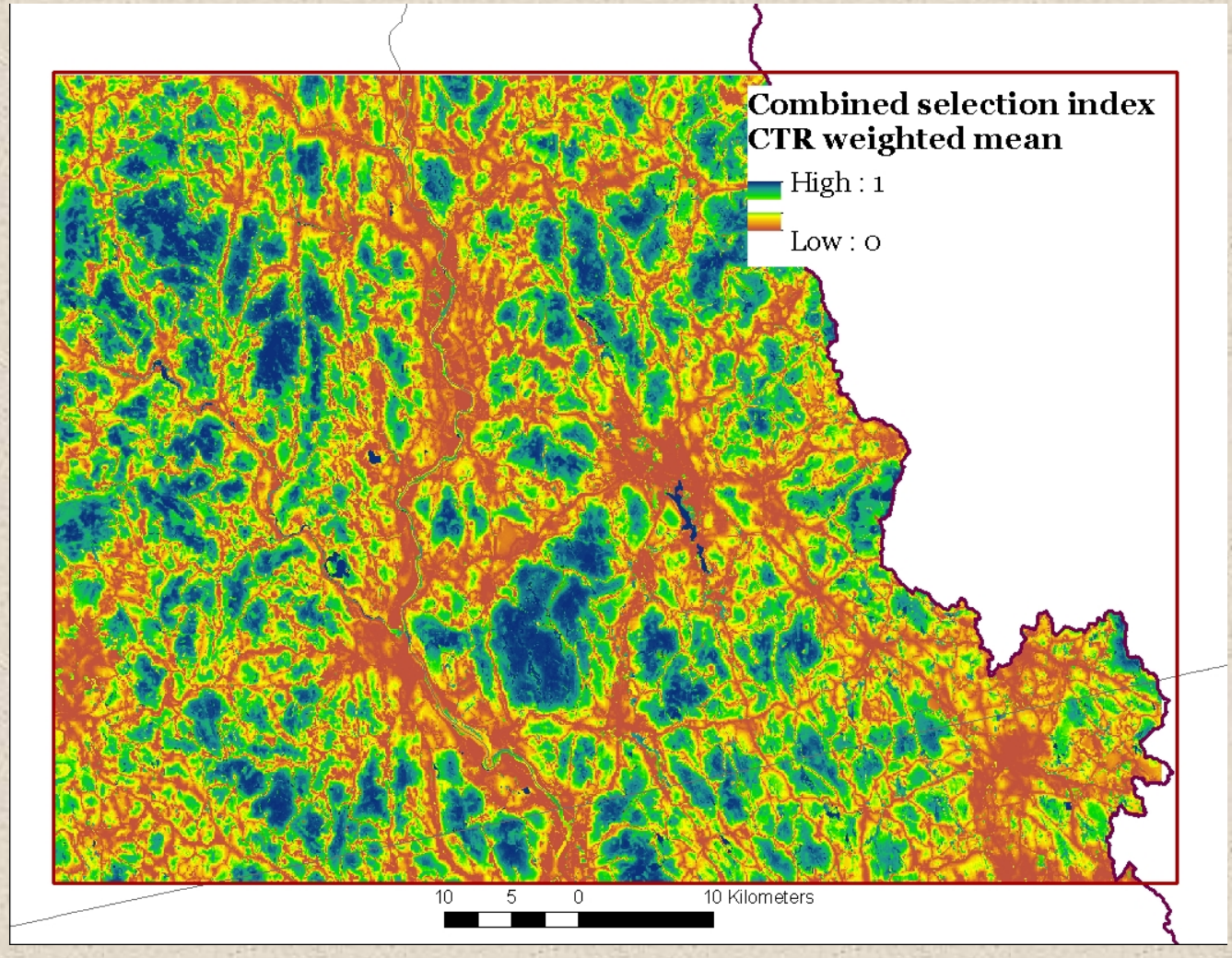
What if we use an algorithmic approach to build meaningful buffered core areas?

- Number versus size
- Minimum area
- Shape (boundary roughness)
- Spread barriers



Step 2: Design Conservation Network

b) Delineate terrestrial buffered core areas



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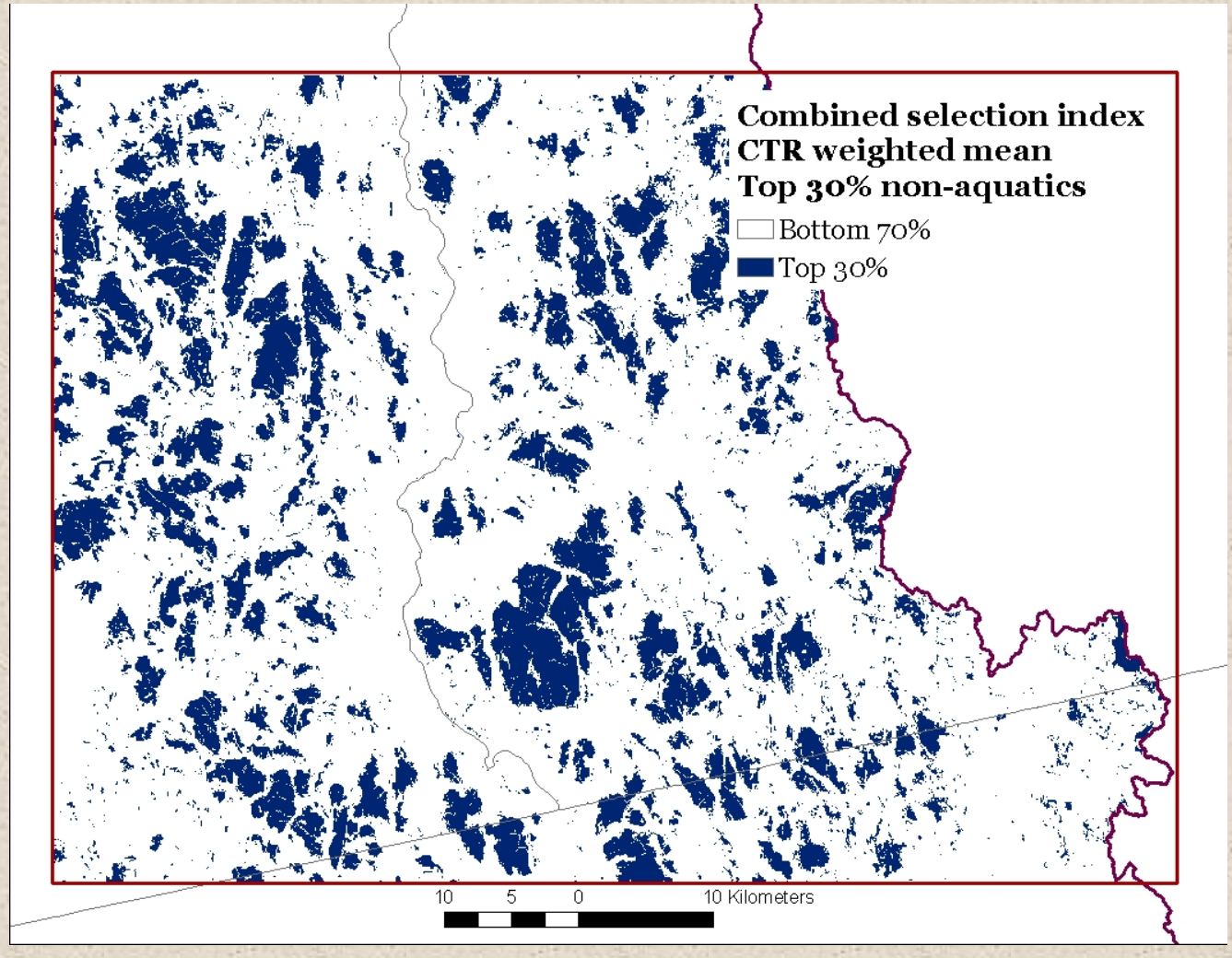

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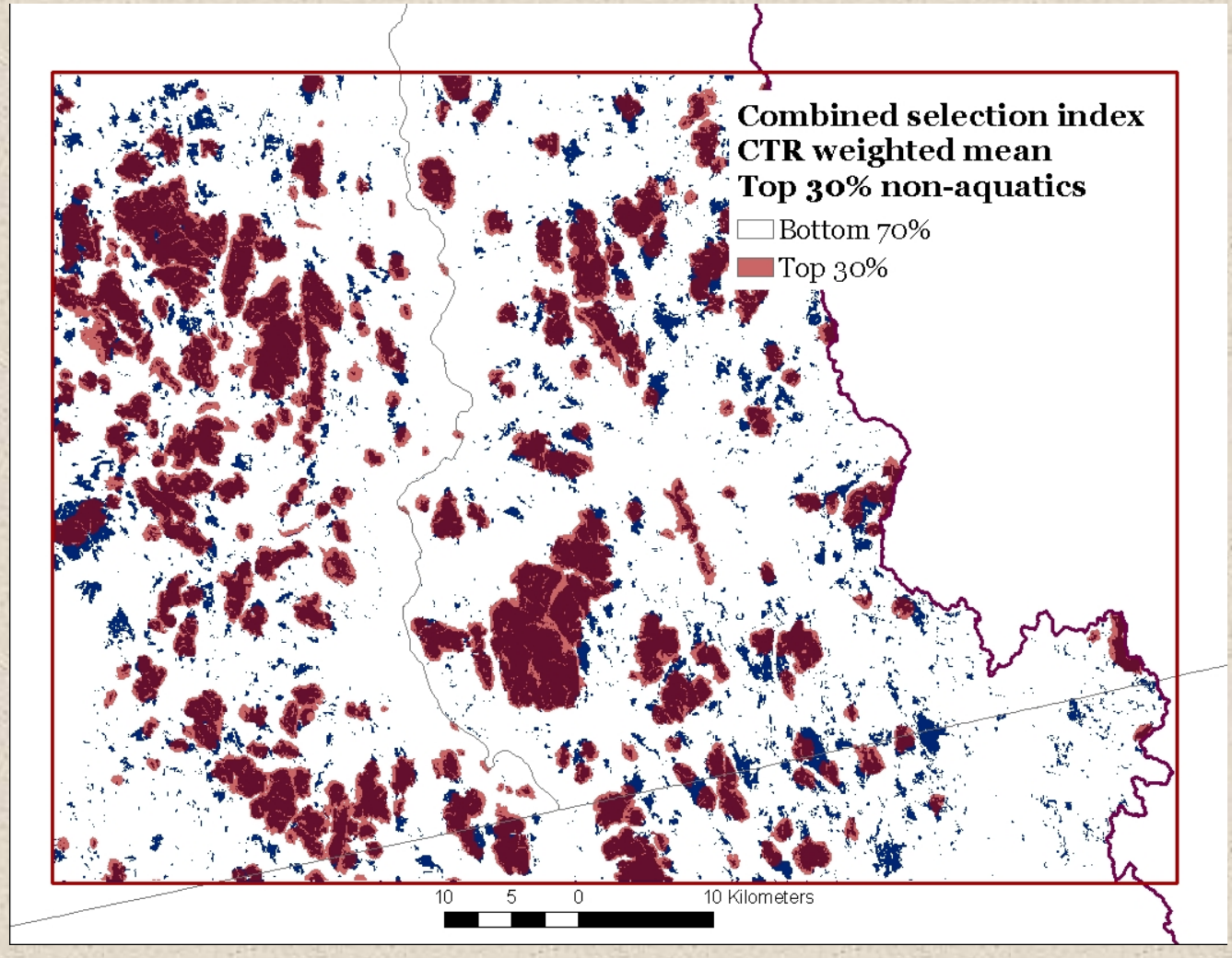
b) Delineate <u>terrestrial</u> buffered core areas



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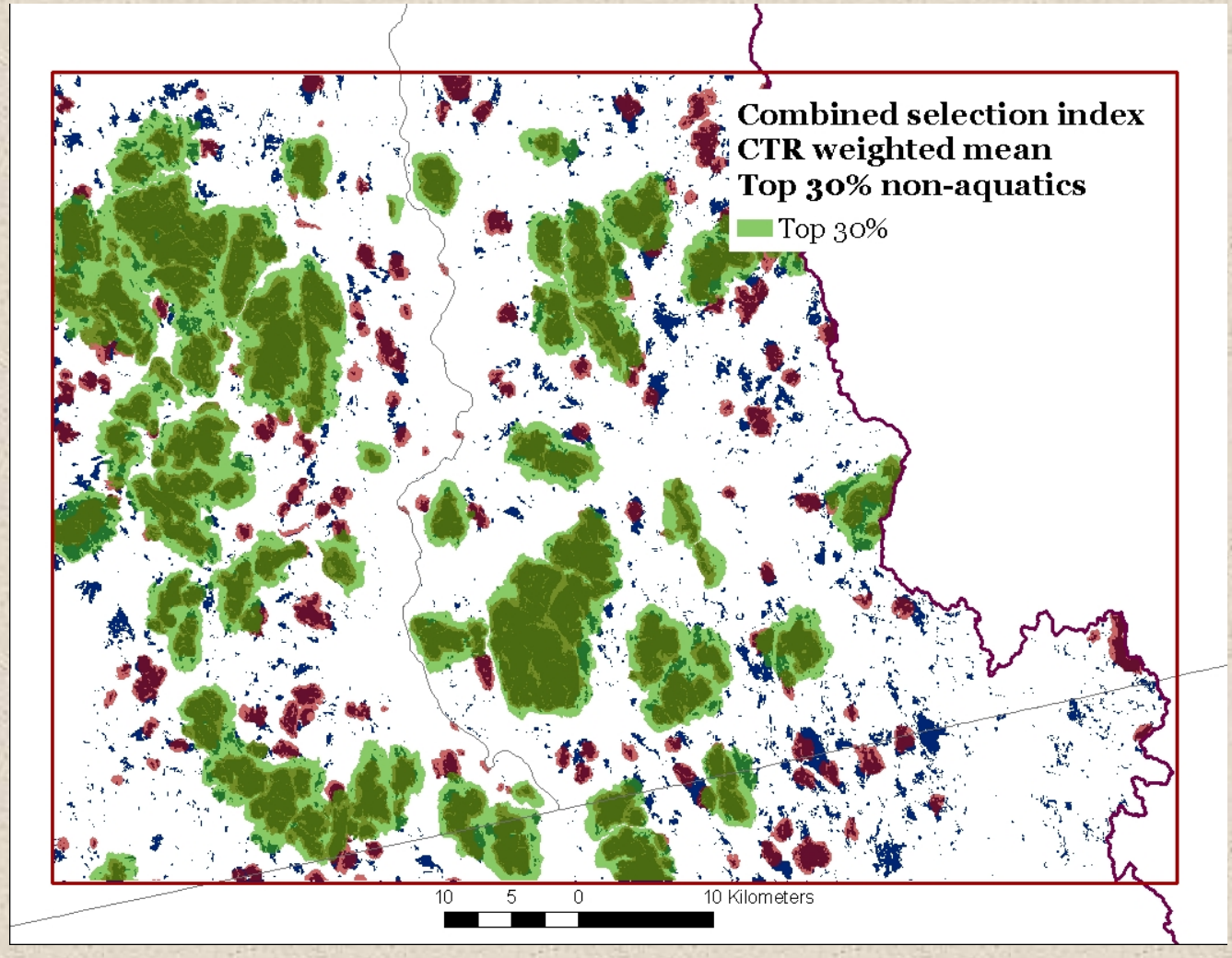

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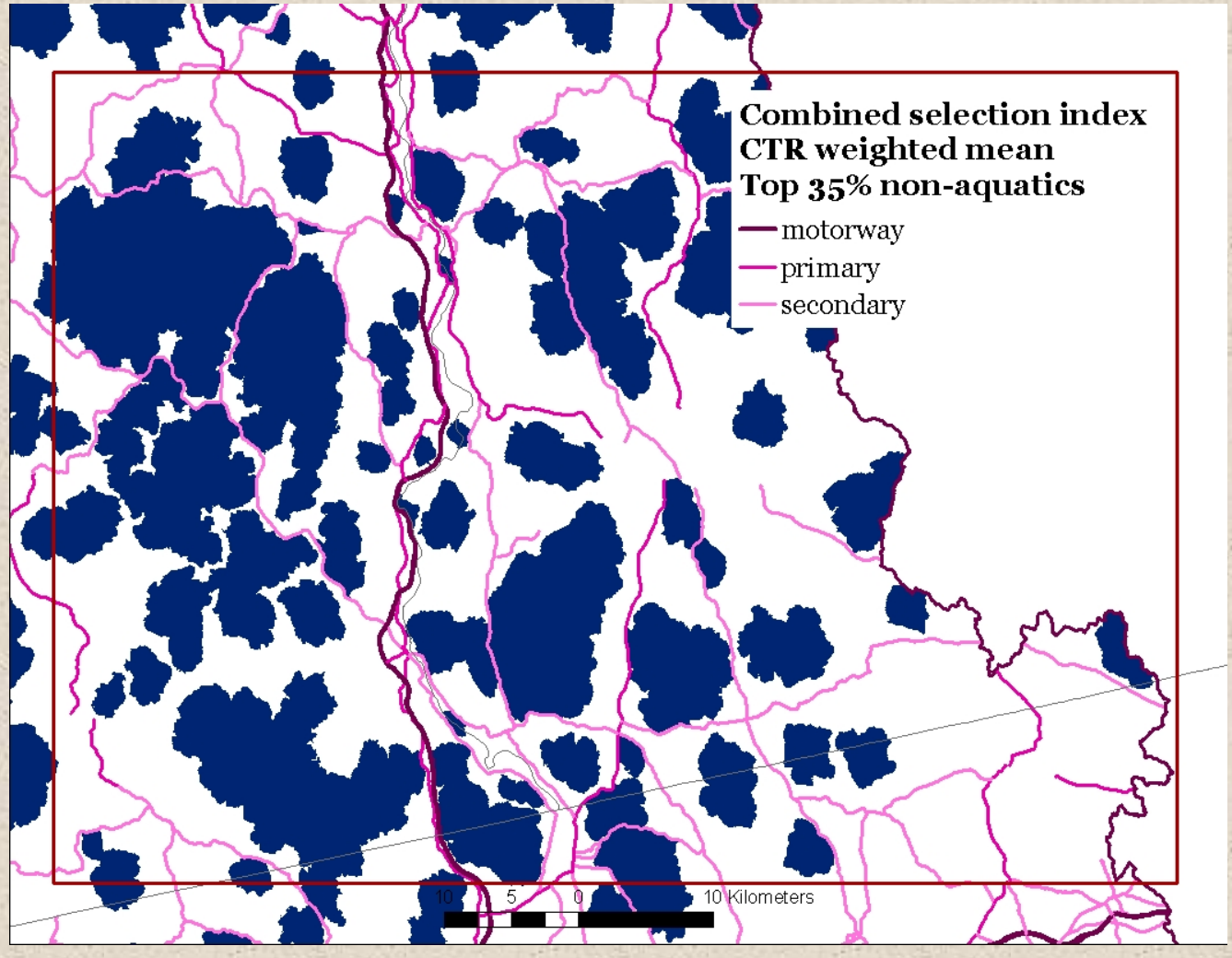

Landscape Conservation Design

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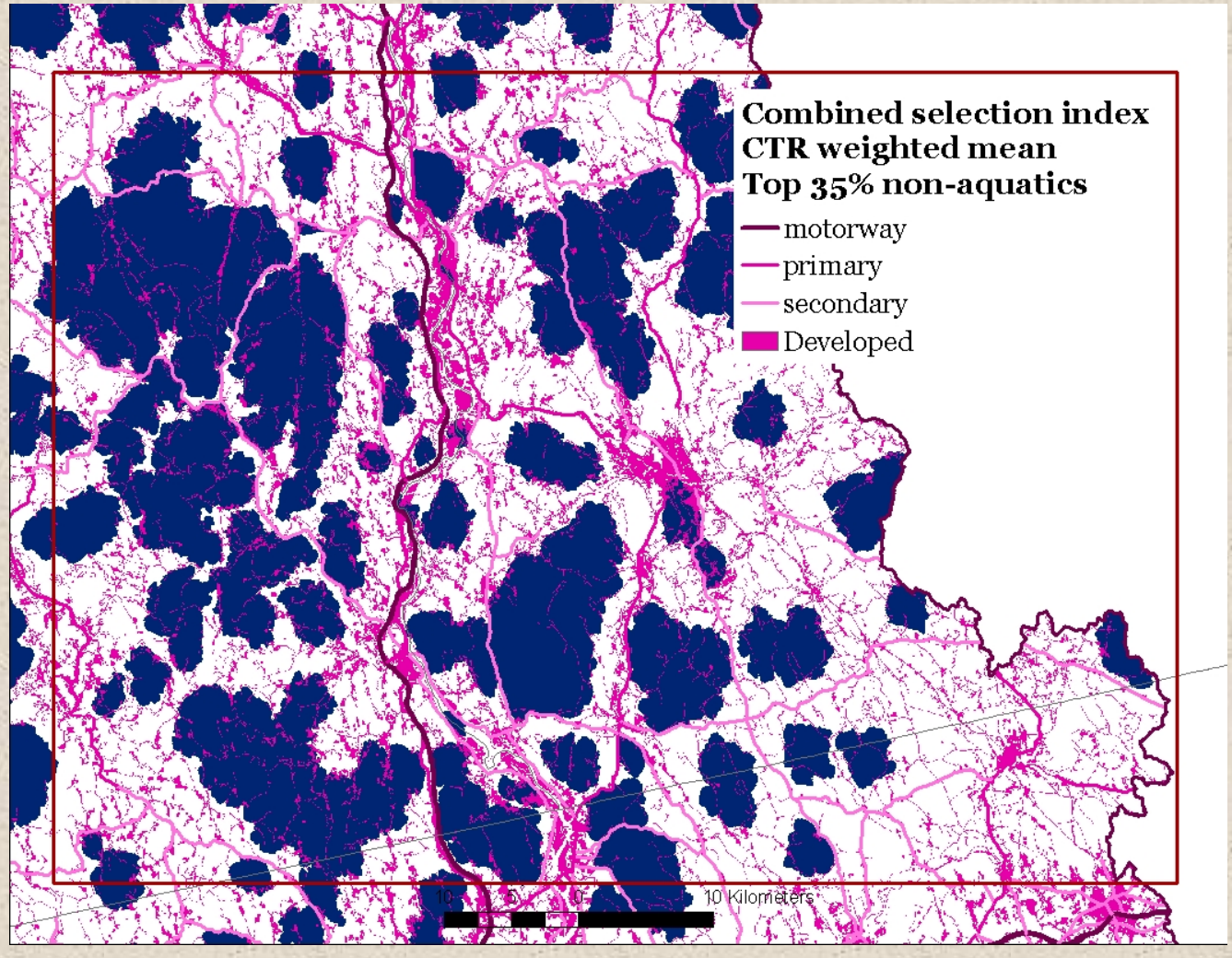

Landscape Conservation Design

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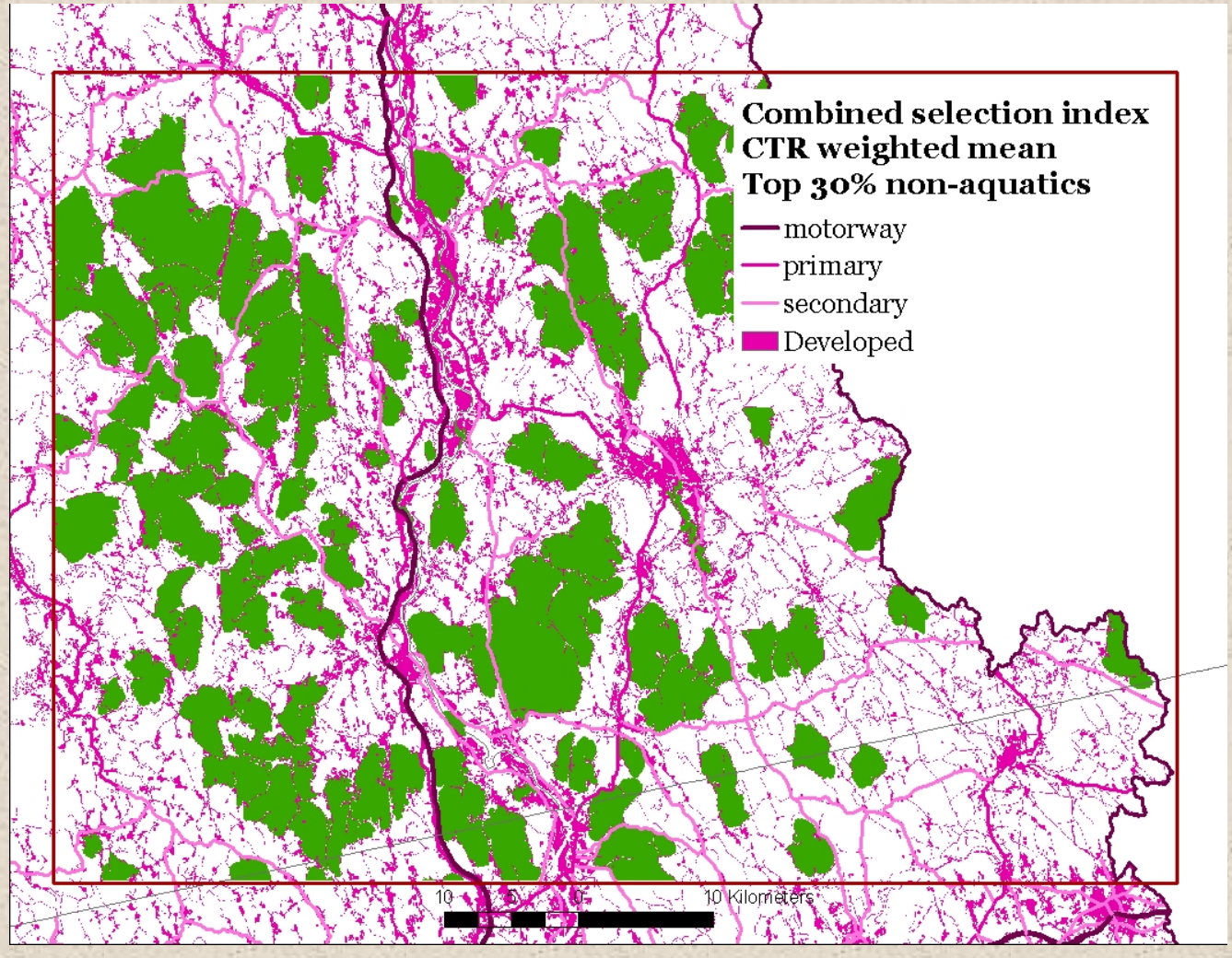

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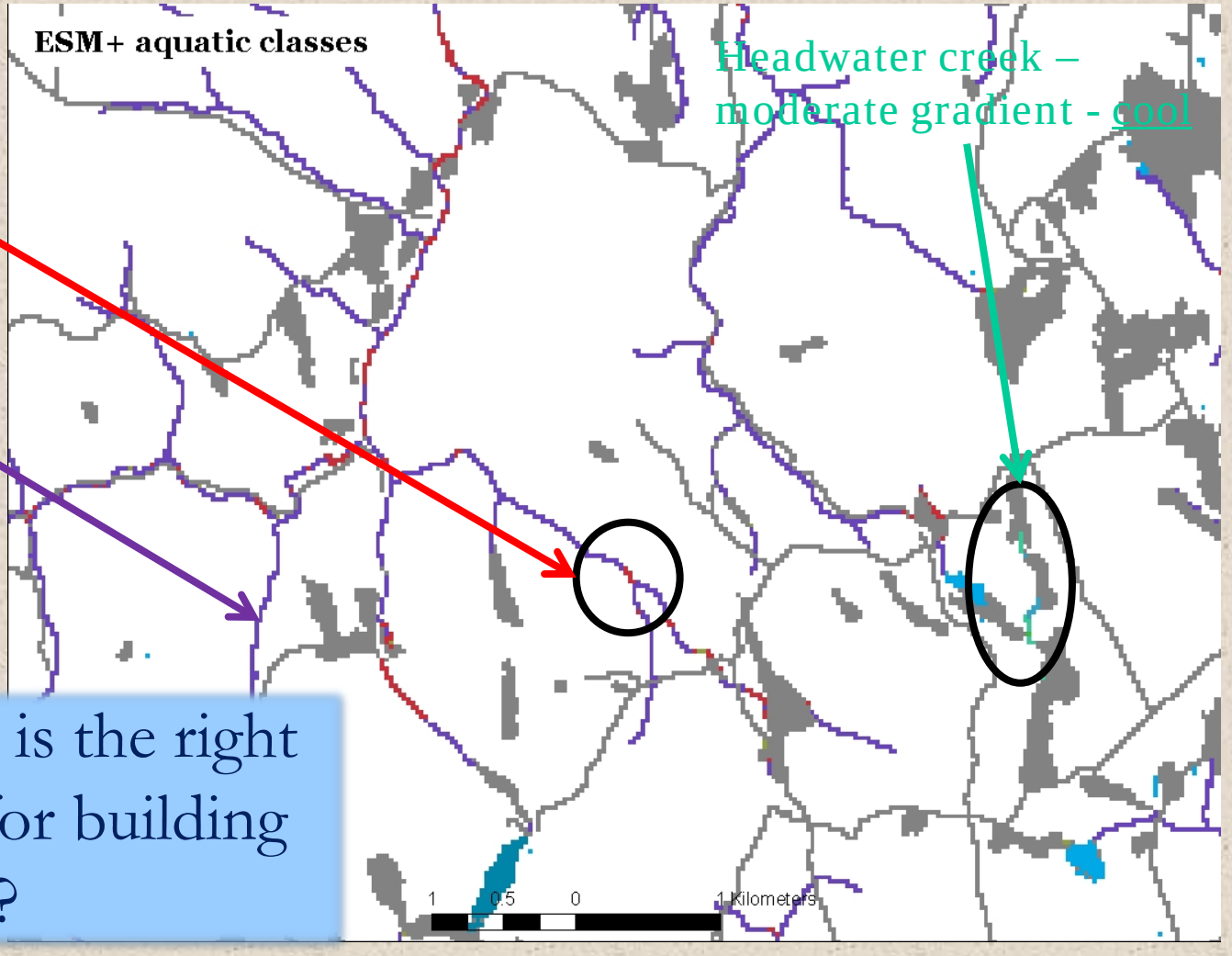
Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 1



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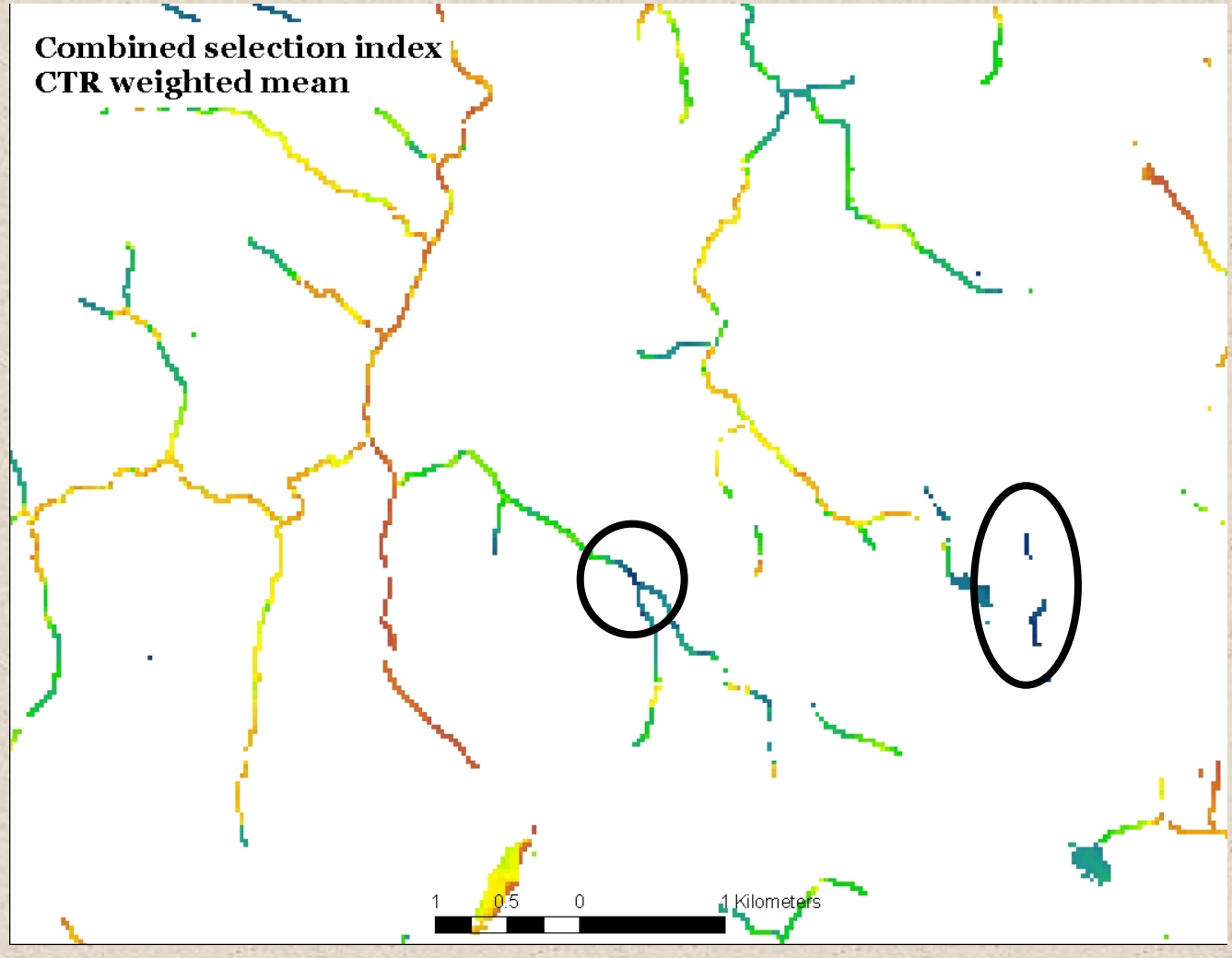
What is the right unit for building cores?

Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 1



Step 2: Design Conservation Network

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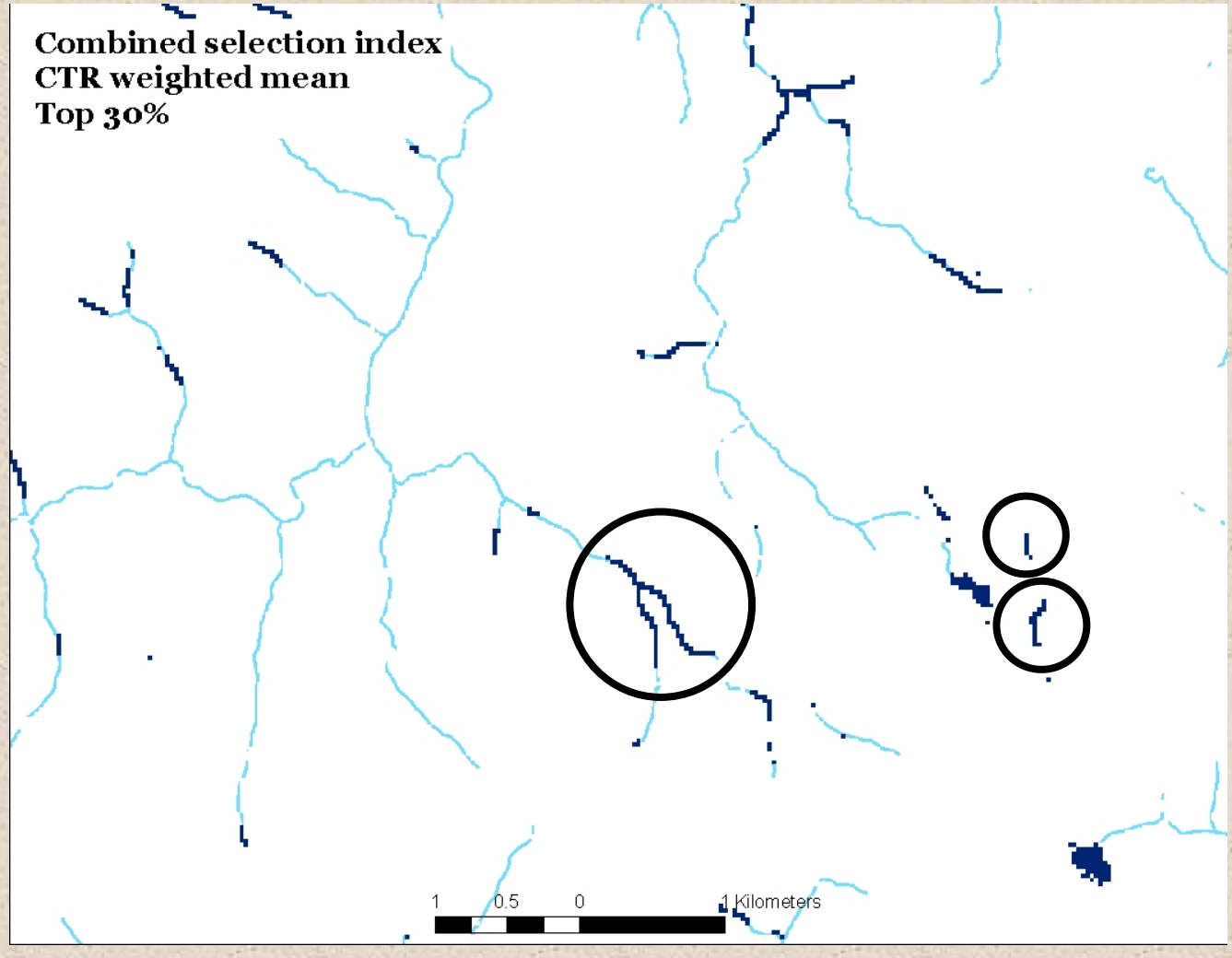

Step 2: Design Conservation Network

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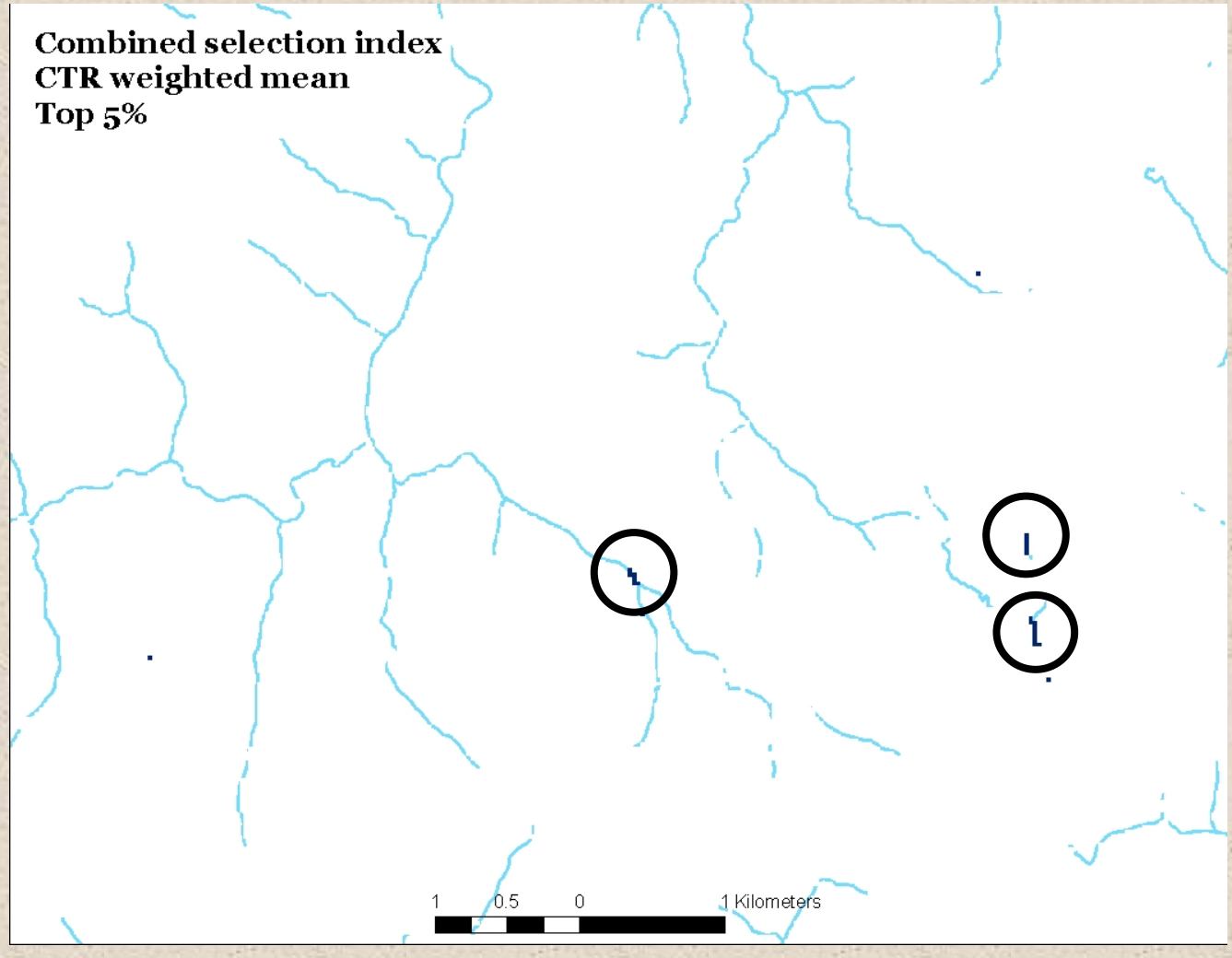

Step 2: Design Conservation Network

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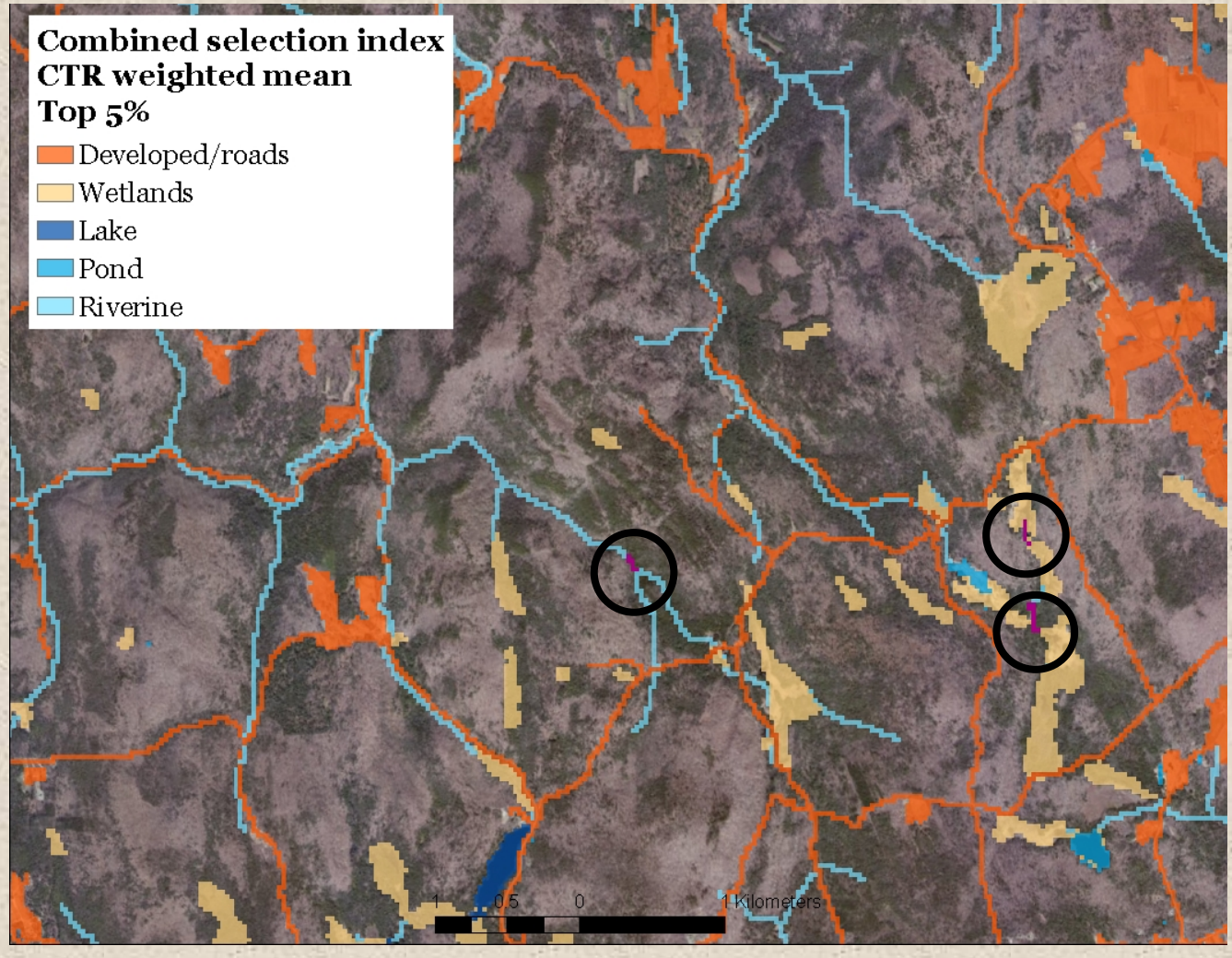

Step 2: Design Conservation Network

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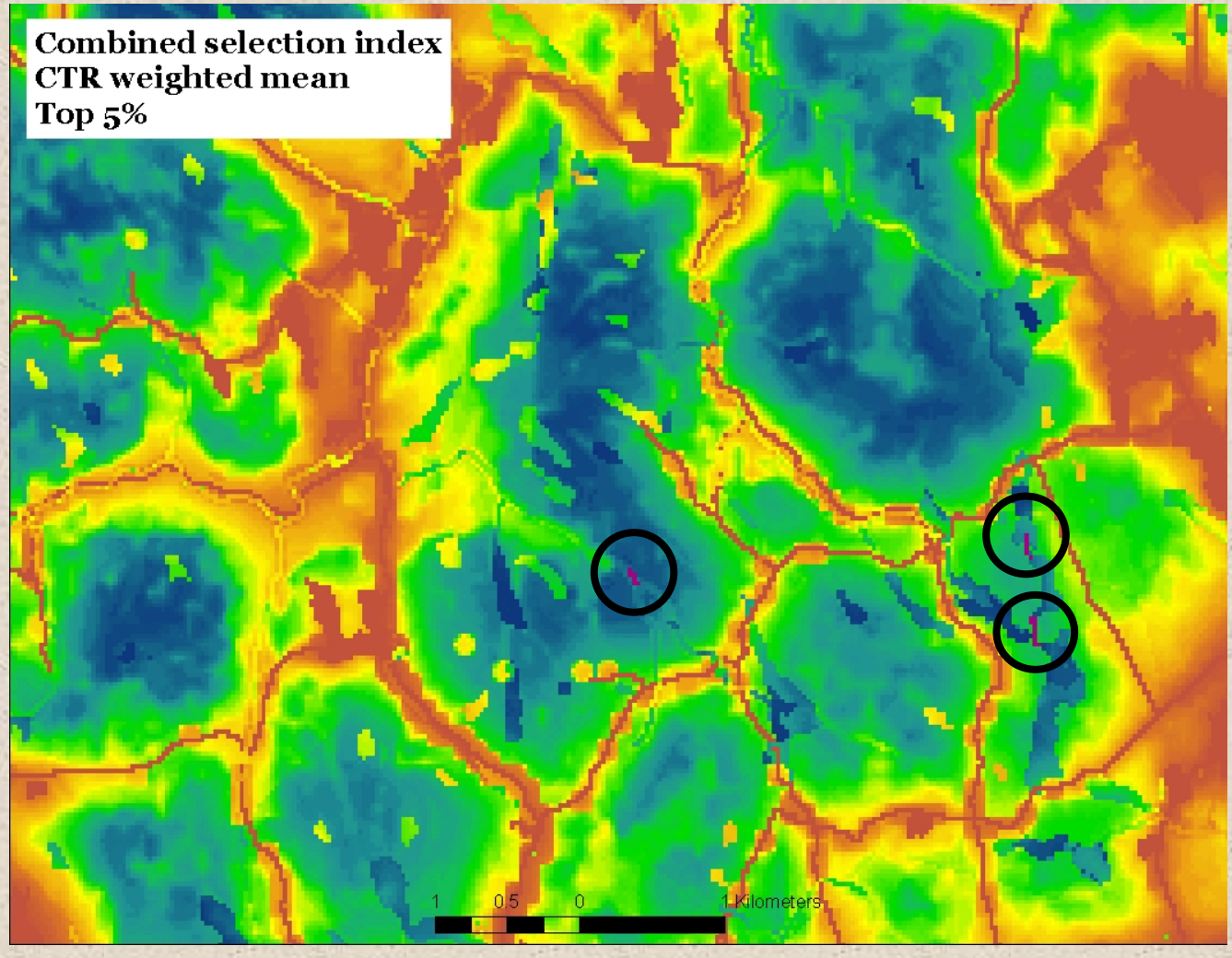

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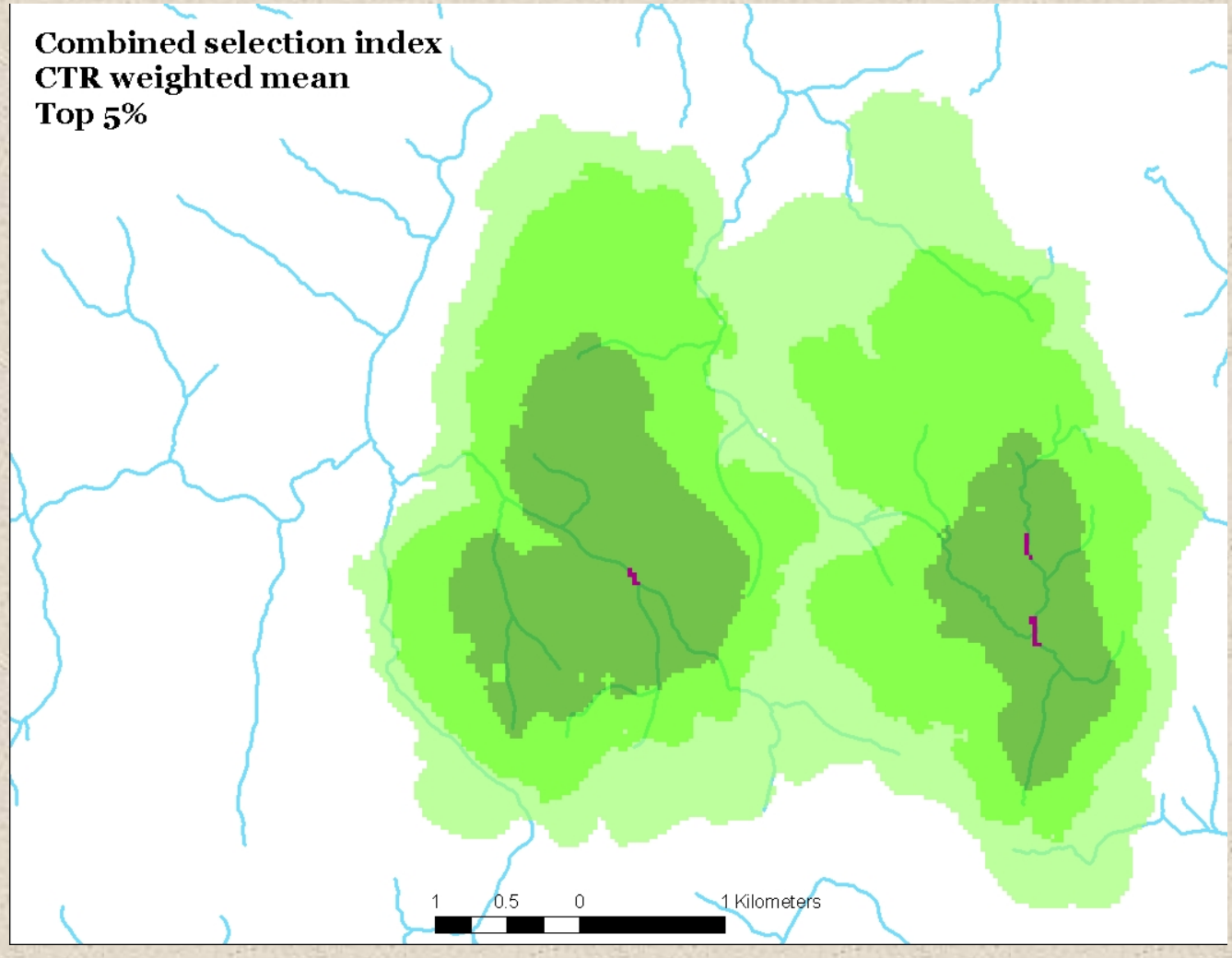

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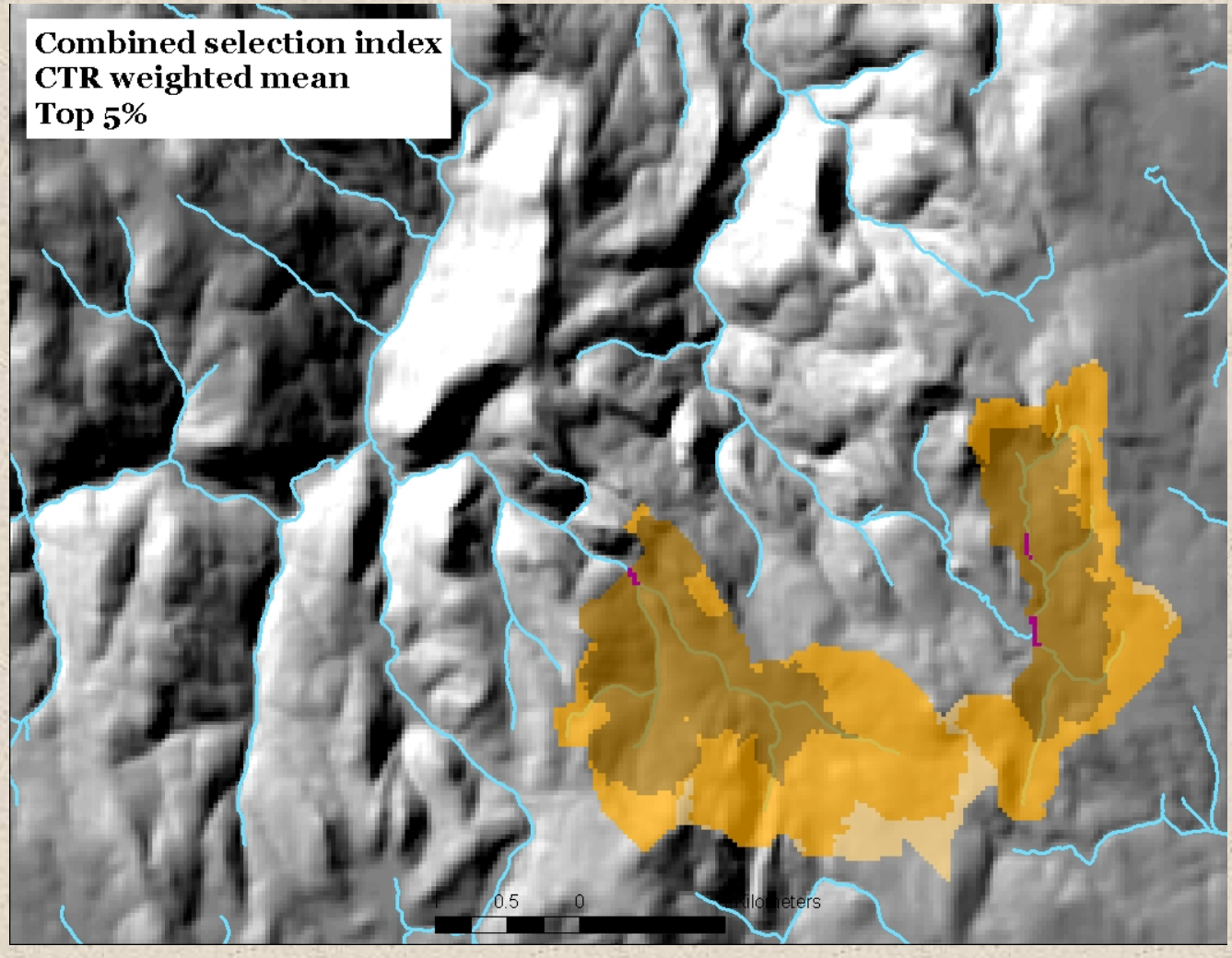

Landscape Conservation Design

Step 2: Design Conservation Network

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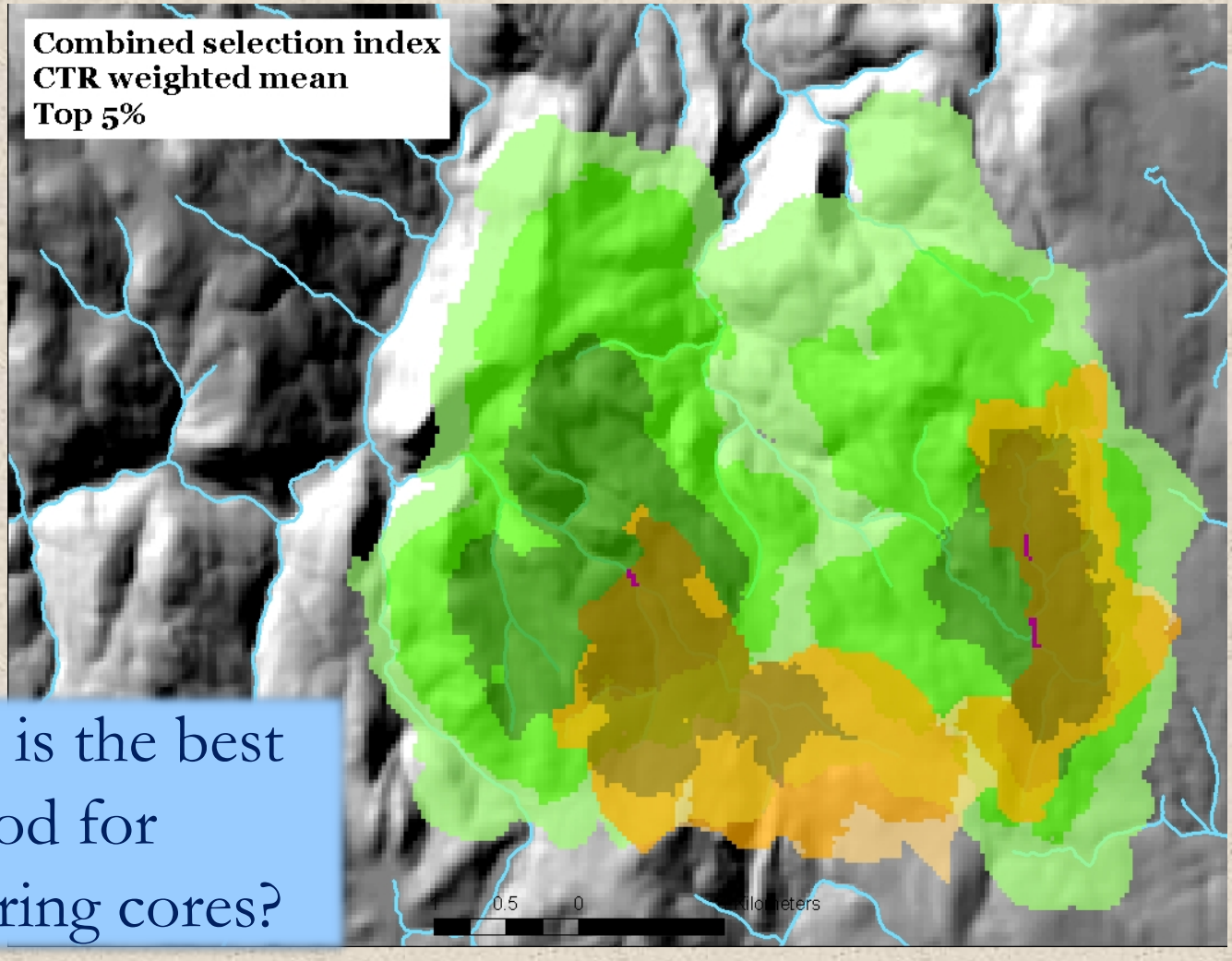

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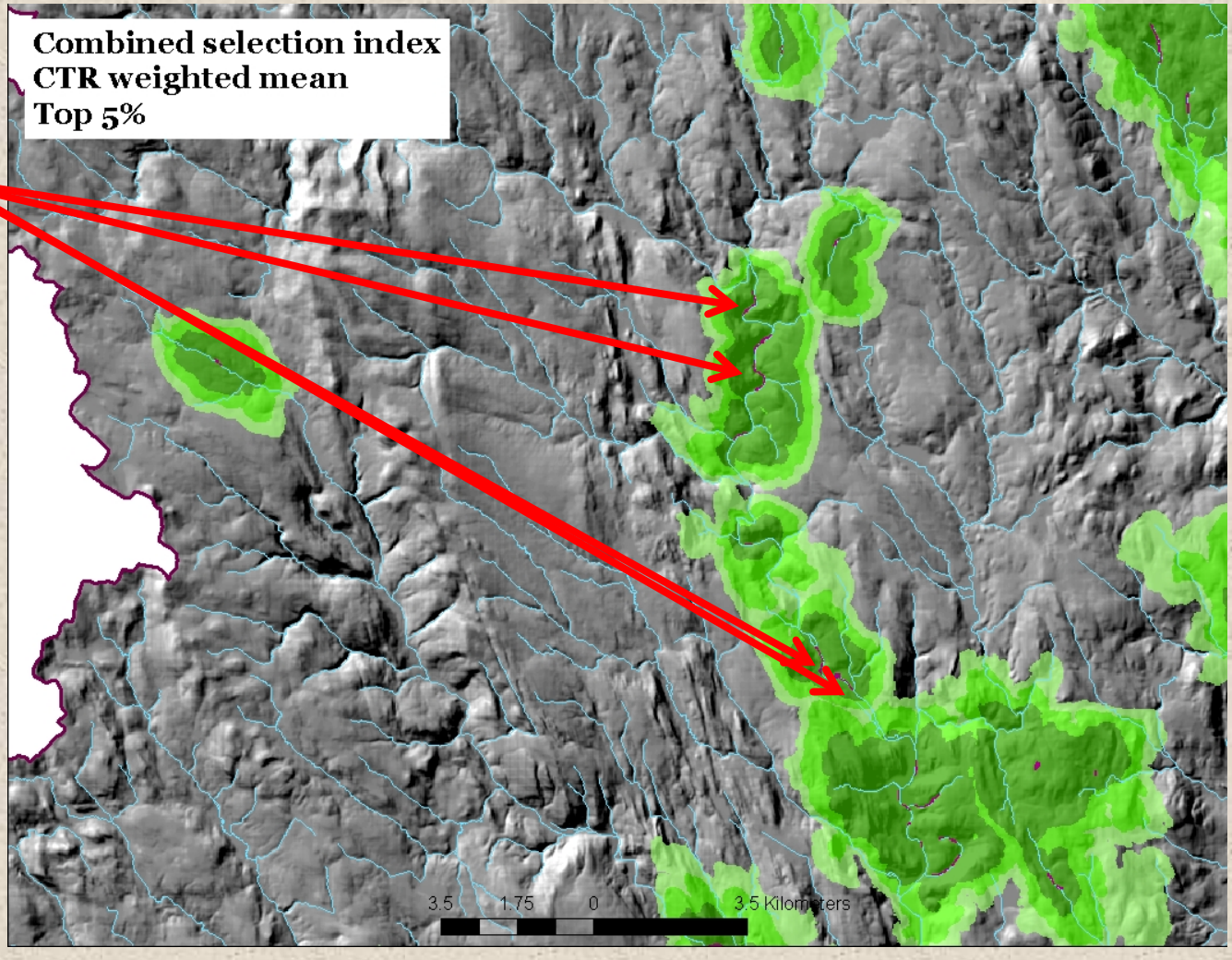
What is the best method for buffering cores?

Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 2

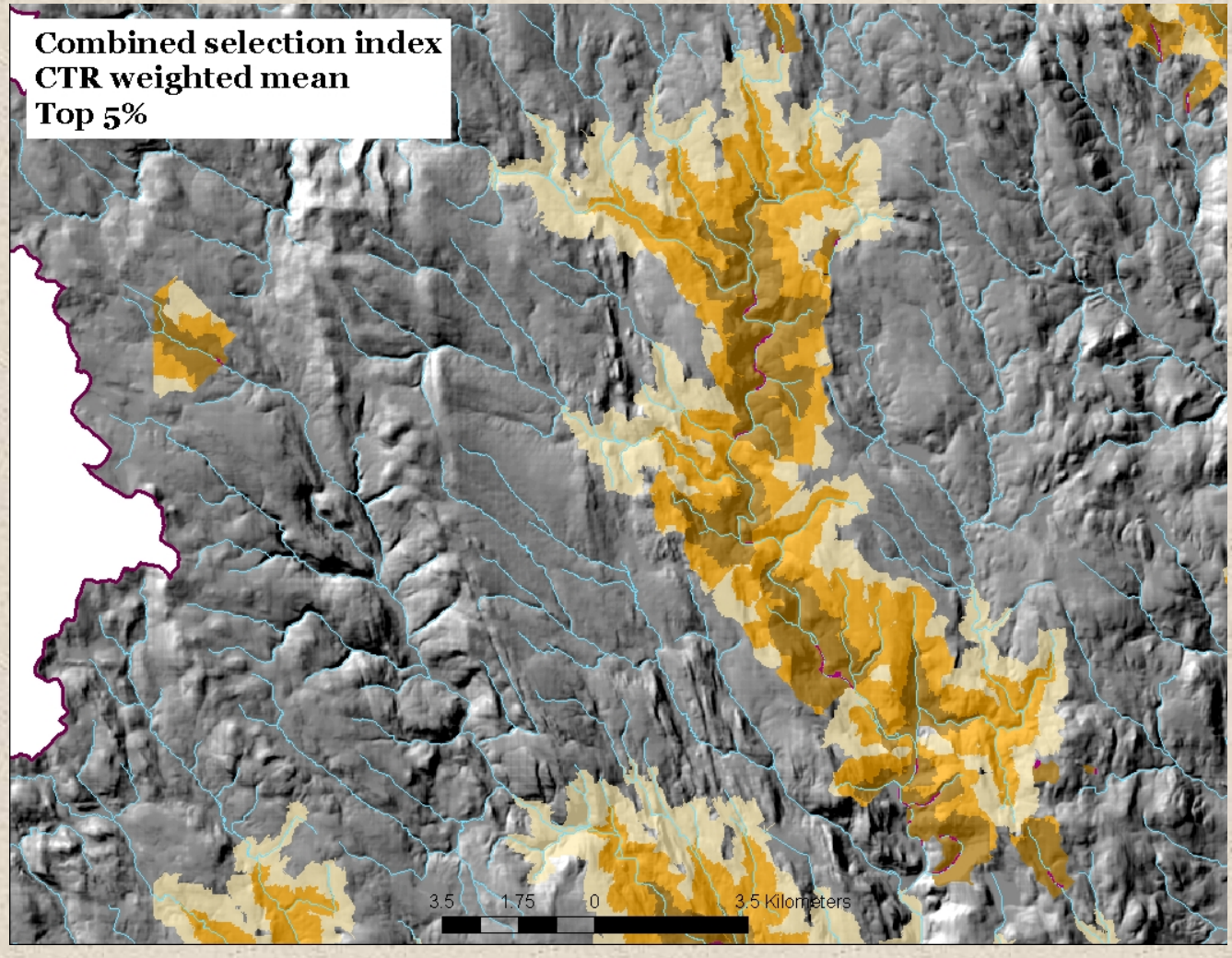
Collection of riverine units (small river – moderate and low gradient – cool)



Landscape Conservation Design

Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 2



Step 2: Design Conservation Network

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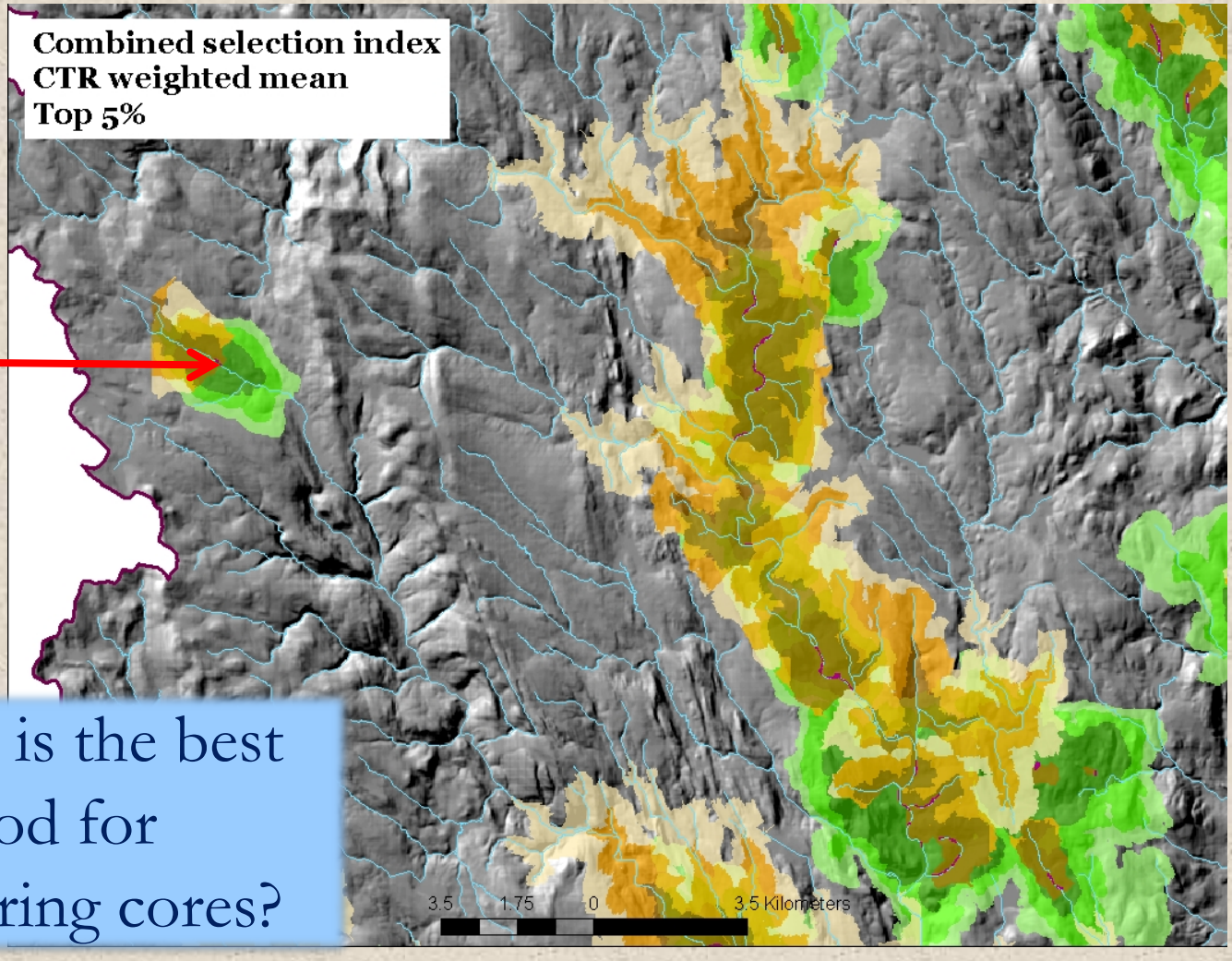

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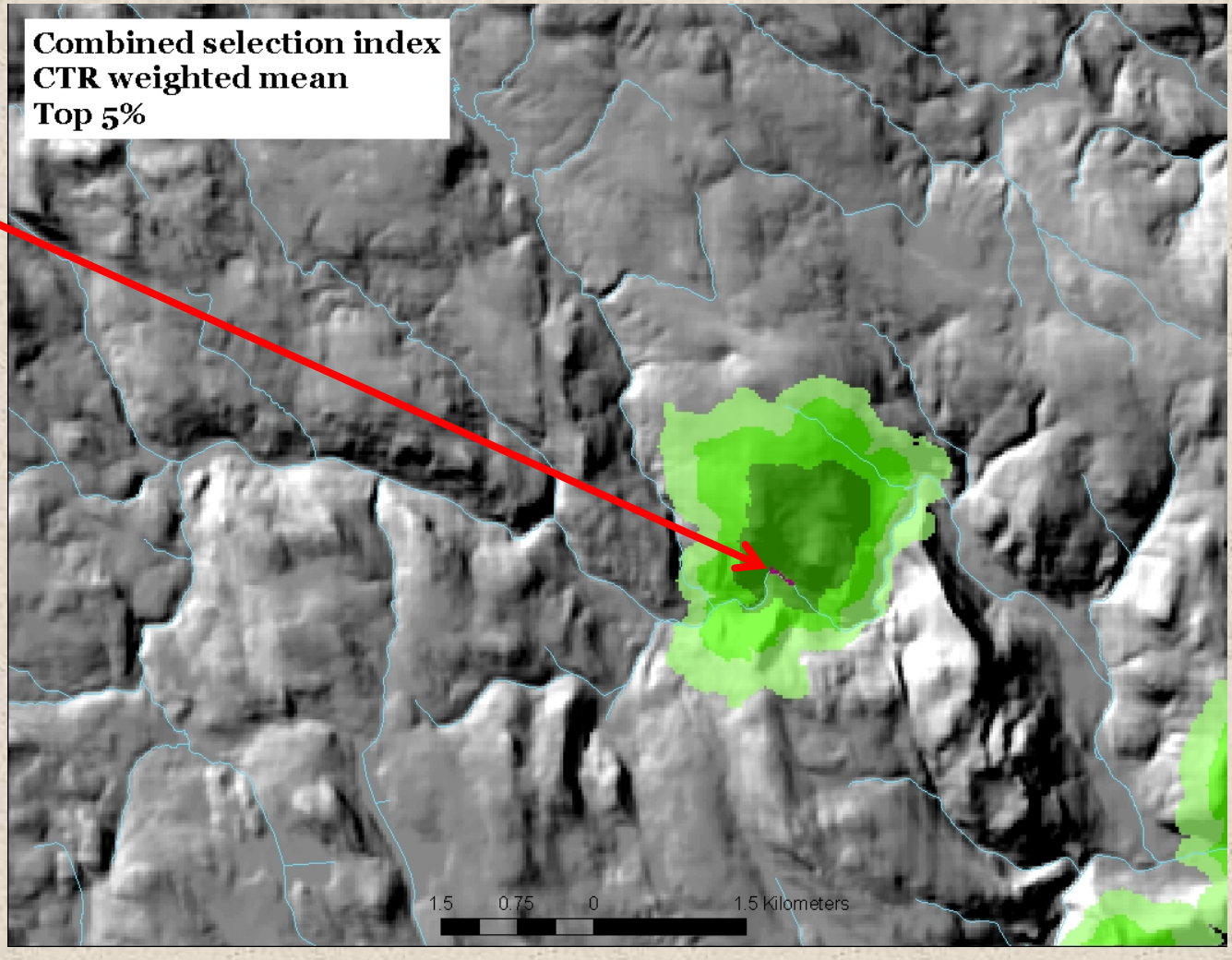
What is the best method for buffering cores?

Step 2: Design Conservation Network

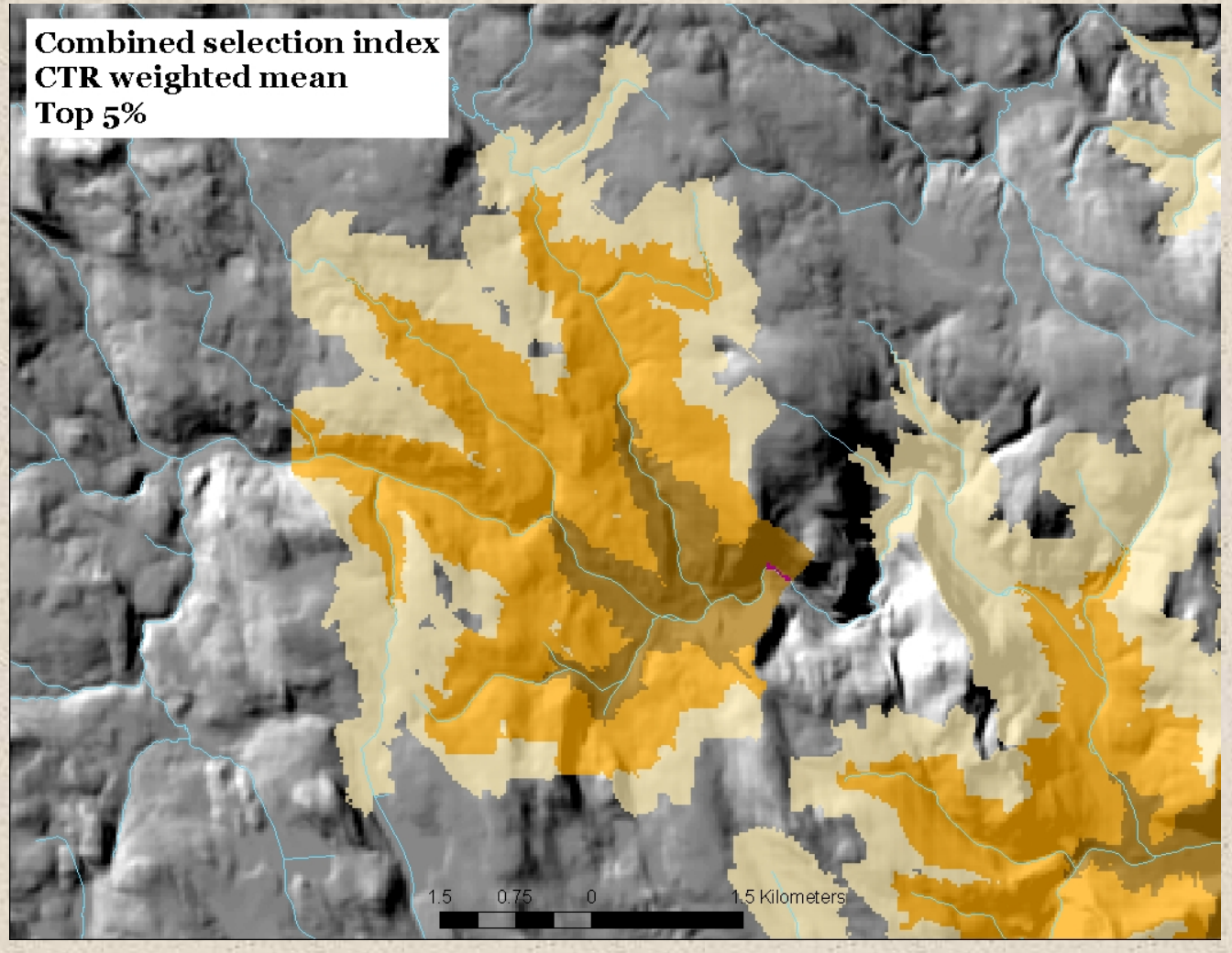
b) Delineate aquatic buffered core areas – Example 3

Small river – moderate gradient - cool



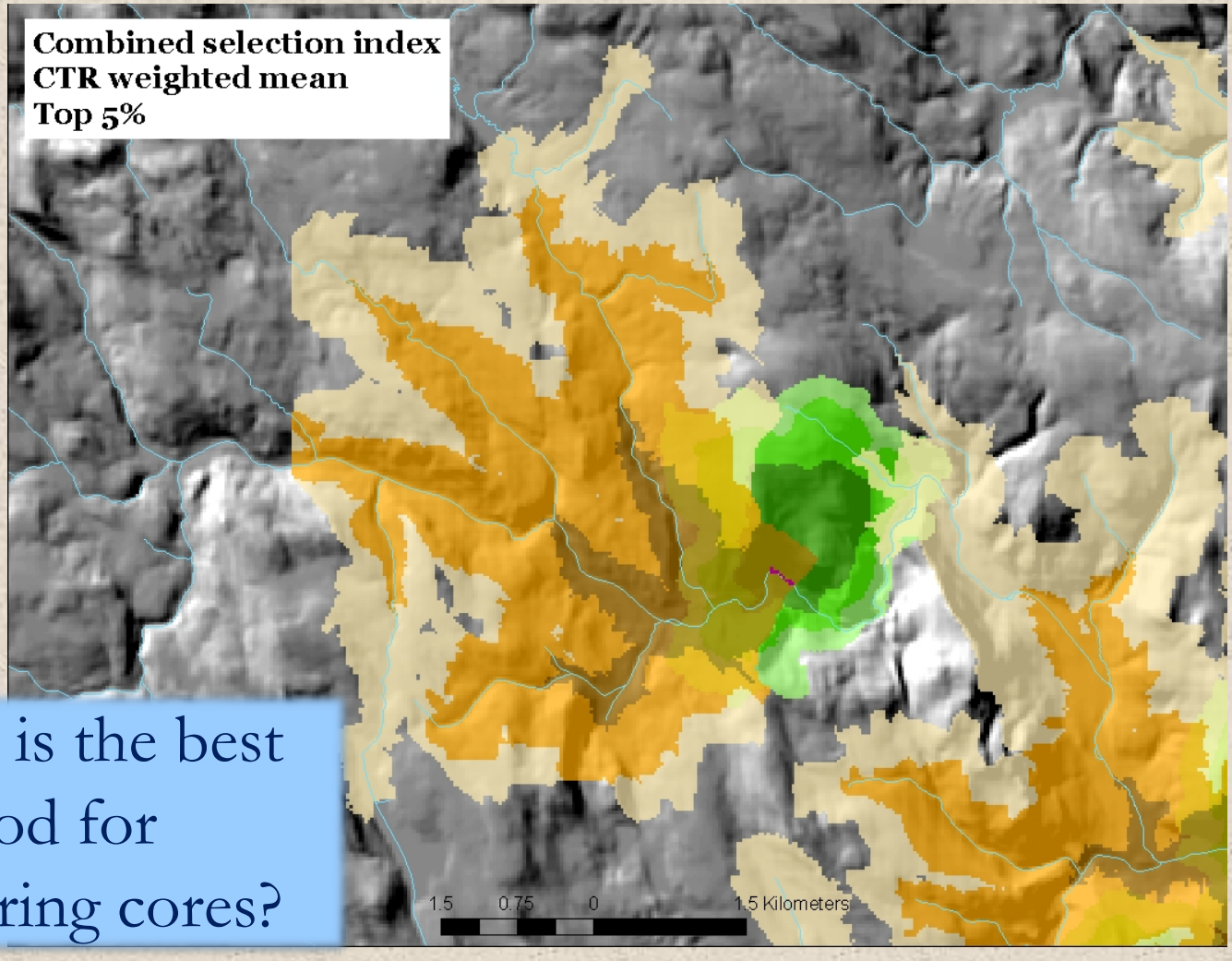
Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 3



Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 3



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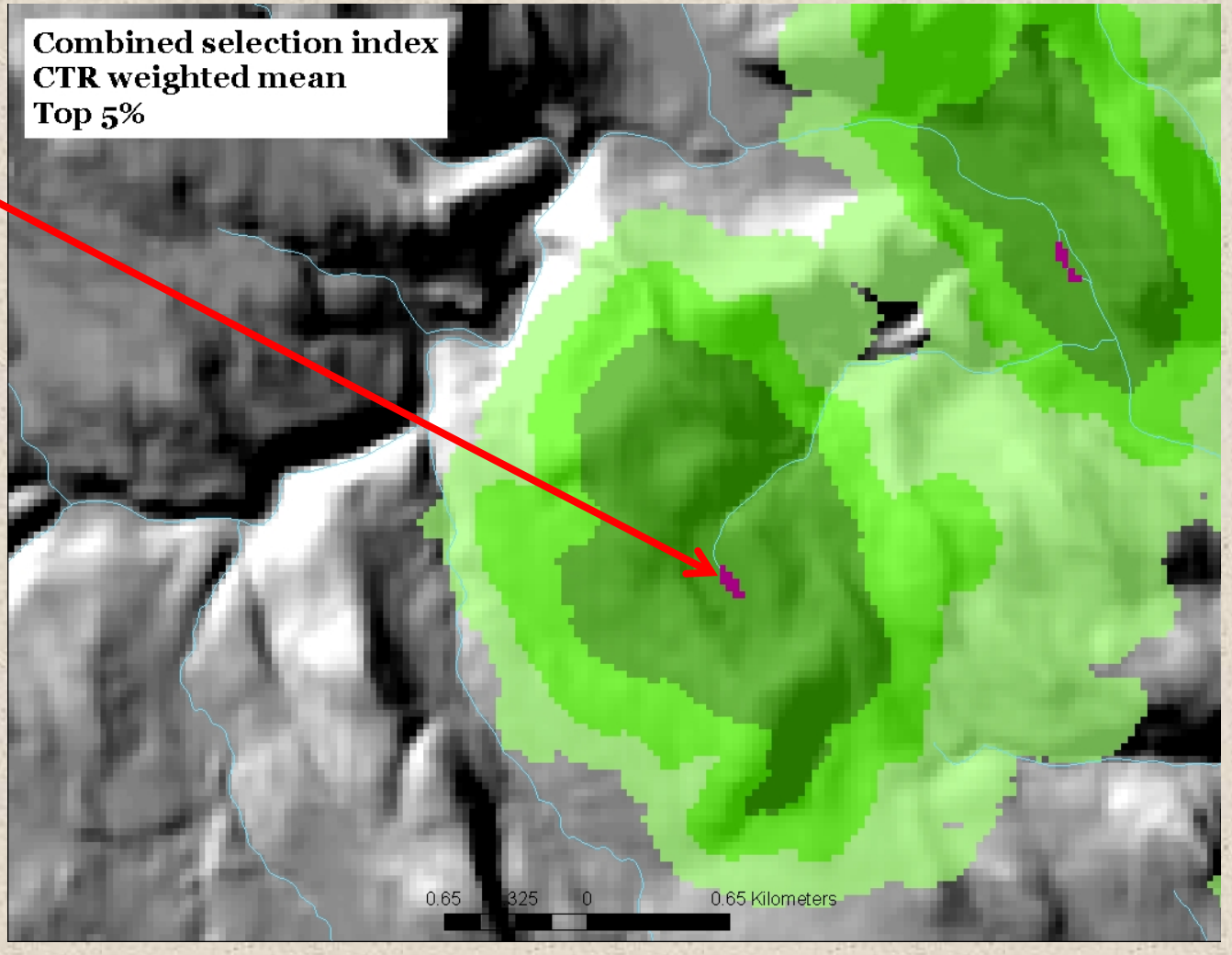
What is the best method for buffering cores?

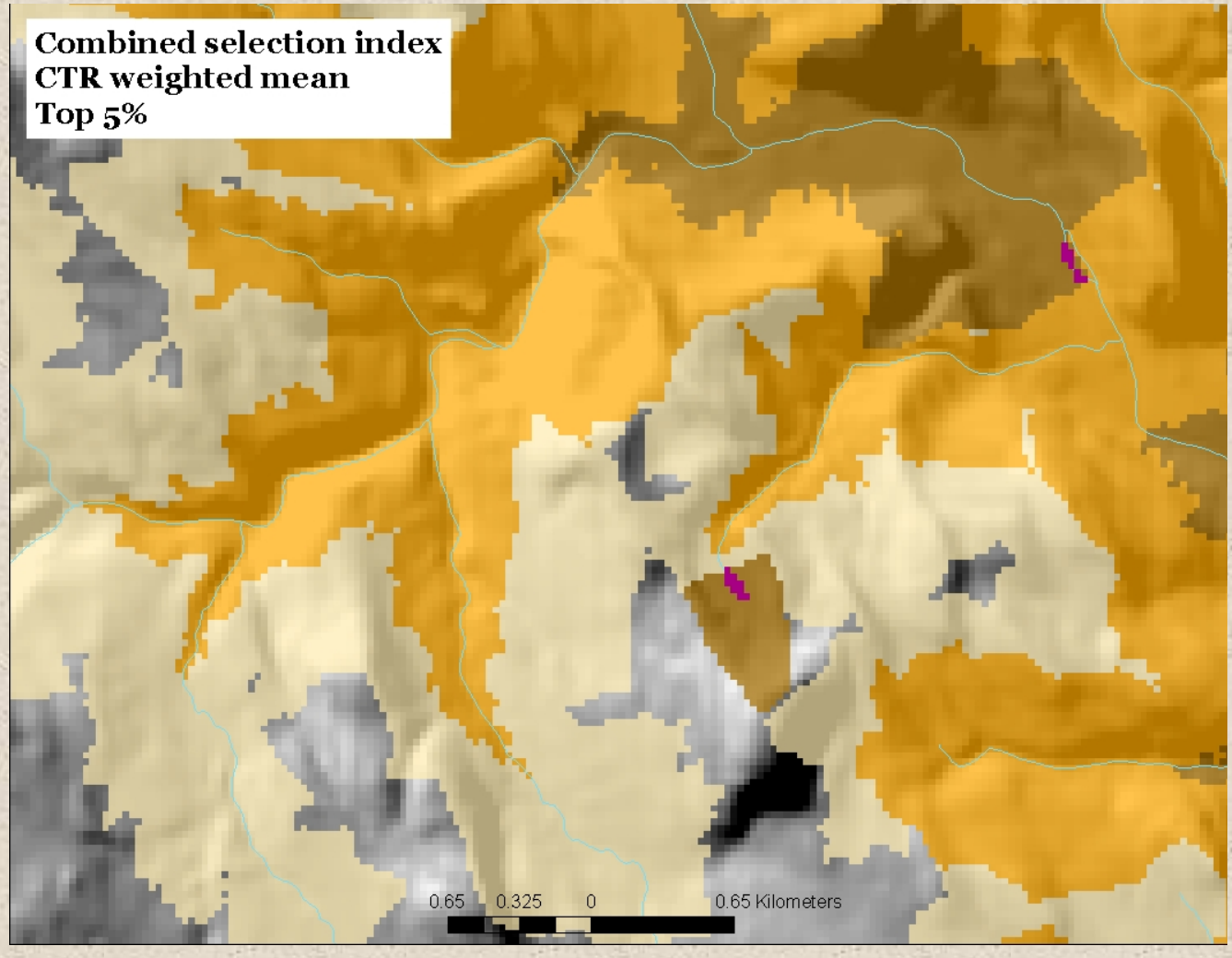
Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 4



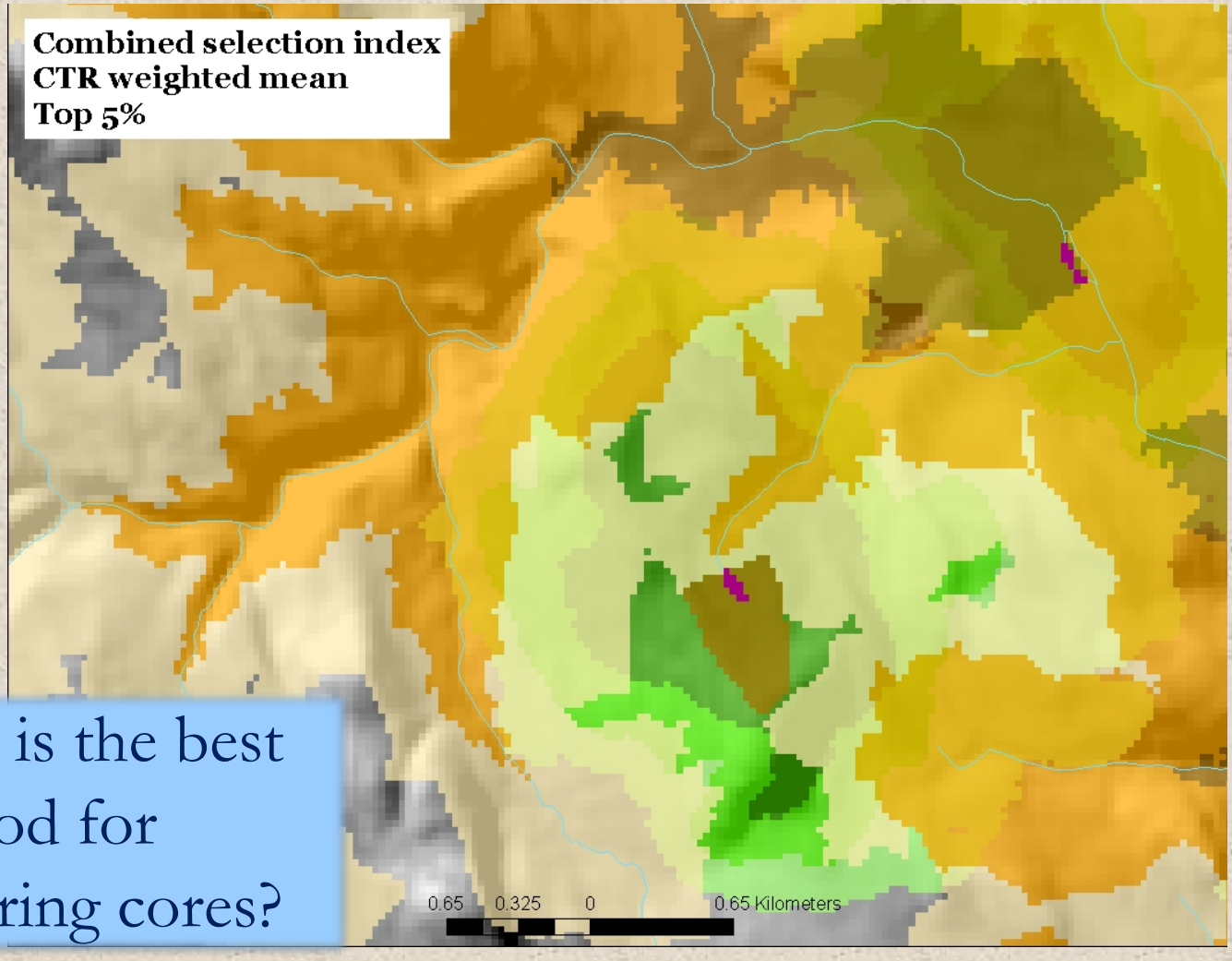
Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 4



Step 2: Design Conservation Network

b) Delineate aquatic buffered core areas – Example 4



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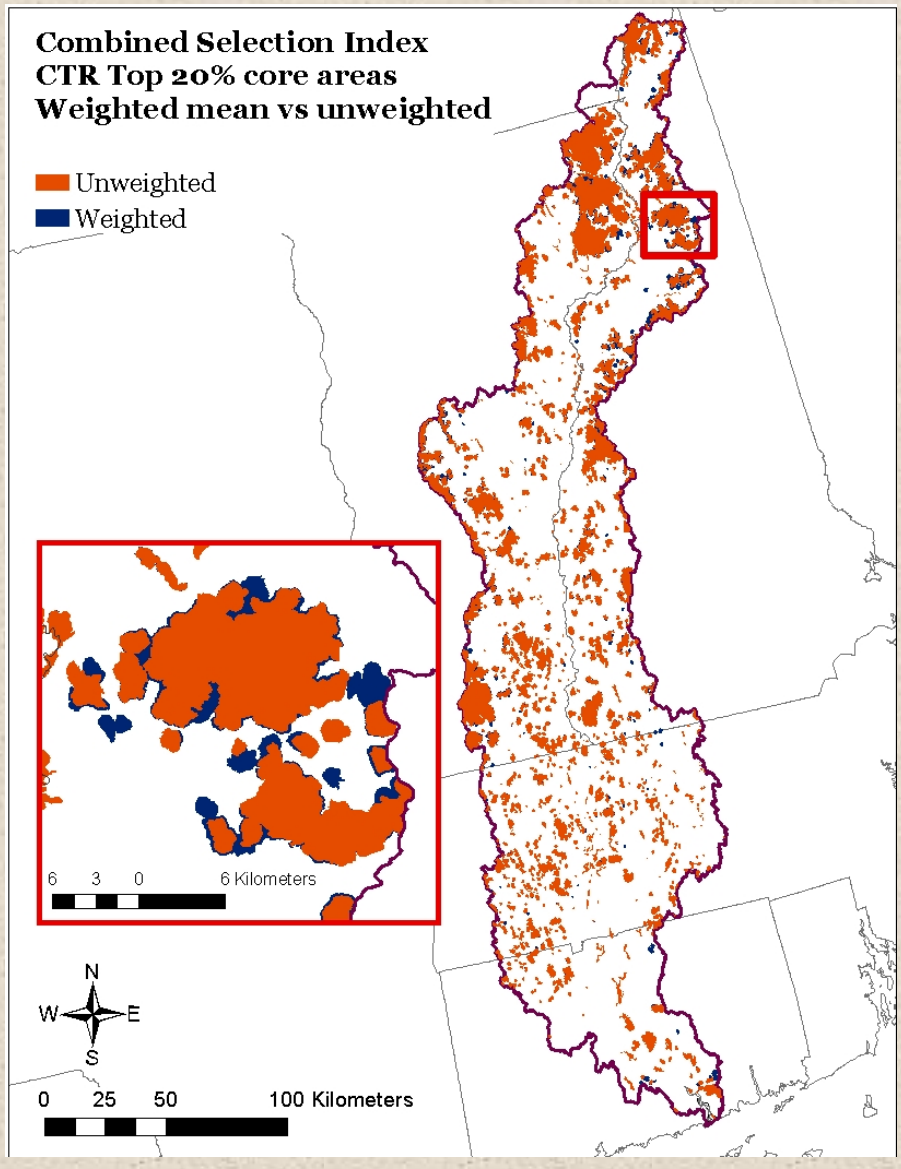
What is the best method for buffering cores?

Step 2: Design Conservation Network

- **Terrestrial buffer-cores:**
  - Weighted versus unweighted selection index



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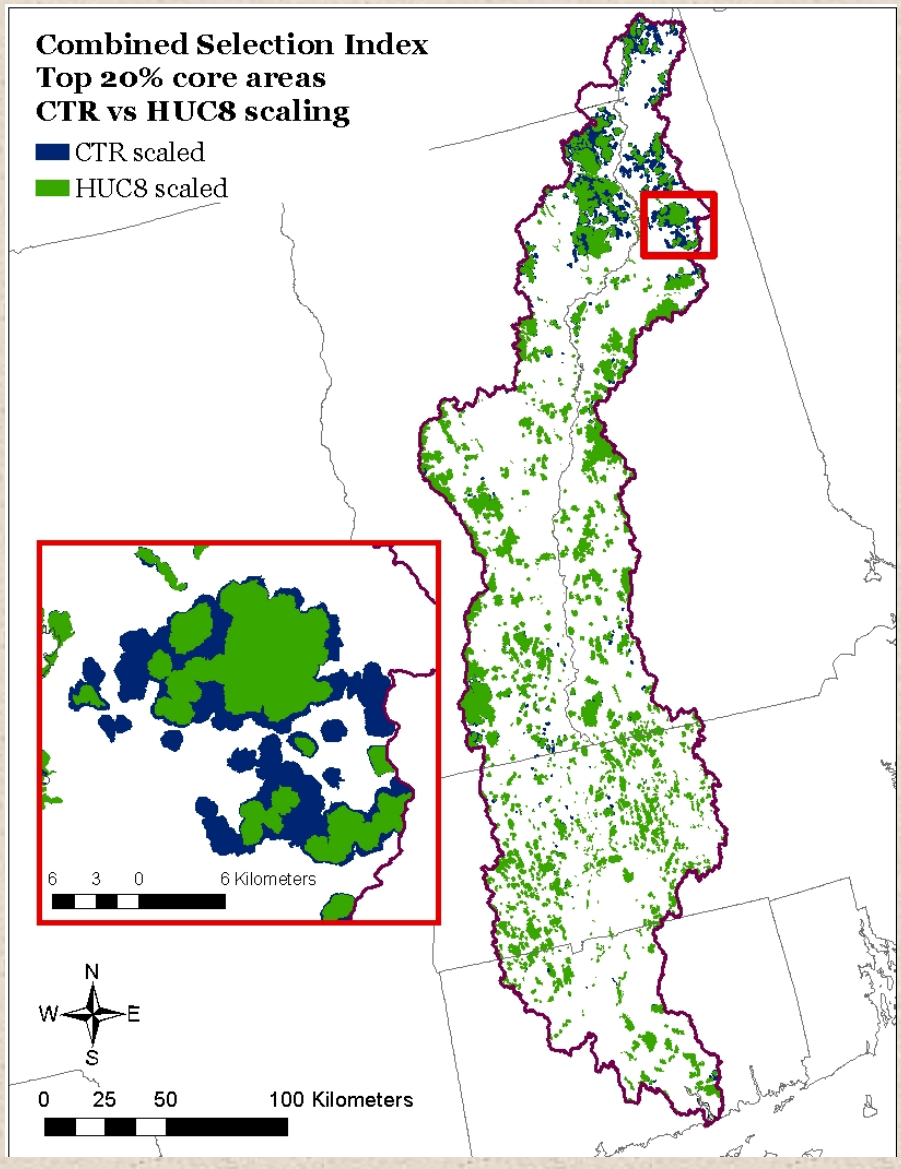
Step 2: Design Conservation Network

- **Terrestrial buffer-cores:**
  - CTR versus HUC8 scaling



Landscape Conservation Design

Step 2: Design Conservation Network

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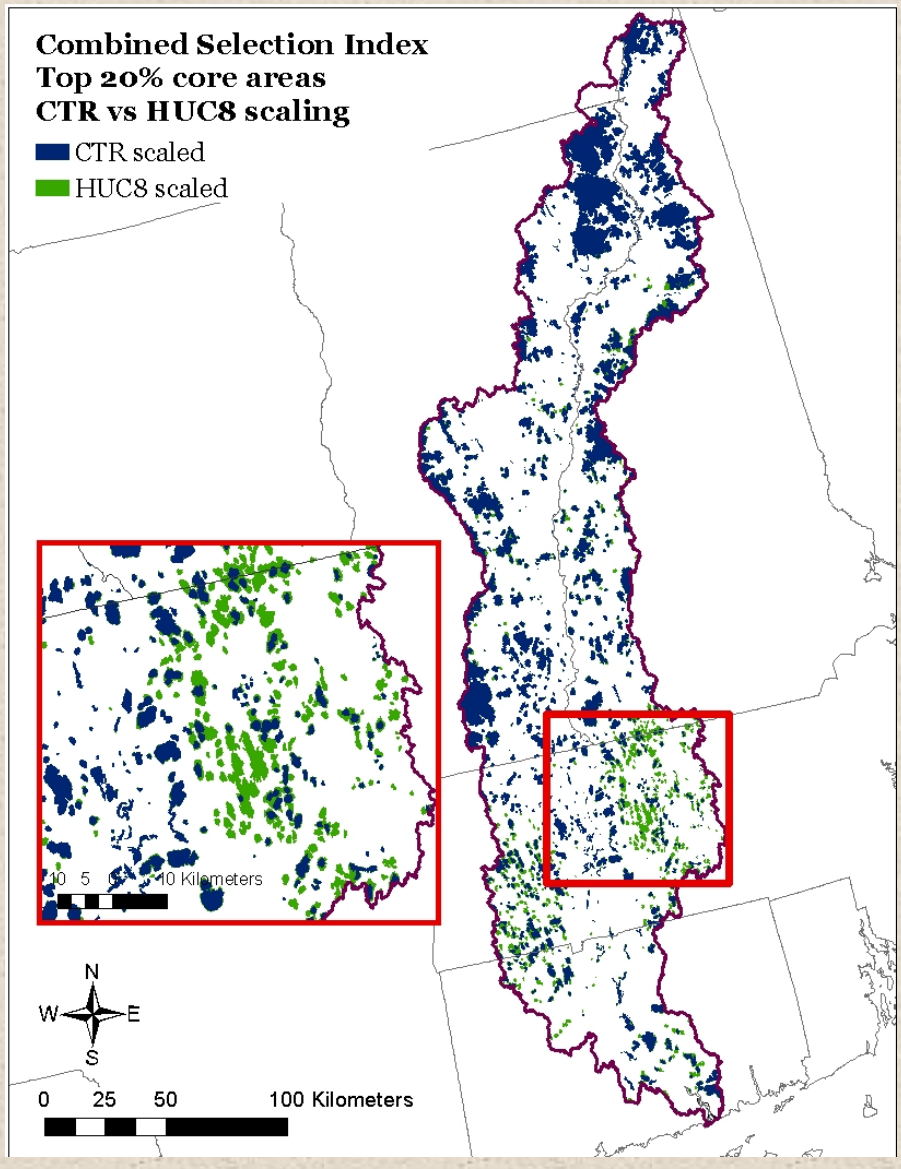
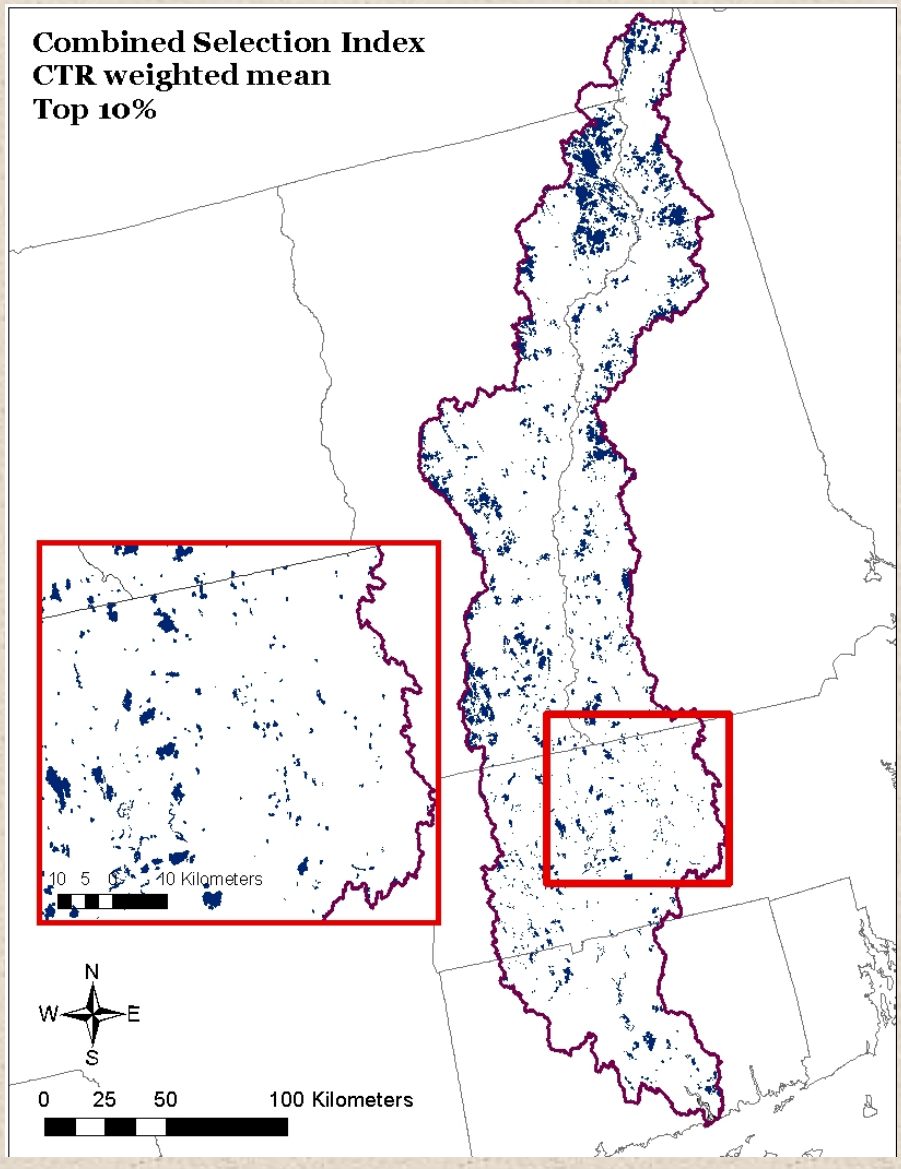


Step 2: Design Conservation Network

- **Terrestrial buffer-cores:**
  - Threshold level



Step 2: Design Conservation Network

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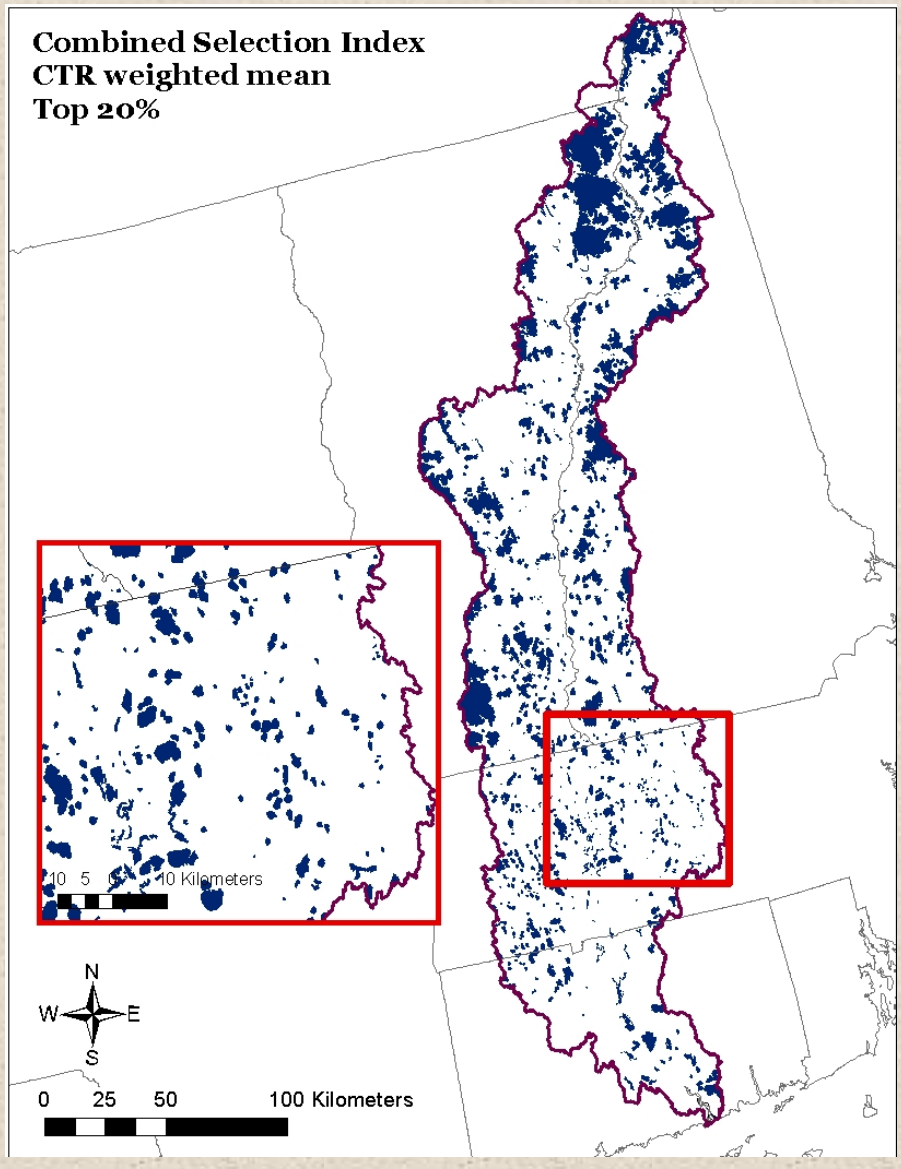
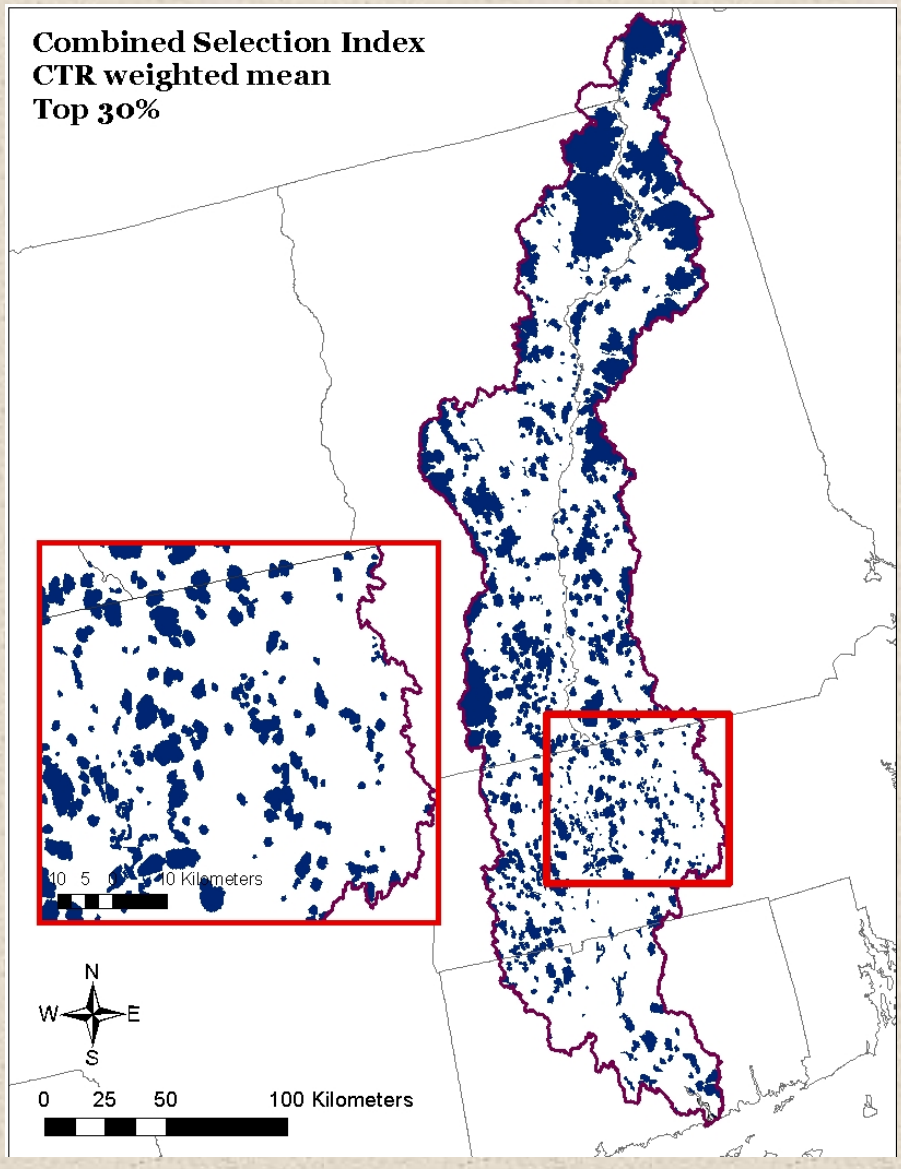


Step 2: Design Conservation Network

- **Terrestrial buffer-cores:**
  - Threshold level

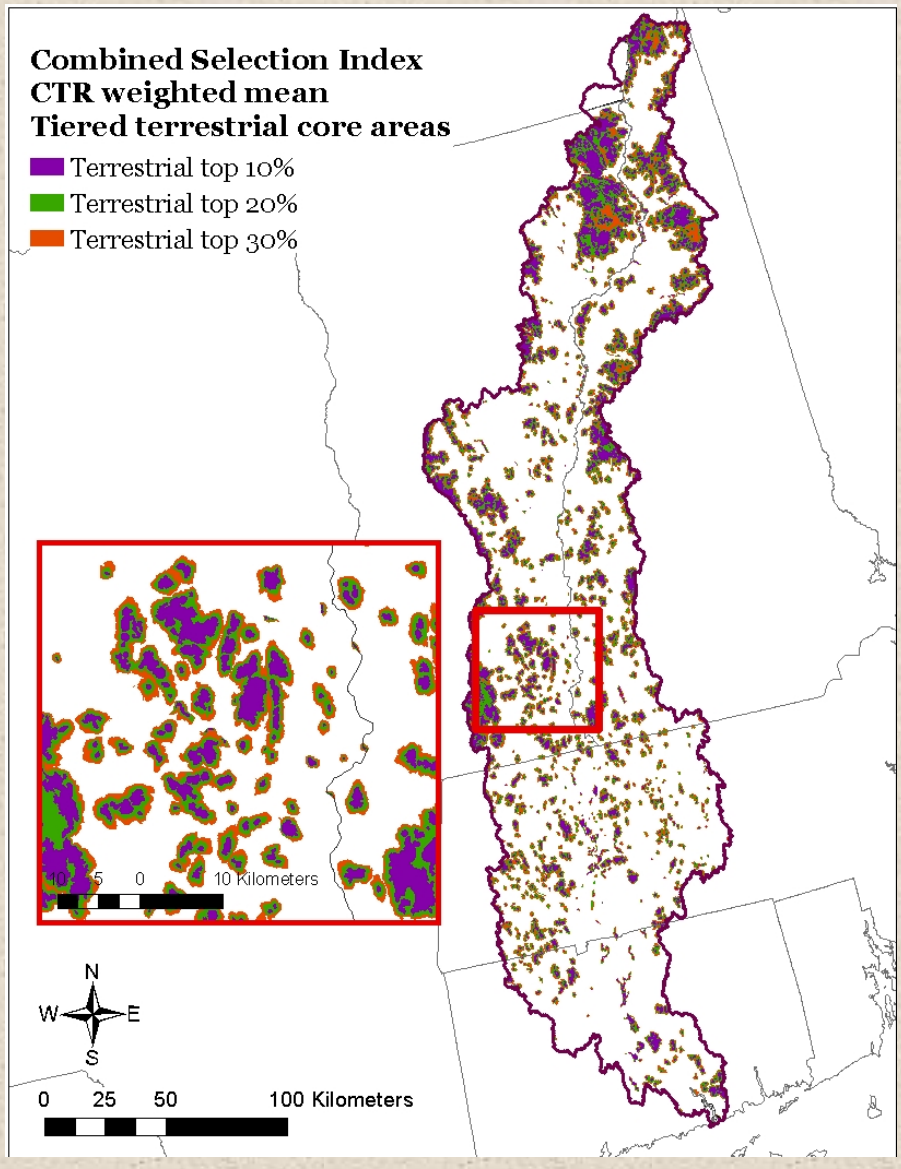


Landscape Conservation Design

Step 2: Design Conservation Network

- **Terrestrial buffer cores:**
  - Tiers

How much area should we allocate to terrestrial buffered cores?

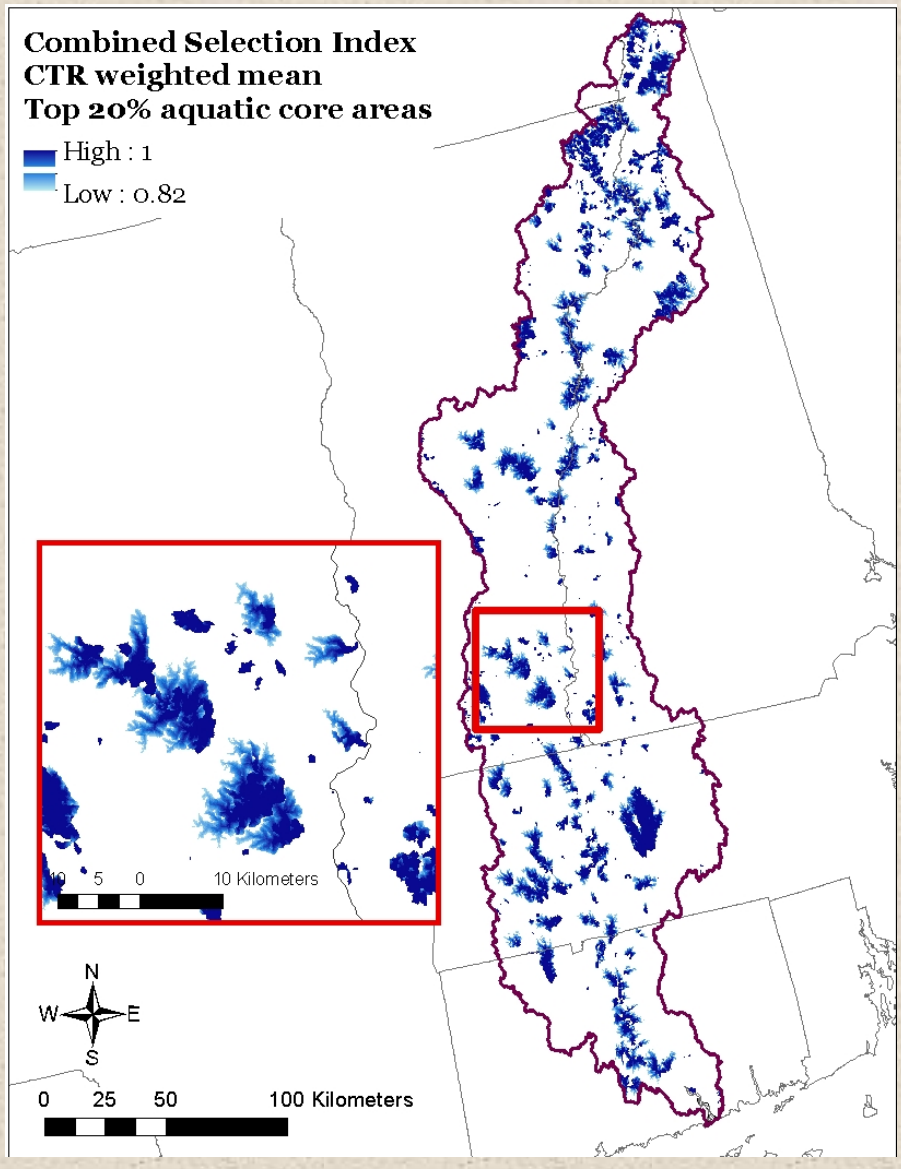


Landscape Conservation Design

Step 2: Design Conservation Network

- **Aquatic buffer-cores:**
  - Watershed-based buffers

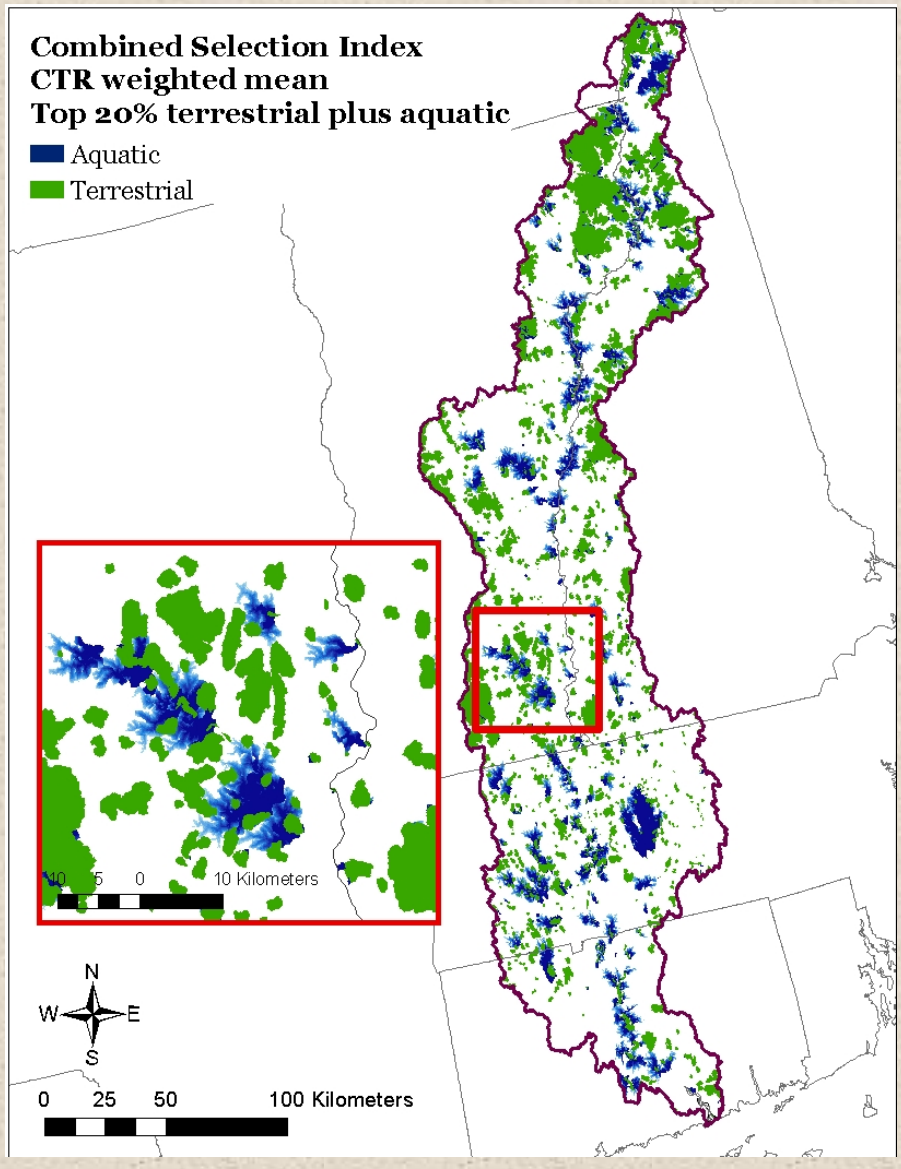
How much area should we allocate to aquatic buffered cores?



Landscape Conservation Design

Step 2: Design Conservation Network

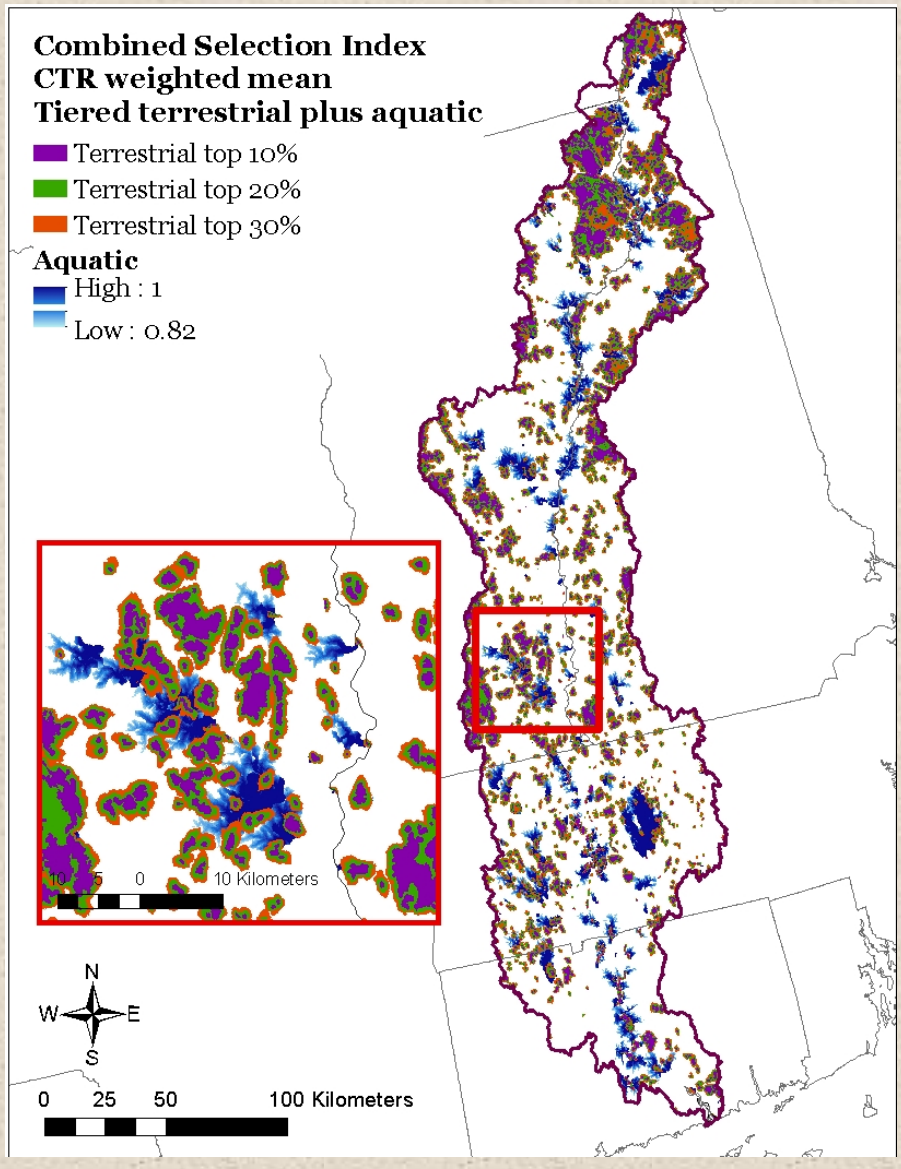
- Terrestrial and aquatic buffer-cores combined



Landscape Conservation Design

Step 2: Design Conservation Network

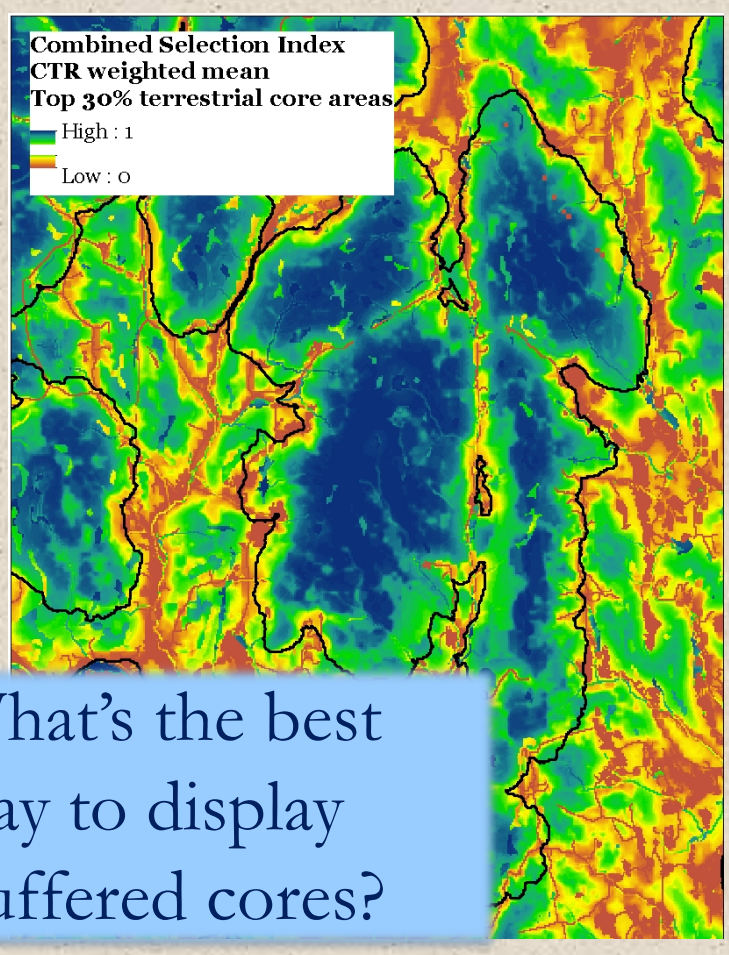
- Terrestrial and aquatic buffer-cores combined

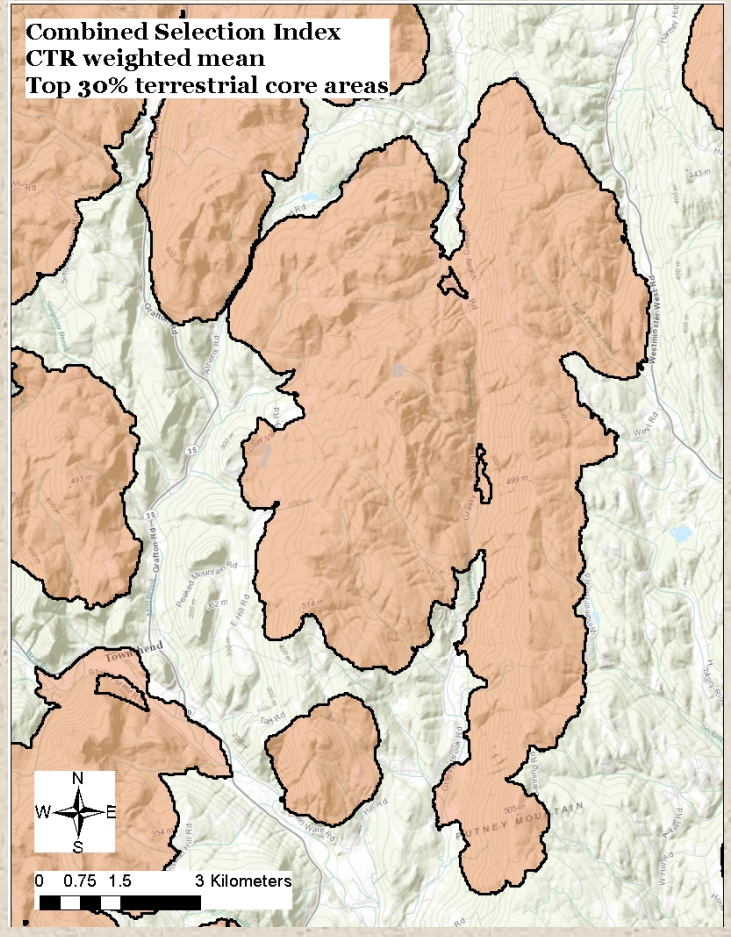


Landscape Conservation Design

Step 2: Design Conservation Network

- Display of results





?

What's the best way to display buffered cores?

Landscape Conservation Design

Step 2: Design Conservation Network

Key Decisions:

1. Terrestrial buffer-core area selection and delineation
   a) Slice or algorithmic approach?
   b) Size and configuration (min size; fewer larger vs more smaller)?
   c) Spread barriers?
   d) CTR vs HUC8 (or other) scaling?
2. Aquatic buffer-core area selection and delineation
   a) What spatial units to use?
   b) What method for delineating buffers?
3. How much area to allocate to buffer-cores?
4. What's the best way to display the results?

For More Information

- **Project website:**

  www.umass.edu/landeco/research/nalcc/nalcc.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 Questionaire

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 tiles (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:** mcgarigalk@eco.umass.edu 413-577-0655