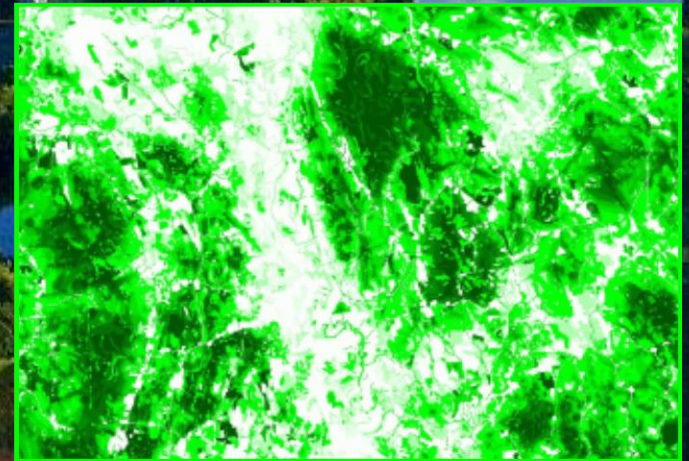
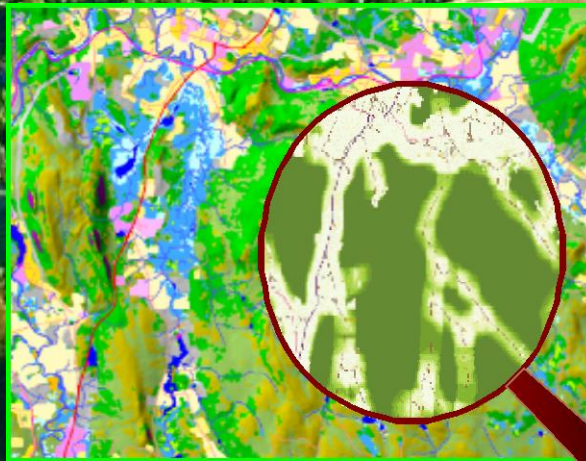


# Designing Sustainable Landscapes in the Northeast

*A project of the North Atlantic Landscape Conservation Cooperative*

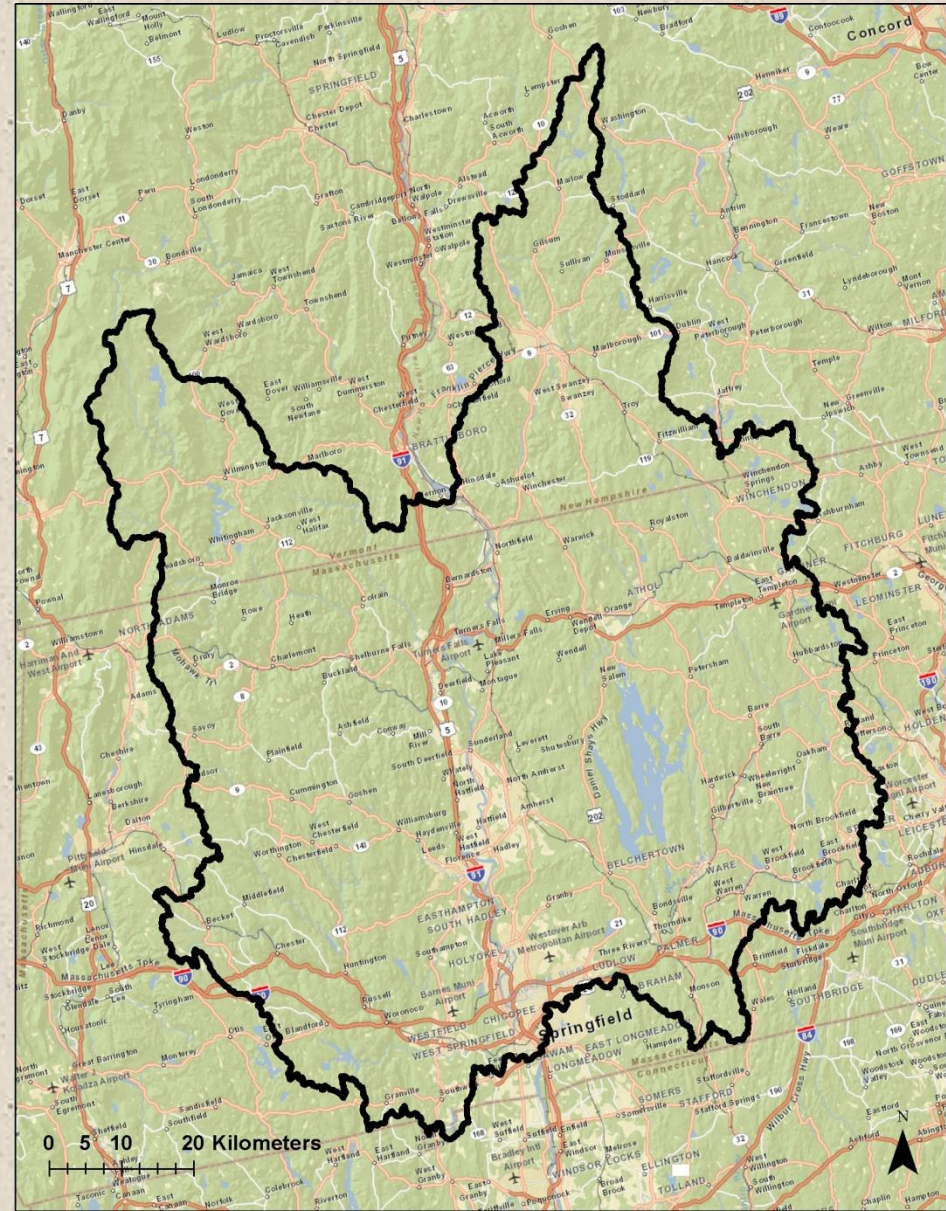
Integrating Stream Science Meeting  
March 14, 2013



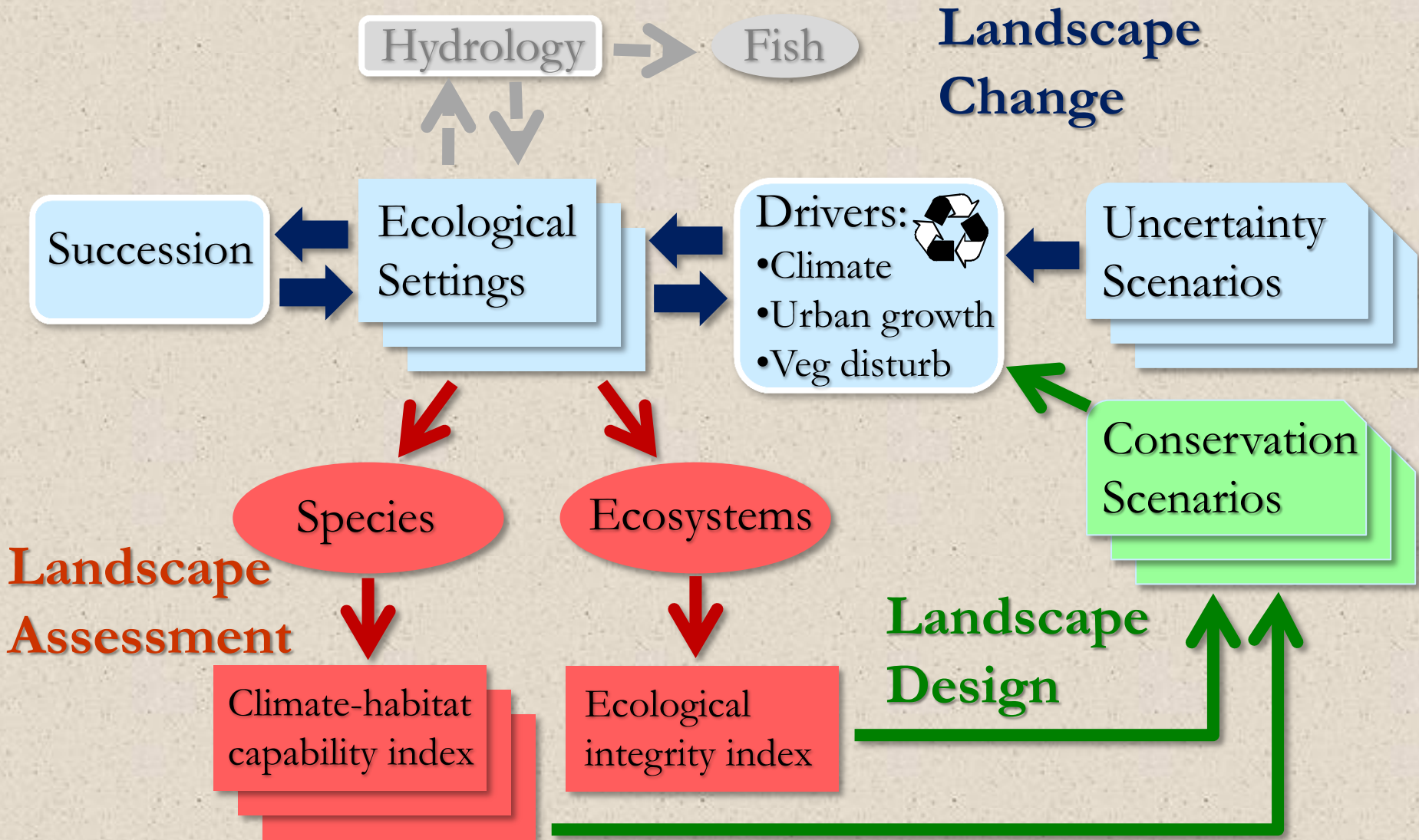
# Purpose & Need

The purpose of this project is to:

- Assess the capability of current and potential future landscapes in the Northeast to provide integral ecosystems and suitable habitat for a suite of representative species, and provide guidance for strategic habitat conservation

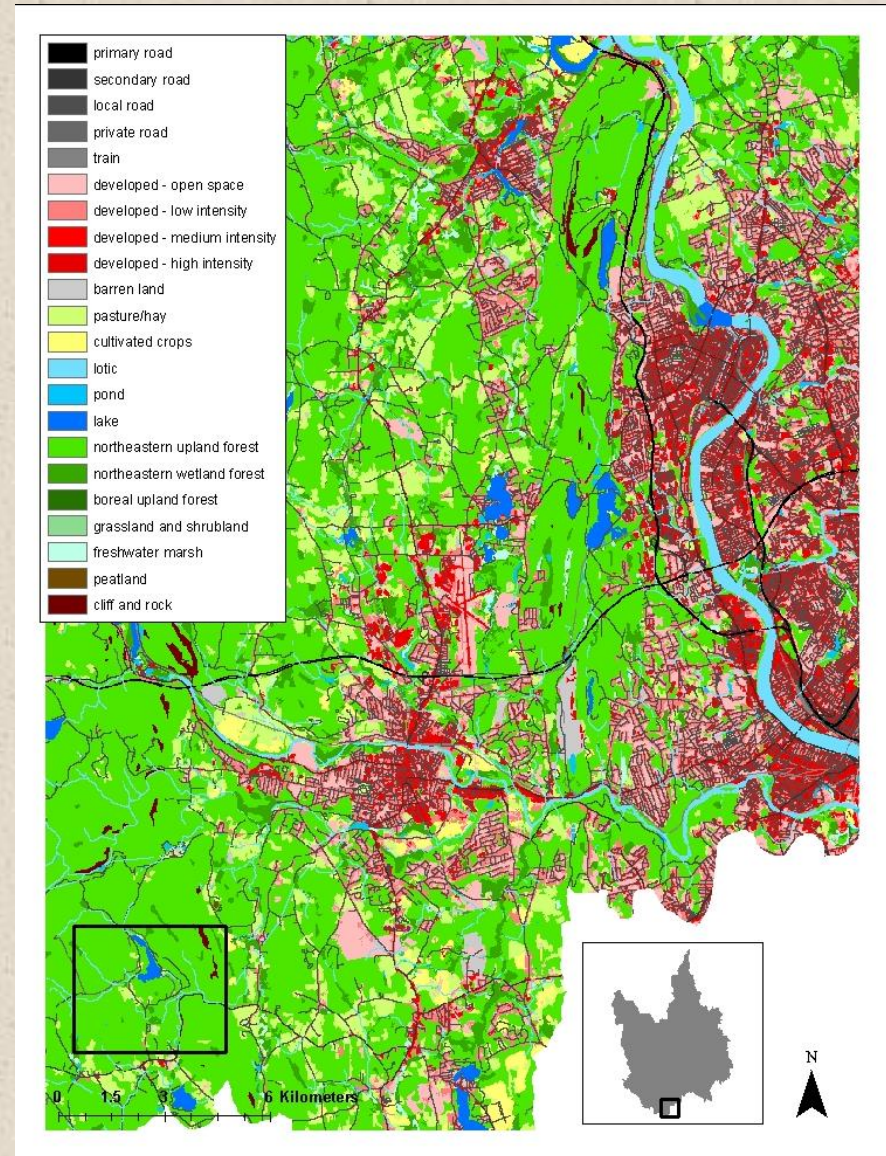


# The LCAD Model



# GIS data development

- Enhanced ecological systems (aka landcover) map
  - Replace NLCD roads and spurious development with TIGER/OSM roads
  - Replace open water with NWI lentic, lotic, estuarine, marine
  - Add NHD streams
  - Add 4 developed classes, barren and 2 agriculture classes from NLCD 06



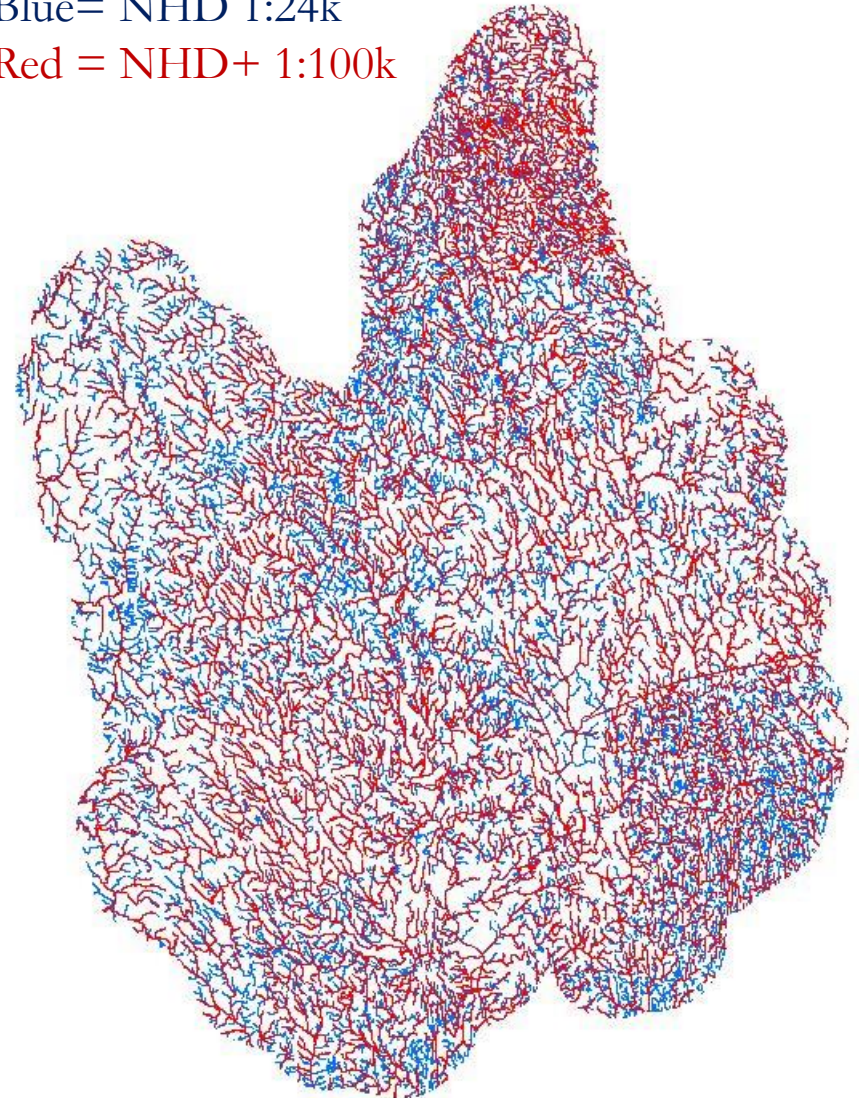
# GIS data development

## ■ Corrected hydrology

- Connect isolated stream segments to main hydro network and close all gaps in the network
- Remove pipelines and coastlines
- Remove salt marsh ditches
- Fix flow reversals
- Fix flow loops

Blue= NHD 1:24k

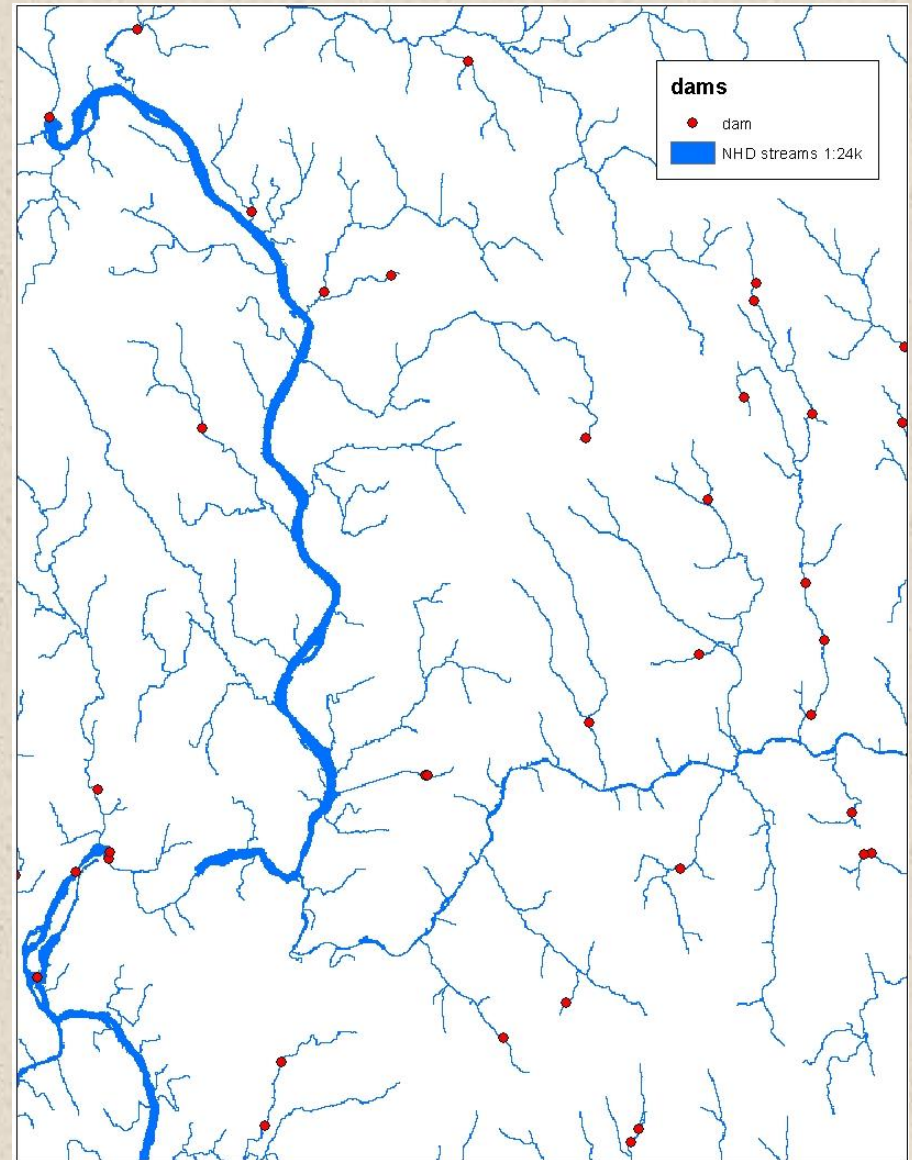
Red = NHD+ 1:100k



# GIS data development

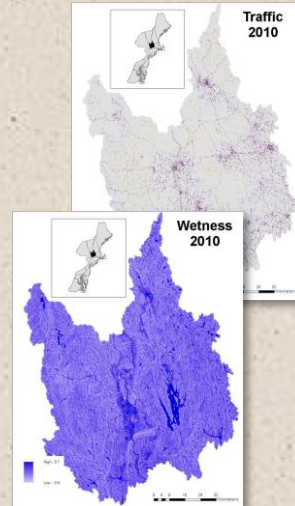
## ■ Corrected Dams

- Snapped dams to NHD streams
- Series of automated and manual GIS steps to accomplish the task



# Ecological Settings Data

“GIS layers including a broad but parsimonious suite of biophysical variables representing the natural and anthropogenic environment at each location (cell) at each timestep”



## Vegetation:

- Potential dominant life form
- Above-ground biomass
- Tree diameter (qmd)

## Abiotic:

- Temperature (3)
- Energy (1)
- Moisture & hydrology (3)
- Chemical & physical substrate (6)
- Physical disturbance (2)
- Stem density

## Anthropogenic:

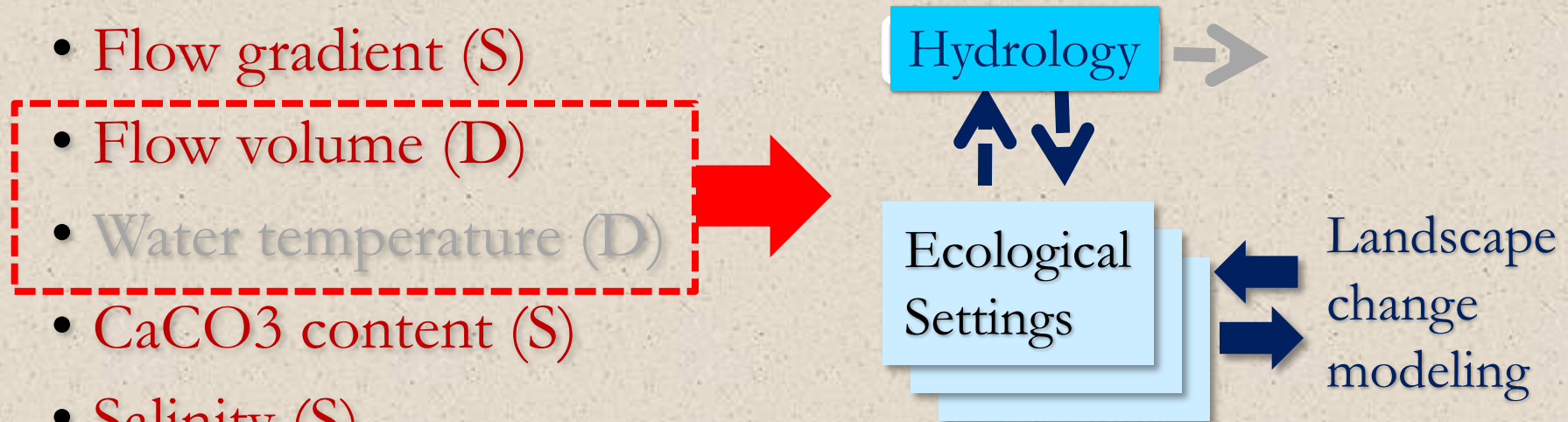
- Traffic
- Development (2)
- Impervious
- Barriers (2)

# Ecological Settings Data

## ■ Aquatic-relevant settings layers

- Flow gradient (S)
- Flow volume (D)
- Water temperature (D)
- CaCO<sub>3</sub> content (S)
- Salinity (S)
- Developed (D)
- Imperviousness (D)
- Aquatic barriers (S)

S = static; D = dynamic





# Ecological Integrity Metrics

## ■ Intactness metrics

1. Habitat loss (2)
3. Road traffic
4. Mowing and plowing
5. Microclimate alterations
6. Road salt
7. Road sediment
8. Nutrient enrichment
9. Domestic predators
10. Edge predators
11. Non-native plants
12. Non-native earthworms
13. Imperviousness

## ■ Resiliency metrics

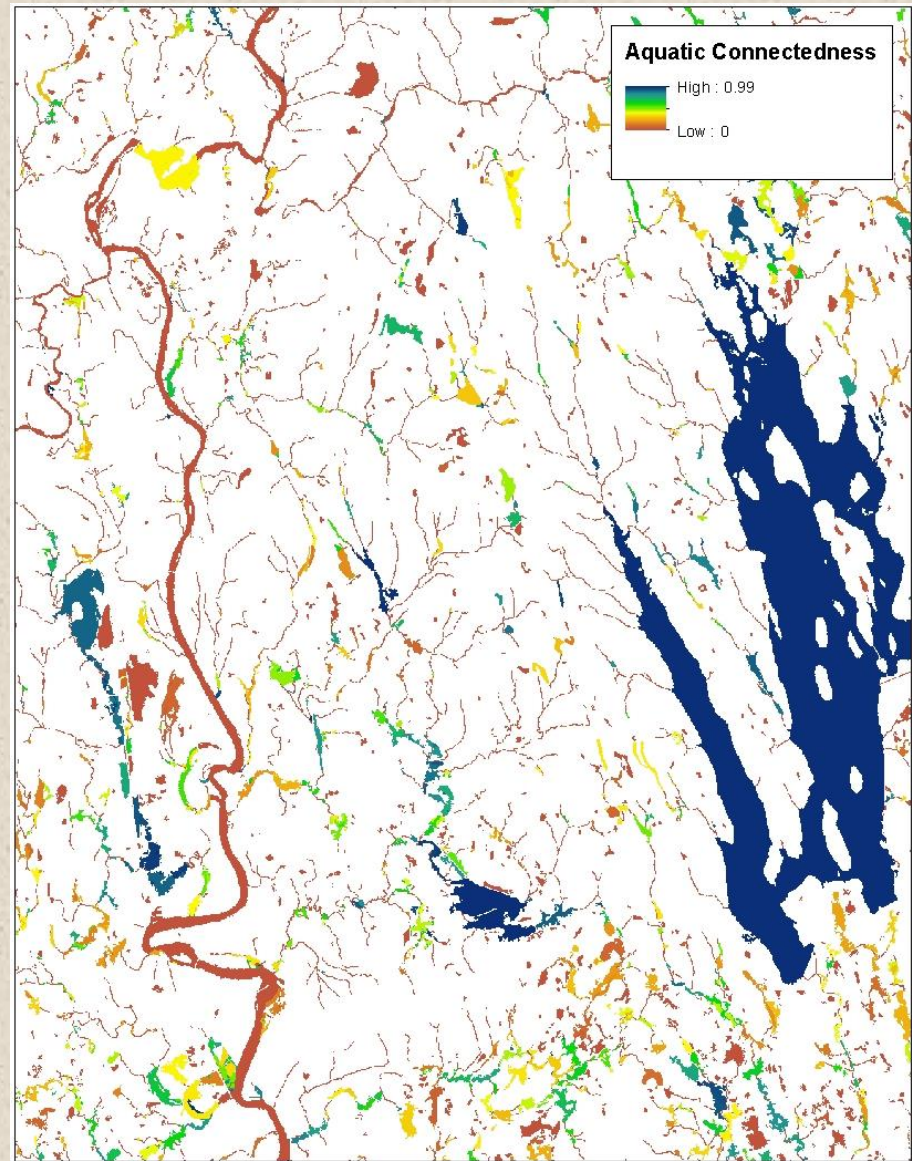
14. Similarity
15. Connectedness
16. Aquatic connectedness

## ■ Composite metric

17. Index of ecological integrity (IEI)

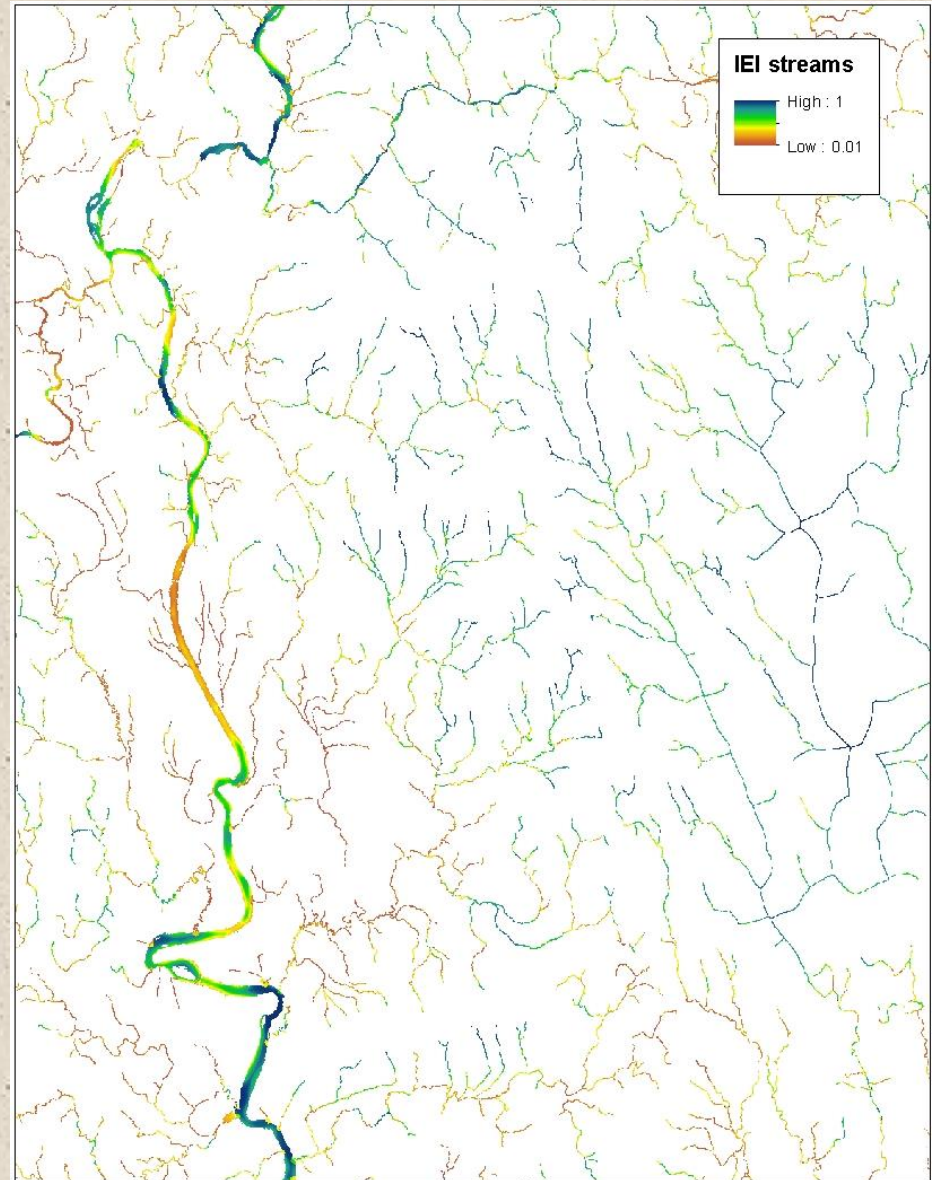
# Ecological Integrity Metrics

- **Aquatic connectedness**
  - Resistant kernel applied to every aquatic cell
  - Kernel spread scaled by time-of-flow model
  - Resistance based on ecological dissimilarity (from settings variables) and passability scores for culverts and dams



# Ecological Integrity Metrics

- Index of ecological integrity (IEI)
  - Composite of stressor and resiliency metrics
  - Quantile-scaled (0-1) by ecosystem & extent



# For More Information

- Project website:

[www.umass.edu/landeco/research/nalcc/nalcc.html](http://www.umass.edu/landeco/research/nalcc/nalcc.html)

UMass Landscape Ecology Lab

Home About People Publications Presentations Research Teaching Opportunities

### Assessment of Landscape Changes in the North Atlantic Landscape Conservation Cooperative: Decision-Support Tools for Conservation

This project is focused on the development of a landscape change model for the North Atlantic Landscape Conservation Cooperative (NALCC) that will ultimately allow us to assess landscape change, assess changes in ecological integrity and habitat capability for representative species, and allow us to identify priorities for land protection and management of existing conservation lands.

This project website is under construction.

**Quicklinks**

- NALCC
- FRAGSTATS
- CAPS
- HABIT@
- RMLands
- Vernal pools
- Fire
- Shortcourses

Department of Environmental Conservation | College of Natural Sciences | University of Massachusetts

## Links to documents:

- [Overview](#)
- [Technical docs](#)

## 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 Wiley 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 and 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)

- Personal contact:

[mccgarigalk@eco.umass.edu](mailto:mccgarigalk@eco.umass.edu)  
413-577-0655