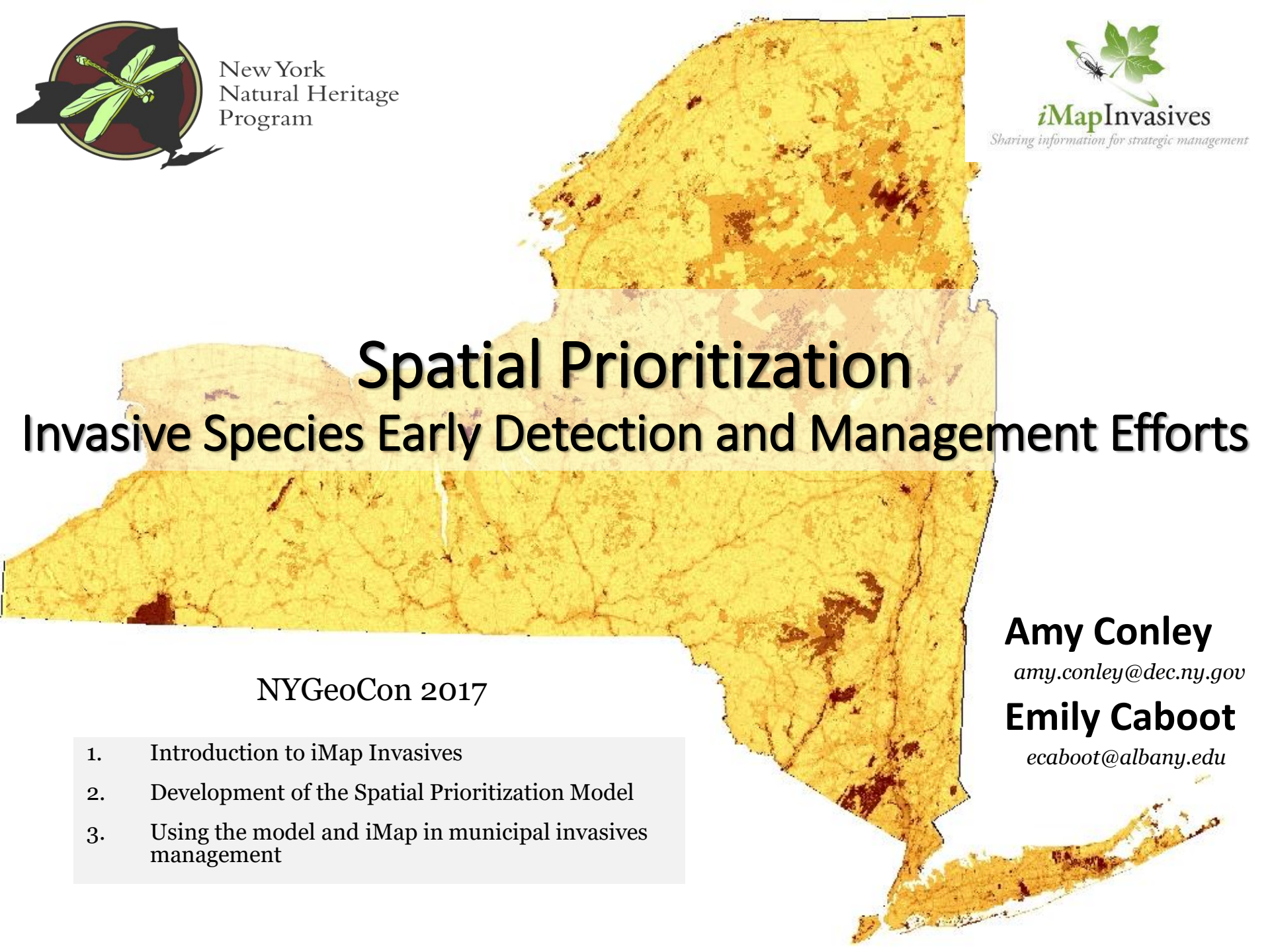
New York
Natural Heritage
Program

iMapInvasives
Sharing information for strategic management

Spatial Prioritization

Invasive Species Early Detection and Management Efforts



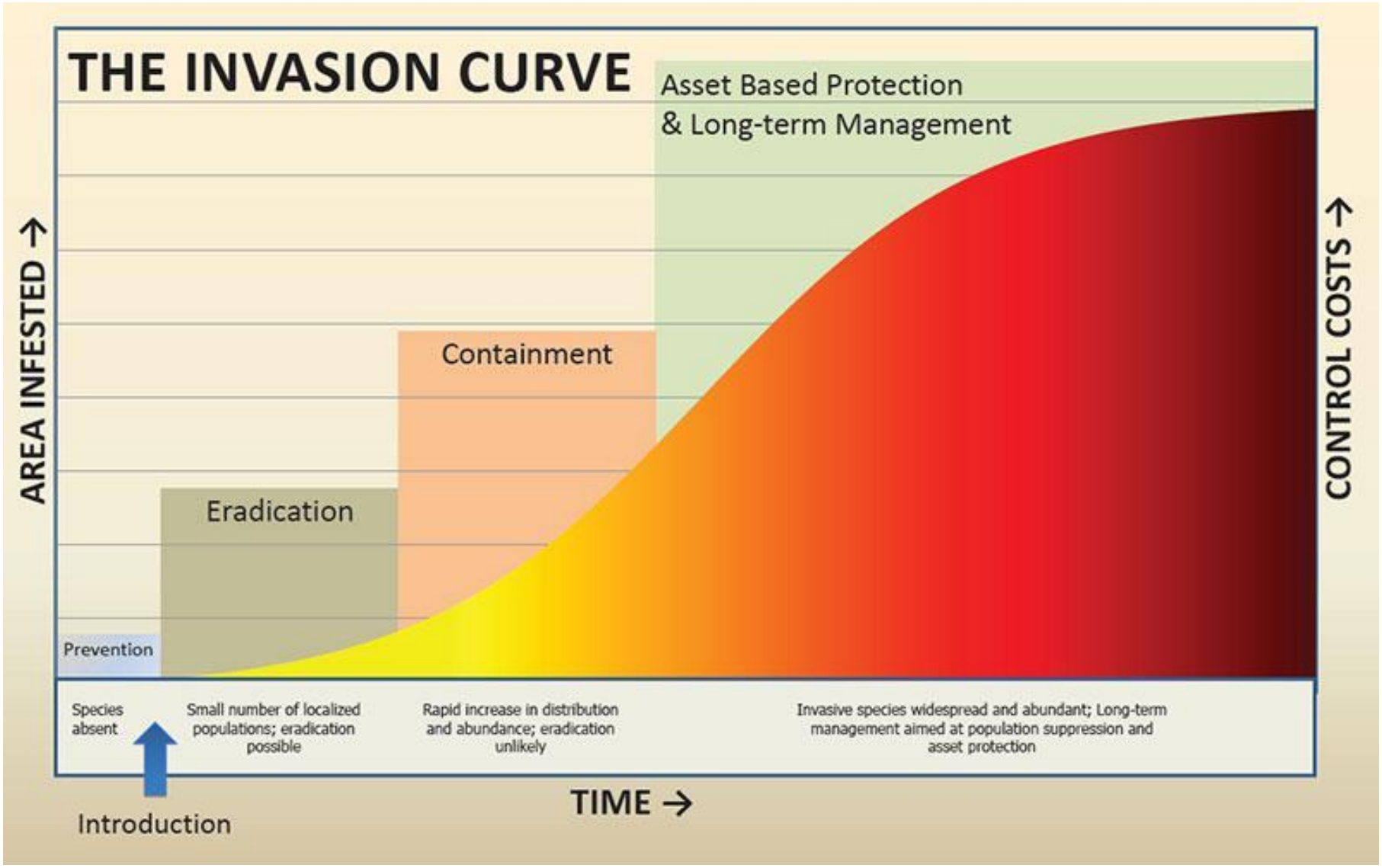
NYGeoCon 2017

1. Introduction to iMap Invasives
2. Development of the Spatial Prioritization Model
3. Using the model and iMap in municipal invasives management

Amy Conley
amy.conley@dec.ny.gov
Emily Caboot
ecaboot@albany.edu

What is an Invasive Species?

Non-native species that can cause harm to the environment, the economy or to human health. Invasives come from all around the world.


THE INVASION CURVE
Asset Based Protection
& Long-term Management
Containment
Eradication
Prevention
AREA INFESTED →
CONTROL COSTS →
Species absent
Small number of localized populations; eradication possible
Rapid increase in distribution and abundance; eradication unlikely
Invasive species widespread and abundant; Long-term management aimed at population suppression and asset protection
Introduction
TIME →

New York State
Invasive Species Database

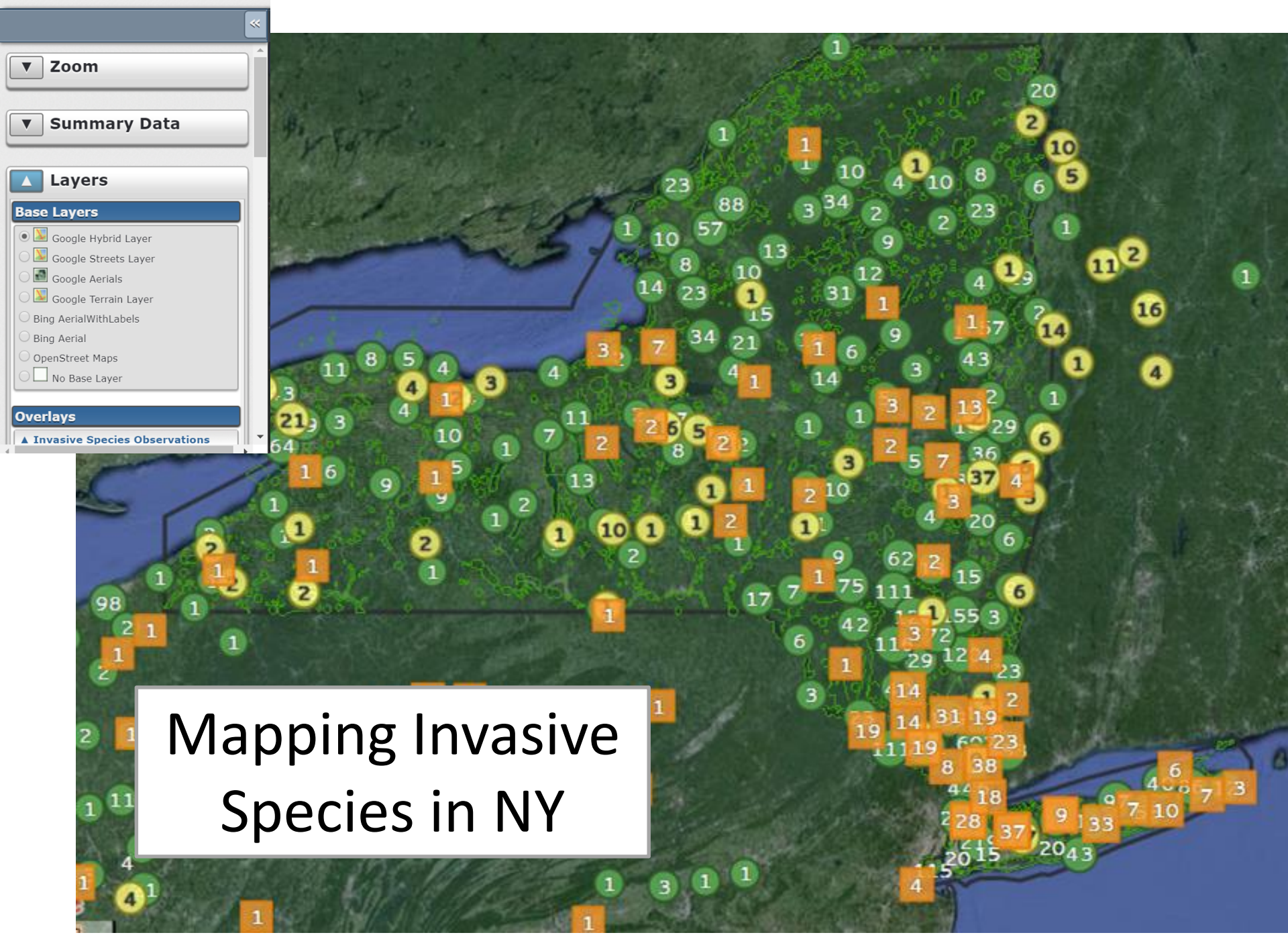
iMapInvasives

Sharing information for strategic management

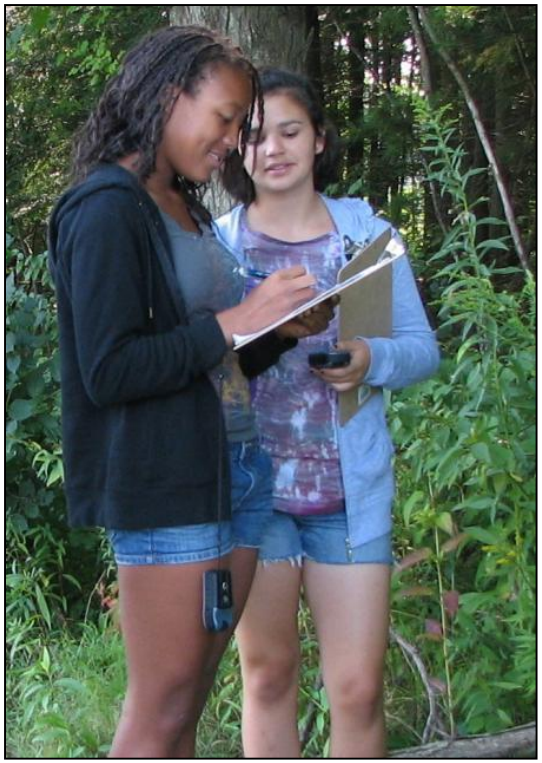
A collaborative GIS-based, online tool for invasive species management

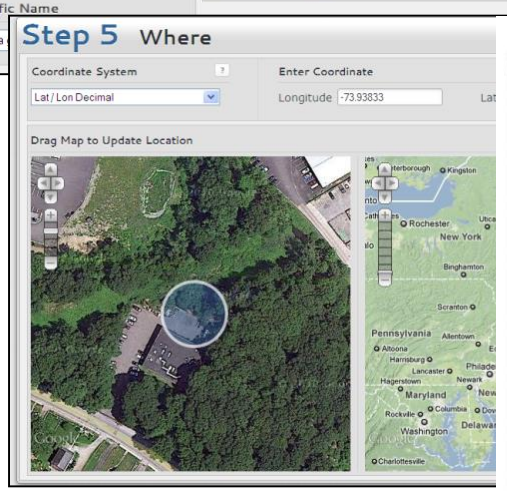
Funding provided by:
New York State
Environmental Protection Fund

New York
Natural Heritage
Program

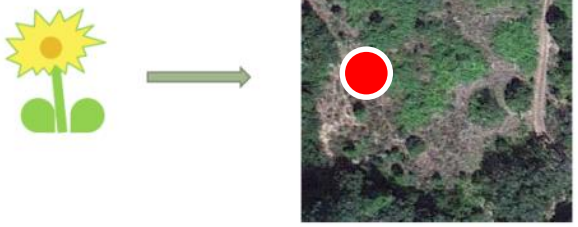

Zoom
Summary Data
Layers
Base Layers
Google Hybrid Layer
Google Streets Layer
Google Aerials
Google Terrain Layer
Bing AerialWithLabels
Bing Aerial
OpenStreet Maps
No Base Layer
Overlays
Invasive Species Observations
Mapping Invasive Species in NY

Online and mobile data entry

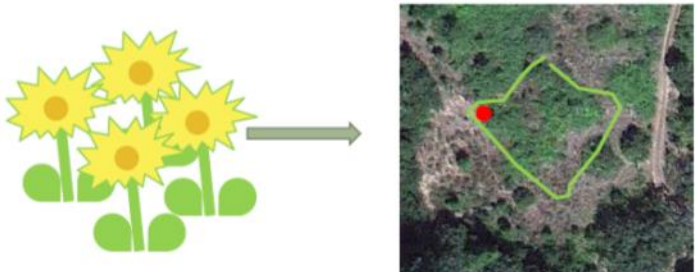




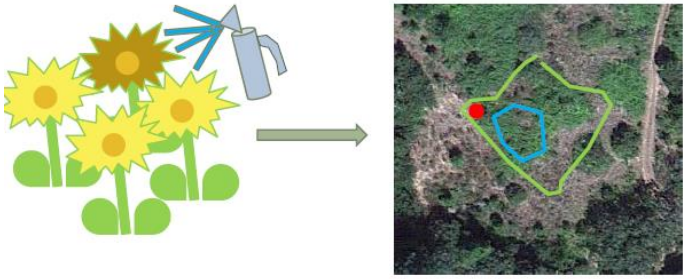
DATA TYPES



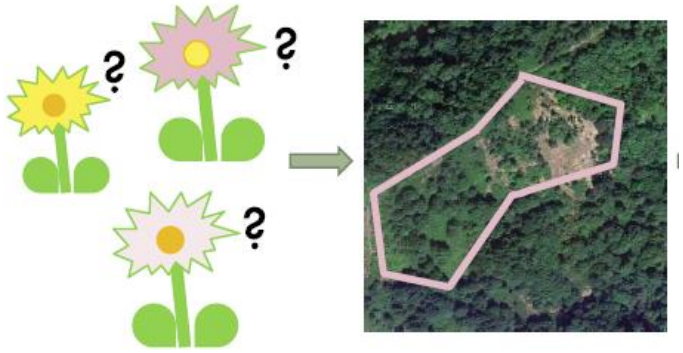
OBSERVATION – location of a specific species(location, date)



ASSESSMENT – detailed information about a specific observation



TREATMENT – control effort details



SURVEY – search for presence or absence of a species

INFESTATION MANAGEMENT RECORD

As the database grows…

- Early detection capacity increases
- Understand patterns/ pathways of invasion
- More strategic management decisions

Spatial Prioritization Maps for Invasive Species

GOAL - Help Natural Resource Managers prioritize where to focus resources for Early Detection surveys and invasive species control by coupling conservation value and risk of spread.

Basic Steps:

1) Compiled spatial data on factors influencing invasive control decisions
   - Used layers with statewide coverage and fine scale resolution
2) Created new synthesis layers
   - Driven by stakeholder feedback and expected uses

Conservation value

Protection Status

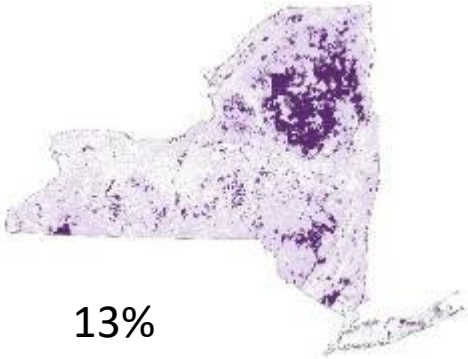
Risk of Spread

Comprehensive Score:
Ecological Significance + Protected or Natural + Risk

Ecological Significance

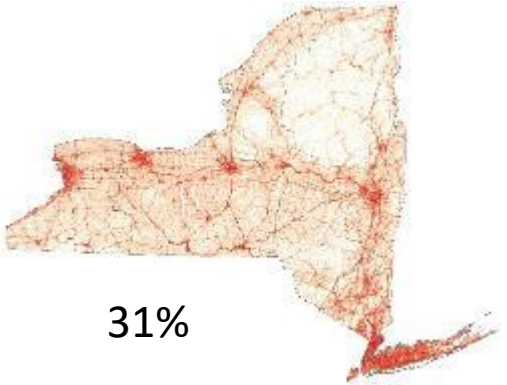
56%

Protected or Natural



13%

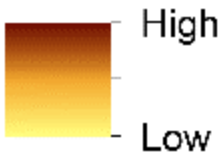
Risk of Spread

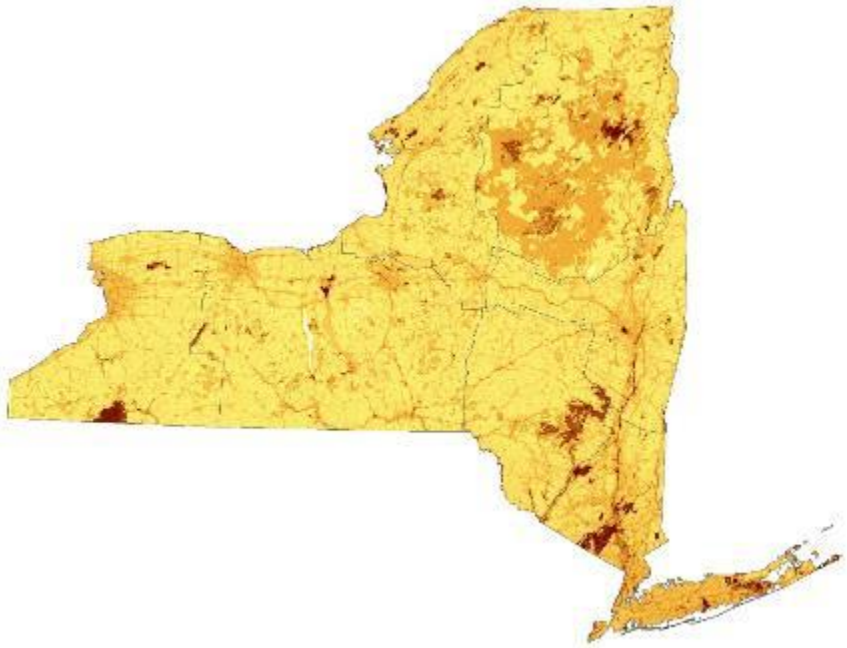


31%

Comprehensive Score

Areas of high conservation value with high risk of new invasions and dispersal



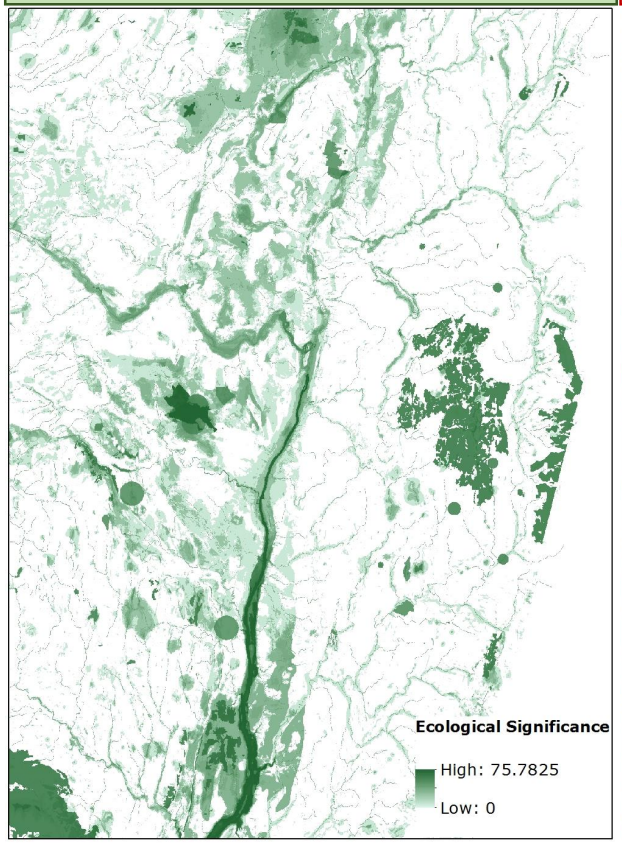


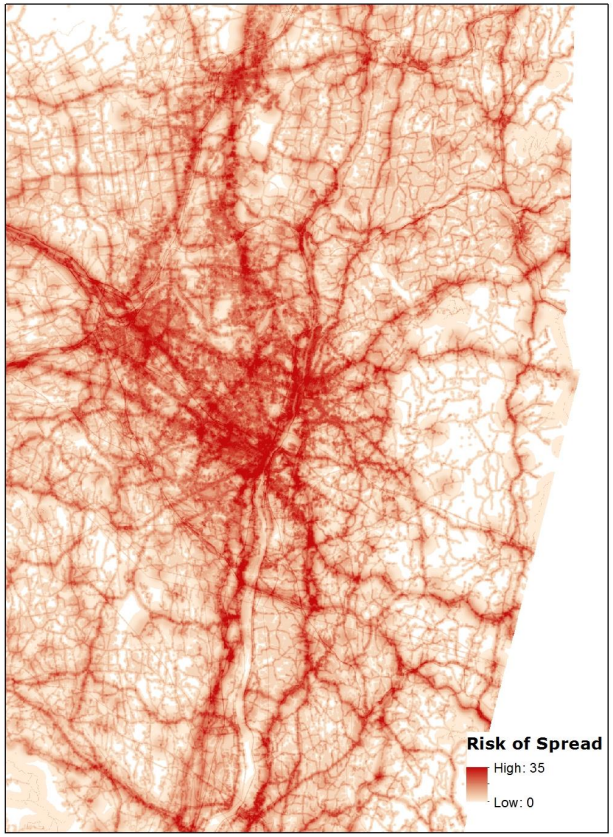
Developing a Spatial Prioritization Tool

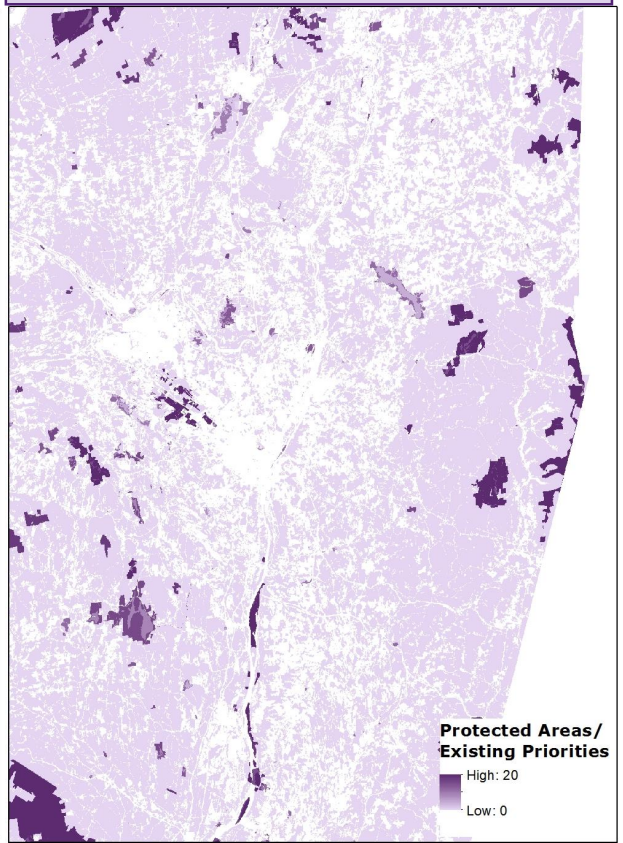
Where is the most valuable habitat under the greatest threat?

The model assessed habitat quality in three categories:

Ecological Significance	Risk of Spread	Protected Status

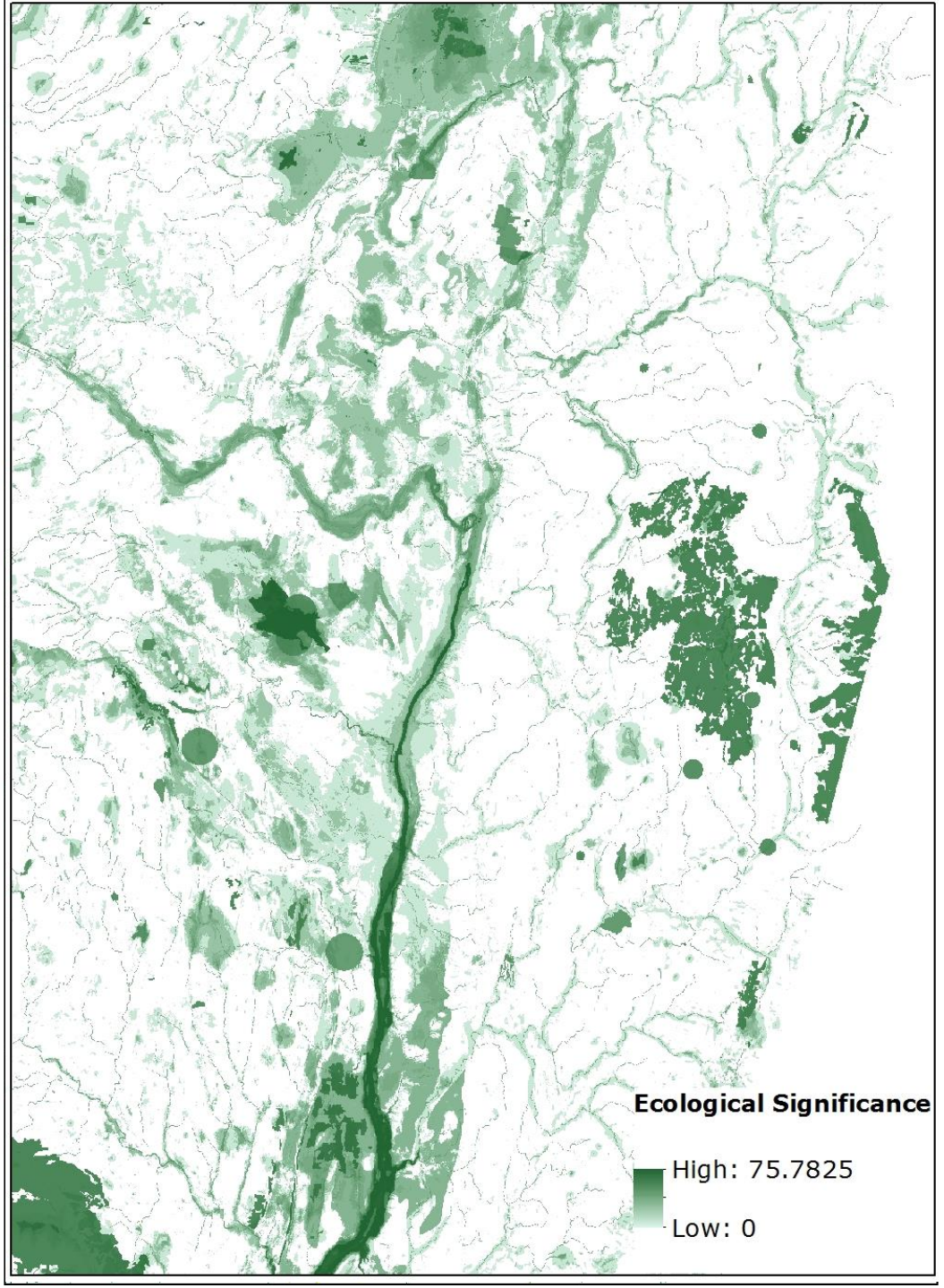






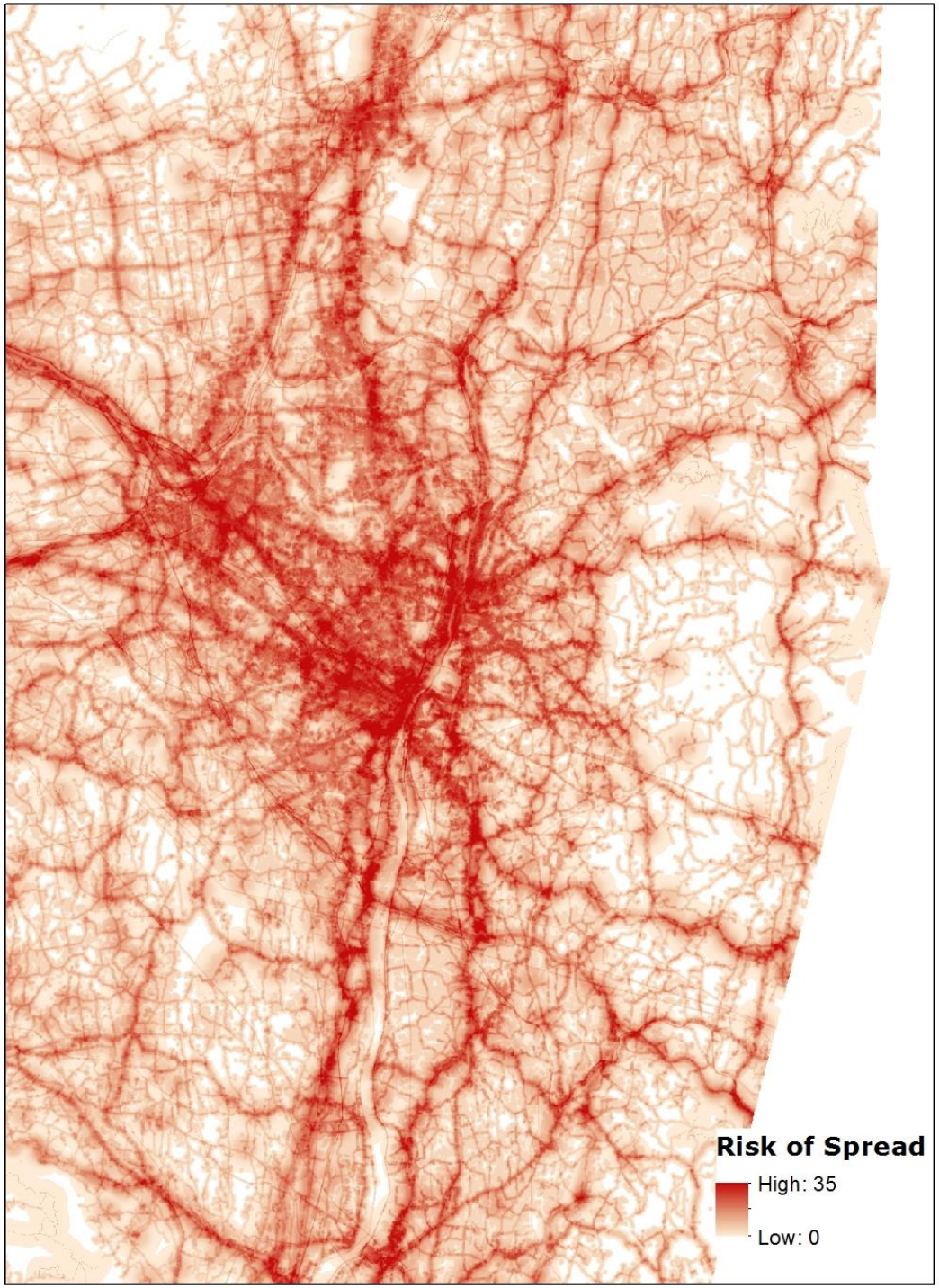
Ecological Significance

Component	Weight
Element Occurrence Data	50
Species Distribution Models	30
Mussel Data	5
BAP	5



Risk of Spread

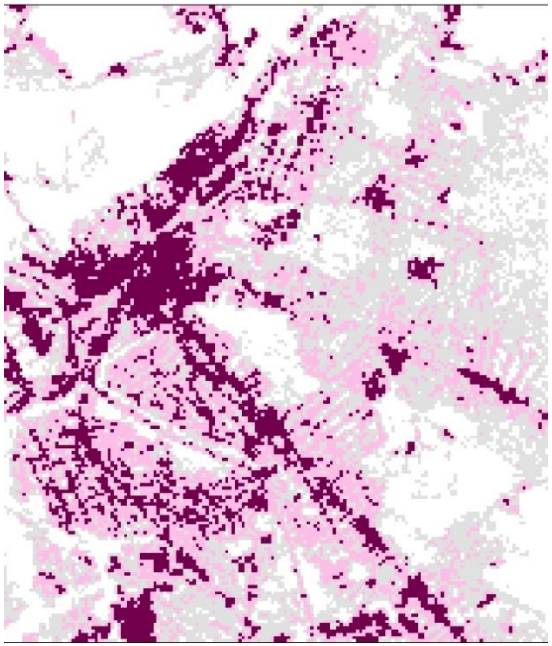
Component	Weight
Landscape Condition Assessment	35
Trails	5
Campgrounds	5
Boat Launches	5



Landscape Condition Assessment

Collect anthropogenic themes that are related to ecosystem stress (transportation, development, utilities)

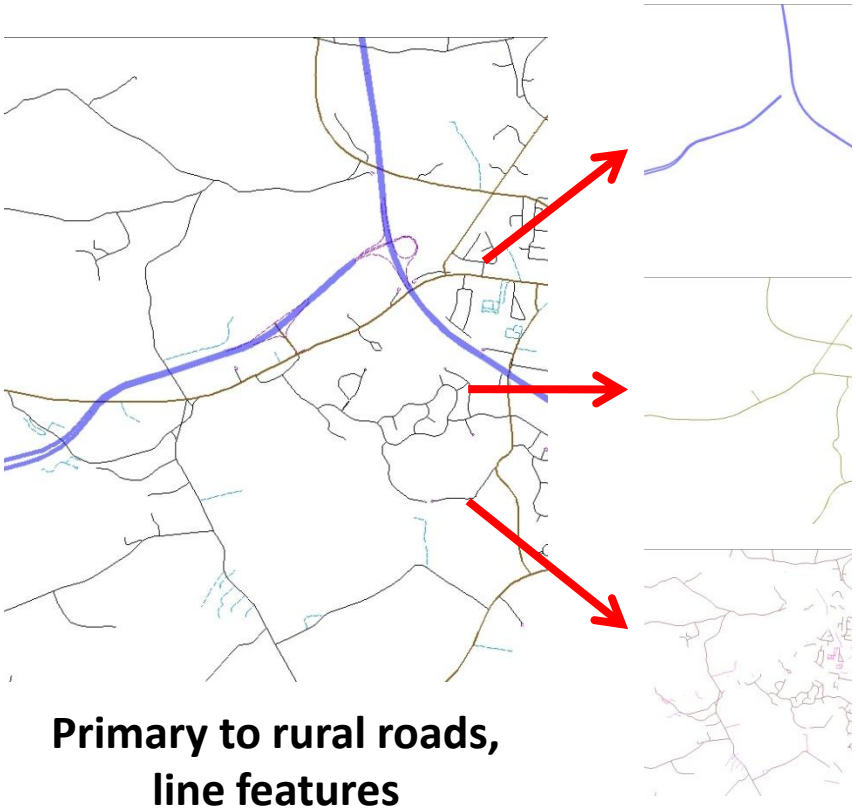
Primary to rural roads, line features



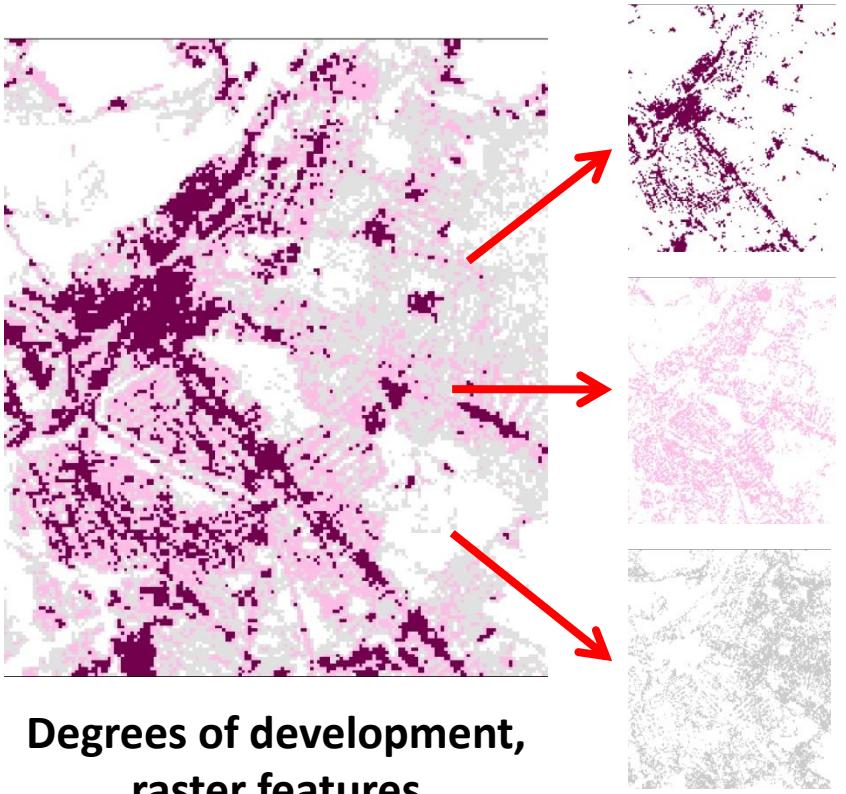
Degrees of development, raster features

Landscape Condition Assessment

Collect anthropogenic themes that are related to ecosystem stress (transportation, development, utilities)



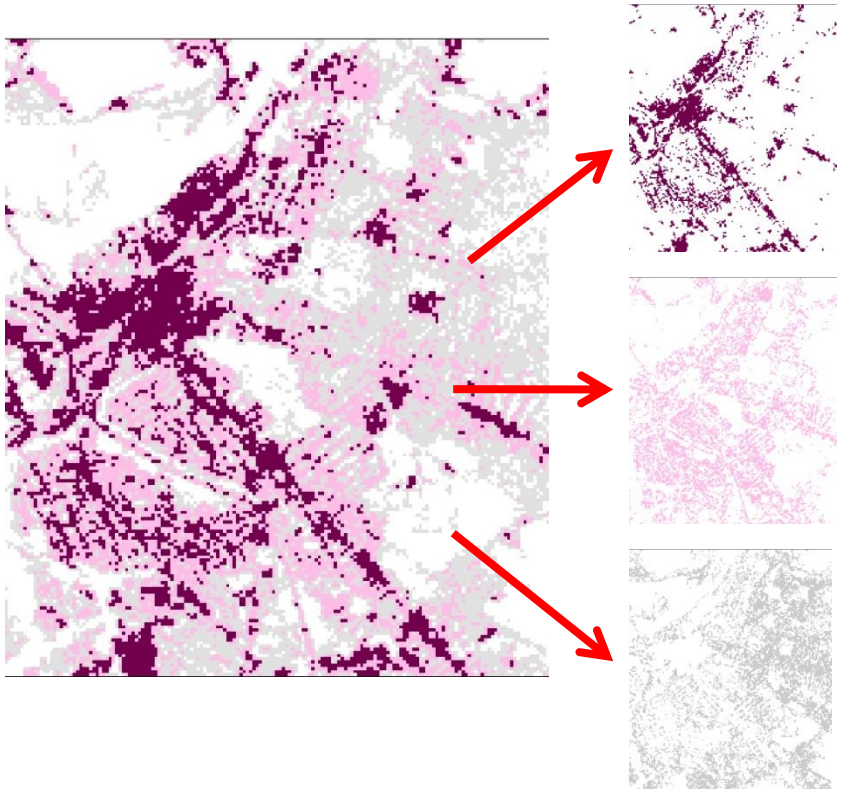
Primary to rural roads, line features



Degrees of development, raster features

Landscape Condition Assessment

Assign relative impact scores (weights) to each stressor



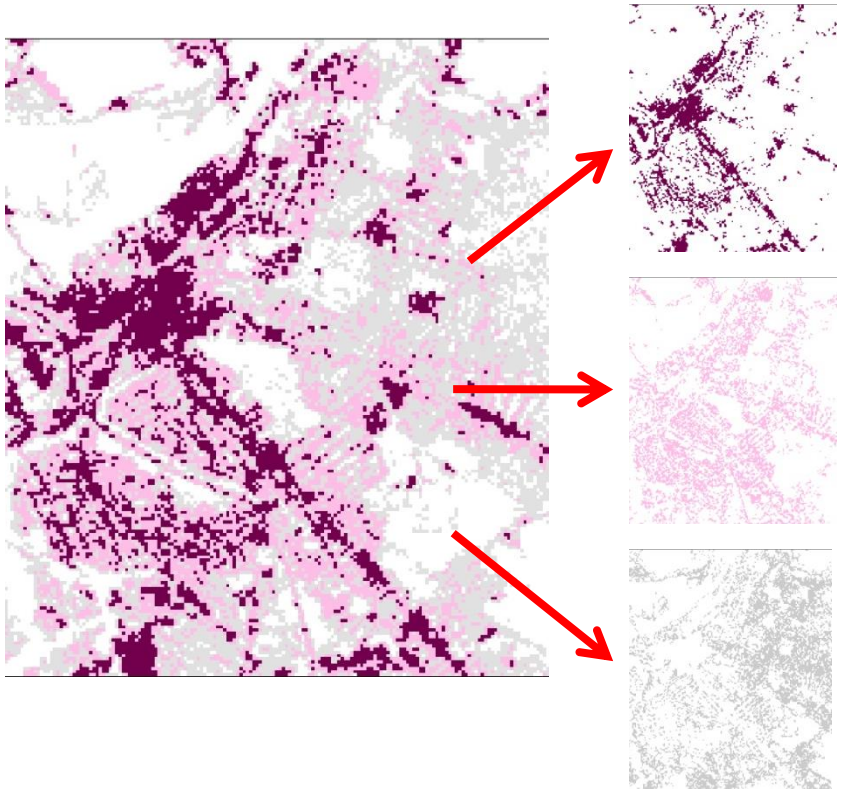
High intensity development = 500

Medium intensity development = 400

Low intensity development = 300

Landscape Condition Assessment

Assign distance at which <u>impact decreases to zero</u>



High intensity development = 2000 m

Medium intensity development = 300 m

Low intensity development = 300 m

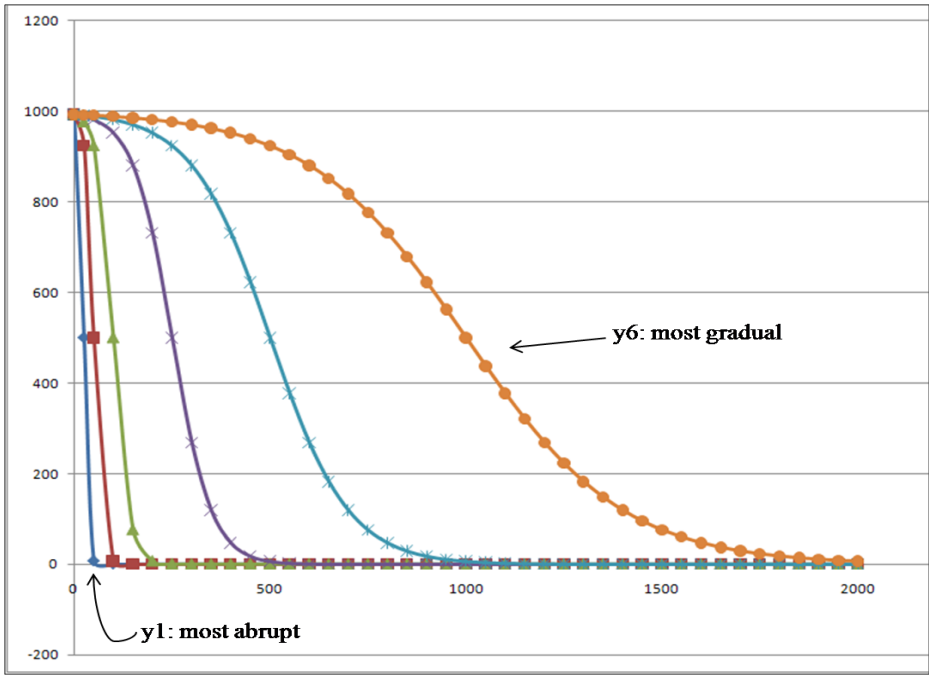
Landscape Condition Assessment

Model attenuation of disturbance effects away from stressors

sigmoidal decay model

High stress

Low stress



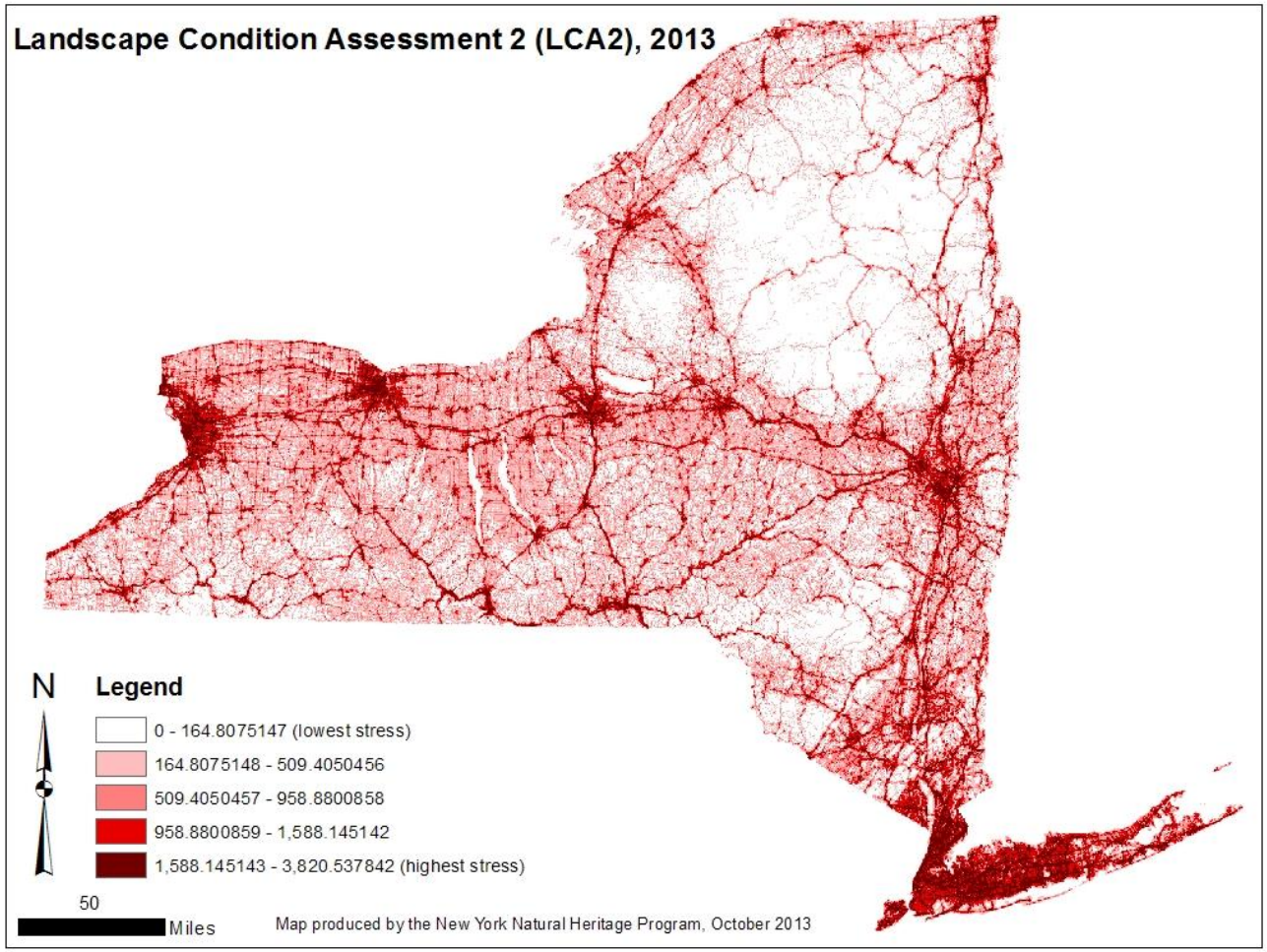
Distance

Landscape Condition Assessment

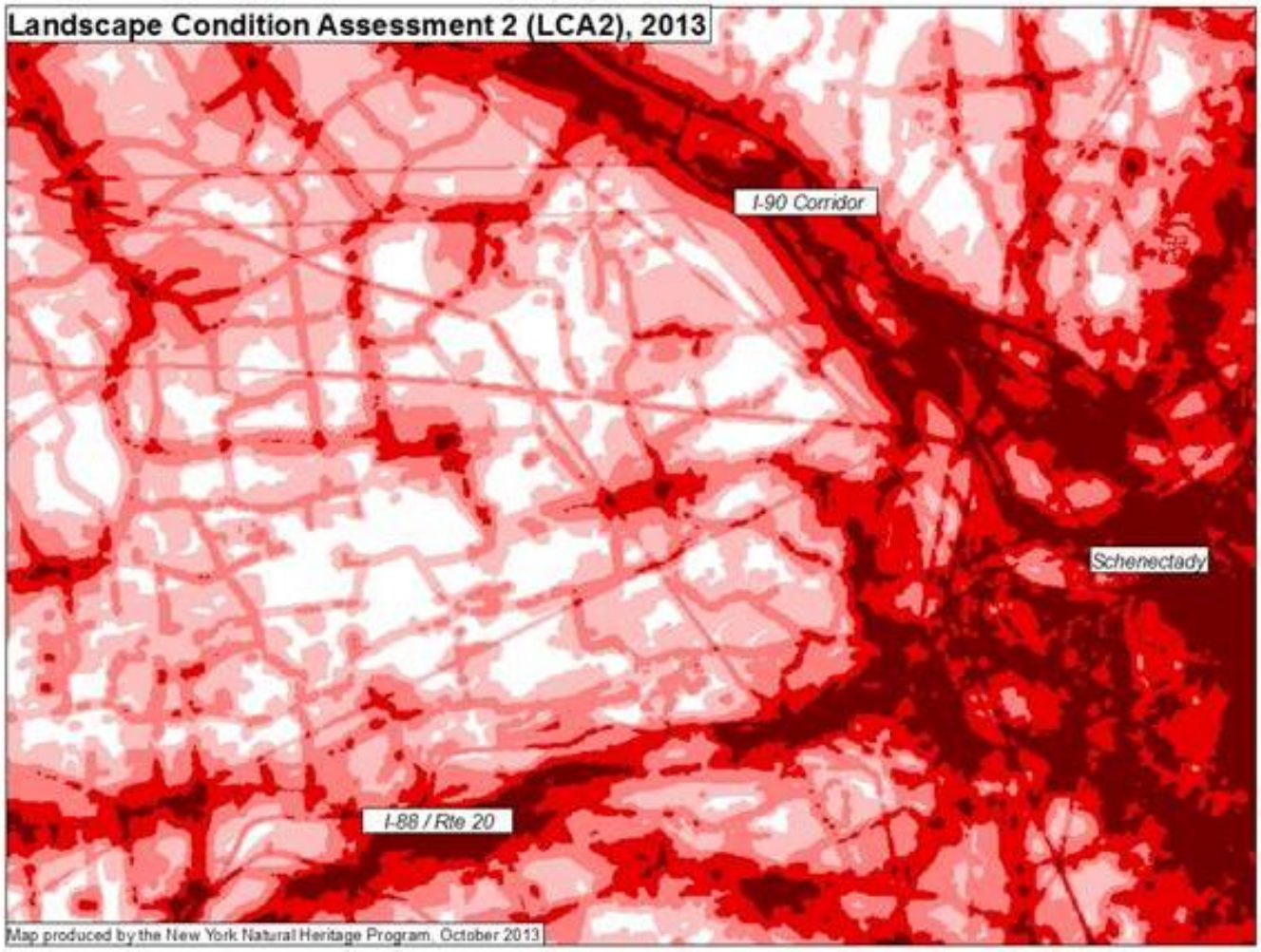
Input theme	Distance decay type	Decay dist.
Transportation		
Vehicle trails, 4-wheel drive	y1 (most abrupt)	50
Local, neighborhood, rural roads	y3	200
Secondary, connecting, special roads	y4	500
Primary highways, limited access	y5	1000
Primary highways, w/o limited access	y5	1000
Active rail lines	y2	100
Urban and Industrial Development		
High intensity development	y6 (most gradual)	2000
Medium intensity development	y4	300
Low intensity development	y4	300
Utility Corridors		
Electric transmission corridor	y2	100
Natural Gas corridor	y2	100
Land Use-Land Cover		
Cropland	y3	200
Open spaces	y3	200

Landscape Condition Assessment

Stack each component model and develop cumulative pixel scores

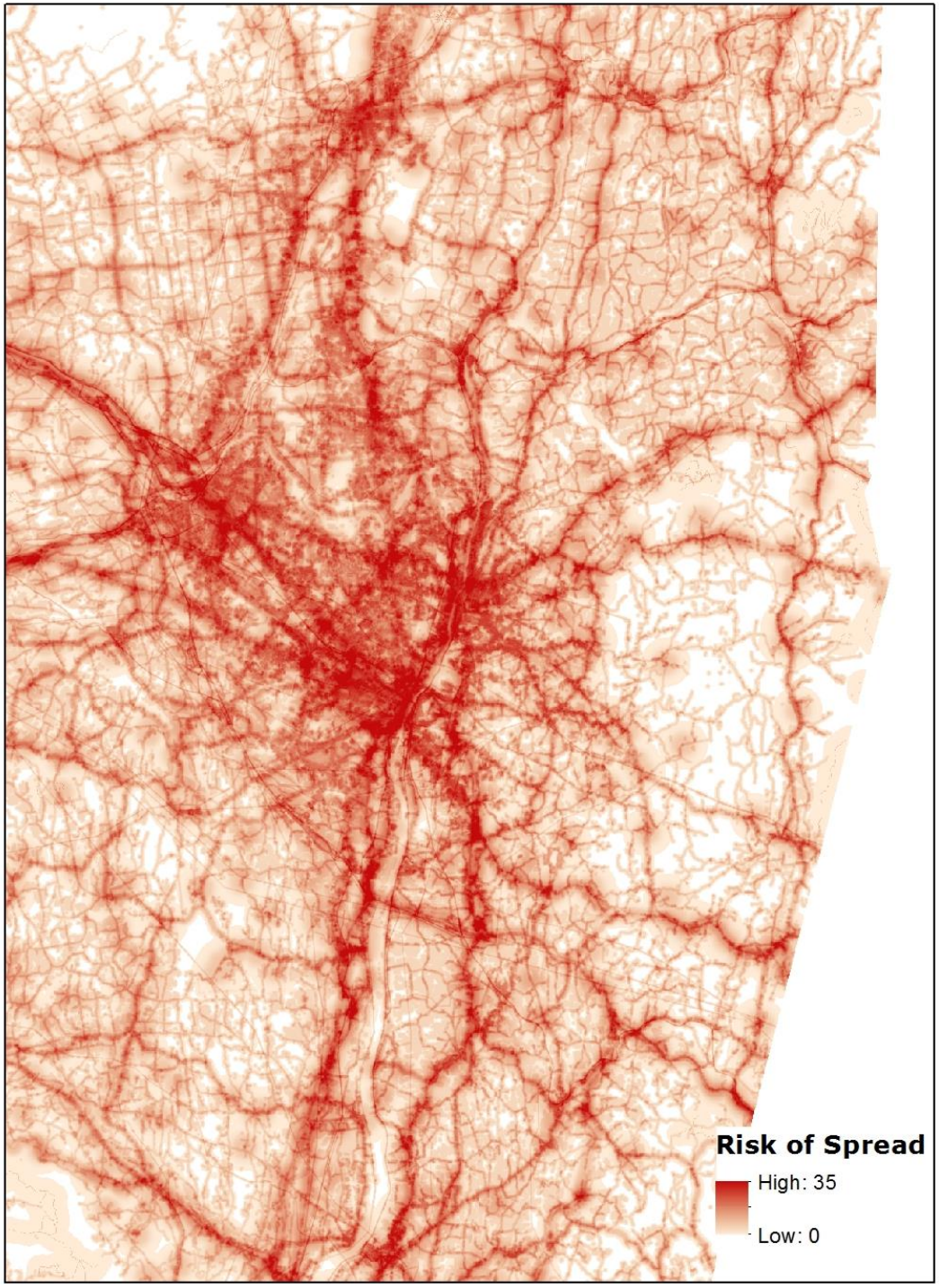


Landscape Condition Assessment



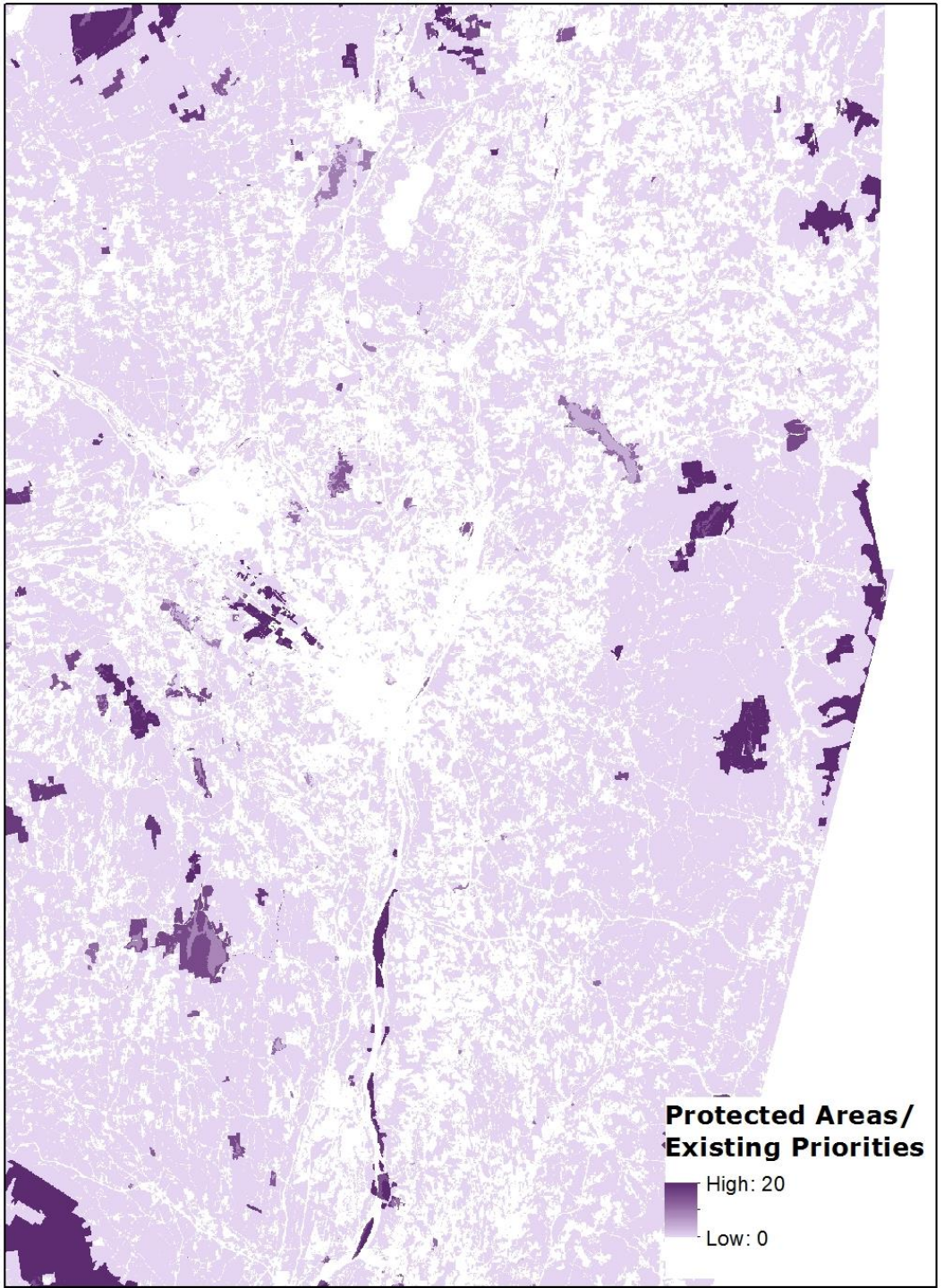
Risk of Spread

Component	Weight
Landscape Condition Assessment: collection of anthropogenic stressors related to transportation, development, utilities, land use	35
Trails	5
Campgrounds	5
Boat Launches	5



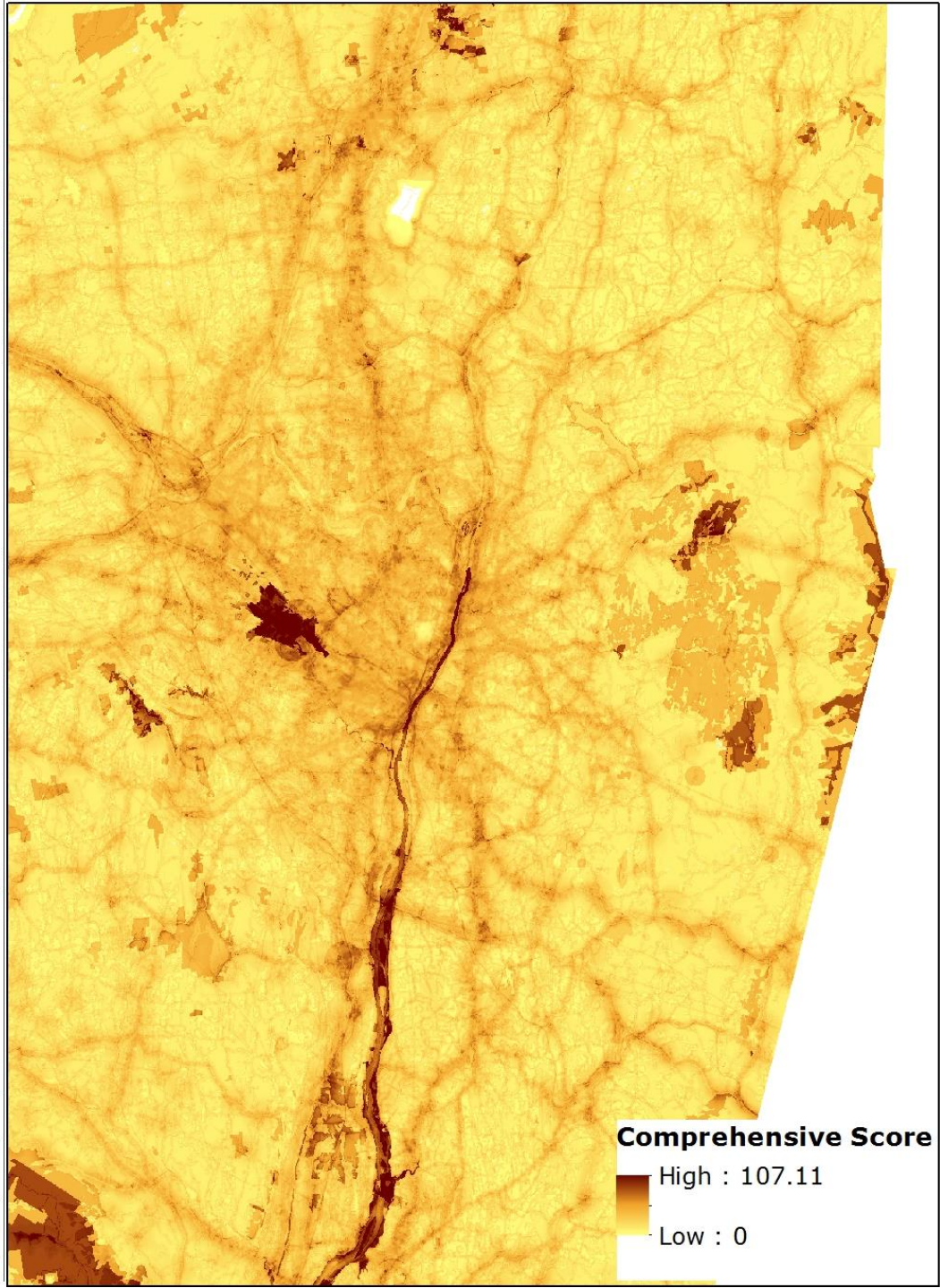
Priority Areas

Component	Weight
New York Protected Areas Database (NYPAD)	15
Natural Land Cover	5



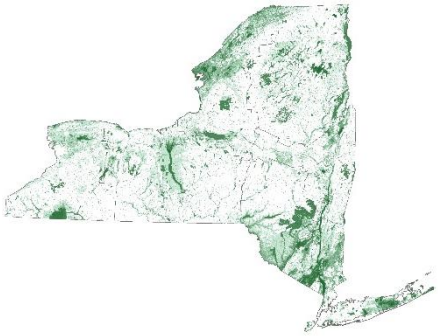
Comprehensive Score

Component	Points	Proportion
Protected Status	20	13%
Risk of Spread	50	31%
Ecological Significance	90	56%

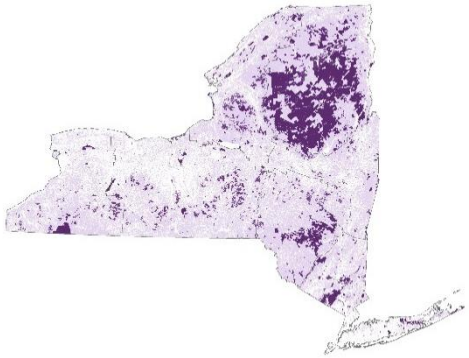


Synthesis layer:
Ecological Significance + Priority Areas + Risk

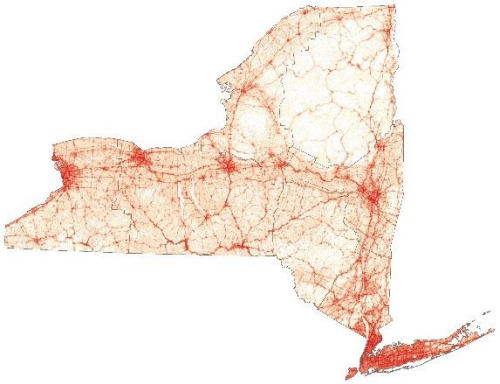
Ecological Significance



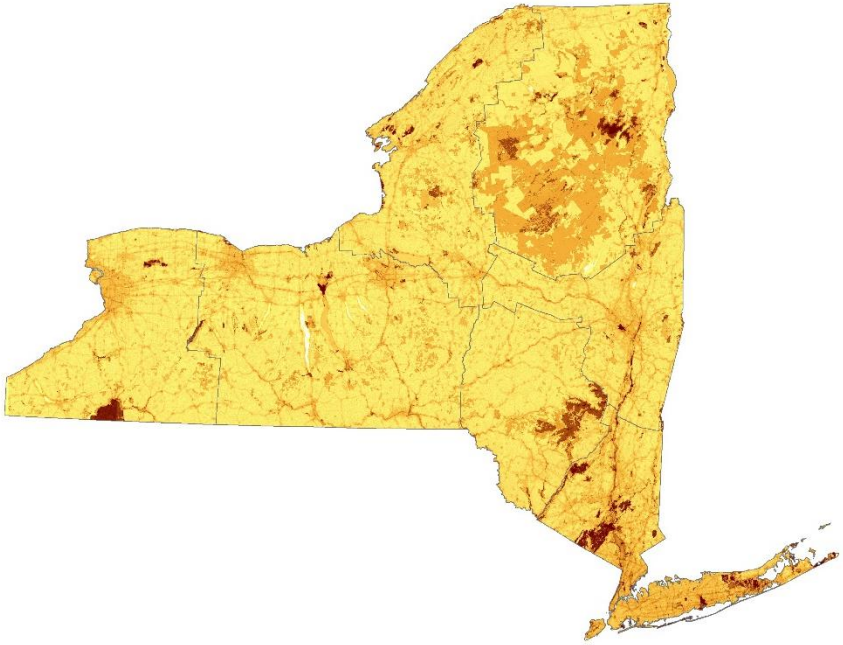
Priority Areas



Risk of Spread

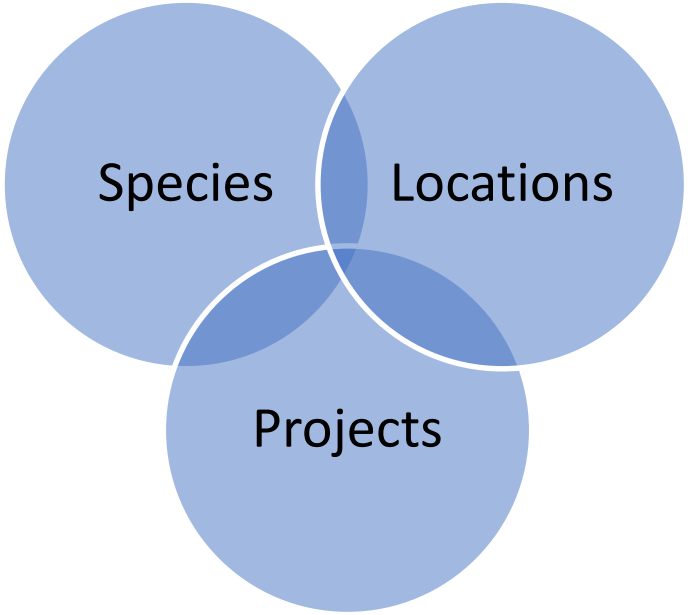


Comprehensive Score

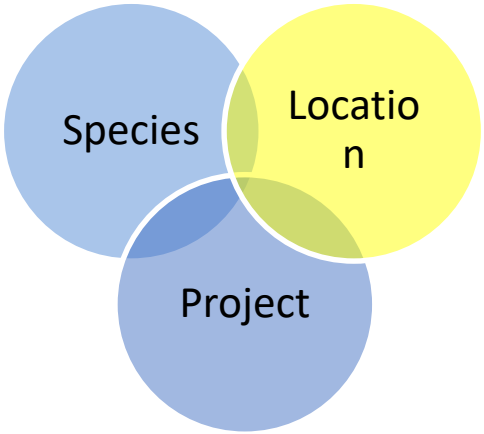


Prioritizing Invasive Species Efforts

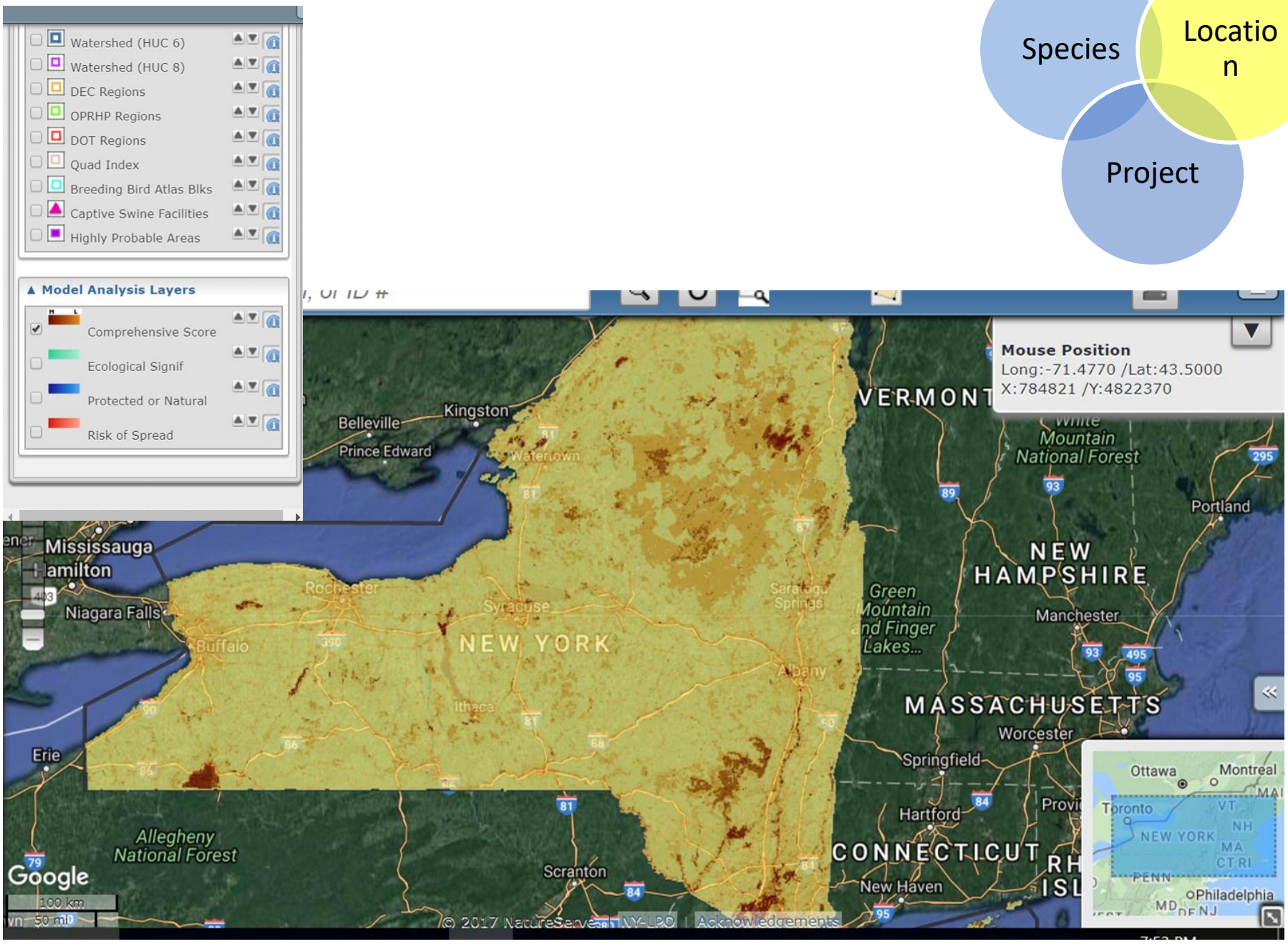
- What are the resources you are trying to protect?
  - ✓ Conservation
  - ✓ Recreation
  - ✓ Human health
  - ✓ Economy
- What impacts of invasive species do you need to mitigate?
- How do you decide where to start?



Where to control and survey for invasive species?



- Protected areas
- High conservation value
- Recreation destinations
- High economic value
- High risk areas
- Areas NOT yet heavily invaded


Watershed (HUC 6)
Watershed (HUC 8)
DEC Regions
OPRHP Regions
DOT Regions
Quad Index
Breeding Bird Atlas Blks
Captive Swine Facilities
Highly Probable Areas
Model Analysis Layers
Comprehensive Score
Ecological Signif
Protected or Natural
Risk of Spread
Mouse Position
Long:-71.4770 /Lat:43.5000
X:784821 /Y:4822370
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
CONNECTICUT
NEW YORK
Belleville
Kingston
Prince Edward
Watertown
Mississauga
Hamilton
Niagara Falls
Buffalo
Rochester
Syracuse
Albany
Ithaca
Erie
Allegheny National Forest
Scranton
Portland
Manchester
Worcester
Springfield
Hartford
New Haven
Green Mountain and Finger Lakes...
White Mountain National Forest
Ottawa
Montreal
Toronto
Philadelphia
Google
100 km
50 mi
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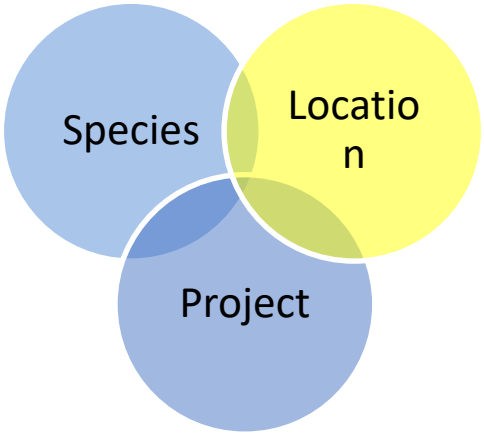
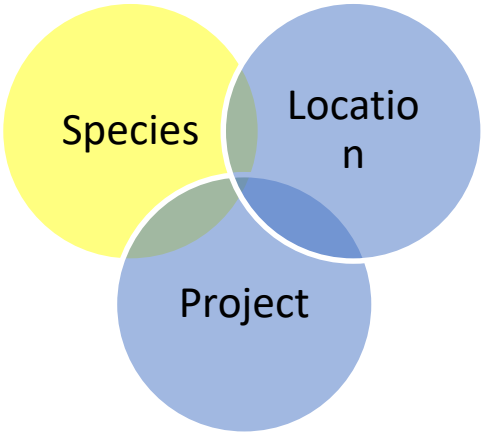

Species
Locatio
n
Project

Which species to focus on?



Create list of target invasive species

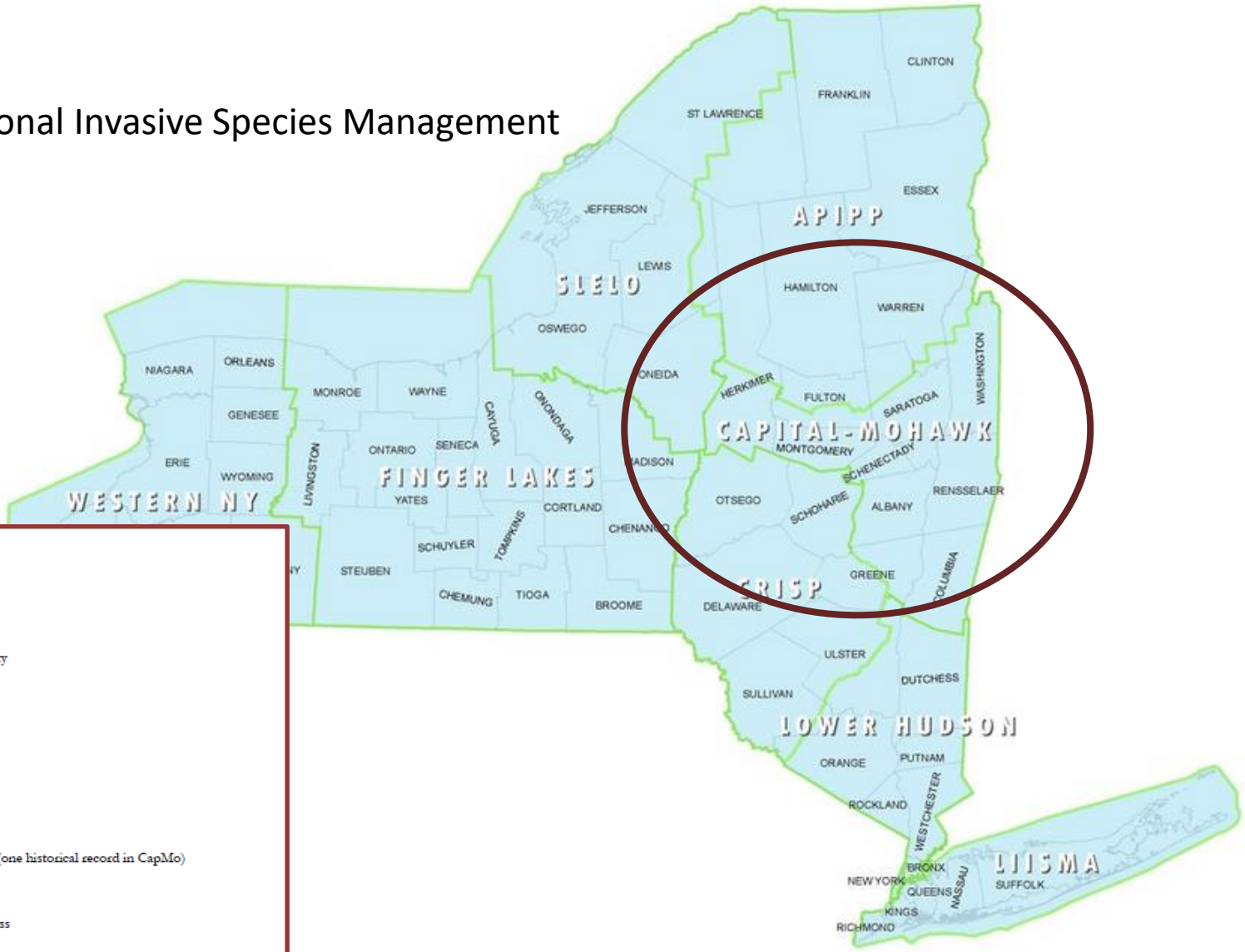
For each species, consider:

- Invasiveness (look at NYS rankings)
- Impacts on the goals of the preserve/region
- Feasibility of control

High Impacts and **Low Abundance**
High chance of success

PRISMs

Partnership for Regional Invasive Species Management



Terrestrial Invasive Plant Species:

Tier 1:

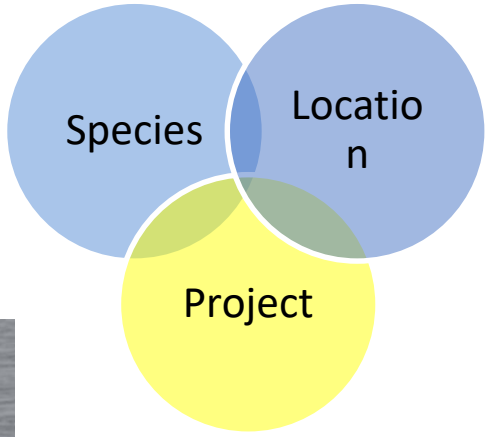
1a: *Actinidia arguta*, Hardy Kiwi, Taravine
Actinidia polygama, Silver Vine
Ampelopsis brevipedunculata, Porcelain Berry
Aralia elata, Japanese Angelica Tree
Cytisus scoparius, Scotch Broom
Dioscorea polystachya, Chinese Yam
Lonicera maackii, Amur Honeysuckle
Phellodendron amurense, Amur Corktree
Pueraria montana var. lobate, Kudzu
Salix cinerea, Gray Florists willow
Salvia glutinosa, Sticky Sage
Schoenoplectus mucronatus, Bog Bulrush (one historical record in CapMo)

1b: *Corydalis incisa*, Incised Fumewort
Oplismenus hirtellus, Wavyleaf Basketgrass

Tier 2

Acer pseudoplatanus, Sycamore Maple
Arthraxon hispidus, Small Carpgrass, Hairy Joint Grass, Jointh
Clematis terniflora, Japanese Virgin's Bower, Sweet Autumn
Eleutherococcus pentaphyllus, Five-leaf Aralia
Ficaria verna ssp. Verna, Lesser celandine, Fig Buttercup
Humulus japonicas, Japanese Hops
Lysimachia vulgaris, Garden Loosestrif, Yellow Garden Loosestrife

Which projects are most likely to succeed?



INVASIVE PLANT MANAGEMENT
IPMDAT
DECISION ANALYSIS TOOL

Using *i*MapInvasives

- Municipalities,organizations and groups can
  - Find invasive species in your area
  - Locate areas which should be prioritized by using the comprehensive score.
- Collect data, record management strategies and develop queries on your area.

Request a Login at:
www.NYiMapInvasives.org

Questions?

Amy Conley (NYNHP): **amy.conley@dec.ny.gov**
Emily Caboot (University of Albany): **ecaboot@albany.edu**

Resources

iMapInvasives
Sharing information for strategic management

Spatial Prioritization Model layers can be accessed by going to the iMap Invasives webpage: **nyimapinvasives.org**

Layers are available for download under "Resources" tab

or

Request a login to view layers and iMap data online

For information on **Partnerships for Regional Invasive Species Management (PRISMs)** go to: **nyis.info**

New York Natural Heritage Program

To download the **Landscape Condition Assessment** layer go to : **nynhp.org/data**

To request information on the **Heritage Biodiversity Index**: email Nick Conrad (NYNHP): **nick.conrad@dec.ny.gov**