## Northeast
## Regional Conservation Opportunity Areas

# Introduction

**context | vision | overview**

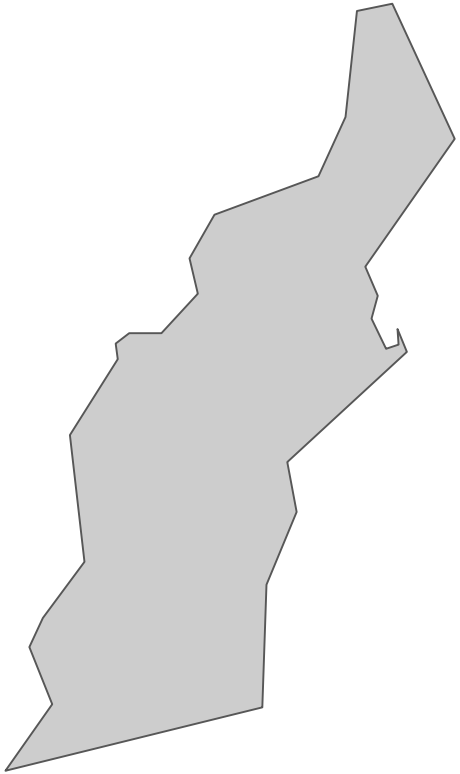
# Vision

Engage the collective wisdom and common interest of partners

To identify and map a **connected** network of **resilient** and **ecologically intact** habitats that will support **biodiversity** under changing conditions

# Why
# is this project important?

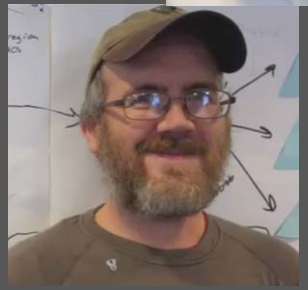
# Geographic scale



# Ecological scope

# Partner networks

## Key partners



# Looking across state boundaries

# Timeliness

# Efficiency

Regional patterns focus conservation efforts

Where can we hedge our investments in the face of change?

Habitats that appear secure locally may be in trouble elsewhere

Opportunities to pre-empt listing may be where species are not on the radar

Which species and habitats is my state/org most “responsible” for?

Is my state the battleground or sideshow for species or habitat x?

# Team

**Andrew Milliken** *USFWS & North Atlantic LCC*
**Andy Cutko** *ME DOC*
**Brian Hall** *Harvard Forest*
**BJ Richardson** *USFWS*
**Brad Compton** *UMass Amherst*
**Chad Rittenhouse** *University of Connecticut*
**Chris Burkett** *VA DGIF*
**Chris Tracey** *PA Natural Heritage Program*
**Dan Rosenblatt** *NYS DEC*
**Gwen Brewer** *MD DNR*
**Jeff Allenby** *Chesapeake Conservancy*

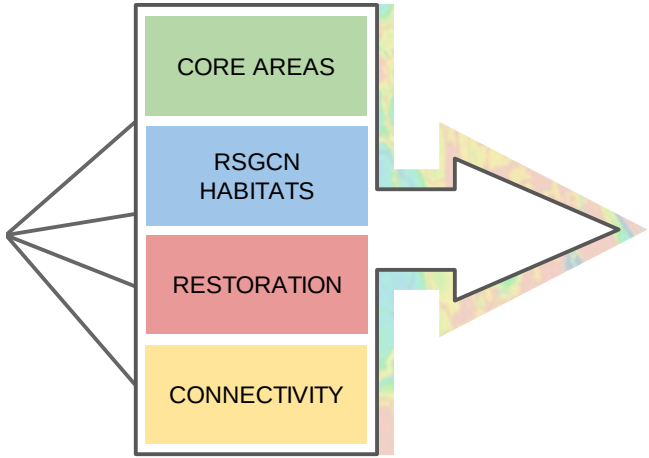
**Jonathan Brooks** *MA F&W*
**Kate Moran** *CT DEEP*
**Katie Callahan** *NH Fish and Game*
**Kevin Ruddock** *RI TNC*
**Mark Anderson, Arlene Olivero &**
**Melissa Clark** *TNC*
**Michale Glennon** *WCS*
**Patrick Woerner** *NJ DEP*
**Steve Fuller, Scott Schwenk, Renee Farnsworth & Stéphanie Cuénoud**
*North Atlantic LCC*

# Process

**Leveraging investments**

**Inclusive collaboration**

**RCN & LCC SCIENCE**



# Process

**Leveraging investments**

**Inclusive collaboration**

**Relevant science**

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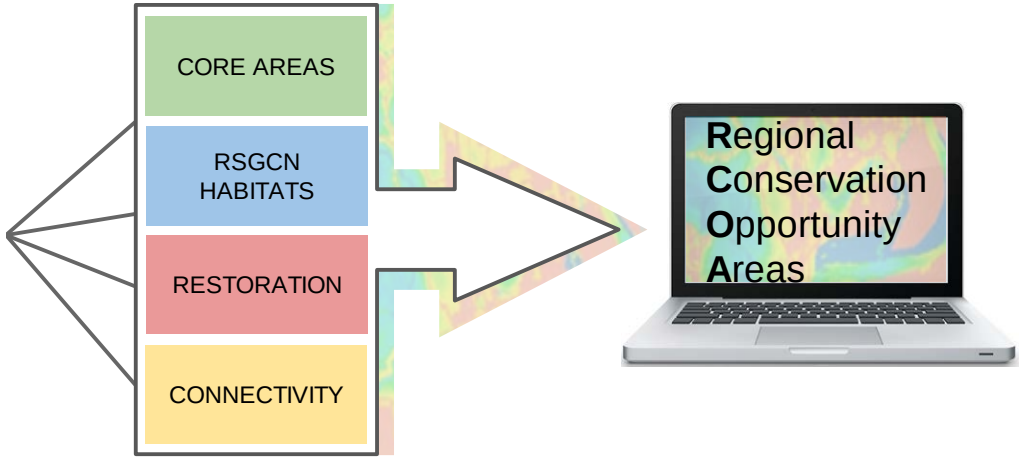
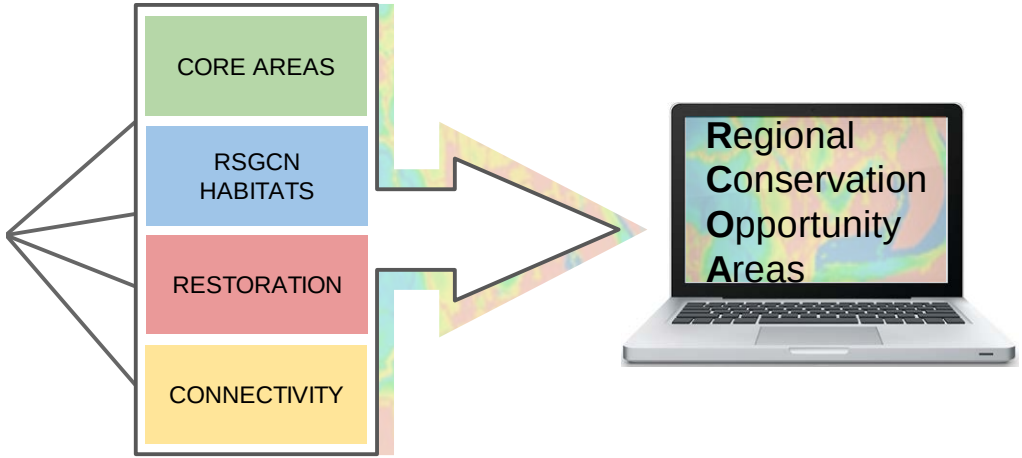
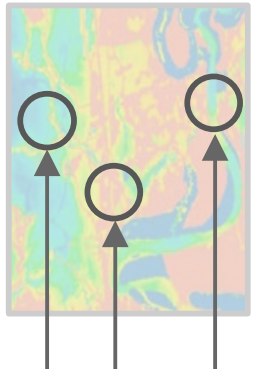


# Process

| Leveraging investments | Inclusive collaboration | Relevant science | Better implementation |
|---|---|---|---|

RCN & LCC SCIENCE

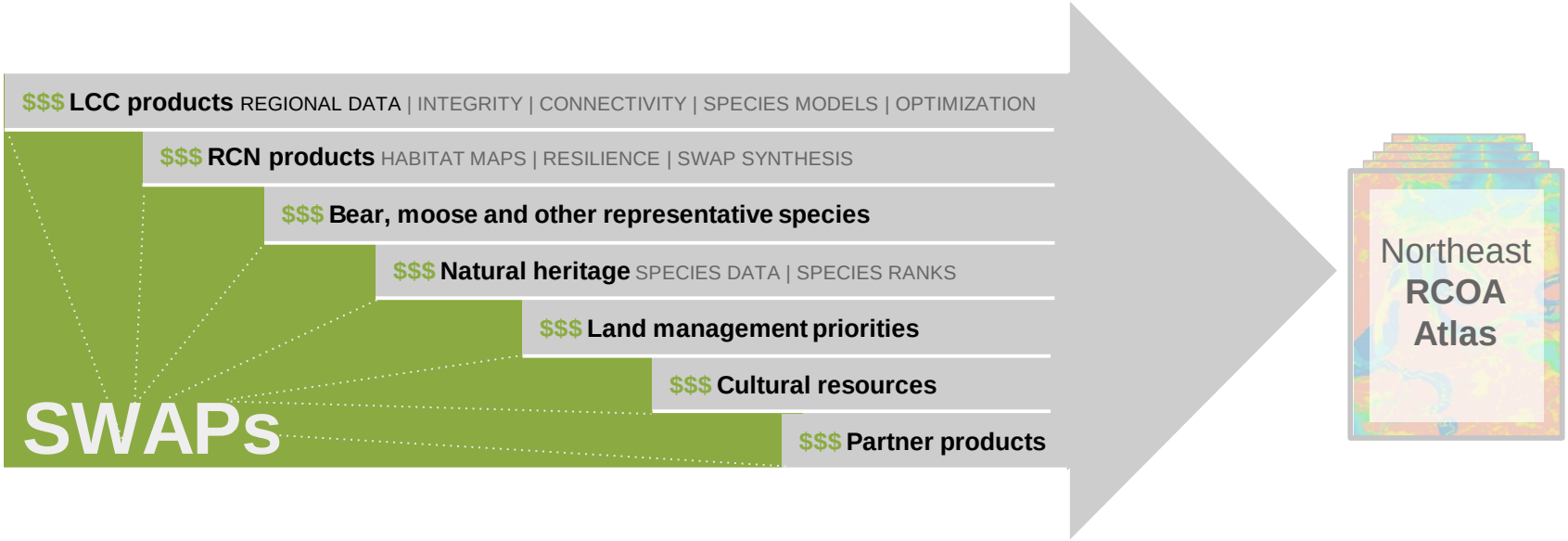


Coordinate partners for success

# Leveraging investments

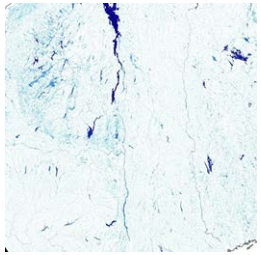
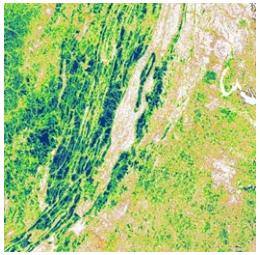
## To address the long-term needs of game species

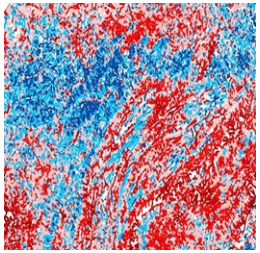
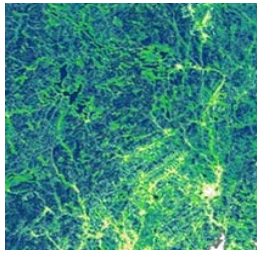


# Vision

## Products

An atlas with methodology documentation

# Vision

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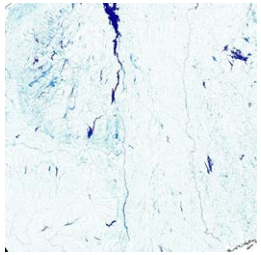
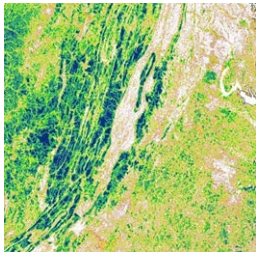
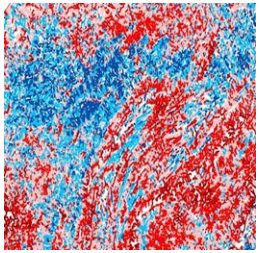
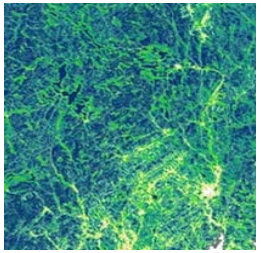



## Uses

Prioritize restoration & land management

Inform land protection

Identify core areas for all species

Complement/Confirm state priority areas

Regional context for state decisions

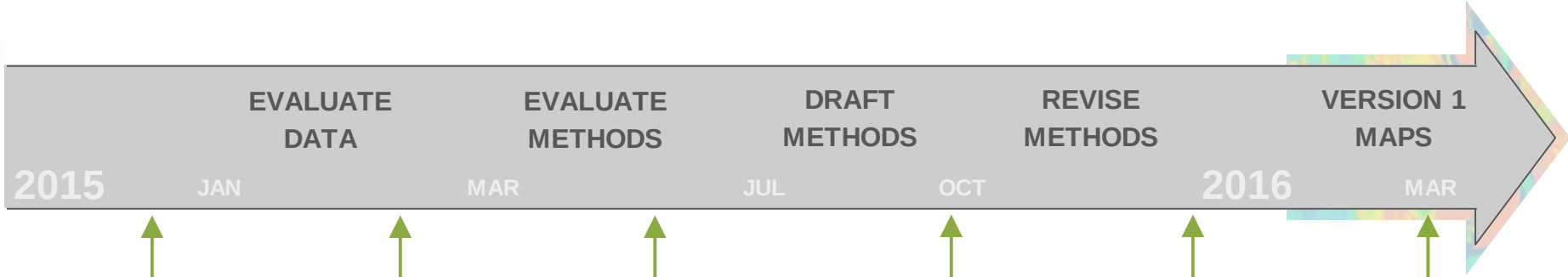
Monitor changes in landscape over time

Inform policy and listing decisions

Grant applications

Guide SWAP implementation and RCNs

# A year in review




**ROUND 1 SWAPS**
RCOA process is using and unifying the products from the first round of SWAPs

**GIS EXPERTS**
Review potential data sets

**DIVERSITY TECH**
Review timeline

**GIS EXPERTS**
Analyze and evaluate data sets; Identify key decision points

**NEFWDTC & LCC STEERING COMMITTEE**
Approval to implement draft methodology with continued input

**OTHER PARTNERS & EXPERTS**
provide input on key decisions points such as priority threats, plants, restoration, and aquatic systems

**ALL PARTNERS**
review maps as they are produced

# Methods overview

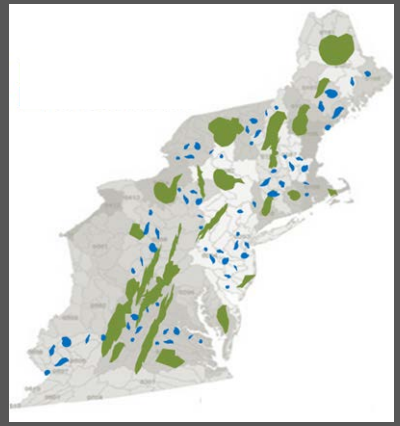
# CORE AREAS

# CORE AREAS

Representing most intact and resilient ecosystems and habitats for fish, wildlife and plants in the region

## CORE AREAS

## RSGCN HABITATS



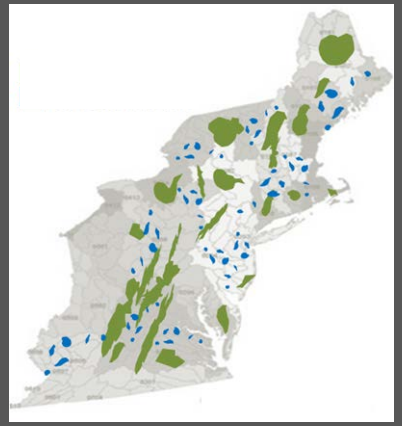
## CORE AREAS

## RSGCN HABITATS

Important habitats for rare and threatened RSGCN

## CORE AREAS

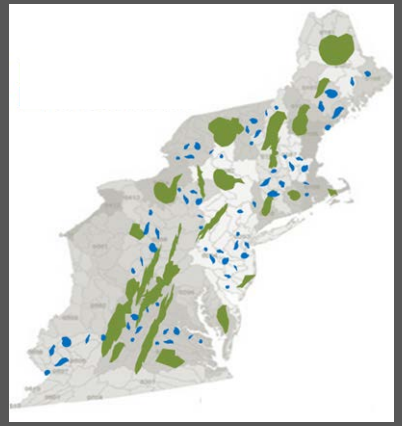
## RSGCN HABITATS



## RESTORATION

## CORE AREAS

## RSGCN HABITATS

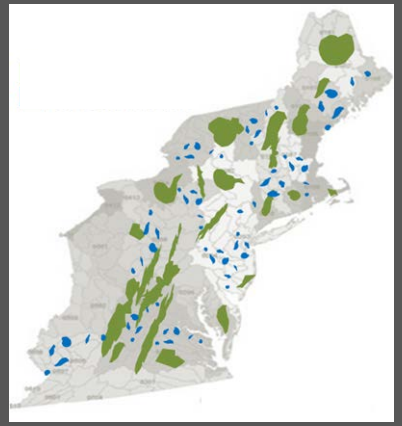


## RESTORATION

Prioritization to focus habitat restoration and management efforts

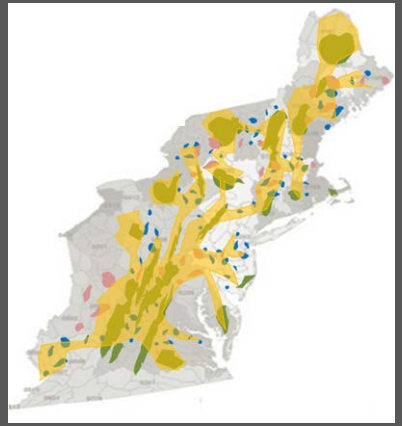
## CORE AREAS

## RSGCN HABITATS



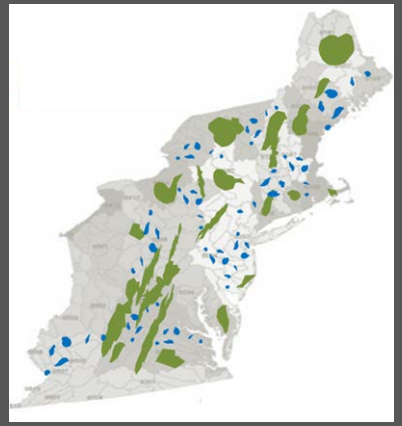
## RESTORATION

## CONNECTIVITY



## CORE AREAS

## RSGCN HABITATS

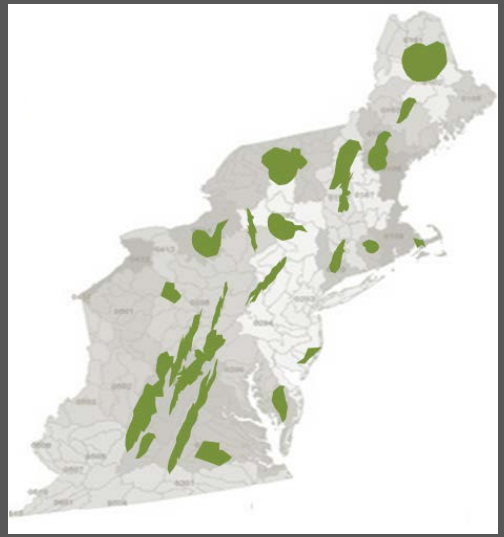


## RESTORATION

## CONNECTIVITY

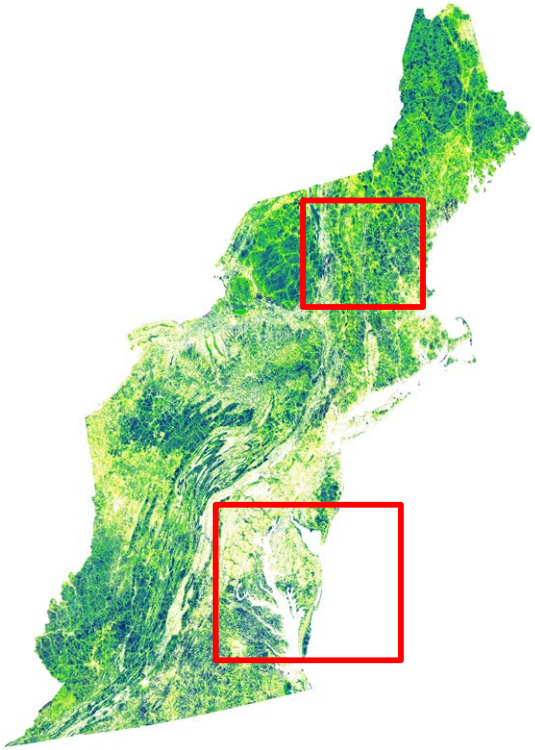
Ensures all wildlife have opportunity to find good habitat

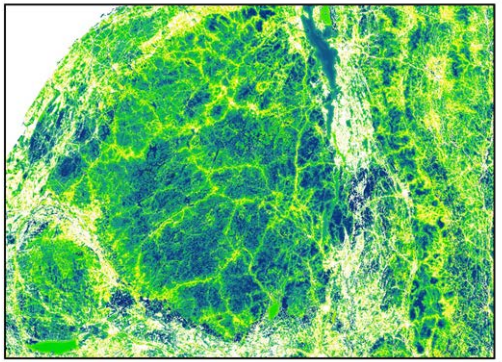
# Core areas

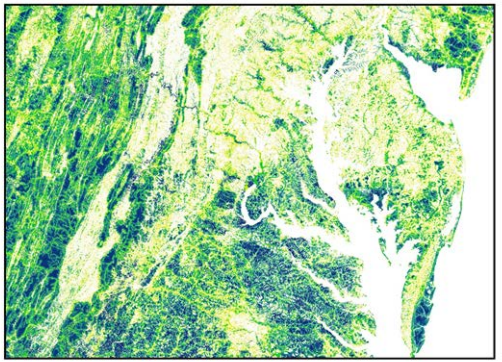


# Core areas analysis

**Identifies land where we can protect high ecological integrity and high resilience**







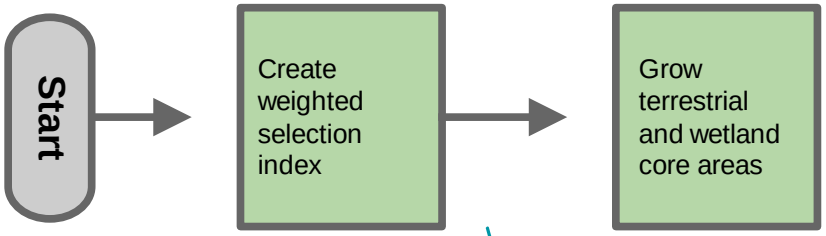
**Selection Index**

**Value**

High : 1

Low : 0.01

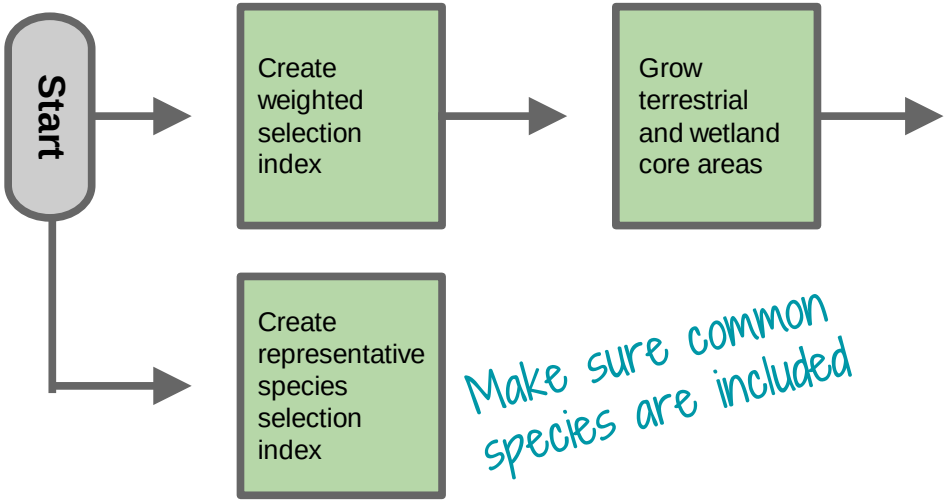
# Core areas analysis




Should all ecological systems be weighted the same?

Find the best examples of each system

# Core areas analysis



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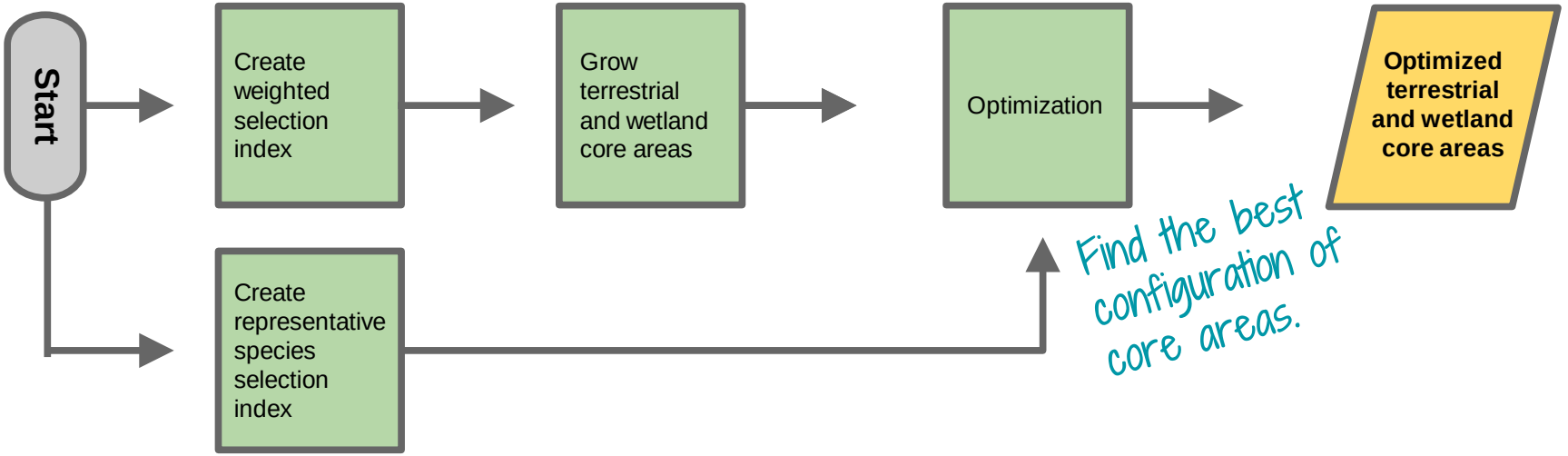

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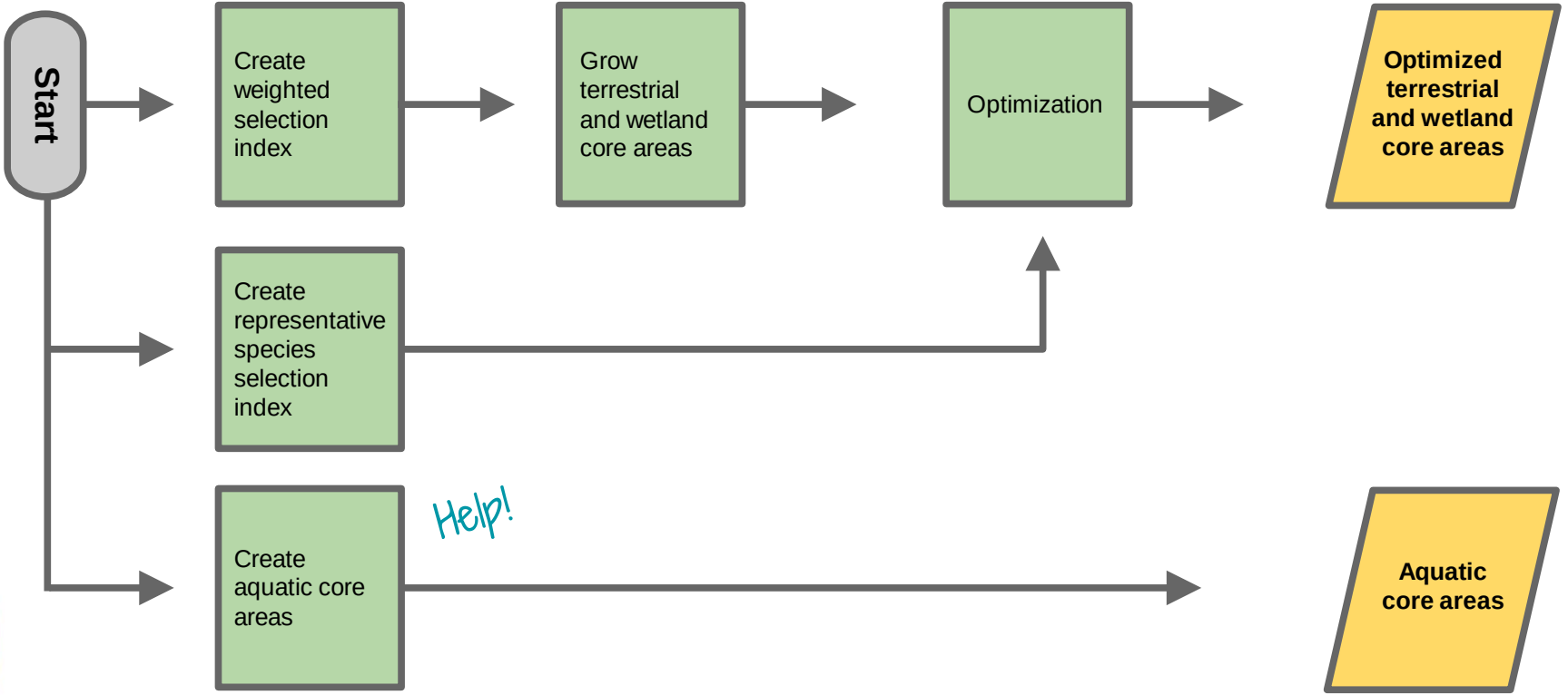
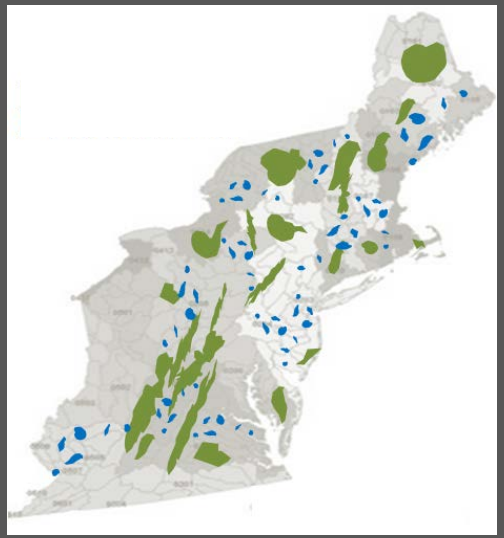
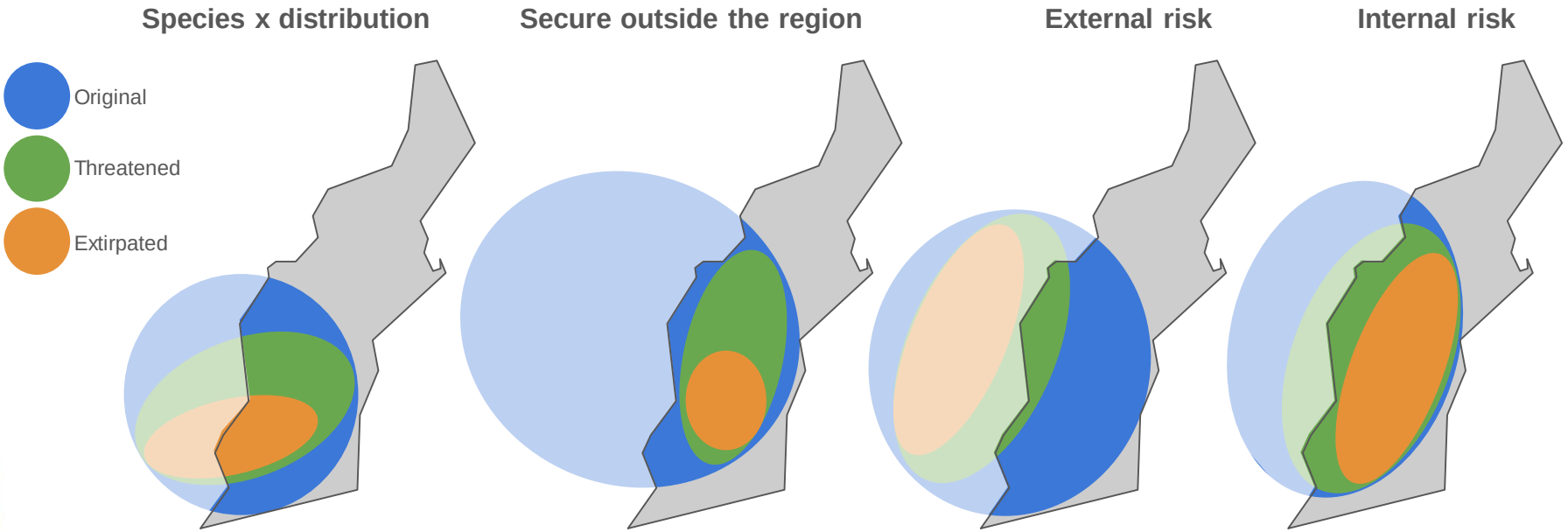


# RSGCN habitats



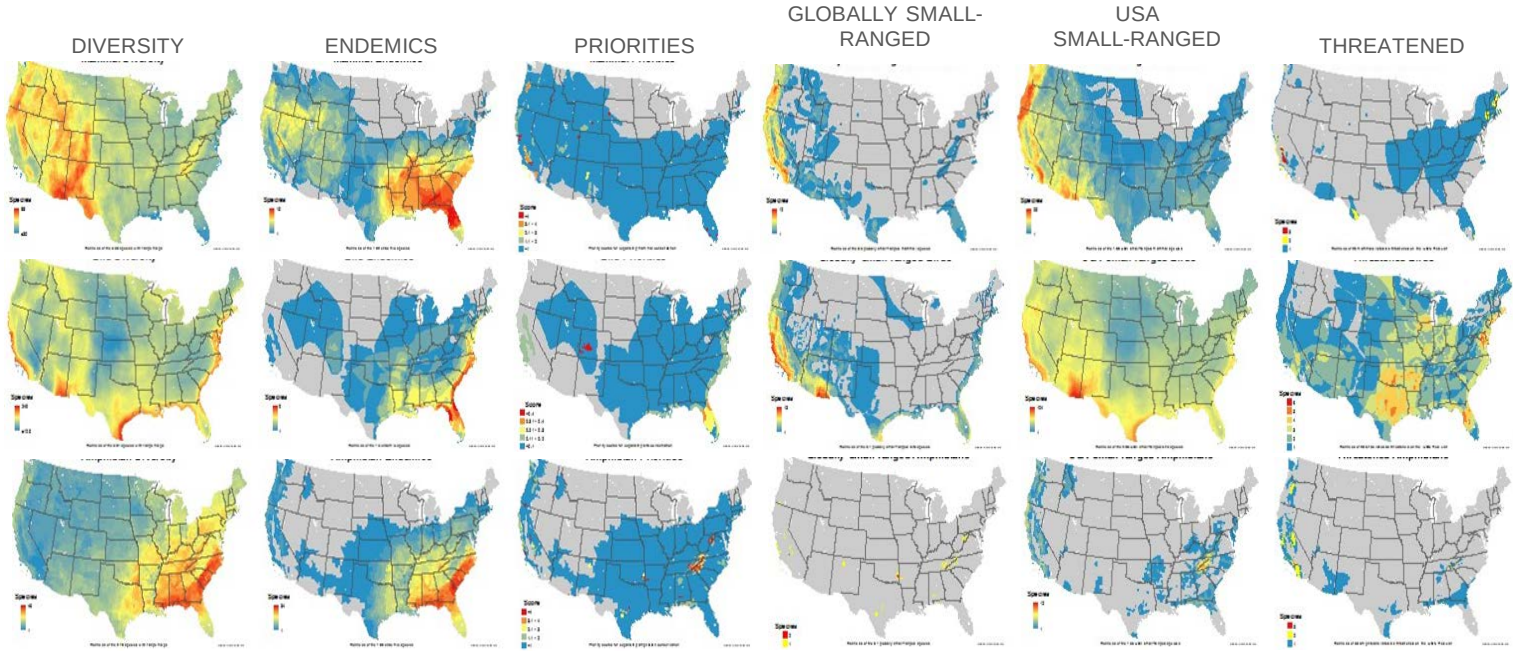
# RSGCN: species status

## Distribution analysis will weight species based on status



# RSGCN habitat associations

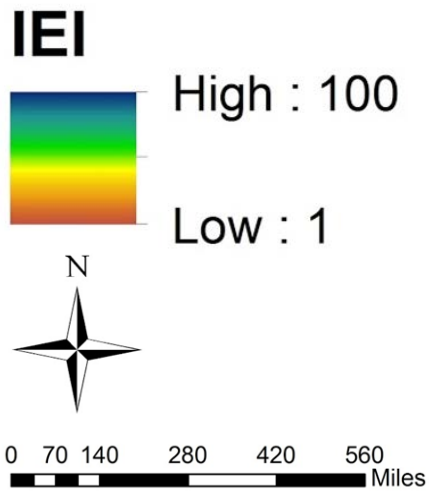
**Habitat importance weights will be based on biodiversity, threat, etc.**




Jenkins, CN, KS Van Houtan, SL Pimm, JO Sexton (2015) US protected lands mismatch biodiversity priorities. PNAS (Early Edition) www.pnas.org/cgi/doi/10.1073/pnas.1418034112

# RSGCN habitat condition

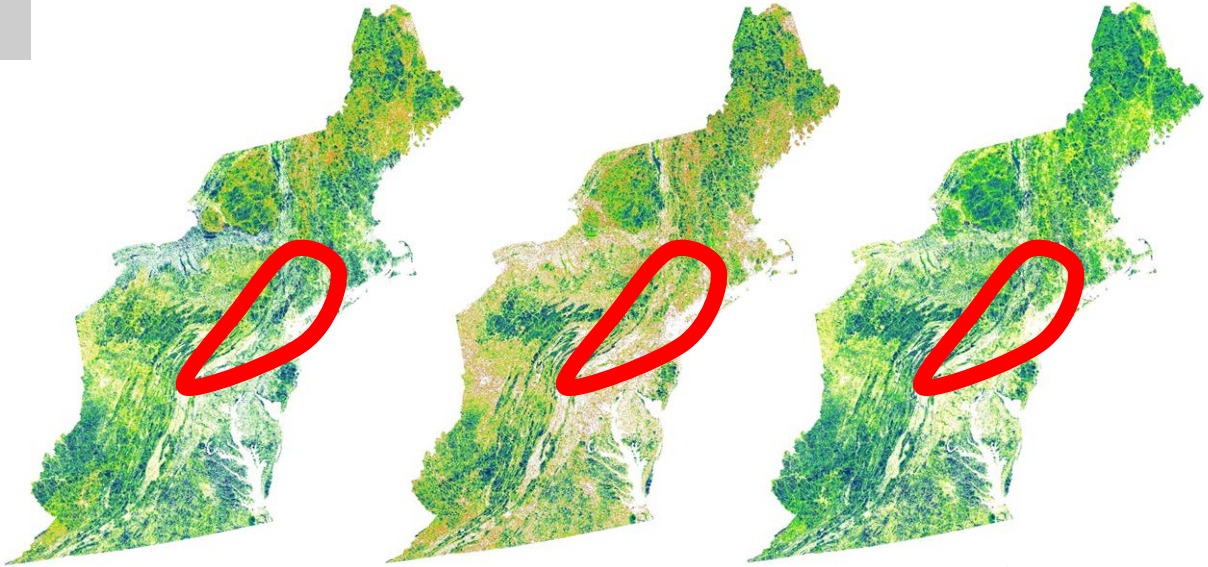
**IEI and resilience could measure condition of weighted habitats**




Weighted for RSGCN

Unweighted

Weighted for cores



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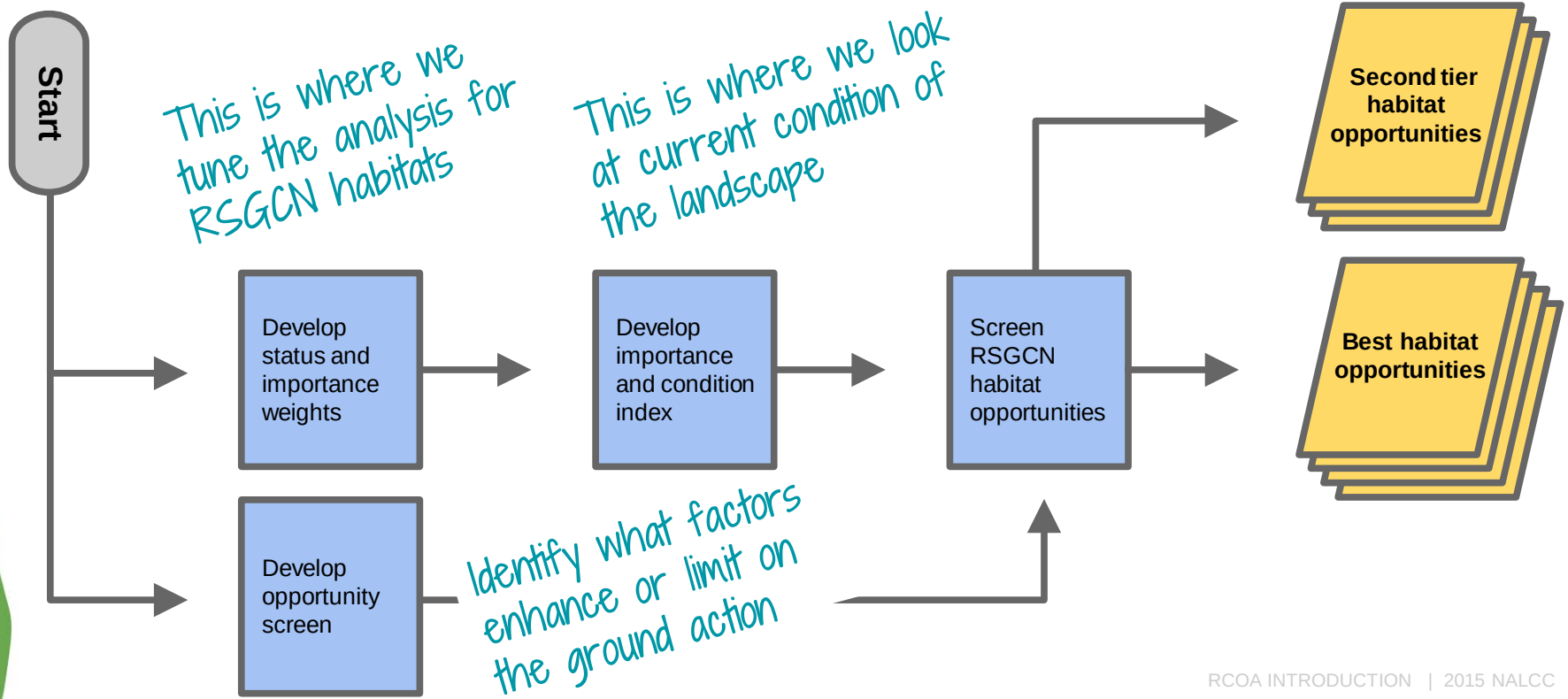
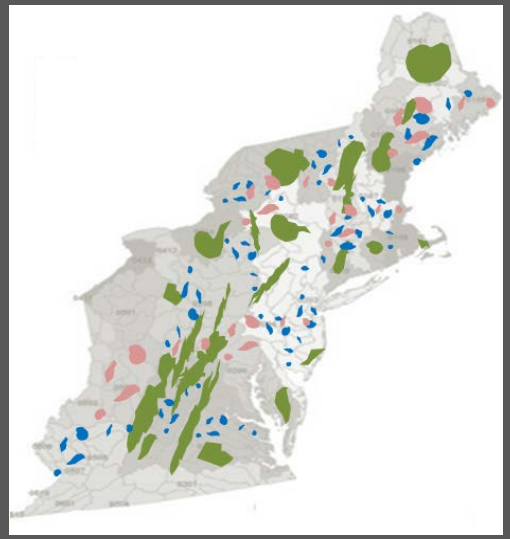
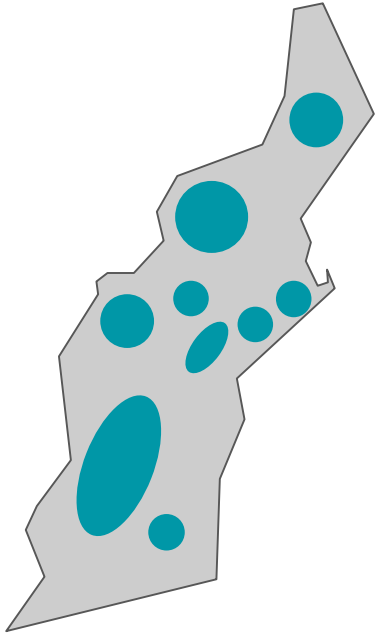


# Restoration



# Restoration analysis

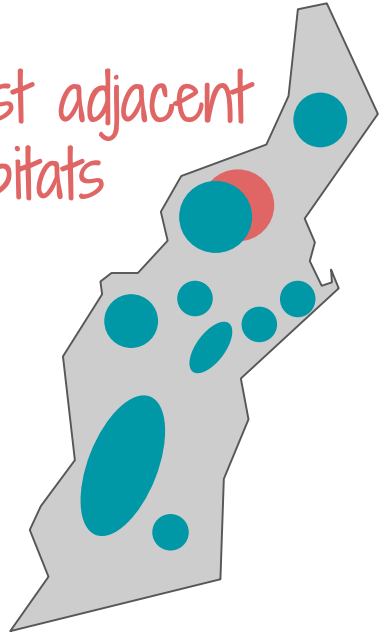
**Identifying restoration opportunities for RSGCN in strategic locations**



# Restoration analysis

**Identifying restoration opportunities for RSGCN in strategic locations**

Regenerate forest adjacent to high value habitats



# Restoration analysis

**Identifying restoration opportunities for RSGCN in strategic locations**

Regenerate forest adjacent to high value habitats

Protect areas upstream of watersheds with diverse RSGCN communities

# Restoration analysis

**Identifying restoration opportunities for RSGCN in strategic locations**

Regenerate forest adjacent to high value habitats

Protect areas upstream of watersheds with diverse RSGCN communities

Find opportunities to connect multiple core areas

# Which habitats and actions?

**SWAPs identify key restoration opportunities...**

**Rare ecological systems**

**Early successional habitats**

**Agricultural lands**

**Degraded watersheds**

**Fragmented waterways**

Would benefit hundreds of RSGCN

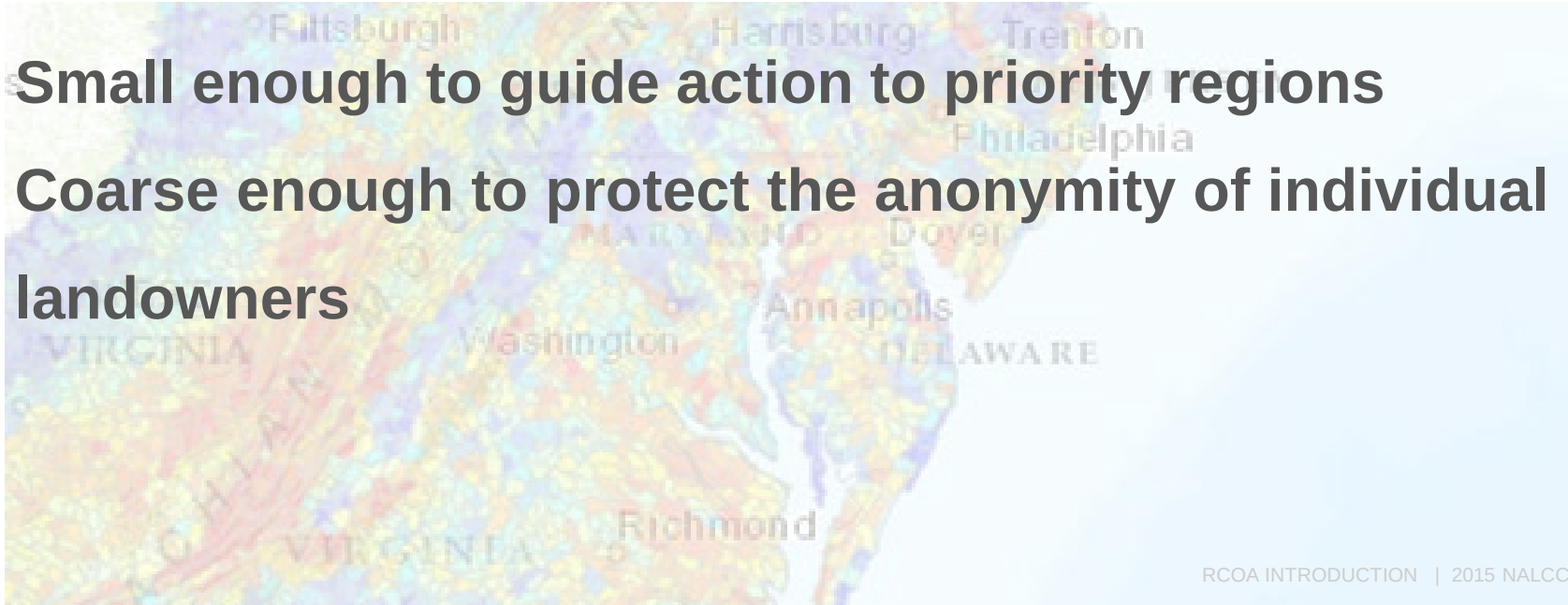
# Restoration analysis

**Mapping at the HUC12 scale**

- **Small enough to guide action to priority regions**

# Restoration analysis

**Mapping at the HUC12 scale**




- **Small enough to guide action to priority regions**
- **Coarse enough to protect the anonymity of individual landowners**

# Restoration analysis

**Mapping at the HUC12 scale**

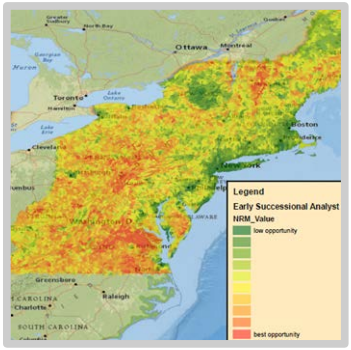
- **Small enough to guide action to priority regions**
- **Coarse enough to protect the anonymity of individual landowners**
- **Many analysis already available using HUC12s**

# Restoration analysis

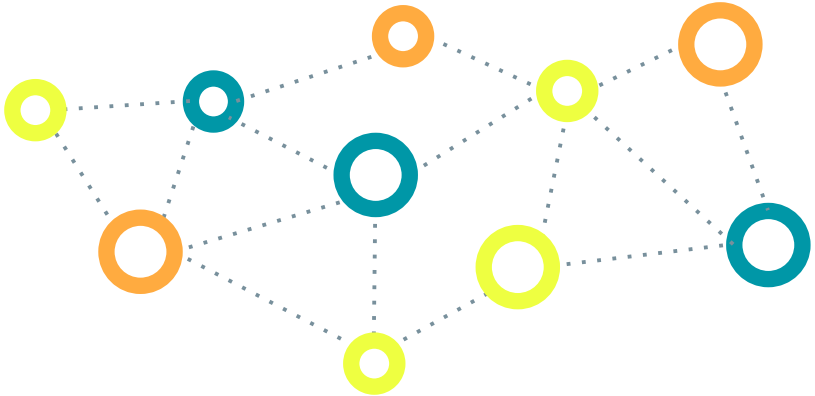
## Three step process

### First, summarize data on HUC12s

Using existing data, Wildlife Action Plans and other resources

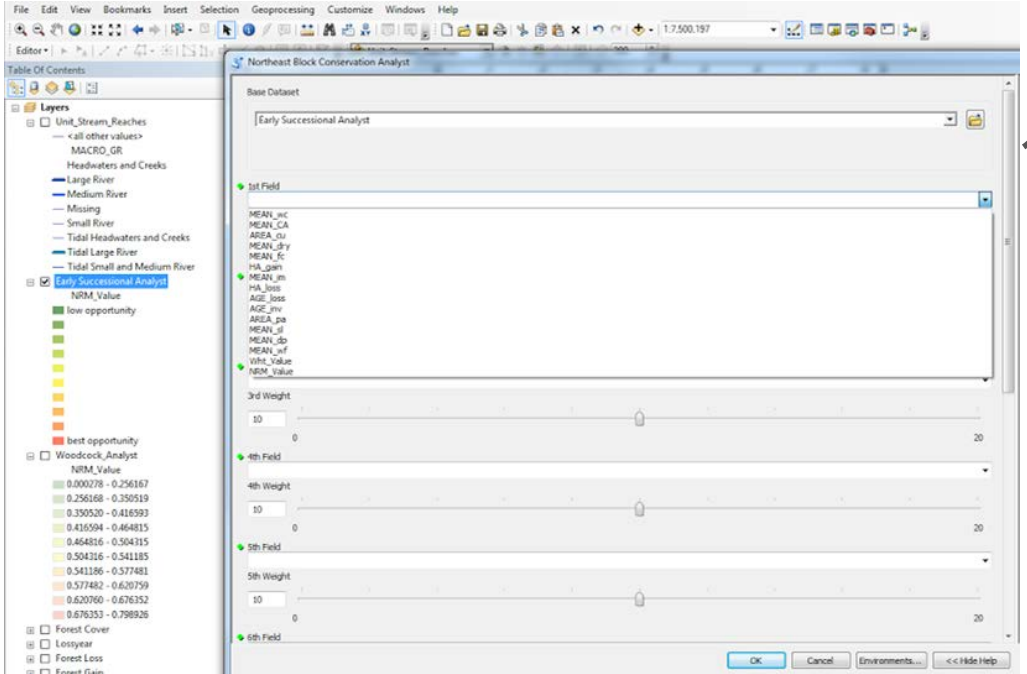



### Second, develop restoration scenarios with partners and peers

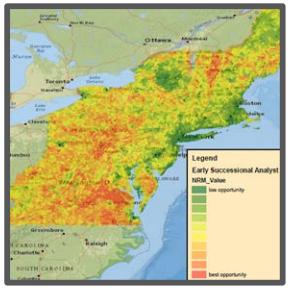


# Restoration analysis

## Third, team applies scenarios to weight and map factors




Restoration Priorities



Teams will develop weights to reflect scenarios

# Restoration analysis

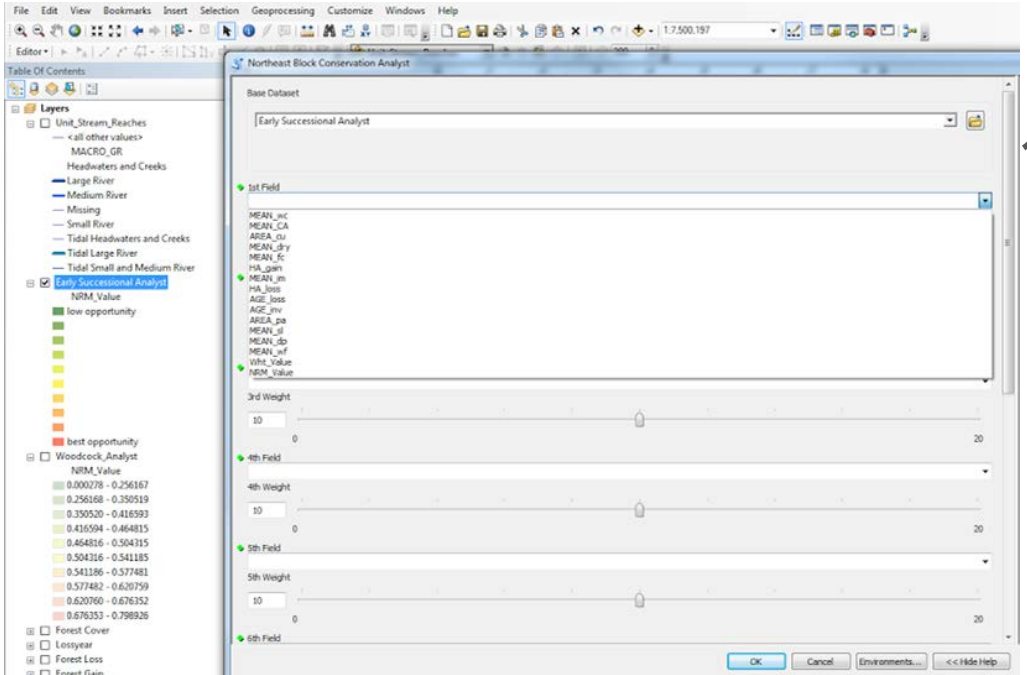
**Five HUC12 restoration opportunity maps for...**

- **Ecological systems**
- **Early successional habitats**
- **Watershed and riparian buffers**
- **Agricultural land**
- **In-stream connectivity**

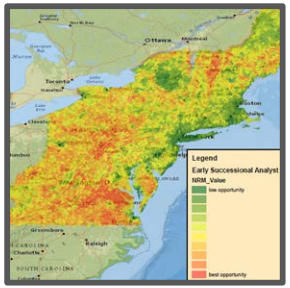
Send out for review, comments and revision

# Restoration analysis

## AND users can customize weights for their own scenarios

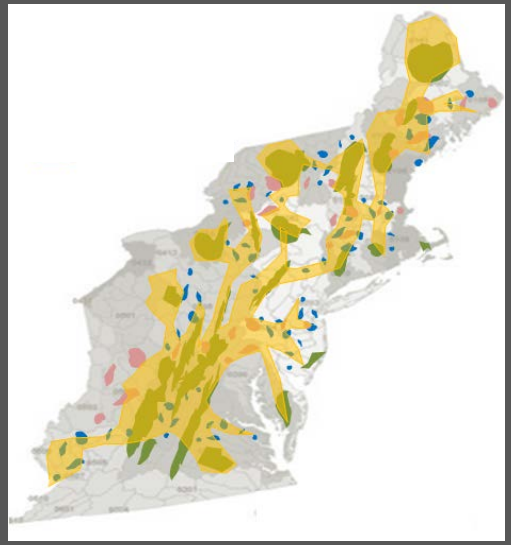



CUSTOMIZED MAP



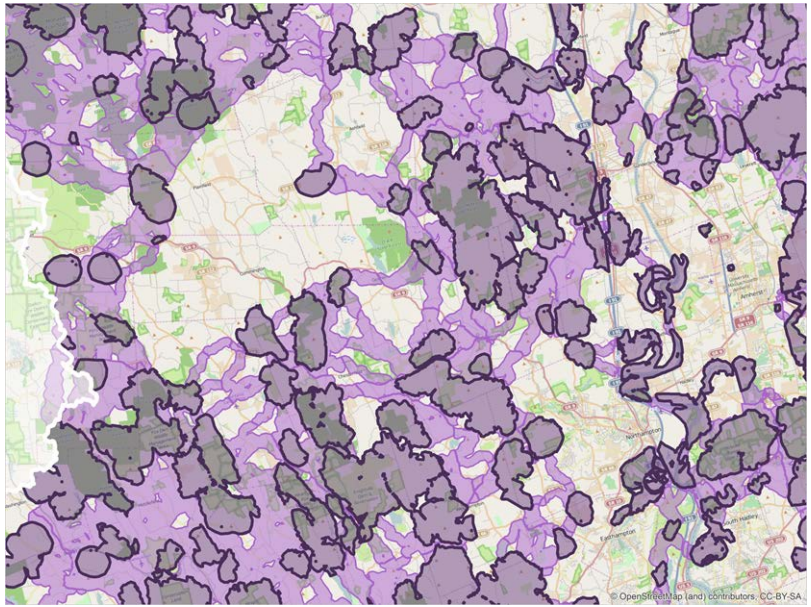

Adjust weights to your needs

# Connectivity

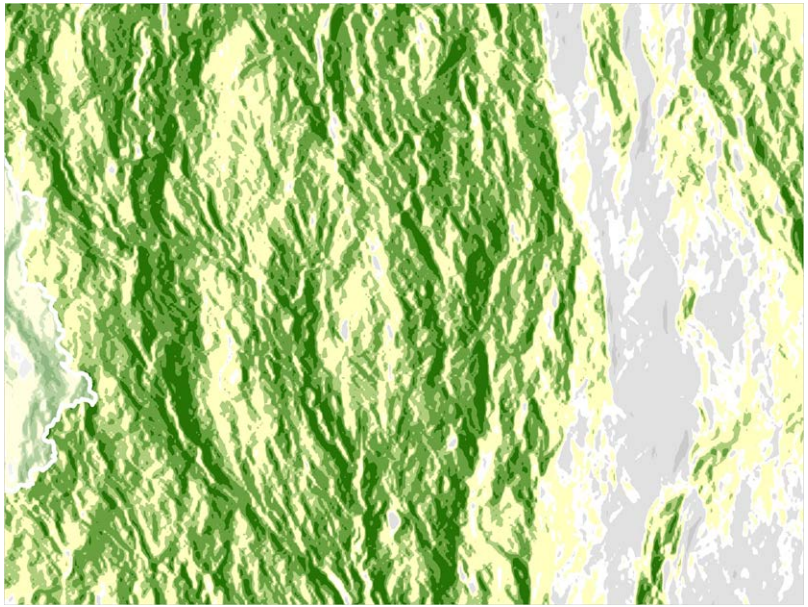


# Connectivity analysis

## Node to node corridors

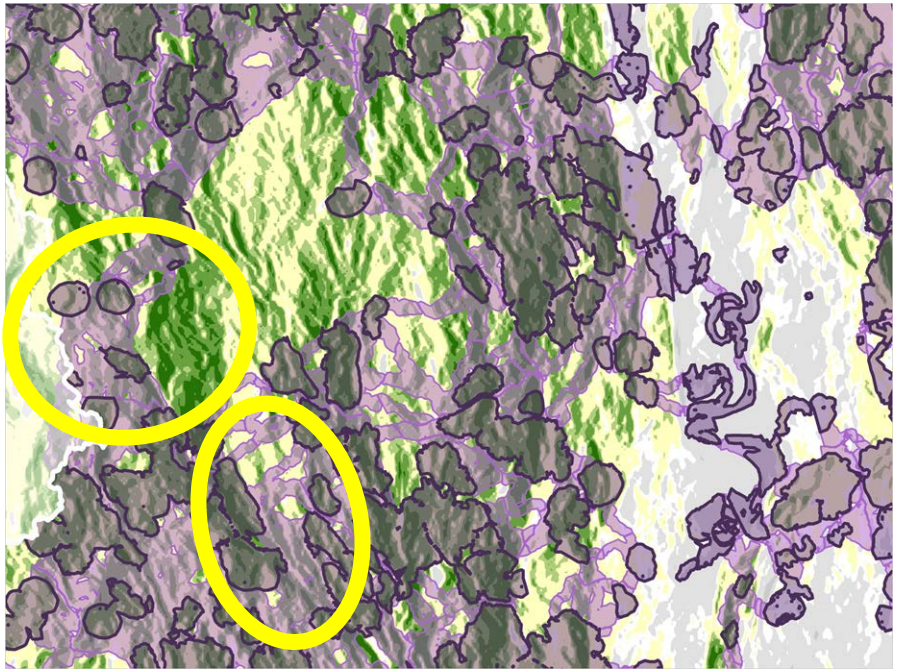



## Global wall to wall permeability



# Connectivity analysis

## Node to node corridors versus global wall to wall permeability



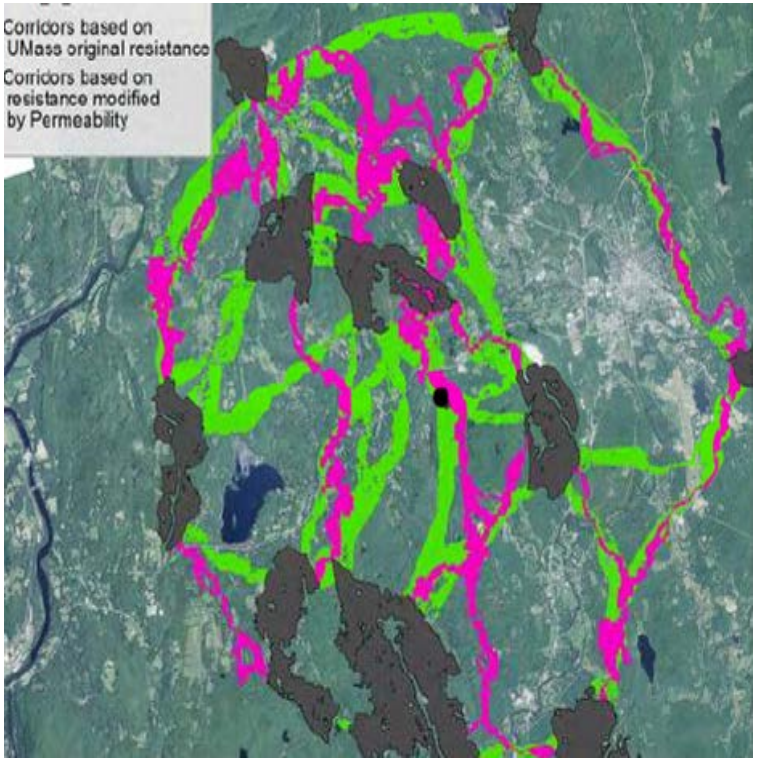
Logical regional flow bypassed

# Connectivity analysis

**Regional connectivity corridors connecting nearby forest cores**

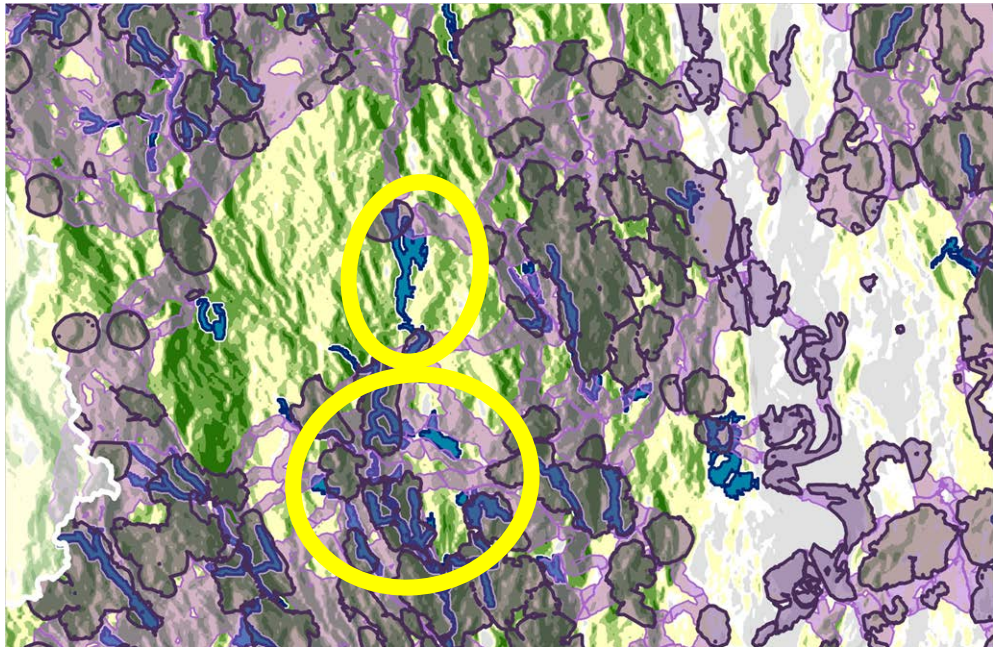
- Forest in a core area
- Corridors based on UMass resistance
- Corridors with resistance modified by TNC permeability

Gives us a connected network influenced by regional patterns



# Connectivity analysis

## Riparian climate corridors

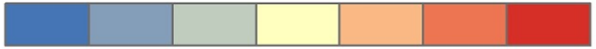


Riparian corridors compliment existing terrestrial based corridors

# Connectivity analysis

## Regional pinch points bottlenecks for species flow

**Anthropogenic Resistence Flow**

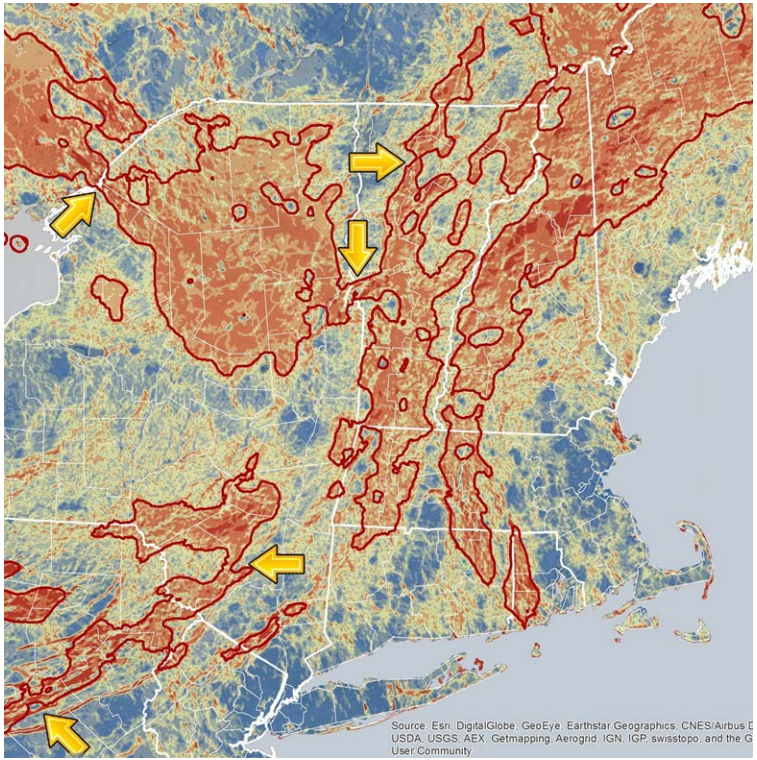


Barrier | Diffuse Flow | Concentrated Flow (bottlenecks)

Area of Concentrated Flow

Example Pinch Point Locations

Highlights irreplaceable locations important in connecting large natural areas



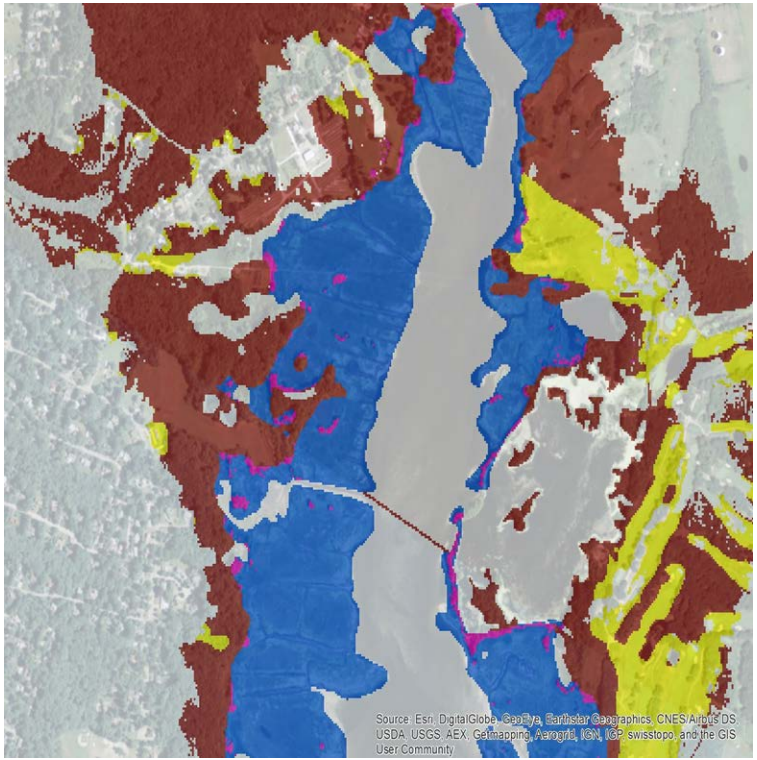
# Connectivity analysis

## Tidal marsh opportunities

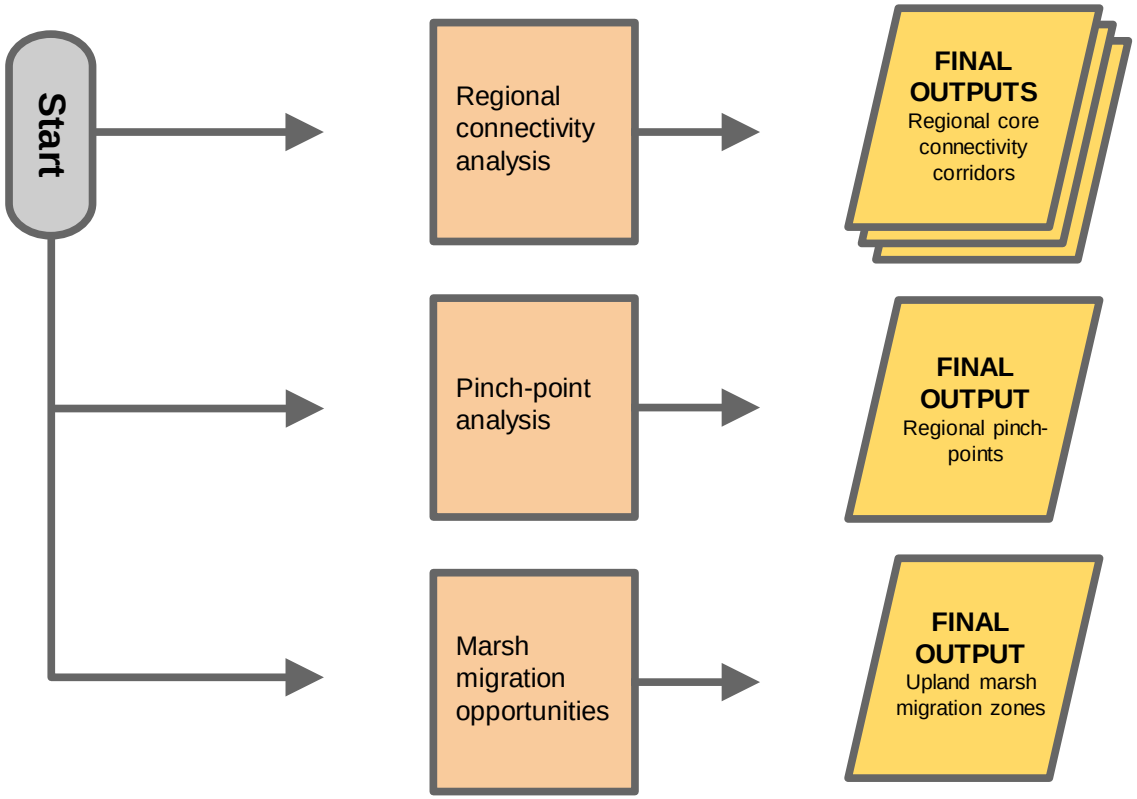
### 5 foot sea level rise model

- Restoration opportunity: marsh at risk of loss to inundation
- Restoration opportunity: marsh migration path over developed land
- Conservation opportunity: upland migration corridor

*Connecting current habitat to potential future habitat*



# Connectivity analysis



# Next steps

# Implementation

1. Begin reviewing methods
2. Team call 12/9
3. Participation on sub-teams to plan/implement mapping
4. Monthly calls through July 2016
5. 2 workshops to review results

# How you can be involved

**Help integrate ongoing partner efforts and products.**

Examples:

- SWAPs
- PARCAs
- North Atlantic Aquatic Connectivity Collaborative
- Brook Trout Joint Venture/Brook Trout Projects
  - Brook trout patches, catchments
  - Brook trout probability of occurrence under current and increased temps

# How you can be involved

## Provide collaborative GIS support.

Assist with mapping and management of data.
Facilitate technical support within your organization.

# How you can be involved

**Serve on a working sub-team.**

**Restoration Team:  help develop restoration scenarios**

In-stream connectivity
Riparian zones and water quality
Early successional habitat
Agricultural land restoration
Unique ecological systems

# How you can be involved

## Serve on a working sub-team.

**RSGCN Habitat Team:**

Evaluate species status weighting
Develop habitat weights
Identify threat and opportunity metrics
Help review of draft results

# How you can be involved

## Serve on a working sub-team.

**Connectivity Team:**

Develop methods to simplify and map results of complex models
Provide input on salt marsh migration
Help review draft results

# How you can be involved

## Serve on a working sub-team.

**Terrestrial Cores Team:**

Develop ecosystem weights that reflect biodiversity and ecosystem services

Review representative species models

Help review draft results

# How you can be involved

## Serve on a working sub-team.

**Aquatic Cores Team:**

- Evaluate datasets proposed for core areas
  - ecological integrity
  - resilient networks
  - fish species occurrence or probability
- Help review of draft results

# Questions ?

print version below

## Northeast
## Regional Conservation Opportunity Areas

# Introduction

**context | vision | overview**

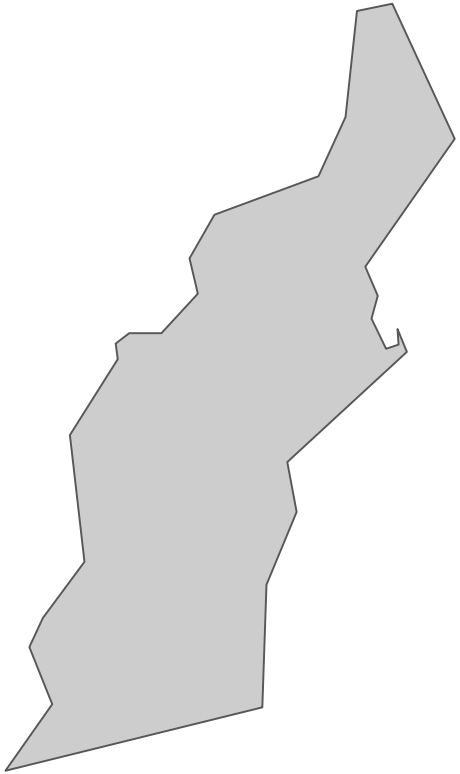
# Vision

Engage the collective wisdom and common interest of partners

To identify and map a **connected** network of **resilient** and **ecologically intact** habitats that will support **biodiversity** under changing conditions

# Why
# is this project important?

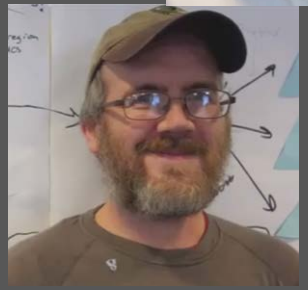
# Geographic scale



# Ecological scope

# Partner networks

## Key partners



# Looking across state boundaries

# Timeliness

# Efficiency

Regional patterns focus conservation efforts

Where can we hedge our investments in the face of change?

Habitats that appear secure locally may be in trouble elsewhere

Opportunities to pre-empt listing may be where species are not on the radar

Which species and habitats is my state/org most “responsible” for?

Is my state the battleground or sideshow for species or habitat x?

# Team

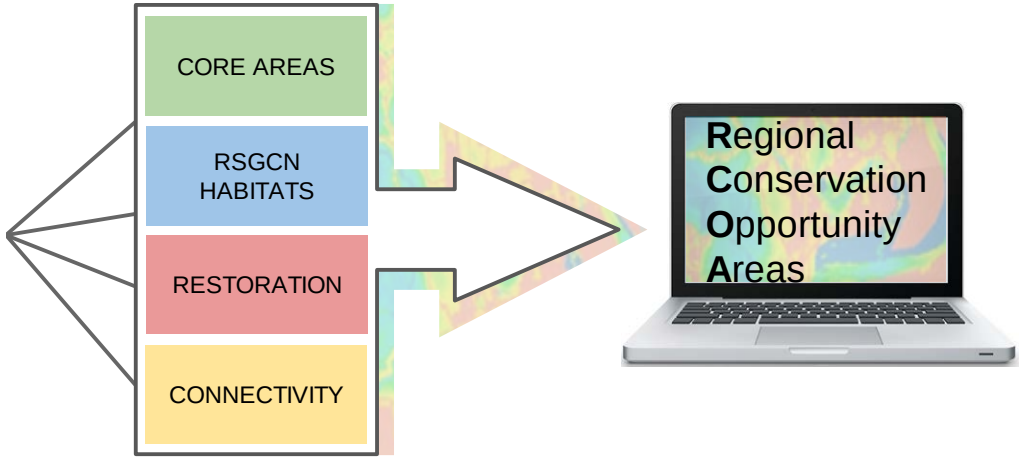
**Andrew Milliken** *USFWS & North Atlantic LCC*
**Andy Cutko** *ME DOC*
**Brian Hall** *Harvard Forest*
**BJ Richardson** *USFWS*
**Brad Compton** *UMass Amherst*
**Chad Rittenhouse** *University of Connecticut*
**Chris Burkett** *VA DGIF*
**Chris Tracey** *PA Natural Heritage Program*
**Dan Rosenblatt** *NYS DEC*
**Gwen Brewer** *MD DNR*
**Jeff Allenby** *Chesapeake Conservancy*

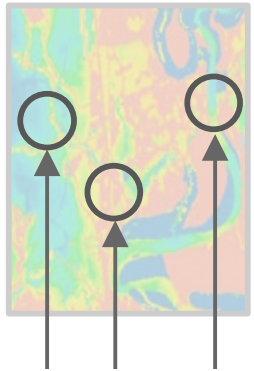
**Jonathan Brooks** *MA F&W*
**Kate Moran** *CT DEEP*
**Katie Callahan** *NH Fish and Game*
**Kevin Ruddock** *RI TNC*
**Mark Anderson, Arlene Olivero &**
**Melissa Clark** *TNC*
**Michale Glennon** *WCS*
**Patrick Woerner** *NJ DEP*
**Steve Fuller, Scott Schwenk, Renee Farnsworth & Stéphanie Cuénoud**
*North Atlantic LCC*

# Process

| Leveraging investments | Inclusive collaboration | Relevant science | Better implementation |
|---|---|---|---|

RCN & LCC SCIENCE

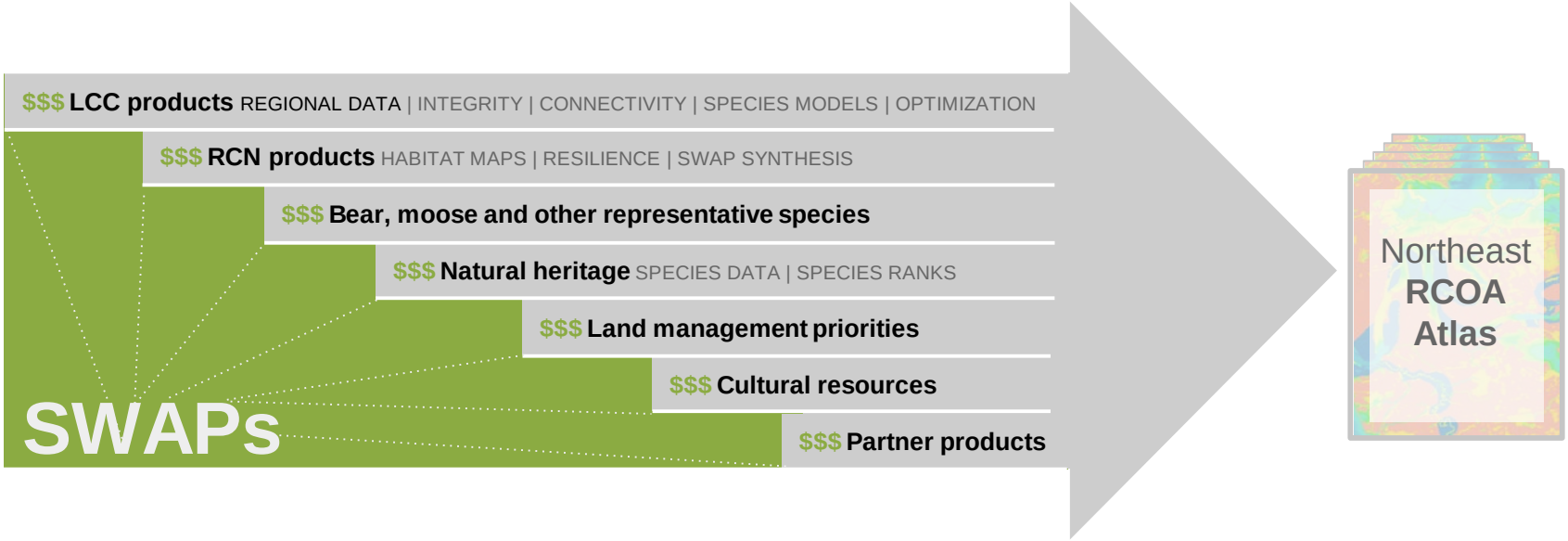


Coordinate partners for success

# Leveraging investments

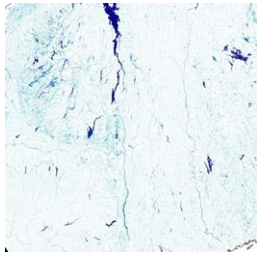
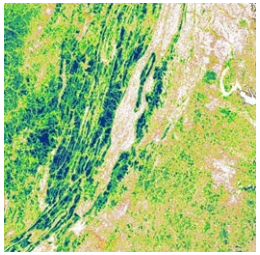
## To address the long-term needs of game species

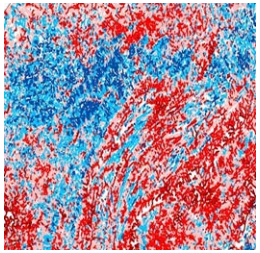
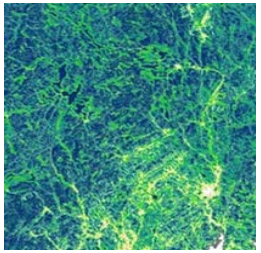


# Vision

## Products

An atlas with methodology documentation

## Uses

Prioritize restoration & land management

Inform land protection

Identify core areas for all species

Complement/Confirm state priority areas

Regional context for state decisions

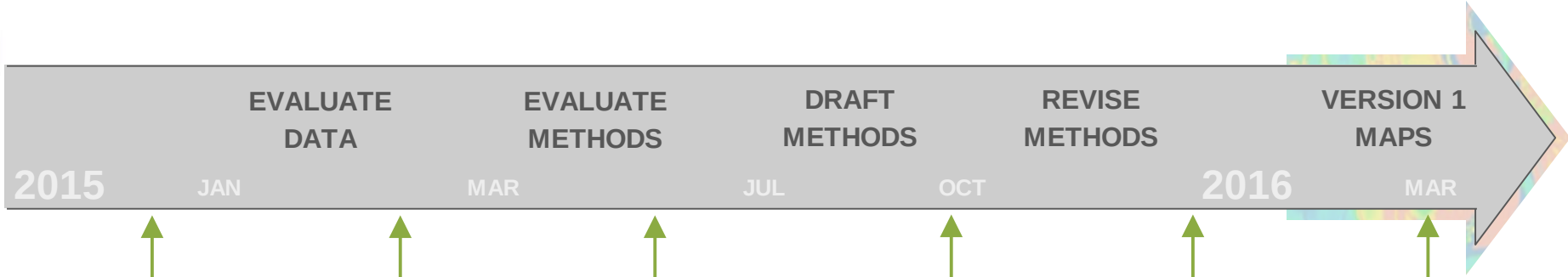
Monitor changes in landscape over time

Inform policy and listing decisions

Grant applications

Guide SWAP implementation and RCNs

# A year in review




**ROUND 1 SWAPS**
RCOA process is using and unifying the products from the first round of SWAPs

**GIS EXPERTS**
Review potential data sets

**DIVERSITY TECH**
Review timeline

**GIS EXPERTS**
Analyze and evaluate data sets; Identify key decision points

**NEFWDTC & LCC STEERING COMMITTEE**
Approval to implement draft methodology with continued input

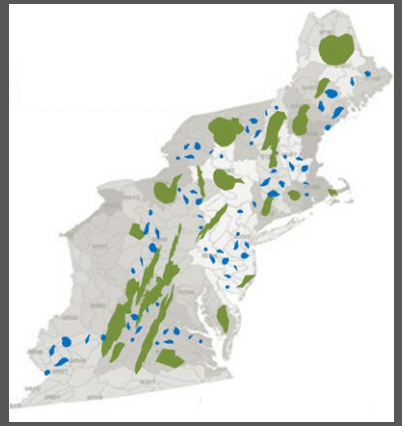
**OTHER PARTNERS & EXPERTS**
provide input on key decisions points such as priority threats, plants, restoration, and aquatic systems

**ALL PARTNERS**
review maps as they are produced

# Methods overview

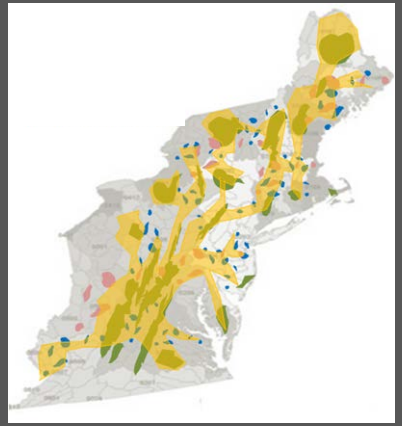
## CORE AREAS

## RSGCN HABITATS



## RESTORATION

## CONNECTIVITY



## CORE AREAS

Representing most intact and resilient ecosystems and habitats for fish, wildlife and plants in the region

## RSGCN HABITATS

Important habitats for rare and threatened RSGCN

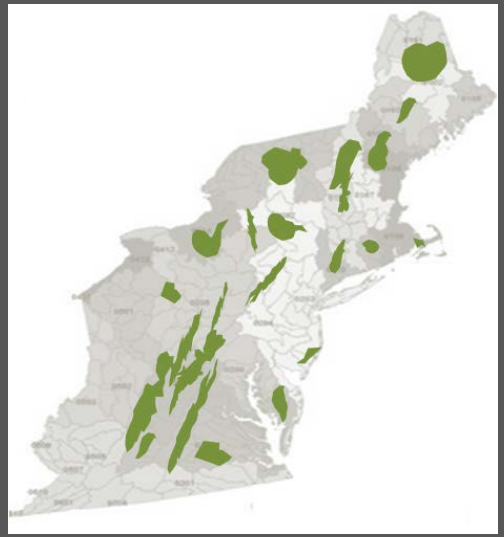
## RESTORATION

Prioritization to focus habitat restoration and management efforts

## CONNECTIVITY

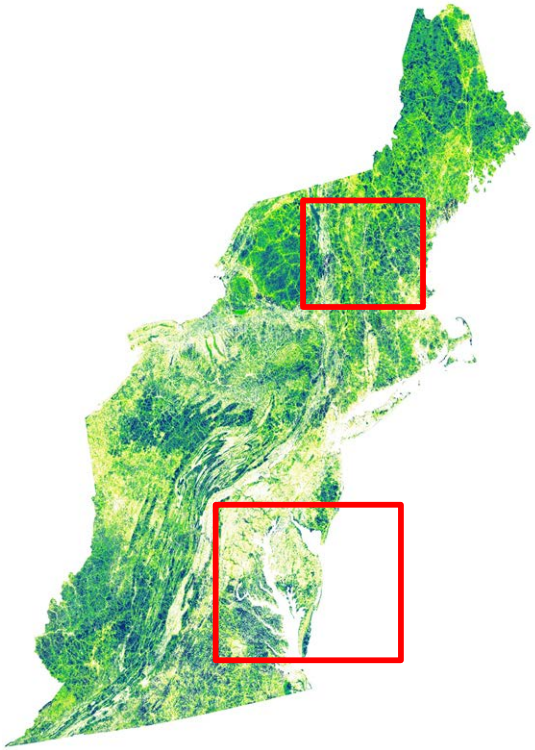
Ensures all wildlife have opportunity to find good habitat

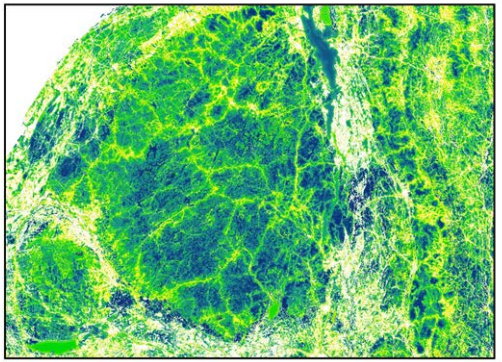
# Core areas

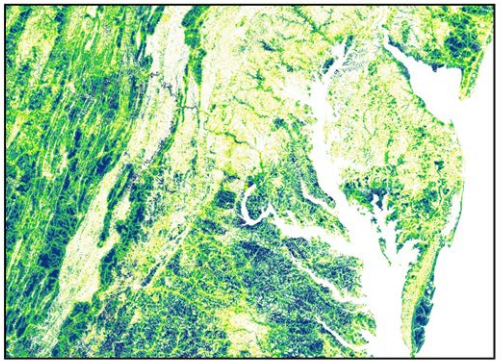


# Core areas analysis

**Identifies land where we can protect high ecological integrity and high resilience**







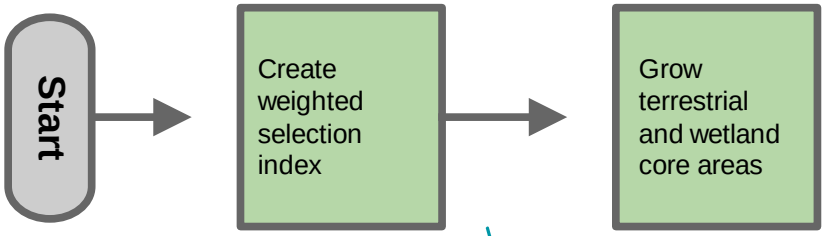
**Selection Index**

**Value**

High : 1

Low : 0.01

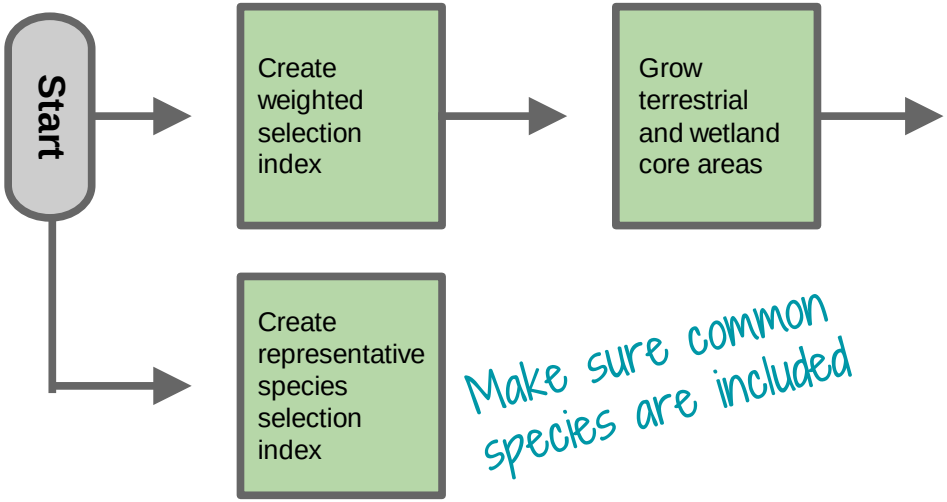
# Core areas analysis



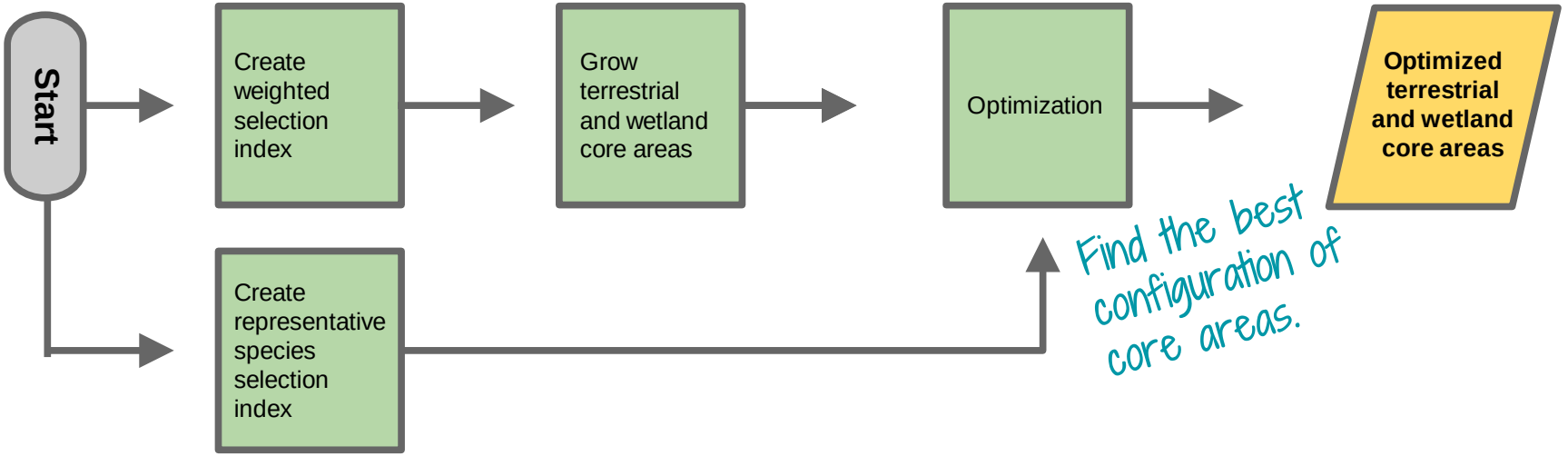

Should all ecological systems be weighted the same?

Find the best examples of each system

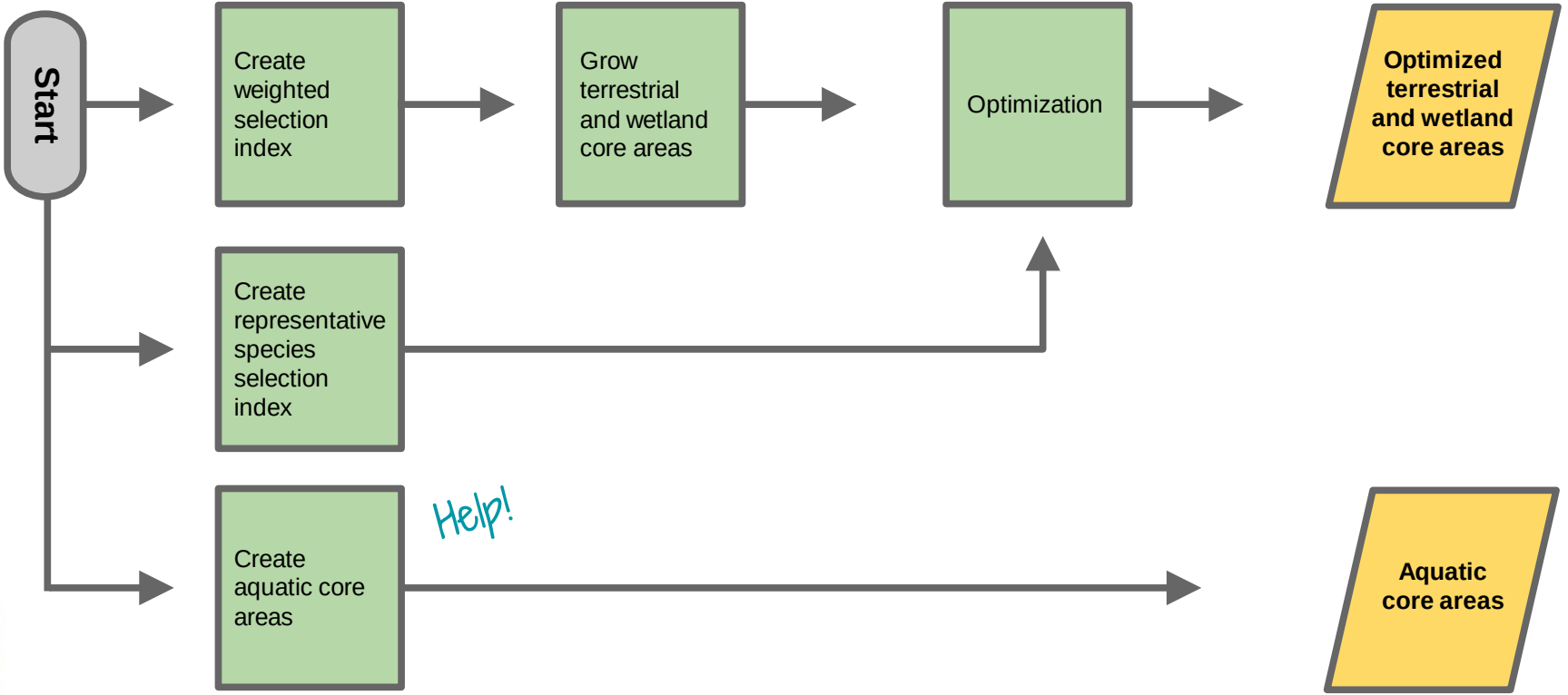
# Core areas analysis



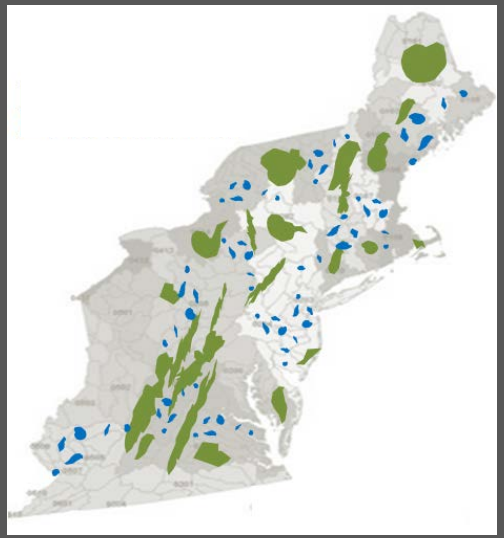
# Core areas analysis



# Core areas analysis

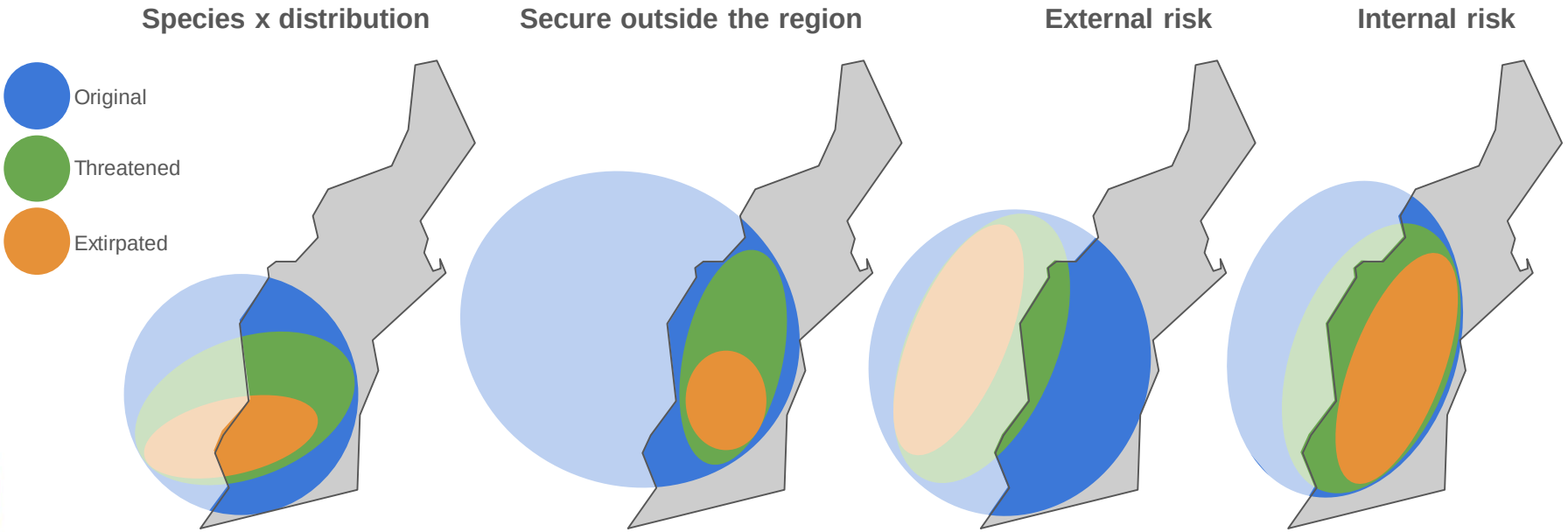


# RSGCN habitats



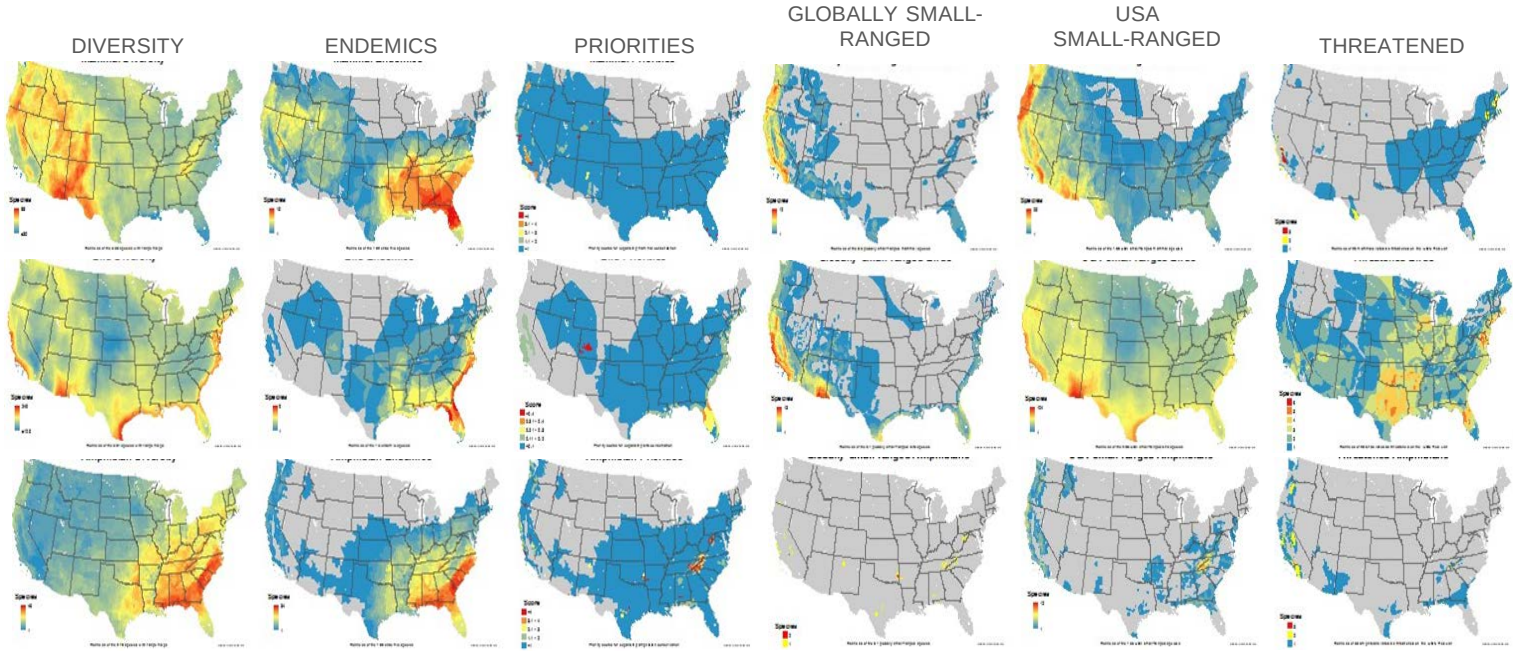
# RSGCN: species status

## Distribution analysis will weight species based on status



# RSGCN habitat associations

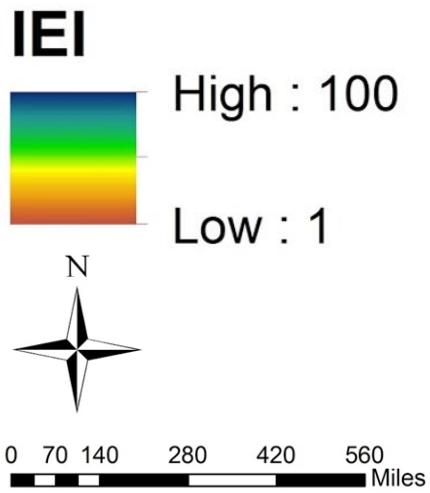
**Habitat importance weights will be based on biodiversity, threat, etc.**




Jenkins, CN, KS Van Houtan, SL Pimm, JO Sexton (2015) US protected lands mismatch biodiversity priorities. PNAS (Early Edition) www.pnas.org/cgi/doi/10.1073/pnas.1418034112

# RSGCN habitat condition

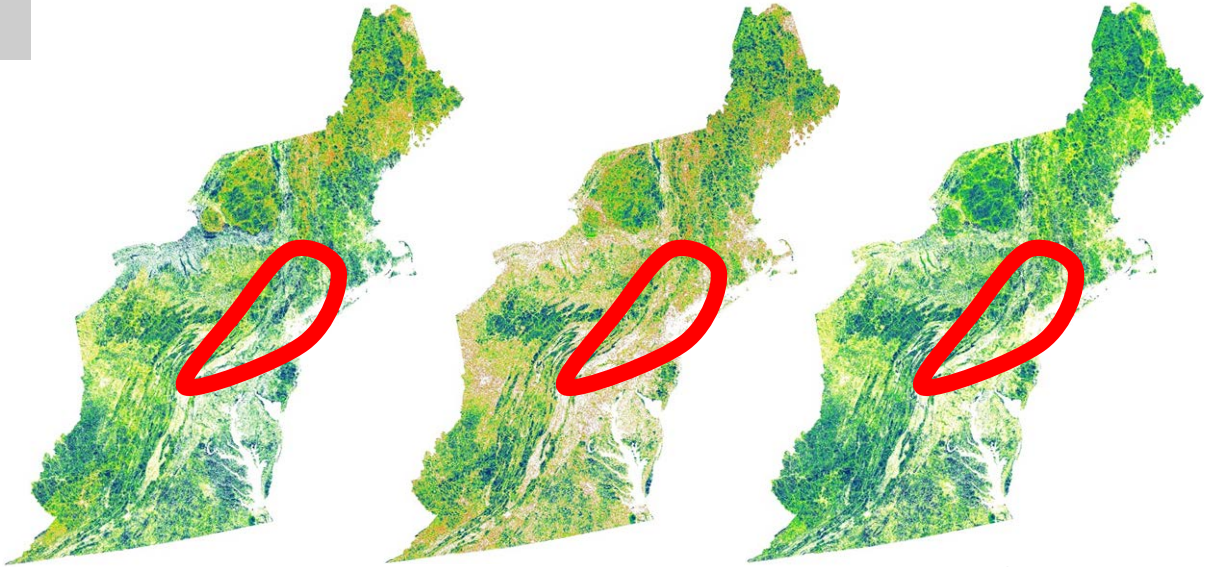
**IEI and resilience could measure condition of weighted habitats**



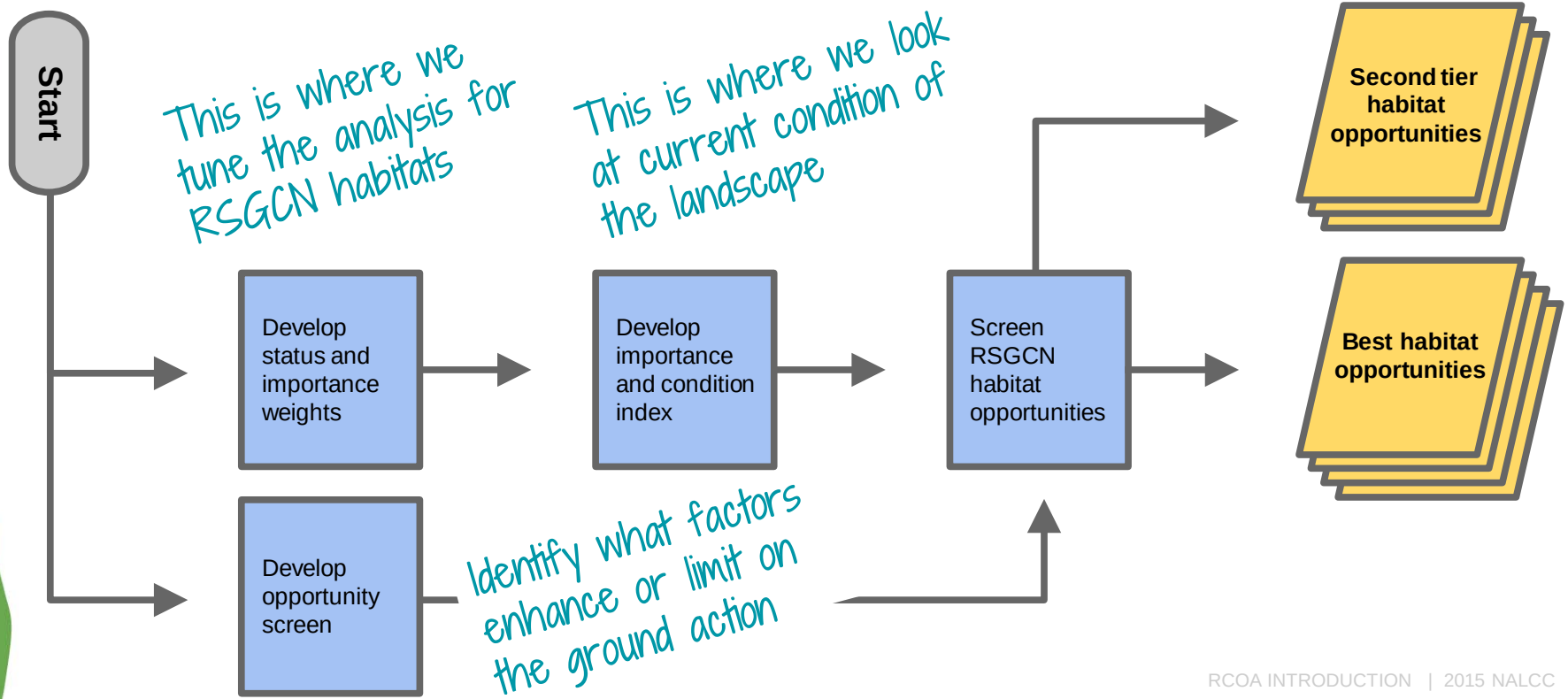

Weighted for RSGCN

Unweighted

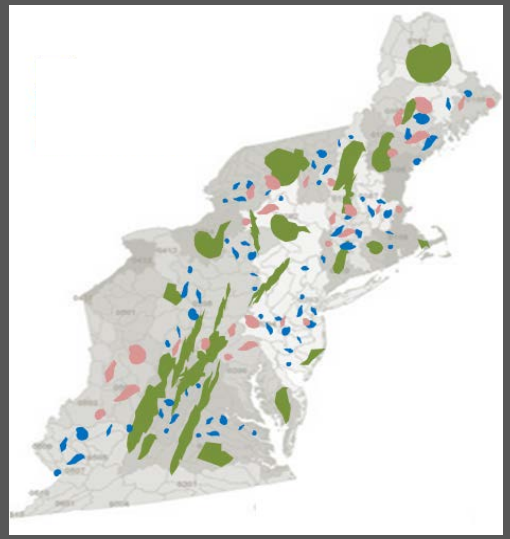
Weighted for cores



# RSGCN habitats analysis



# Restoration



# Restoration analysis

**Identifying restoration opportunities for RSGCN in strategic locations**

Regenerate forest adjacent to high value habitats

Protect areas upstream of watersheds with diverse RSGCN communities

Find opportunities to connect multiple core areas

# Which habitats and actions?

**SWAPs identify key restoration opportunities...**

**Rare ecological systems**

**Early successional habitats**

**Agricultural lands**

**Degraded watersheds**

**Fragmented waterways**

Would benefit hundreds of RSGCN

# Restoration analysis

**Mapping at the HUC12 scale**

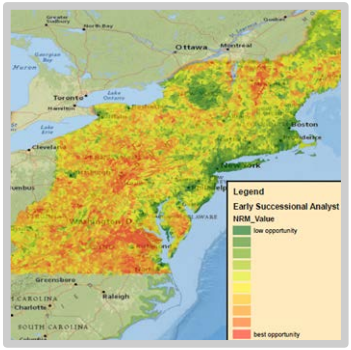
- **Small enough to guide action to priority regions**
- **Coarse enough to protect the anonymity of individual landowners**
- **Many analysis already available using HUC12s**

# Restoration analysis

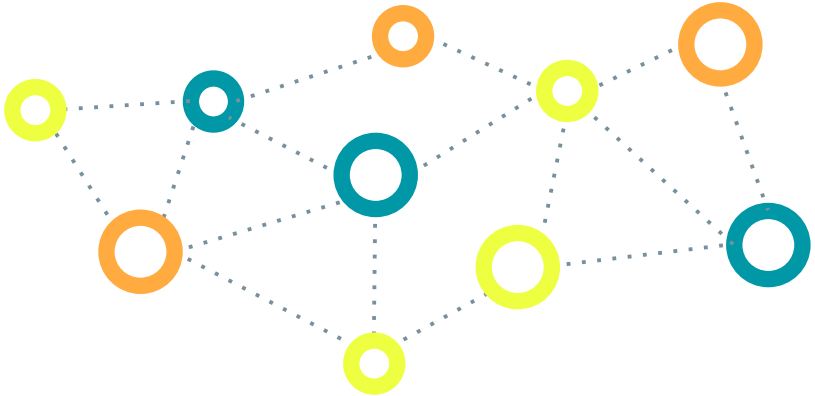
## Three step process

### First, summarize data on HUC12s

Using existing data, Wildlife Action Plans and other resources

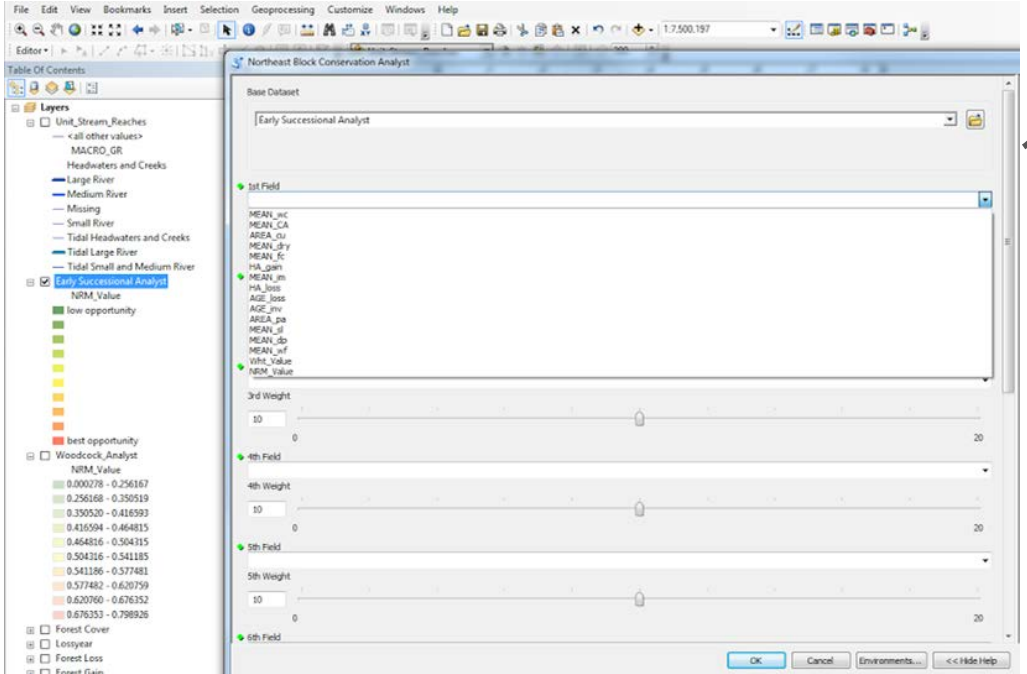



### Second, develop restoration scenarios with partners and peers

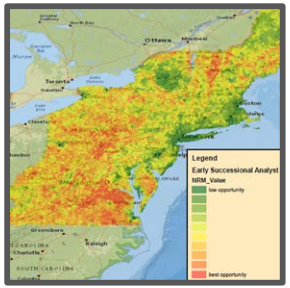


# Restoration analysis

## Third, team applies scenarios to weight and map factors




Restoration Priorities



Teams will develop weights to reflect scenarios

# Restoration analysis

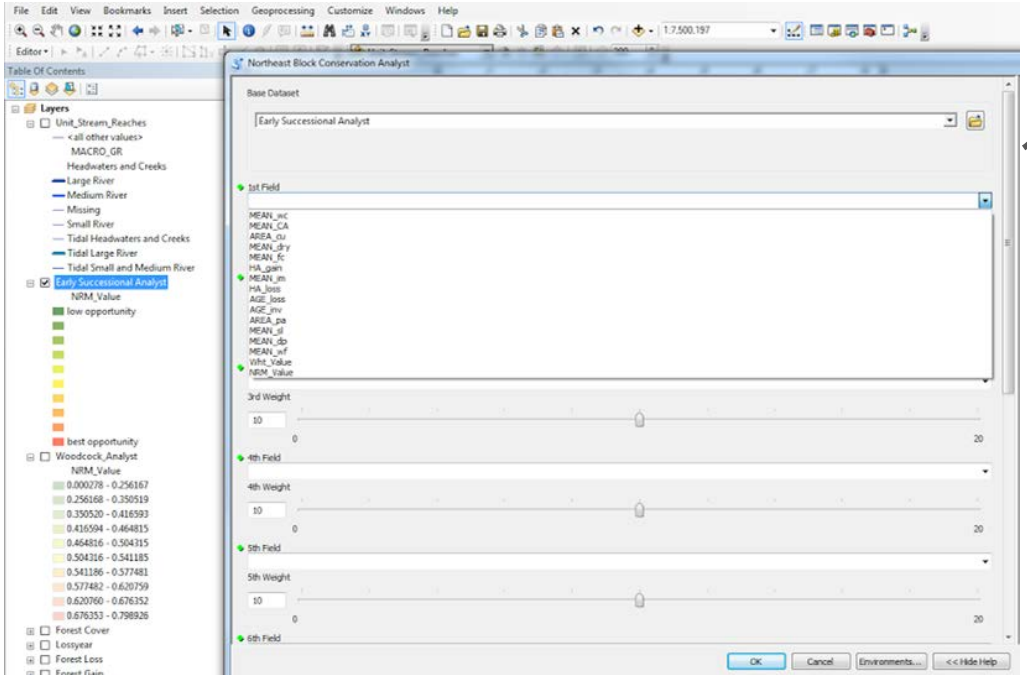
**Five HUC12 restoration opportunity maps for...**

- **Ecological systems**
- **Early successional habitats**
- **Watershed and riparian buffers**
- **Agricultural land**
- **In-stream connectivity**

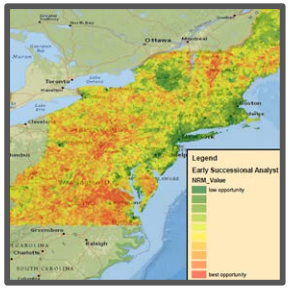
Send out for review, comments and revision

# Restoration analysis

## AND users can customize weights for their own scenarios

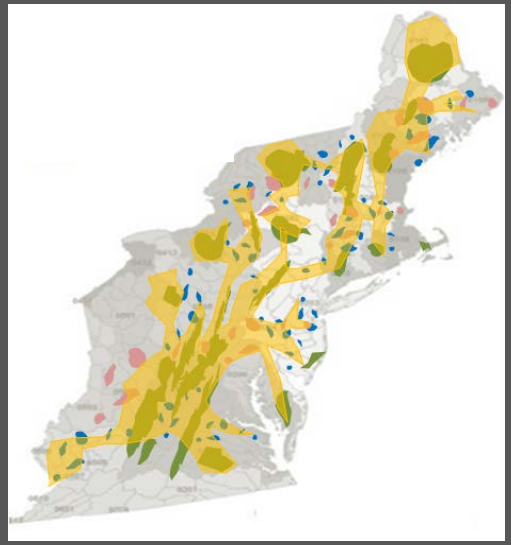



CUSTOMIZED MAP



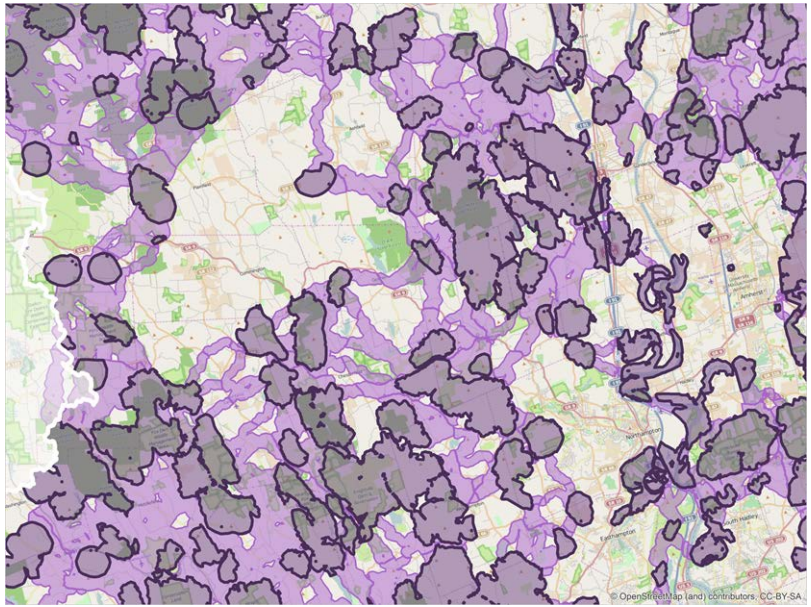

Adjust weights to your needs

# Connectivity

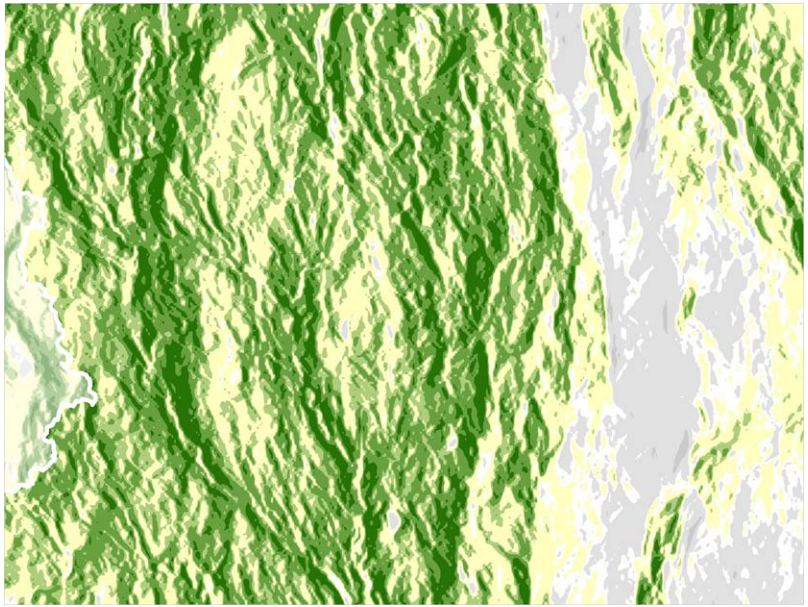


# Connectivity analysis

## Node to node corridors

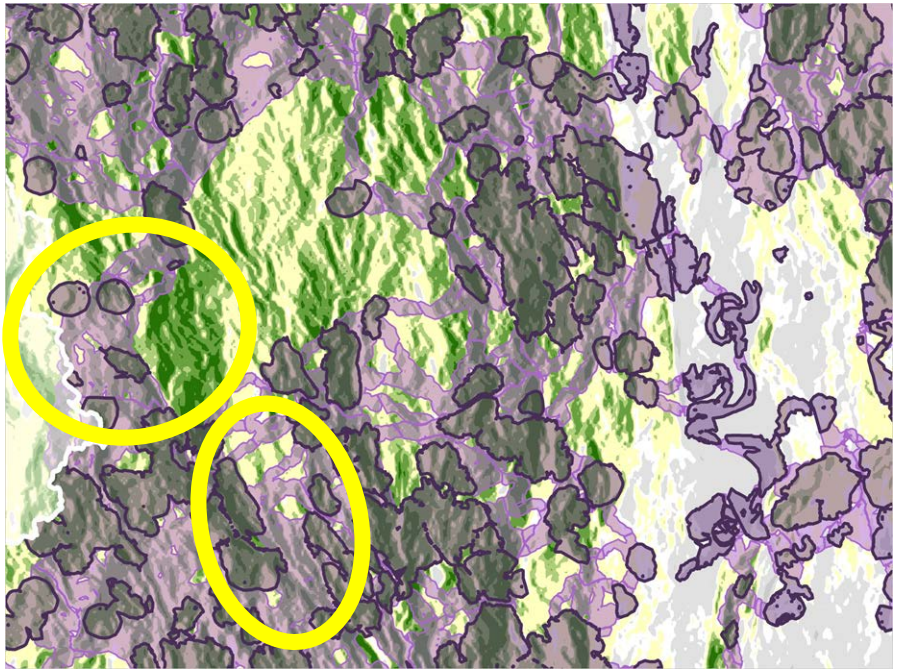



## Global wall to wall permeability



# Connectivity analysis

## Node to node corridors versus global wall to wall permeability



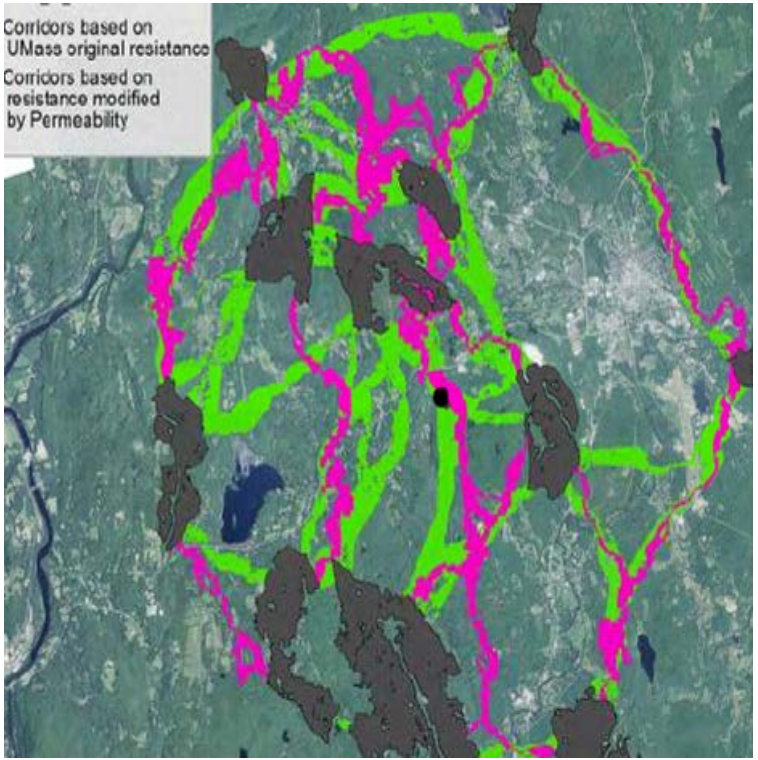
Logical regional flow bypassed

# Connectivity analysis

**Regional connectivity corridors connecting nearby forest cores**

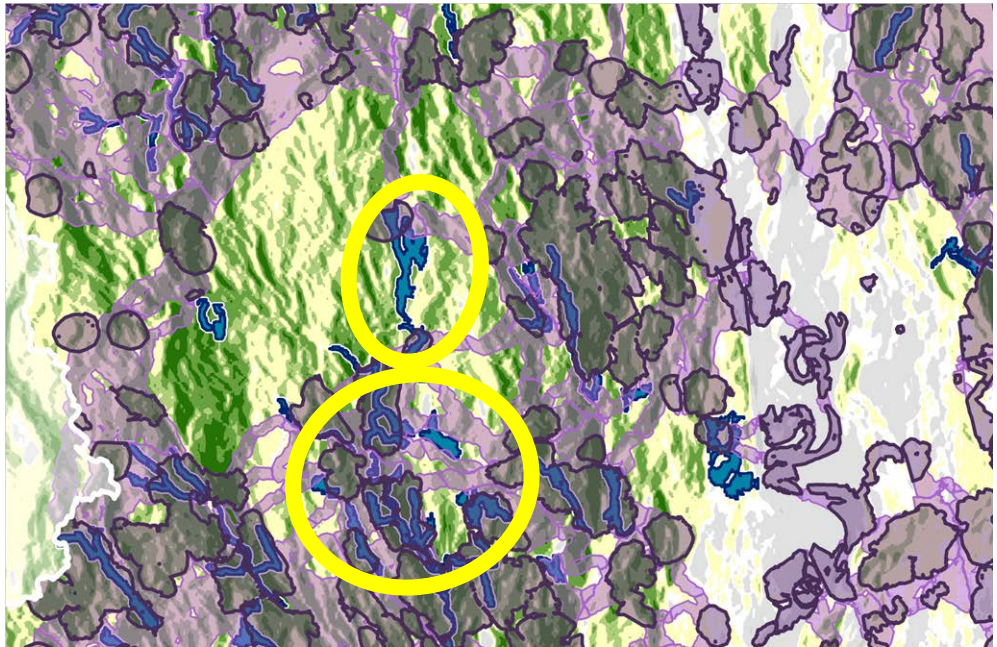
- Forest in a core area
- Corridors based on UMass resistance
- Corridors with resistance modified by TNC permeability

Gives us a connected network influenced by regional patterns



# Connectivity analysis

## Riparian climate corridors

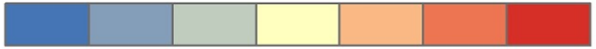


Riparian corridors compliment existing terrestrial based corridors

# Connectivity analysis

## Regional pinch points bottlenecks for species flow

**Anthropogenic Resistence Flow**

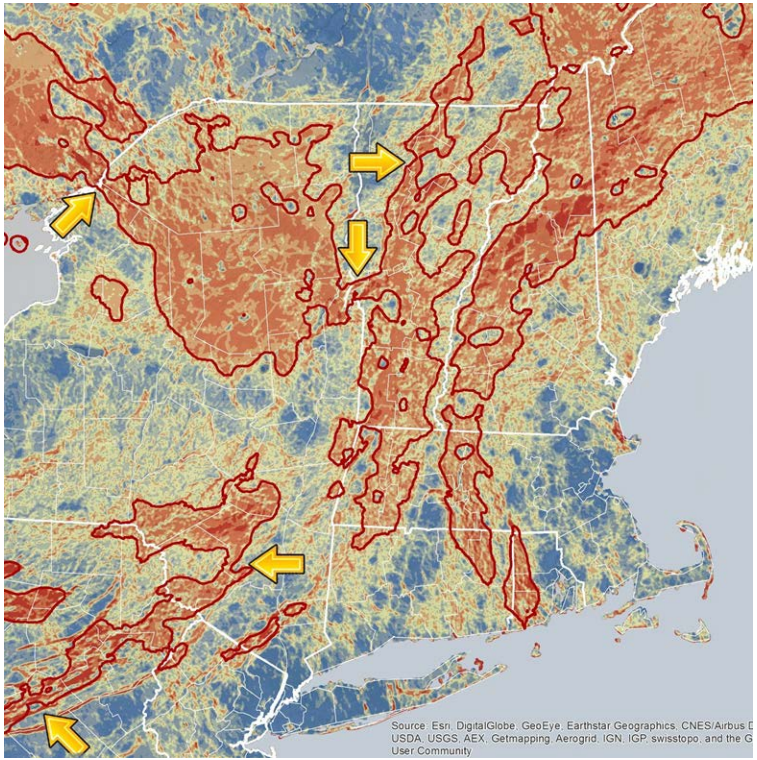


Barrier | Diffuse Flow | Concentrated Flow (bottlenecks)

Area of Concentrated Flow

Example Pinch Point Locations

Highlights irreplaceable locations important in connecting large natural areas



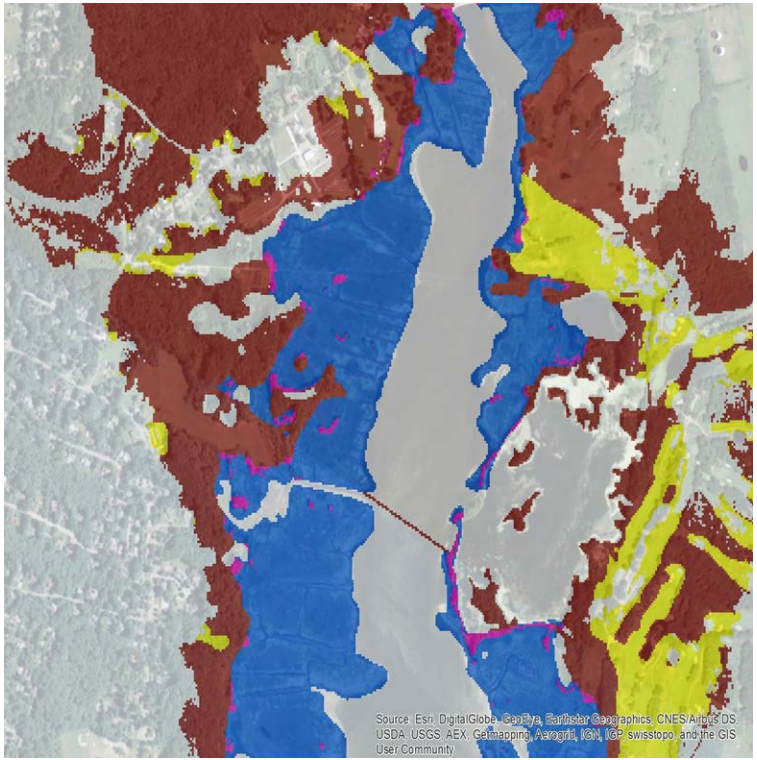
# Connectivity analysis

## Tidal marsh opportunities

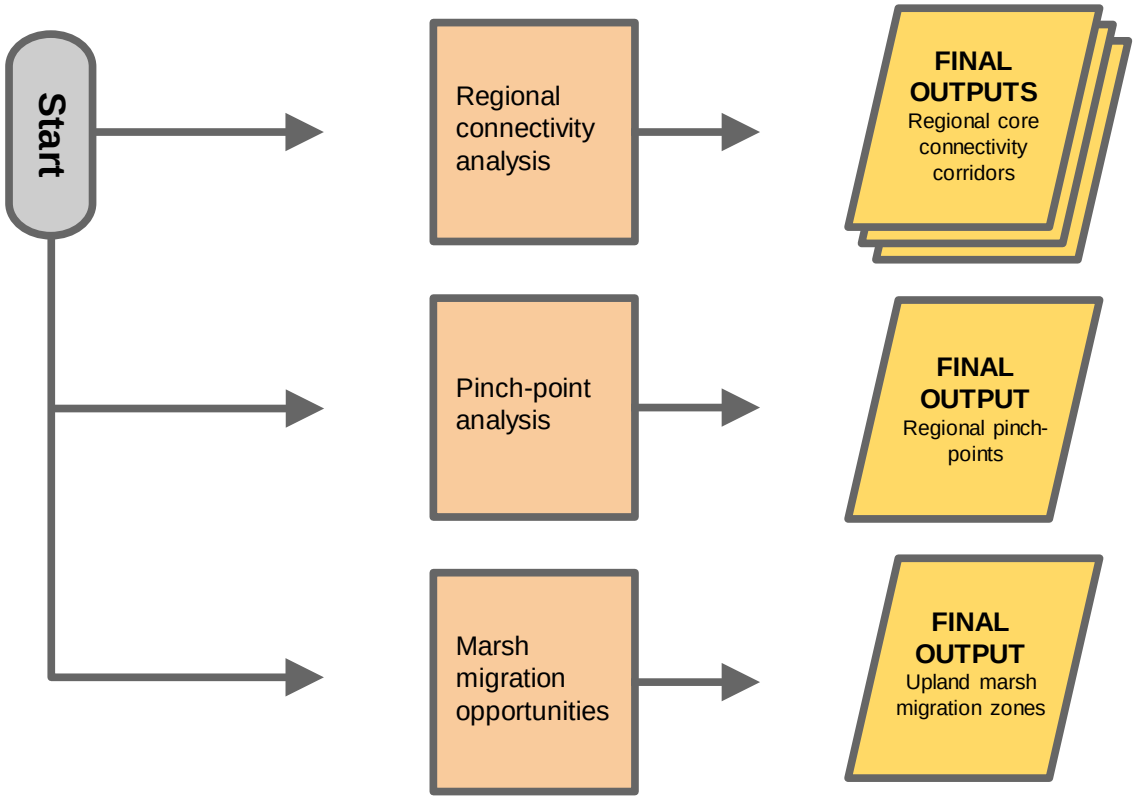
### 5 foot sea level rise model

- Restoration opportunity: marsh at risk of loss to inundation
- Restoration opportunity: marsh migration path over developed land
- Conservation opportunity: upland migration corridor

*Connecting current habitat to potential future habitat*



# Connectivity analysis



# Next steps

# Implementation

1. Begin reviewing methods
2. Team call 12/9
3. Participation on sub-teams to plan/implement mapping
4. Monthly calls through July 2016
5. 2 workshops to review results

# How you can be involved

## Help integrate ongoing partner efforts and products.

Examples:

- SWAPs
- PARCAs
- North Atlantic Aquatic Connectivity Collaborative
- Brook Trout Joint Venture/Brook Trout Projects
  - Brook trout patches, catchments
  - Brook trout probability of occurrence under current and increased temps

# How you can be involved

## Provide collaborative GIS support.

Assist with mapping and management of data.
Facilitate technical support within your organization.

# How you can be involved

## Serve on a working sub-team.

**Restoration Team:  help develop restoration scenarios**

In-stream connectivity
Riparian zones and water quality
Early successional habitat
Agricultural land restoration
Unique ecological systems

# How you can be involved

## Serve on a working sub-team.

**RSGCN Habitat Team:**

Evaluate species status weighting
Develop habitat weights
Identify threat and opportunity metrics
Help review of draft results

# How you can be involved

## Serve on a working sub-team.

**Connectivity Team:**

Develop methods to simplify and map results of complex models
Provide input on salt marsh migration
Help review draft results

# How you can be involved

## Serve on a working sub-team.

**Terrestrial Cores Team:**

Develop ecosystem weights that reflect biodiversity and ecosystem services

Review representative species models

Help review draft results

# How you can be involved

## Serve on a working sub-team.

**Aquatic Cores Team:**

- Evaluate datasets proposed for core areas
  - ecological integrity
  - resilient networks
  - fish species occurrence or probability
- Help review of draft results

# Questions ?