Setting Priorities for Conservation Opportunity Areas: Different Targets Result in Different Outcomes

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“I am not young enough to know everything.”

~Oscar Wilde~

Underpinning Philosophy

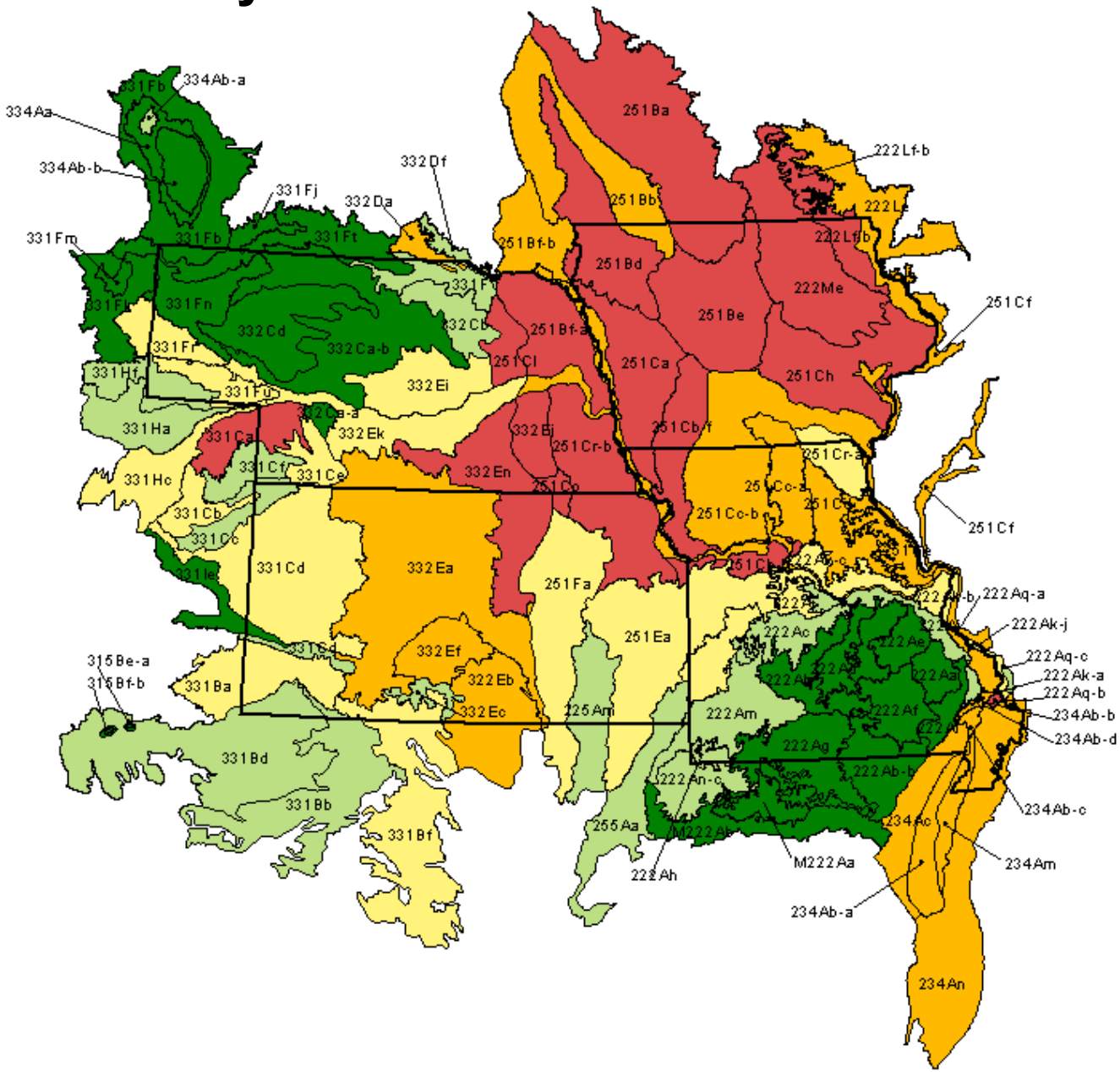
- Ultimate goal is to see that natural resources are conserved
- We use ecological subsections as the assessment unit, and assume that each subsection is worthy of conservation effort (strategies may vary)
- Many groups will be involved, each with slightly different concerns
- No single agreed-upon ‘right answer’ exists
- Different organizations can work from the same information base

Strategy

- Involve many groups
- Methods need to be easy to understand
- End users need to be able to explore different outcomes
  - different geographic areas
  - different conservation targets

Environmental Quality Index

+Area of Subsection In OA
-Human Use Index
-Cropland on Slopes >5%
-Anthropogenic Vegetation Along Streams
(from ordinal ranks)



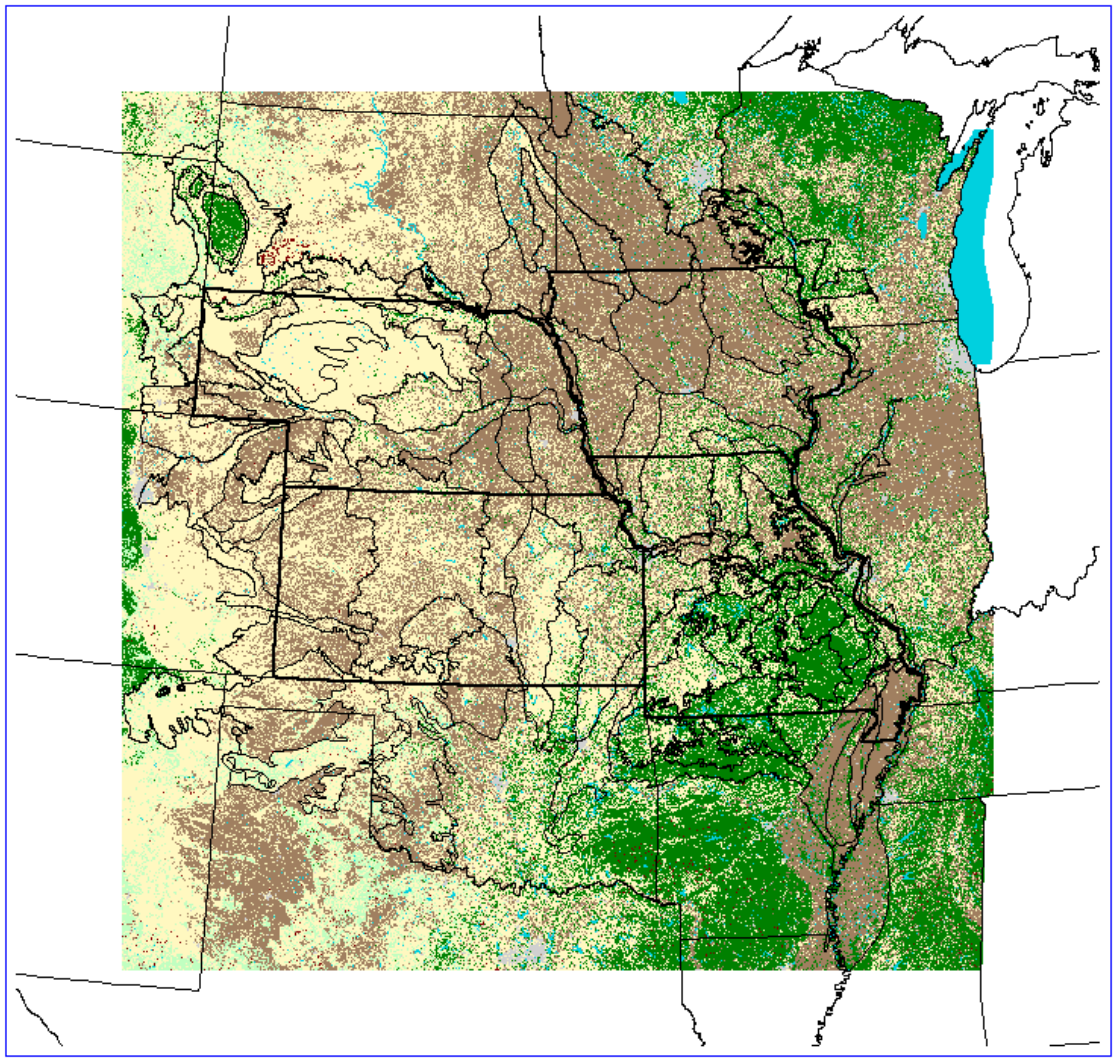
Methods

- Committee convened; coined “Conservation Opportunity Area” (OA)
- OAs defined (first part of presentation)
- Priority (1-5) set for each OA polygon from “Module” scores (second part of presentation)
  - Module A: landform (enduring feature) representation
  - Module B: vertebrate diversity
  - Module C: target bird diversity
  - Module D: rare species and communities
  - Module E: target land cover representation

“A little inaccuracy sometimes saves a ton of explanation.”

~H. H. Munro~

Defining Conservation Opportunity Areas:
Land Use/Land Cover from NLCD



Land Cover Classes

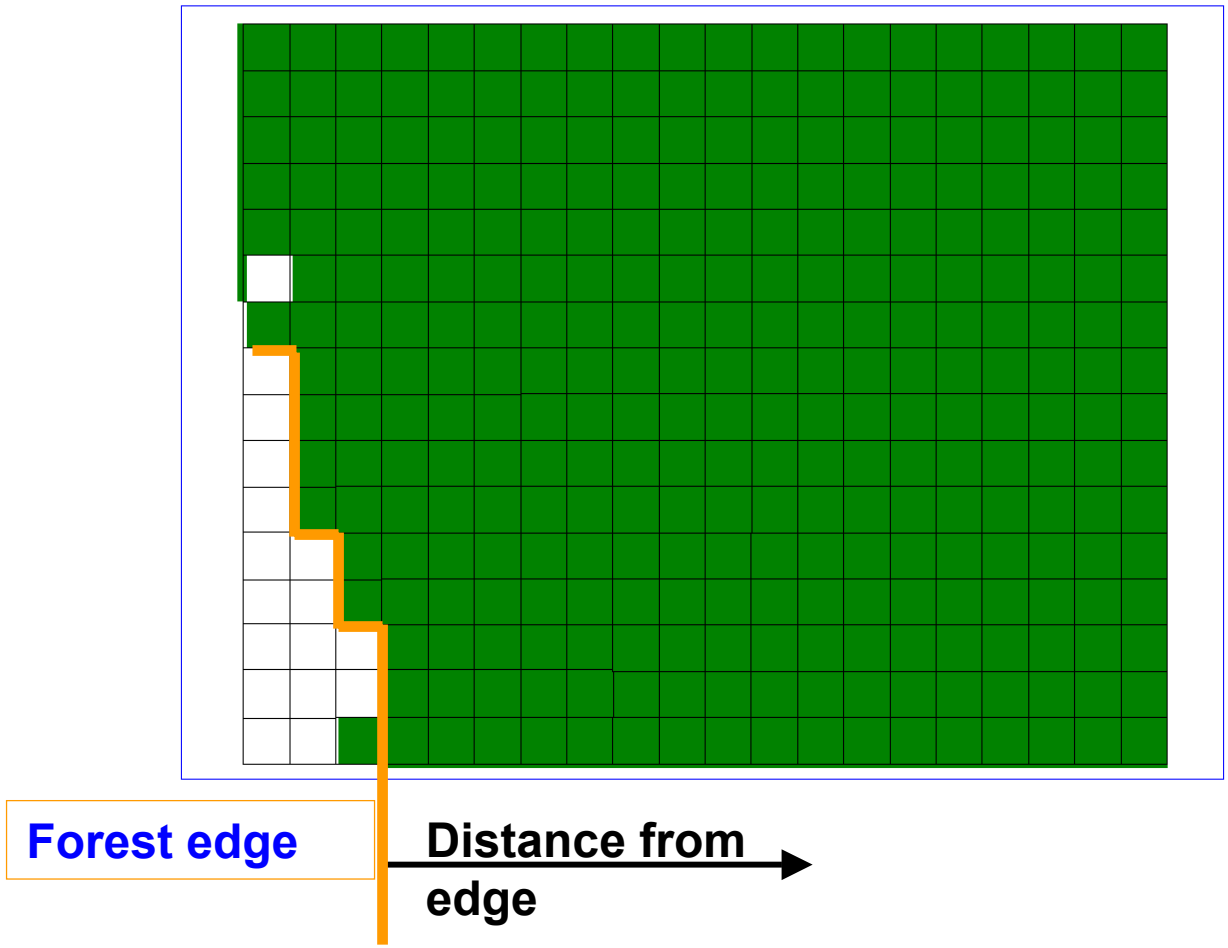
- Forest
- Grassland
- Shrubland
- “Mosaic” (areas with a mixture of forest, grassland, and shrubland, but no big patches of any one type)
- Rowcrops
- Urban
- Water

Creation of ‘mosaic’ cover class

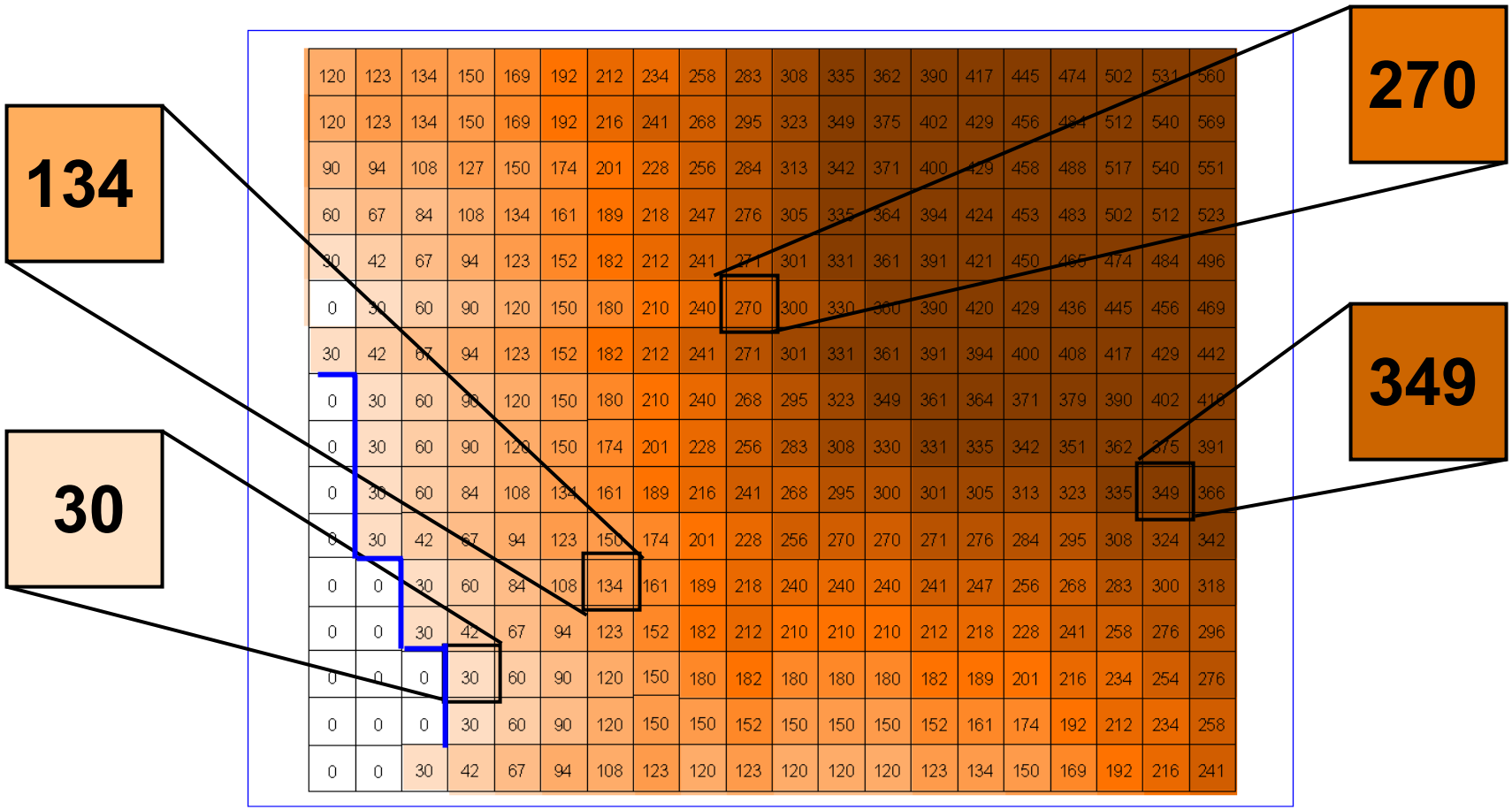
- Expand natural vegetation types (forest, grassland, shrubland) by 90 meters
- Identify expanded areas that overlap onto other natural vegetation classes
- Classify overlapping areas as ‘mosaic’ (90 meters into a cover class that borders another natural vegetation type).

Create distance grids for land cover & roads

Example: 30-meter grid cells of forest land cover

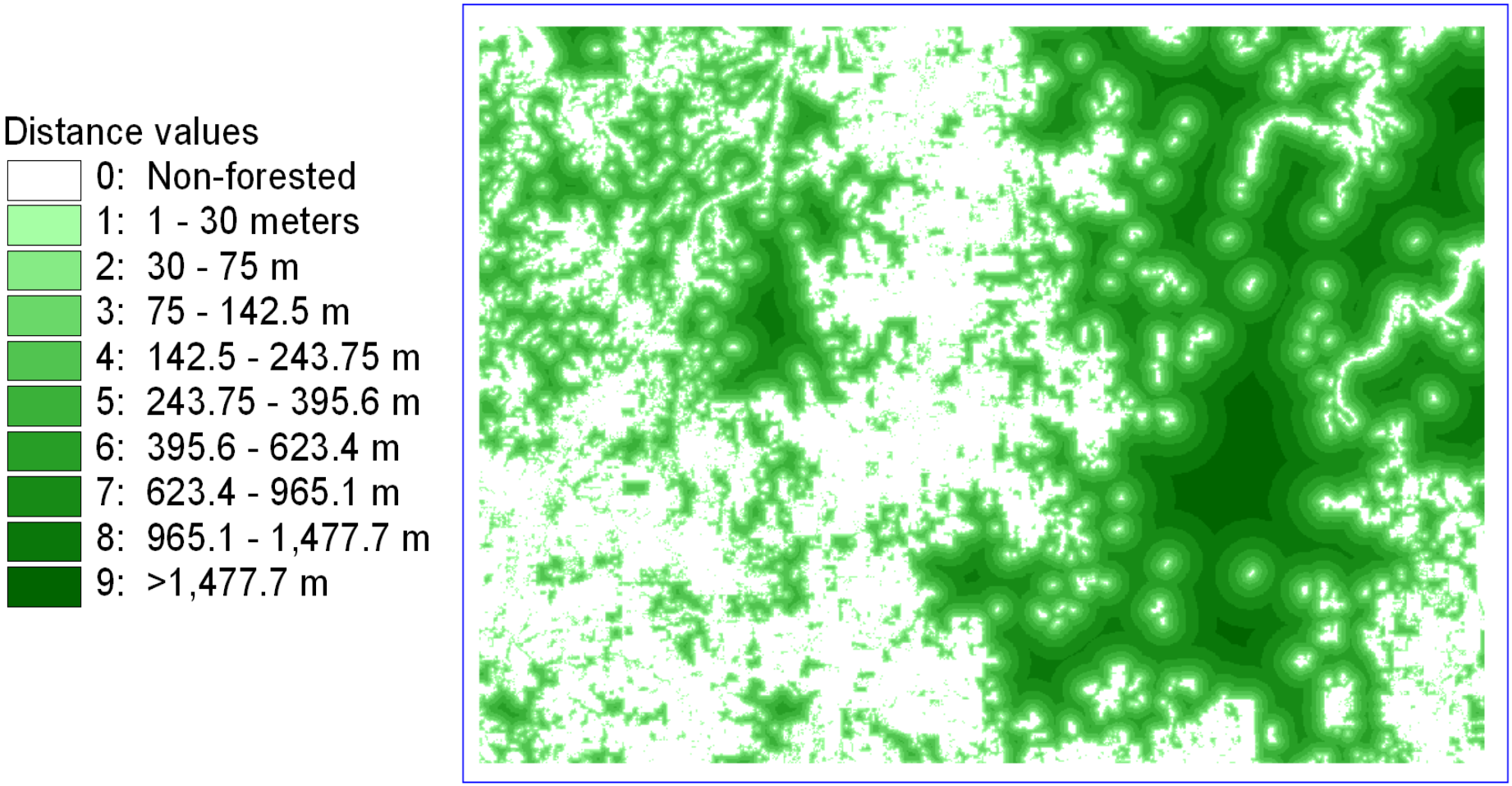


Example: distance grid surface values (30 meter grid)

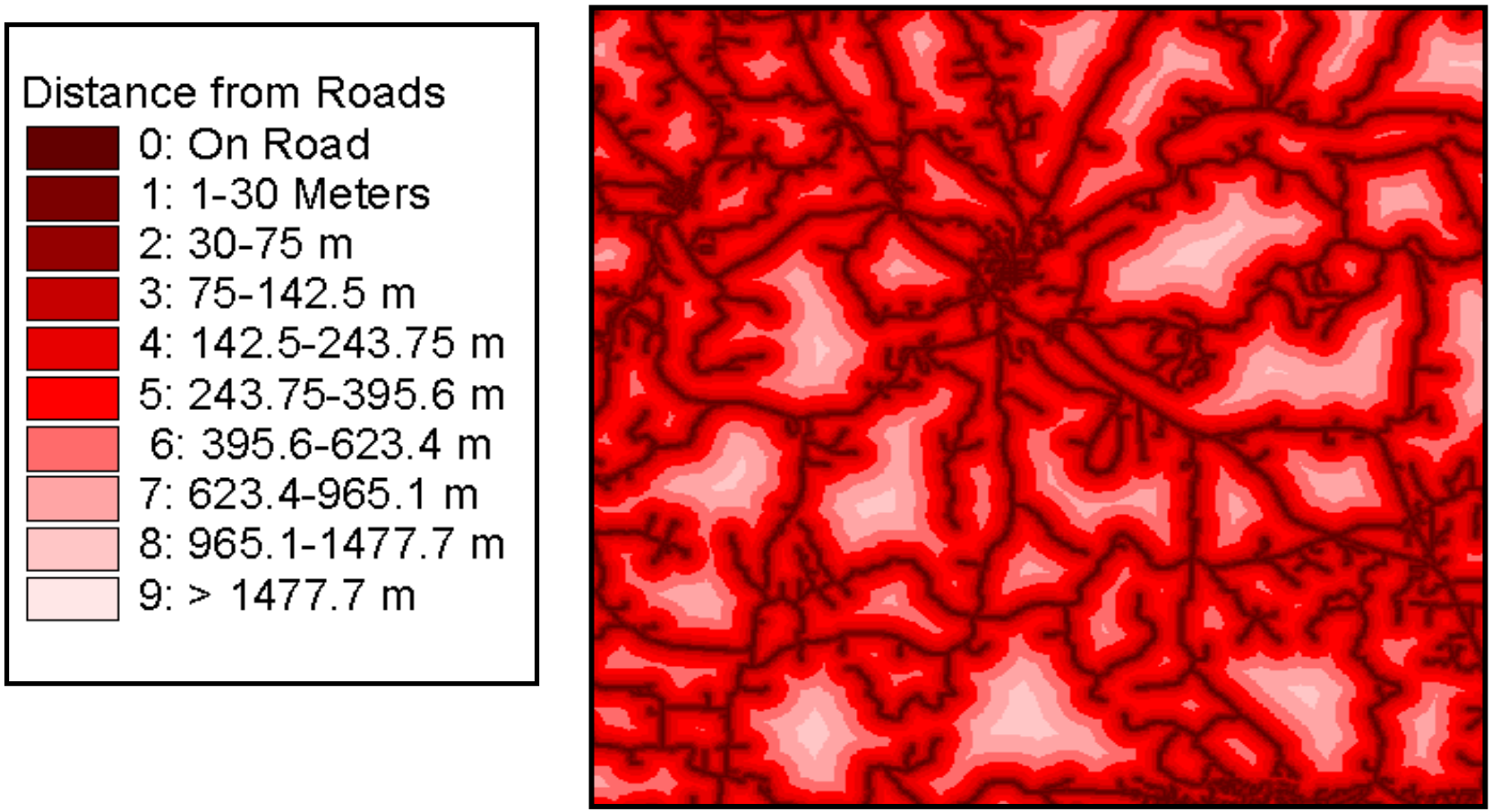


Distance of each forest pixel from the edge of forest

Result: a new forest grid with cell values 0 to 9 based on distance to the forest edge



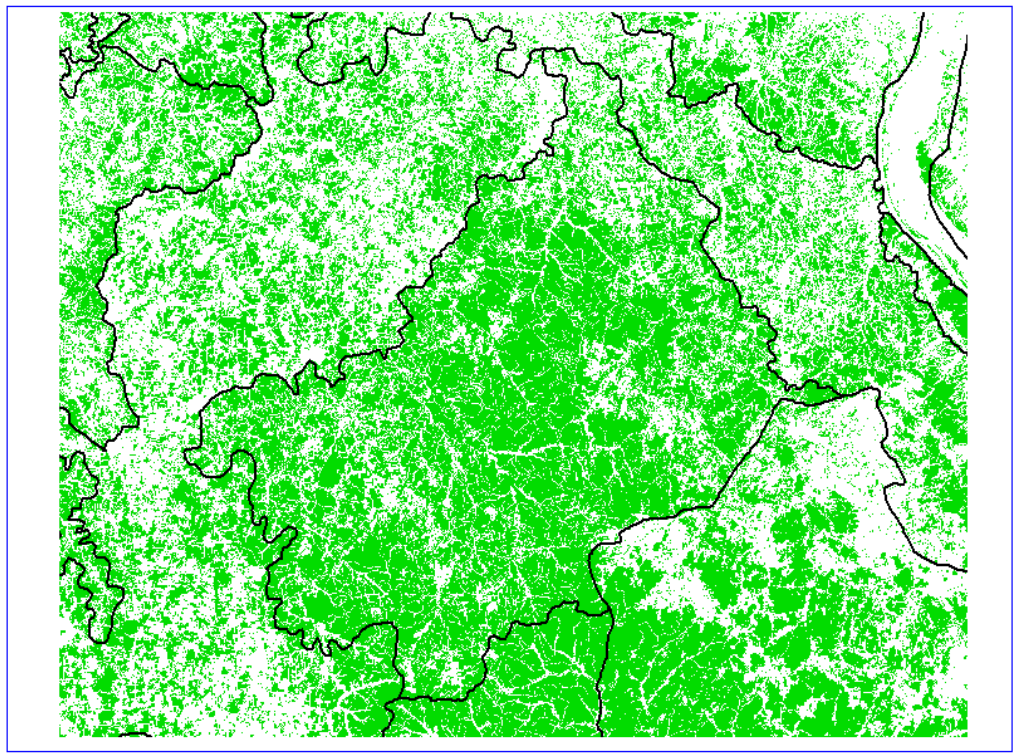
Road Distance Grid



Opportunity Areas Defined in a Flexible Way:

select pixels that meet ‘threshold’ values

“Liberal:” Forest ≥ 3 Roads ≥ 3

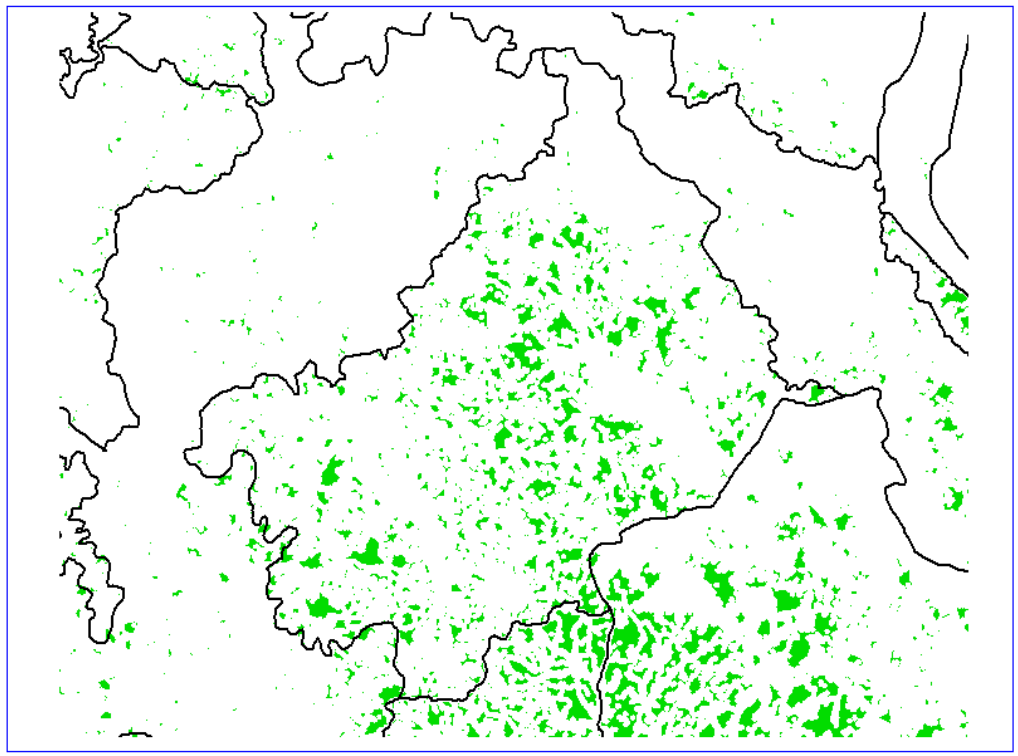


<u>Close</u> to forest edge and <u>close</u> to roads

Opportunity Areas Defined in a Flexible Way:

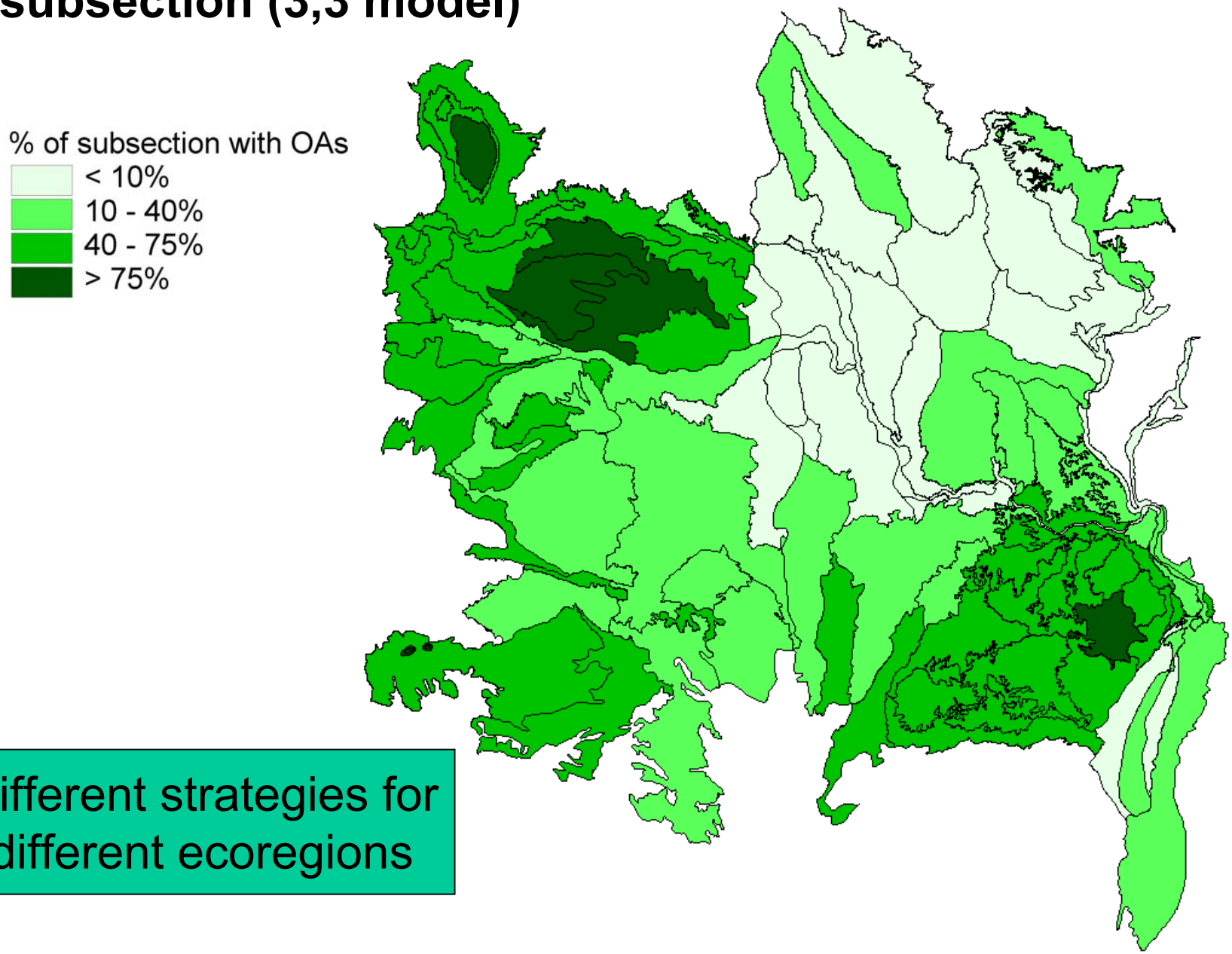
select pixels that meet ‘threshold’ values

“Conservative:” Forest ≥ 6 Roads ≥ 6



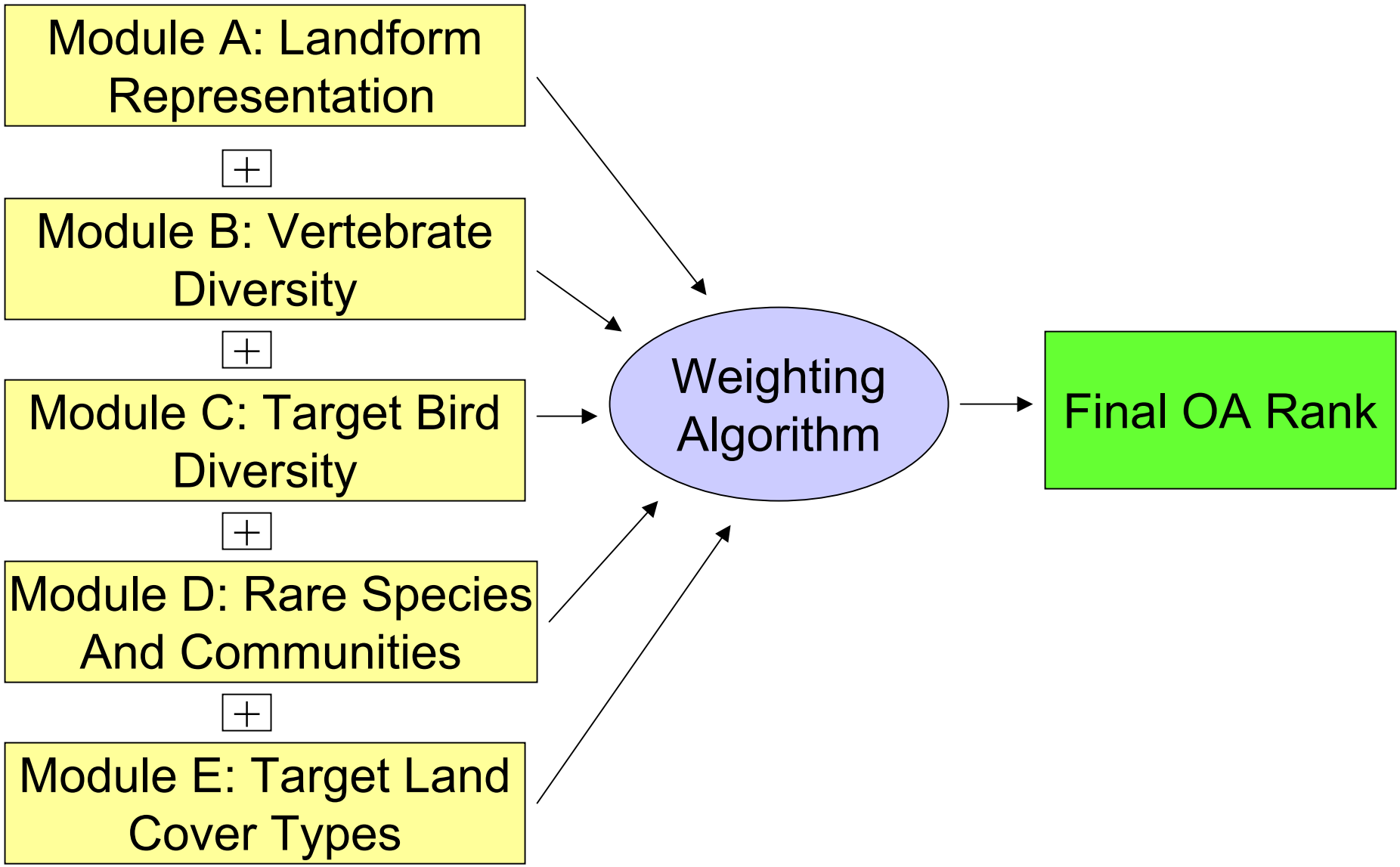
Mid-distance from forest edge and roads

Percent of total OA area by subsection (3,3 model)



Different strategies for different ecoregions

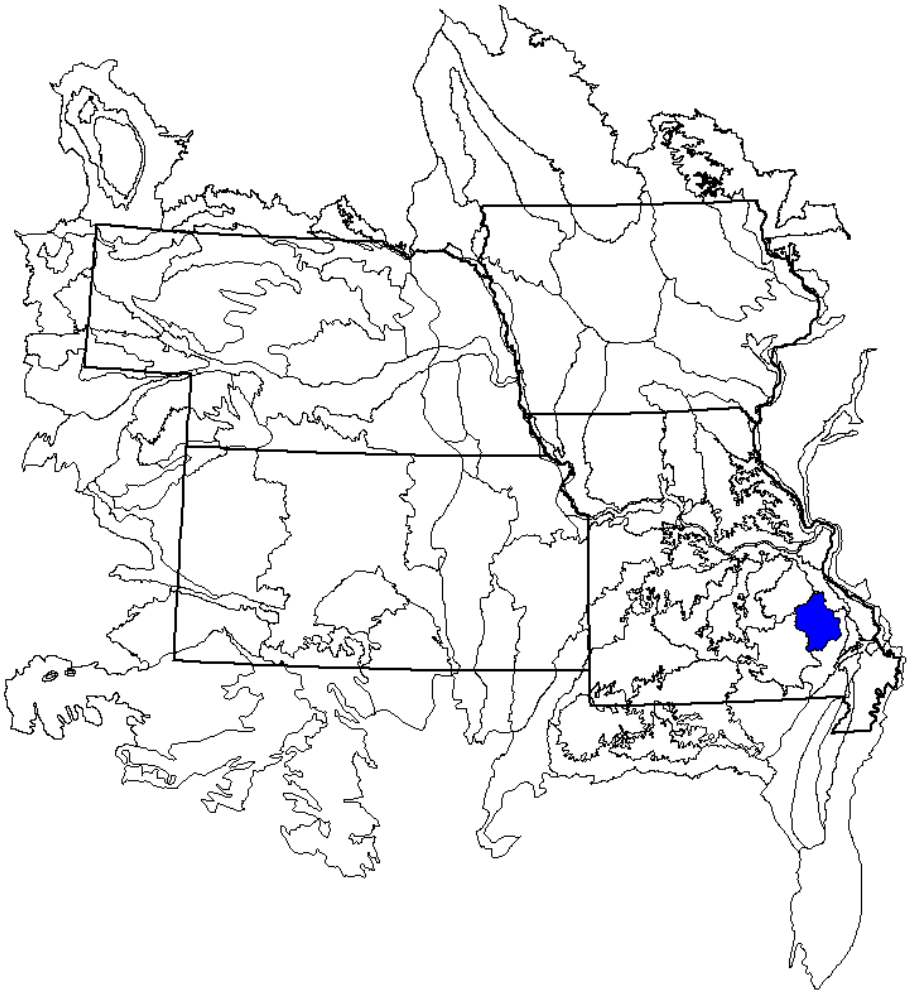
Setting Conservation Priorities for OAs

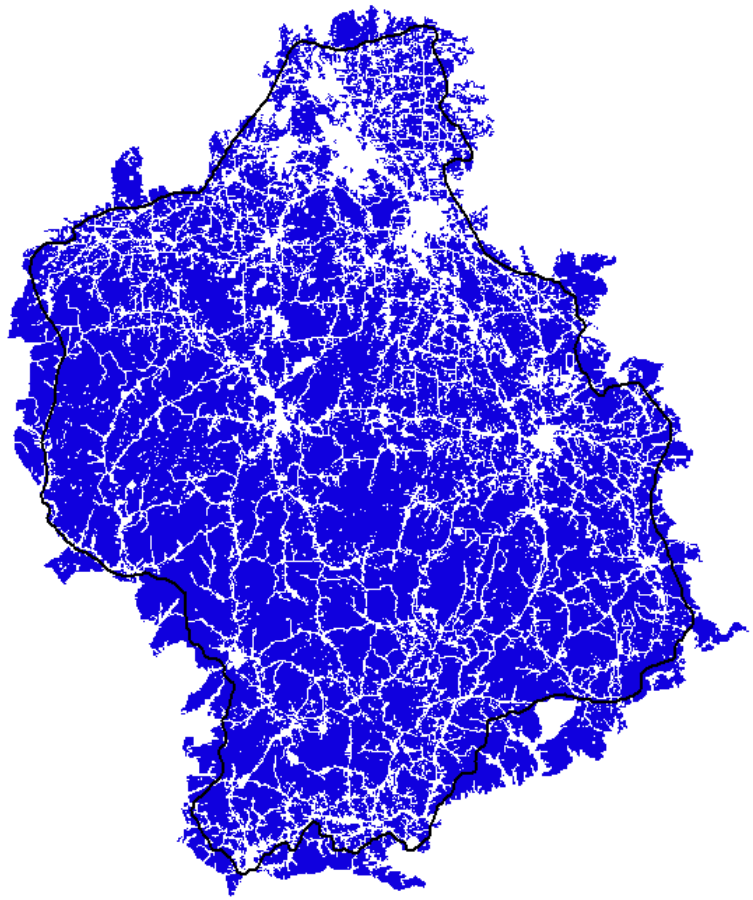


Case Study: St. Francois Knobs & Basins

A Largely Intact Ecoregion

3,3 threshold OAs

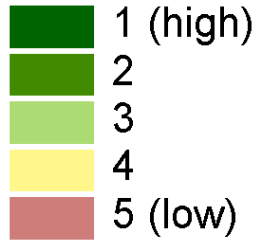




“Few things are harder to put up with than a good example.”

Mark Twain

OAs Are Ranked for Each Module



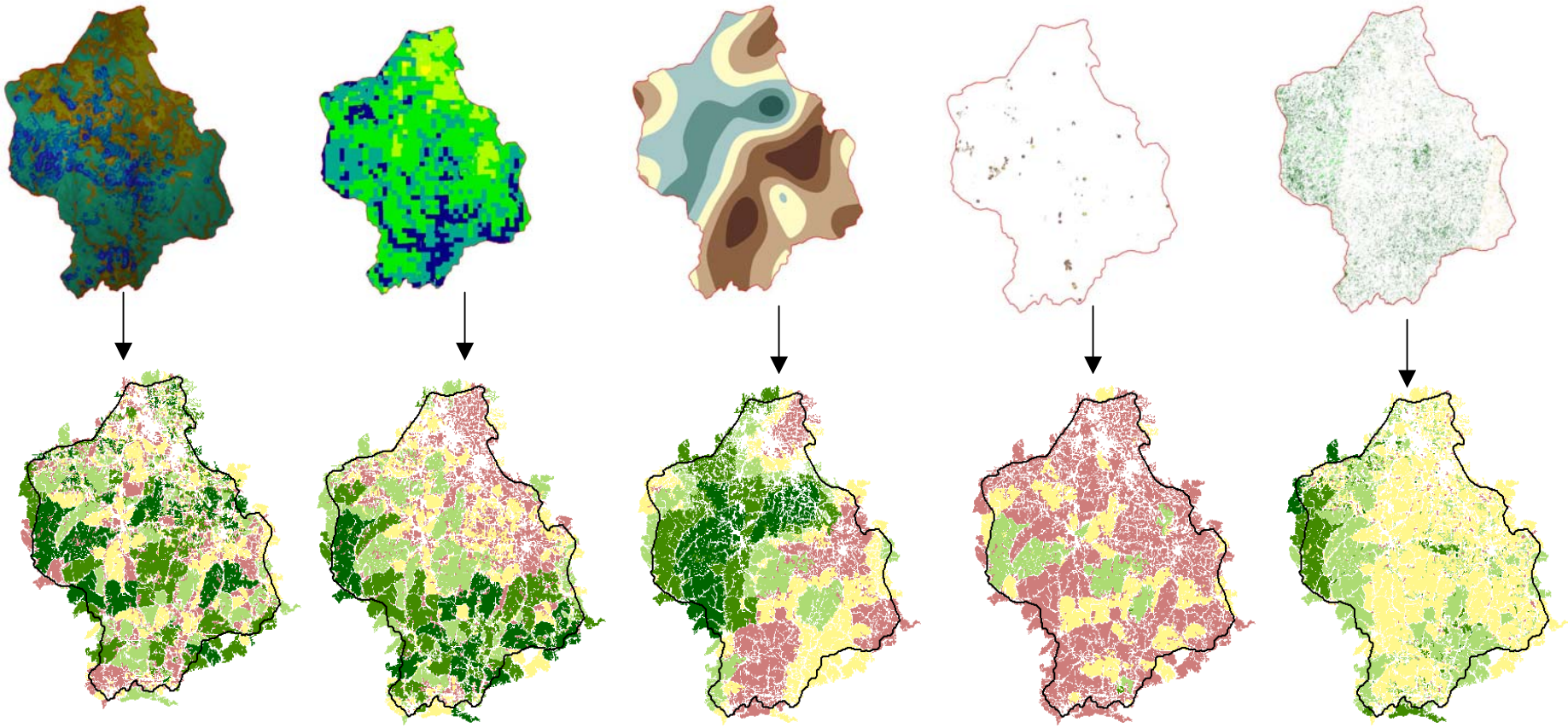
Module A: Landform Representation

Module B: Vertebrate Diversity

Module C: Target Bird Diversity

Module D: Rare Elements

Module E: Target Land Cover



Methodology for developing Modules: Landform Representation

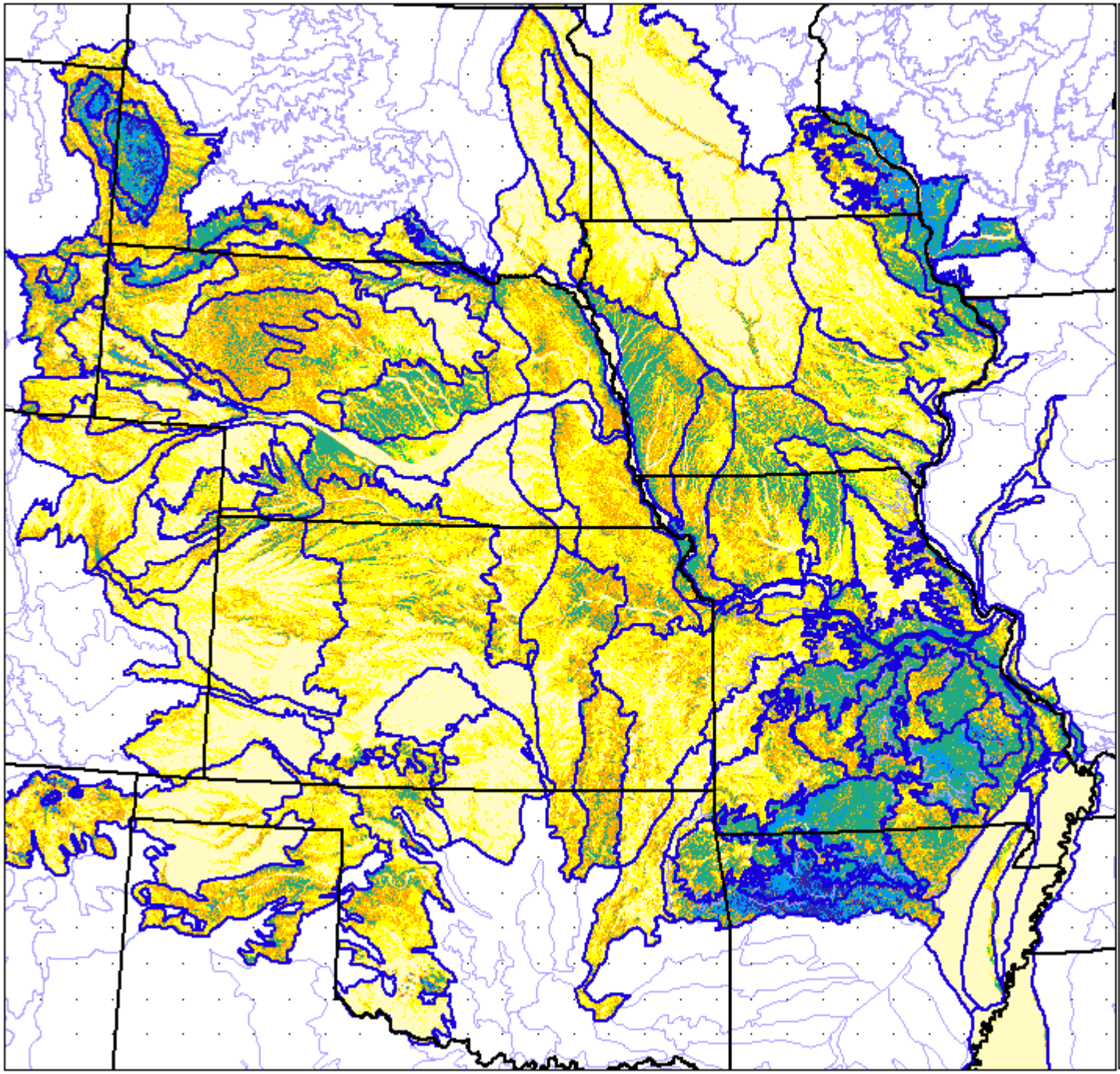
- Classify landforms
- Form OA Groups (OAs with similar landforms)
- Select the largest OAs from each OA Group as high priority (relative to subsection)
    - **5: largest OAs to 20% of that OA Group**
    - **4: next largest OAs to 40%**
    - **3: next largest OAs to 60%**
    - **2: next largest OAs to 80%**
    - **1: smallest OAs form that OA group**

Model Landforms from 30-m Digital Elevation Models

Slope (2 classes) + Relief (7 classes)

= Landform (14 possible; 10 occurred)

Derived from Neighborhood Analysis (1 square kilometer, or 564 meter radius) of Digital Elevation Models (DEMs) – National Elevation Database files used for basic input



Landforms of Central USA

Landforms were created from USGS 30-meter DEM's. The numeric code represents slope and relief. If more than 50% of the neighborhood is gently sloping, then the first digit is 1. If less than 50% of the neighborhood is gently sloping, then the first digit is 2. Relief, or the range of elevation in the neighborhood, is broken into six classes with 1 representing the least relief.

Bailey's Ecoregions

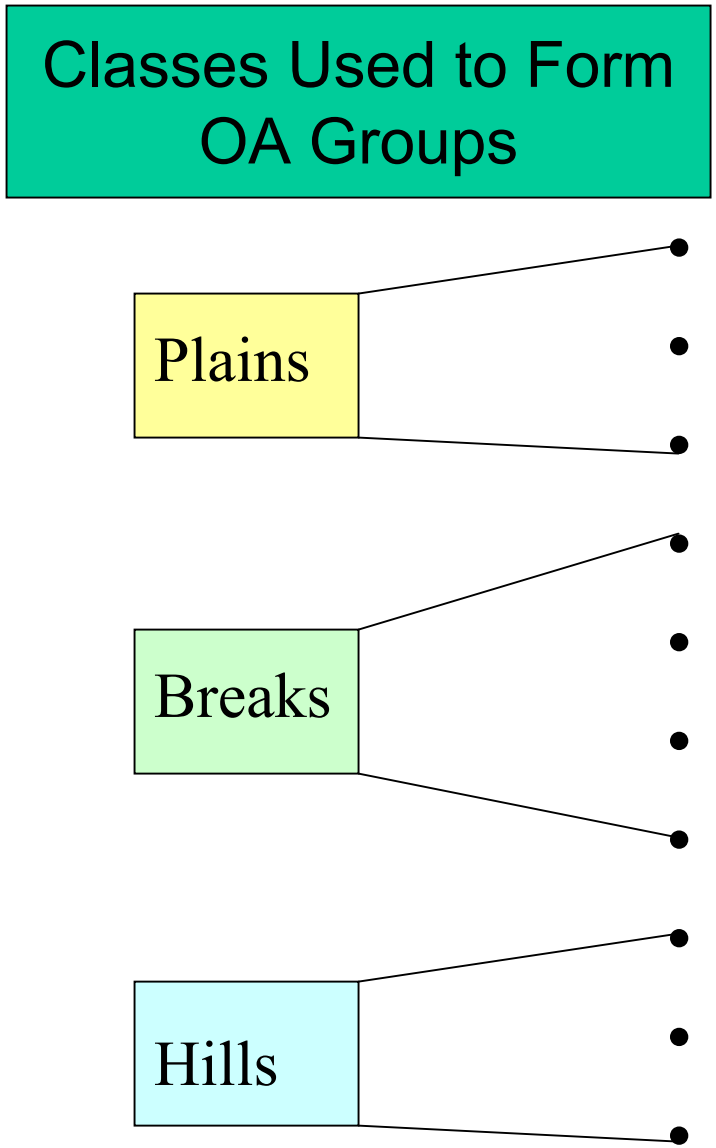
Landforms

- 11 Flat Plains
- 12 Smooth Plains
- 13 Irregular Plains
- 14 Plains with Low Hills
- 15 Plains with Hills
- 16 Plains with Low Mountains
- 22 Rugged Plains
- 23 Breaks
- 24 Low Hills
- 25 Hills
- 26 Low Mountains

MRAP

N W E S

25 0 25 50 75 100 Miles



Landforms

- 11 - Flat Plains
- 12 - Smooth Plains
- 13 - Irregular Plains
- 14 - Plains with Escarpments
- 15 - Plains with High Escarpments
- 22 - Rugged Plains
- 23 - Breaks
- 24 - Low Hills
- 25 - Hills
- 26 - Low Mountains

Forming OA Groups Based on Landform Similarity

- If >=75% of OA is one class, then assign to OA Group named for that class
- If >=75% of OA is the sum of two classes, assign to OA Group named of those classes
- If <75% of OA is comprised of two classes, assign to 'Mixed' OA Group

Plains	Plains & Breaks
Breaks	Breaks & Hills
Hills	Plains & Hills
Mixed	

Pick the largest OAs from each OA Group as "Top Priority"

Methodology for developing Modules: Vertebrate Richness

- Used Missouri GAP plss polygons (sq. mi.) to calculate richness
- Converted plss polygons to a grid (30x30 meter) based on richness value
- Intersected grid with OAs and assigned OA the value with the highest count
- Ranked OAs from 1-5 by equal area (relative to each subsection)

Methodology for developing Modules: Target Bird Richness

- Used Breeding Bird Atlas on-the-ground samples of 1/6th USGS 7.5' quad
- Calculated richness using a list of target bird species from American Bird Conservancy
- Created surface via interpolation using spline method in ArcView
- Determined the maximum bird species count in each OA
- Ranked richness values by equal area (relative to each subsection)

Methodology for developing Modules: Rare Elements

- Used Missouri Heritage point and polygon data (G1 – G3; S1 – S3, excluding G5)
- Create a 30-m grid surface by buffering each point using a 1 square km circle
- Intersected grid with OAs
- Assigned OA highest grid cell value, which represents number of element occurrence records
- Ranked OAs by number of element occurrence records:
    - 1: 0 records
    - 2: 1 record
    - 3: 2 records
    - 4: 3 records
    - 5: 4 or more

Methodology for developing Modules: Target Land Cover

- Used 44 class land cover developed at MoRAP
- Extracted land cover types important in Missouri (see next slide)
- Calculated the percent of the target land cover types that occurred in each OA
- Ranked each OA based on percentage of the OA that is a target land cover type:
    - 1: 0%
    - 2: >0% and <10%
    - 3: >=10% and <20%
    - 4: >=20% and <30%
    - 5: >=30%

Target land cover types

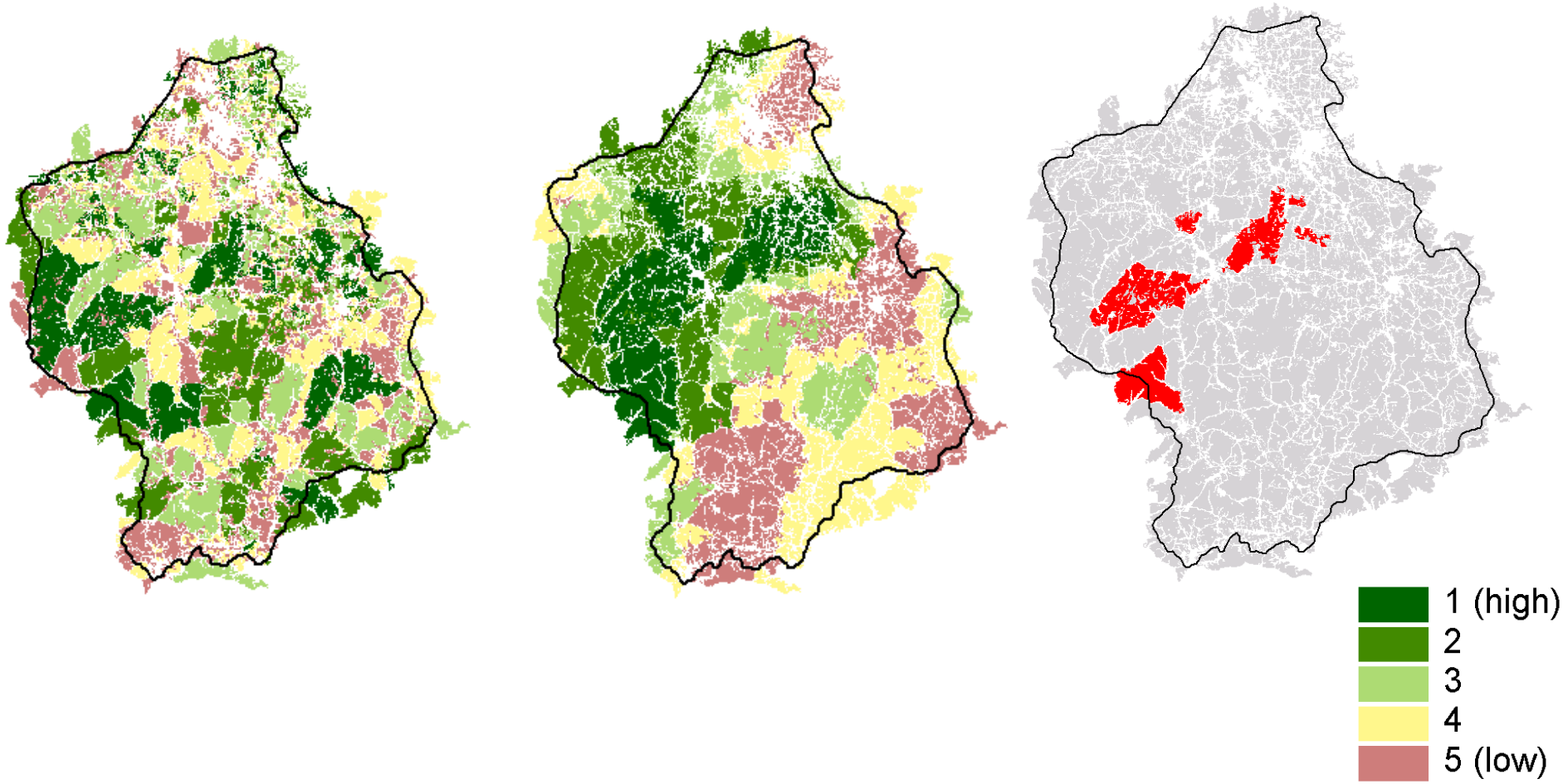
- Warm season grassland
- Bluestem glade grasslands
- Oak glade woodland
- Mixed hardwood forest
- Eastern red cedar glade woodland
- Eastern red cedar – hardwood glade woodland
- Shortleaf pine forest
- Shortleaf pine-oak forest & woodland
- Marsh
- Shrub swamp
- Wet herbaceous vegetation
- Forested swamp
- Bottomland hardwood forest & woodland

Setting Priorities Using Different Targets (Module Outcomes)

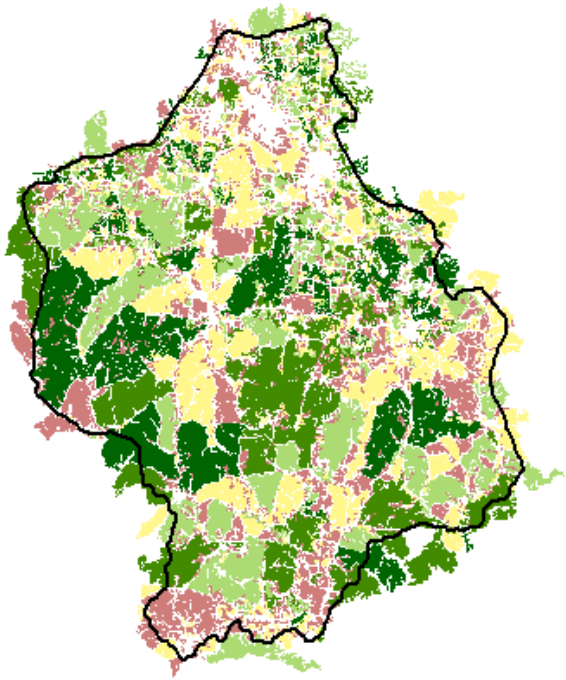
Landform Representation

Target Bird Diversity

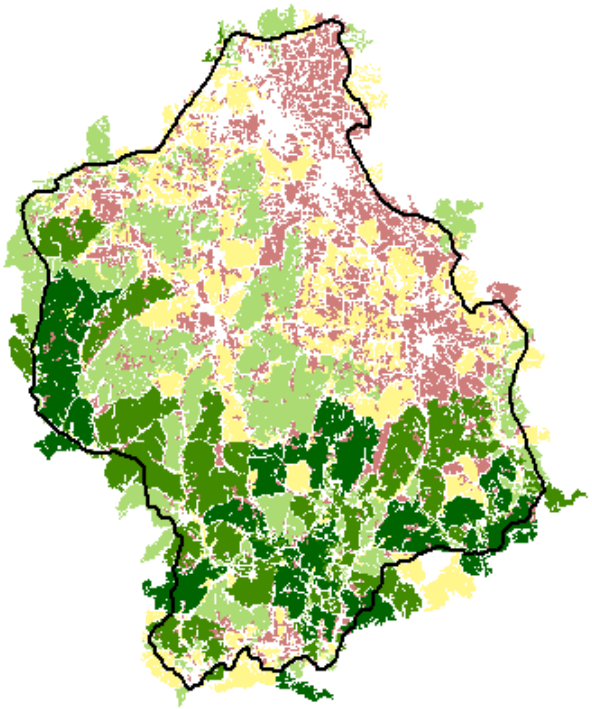
19% Overlap



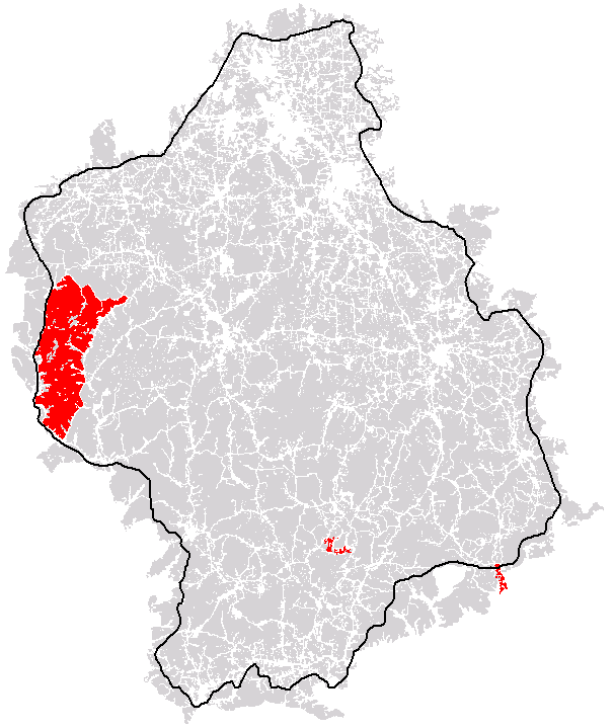
Landform Representation



Vertebrate Diversity

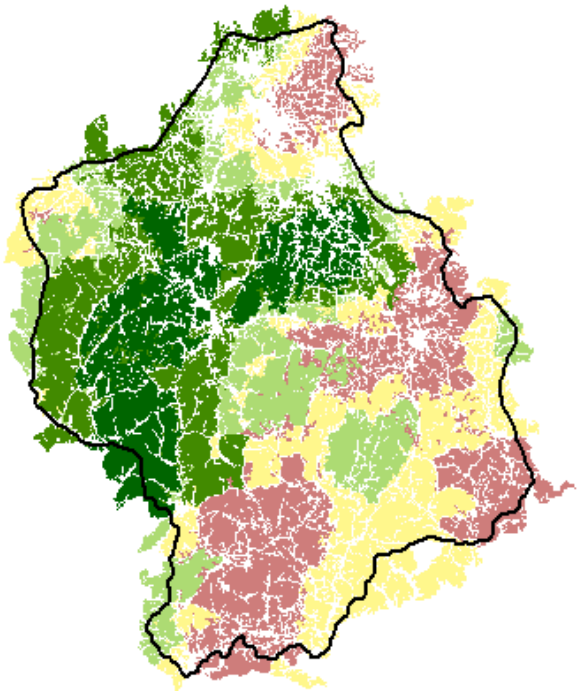


9% Overlap

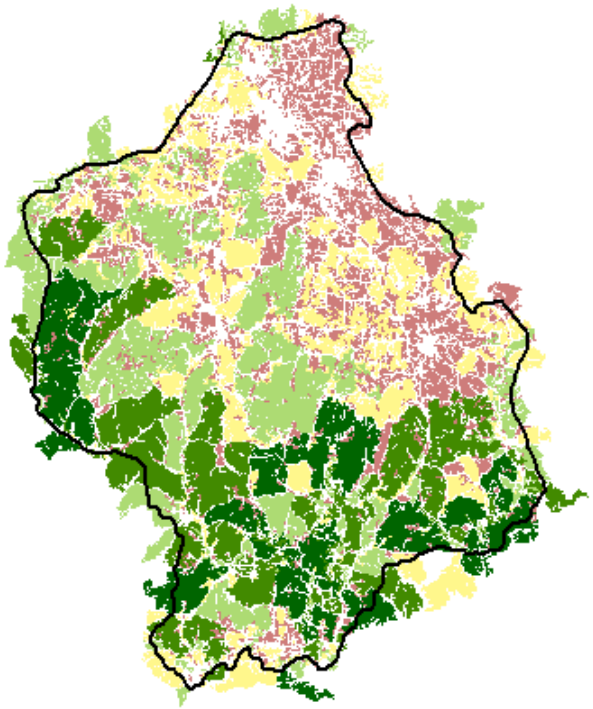


1 (high)
2
3
4
5 (low)

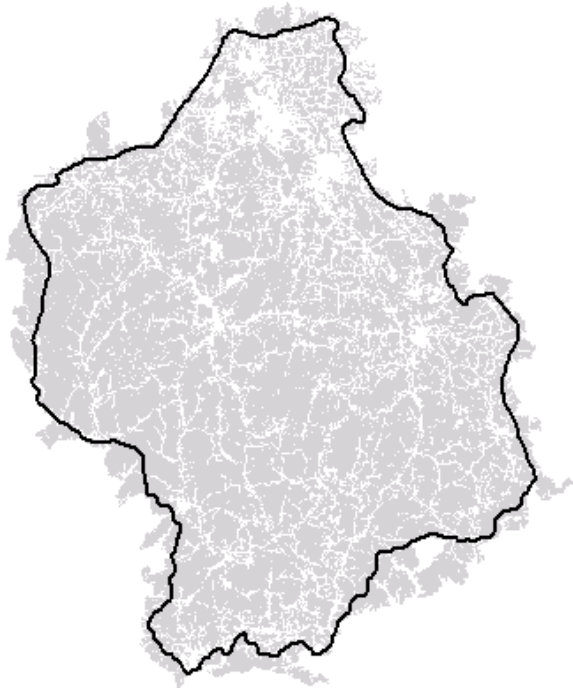
Target Bird Diversity



Vertebrate Diversity

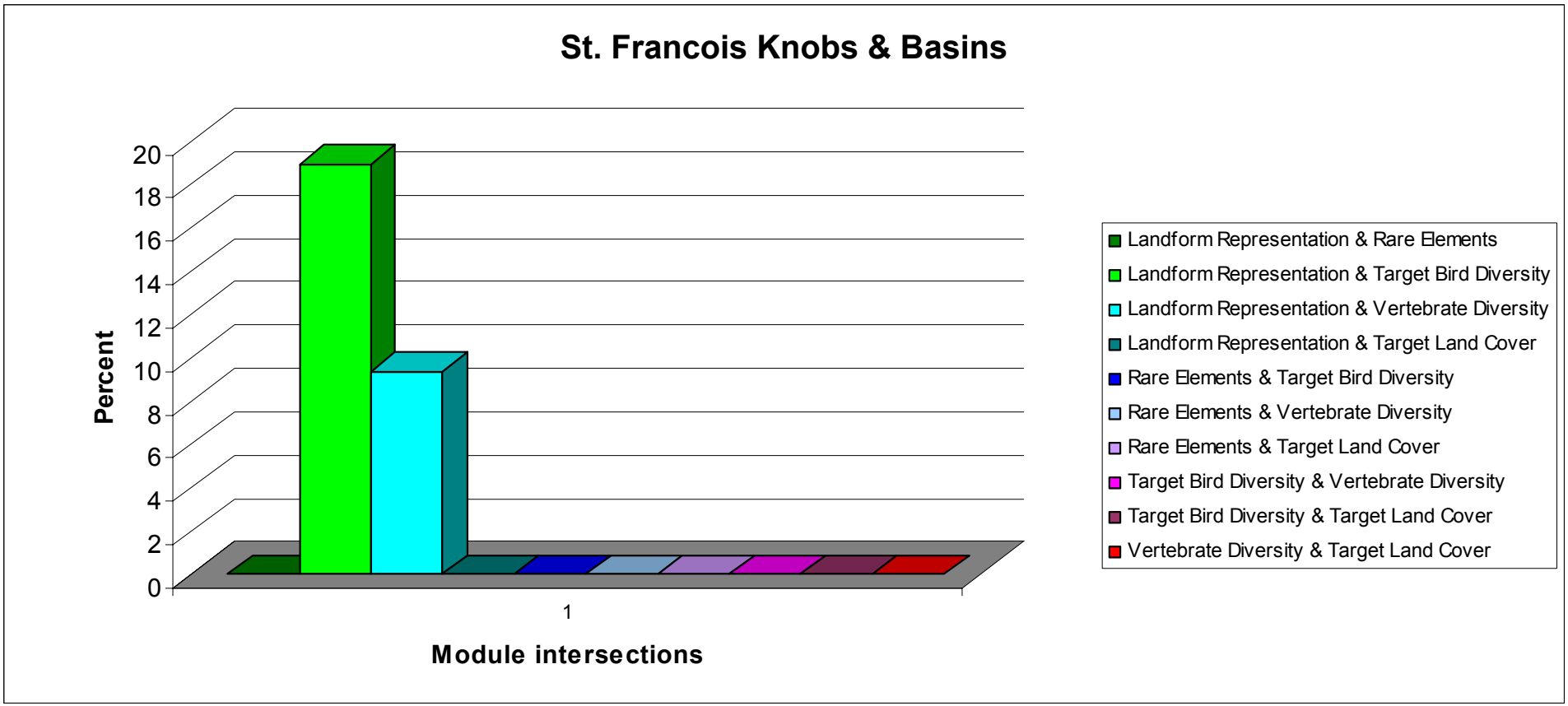


No Overlap



1 (high)
2
3
4
5 (low)

Percent Overlap in Priority 1 OA Selection: Area of Overlap/(Mod1 + Mod2)

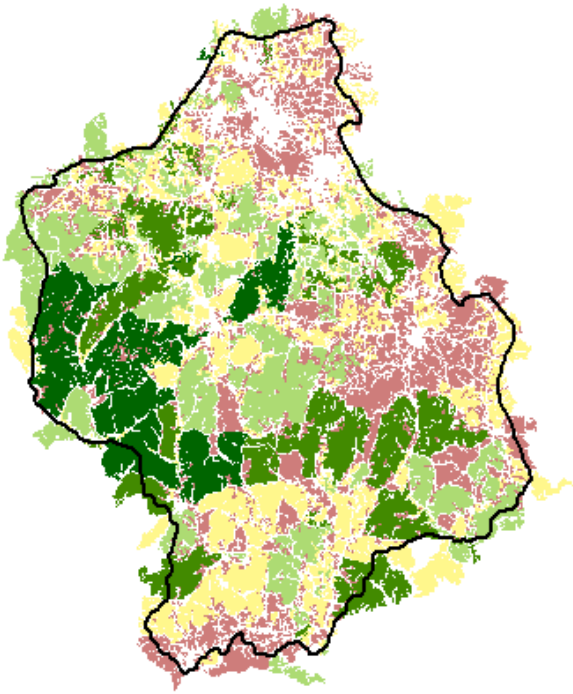


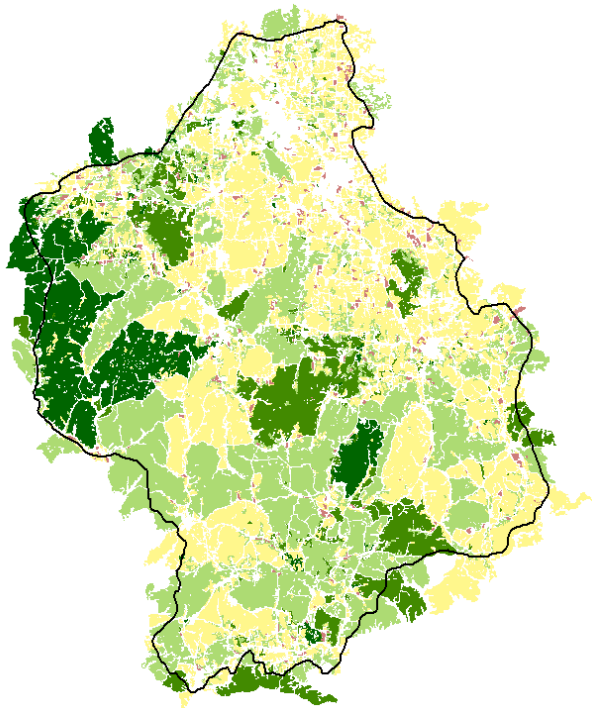
THE TARGETS DRIVE THE OUCOME IN TERMS OF APPARENT PRIORITY

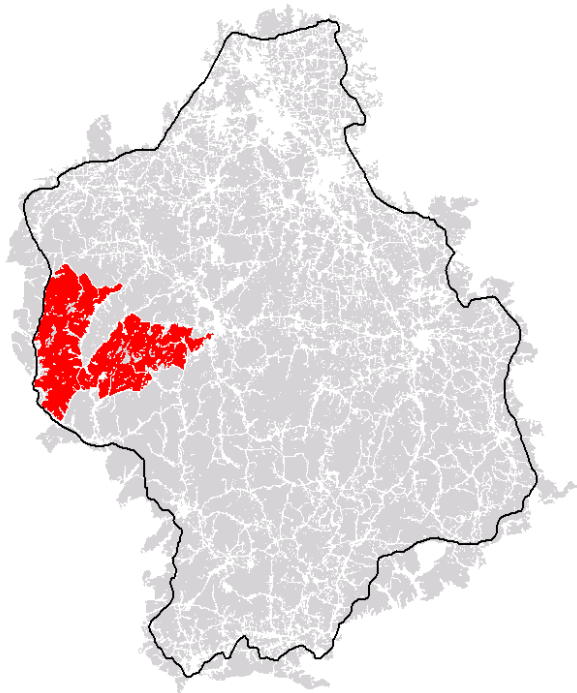
Landform Represent-ation + Vertebrate Diversity + Target Bird Diversity

Rare Elements + Target Land Cover Type

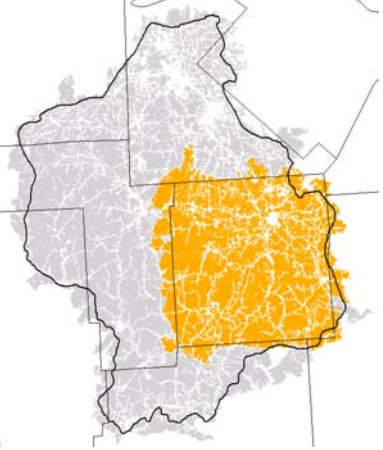
33% Overlap







1 (high)
2
3
4
5 (low)



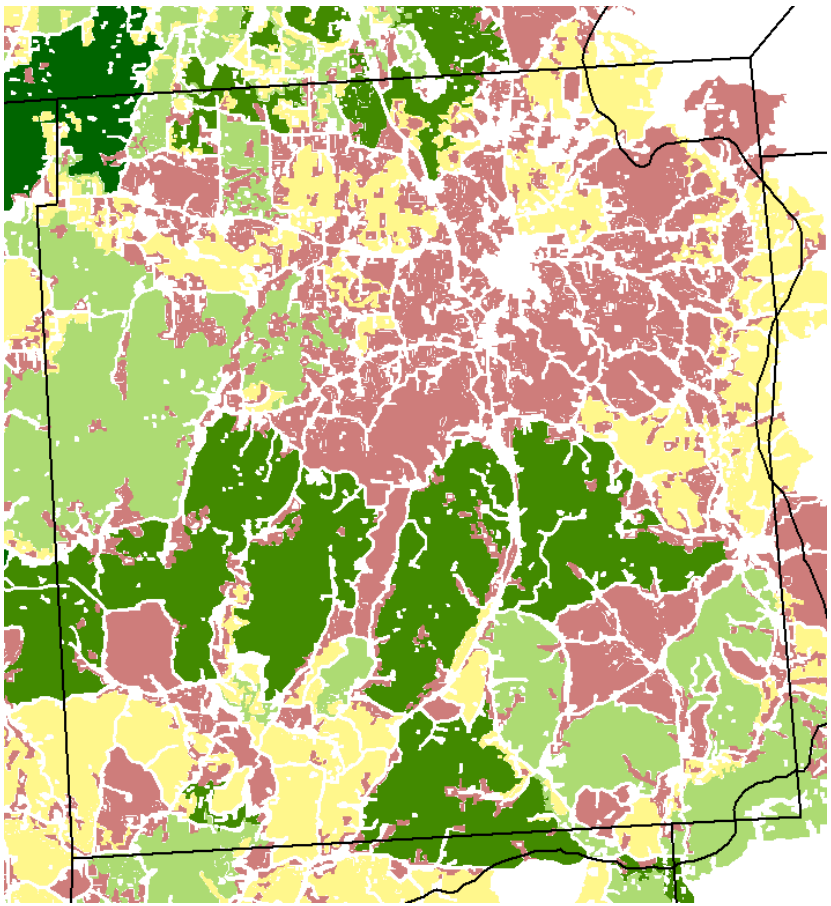
County Level

Landform Representation
+ Birds + Vertebrates

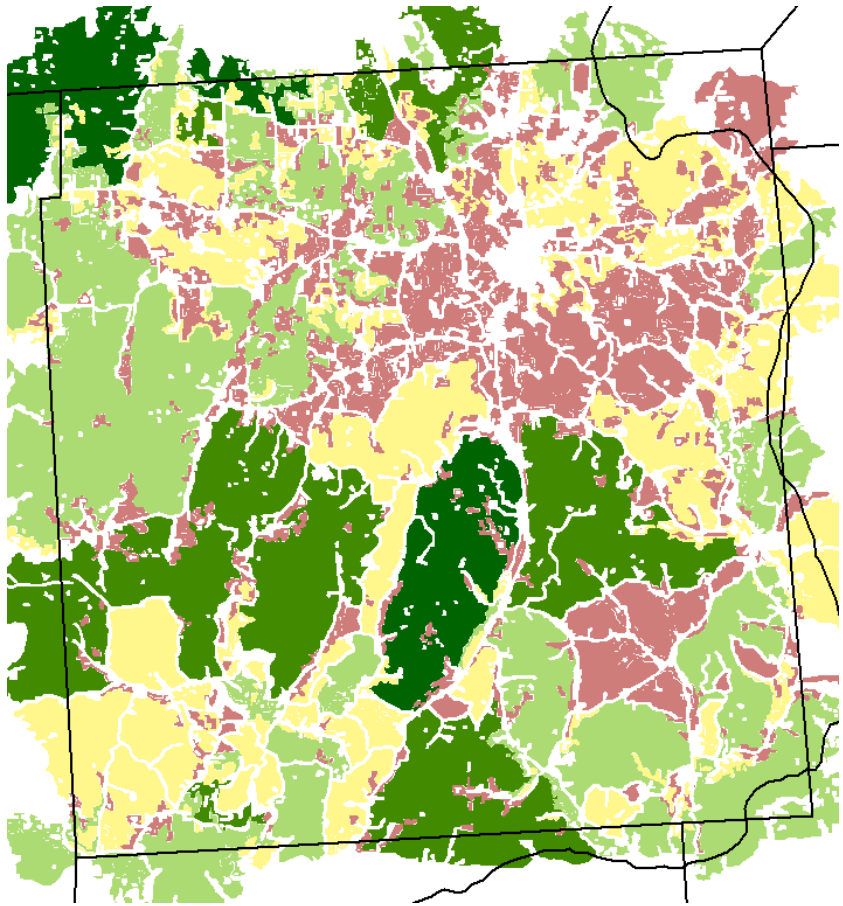
Geographic area of interest also
may drive outcomes

1 (high)
2
3
4
5 (low)

Original



Readjusted



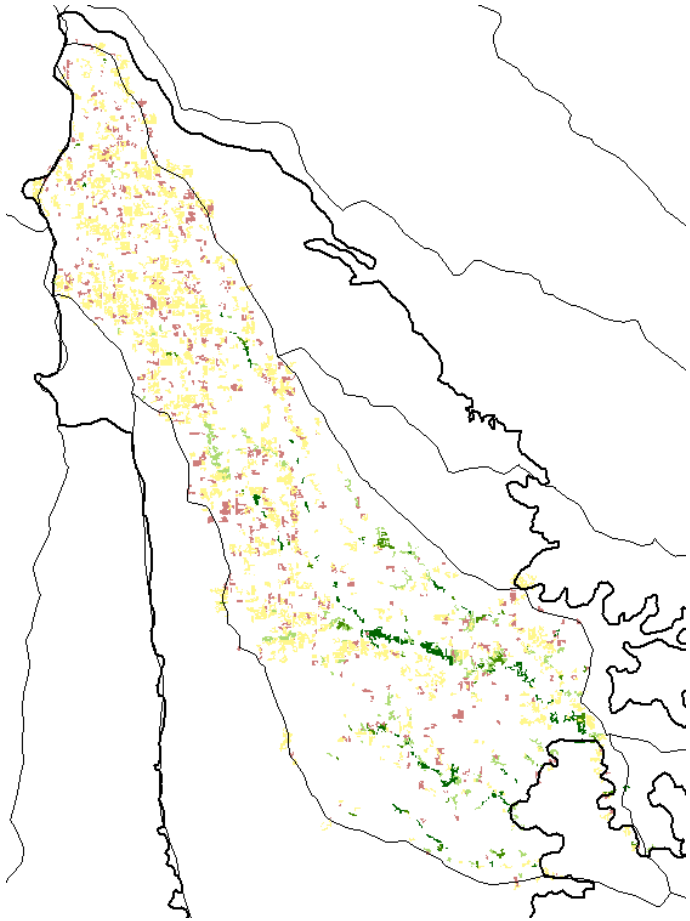
Watershed Level

Target Land Cover Representation

Geographic area of interest also may drive outcomes

1 (high)
2
3
4
5 (low)

Original



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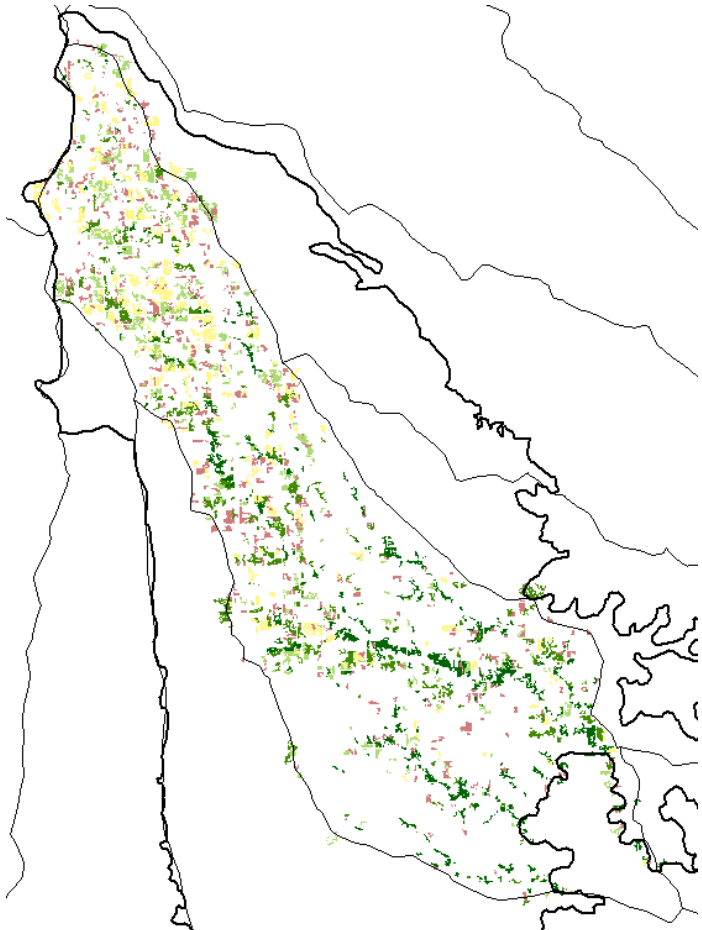

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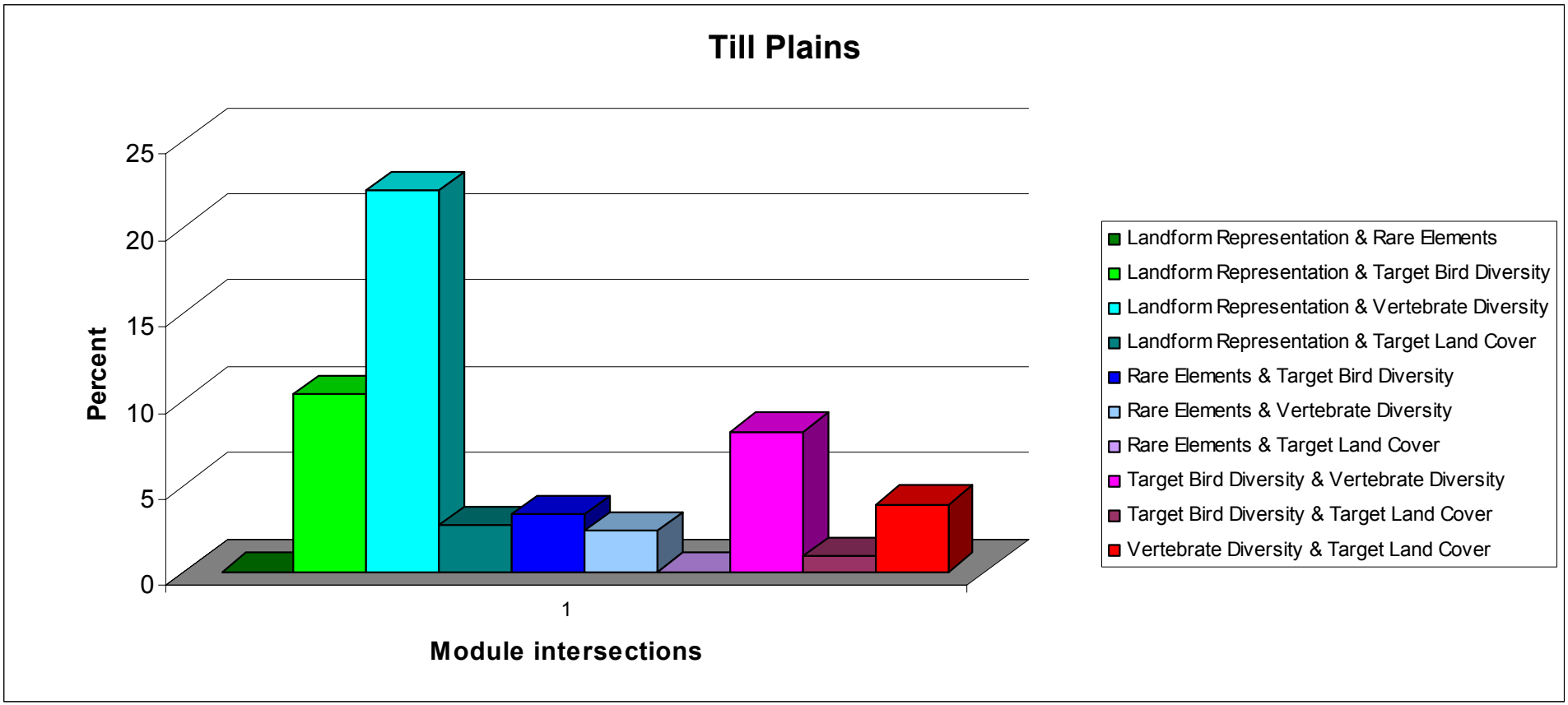

THE TARGETS DRIVE THE OUCOME IN TERMS OF APPARENT PRIORITY

Search of the 'Right Answer:' How to Set Priorities

- Appropriate assessment units (ecoregions?)
- Appropriate conservation targets (enduring features?)
- How much is enough to target for 'conservation management?' (25% of each ecoregion?)
- How important is restoration vs conservation of current high-quality areas (varies by ecoregion? pro-active more important?)

How will conservation be accomplished on the ground?

- Public lands management (most important in west)
- Private lands management (national 'ecosystems' program similar to the farm program is not reality; other incentives?)
- Private conservation organizations (land acquisition, conservation easements, conservation ownership)
- Regulations (wetlands, clean air, clean water, endangered species)
- State-based efforts (many already ongoing)
- Local, grass-roots planning (large impact on city, county planning)

“You got to be careful if you don’t know where you’re going, because you might not get there.”

~Yogi Berra~