Conservation Opportunity Area Inventory for the Midwest (IA, KA, MO, NE)

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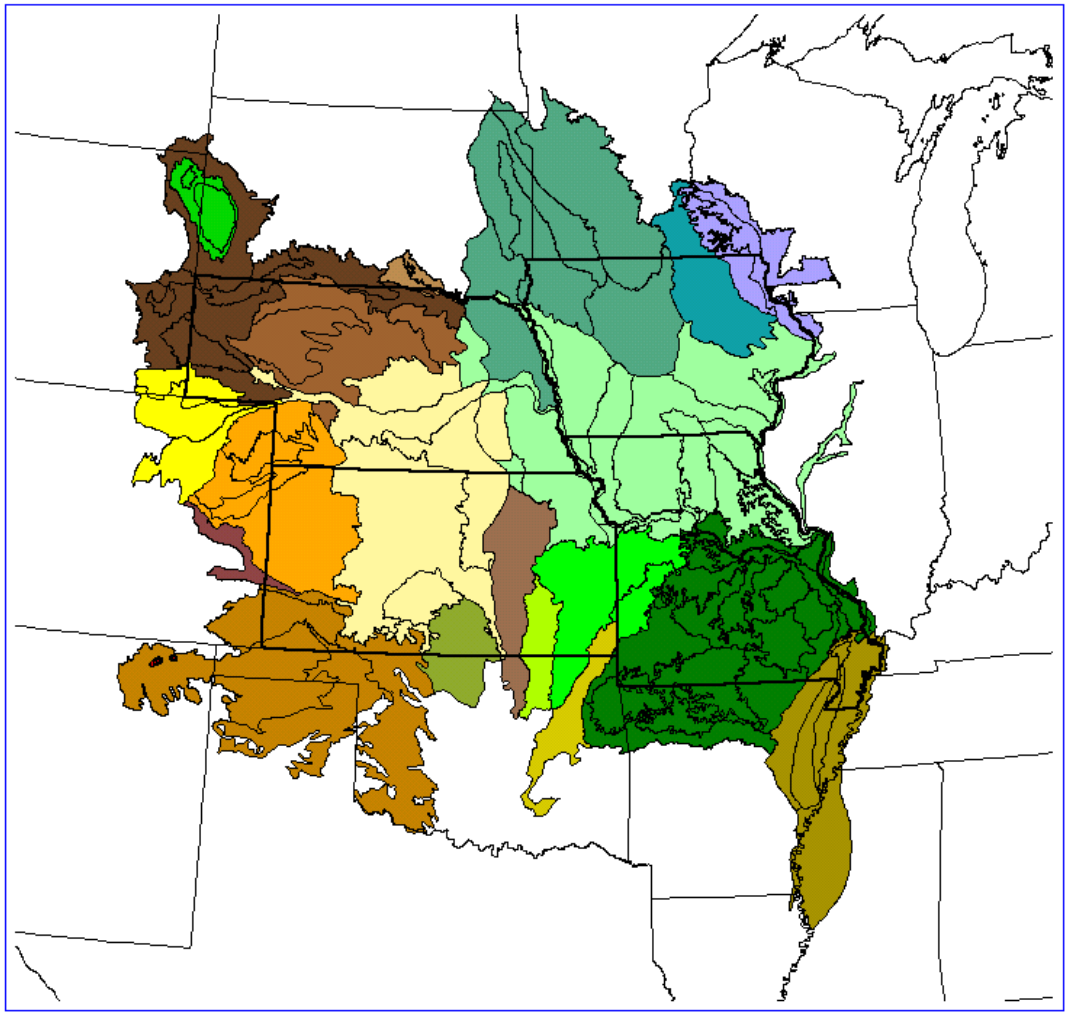
Conservation Opportunity Areas

- **First: methods and preliminary results for the Midwest**
  - **Basic input data**
  - **Creating new data layers derived from land cover and roads data and from Digital Elevation Models (DEMs)**
  - **“Stacked grid” approach to ensure flexibility for multiple end users (planners, researchers) at different resolutions as needed**
- **Second: philosophical considerations & questions**

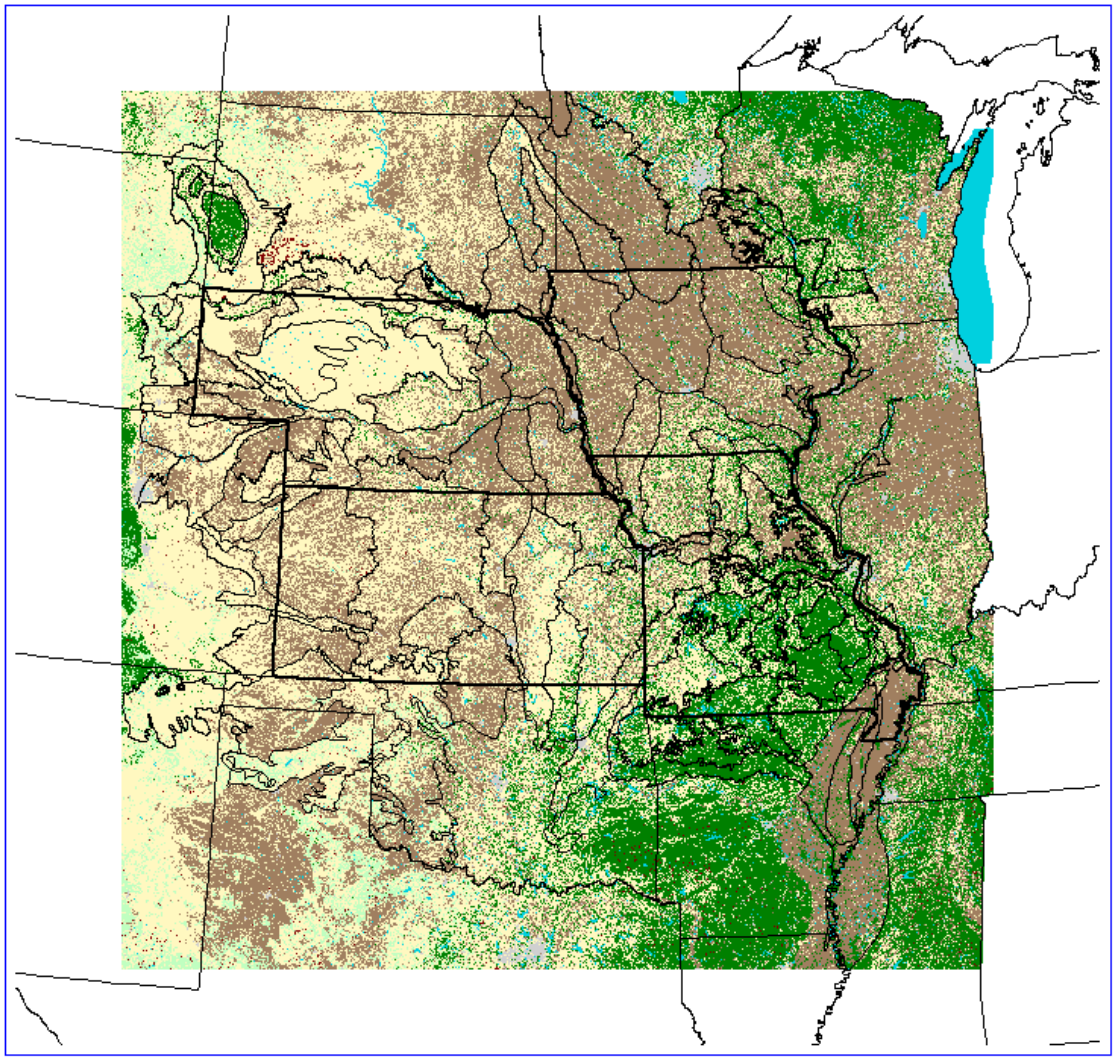
Study area: all ecological subsections that intersect EPA Region 7 states



Opportunity Area Inventory: Brief Overview of Methodology

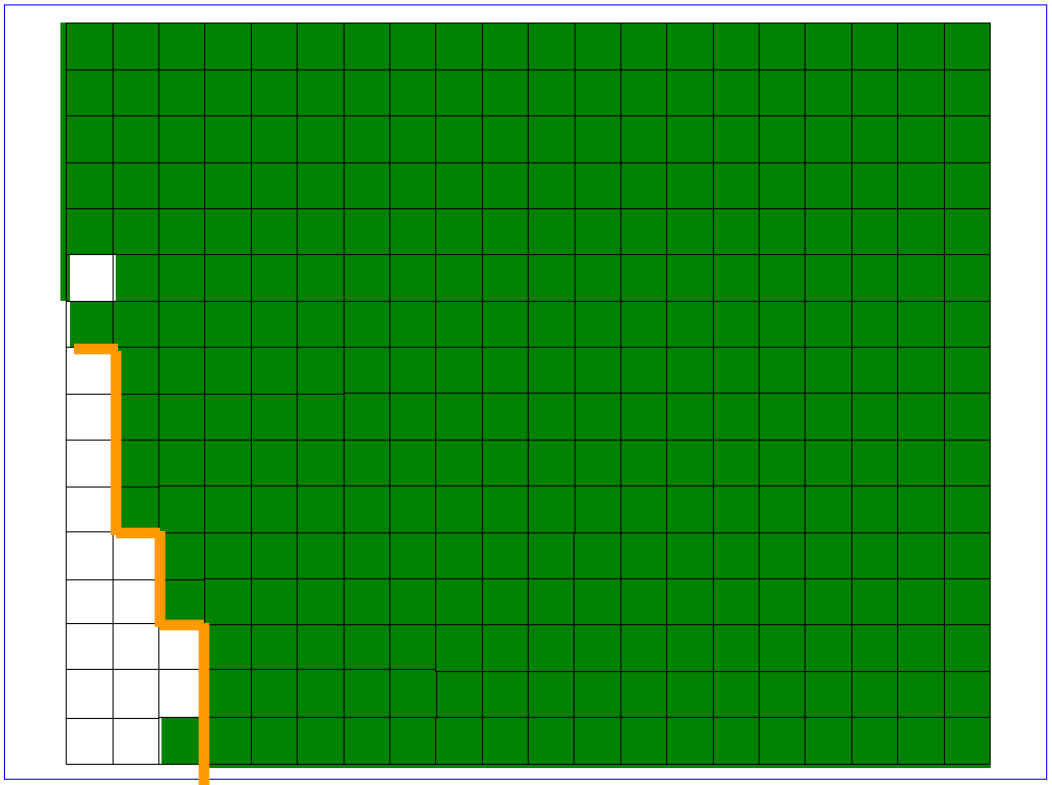
- Identify core natural and semi-natural vegetation (forest, grassland, shrubland, ‘mosaic’)
- Create buffered road network
- Use flexible, stacked grid method to evaluate conservation opportunity areas (OAs)
- Model landforms (enduring features) and analyze opportunity areas by landform
- Work within ecological subsections
- Deliver via appropriate mode to end users (incorporate Arc Internet Map Server)

Land Use / Land Cover from NLCD



Create distance grids for land cover & roads

30 meter grid cells of forest land



Forest edge

Distance from edge

Example: distance grid surface values (30 meter grid)

134

30

270

349

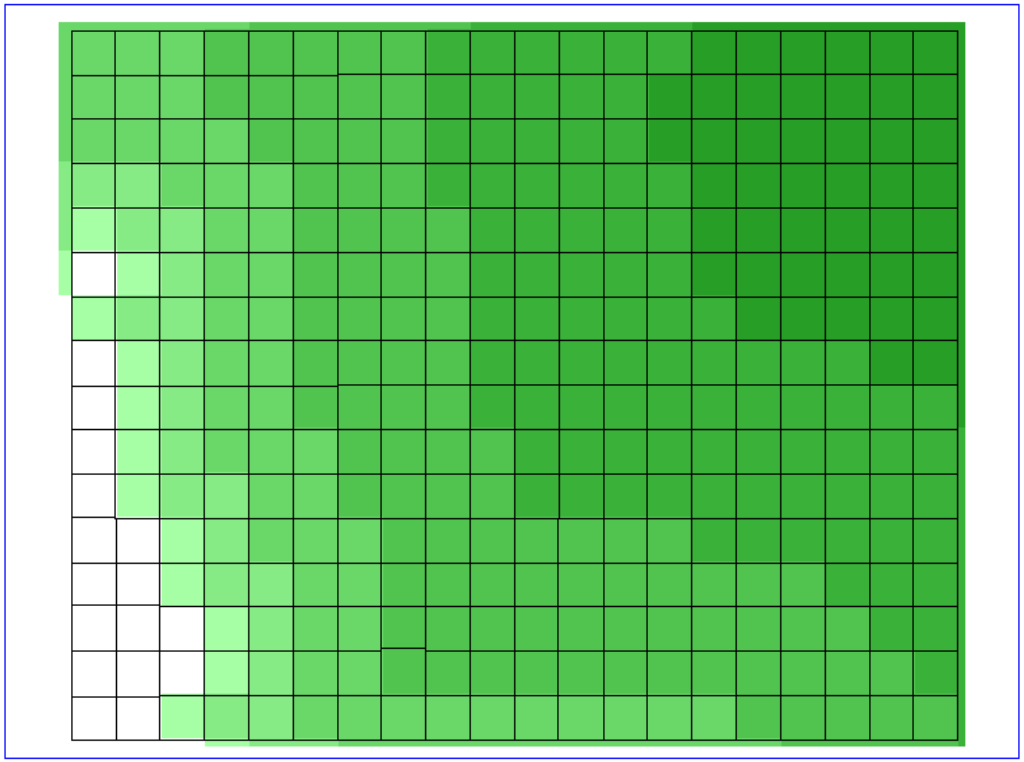
120	123	134	150	169	192	212	234	258	283	308	335	362	390	417	445	474	502	531	560
120	123	134	150	169	192	216	241	268	295	323	349	375	402	429	456	484	512	540	569
90	94	108	127	150	174	201	228	256	284	313	342	371	400	429	458	488	517	540	551
60	67	84	108	134	161	189	218	247	276	305	335	364	394	424	453	483	502	512	523
30	42	67	94	123	152	182	212	241	271	301	331	361	391	421	450	465	474	484	496
0	30	60	90	120	150	180	210	240	270	300	330	360	390	420	429	436	445	456	469
30	42	67	94	123	152	182	212	241	271	301	331	361	391	394	400	408	417	429	442
0	30	60	90	120	150	180	210	240	268	295	323	349	361	364	371	379	390	402	416
0	30	60	90	120	150	174	201	228	256	283	308	330	331	335	342	351	362	375	391
0	30	60	84	108	134	161	189	216	241	268	295	300	301	305	313	323	335	349	366
0	30	42	67	94	123	150	174	201	228	256	270	270	271	276	284	295	308	324	342
0	0	30	60	84	108	134	161	189	218	240	240	240	241	247	256	268	283	300	318
0	0	30	42	67	94	123	152	182	212	210	210	210	212	218	228	241	258	276	296
0	0	0	30	60	90	120	150	180	182	180	180	180	182	189	201	216	234	254	276
0	0	0	30	60	90	120	150	150	152	150	150	150	152	161	174	192	212	234	258
0	0	30	42	67	94	108	123	120	123	120	120	120	123	134	150	169	192	216	241

Distance of each forest pixel from the edge of forest

Assign grid cells a value from 0 to 9 based on distance from land cover patch edge or distance from road

Distance values

- 0: Non-forested
- 1: 1 - 30 meters
- 2: 30 - 75 m
- 3: 75 - 142.5 m
- 4: 142.5 - 243.75 m
- 5: 243.75 - 395.6 m
- 6: 395.6 - 623.4 m
- 7: 623.4 - 965.1 m
- 8: 965.1 - 1,477.7 m
- 9: >1,477.7 m



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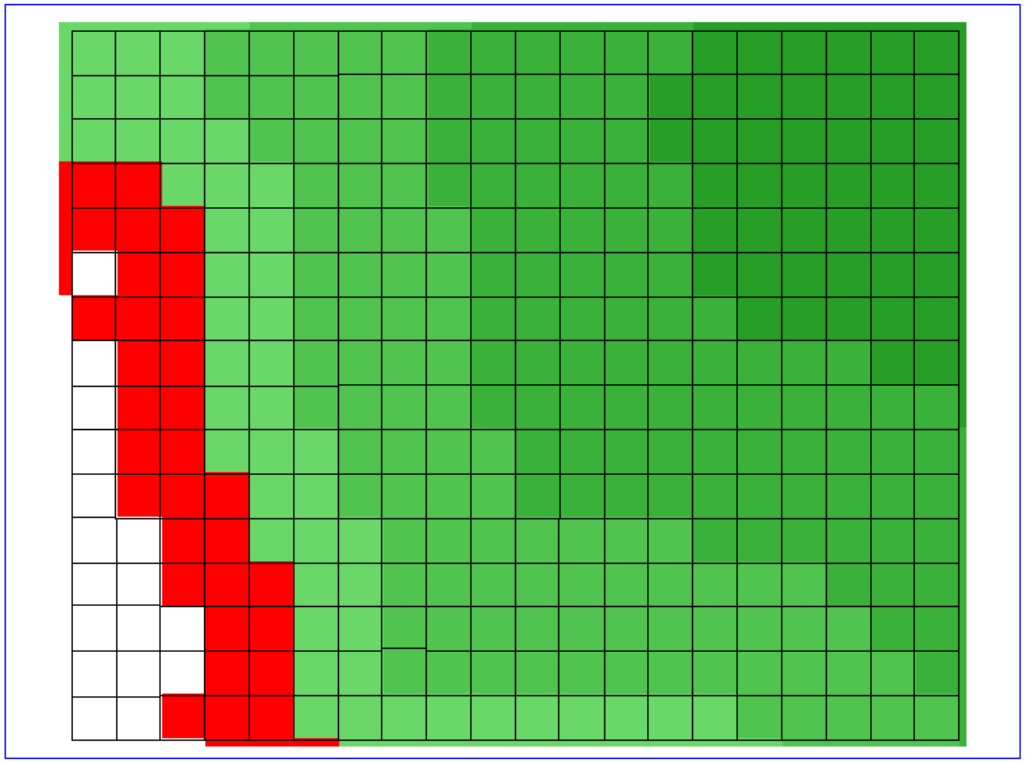

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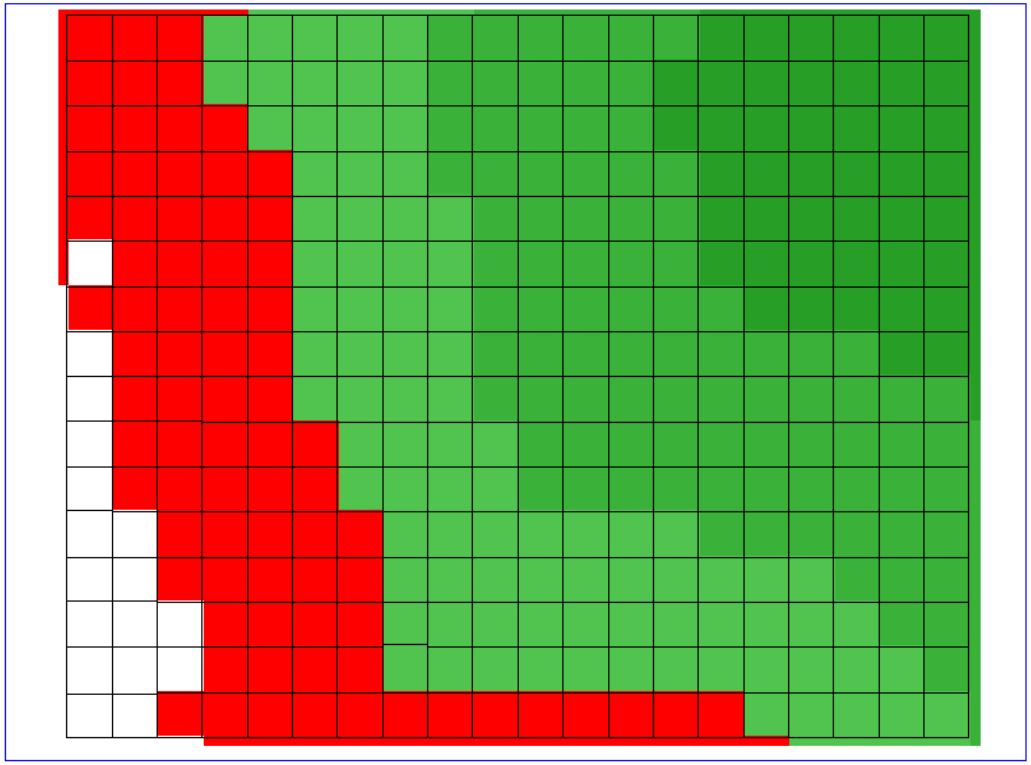

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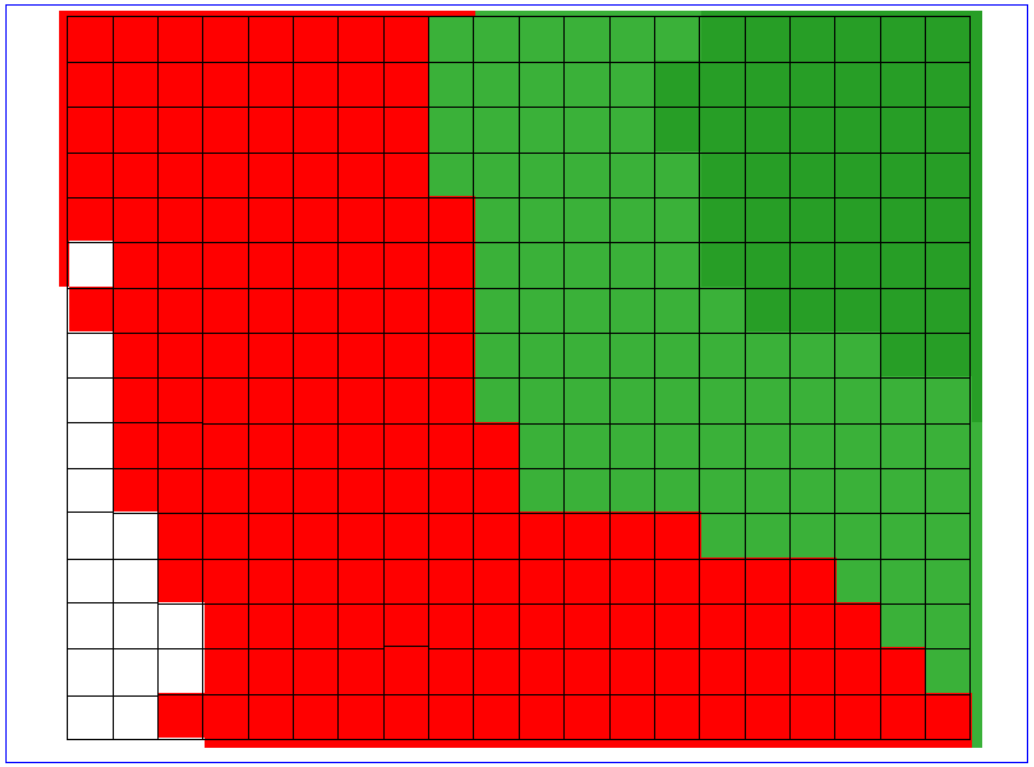

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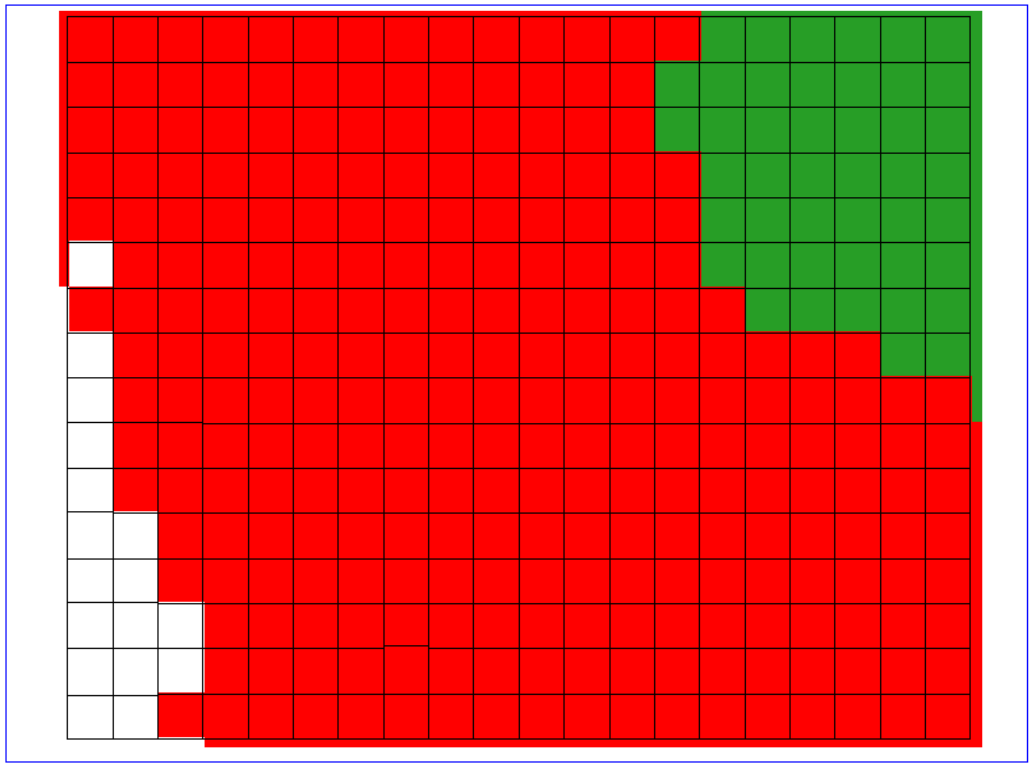

Result: a new forest grid with cell values 0 to 9 based on distance to the forest edge

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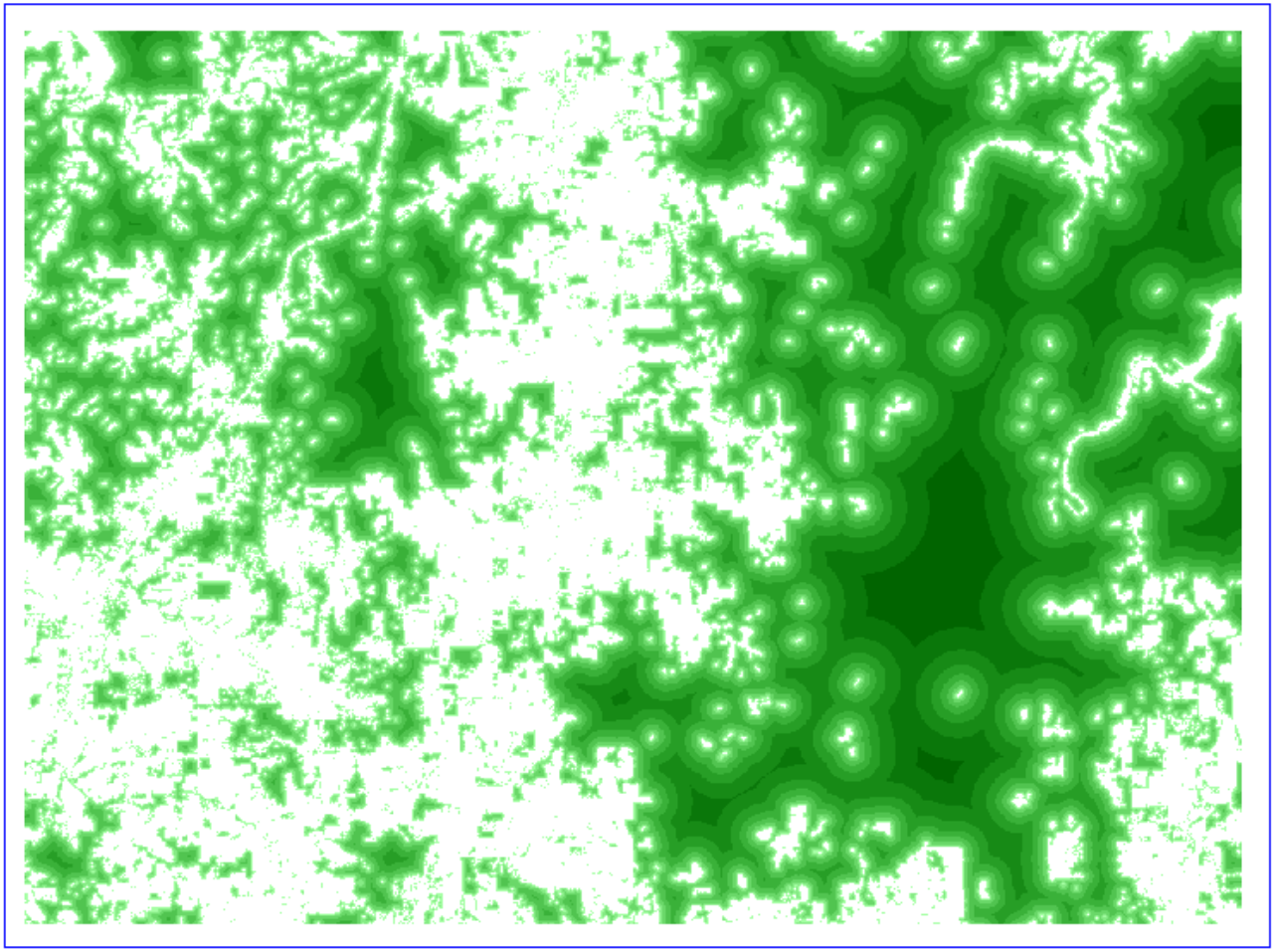
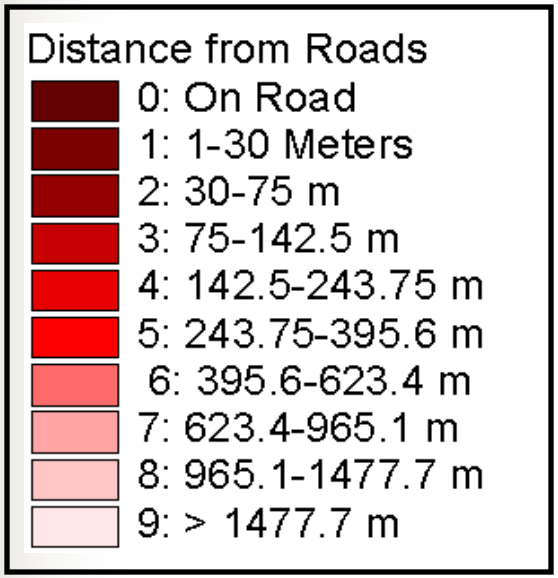
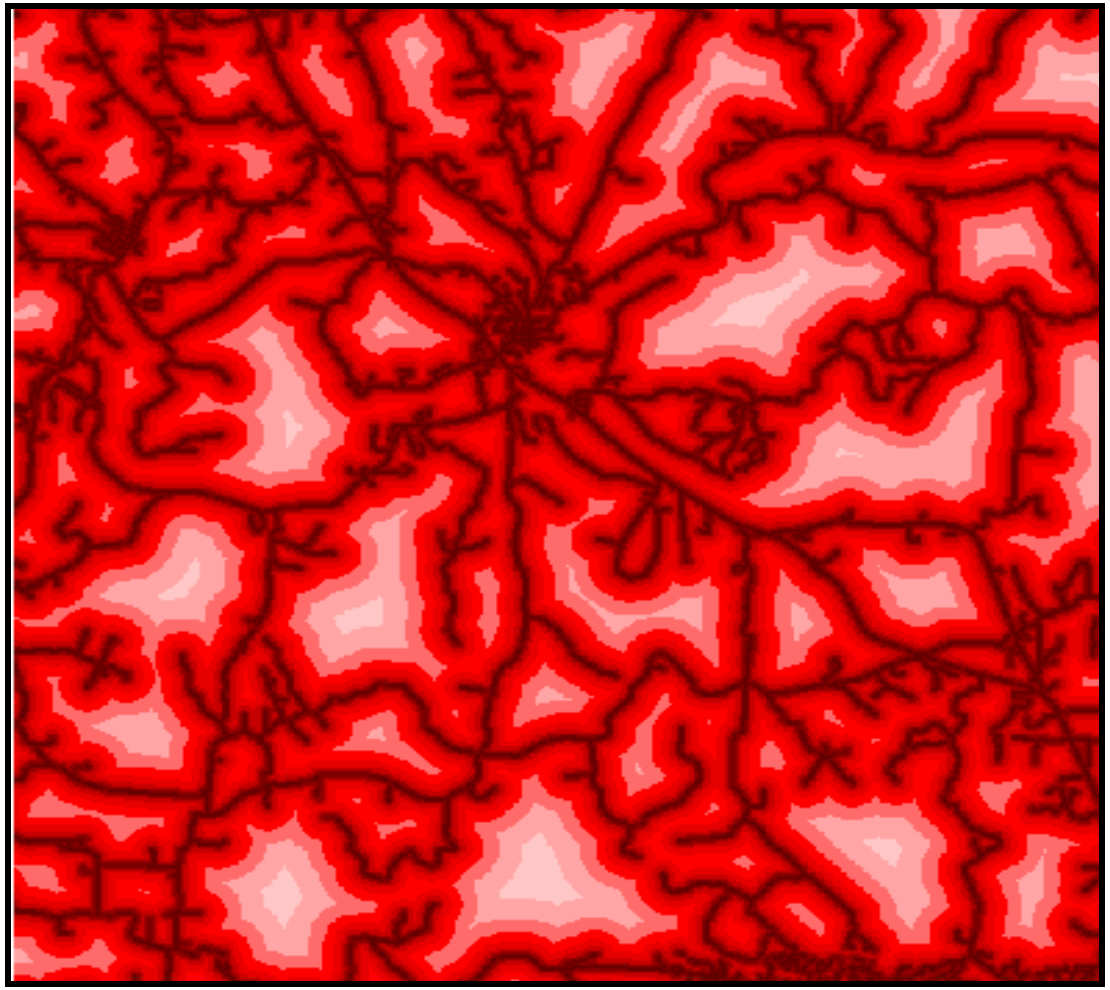


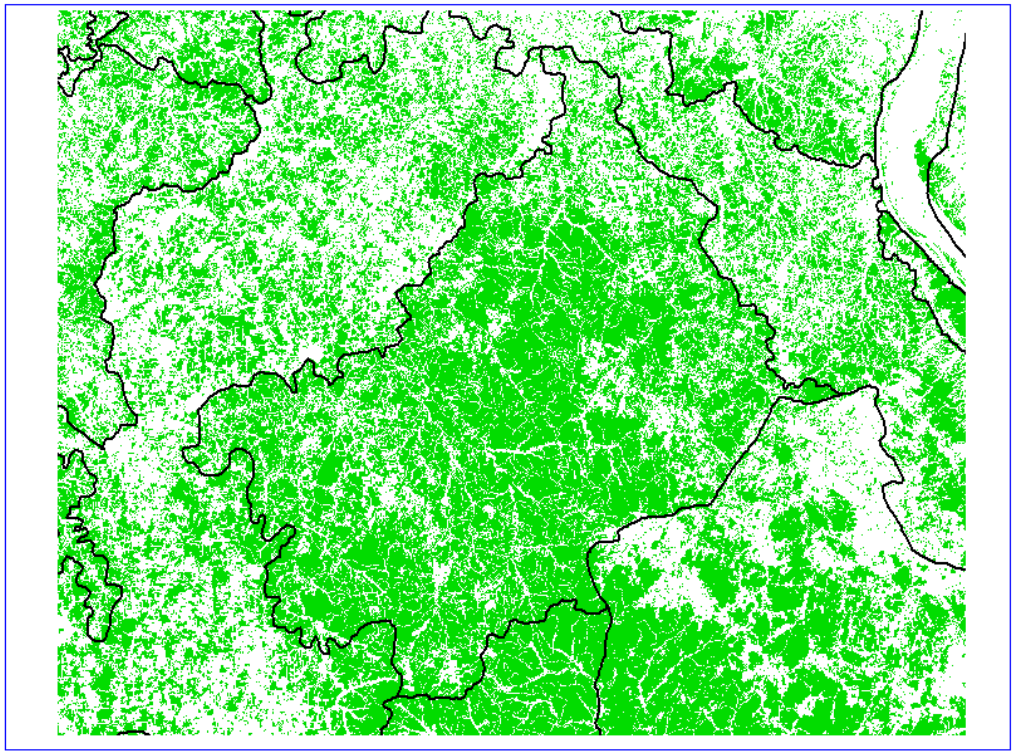
Road distance grid with cell values 0 to 9 based on distance to any road (from TIGER road files)





Opportunity Areas resulting from *flexible* criteria

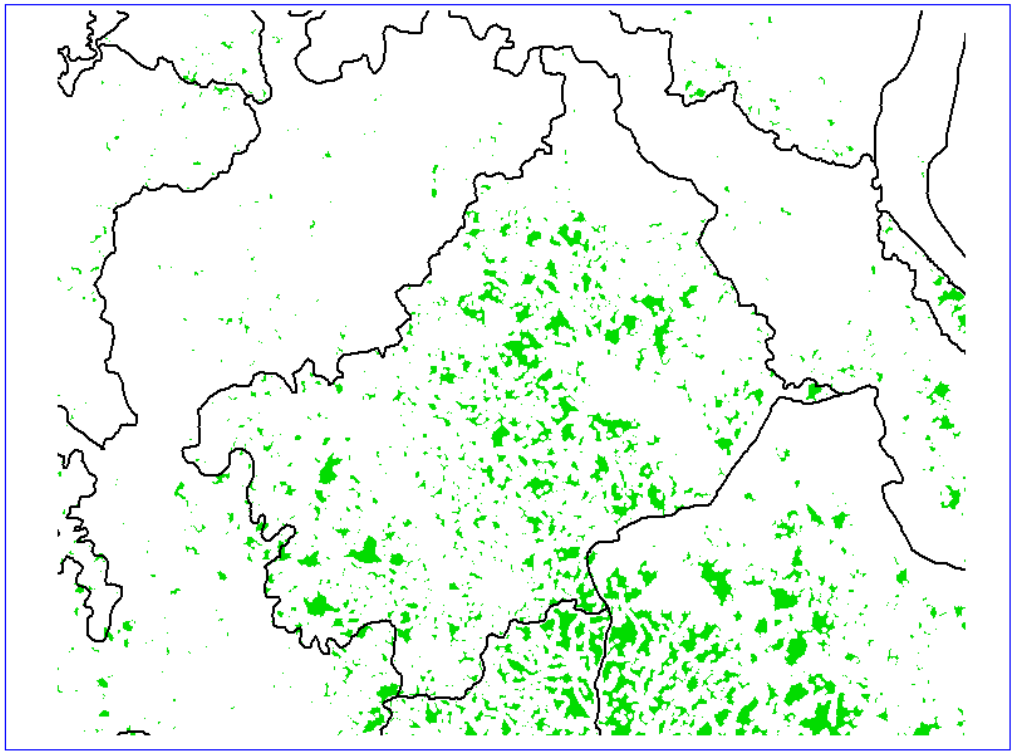
Criteria: Forest ≥ 2 Roads ≥ 2



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

Opportunity Areas resulting from *flexible* criteria

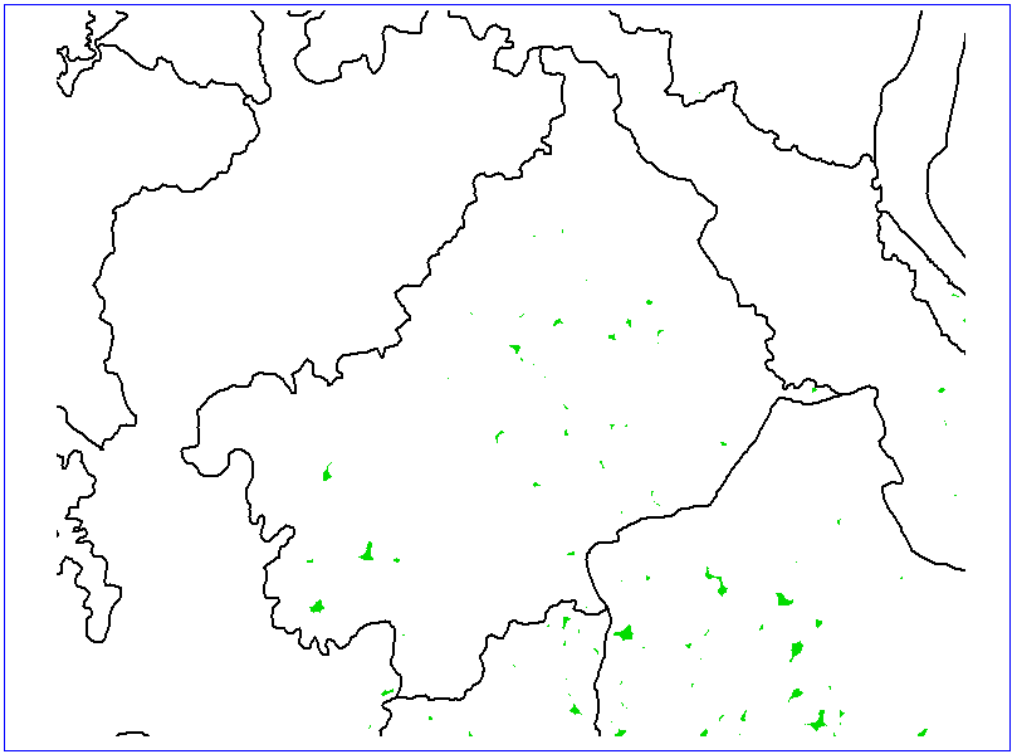
Criteria: Forest ≥ 6 Roads ≥ 6



Mid-distance from forest edge and roads

Opportunity Areas resulting from *flexible* criteria

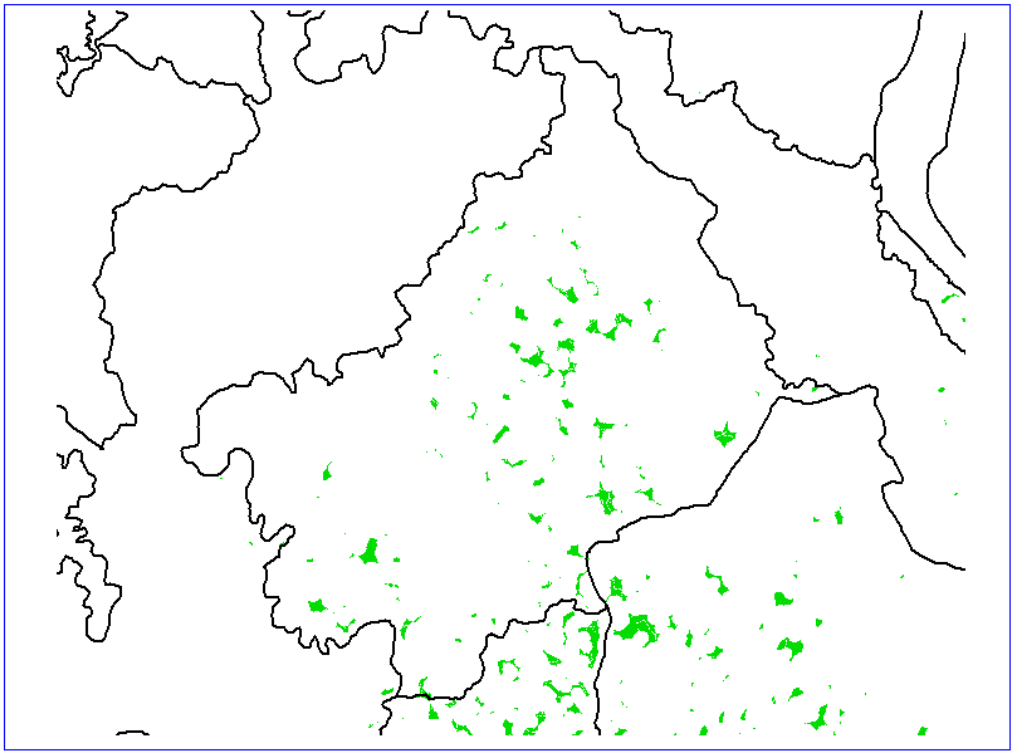
Criteria: Forest ≥ 8 Roads ≥ 8



Far from forest edge and far from roads

Opportunity Areas resulting from *flexible* criteria

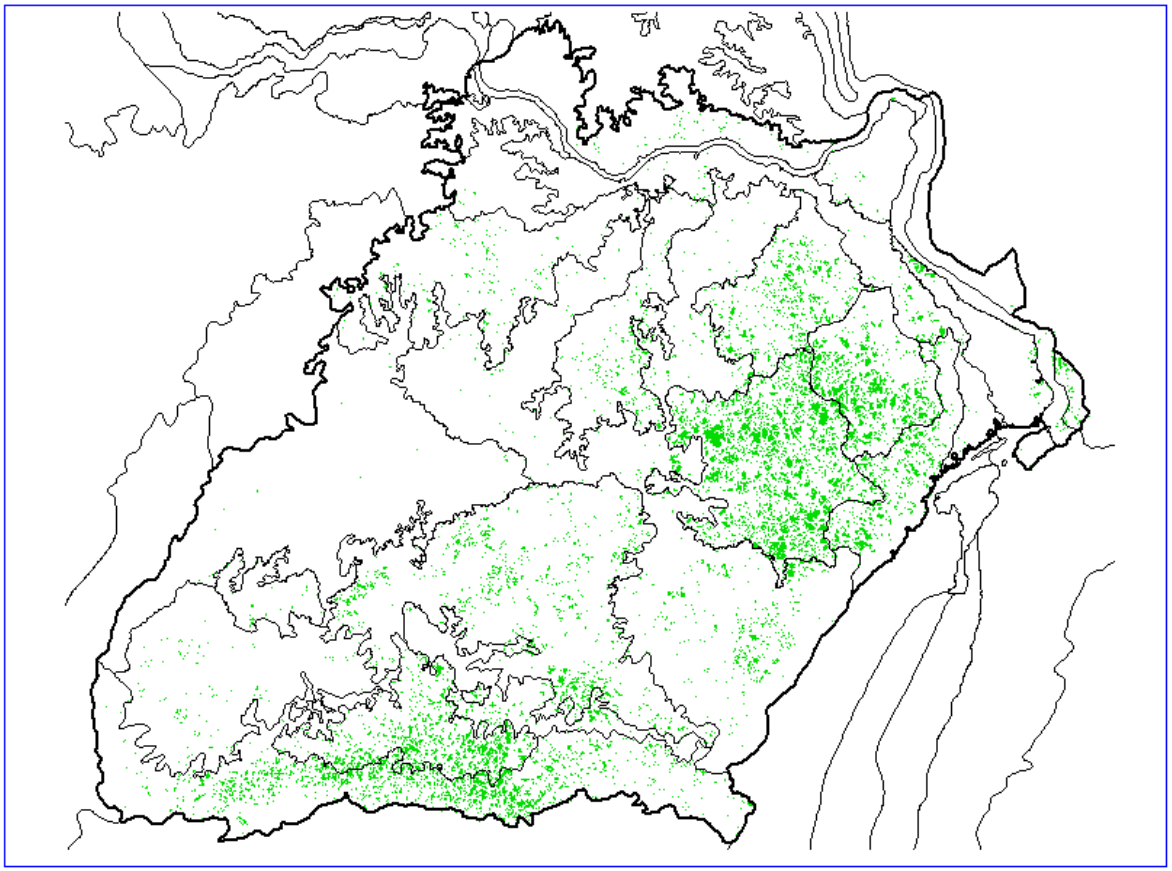
Criteria: Forest ≥ 8 Roads ≥ 2



Far from forest edge and close to roads

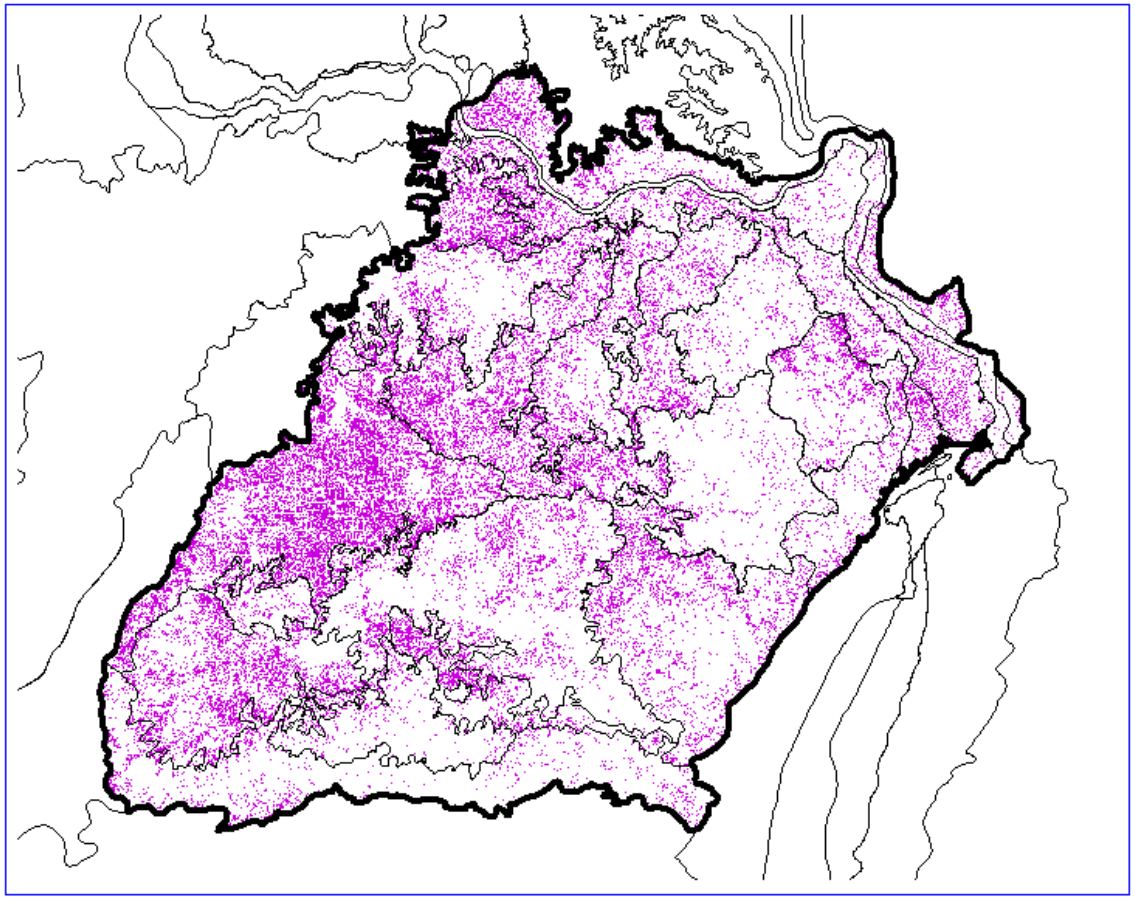
Ozark Highlands forest OAs: example model #2

Forest ≥ 6 Roads ≥ 6



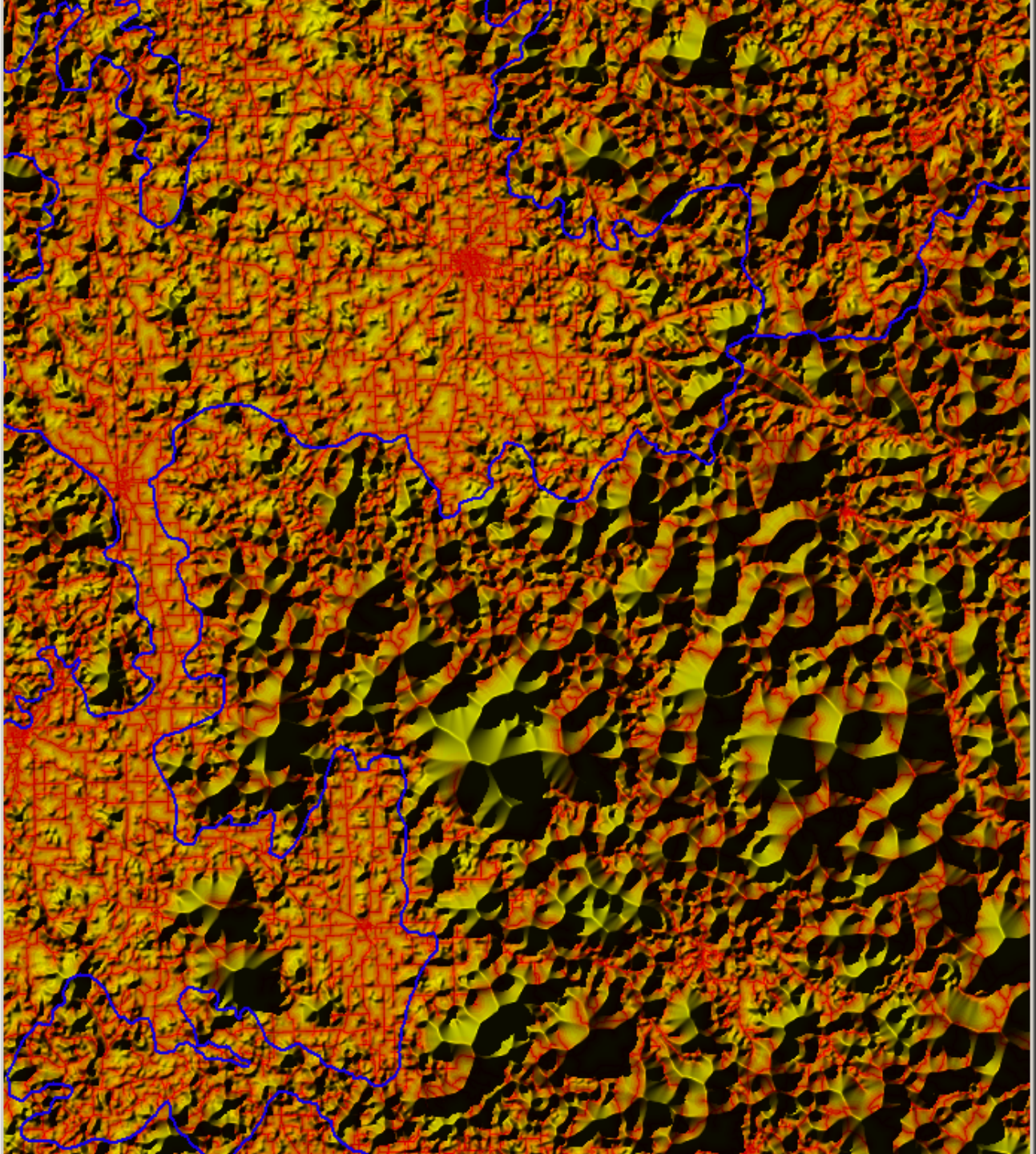
Grassland OAs Model #1

Forest ≥ 2 Roads ≥ 2



Data Visualization

- Reds are close to roads
- Yellows are far from roads
- Flat areas have no trees
- Taller mountains are deeper in the forest

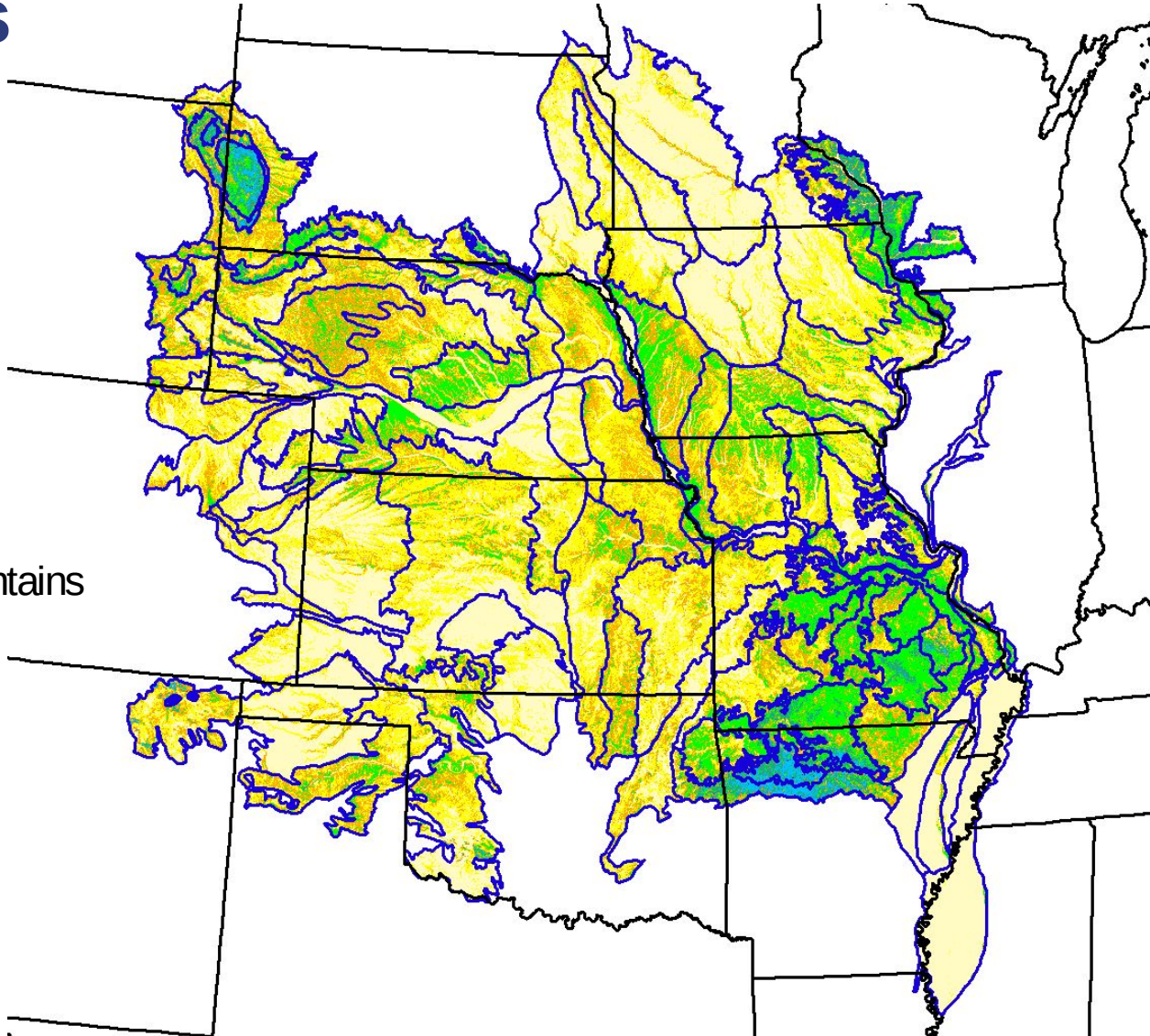


Landform modeling: an enduring features data layer

Slope + Relief = Landform

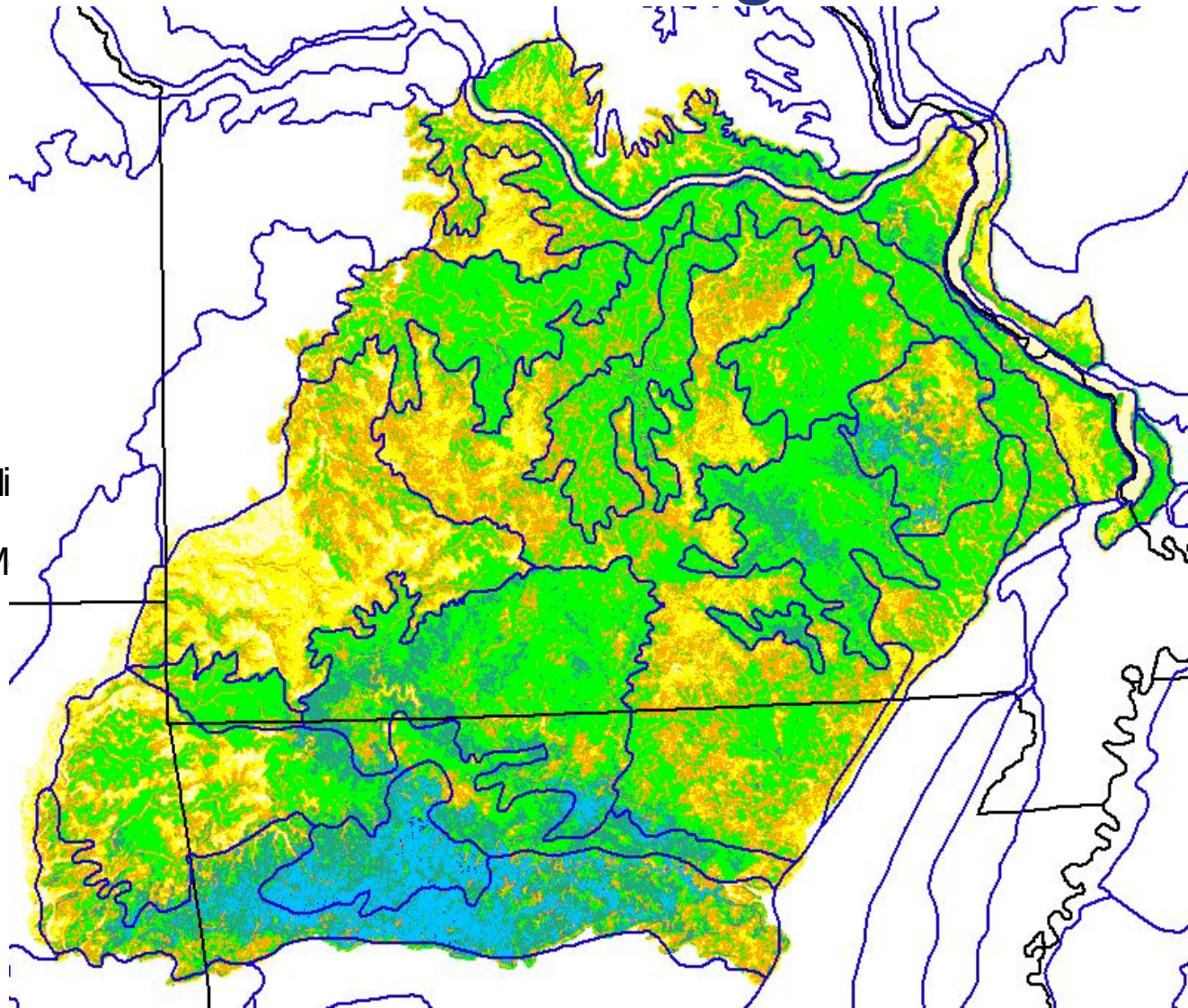
Derived from Neighborhood Analysis of Digital Elevation Models (DEMs) – National Elevation Database files used for basic input

Landforms for EPA Region 7 ecological subsections



- 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

Landforms of the Ozark Highlands



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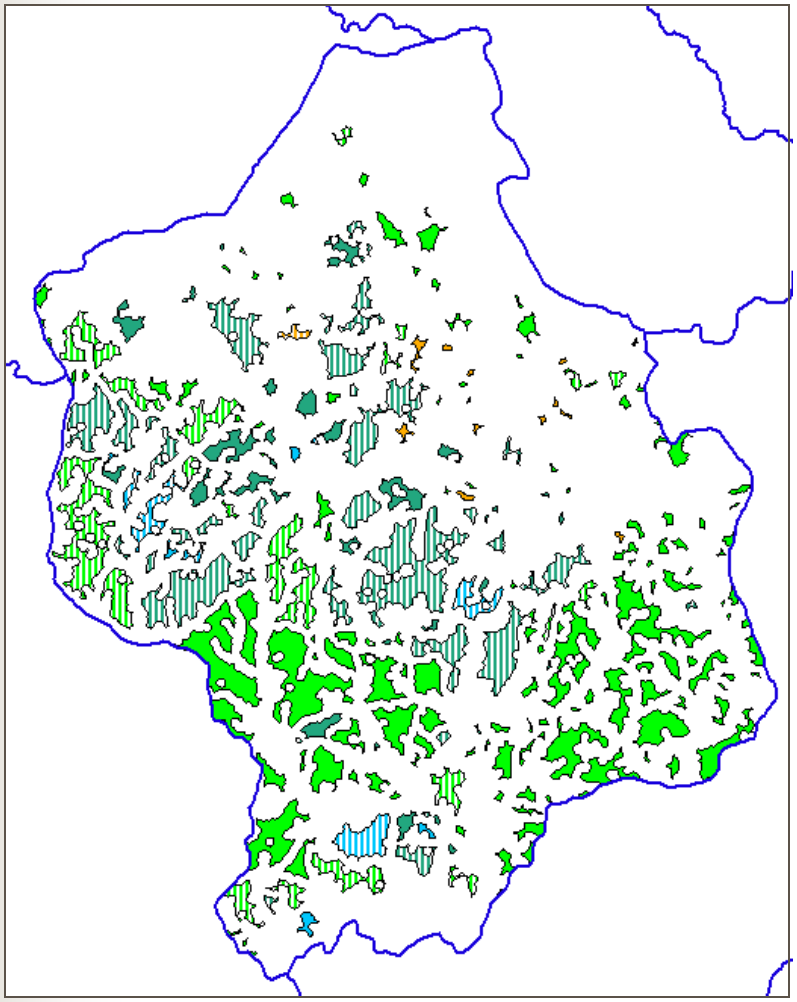
Forming OA Groups based on landform composition



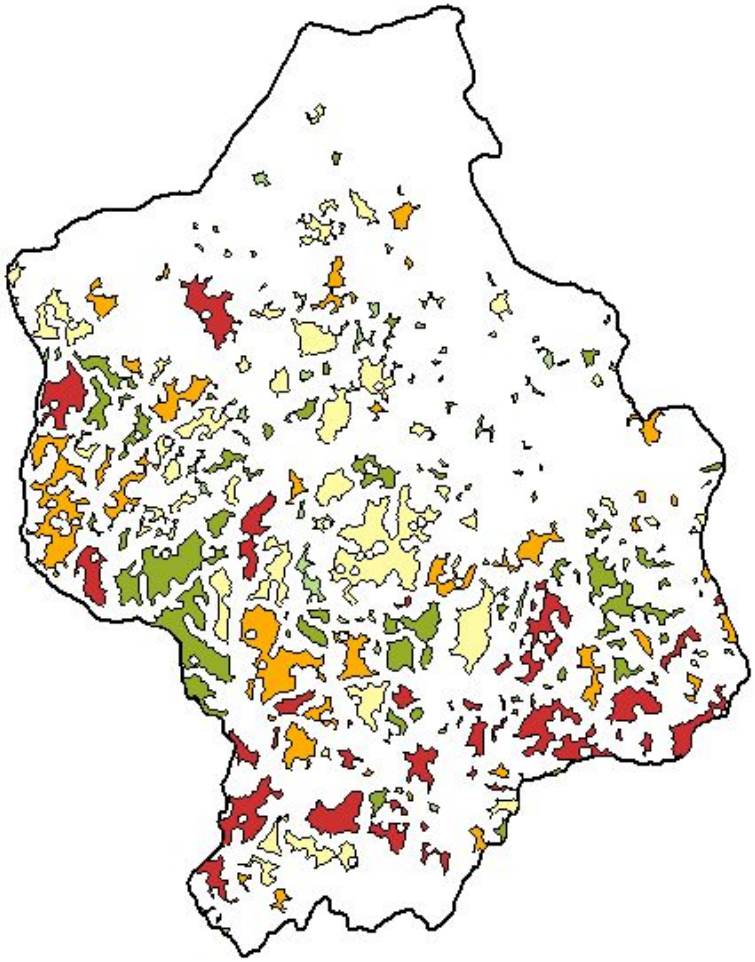
St. Francois Knobs and Basins

Landform	# of OA's	Total Area
23	131	31,321 ha.
24-23	25	14,305 ha.
23-24	20	10,959 ha.
24-25	11	8,984 ha.
24	29	5,344 ha.
25-24	7	3,246 ha.
23-25	3	1,799 ha.
23-13	6	580 ha.
13	11	572 ha.
25	5	525 ha.
13-24	1	215 ha.
24-13	1	109 ha.

Total vertebrate count by OA (OAs contain 97% of all vertebrates in subsection, and 89% of all in Missouri)

Total No. Vertebrates

- 127 - 162
- 163 - 181
- 182 - 199
- 200 - 221
- 222 - 261



Philosophical considerations & questions

- Look for one answer or develop flexible data layers for multiple end users
- Conservation targets & preserve design
  - Ecoregion-based approach
  - Species, communities, ecological systems, enduring features
  - Preserve ‘do-ability’
- Data delivery: multiple end-users may require different approaches (Arc IMS, ArcView, paper maps)

Closing comments on current OA inventory methods & results

- Nationally available data sets are used to create flexible data layers
- Methods are innovative but not impractical, so large regions could be finished over short time periods
- OAs are the start, not the end of a conservation assessment
- Flexible data layers could be served via the Internet

“Most of our critical problems in natural resources – endangered species, landscape fragmentation, disruption of natural processes, air and water pollution – are affected by large-scale (in human terms) phenomena.” David L. Peterson and V. Thomas Parker, “Ecological Scale,” - 1998

Governments are planning for growth and development; how can Gap best be a player in terms of timing and products provided?