

Additional Evaluation of Natural Resources Indicators for GO TO 2040 Scenario Planning

Environment and Natural Resources Committee

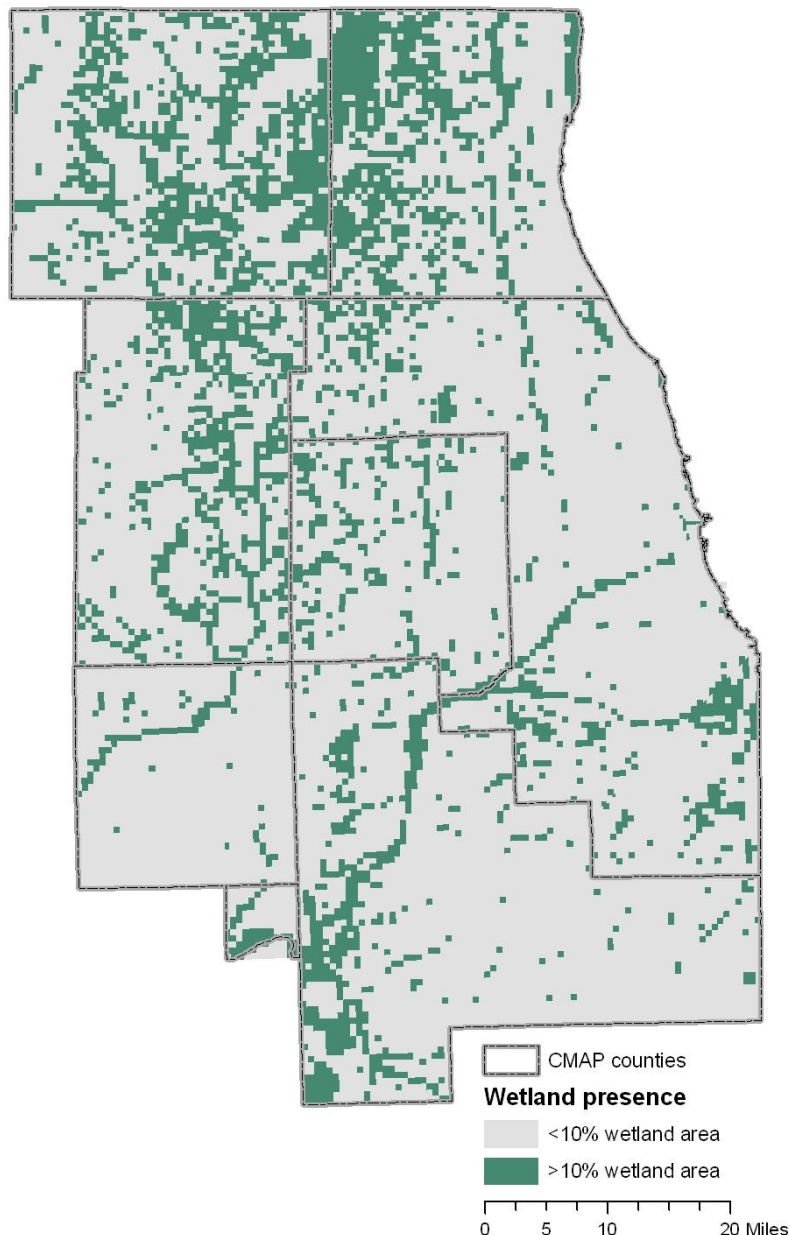
September 2, 2009

Indicator roster

- Natural resource indicators already considered
 - Land consumption
 - Open space access
 - Imperviousness
 - Sensitive watersheds, watersheds >10% impervious
 - Water use
 - Energy consumption / GHG emissions
 - Air quality
- Additional suggestions from July ENR meeting
 - Wetland impacts
 - Connectivity (and biodiversity)
 - Runoff and pollutant loading

Wetland impacts

- Used National Wetlands Inventory + ADID studies from Kane and McHenry Counties
- If subzone was >10% wetland by acreage, then considered a significant wetland area
- Household growth in wetland areas assumed to increase likelihood of impact



Results

	Reference	Reinvest	Preserve	Innovate
Household growth	786,385	786,385	786,385	786,385
Household growth in wetland areas	134,829	87,022	117,126	134,829
Percent of growth in wetland areas	17.1%	11.1%	14.9%	17.1%
Difference from Reference		(47,807)	(17,704)	-
% Difference		-35.5%	-13.1%	0.0%

Connectivity

- Core concept is really biodiversity
- No single metric represents this; best proxy perhaps connectivity
- Examined metrics from FRAGSTATs:
 - Percentage of like adjacencies:

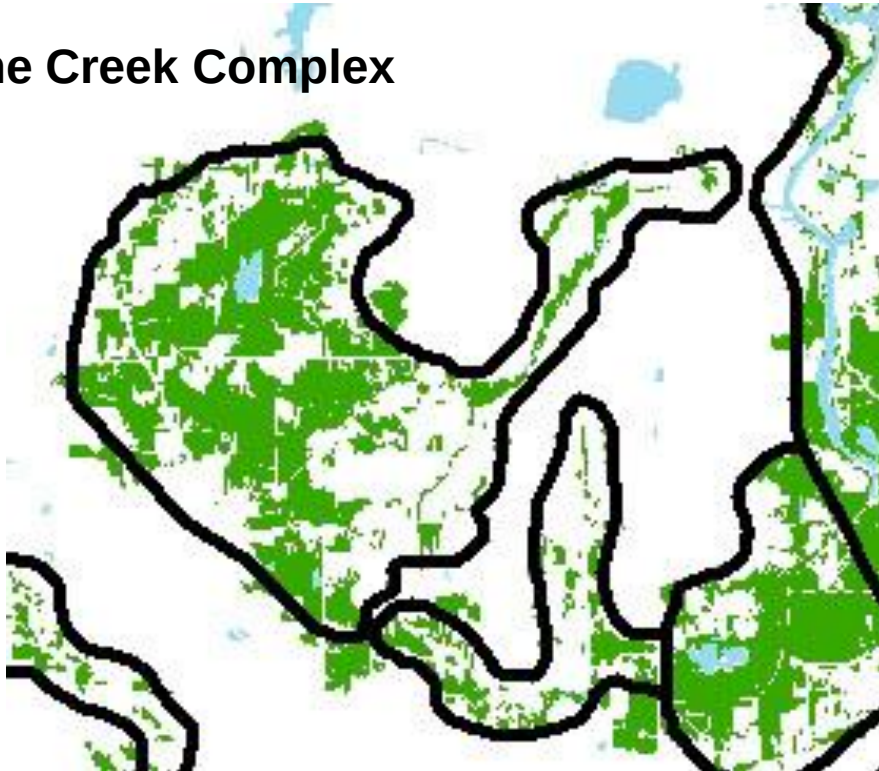
$$PLADJ = \left(\frac{g_{ii}}{\sum_{k=1}^m g_{ik}} \right) (100)$$

- Patch cohesion index:

$$COHESION = \left[1 - \frac{\sum_{j=1}^n p_{ij}}{\sum_{j=1}^n p_{ij} \sqrt{a_{ij}}} \right] \left[1 - \frac{1}{\sqrt{A}} \right]^{-1} (100)$$

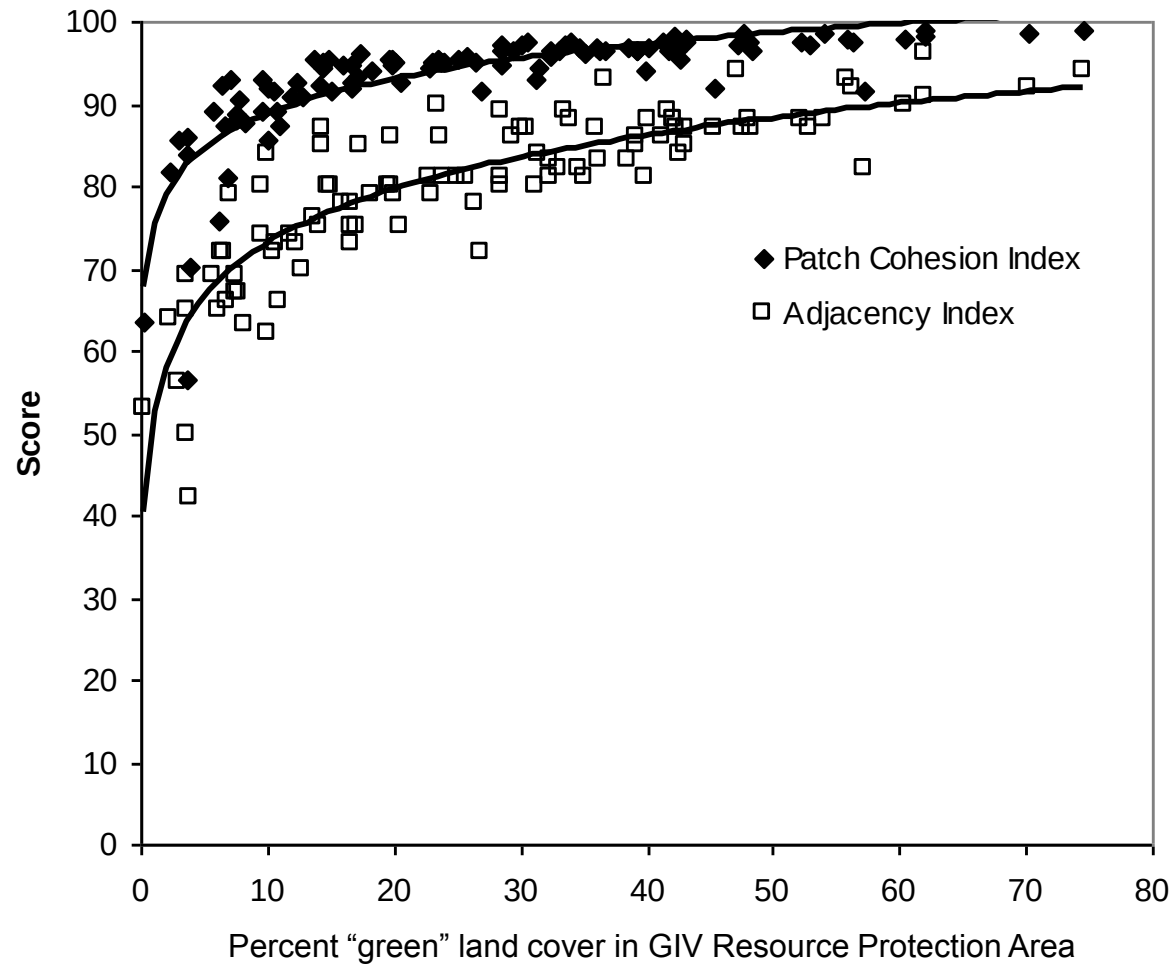
Connectivity assessment of GIV Resource Protection Areas

Boone Creek Complex



- Looked at land cover from 2001 – “green” areas are undeveloped, non-agricultural
- Could take this land cover base and overlay expected changes from household/job growth

Results



Discussions with biologists

- Combined observations from Doug Stotz, Laurel Ross, Mike Ward:
 - Don't overstate the value of a single metric (a metric by itself is not a straight-forward measure)
 - Best to use multiple metrics (to provide multiple perspectives and address more sophisticated questions)
 - It is important that a metric is doing more good than harm (i.e., not resulting in land-use decisions that could be detrimental to certain species)
 - It might be helpful to create "scores" for different RPAs (i.e., prairie parklands, calumet region, Des Plaines river valley)
 - Connectivity doesn't solve problems for birds, and there are no large mammals that need large ranges as there are out West

Summary

- Approach connectivity qualitatively
- Use connected network from Green Infrastructure Vision to provide form

Runoff

- First attempt:
 - Convert changes in household/jobs by subzone into changes in detailed land use categories
 - Estimate base year and 2040 annual runoff by scenario
 - Problems:
 - CN values: residential lot size assumptions and farmland runoff
 - Redevelopment
- Second attempt:
 - Aggregate land use categories to urban, ag, water/wetland, etc.
 - Estimate base year and 2040 annual runoff by scenario
 - Problems:
 - Very minor changes from base year to 2040 while imperviousness increases substantially (~5% versus ~30%)

Runoff results

Runoff (ac-ft)	BASE	REFERENCE	REINVEST	PRESERVE	INNOVATE
Urban	3,487,725	5,542,856	4,913,633	4,972,317	5,302,099
Cropland	2,430,393	1,034,437	1,426,731	1,219,523	1,091,091
Open space	1,246,025	969,983	1,072,499	1,150,412	1,057,118
Wat/wet	378,659	378,659	378,659	378,659	378,659
Total	7,542,803	7,925,935	7,791,522	7,720,912	7,828,966
Change to 2040		5%	3%	2%	4%

Nutrient loading

Nitrogen (lb/yr)	BASE	REFERENCE	REINVEST	PRESERVE	INNOVATE
Urban	6,639,811	10,552,297	9,354,404	9,466,124	10,093,952
Cropland	18,507,590	7,877,303	10,864,645	9,286,745	8,308,721
OS	1,821,081	1,417,641	1,567,469	1,681,341	1,544,990
Wat/wet	-	-	-	-	-
Total	26,968,481	19,847,241	21,786,519	20,434,211	19,947,663
Change to 2040		-26%	-19%	-24%	-26%
Phosphorus (lb/yr)					
Urban	1,897,089	3,014,942	2,672,687	2,704,607	2,883,986
Cropland	4,296,405	1,828,660	2,522,150	2,155,852	1,928,810
OS	453,210	352,806	390,094	418,433	384,499
Wat/wet	0	-	-	-	-
Total	6,646,703	5,196,408	5,584,931	5,278,892	5,197,296
Change to 2040		-22%	-16%	-21%	-22%

Summary

- Use imperviousness as a proxy of water resource impacts

Questions?

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