Sensitivity Analysis of KBA Ecosystem Criteria

Are there some KBAs which get missed or underrepresented?

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Background

KBAs are Key Biodiversity Areas, or sites that promote the global persistence of biodiversity based upon their contributions at the species or ecosystem level.

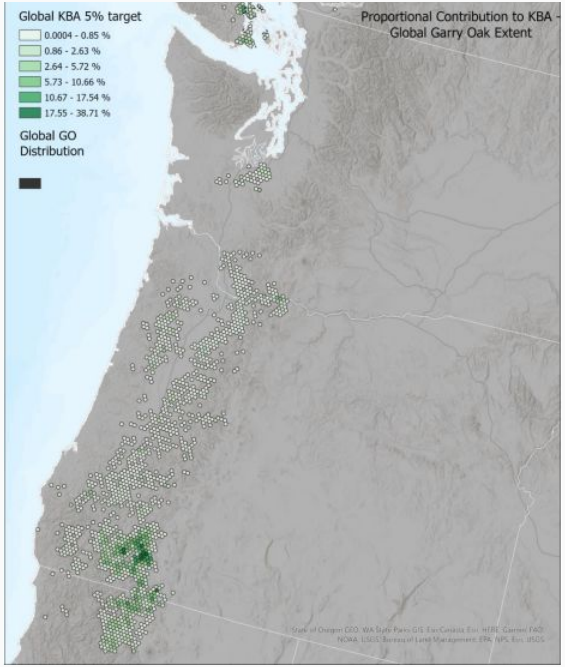
Background

A	Threatened Biodiversity	A1 Threatened Species **A2 Threatened Ecosystem Types**
B	Geographically Restricted Biodiversity	B1 Individual Geographically Restricted Species B2 Co-Occurring Geographically Restricted Species B3 Geographically Restricted Assemblages **B4 Geographically Restricted Ecosystem Types**
C	Ecological Integrity	
D	Biological Processes	D1 Demographic Aggregations D2 Ecological Refugia D3 Recruitment Sources
E	Irreplaceability Through Quantitative Analysis	

Background

A2 Threatened ecosystem types		
IUCN Red List **Criteria** for Ecosystems		**Threshold** to Define KBA Site
	COLLAPSED	
CR	**CRITICALLY ENDANGERED**	**≥ 5% of Global Extent**
EN	**ENDANGERED**	
VU	**VULNERABLE**	**≥ 10% of Global Extent**
	NEAR THREATENED	
	LEAST CONCERN	
	DATA DEFICIENT	

Background



Example:

If the full spatial extent of a Vulnerable (VU) ecosystem is measured at 2500 km^2, then a KBA is identified if when a connected group of hexcells measuring at least 250 km^2 is found.

- VU threshold = 10% of it's global extent
- 250 km^2 ≥ 10% of Global Extent of 2500 km^2

Science Question / What We Will Look At

We will perform a sensitivity analysis of the current thresholds set by the IUCN, looking to see what KBAs can be found for each ecosystem type at 100%, 75%, 50% and 25% of the current thresholds.

Another factor we will look at is the natural spatial pattern of each ecosystem type (linear, patchy or matrix-forming), and how that pattern may affect how KBAs are identified.

Perhaps a lower threshold would more effectively trigger KBA identification in linear ecosystems, such as those found along rivers and coasts. If so, spatial pattern might be a characteristic to be included in future IUCN Guidelines.

Overview of the Data Types

Raster Data - US Ecosystems:

- National (covers lower 48 states)
- Spatial resolution of 30 m
- Developed by NatureServe

Vector Data - Nested Hexagon Framework (NHF):

- The NHF is a fishnet grid of one square mile hexagons, it aggregates hexagons together to create 7 square miles hexagons.
- Covers most of North America.

Study Area: 48 Conterminous US

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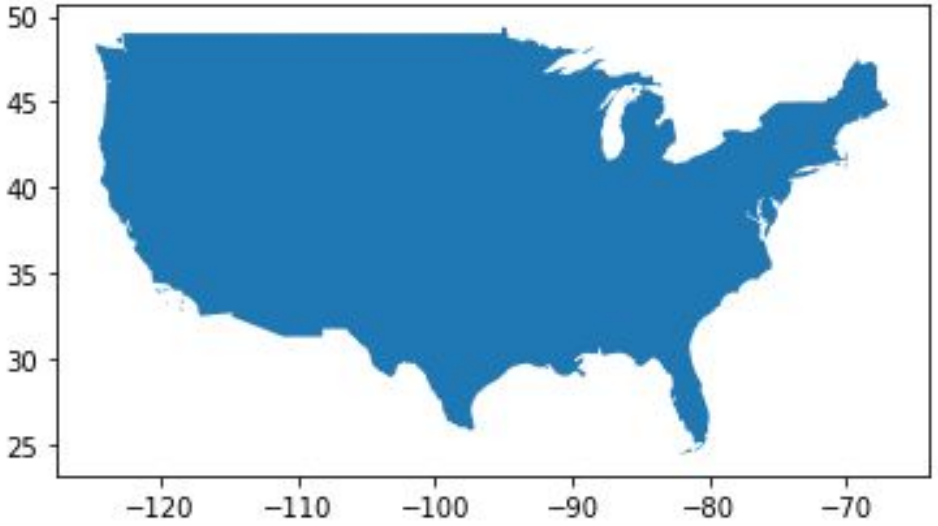
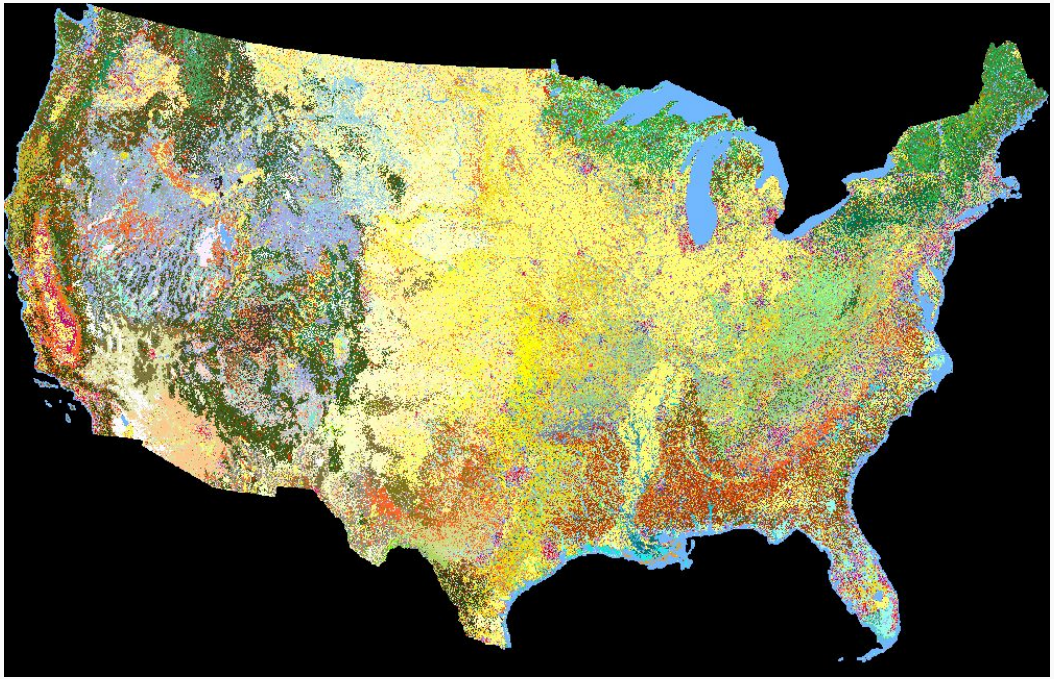
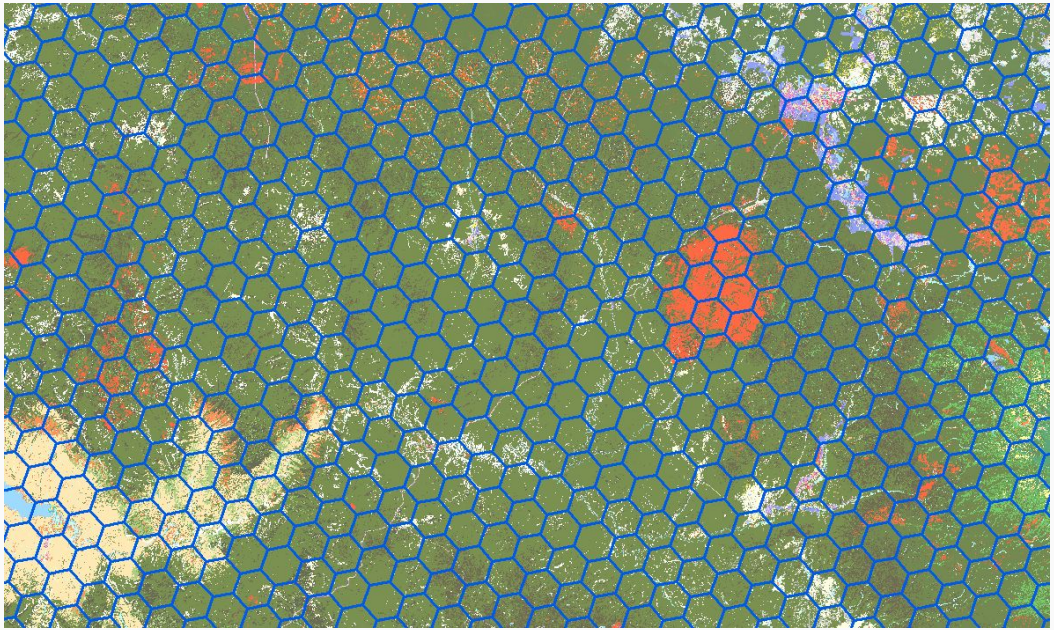


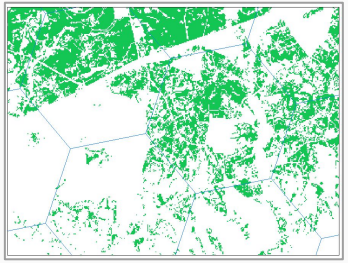
Visualization of Data (1): Ecosystem Raster



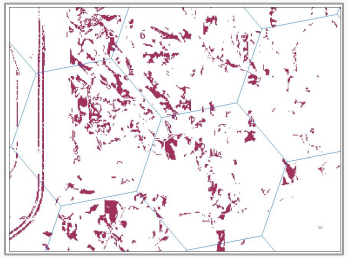
Visualization of Data (2): NHF Shapefile



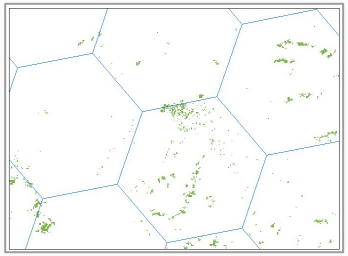
Atlantic Coastal Plain Fall-line Sandhills Longleaf Pine Woodland



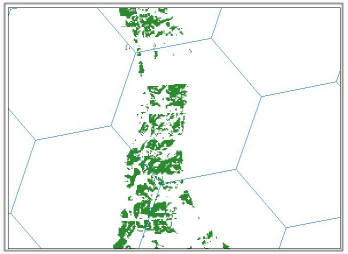
Central Tallgrass Prairie



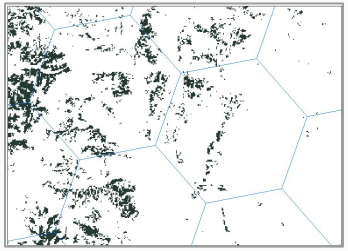
Columbia Basin Palouse Prairie



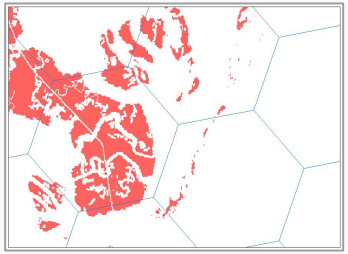
Crowley's Ridge Mesic Loess Slope Forest



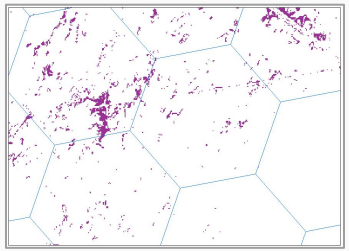
East Gulf Coastal Plain Northern Loess Bluff Forest



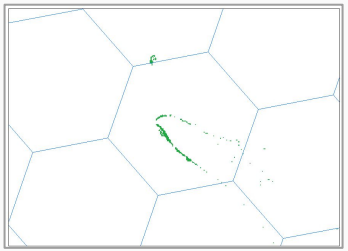
Northern Atlantic Coastal Plain Tidal Salt Marsh



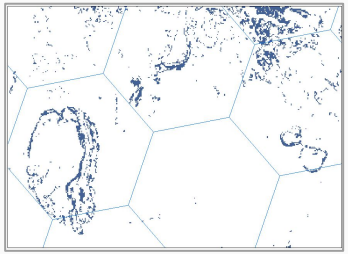
South Florida Cypress Dome



Southwest Florida Dune and Coastal Grassland



Western Great Plains Foothill and Piedmont Grassland



Discussion (1): Expected Outcome

- Create reproducible workflow allowing us to run marxan analysis on various ecosystem datasets.
  - Apply that workflow to the contiguous U.S. and beyond
- Making KBA identification process sensitive to a greater variety of ecosystem types allows to scale it up globally.
  - (These limitations discussed on the next slide)
- Results will be shareable with conservation organizations and policy makers to determine what actions need to be taken to protect these environments.

Discussion (2): Limitations and Challenges

- In producing this workflow, we will develop a clear understanding of the limitations of the current KBA identification process and will inform future efforts to improve the system.
  - One current limitation comes with the “shape” of the ecosystems in question.
    - “patchy” and “linear” distribution will tend to drop out with higher KBA area thresholds.
    - they are naturally less likely to occur with enough contiguous sections to practically meet KBA thresholds compared to “matrix-forming” ecosystems
    - We may need to categorize ecosystems by shape (“patch forming” vs. “linear” vs. “matrix forming”) and establish recommended thresholds for each.