Utilizing GIS to Locate Endangered Gravel Hill Prairies of the Wabash River Valley

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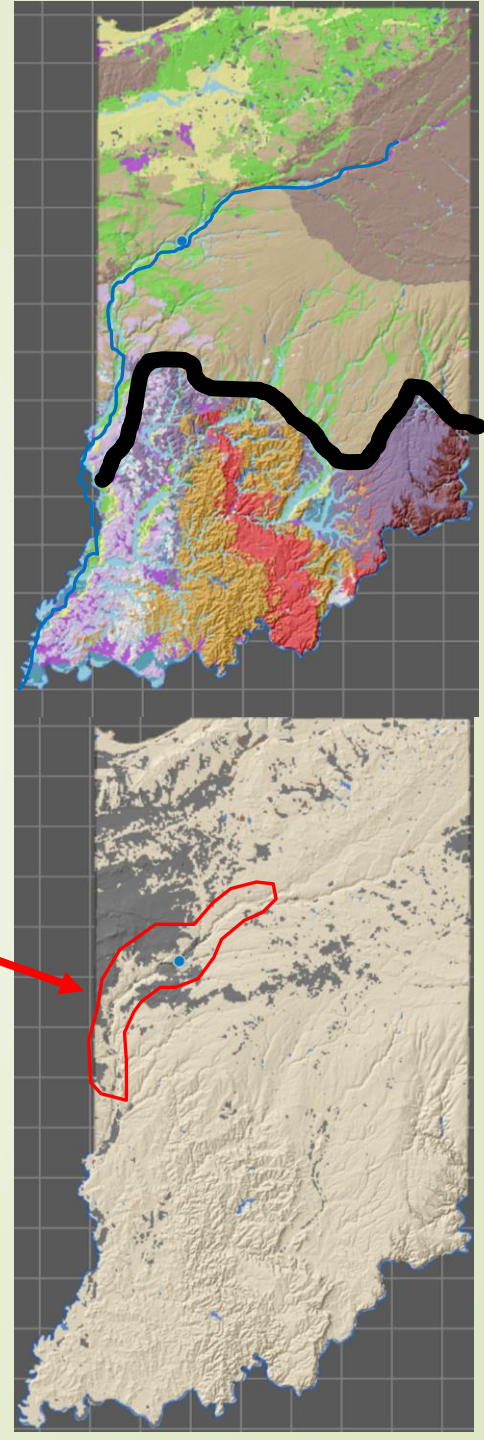
Background – Indiana Glaciation and Native Vegetation

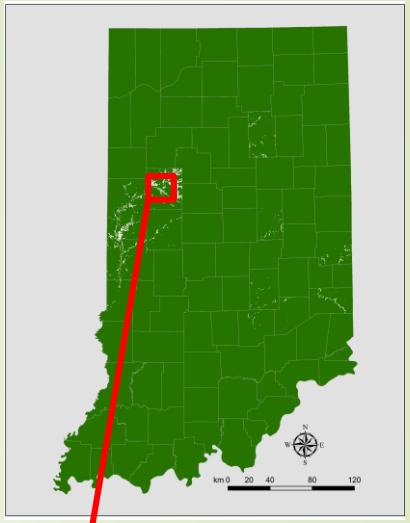
- Wisconsinan glaciation
  - Geomorphology mosaic – Wabash River Drainage
    - Till plains, outwash terraces, kames, sand plains, etc
- Native Ecosystems
  - Southern, central, northeastern Indiana – mesic forests
  - Northwestern – prairie peninsula
    - Wabash River Valley – forest, savannah, prairie mosaic
  - Ecosystem of Interest – Gravel Hill Prairies (GHP)
    - Xeric gravel bluffs, kames, terraces
    - Eastern-most range of numerous mixed-grass prairie plants
    - Soil & topographic position drivers of eastern extent

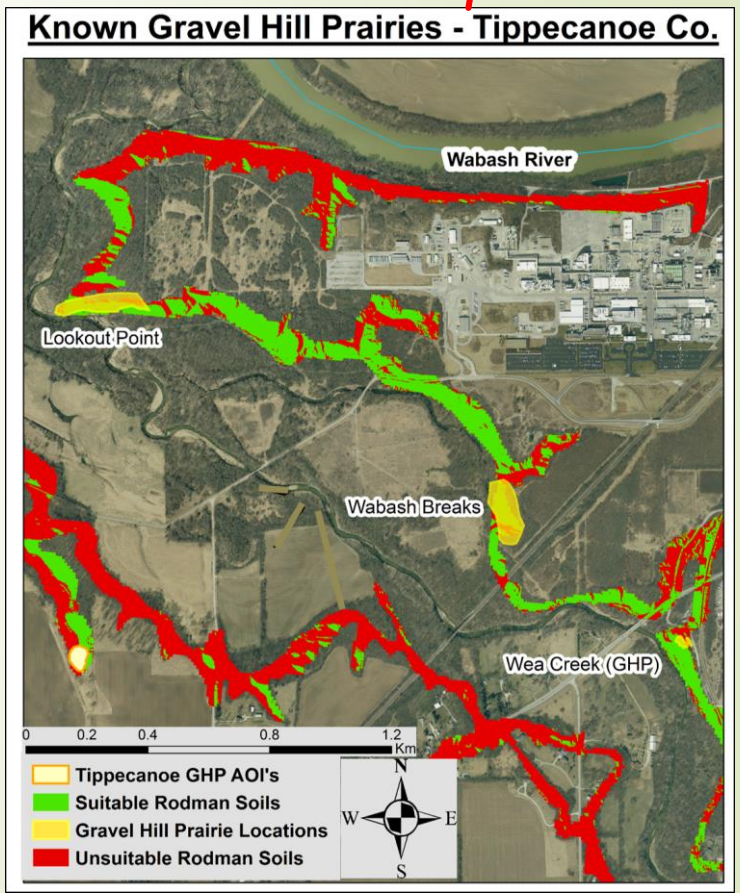


Rodman soil series:
Sandy-skeletal, mixed, mesic Typic Hapludolls

Significance & Research Goals

- Indiana gravel hill prairies – state endangered ecosystem
  - Community similar to prairies farther west
  - Seven state endangered plant species
- Post, Bacone, and Aldrich (1984)
  - Located 4 remnants ~5ha total
  - Managed by TNC, NICHES Land Trust, IDNR
- Plant community nearly extirpated
  - Lack of natural disturbance
  - Development & Gravel Mining
- Goal – locate unknown remnants
  - GIS spatial analysis – suitability modeling





western rock jasmine

kittentails

Pitcher's stiltwort

aromatic aster

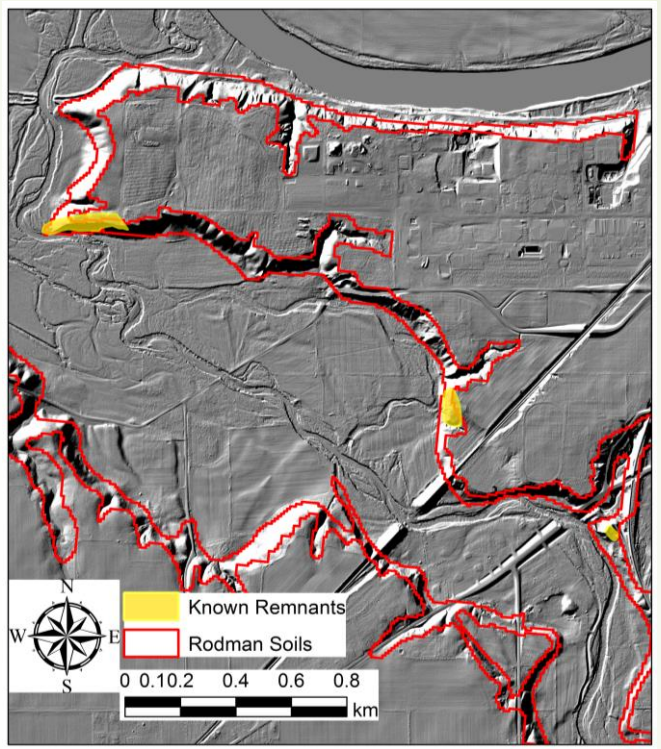
narrow-leaved stoneseed

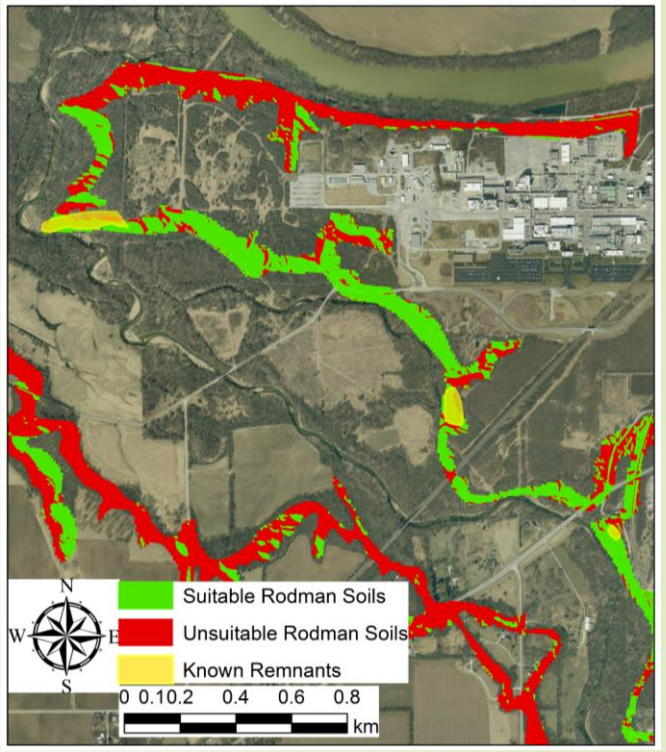
prairie-rocket wall flower

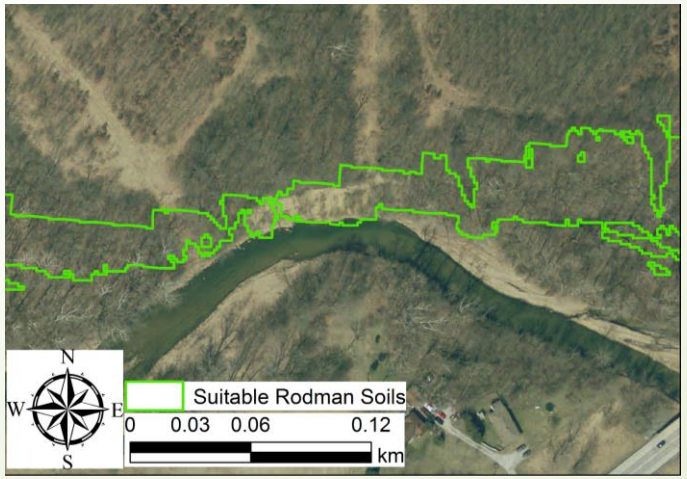
plains muhlenbergia

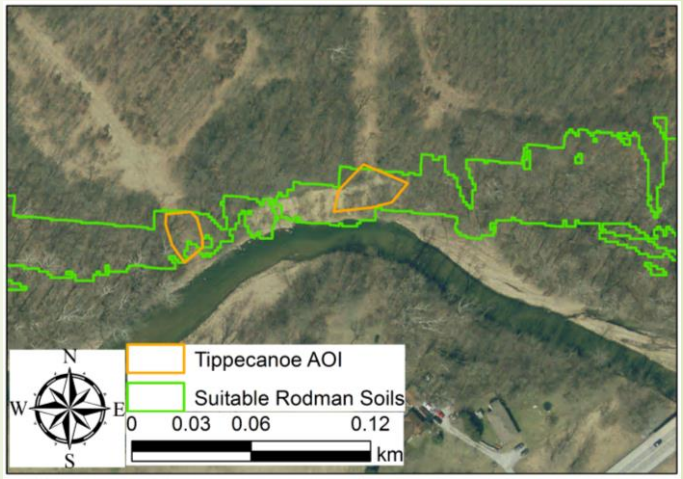
Methods – Spatial Analysis

- ArcGIS v10.3 (ESRI)
- Data
  - NRCS gSSURGO dataset
  - County DEM data
  - Aerial Imagery
- Habitat Suitability Model
  - Isolated Rodman series
  - Suitable =157 – 293°
- Aerial Image Analysis
  - Delineate AOI's









Methods – Field Scouting

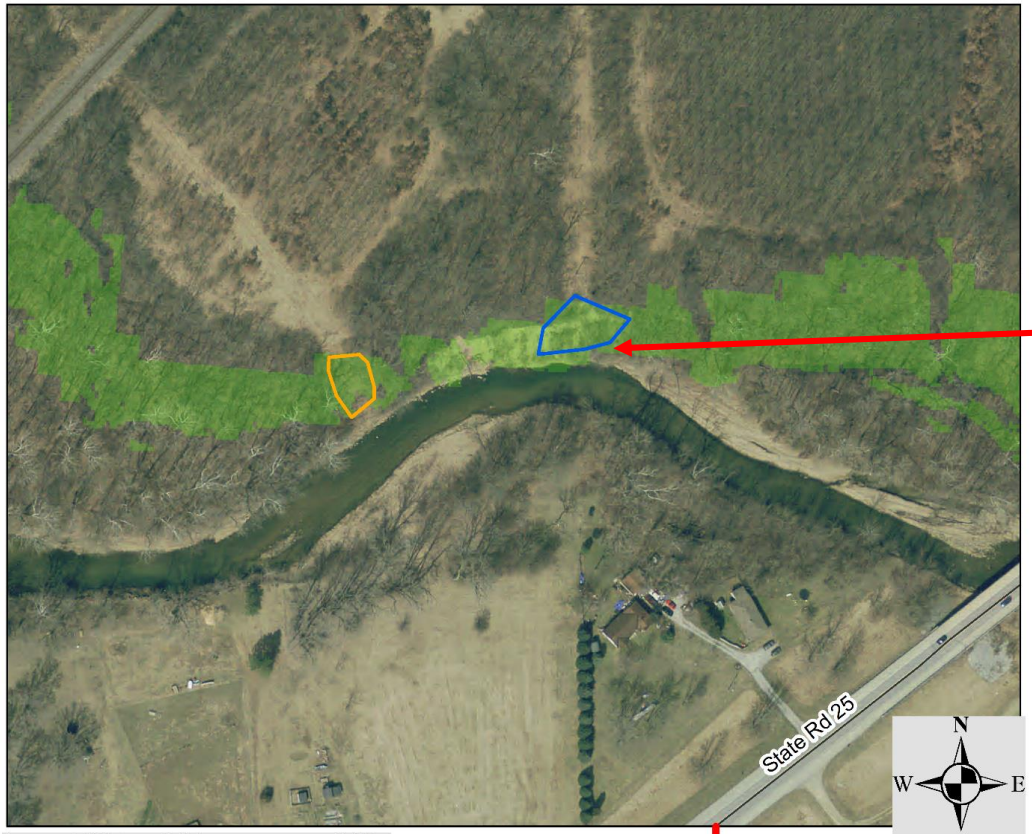
- Collaborators
  - The Nature Conservancy
  - NICHES Land Trust
- Focused on Tippecanoe Co.
- Visited accessible sites
- Develop plant list
- Goal: find endangered species

Results

- Total area of Rodman soils in Indiana = 10,016 ha
  - Analyzed Tippecanoe & Fountain Co.'s

GIS Results					
County	Rodman Soils (hectares)	Suitable Area (hectares)	Suitable area (% of total)	Areas of Interest (Locations | Hectares)	
Tippecanoe	4,430	1,354	31	550	46.46
Fountain	2,163	813	38	259	64

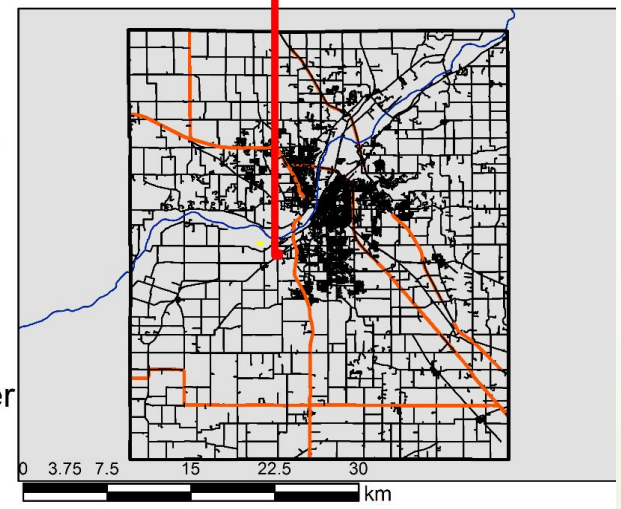
  - Total AOI's Delineated: 809
  - AOI's scouted: 47 – primarily in Tippecanoe Co.
- Unknown remnants located: 5
  - One with aromatic aster
  - Four with characteristic dry-mesic/xeric indicator vegetation
    - Range of plant community degradation
- Numerous high-quality natural oak woodlands located



GHP w/ Aromatic Aster
Suitable Rodman Soils
Unsuitable Rodman Soils
Tippecanoe AOI

GHP AOI Scouting
Remnant Locations
10/13/2016

Prepared By: Ryan Schroeder



aromatic aster

Additional Species Present

- big bluestem →
- bee balm
- silky wild rye
- woodland sunflower
- wild petunia
- flowering spurge
- fragrant sumac
- columbine
- hairy penstemon
- prickly pear

Significance & Future Work

- Located unknown remnants - one w/ endangered species
  - Despite degradation – remnant still present
- Model effectiveness – GHP's not guaranteed
  - Numerous high-quality natural areas (open-oak woodlands) found
- Learning process – aerial image interpretation
- Conservation organizations (TNC, NICHES, DNR) involved
  - Reaching out to landowners
  - Starting conservation process
- 35% of Indiana Rodman soils yet to be analyzed

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