TOWARDS RAPID FLORISTIC QUALITY ASSESSMENT OF OKLAHOMA WETLANDS USING PLANT INDICATOR SPECIES

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WETLAND BIOASSESSMENTS

- Ecological health
- Importance in Oklahoma
- Challenges

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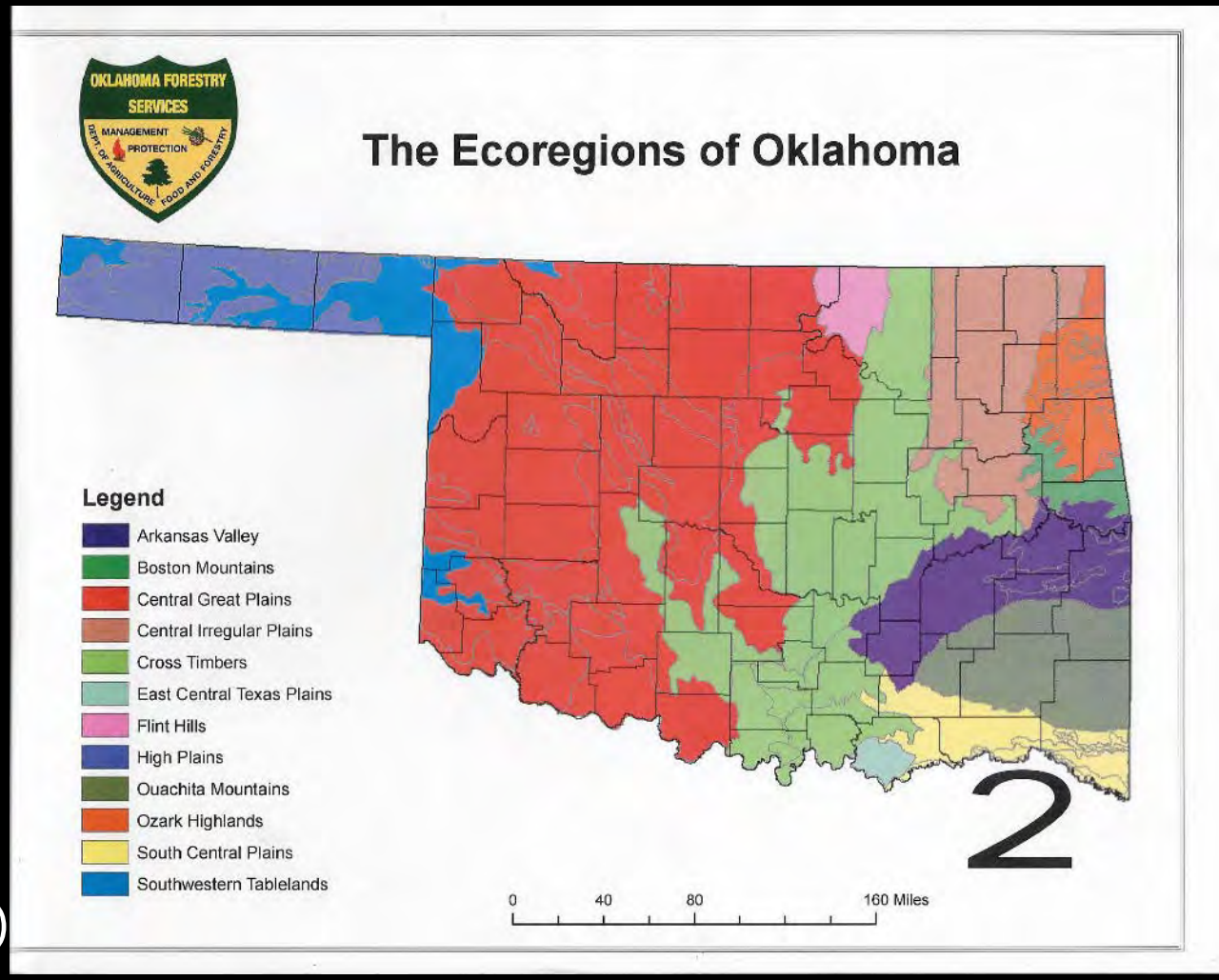
ENVIRONMENTAL HETEROGENEITY

- Natural variability vs disturbance
- Stratification by
  - Ecoregion?
  - Hydrogeomorphic Class?

(Brinson 1993, Dvorett et al. 2012)



WETLAND BIOASSESSMENTS

- Ecological health
- Importance in Oklahoma
- Challenges

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BIOASSESSMENT METHODS

- Landscape assessments
- Rapid assessments
- Intensive assessments

WETLAND BIOASSESSMENTS

- Evaluate shortcuts around intensive assessments
  - Landscape and rapid assessments
  - Plant Indicator species

(Bried et al. 2014, 2016, Jog et al. 2017)

OBJECTIVES

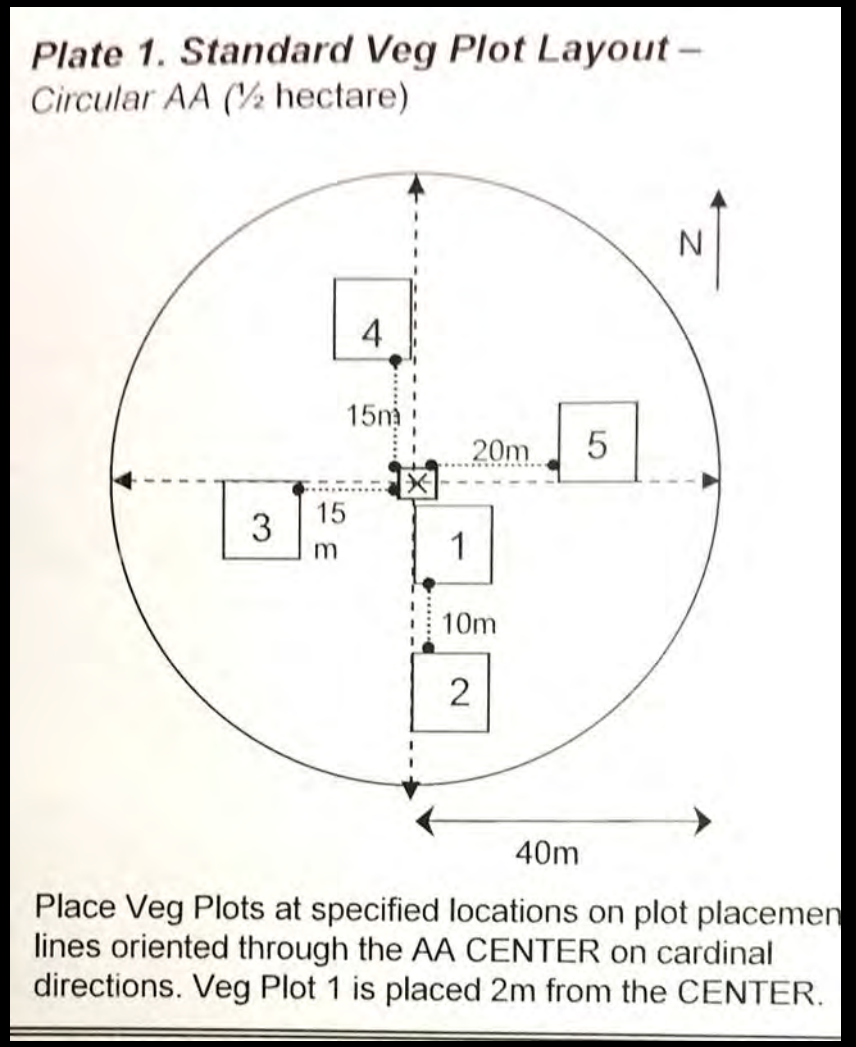
1. Determine if indicator species performance improves with increasing environmental stratification

2. Find indicator species for low, medium, and high quality wetlands

3. Validate indicator species

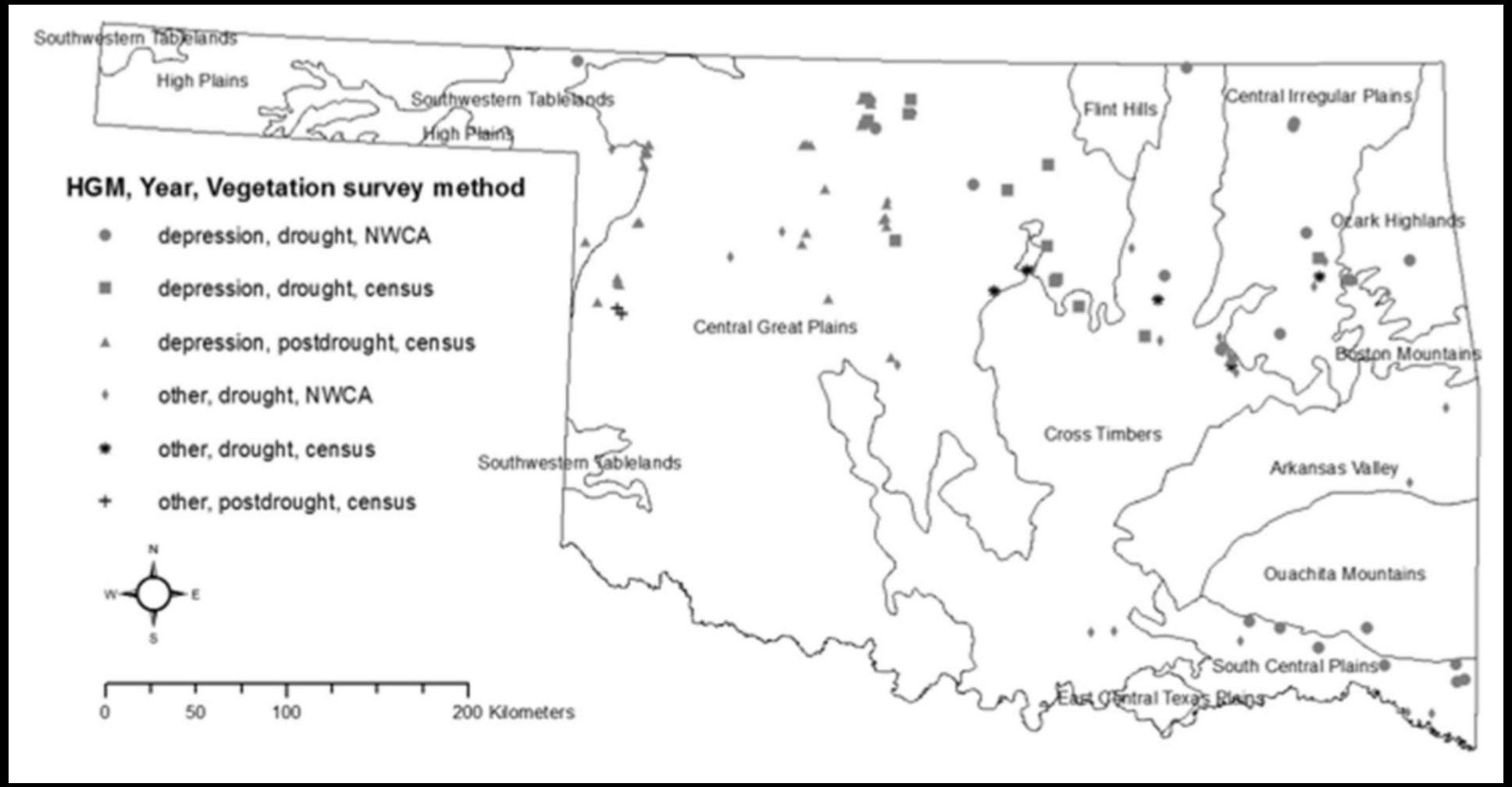
METHODS

- 117 sites (previously surveyed)
- Sampled by
  - EPA protocol
  - Meandering searches
- Identified all vascular species



(U.S. EPA 2011)

LOCATIONS


Southwestern Tablelands
High Plains
Southwestern Tablelands
High Plains
Flint Hills
Central Irregular Plains
Ozark Highlands
Boston Mountains
Central Great Plains
Cross Timbers
Southwestern Tablelands
Arkansas Valley
Ouachita Mountains
South Central Plains
East Central Texas Plains
HGM, Year, Vegetation survey method
depression, drought, NWCA
depression, drought, census
depression, postdrought, census
other, drought, NWCA
other, drought, census
other, postdrought, census
N
W
E
S
0
50
100
200 Kilometers

METHODS

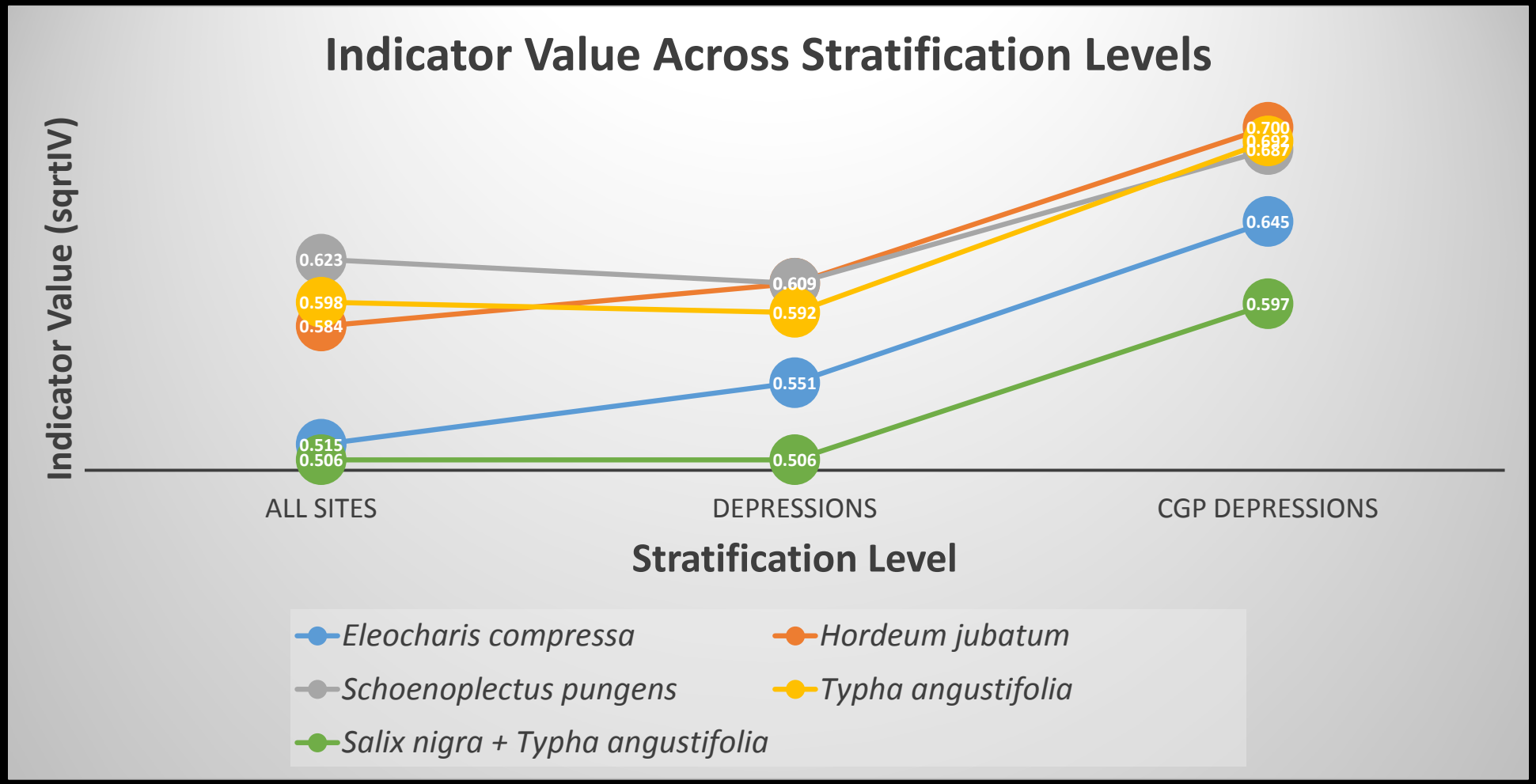
- Indicator Species Analysis (ISA)
  - Group Sites
  - Extract indicators
- Stratification Analysis
  - 3 stratification levels
- Quality Analysis
  - 3 quality levels

ISA uses an algorithm to statistically determine which species are indicative of the target group

(De Cáceres et al. 2012)

- Stratification Analysis
  - All Sites
  - Depressions
  - CGP Depressions

STRATIFICATION ANALYSIS – RESULTS



STRATIFICATION ANALYSIS – RESULTS

Indicators	False Positive Rate		
	All Sites	Depressions	CGP Depressions
Eleocharis compressa	0.165	0.149	0.117
Hordeum jubatum	0	0	0
Schoenoplectus pungens	0	0	0
Typha angustifolia	0.275	0.279	0.231
Salix nigra + Typha angustifolia	0.222	0.222	0.178

- Extract quality indicators from:
  - Lowest stratification (All Sites)
  - Highest stratification (CGP depressions)

SUCCESSFUL METRICS

- Coefficient of Conservatism (CoC)
  - 0 – 3 : Tolerant of high disturbance
  - 4 – 6 : Tolerant of moderate disturbance
  - 7 – 10 : Intolerant of disturbance

- Floristic Quality Assessment Index (FQI)

$$FQI = \bar{C} \times \sqrt{S}$$

(Miller & Wardrop 2006)

- Quality analysis
  - All Sites
    - Low
    - Medium
    - High
  - CGP Depressions
    - Low
    - Medium
    - High

QUALITY ANALYSIS – RESULTS

All Sites	
Low Quality Sites	High Quality Sites
Tamarix chinensis	*Limnosciadium pinnatum*
Populus deltoides + Salix nigra	*Boehmeria cylindrica*
	Juncus diffusissimus

QUALITY ANALYSIS – RESULTS

CGP Depressions	
Low Quality Sites	High Quality Sites
Tamarix chinensis	*Eleocharis compressa* + *Rumex crispus*

- Quality analysis
  - Handful of species
  - Congruence with metrics
  - Potential tool

NEXT STEP

- Validation
  - Intensive surveys
  - Compare quality levels
- 8 sampled so far
  - Finding indicators

CONCLUSIONS

- Environmental stratification may improve indicator species performance
- Extracted indicator species look promising as a tool for rapid floristic quality assessment
- Validation still needed

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QUESTIONS?