Natural Community Classification and Ecological Integrity Analysis -Arkansas

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ARKANSAS NATURAL HERITAGE COMMISSION

NatureServe
A Network Connecting Science With Conservation

Additional Project Team Members

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Overview of Presentation

- NatureServe and the Heritage Network
- Arkansas Natural Heritage Commission (Arkansas Heritage Program)
- Community Classification
- Ecological Integrity Assessment
- Final Products and Intended Impact

What is NatureServe and the Natural Heritage Network?

- NatureServe is a non-profit conservation organization that provides the scientific information and tools needed to help guide effective conservation action.
- NatureServe and its network of natural heritage programs are the leading source for information about rare and endangered species and threatened ecosystems.
- An international network of biological inventories - natural heritage programs or conservation data centers - active in all 50 U.S. states, Canada, Latin America, and Caribbean

The Arkansas Natural Heritage Commission

- ANHC is an agency of the State of Arkansas housed within the Department of Arkansas Heritage.

- The Research Section of ANHC functions as the Arkansas Natural Heritage Program, a member of the Network of Natural Heritage Programs.

Project Purposes

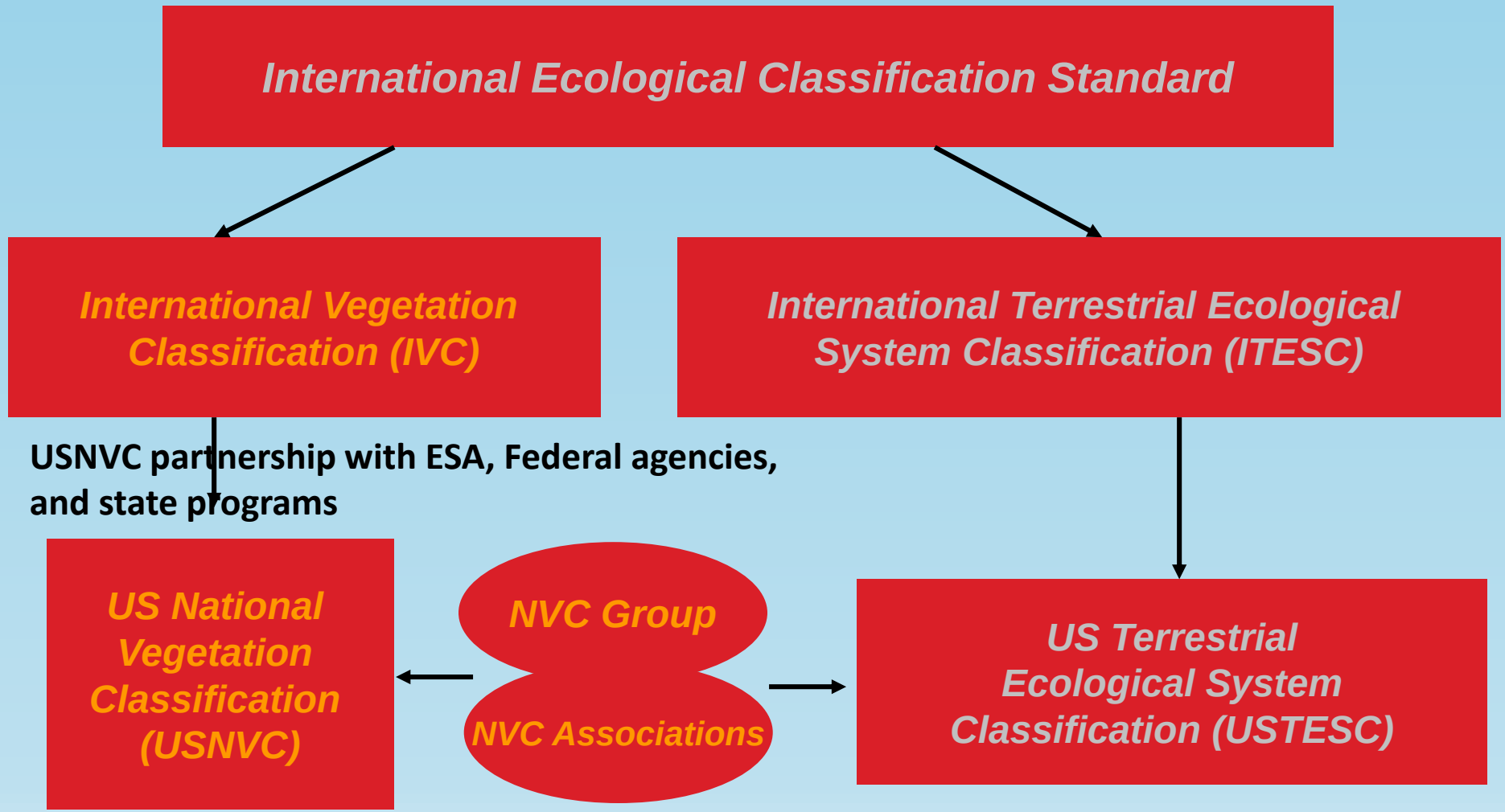
Short–term – Develop Natural Community Classification and Ecological Integrity Analysis (EIA) Criteria for Evaluation of Occurrences

Longer-term – Add Natural Community Element Occurrences to enhance protection priorities

Arkansas Natural Community Classification - based on NatureServe Ecological Systems

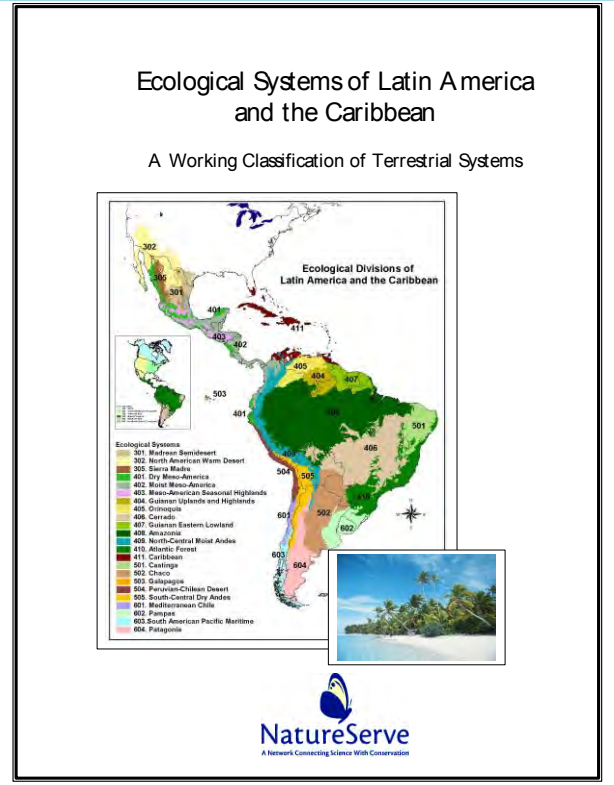
- Simple (~40 Units in AR)
- Ecologically based (site based)
- Similar to Current Classification
- Relatively easy to define and map
- Can be related to National Vegetation Classification

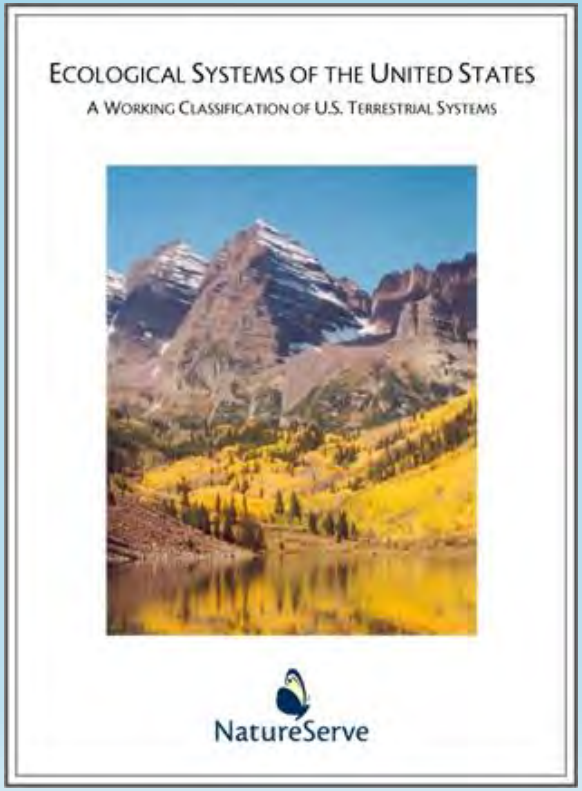
Types of Ecological Classifications
(Developed by NatureServe & partners)



TERRESTRIAL ECOLOGICAL SYSTEMS

Groups of associations that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients.





NatureServe's Ecological Systems:

- Relate vegetation patterns to local environment within landscapes and integrate spatial (soil, hydrology) and temporal (successional) patterns of the component vegetation communities
- Are broad units for planning and habitat characterization - related rare plants and animals – promoting ecosystem management

Characteristics of Ecological System-based Classification

- **Not a strict classification hierarchy**
  - A Vegetation Association can be placed in multiple Systems
- **Generality of Ecological Systems**
  - Typically allows for better mapping and knowledge of distribution and ecological drivers
  - May encompass both rare and common associations.
  - Some ES will be globally “at-risk”
  - Component Associations within an ES that are of critical concern may be tracked & ranked separately

AR Ecological Integrity Assessment Methods

- Provide a consistent methodology for assessing condition/quality of stands
- Link EIA methods to EORANK methods.
- Provide database support for implementation of methods (EcoObs)
- Field forms and field testing

Collaboration Among Conservation Partners in Arkansas

This classification is used by several Agencies

- NatureServe
- AR Natural Heritage Program
- AR Game and Fish Commission (AWAP)
- Ozark and Ouachita National Forests

Arkansas EIA "General Types"

Used to group Systems for Ecological Integrity Assessments

“Prairie”


Baker Prairie


Flanagan Prairie


Downs Prairie


Stuttgart Airport Prairie

“Glades and Barrens”


Devil's Eyebrow Glade


City Rock Glade


Novaculite Glade


Saline Barrens and Savanna Fort Chaffee

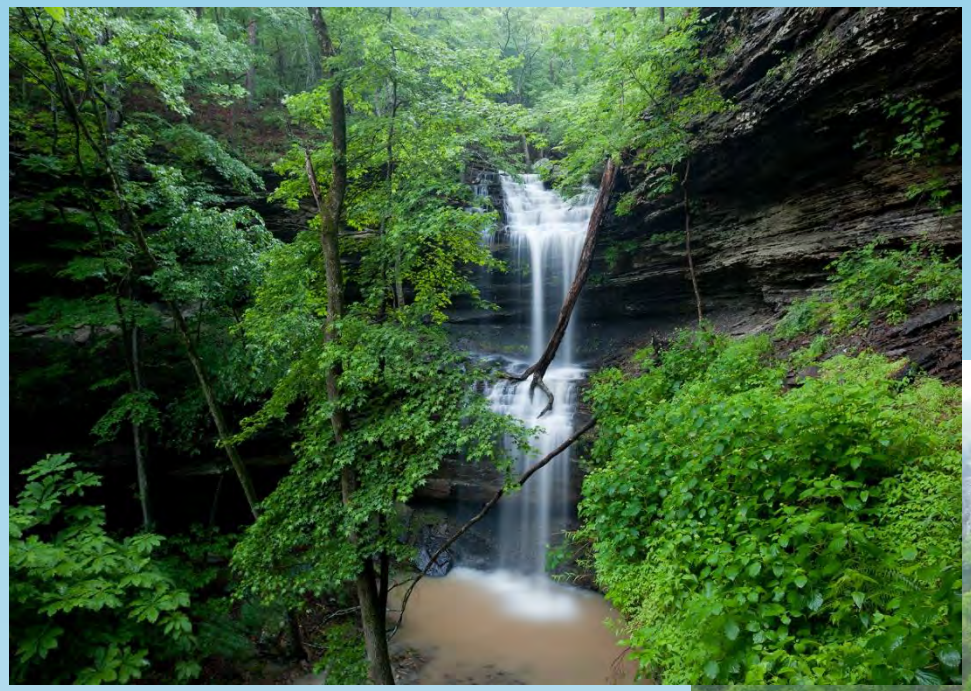
“Open Pine Pine-Hardwood Woodland”

Miller County Sandhills

Ozark Woodland

North Fork Pinnacle

“Upland Hardwood Forest”



Acord Hollow Falls

Magazine Mountain

“Bog and Fen”

“Flooded and Swamp Forest”

Evaluation and Prioritization of Natural Community Occurrences

- Ecological Integrity Assessment criteria are being assembled or developed
- EIA criteria will be the basis for NHP EO definition and EO ranks - EO SPECS, EORANK SPECS, EOTRACKING criteria

Ecological Integrity Assessment

"an assessment of the degree to which, under current conditions, an occurrence of an ecosystem matches reference conditions for structure, composition, and function, operating within the bounds of natural or historic disturbance regimes, and is of exemplary size"

Status of Development of EIA

- EIA factors and metrics for Wetlands and Open Pine communities have already been developed

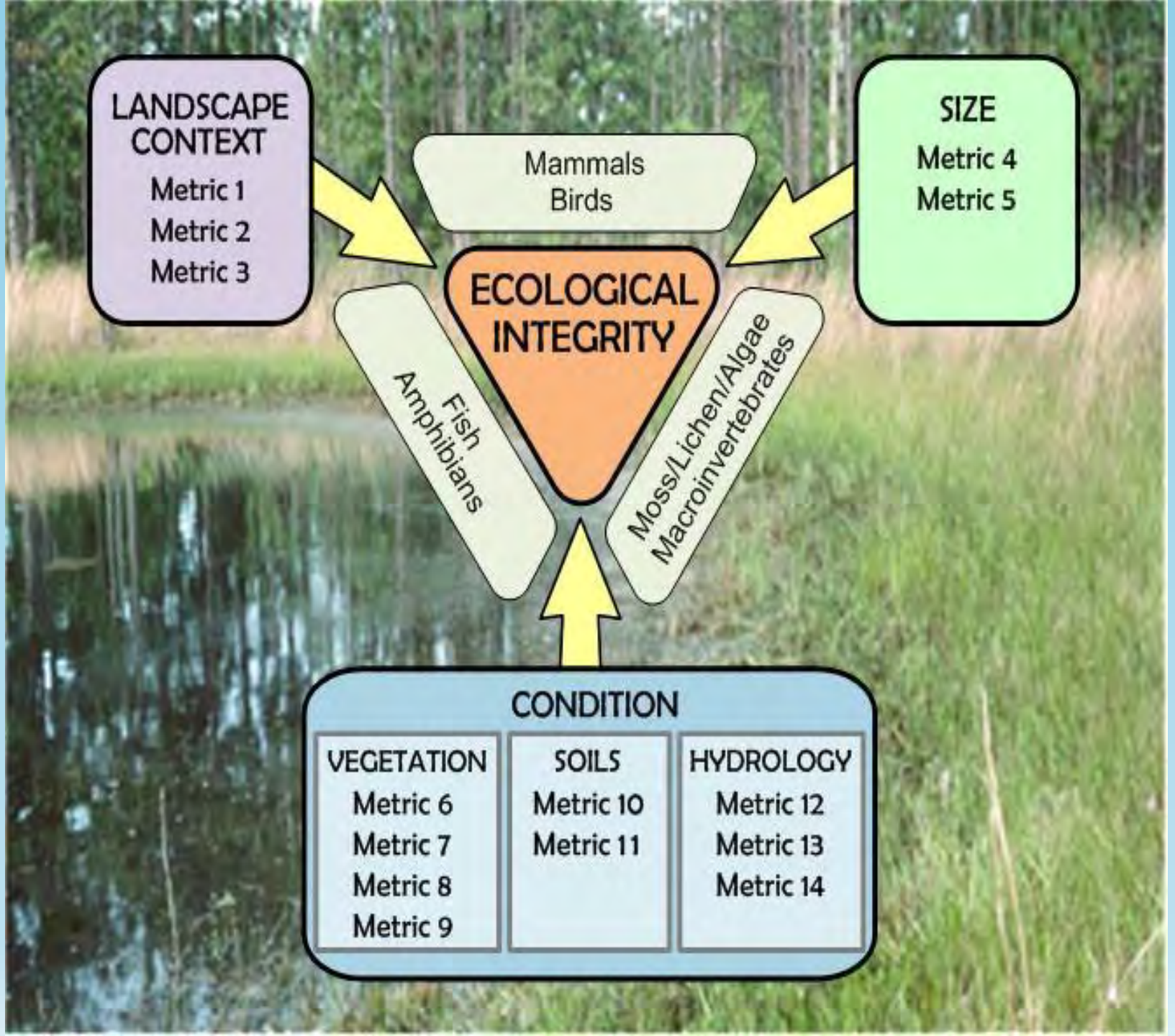
- NS-ARHP team is developing additional metrics for the Arkansas upland types

United States Environmental Protection Agency

Assessment of Wetland Ecosystem Condition across Landscape Regions: A Multi-metric Approach

Part B. Ecological Integrity Assessment Protocols for Rapid Field Methods (L2)

EPA/600/R-12/021b
June 2012


LANDSCAPE CONTEXT
Metric 1
Metric 2
Metric 3
Mammals
Birds
SIZE
Metric 4
Metric 5
ECOLOGICAL INTEGRITY
Fish
Amphibians
Moss/Lichen/Algae
Macroinvertebrates
CONDITION
VEGETATION
Metric 6
Metric 7
Metric 8
Metric 9
SOILS
Metric 10
Metric 11
HYDROLOGY
Metric 12
Metric 13
Metric 14

Tiers of Assessment

- Level 1 – Based on Remote Sensing
- Level 2 – Rapid (on-site) Assessment
- Level 3 – Intensive Assessment (quantitative)

Assessment Rating (A-D)

- For each metric, Excellent, Good, Fair, Poor levels are defined
- Metrics may be weighted if desired to provide most accurate roll-up to overall occurrence rating
- For our purposes, EIA Rank of an EO = EO Rank (EIA = EORANK SPECS)

Classification Approach

Group ES into general types (16 in AR) that can be evaluated using similar EIA metrics

Example – Upland Hardwood Forest Type

Includes these Ecological Systems

- Ozark-Ouachita Mesic Hardwood Forest (CES202.043)
- Ozark-Ouachita Dry-Mesic Oak Forest (CES202.708)
- Mississippi River Alluvial Plain Dry-Mesic Loess Slope Forest (CES203.071)
- Crowley's Ridge Mesic Loess Slope Forest (CES203.079)
- West Gulf Coastal Plain Mesic Hardwood Forest (CES203.280)

EIA Approach

Adopt or develop EIA metrics to determine ranks for each occurrence. Metrics are grouped under 3 factors – Landscape Context, Condition and Size.

Example –

Rank Factor	Ecological Factor	Metric Name
Landscape Context	Landscape	Connectivity (core, supporting)
	Buffer	Buffer Index – percent having buffer
Size	Size	Absolute Patch Size
Condition	Vegetation	Vegetation Structure
		Native Plant Species Cover
		Invasive Plant Species Cover

Overview of Current Metrics

Landscape Context

Landscape

- Natural land cover
- Contiguous natural land cover
- Land use index
- Natural/Prescribed Fire Potential

Buffer

- Perimeter with natural buffer
- Width of natural buffer
- Condition of natural buffer

Overview of Current Metrics

Condition

Vegetation (16 metrics; additional variants)

- Native and invasive cover
- Structure
- Regeneration

Hydrology (3 metrics; several variants)

- Water Source
- Hydroperiod
- Connectivity

Soil (1 metric)

- Soil Condition

Overview of Current Metrics

Size

- Absolute size
- Change in size (compared to original extent)

Summary – Classification and Ranking of Arkansas Natural Communities

- Classification is based on Ecological Systems
  - Associations may be added if that is the appropriate level
- Observed communities are ranked using EIA methodology
- Element Occurrences are defined using minimum EIA cut-offs and other criteria
- EOs are tracked based on rank and rarity

Conclusion

This classification approach is more standardized than the existing classification and ranking, is less standardized (coarser, no global ranks), but simpler than basing it on Associations from the NVC.