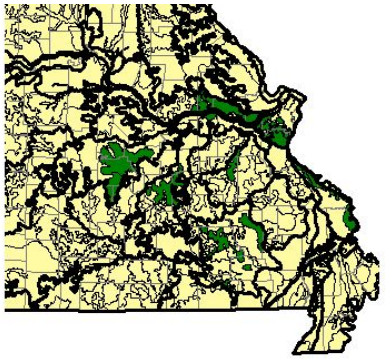
Z3 OZARK FORESTED RUGGED HILLS AND BREAKS LTAs



CHARACTERISTICS: The exceptionally steep and rugged lands associated with many river valleys. Local relief 250 to 450 feet, with narrow ridges, steep sideslopes and narrow, sinuous valleys. Historically the most densely wooded landscapes in the region. Associated with a variety of parent materials (including loess, limestone and cherty residuum), soils and forest types. Outstanding spring-fed perennial creeks and small rivers with gravel beds and deeply incised valleys. Today, still largely timbered with high habitat diversity including numerous forest types, glades, fens, cliffs, caves, springs and outstanding streams.

MANAGEMENT ISSUES AND OPPORTUNITIES:

* These lands encompass nearly 2 million acres. Public lands comprise almost 300,000 acres or 15% of these landscapes; this offers outstanding opportunities to manage these ecosystems at a landscape scale. Mark Twain National Forest and MDC own approximately 100,000 acres each. Prominent CAs are Sunklands, Current River, Angeline, Weldon Spring, Huzzah, Rocky Creek, Meramec and Daniel Boone.
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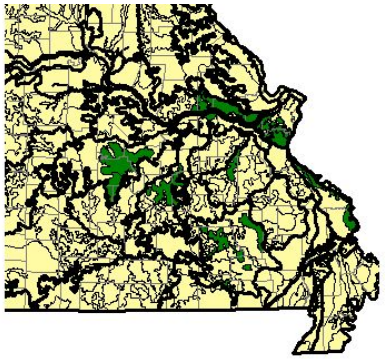

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Conservation Targets:

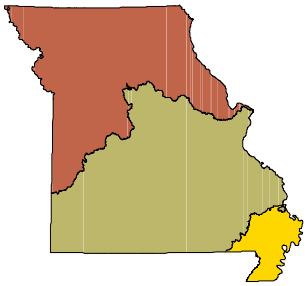
Landscapes

Communities

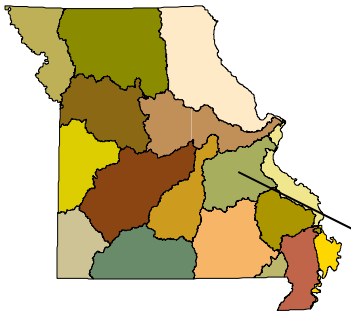
Species

Aquatic Classification Hierarchy

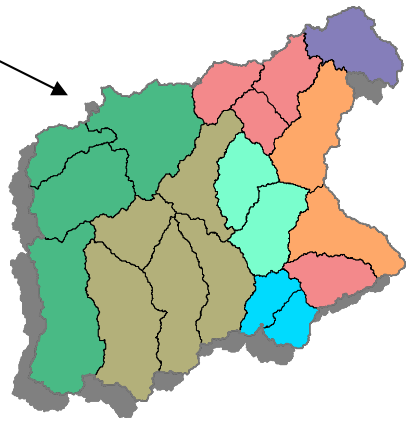
Level 4
Aquatic Subregions



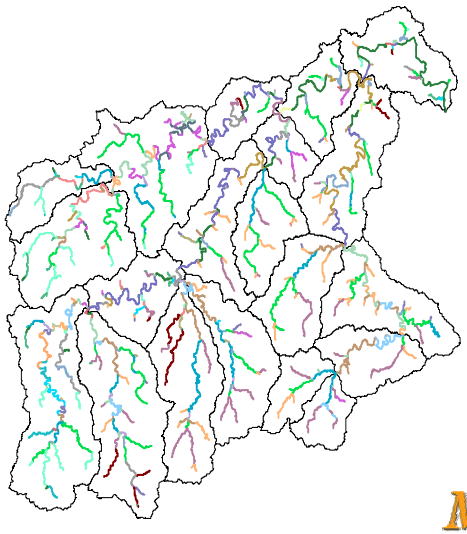
Level 5
Ecological
Drainage Units

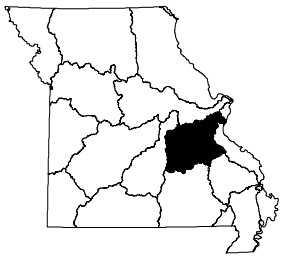


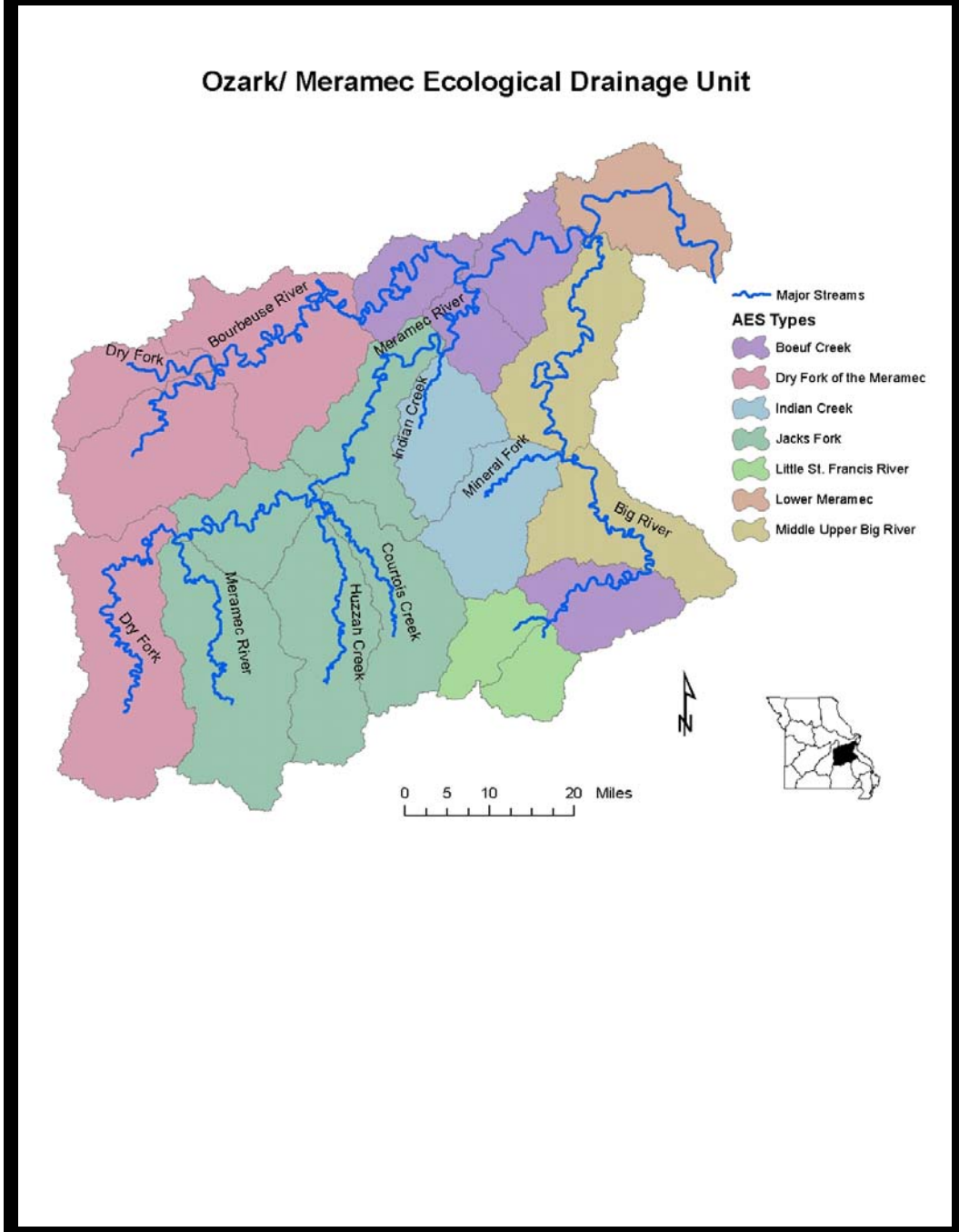
Level 6
Aquatic
Ecological Systems



Level 7
Valley Segment
Types







Conservation Targets:

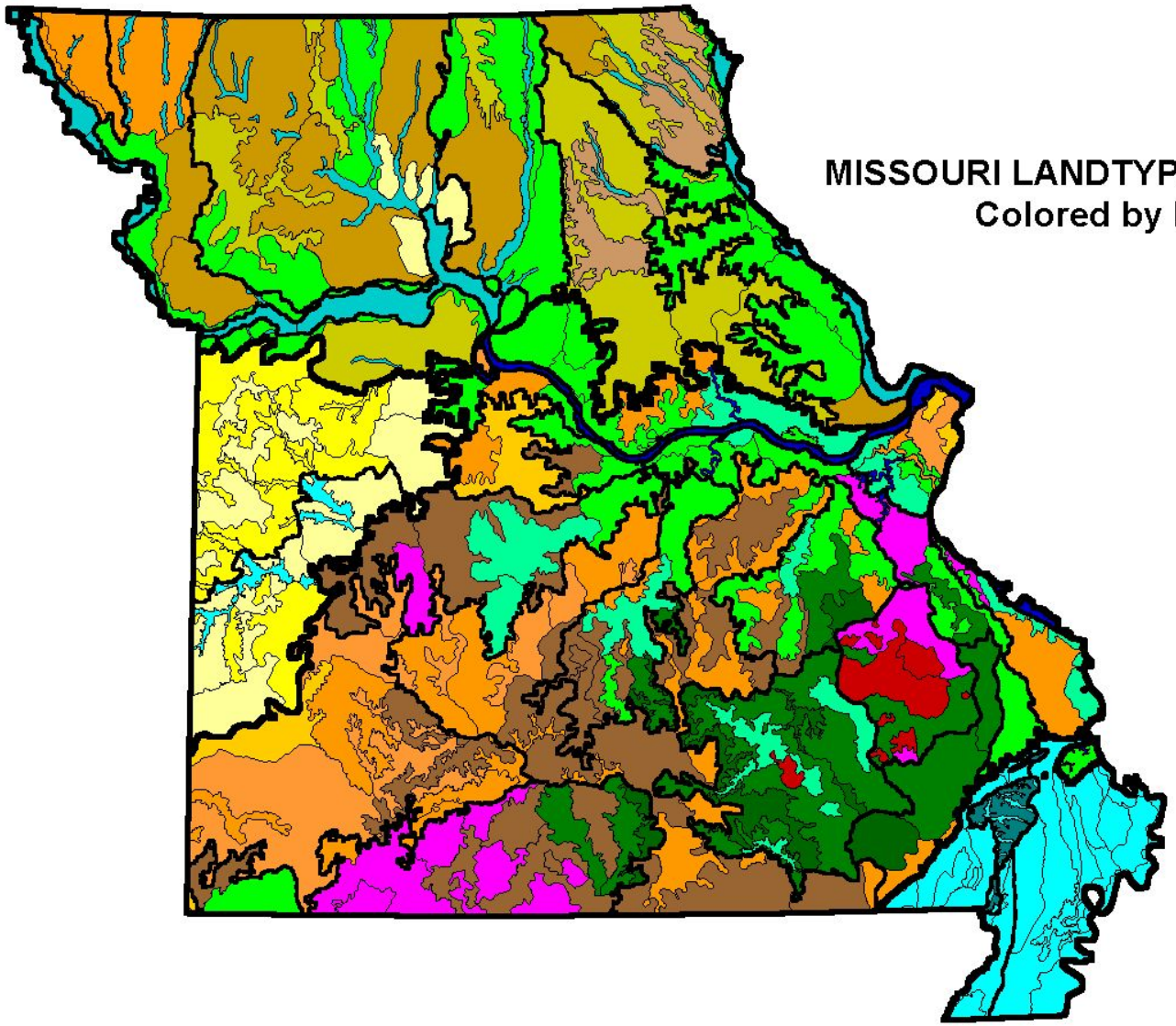
Watershed (AES)

Dominant Valley Segements

Aquatic Species

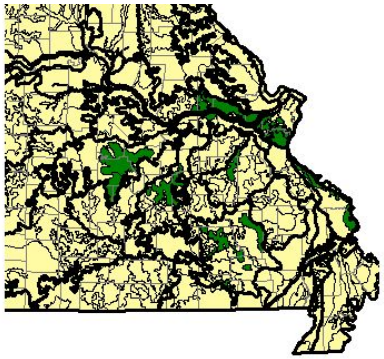
MDC Terrestrial and Aquatic Biodiversity Assessments

Purpose: Identify a set of Conservation Opportunity Areas that best represent the native ecosystems, communities and species in Missouri.



MISSOURI LANDTYPE ASSOCIATIONS
Colored by LTA Type

Z3 OZARK FORESTED RUGGED HILLS AND BREAKS LTAs



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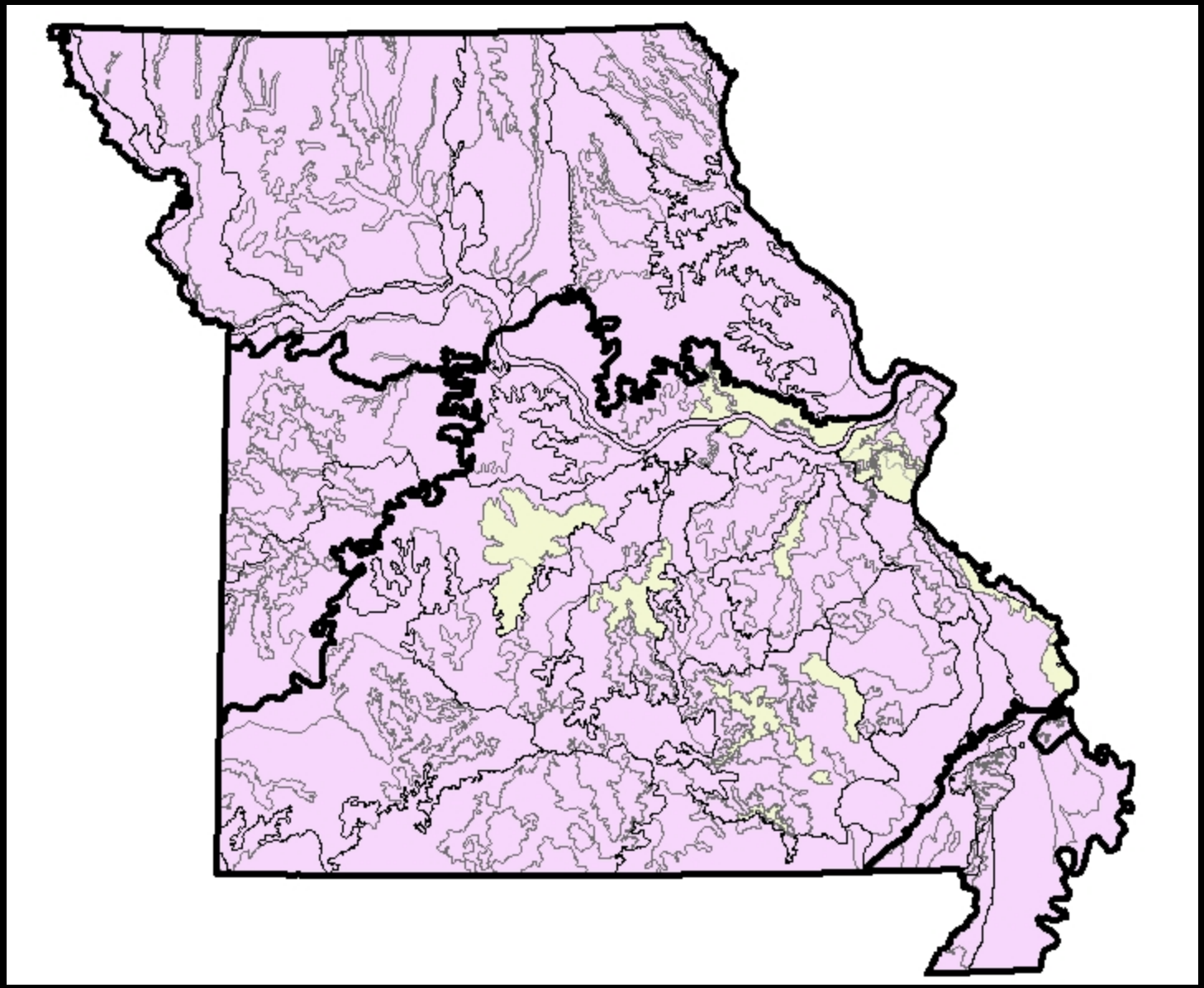
Landscapes

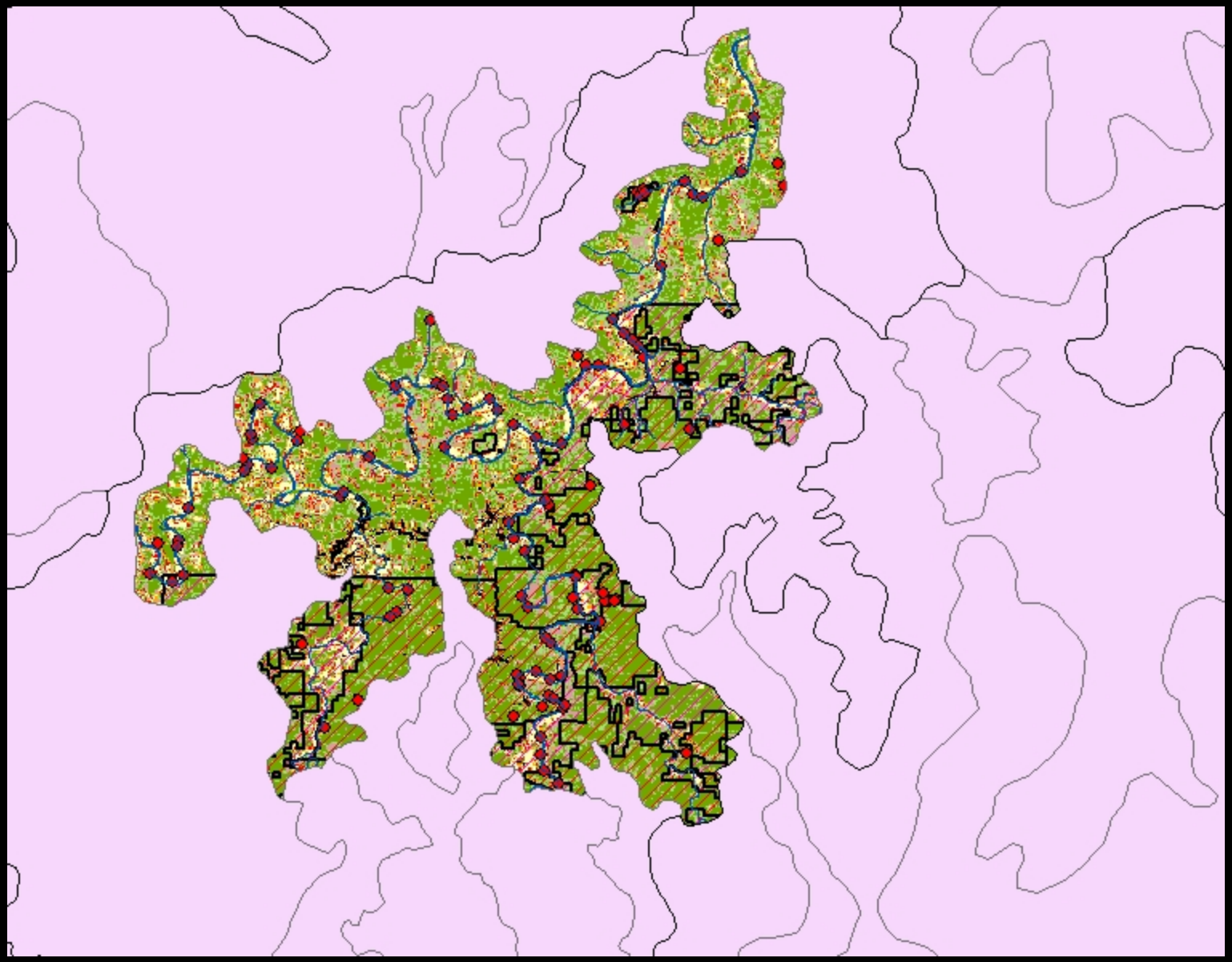
Communities

Species

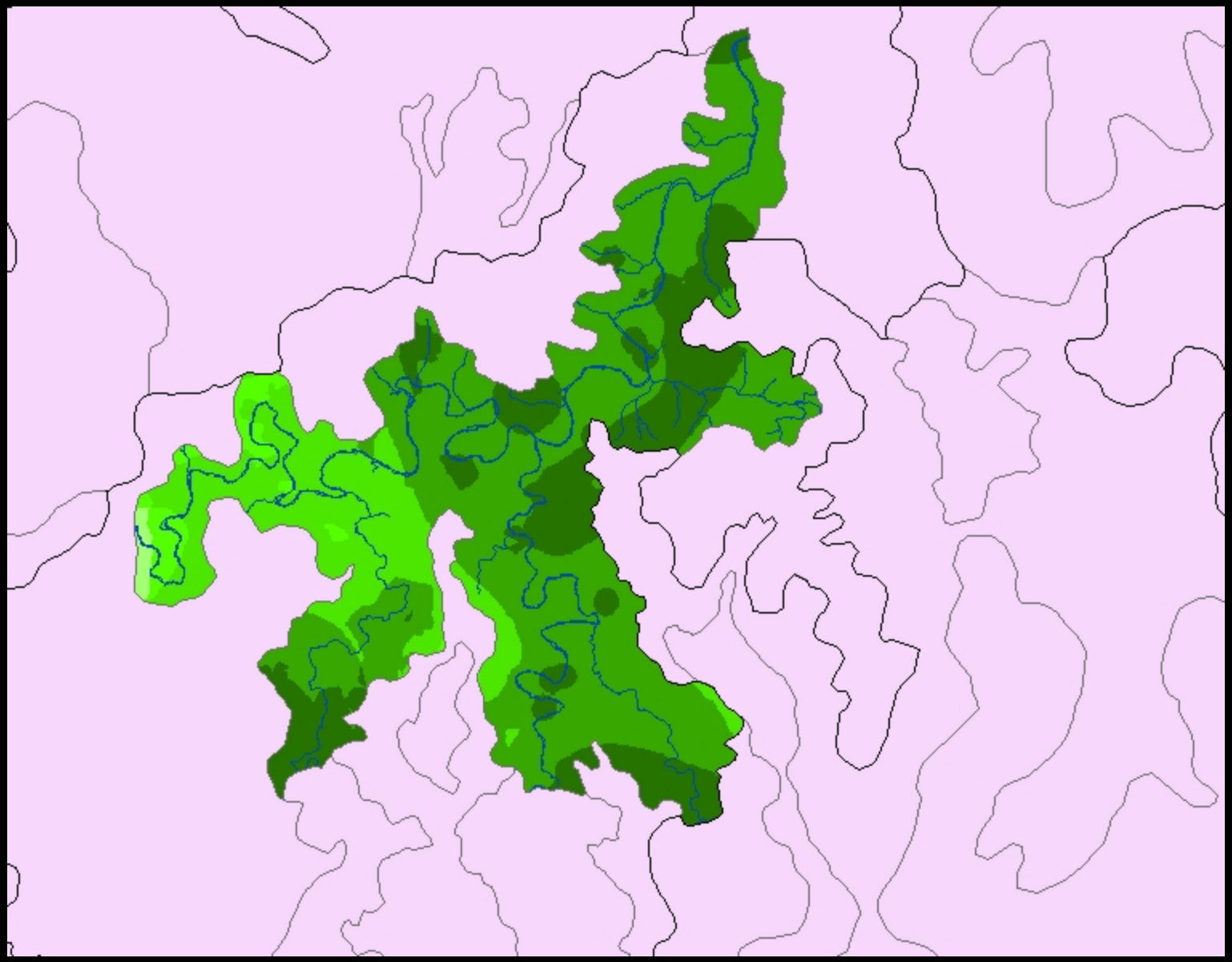
See Handout**



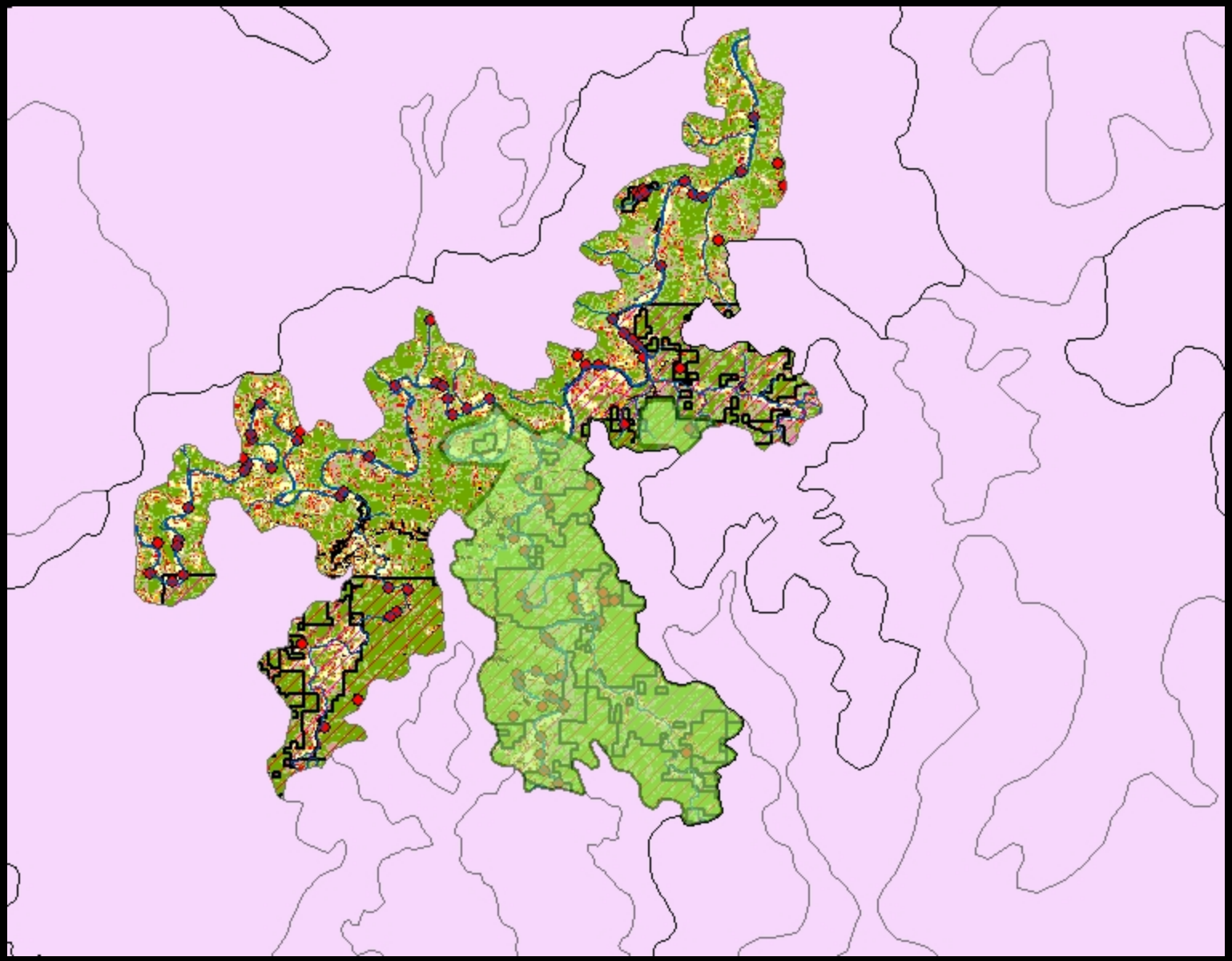
Ozark Forested Breaks LTAs



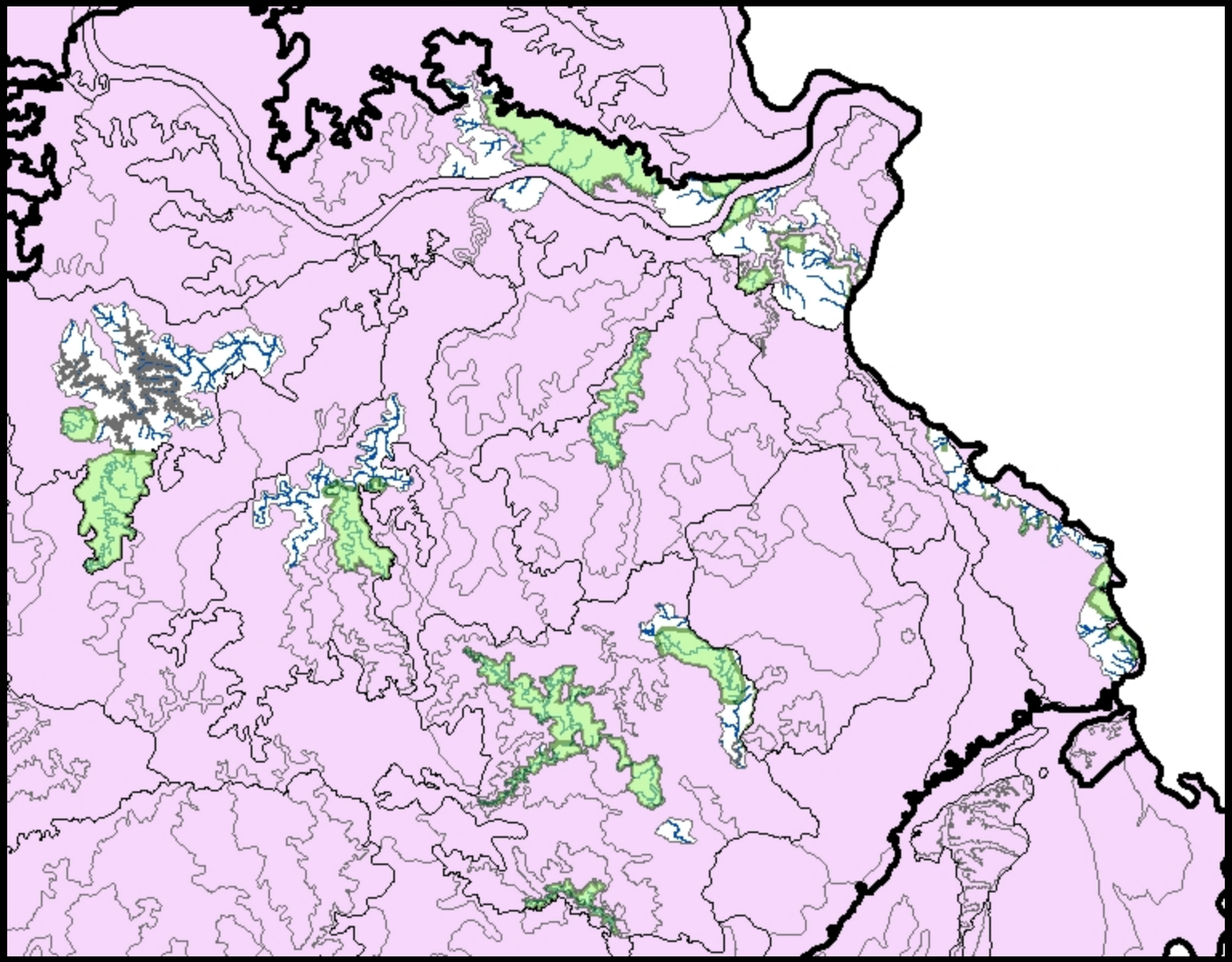
Big Piney Breaks Example



Forest Blocks + Heritage Targets + Forest Birds

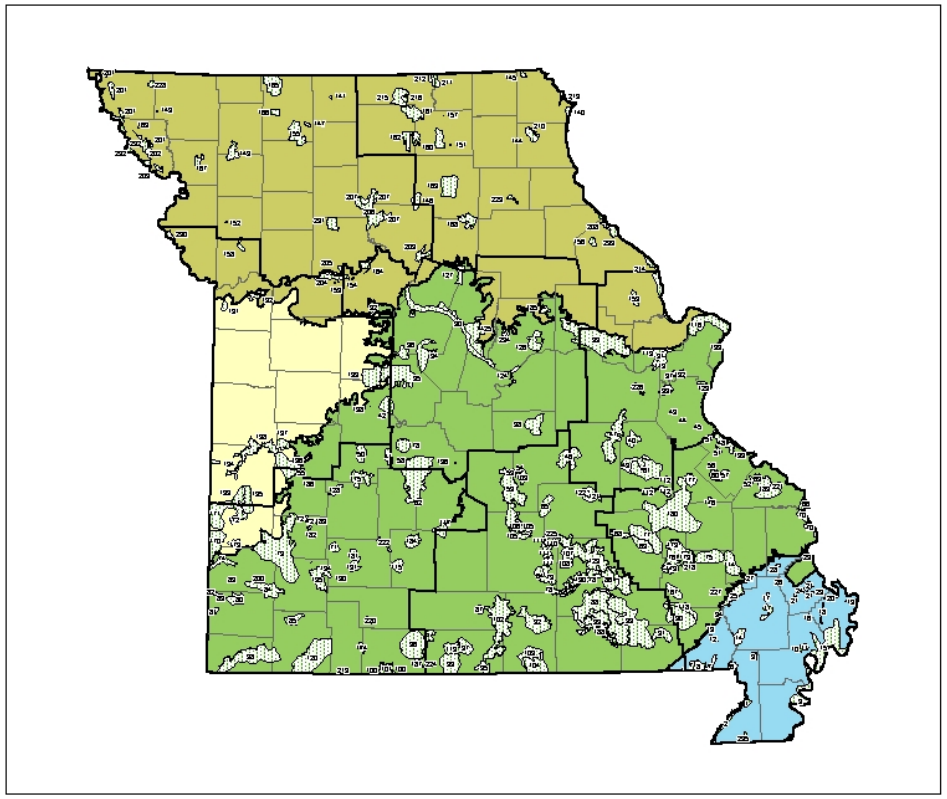


Upper Big Piney and Kaintuck Hollow COAs



Ozark Forested Breaks COAs

Missouri Department of Conservation
Terrestrial Biodiversity Assessment
March 2005



Ecological Sections

- Central Dissected Till Plains
- Mississippi River Alluvial Basin
- Osage Plains
- Ozark Highlands

- MDC_Terrestrial Conservation Opportunity Areas
- COUNTY
- regions

***233 COAs

***5 Million Acres

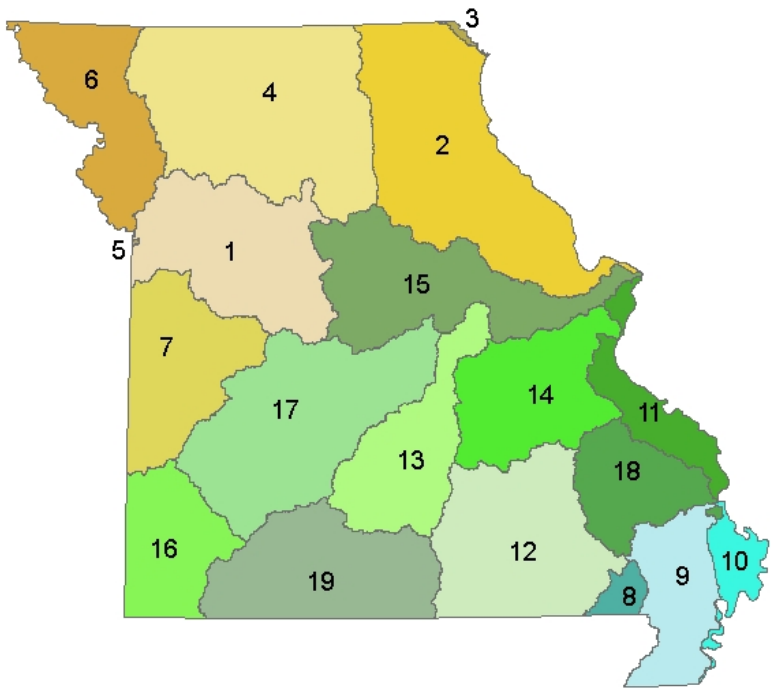
***12% of State

All Ecosystems

Communities

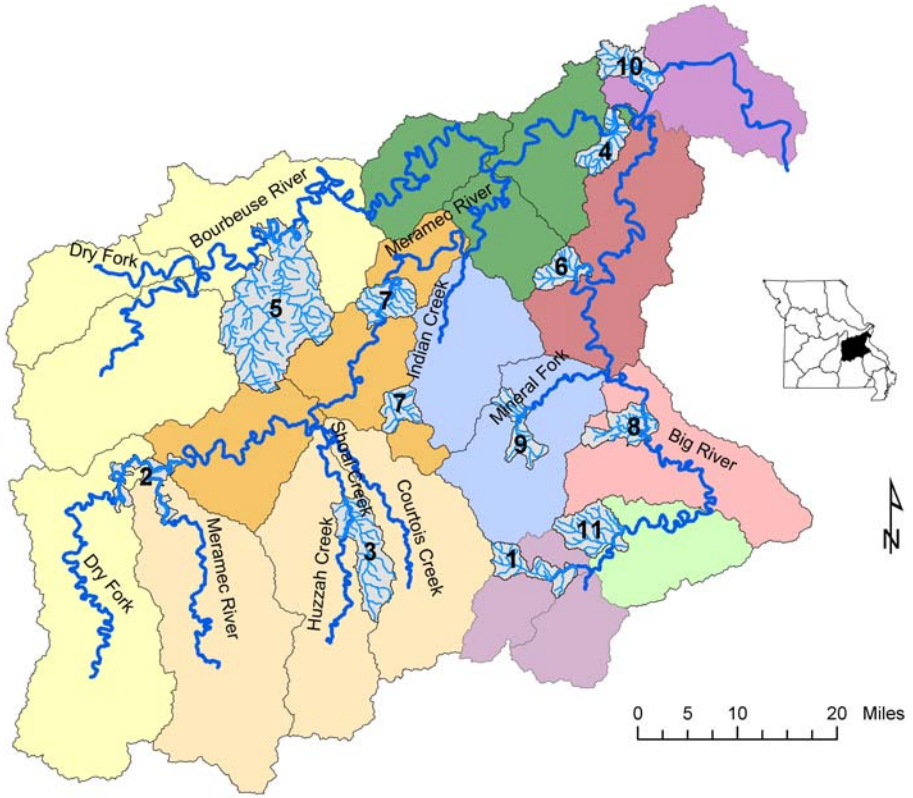
Species

Figure 2. Ecological Drainage Units



1 Central Plains/Blackwater/Lamine
2 Central Plains/Cuivre/Salt
3 Central Plains/Des Moines
4 Central Plains/Grand/Chariton
5 Central Plains/Kansas
6 Central Plains/Nishnabotna/Platte
7 Central Plains/Osage/South Grand
8 MS Alluvial Basin/Black/Cache
9 MS Alluvial Basin/Little
10 MS Alluvial Basin/St. Johns Bayou
11 Ozark/Apple/Joachim
12 Ozark/Black/Current
13 Ozark/Gasconade
14 Ozark/Meramec
15 Ozark/Moreau/Loutre
16 Ozark/Neosho
17 Ozark/Osage
18 Ozark/Upper St. Francis/Castor
19 Ozark/White

Ozark/ Meramec Ecological Drainage Unit



Conservation Opportunity Areas

1. Bootleg Access
2. Dry Fork Upper Meramec
3. Huzzah Creek
4. La Barque Creek
5. Lower Bourbeuse
6. Maupin Creek
7. Middle Meramec
8. Mill Creek
9. Mineral Fork
10. Rockwoods
11. Wallen Creek

COA Streams
Major Streams
COA

Upper AES Types

Boeuf Creek
Dry Fork of the Meramec
Indian Creek
Jacks Fork
Little St. Francis River
Middle Upper Big River

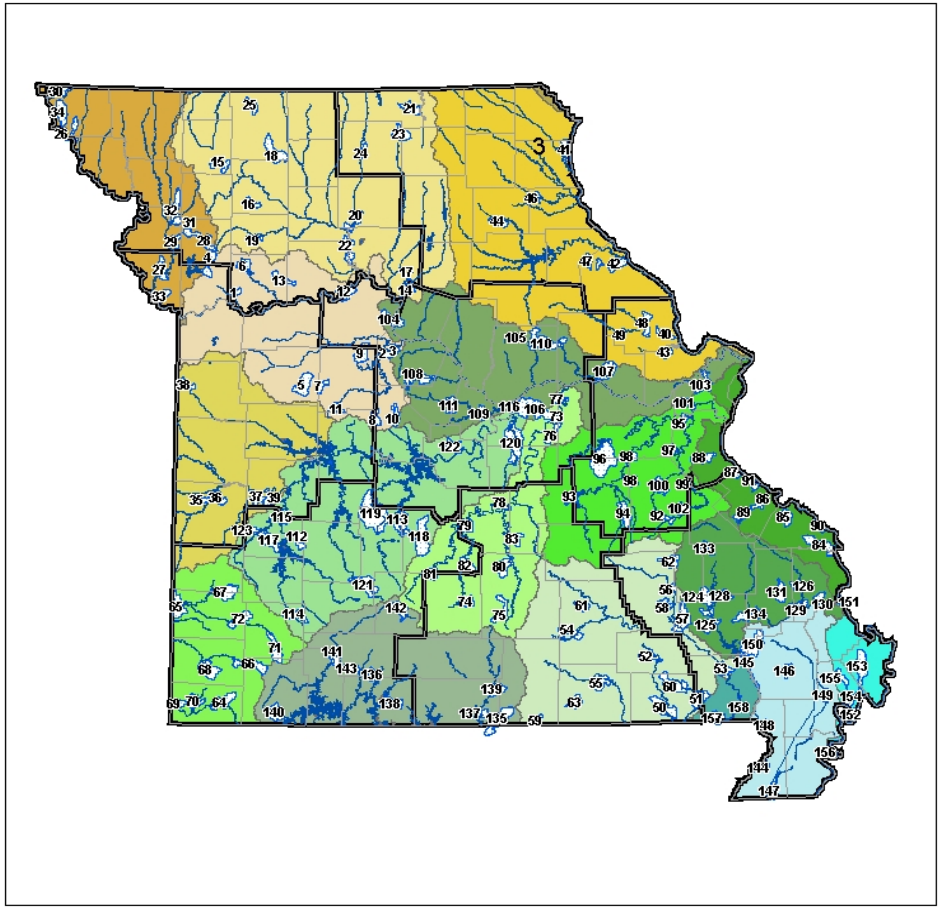
Lower AES Types

Boeuf Creek
Jacks Fork
Lower Meramec
Middle Upper Big River

Missouri Department of Conservation

Aquatic Biodiversity Assessment

April 2005



MDC Aquatic COAs

MDC Regions

Ecological Drainage Units (EDUs)

Counties

***158 COAs

***3 Million Acres

***6% of State

All Aquatic Ecosystems

Communities

Species

Overview of MDC Resource Assessment Process in Support of CWCS

Basic Elements of Conservation Assessments

- Formulate general conservation goal(s)
- Identify fundamental conservation principles or assumptions that must be considered in order to meet these goals
- Select Planning Regions and Assessment Units
- Select conservation targets (biotic, abiotic, processes)
- Specify qualitative or quantitative assessment strategy for meeting general conservation goals
- Identify geographic conservation opportunity areas
- Assess capture of targets by Conservation Opportunity Areas; adjust COAs to capture missing targets
- Specify and implement spatially explicit conservation actions for each COA
- Monitor key indicators to evaluate success of conservation actions

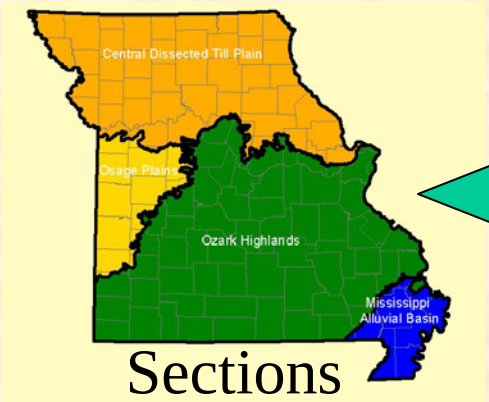
Conservation Goal for CWS

To identify a system of Conservation Opportunity Areas that represent and conserve Missouri's native fauna, flora and the ecosystems they depend on.

Fundamental Conservation Principles and Assumptions

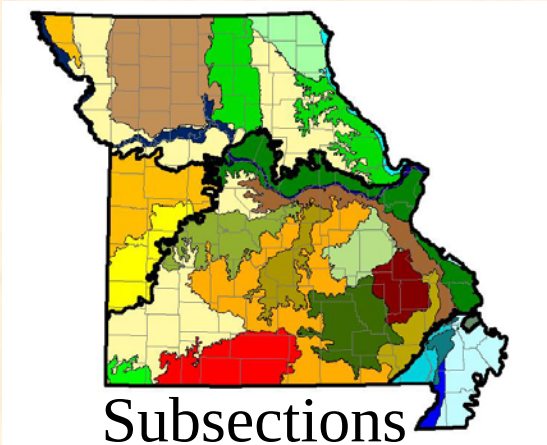
- **The continued decline of our biota and their habitats with limited human and financial resources necessitates the establishment of geographic priorities.**
- **The best way to conserve native species is to conserve the ecosystems and processes they depend on.**
- **The Missouri Terrestrial and Aquatic Ecological Classification Systems are hierarchical frameworks for ecologically based conservation assessments.**
- **Proactive protective measures are less costly and more likely to succeed than restoration actions, therefore we will identify Conservation Opportunity Areas that are in the best condition for conserving the targets.**
- **Conserving a diversity of biotic and abiotic targets is the best and most efficient approach to conservation**
- **More/bigger is better, redundancy is a safeguard, connectivity is important…**
- **Priorities should be established and conservation actions taken at multiple spatial scales; start with landscape scale as a coarse filter, and pick up under represented targets at a finer scale.**
- **Success will depend on the participation of local stakeholders, often private land owners.**

Select Planning Regions and Assessment Units



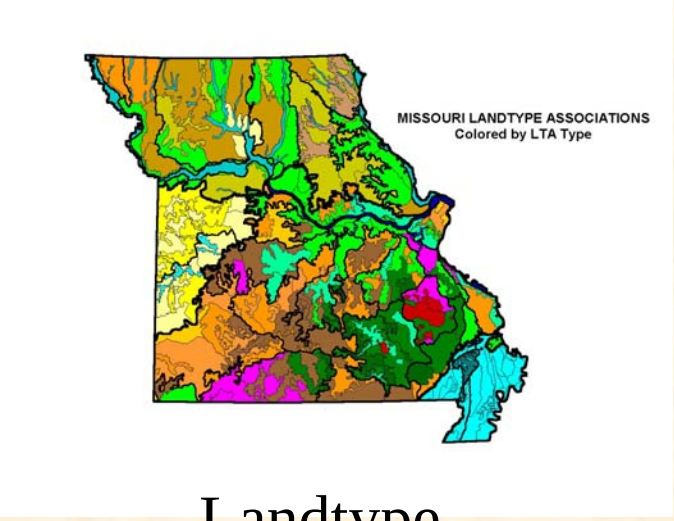
Sections

Planning Regions



Subsections

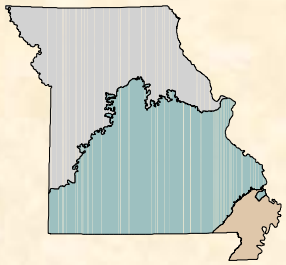
Assessment Units



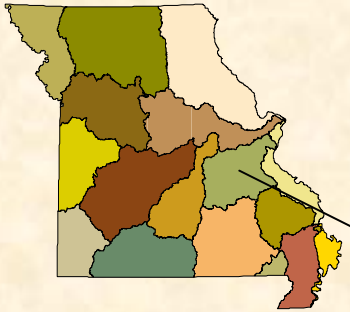
Landtype Association Types

Geographic Framework for Conservation Plan

Level 4
Subregions

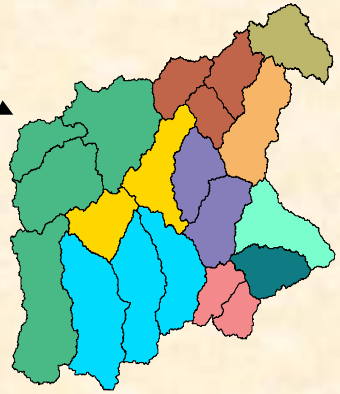


Level 5
Ecological Drainage Units



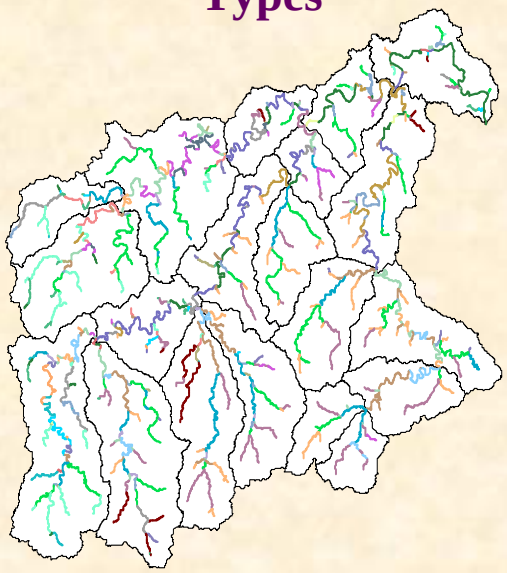
Planning Regions

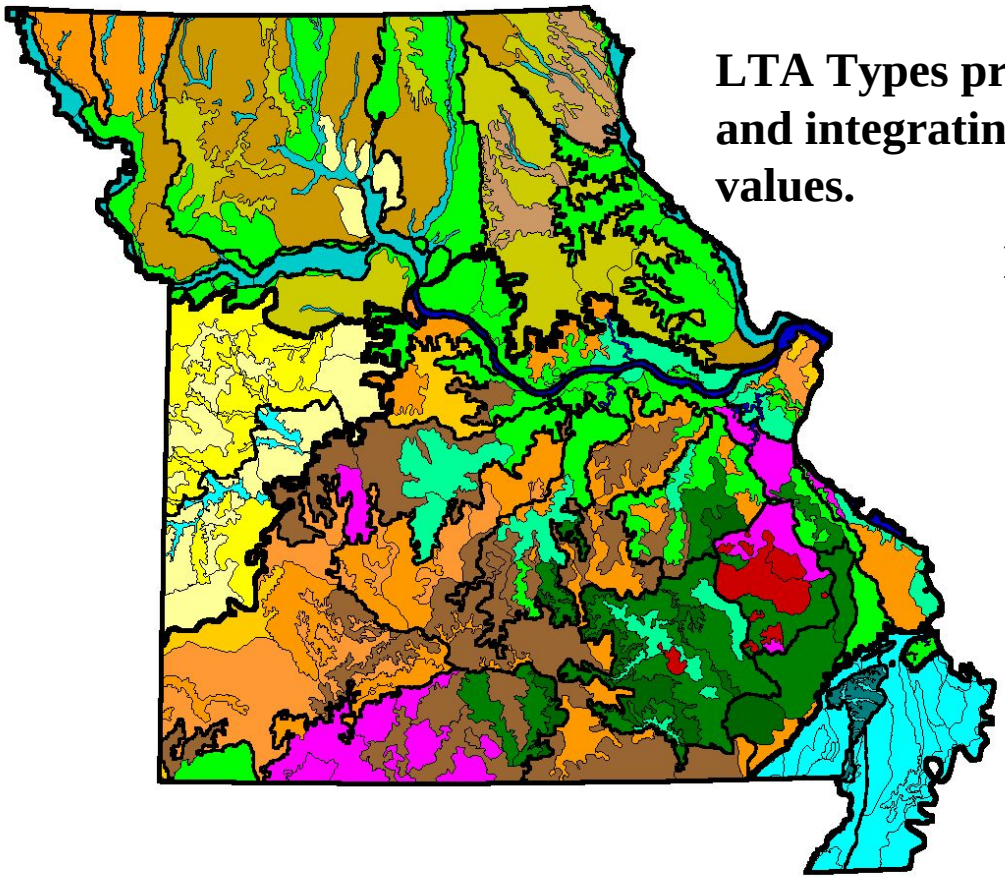
Level 6
Aquatic Ecological System Types



Assessment Units

Level 7
Valley Segment Types





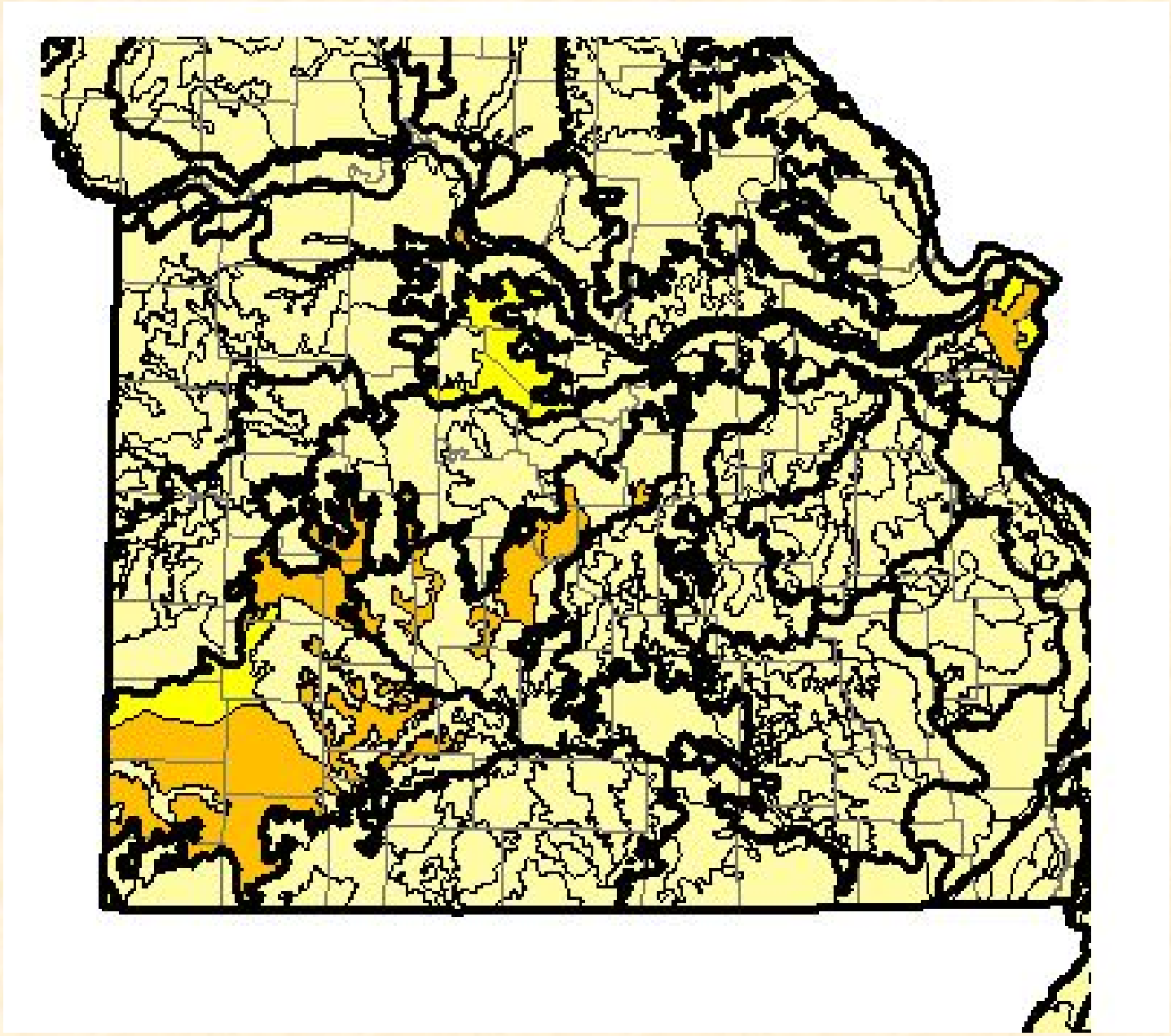
LTA Types provide a framework for identifying and integrating conservation priorities for multiple values.

Landscape Scale Patterns

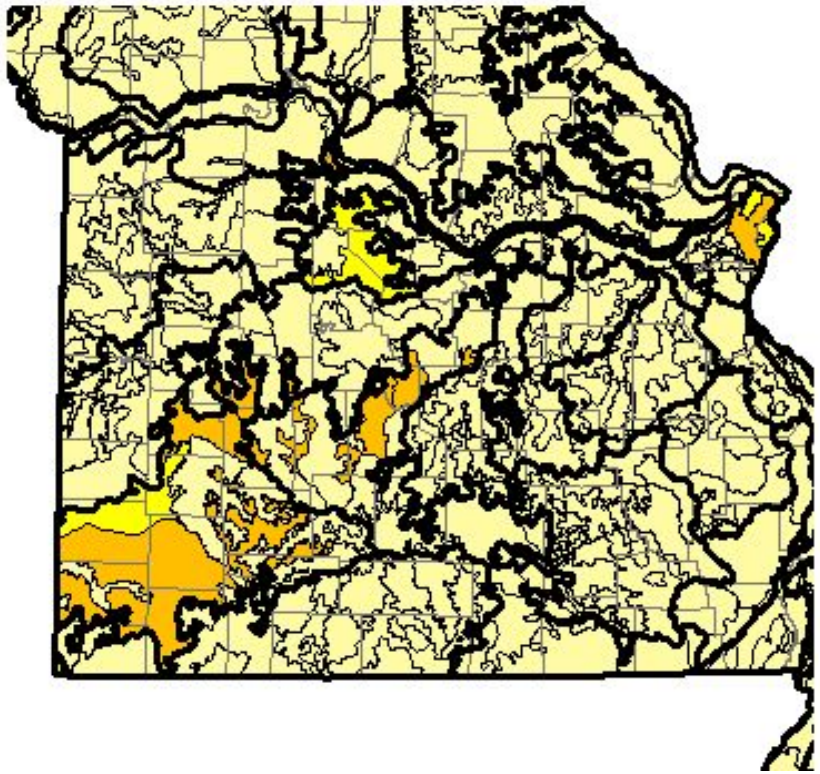
Natural Communities and Habitats

Rare Species

Wildlife Emphasis Species



Ozark Prairie and Prairie-Savanna Plains



Example Conservation Priorities

***Large Grassland and**

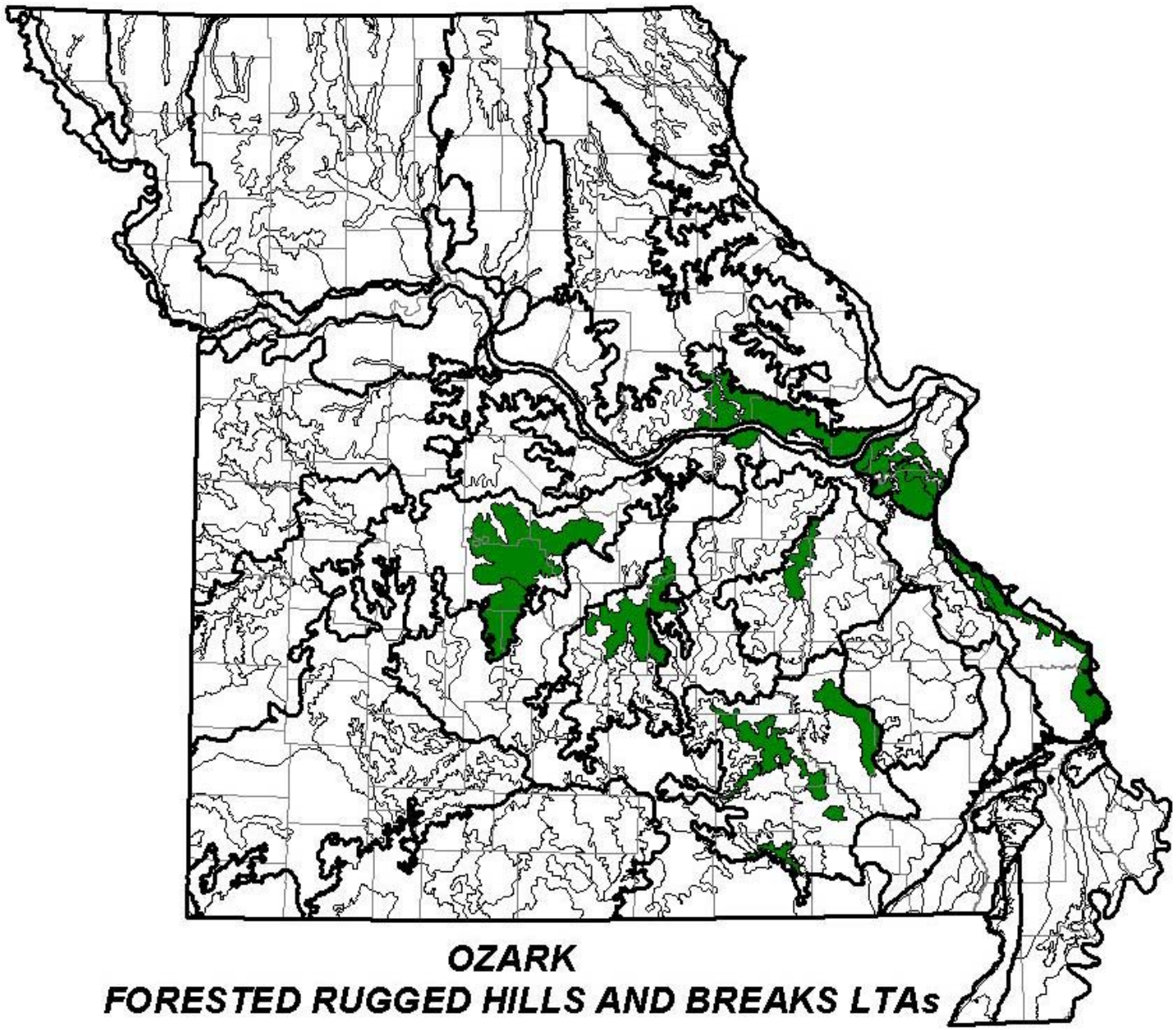
Gassland-Savanna Mosaics

***Prairie and Oak Savanna Restoration**

***Intermittent Headwater**

Streams and Sinkhole Basins

***Prairie and Savanna Species**



OZARK
FORESTED RUGGED HILLS AND BREAKS LTAs

Example Conservation Priorities:

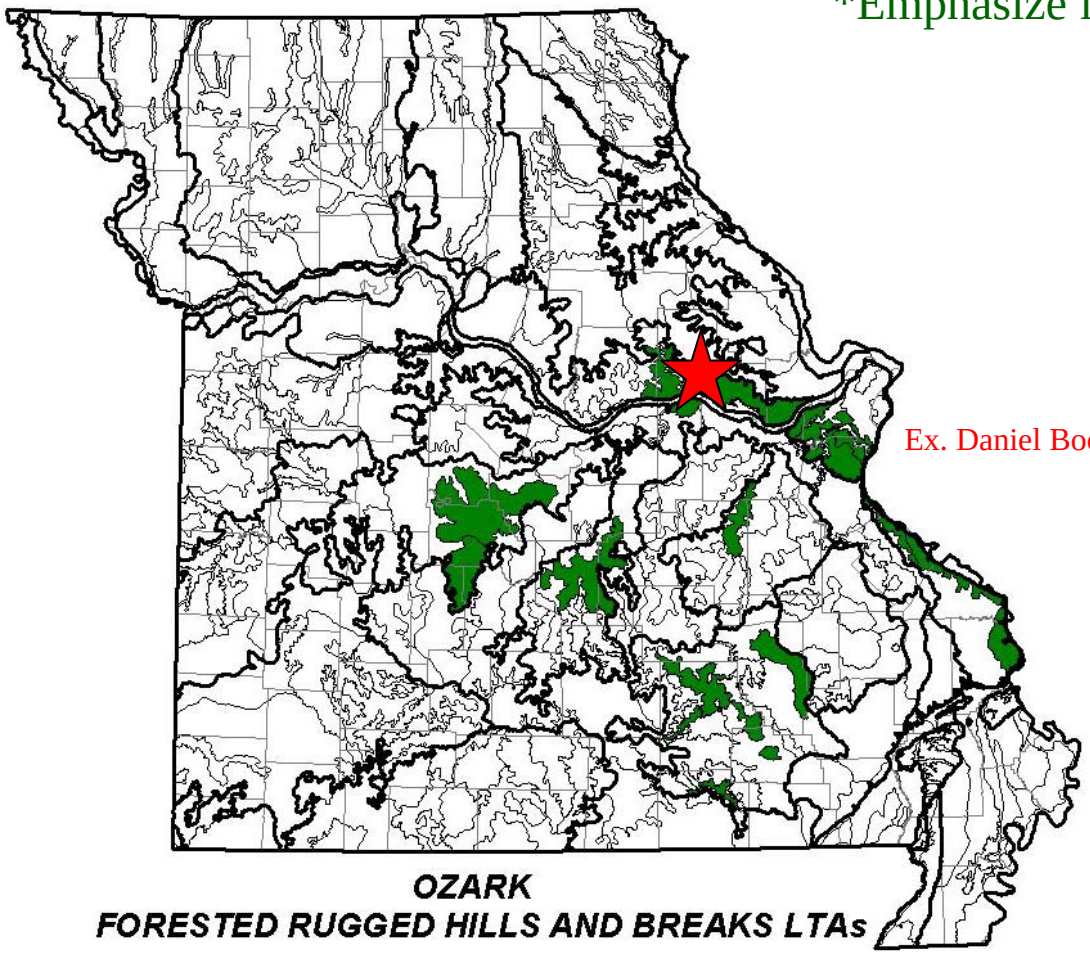
*Maintain large blocks of contiguous forest

*Emphasize mature mixed oak, white oak,

mixed hardwood and bottomland

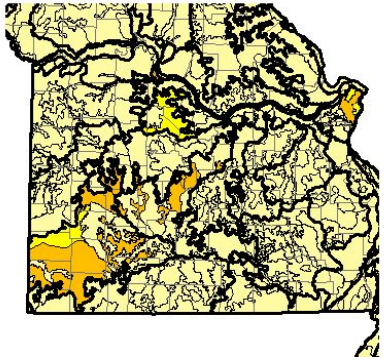
forest communities and glade-woodland complexes.

*Emphasize forest interior wildlife

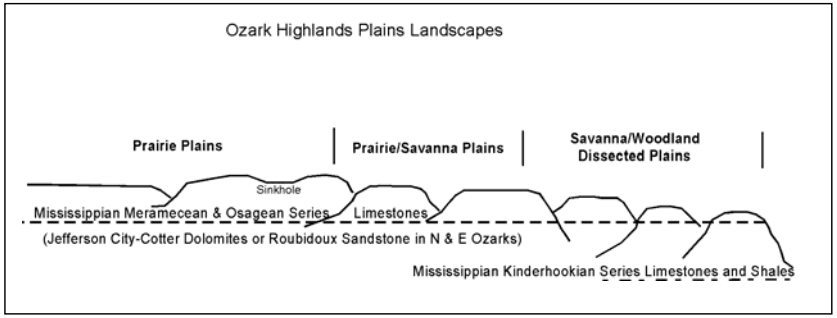


Ex. Daniel Boone CA

OZARK PRAIRIE PLAINS (yellow) & PRAIRIE/SAVANNA DISSECTED PLAINS (orange) LTAS



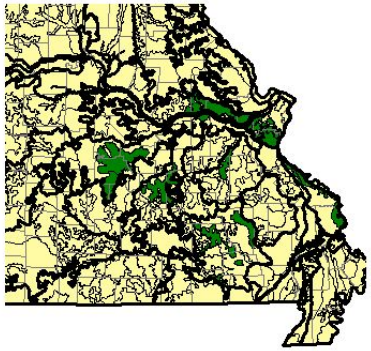
CHARACTERISTICS: High, flat to gently rolling landscapes with less than 100 feet of local relief. Mainly in western Ozarks where prairie was more prevalent, but also in the vicinity of St. Louis. Often associated with karst areas. Historically, prairie dominated the highest, flattest areas and graded into post oak barrens and savanna. Intermittent headwater streams, as well as sinkhole basins were prevalent. Today, these landscapes are largely fescue pasture with small, isolated woodlots, except where urban development dominates. Substantial opportunity for grassland and savanna management exists.



MANAGEMENT ISSUES AND OPPORTUNITIES:

* These landscapes encompass over 3 million acres. Public lands make up only 18,000 acres or less than 1% of the area. Prominent conservation areas include Bois d' Arc, Talbot, Diamond Grove, Murphy, Sloan, and Rinquelin. There are several prairie preserves and a grassland focus area.
* While some of the largest patches of grassland in the Ozarks occur on these LTAs, they are mainly fescue pasture with limited diversity.
* Very few prairie or savanna communities remain, making these ecosystems among the most endangered in the Ozarks. Management using prescribed fire in these landscapes has illustrated the resiliency of prairie and savanna systems.
* 800 records of state-listed species and outstanding natural communities occur. Most records are for upland prairie species. There are also many records for headwater stream and small river species, including federally listed Neosho Madtom, Topeka Shiner and Arkansas Darter. Other important habitats include glades (with Geocarpon and Missouri Bladderpod), and caves (with Ozark Cavefish, Indiana and Gray Bats).
* Land use in sinkhole plains and headwater streams may impact water quality downstream.
* Grassland management can potentially supply native forage .
* Access to roads and towns offers opportunities for interpretation, picnic grounds and short trails.

Z3 OZARK FORESTED RUGGED HILLS AND BREAKS LTAs



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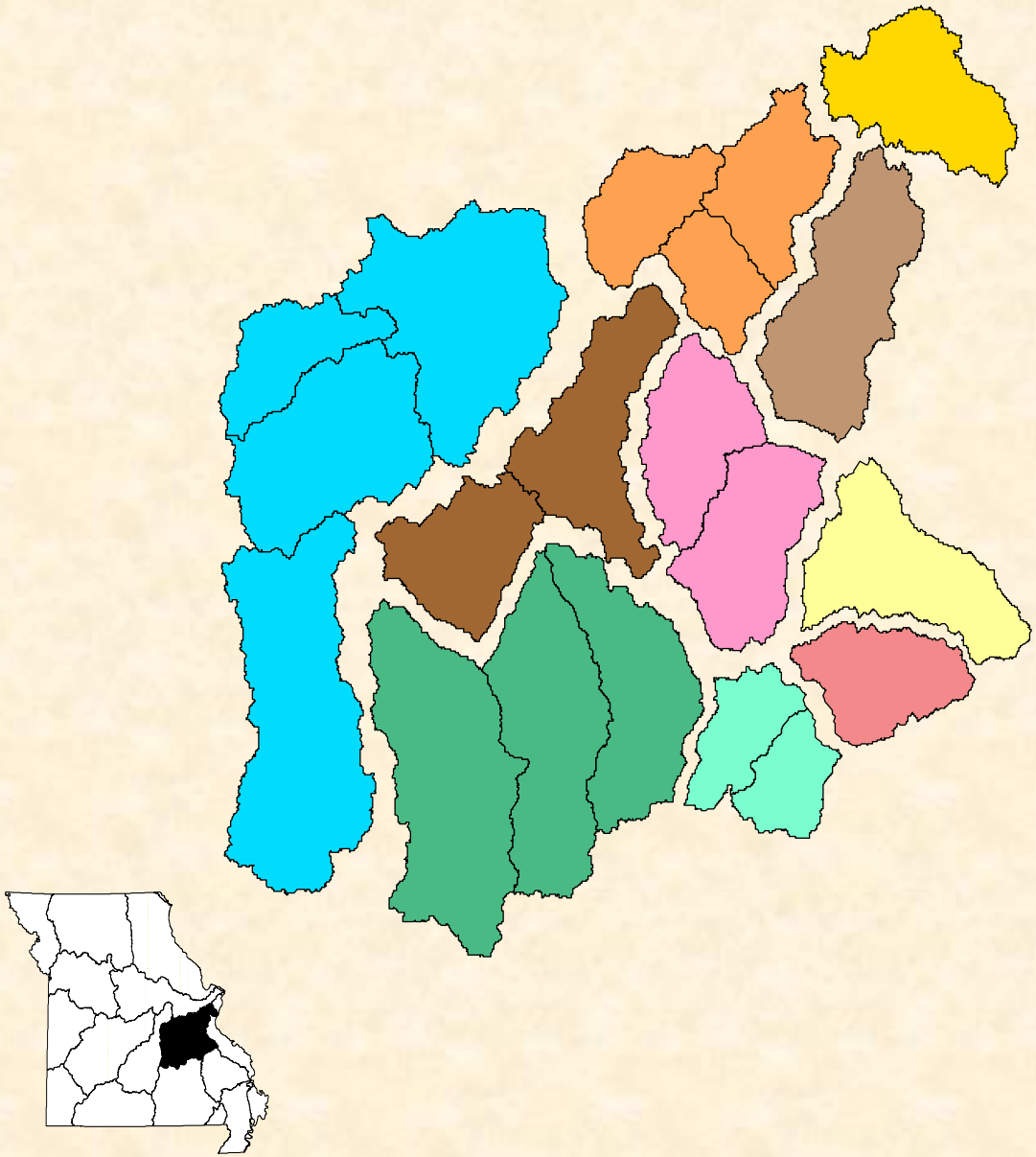
* Outstanding scenery and streams draw concentrations of outdoor recreation.
* The rugged lands offer opportunity for remote recreation.

Aquatic Ecological Systems



Like LTA Types

AESs have inherent

Watershed

Aquatic Community

Aquatic Species

Characteristics

Identify Conservation Targets

Landscapes

Large Blocks of Contiguous Forest

Prairie-Savanna-Woodland Mosaics

Communities/Habitats

Upland Prairie

Post Oak Savannas

Fens

Headwater Streams

Species

Listed, Endemic or Characteristic Species

CONSERVATION STRATEGY FOR:
Ozark Prairie and Prairie/Savanna LTAs

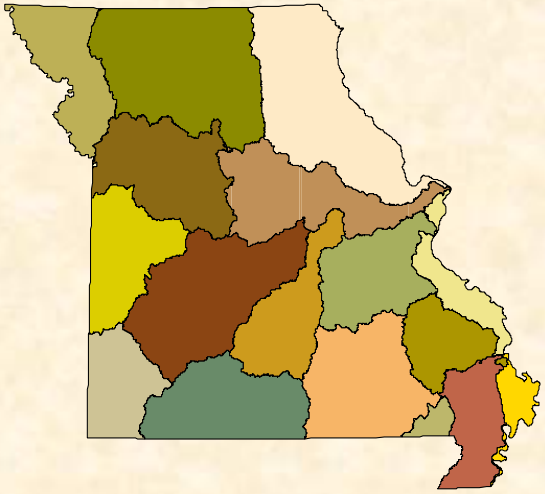
Conservation Targets	
Landscape	Maintain, enhance or restore 2000 acre blocks of grassland and grassland-savanna mosaics
Natural Communities	*Emphasize maintenance and restoration of the following communities*: Upland Prairie Post Oak Savanna and Post Oak-Black Oak Savanna Upland Flatwoods Fens Headwater Streams
Listed Species	*Inventory, Protect and Restore*: Ringed Salamander Niangua Darter Small Sundrop Henslow's Sparrow and Bell's Vireo
Other Emphasis Species	*Ensure Viable populations of*: Northern Bobwhite Quail Cottontail Rabbit
Other	Very limited public lands; conservation activities will require private land owner cooperation.

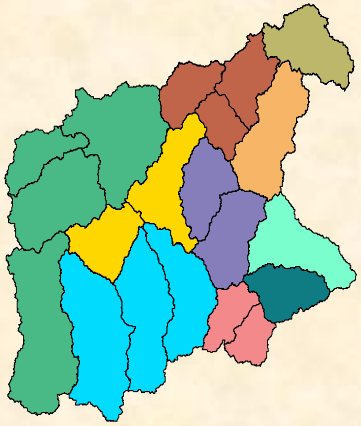
CONSERVATION OPPORTUNITY AREAS

Area	Size (ac)	Public Lands	Management Emphases

Aquatic Assessment Targets

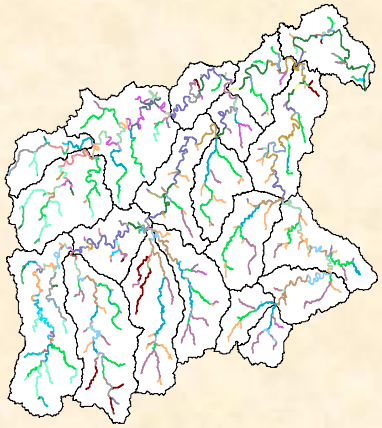
- Assessments done for each EDU





Watersheds

Spring fed, high gradient Ozark streams



Valley Segements

Cold headwater stream on sandstone

Species

Listed, Endemic or Characteristic Species

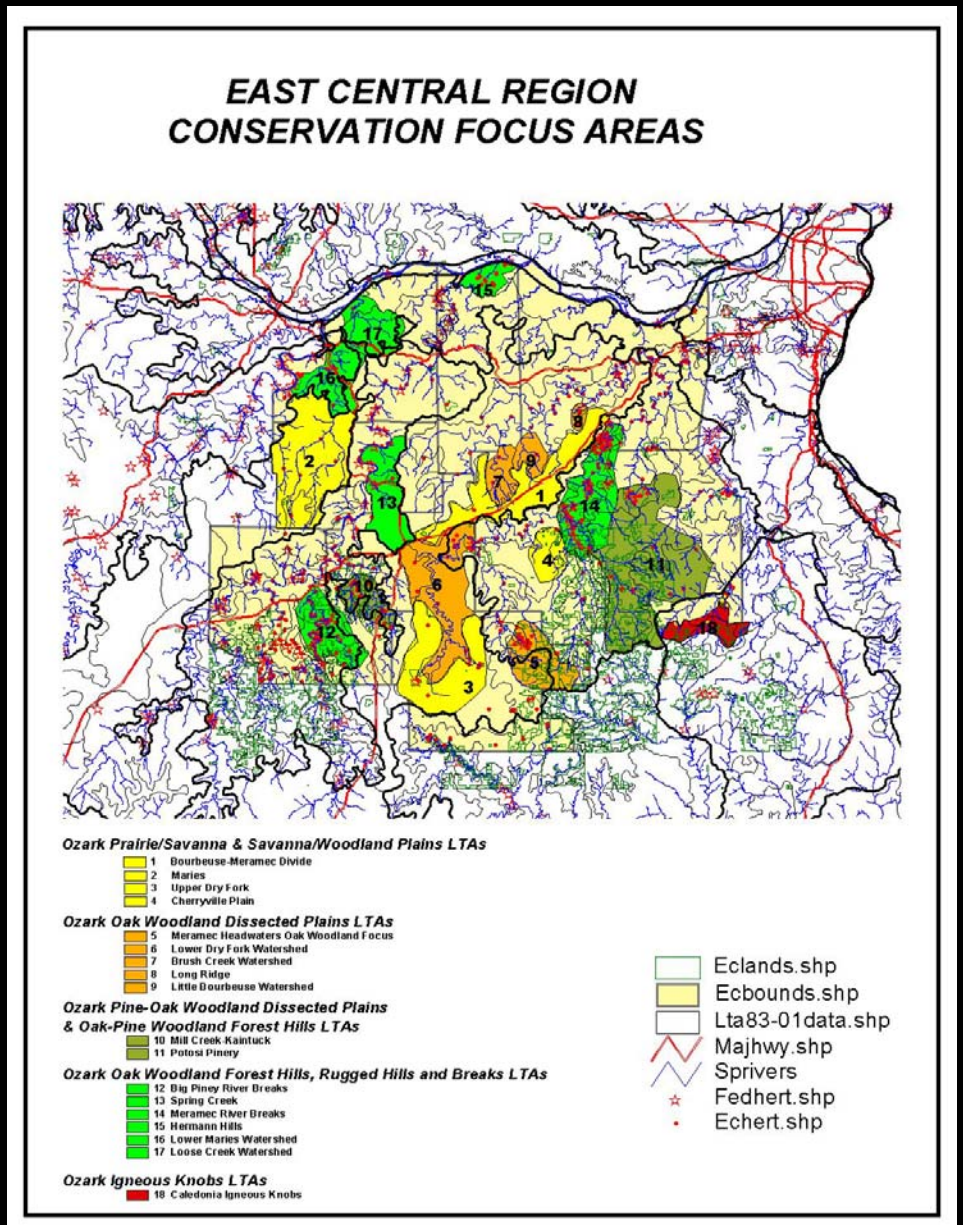
Specify Qualitative or Quantitative Assessment Criteria

- How many occurrences of each target?
- How much area or length?
- Should they be connected?
- If given a choice should conservation efforts:
  - focus on public land?
  - focus on the highest quality locations remaining
- What specific measures will you use to compare and prioritize assessment units?
  - Significance: Richness, # of endemics, …
  - Condition: Quantitative or qualitative measure
  - Threats: Population change, potential for future extractive uses
  - Costs: For restoration, acquisition,…
  - Opportunities: Cooperation/Leveraging, willing landowners

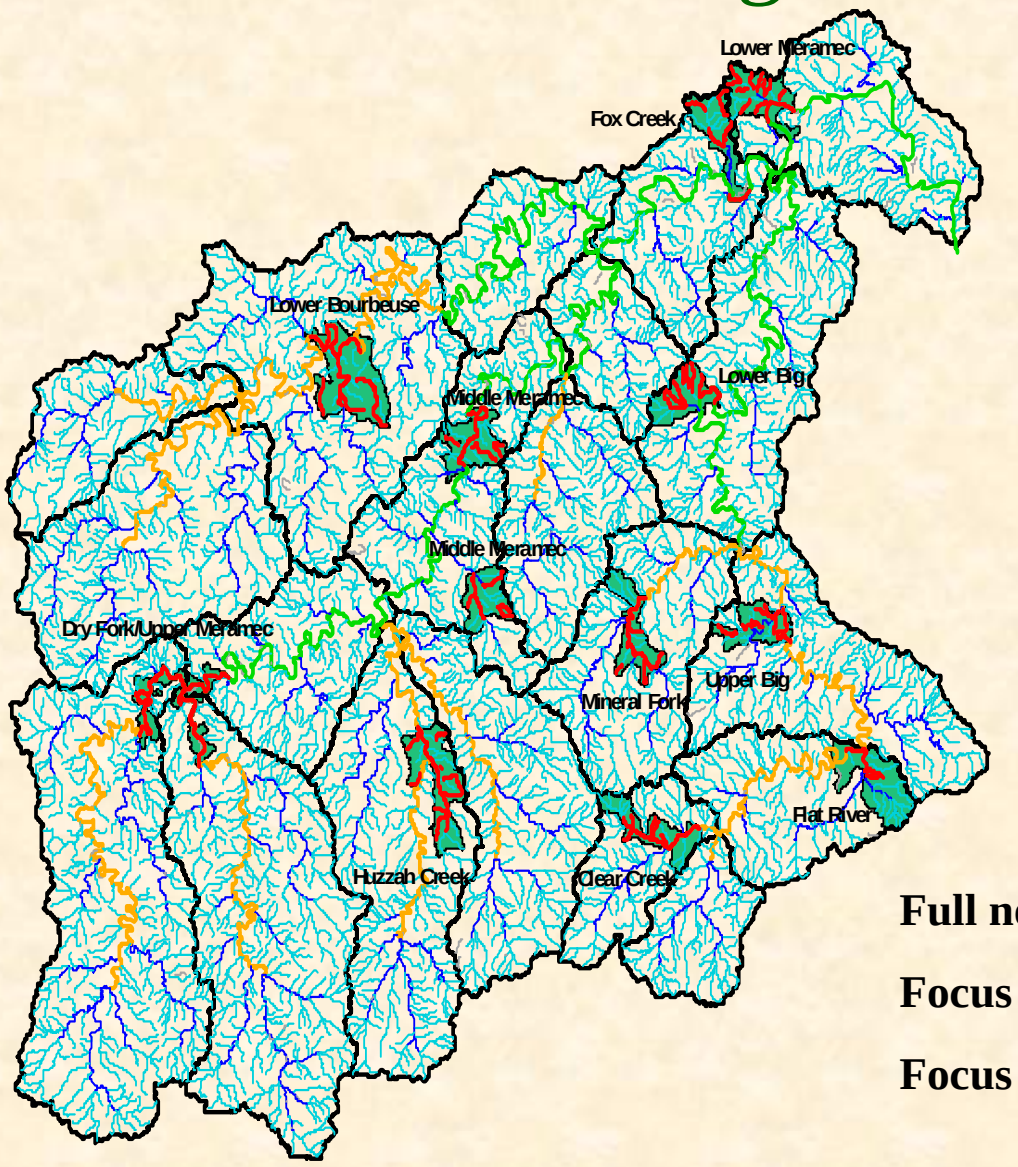
Specify Qualitative or Quantitative Assessment Criteria

- **Terrestrial Conservation Assessment Objectives:**
- Landscapes: Select at least one landscape scale patch representing the LTA Type in each subsection it occurs.
- Communities/Habitats. Select at least 3 examples of target communities/habitats in each LTA Type they are targeted in.
- Select at least 3 populations of target species in the LTA Types they are targeted in.

Select Conservation Opportunity Areas



Meramec Ecological Drainage Unit Showing Focus Areas



Priority Segments
Focus Areas
AES Boundaries
Headwater
Creek
Small River
Large River

Full network: 10,684 km

Focus Area network: 300 km

Focus area represents 2.8% of entire network

Assess Target Capture & Adjust COAs

Taxon	Common	Scientific	Grank	Srank	Endemism	#Captures
Fish	Alabama shad	Alosa alabamae	G3	S2	Region	3
	banded darter	Etheostoma zonale	G5	S?	Region	7
	banded sculpin	Cottus carolinae	G5	S?	Region	8
	bigeye chub	Notropis amblops	G5	S?	Region	10
	bigeye shiner	Notropis boops	G5	S?	Region	10
	bigmouth shiner	Notropis dorsalis	G5	S?	Region	3
	black redhorse	Moxostoma duquesnei	G5	S?	Region	10
	blackspotted topminnow	Fundulus olivaceus	G5	S?	Region	10
	blackstripe topminnow	Fundulus notatus	G5	S?	Region	6
	bleeding shiner	Luxilus zonatus	G5	S?	Subregion	10
	blue sucker	Cycleptus elongatus	G3G4	S3	Region	1
	bluegill	Lepomis macrochirus	G5	S?	Subzone	10
	bluntnose minnow	Pimephales notatus	G5	S?	Subzone	10
	brook silverside	Labidesthes sicculus	G5	S?	Subzone	9
	chestnut lamprey	Ichthyomyzon castaneus	G4	S?	Region	7
	creek chubsucker	Erimyzon oblongus	G5	S?	Subzone	4
	crystal darter	Crystallaria asprella	G3	S1	Region	4
	fantail darter	Etheostoma flabellare	G5	S?	Subzone	10
	flathead chub	Platygobio gracilis	G5	S1	Subzone	1
	flier	Centrarchus macropterus	G5	S3	Subzone	3
	ghost shiner	Notropis buchanani	G5	S2	Region	1
	gilt darter	Percina evides	G4	S?	Region	6
	golden redhorse	Moxostoma erythrurum	G5	S?	Subzone	9
	grass pickerel	Esox americanus	G5	S?	Subzone	9
	gravel chub	Erimystax x-punctatus	G4	S?	Region	7
	green sunfish	Lepomis cyanellus	G5	S?	Region	10
	greenside darter	Etheostoma blennioides	G5	S?	Region	10
	highfin carpsucker	Carpiodes velifer	G4G5	S2	Region	4
	hornyhead chub	Nocomis biguttatus	G5	S?	Region	10
	largemouth bass	Micropterus salmoides	G5	S?	Subzone	10
	largescale stoneroller	Campostoma oligolepis	G5	S?	Region	10
	least brook lamprey	Lampetra aepyptera	G5	S4	Region	4
	logperch	Percina caprodes	G5	S?	Subzone	9
	longear sunfish	Lepomis megalotis	G5	S?	Subzone	10
	Mississippi silvery minnow	Hybognathus nuchalis	G5	S3S4	Region	3
	Missouri saddled darter	Etheostoma tetrazonum	G5	S?	Subregion	10
	mooneye	Hiodon tergisus	G5	S3	Subzone	4
Fish	mottled sculpin	Cottus bairdi	G5	S4	Subzone	10

MDC Resource Assessment Process

- **Conduct parallel Terrestrial and Aquatic Resource Assessments**
  - **Nigh, Figg & Sowa Coordinate with GIS Support**
  - **Core Teams of Specialists Participate Throughout**
  - **Appropriate Field Staff are nominated by Divisions**
- **Formulate general conservation goal(s)**
- **Use ECS to stratify Planning Regions and Assessment Units**
- **Identify conservation targets at landscape, community and species levels**
- **Specify qualitative or quantitative assessment objectives**
- **Use multiple GIS layers to Identify geographic Conservation Opportunity Areas**
- **Assess Target Capture and Adjust COAs to Capture Under Represented Targets**
- **Integrate and merge terrstrial and aquatic assessments into a single set of COAs**

Products:

1. **Map and Descriptions of Conservation Opportunity Areas**
2. **Tables and databases outlining targets and target capture.**
3. **A document summarizing the MDC Terrestrial and Aquatic Assessment processes and results.**