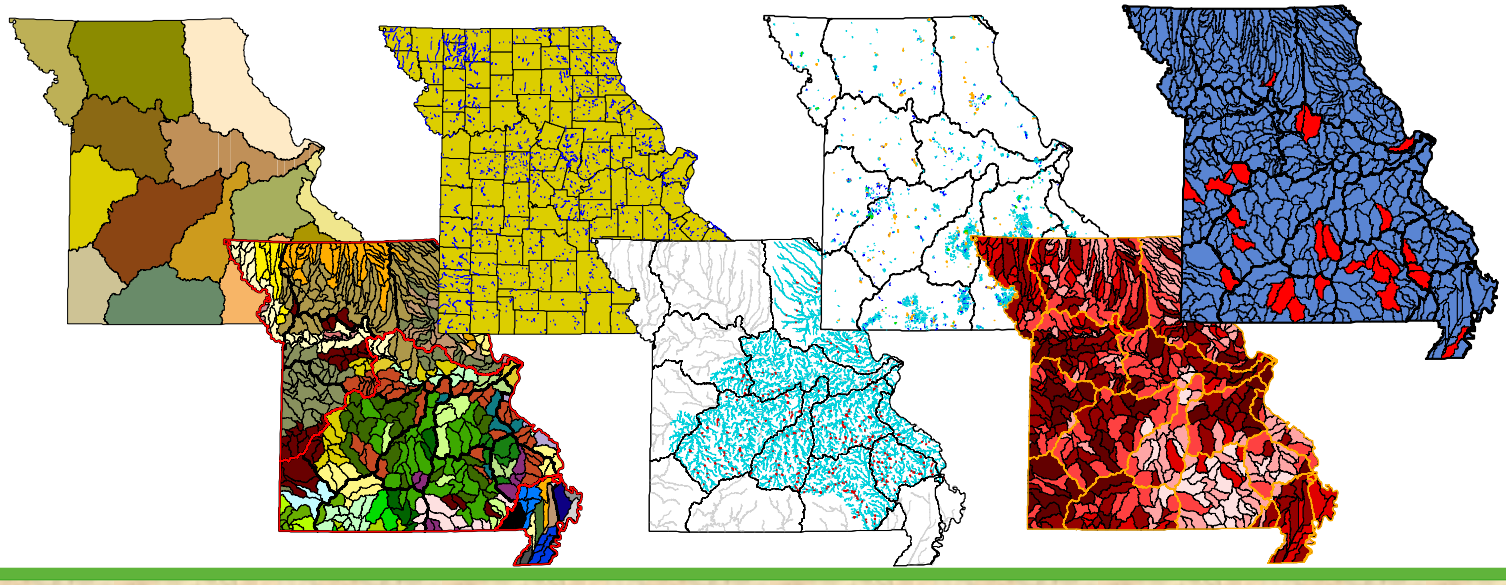
Using Aquatic GAP Data to Assist with the Development Of Statewide CWCSs An Example from Missouri



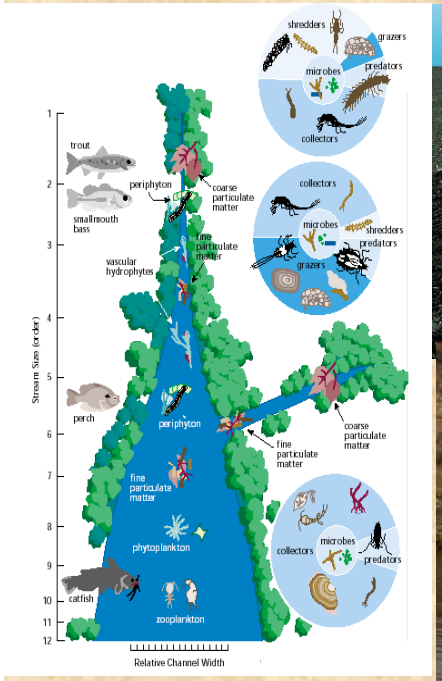
Scott Sowa, Gust Annis, Michael Morey, and David Diamond
Missouri Resource Assessment Partnership
University of Missouri

Tim Nigh and Dennis Figg
Missouri Department of Conservation

“Comprehensive”Biodiversity Conservation Plan

- Monies from the Federal State Wildlife Grant (SWG) Program are being used to develop a statewide comprehensive conservation plan
- SWG started in 2001
  - revenues generated from taxes on items used for non-consumptive outdoor recreation
- Appropriations have ranged from $50-80 million nationally with MDC receiving ~ $1 million
- All states required to develop plan by October 2005
- We will be using our data to work with a core committee and 9 regional teams from Oct 2003-2004 to develop plan

Overview of Conservation Planning

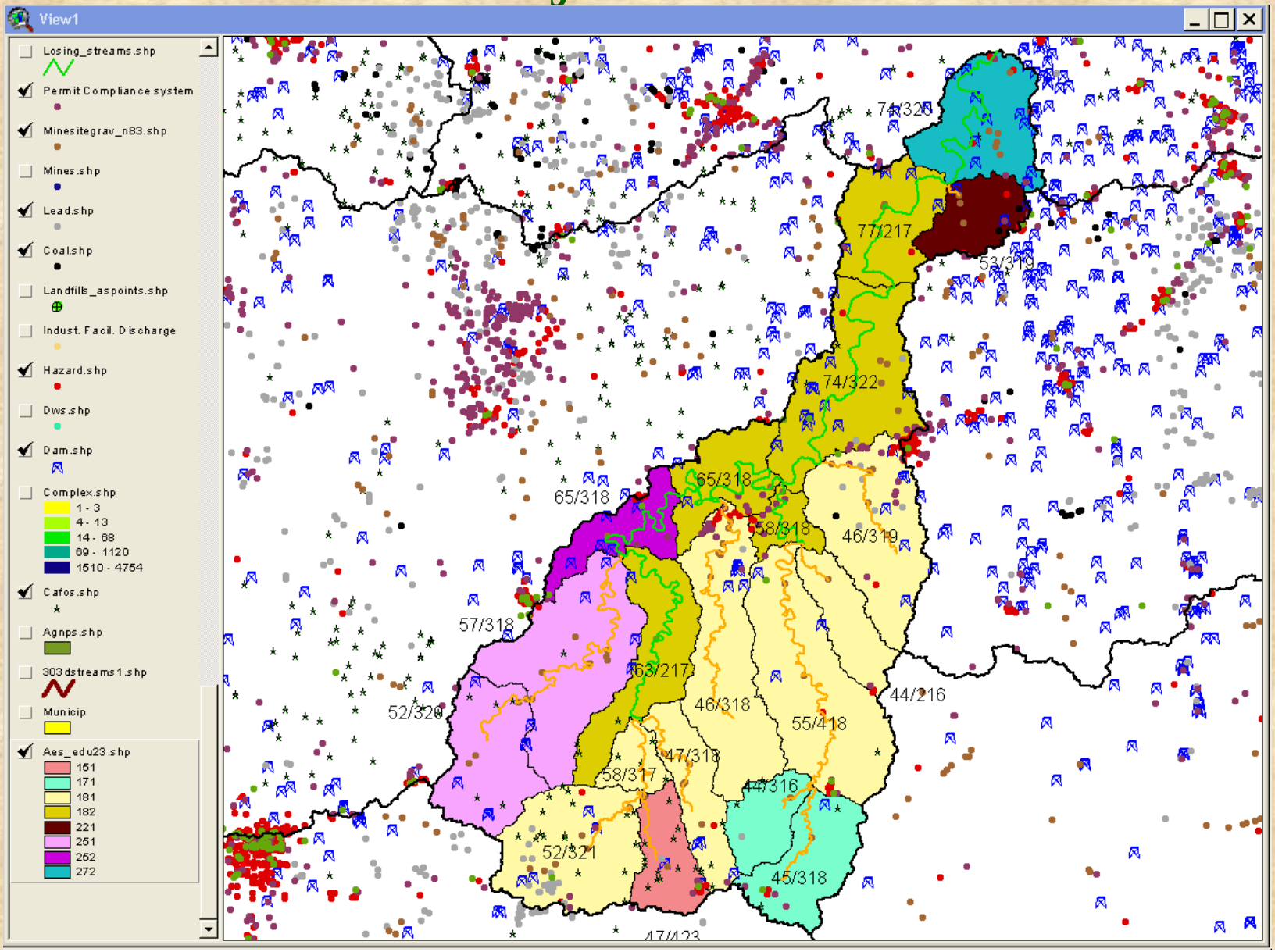


Objectives of Aquatic Task Force

- 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
- Specify qualitative or quantitative assessment criteria
- Establish geographic conservation priorities
- Specify spatially explicit conservation actions for each priority species, community, or site

- Implement spatially explicit conservation actions for each priority species, community, or site
- Monitor key indicators to evaluate success of conservation actions

MoRAP Developed Customized ArcView Projects for each EDU

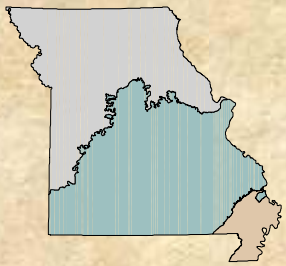


Elements of Comprehensive Conservation Plan

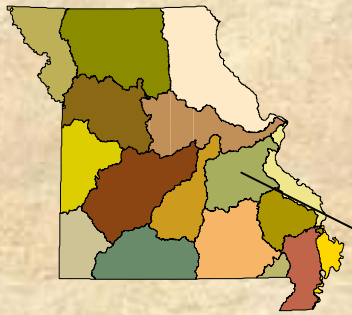
- Goal: Ensure long term persistence of native aquatic plant and animal communities, by conserving the conditions and processes that sustain them,…
- Fundamental conservation principles or assumptions:
  - Must conserve ecosystems and associated processes
  - Watersheds are a fundamental conservation unit and define ecosystems for riverine systems
  - Proactive protective measures are less costly and more likely to succeed than restoration actions
  - Conserving a diversity of biotic and abiotic targets is the best and most efficient approach to conservation
  - Planning efforts must be scaleable to address state, regional and ultimately local implementation by all stakeholder
  - Ensuring connectivity among abiotic targets is essential for meeting the life history requirements of many riverine species
  - Redundancy in the representation of conservation targets is more costly but often necessary to ensure the long-term persistence of these targets
  - Several others

Geographic Framework for Conservation Plan

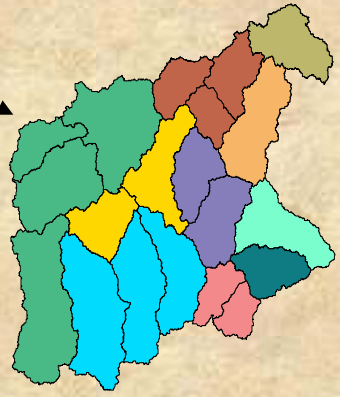
Level 4
Subregions



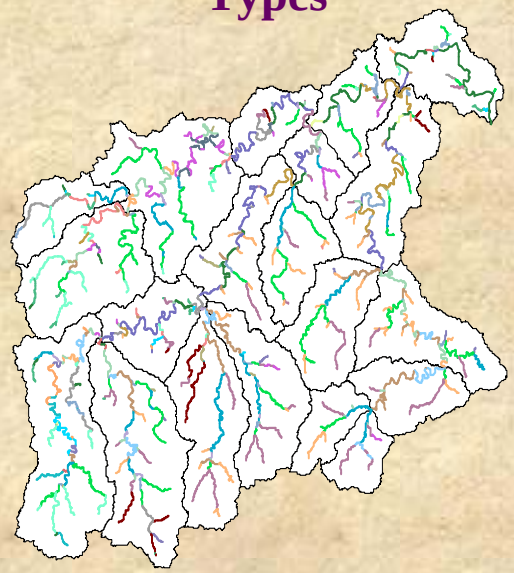
Level 5
Ecological Drainage Units



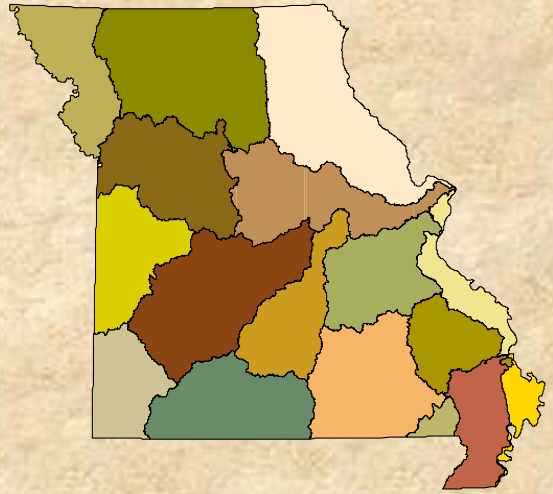
Level 6
Aquatic Ecological System Types



Level 7
Valley Segment Types

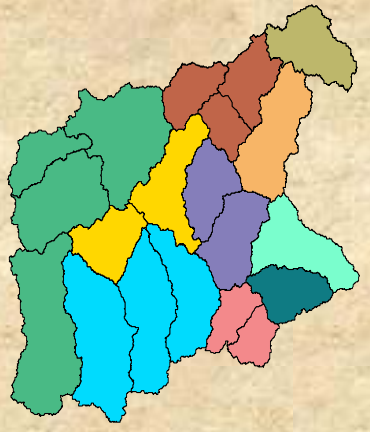


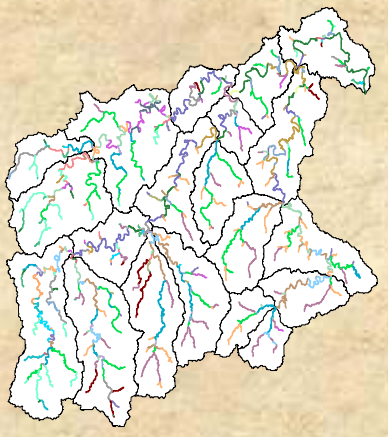
Approach for Developing Statewide Plan



- Generate separate conservation plans for each Ecological Drainage Unit (EDU)

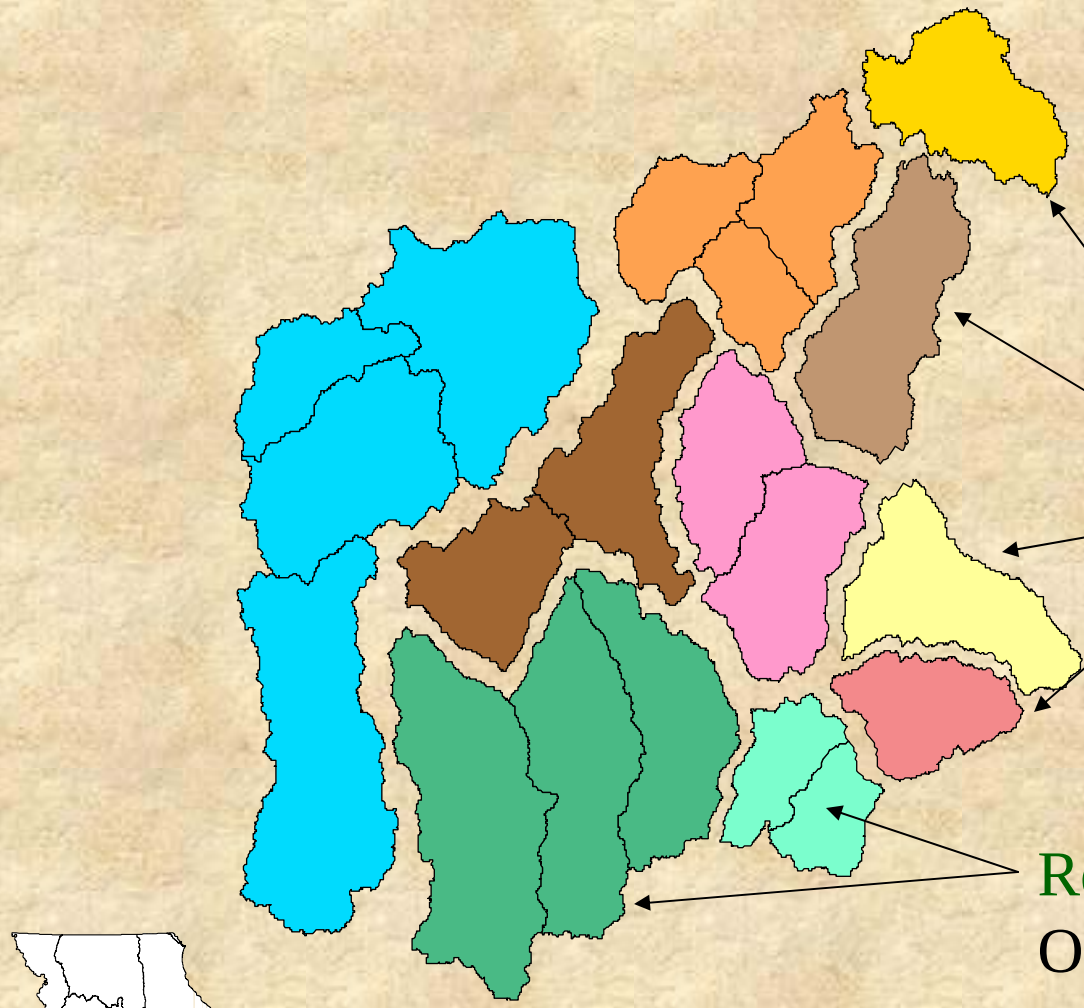
- Select priority Aquatic Ecological Systems (AES's) and Valley Segment Types (VST) complexes





Conservation Strategy

Abiotic



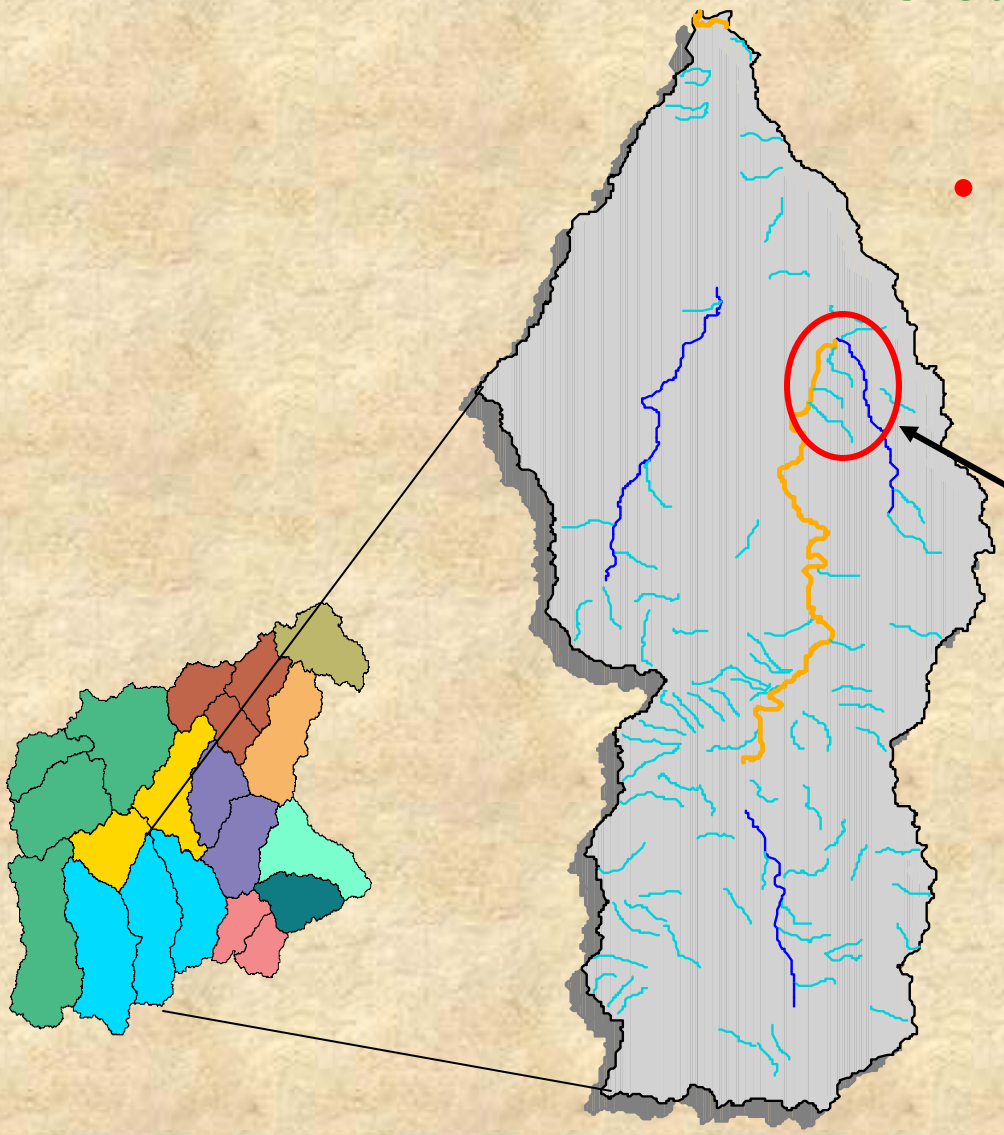
- EDU Level
  - Representation of all AES-Types

Distinct types:
Each one warrants conservation

Redundant types:
One individual AES warrants conservation

Conservation Strategy

Abiotic



- AES Level
  - Represent all dominant VST's for each stream size
  - Within a <u>single</u> AES
  - Ensure <u>connectivity</u> among size classes

Stream Size Classes

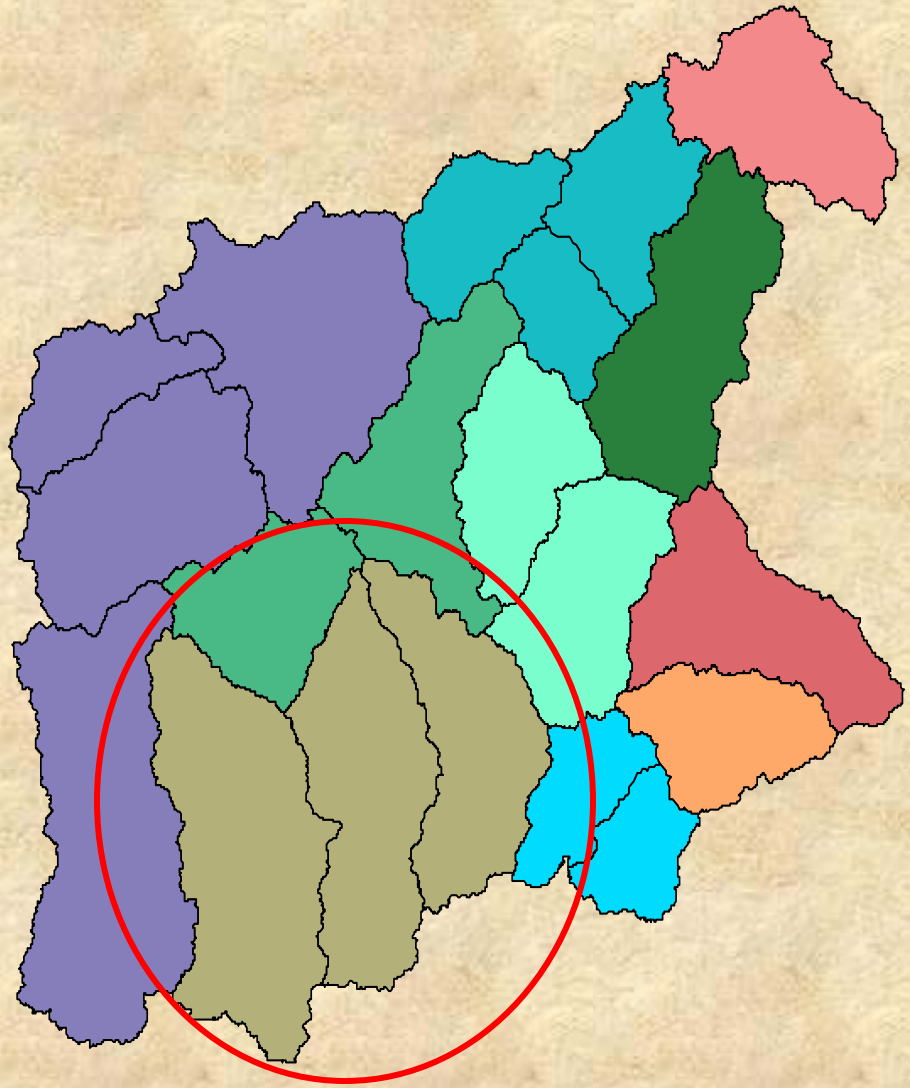
Headwater

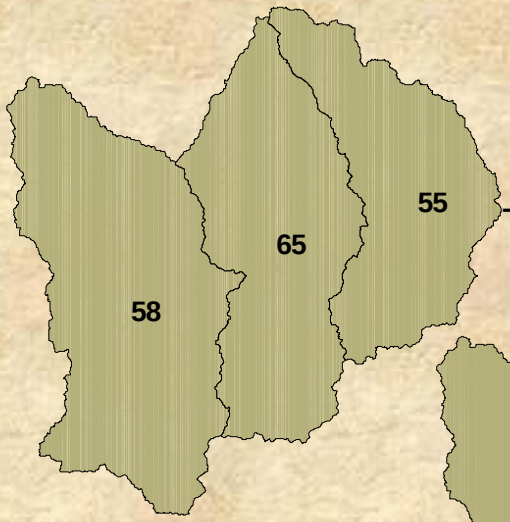
Creek

Small River

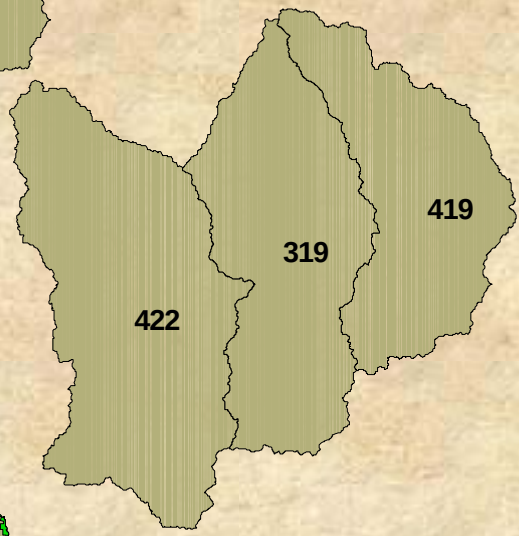
Dominant Valley Segment Types by Size Class For Huzzah River AES

AES Selection Criteria

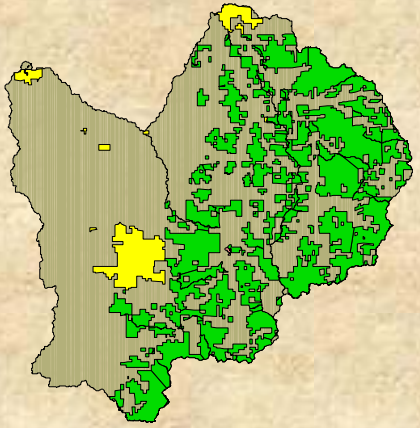




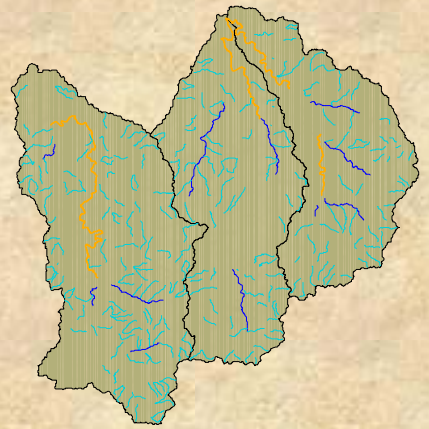
- Target Species Richness



Human Stressor Index -

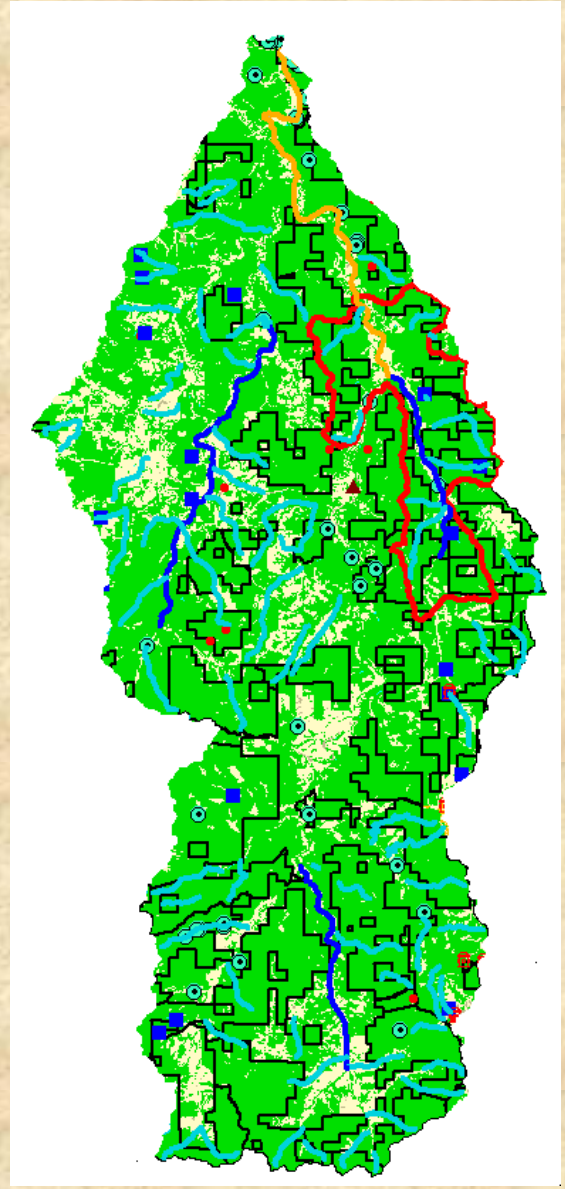


- Public Lands



Ability to Achieve
Connectivity among -
Dominant VST's

VST Selection Criteria and Important Data Layers



COA

Dominant Stream Types

Headwater
Creek
Small River

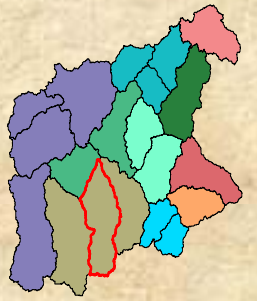
Stressors

Heritage Data Point
Point Sources
Dams
CAFOS
AGNPS
Gravel Mines

Public Lands Boundary

Landcover

Urban
Row and Close-Grown Crops
Grassland
Forest and Woodland
Swamp and Marsh
Open Water
No Data



Criteria:

Connectivity

Stressors

Public Ownership

Stressors:

Point sources

Dams

Cafos

Agricultural non-point sources

303d listed streams

Gravel mines

Other mines

Roads

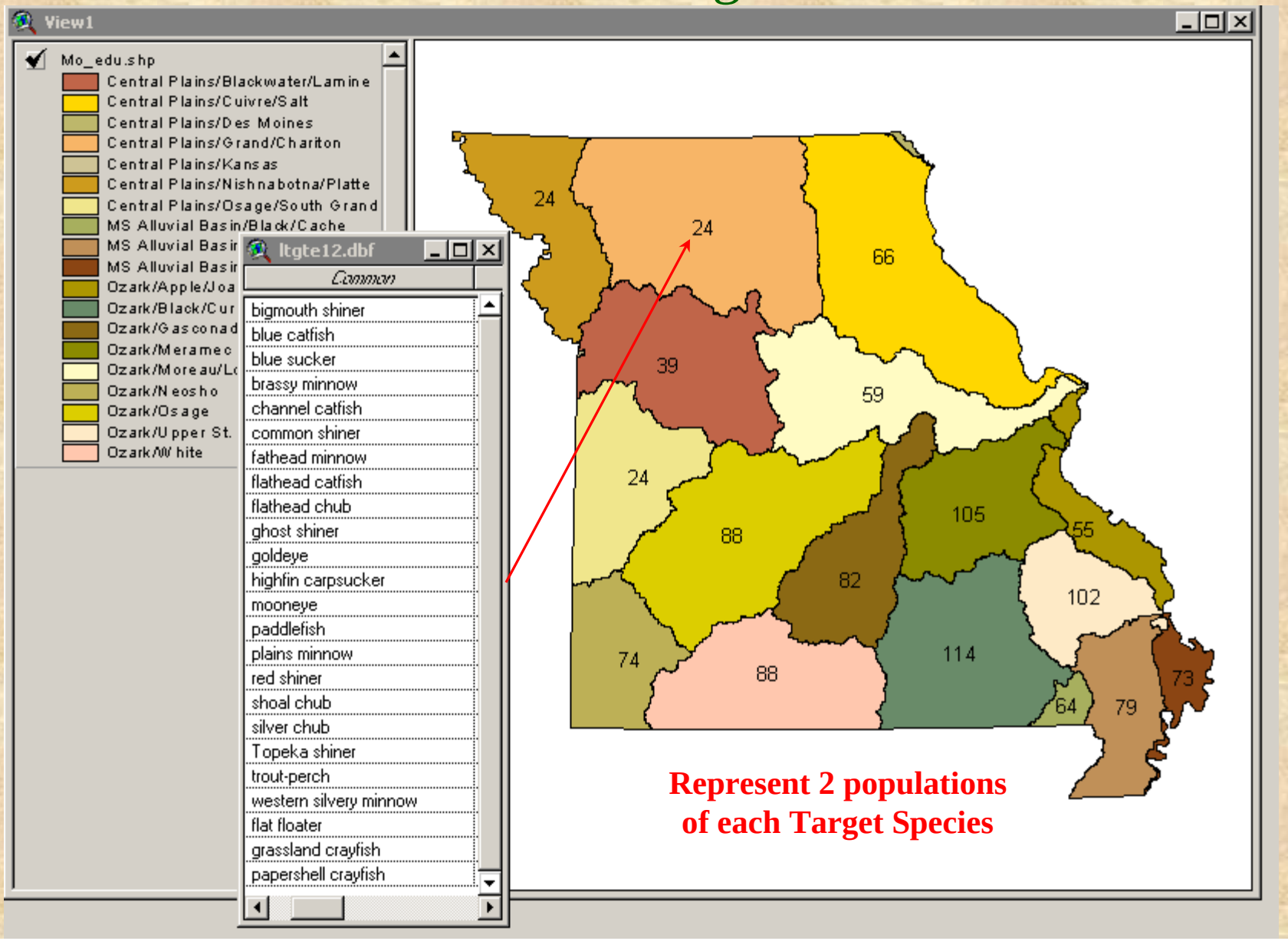
Exotic species

Hazardous material generators

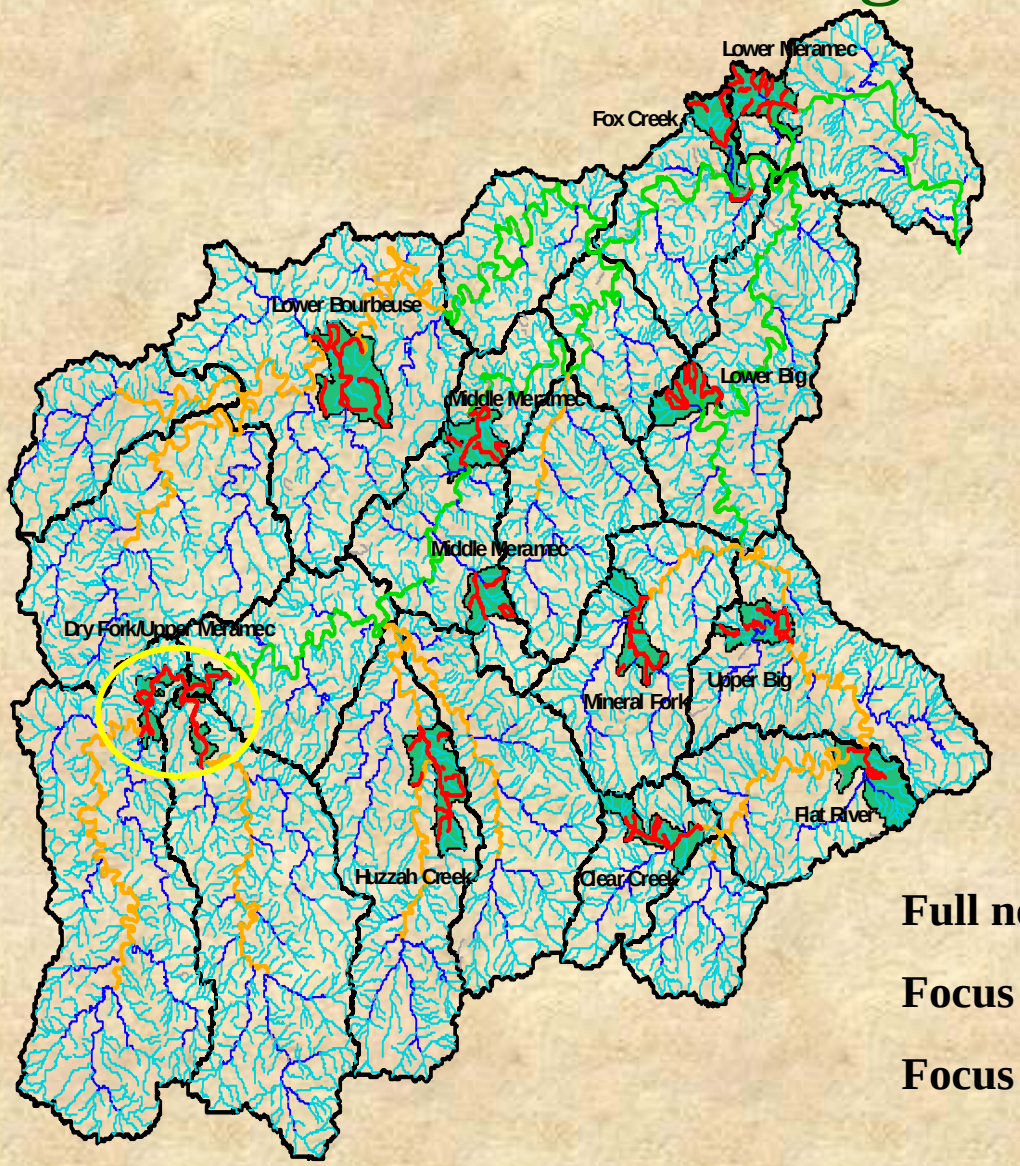
Industrial Facility Discharges

Conservation Strategy

Biotic Targets



Meramec Ecological Drainage Unit Showing COAs



Priority Segments

COAs

AES Boundaries

Headwater

Creek

Small River

Large River

Full network: 10,684 km

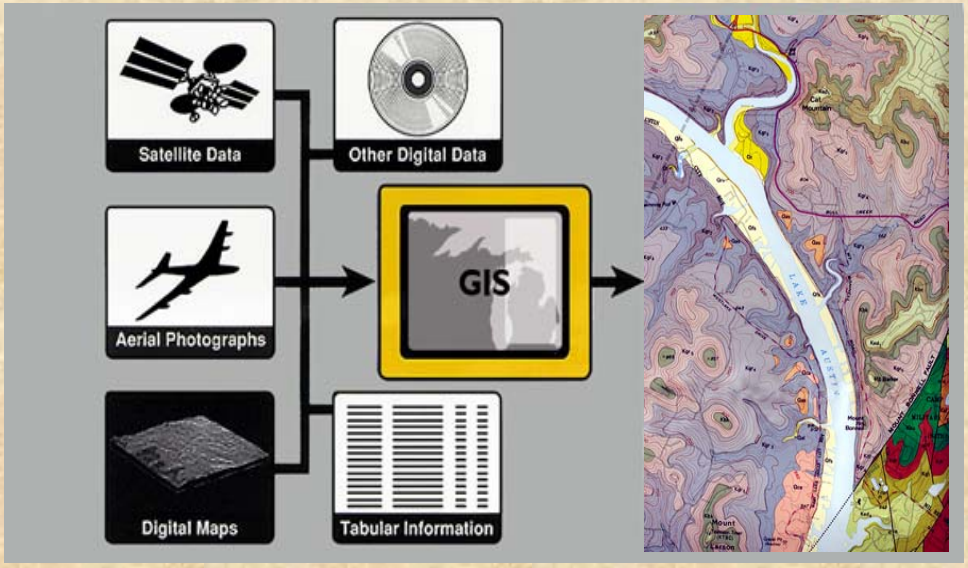
Focus Area network: 300 km

Focus area represents 2.8% of entire network

Conservation Planning
Is a Geographical and Logistical Exercise

- Geographical: Where?
- Logistical: Who, What, How, When?

- GIS is a powerful tool for conservation planning
- Problem: Do not have all the information we need in a geospatial format, must incorporate collective knowledge of experts



COA Selection Criteria and Characteristics

	A	B	C	D	E
1	**NAME**	**Public Landowners**	**MDC Regions**	**Reason AES Selected**	**Reason VST's Selected**
2	Clear Creek	USFS; MDC	Primary: St. Louis	Higher local and watershed public ownership	Only place to achieve connectivity among size classes
3	Dry Fork/Upper Meramec	MDC	Primary: St. Louis; Secondary: Ozark	To capture target species not captured in other focus areas	To capture target species not captured in other focus areas
4	Flat River	MDNR	Primary: St. Louis; Secondary: Southeast	Only AES of Type	Only place to achieve connectivity among size classes
5	Fox Creek	MDC	Primary: St. Louis	Higher public land and no lead or coal mines	Relatively intact subwatershed and connectivity
6	Huzzah Creek	USFS; MDC	Primary: St. Louis	Highest target richness, higher public land, highest quality	Only place to achieve connectivity among size classes
7	Lower Big	None	Primary: St. Louis; Secondary: Southeast	Only AES of Type	Connectivity and low human disturbance
8	Lower Bourbeuse	MDC	Primary: St. Louis	Highest target richness	Connectivity and relatively low human disturbance
9	Lower Meramec	MDC	Primary: St. Louis	Only AES of Type	Connectivity, public lands and relatively low disturbance
10	Middle Meramec	MDNR; MDC	Primary: St. Louis	Public lands, higher target richness	Public lands
11	Mineral Fork	MDC	Primary: St. Louis	Much higher target richness	Only place to achieve connectivity among size classes
12	Upper Big	MDC	Primary: St. Louis	Only AES of Type	Connectivity

Continued

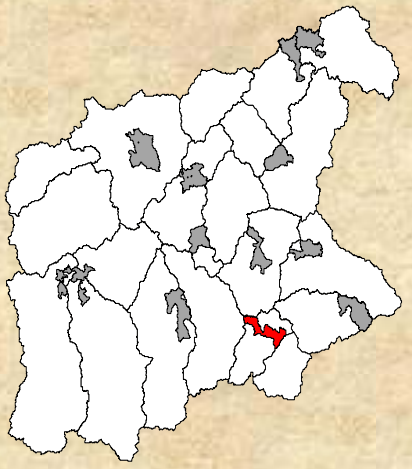
	A	F	G	H
1	**NAME**	**Potential Alternates**	**Potential VST Alternatives**	**Management Concerns**
2	Clear Creek	AESpolyid 371	None	gravel mining, upland pasture, floodplain row/crop, point sources, lead, small impoundments,
3	Dry Fork/Upper Meramec	None	None	gravel mining, floodplain row/crop, point sources, hazard, dams, roads, exotics
4	Flat River	None	None	upland pasture, floodplain row/crop, urban, point sources , ifd, lead, hazard, cafos, 303d, roads, exotics
5	Fox Creek	None	Lower Calvey Creek and tributaries	upland pasture, floodplain row/crop, point sources, hazard, roads, exotics
6	Huzzah Creek	Aespolyid 363	Upper Courtois Creek and tributaries	gravel mining, floodplain pasture/grazing, point sources, lead, small impoundments, roads, exotics
7	Lower Big	None	Tyrey Creek and tribs, or Calico Creek and tribs.	upland pasture, floodplain row/crop, point sources, lead, small impoundments, 303d, roads, exotics
8	Lower Bourbeuse	None	Red Oak Creek and tributaries	gravel mining, toxic release, upland pasture, floodplain row/crop, point sources, lead, coal, hazard, small impoundments, roads, exotics
9	Lower Meramec	None	None	upland pasture, floodplain row/crop, urban, point sources, ifd, hazard, small impoundments, roads, exotics
10	Middle Meramec	None	None	point sources, lead, coal, small impoundments, exotics
11	Mineral Fork	Aespolyid 361	Lower Indian Creek and tributaries	upland pasture, urban, point sources, ifd, lead, small impoundments, roads
12	Upper Big	None	Mill Creek or Tiff Creek and tributaries	gravel mining, point sources, lead, small impoundments, 303d, roads, exotics

Continued

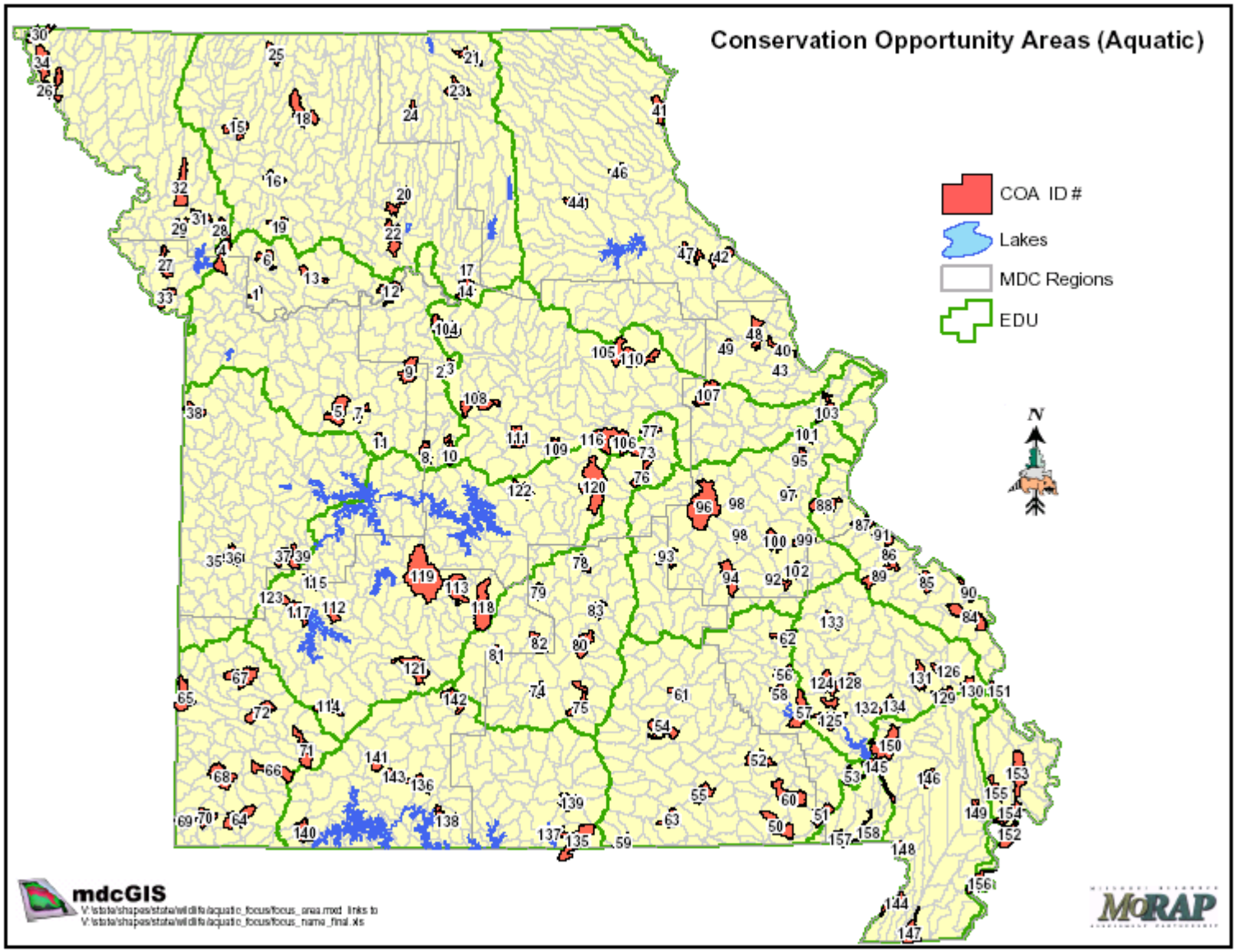
	A	I
1	**NAME**	**Exotics**
2	Clear Creek	None
3	Dry Fork/Upper Meramec	brown trout, common carp, rainbow trout, Asian clam
4	Flat River	common carp
5	Fox Creek	common carp, Asian clam, zebra mussel
6	Huzzah Creek	common carp, rainbow trout
7	Lower Big	common carp, Asian clam
8	Lower Bourbeuse	common carp, Asian clam
9	Lower Meramec	common carp, Asian clam, zebra mussel
10	Middle Meramec	common carp, Asian clam, zebra mussel
11	Mineral Fork	None
12	Upper Big	common carp, Asian clam

Other Info

- Uncertainties
- Opportunities
- Species
- People



Aquatic Conservation Opportunity Areas for Missouri



What We Have Learned

- Local experts are frequently humbled by the GIS data
- GIS data are often insufficient
- Must develop better data and ways of accounting for human disturbance
- Hidden jewels do exist
- Abiotic targets work well
- Conservation can be achieved in relatively small area
- Priorities should be established at a scale that managers can comprehend and use
- Aquatic Gap Analysis for Missouri paints a bleak picture, but the CWCS provides a blueprint and hope

Basic Elements of Conservation Planning

- 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 or abiotic)
- Specify qualitative or quantitative assessment criteria for meeting general conservation goals
- Establish geographic conservation priorities
  - Relative comparison of assessment units based on:
    - Significance, condition, threats, costs, and opportunities
- Specify and implement spatially explicit conservation actions for each priority species, community, or site
- Monitor key indicators to evaluate success of conservation actions