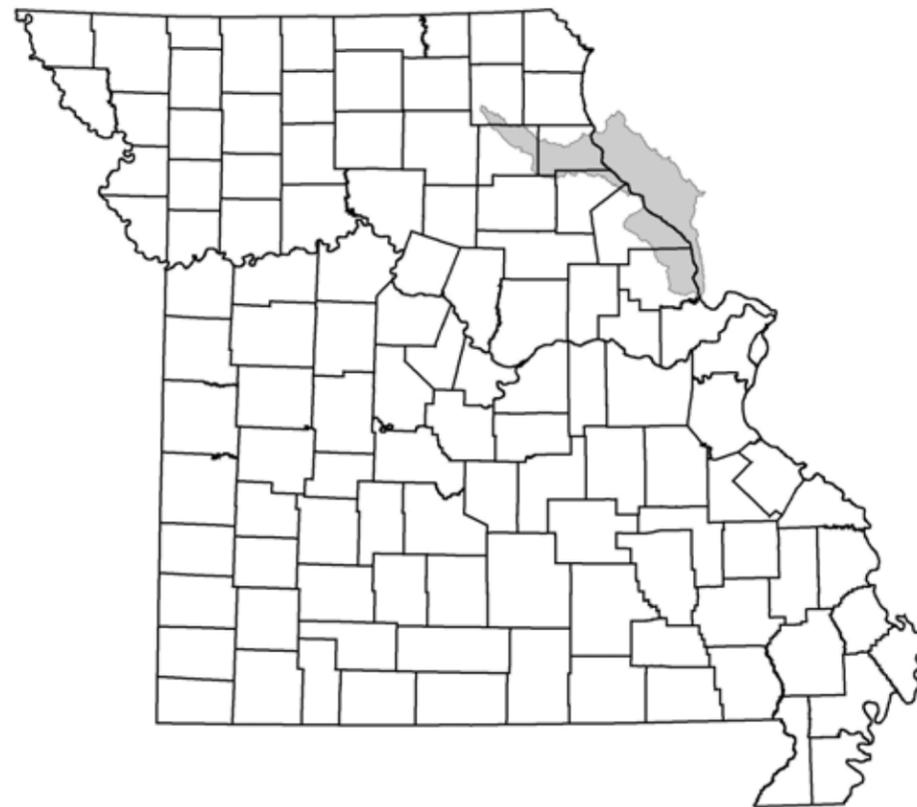


Missouri Natural Resources Conservation Service

Rapid Watershed Assessment

The Sny Sub-basin

HUC # 07110004



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1.0 Introduction [/34, /35 & /36](#)

The Sny River sub-basin drains portions of ten counties in northeastern Missouri and western Illinois. Split in half by the Mississippi River, this long irregularly shaped drainage area covers approximately 2,000 square miles, extending south from just below Quincy, Illinois nearly to the confluence of the Mississippi and Cuivre River in Lincoln County, Missouri. The sub-basin's eastern boundary is formed by the drainage divide with the Illinois River. The Salt and Cuivre River drainages define the sub-basin's western limits. The drainage divides with the Bear and Wyaconda Rivers demarcate the Sny's northern boundary.

The Missouri portion of the sub-basin has two distinct sub-regions. To the north, covering 465 square miles in portions of Knox, Shelby, Marion and Monroe, Counties, the sub-basin is primarily defined by the North River watershed. To the south, a 623 square mile area comprising eastern Ralls County, southeast Pike County and eastern Lincoln County, is distinguished by the Lincoln Hills

On the Illinois side, the Lincoln Hills extend over the entirety of Calhoun County located within the sub-basin. The Illinois side of the sub-basin, north of the Lincoln Hills, is dominated by the southwestern extent of the Galesburg Plain, covering 850 square miles of southwestern Adams County and most of Pike County. Both states share a portion of the Upper Mississippi Alluvial Plain, separating the east and west halves of the sub-basin.

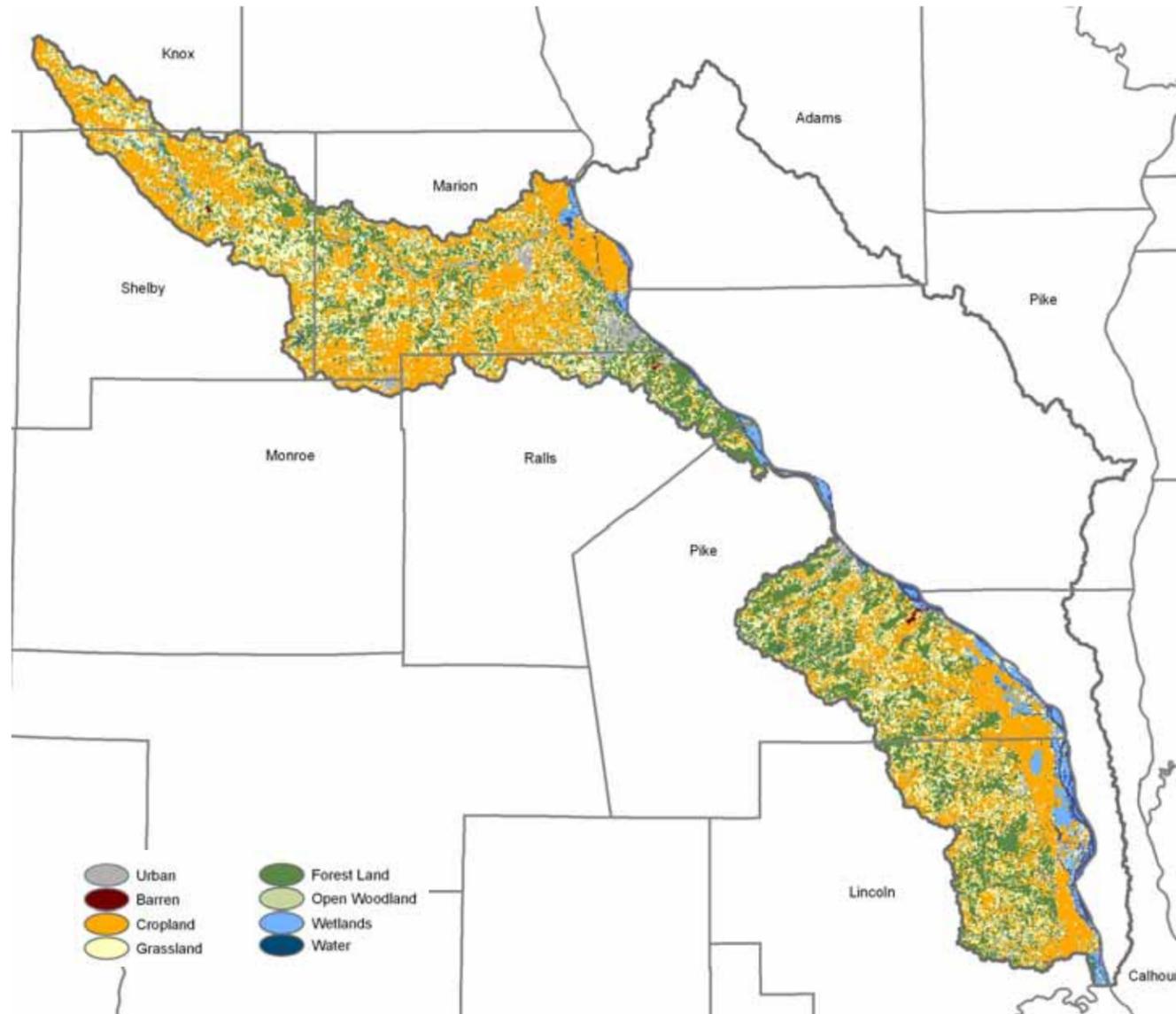
Nine-two percent of the land within the Sny sub-basin is used for agricultural purposes. Approximately 4 percent is developed land; 3 percent is water; and 1 percent is in federal ownership. Forty-six percent of the sub-basin's land area is used for cultivated and close-grown crops, with the largest acreages planted to soybeans, followed by corn, wheat for grain and grain sorghum. Forest land is the second largest land cover/use, covering 21 percent of the drainage area. The third largest land use/cover is pastureland, covering 14 percent of the sub-basin's land area. Non-cultivated cropland, primarily hay land, is fourth in land area at 6 percent and forage is the sub-basin's third largest crop. Conservation Reserve Program (CRP) uses cover 3 percent of the sub-basin.

Land Cover/Land Use Percentages by Sub-region					
Sub-region	Cultivated Cropland	Non-cultivated Cropland	Pasture Land	Forest Land	Developed Land
North River	48%	11%	8%	15%	7%
Lincoln Hills	34%	6%	16%	28%	3%
Galesburg Plain	54%	1%	15%	17%	4%

2.0 Physical Description

2.1 Land Use/Land Cover

2.1.1 Missouri



Land Use/Land Cover MoRAP ¹²	Urban	Cropland	Grassland	Barren	Open Woodland	Forest Land	Wetland	Water
2000 Acres	21,405	252,625	155,768	576	15,093	154,580	26,563	22,489
%	3%	39%	24%	0.1%	2%	24%	4%	3%

Land Use/Land Cover NRI ¹¹	Developed Land	Cultivated Cropland	Conservation Reserve Program	Non-cultivated Cropland	Pastureland	Forest land	Minor land cover/uses	Water	Federal land cover/use not recorded
1982 Acres	28,900	302,500	0	17,800	145,500	124,300	13,000	20,100	4,200
%	4%	46%	0%	3%	22%	19%	2%	3%	1%
1987 Acres	29,300	312,400	3,800	1,700	138,800	131,800	13,600	20,200	4,200
%	4%	48%	1%	0%	21%	20%	2%	3%	1%
1992 Acres	30,000	285,500	22,300	22,700	118,200	138,600	13,700	20,600	4,200
%	5%	42%	3%	3%	18%	21%	2%	3%	1%
1997 Acres	32,800	275,200	22,900	59,200	81,900	145,400	14,100	20,100	4,200
%	5%	42%	3%	9%	12%	22%	2%	3%	1%
Total Gain or Loss from 1982 to 1997	3,900	(27,300)	22,900	41,400	(63,100)	21,100	1,100	0	0
%	1%	-4%	3%	6%	-10%	3%	0%	0%	0%

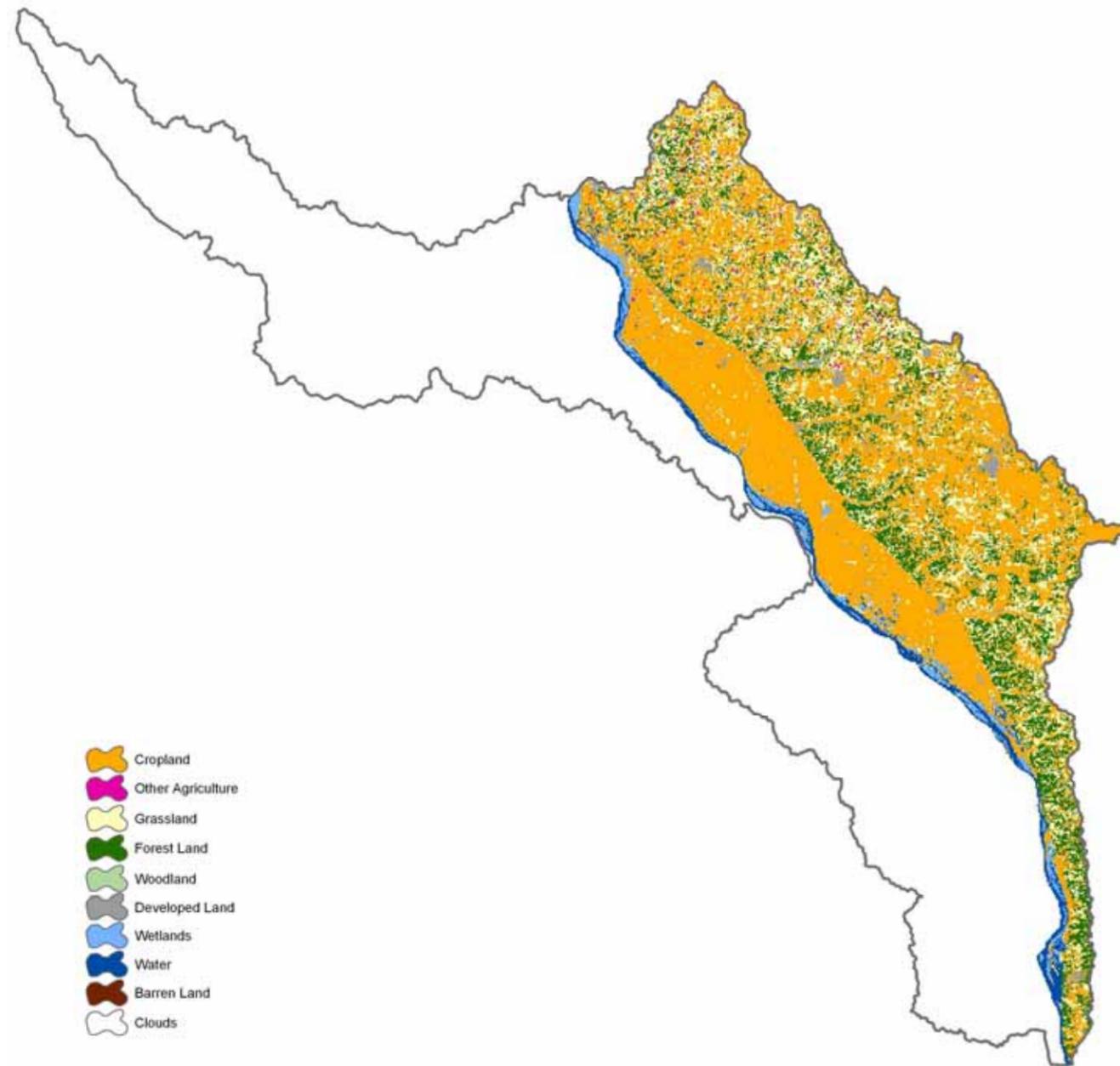
2.1.2 Crop History ¹¹

Year	Close Grown Crops (acres)			Row Crops (acres)				General (acres)	
	Oats	Wheat	All Other	Corn	Sorghum	Soybeans	Double Cropped	Cultivated	Non-Cultivated
1982	0	55,700	2,700	81,700	8,000	135,800	11,100	302,500	17,800
1987	0	29,000	0	91,800	5,200	153,500	0	312,400	1,700
1992	0	42,800	0	71,500	3,800	140,700	1,800	285,500	22,700
1997	900	29,000	0	96,700	2,300	122,900	3,300	275,200	59,200

2.1.3 Grassland ¹¹

Year	Grassland (acres)						
	Hayland			Pastureland			Other Farmland
	Grass	Legume	Legume-Grass	Grass	Legume	Grass-Forbes-Legume Mix	CRP
1997	53,200	3,100	16,000	54,700	0	29,000	22,900

2.1.4 Illinois



Land Use/ Land Cover /24	Developed Land	Cropland	Grassland	Barren	Woodland	Forest Land	Other Ag.	Clouds	Wetland	Water
2000	14,263	341,813	120,885	515	2,346	91,969	4,892	207	23,462	23,853
%	2%	55%	19%	0.1%	0.4%	15%	1%	0.0%	4%	4%

Land Use/ Land Cover NRI /1	Developed Land	Cultivated Cropland	Conservation Reserve Program	Non- cultivated Cropland	Pastureland	Forest land	Minor land cover/uses	Water	Federal land cover/use not recorded
1982 Acres	18,400	314,300	0	16,600	124,400	107,300	8,800	26,900	11,400
%	3%	50%	-	3%	20%	17%	1%	4%	2%
1987 Acres	19,800	333,700	0	8,800	113,300	106,100	8,800	26,900	10,700
%	3%	53%	-	1%	18%	17%	1%	4%	2%
1992 Acres	20,400	296,900	32,000	17,200	106,300	107,900	8,800	25,900	12,700
%	4%	47%	5%	3%	17%	17%	1%	4%	2%
1997 Acres	22,000	313,900	23,200	12,200	91,600	118,100	8,700	25,700	12,700
%	4%	50%	4%	2%	15%	19%	1%	4%	2%
Total Gain or Loss from 1982 to 1997	3,600	(400)	23,200	(4,400)	(32,800)	10,800	(100)	(1,200)	1,300
%	1%	-	4%	-1%	-5%	2%	-	-	-

2.1.5 Crop History [/1](#)

Year	Close Grown Crops (acres)			Row Crops (acres)				General (acres)	
	Oats	Wheat	All Other	Corn	Sorghum	Soybeans	Double Cropped	Cultivated	Non- Cultivated
1982		55,900		181,800	0	68,900	1,700	314,300	16,600
1987		9,500		145,200	0	145,400	0	333,700	8,800
1992		34,000		180,000	0	76,800	0	296,900	17,200
1997		22,600		117,400	2,800	146,600	1,300	313,900	12,200

2.1.6 Grassland [/1](#)

Year	Grassland (acres)						
	Hayland			Pastureland			Other Farmland
	Grass	Legume	Legume- Grass	Grass	Legume	Grass- Forbes- Legume Mix	CRP
1997	13,300	8,100	12,800	80,100	0	14,000	23,200

2.2 Public Land

About 21,731 acres, or 1.7% of the sub-basin, are in public ownership. These public lands include 3 conservation areas and 3 river accesses. The region falls well below the state average off 6.7% public land but is typical of north Missouri.

Missouri ³				
Public Land Ownership (acres)				
Owner	Missouri Department of Conservation	The Nature Conservancy	US Fish and Wildlife Service	Other
Total Acres	10,628.60	29.8	3,676.8	7,642

Illinois ^{20 & 21}		
Public Land Ownership (acres)		
Owner	Federal Land	State Conservation Areas
Total Acres	15,279.0	1,376.8

2.3 Soil Capacity

2.3.1 Land Capability ¹

Land Capability is a classification system used to identify the erosion potential of farmland. For over forty years the USDA has used land capability classification as a planning tool in laying out conservation measures and practices to farm without serious deterioration from erosion or other causes. The current system includes eight classes of land designated by Roman numerals I thru VIII. The first four classes are arable land--suitable for cropland--in which the limitations and the need for conservation measures and management increase from I thru IV. The remaining four classes, V thru VIII, are not to be used for cropland, but may have uses for pasture, range, woodland, grazing, wildlife, recreation, and esthetic purposes.

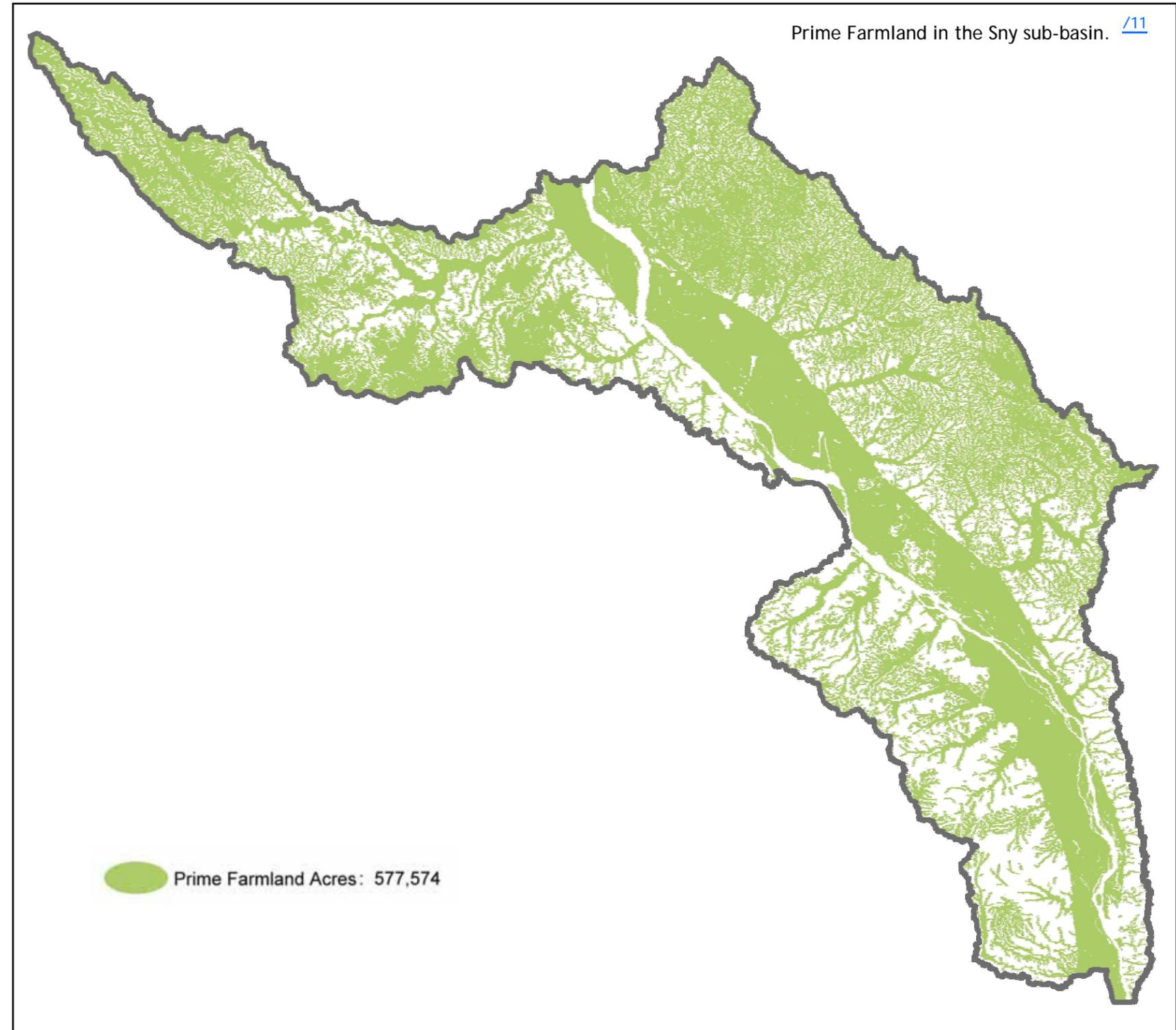
Missouri						
Land Capability Class	Cultivated Cropland (acres)	Cultivated Cropland (%)	Non-cultivated Cropland (acres)	Non-cultivated Cropland (%)	Pastureland (acres)	Pastureland (%)
I - slight limitation	0	0%	0	0%	0	0%
II - moderate limitation	127,300	46%	13,500	23%	20,500	25%
III - severe limitations	122,900	45%	34,600	58%	40,000	49%
IV - very severe limitations	22,700	8%	5,700	10%	10,500	13%
V - no erosion hazard, but other limitations	0	0%	0	0%	0	0%
VI - severe limitations, unsuited for cultivation, limited to pasture, reange, forest	900	0%	1,400	2%	6,600	8%
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	1,400	1%	4,000	7%	4,300	5%
VIII - misc. areas have limitations, limited to recreation, wildlife and water supply	0	0%	0	0%	0	0%
Total	275,200		59,200		81,900	

Illinois						
Land Capability Class	Cultivated Cropland (acres)	Cultivated Cropland (%)	Non-cultivated Cropland (acres)	Non-cultivated Cropland (%)	Pastureland (acres)	Pastureland (%)
I - slight limitation	23,600	4	0	-	2,700	3
II - moderate limitation	204,600	36	600	5	23,100	25
III - severe limitations	163,600	29	7,700	63	24,300	27
IV - very severe limitations	53,500	9	0	-	8,600	9
V - no erosion hazard, but other limitations	14,000	2	0	-	6,400	7
VI - severe limitations, unsuited for cultivation, limited to pasture, reange, forest	70,600	12	3,300	27	17,900	20
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	37,800	7	600	5	8,600	9
VIII - misc. areas have limitations, limited to recreation, wildlife and water supply	0	-	0	-	0	-
Total	567,700		12,200		91,600	

2.3.2 Prime Farmland [/49](#)

Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

Prime Farmland—Change between 1982 and 1997 /1	
Year	Acres
1982	541,100
1997	528,100
Difference	-13,000



2.4 Common Resource Areas [/10](#)

NRCS has divided the Nation into ecological type land regions called Major Land Resource Areas (MLRA). MLRAs are defined by their agricultural potential and soils capabilities and provide a spatial framework for addressing national and regional agricultural issues. A Common Resource Area is a geographic subdivision of an MLRA within which there are similar resource concerns and treatment requirements.

Missouri's CRAs are ecological subdivisions of its MLRAs. Each CRA is a grouping of Land Type Associations (LTA) taken directly from the state's ecological classification system (ECS). Missouri's LTAs are primarily differentiated on the basis of local climate, landforms and topography, geologic parent materials, soil types and potential vegetation.

The Sny sub-basin occupies portions of MLRA 113 and MLRA 115.

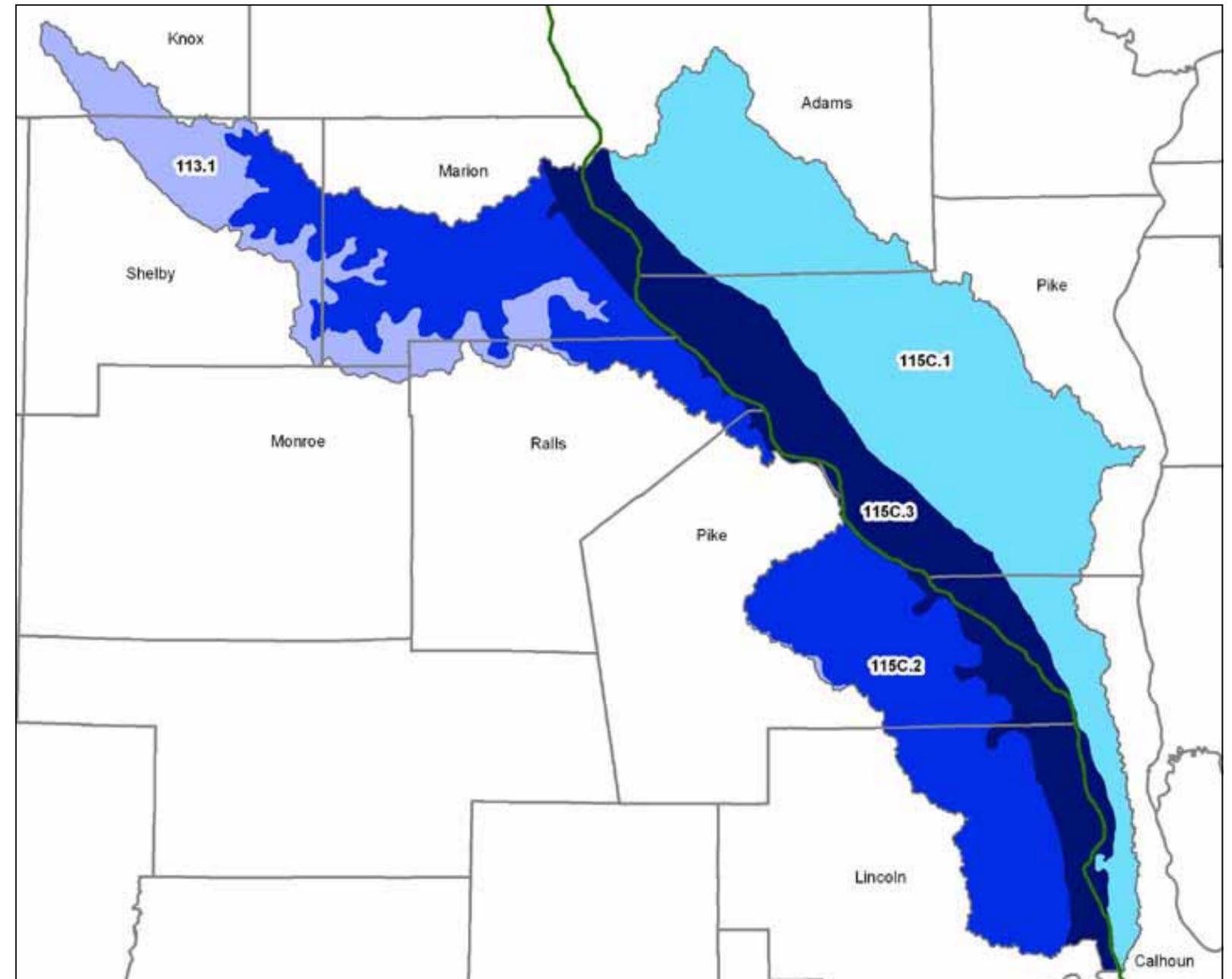
Common Resource Areas in The Sny Sub-basin

113.1 – Clay Pan Till Plains:

The Clay Pan Till Plains CRA is nearly level and gently sloping, well-developed claypan soils on a flat glacial till plain. Light to moderately dark colored, poorly drained and somewhat poorly drained soils formed primarily in loess. Loess thickness generally ranges from greater than 6 feet in the western part to about 3 feet in the eastern part. The low clay surface soil changes abruptly to the high clay subsoil. The area is intensively cropped with row crops and small grain. Sodium affected soils are throughout the area and occur in an intricate pattern with soils not affected by sodium. The more sloping areas adjacent to the streams are more commonly used for pasture or remain in woodland. Postglacial stream erosion has made little progress and most of the surface is flat or gently rolling with local relief less than 100 feet. Bedrock exposures are rare.

115C.1 – Central Mississippi Valley Wooded Slopes:

The Central Mississippi Valley Wooded Slopes CRA consists of the Mississippi and lower Illinois River valleys and adjacent slopes. Low areas consist of the nearly level flood plains and terraces. The Corps of Engineers maintains a levee along the Mississippi River. Adjacent uplands consist of loess hills with moderately steep to very steep side slopes and narrow to moderately wide gently sloping to moderately sloping ridgetops. Low areas are composed of poorly drained to well drained silty, clayey and loamy alluvial and outwash deposits. Corn and soybeans are the major crops. Upland areas consist of well drained to somewhat poorly drained light colored soils. Hardwood forest dominate the upland side slopes. Livestock and grain farming are dominant in the less sloping upland areas. Urban growth is evident in the area around the Quad Cities.



115C.2 – Mississippi River Hills:

The Mississippi River Hills CRA consists of a broad belt of hills, valleys, and bluffs. Topography ranges from moderately rolling to steep and rugged; local relief averages 150-250 feet. Loess mantles the entire subsection. Carbonate bedrock is exposed on steeper slopes and locally creates karst tracts. Most of the subsection is farmed, mainly livestock, with crops on better soils.

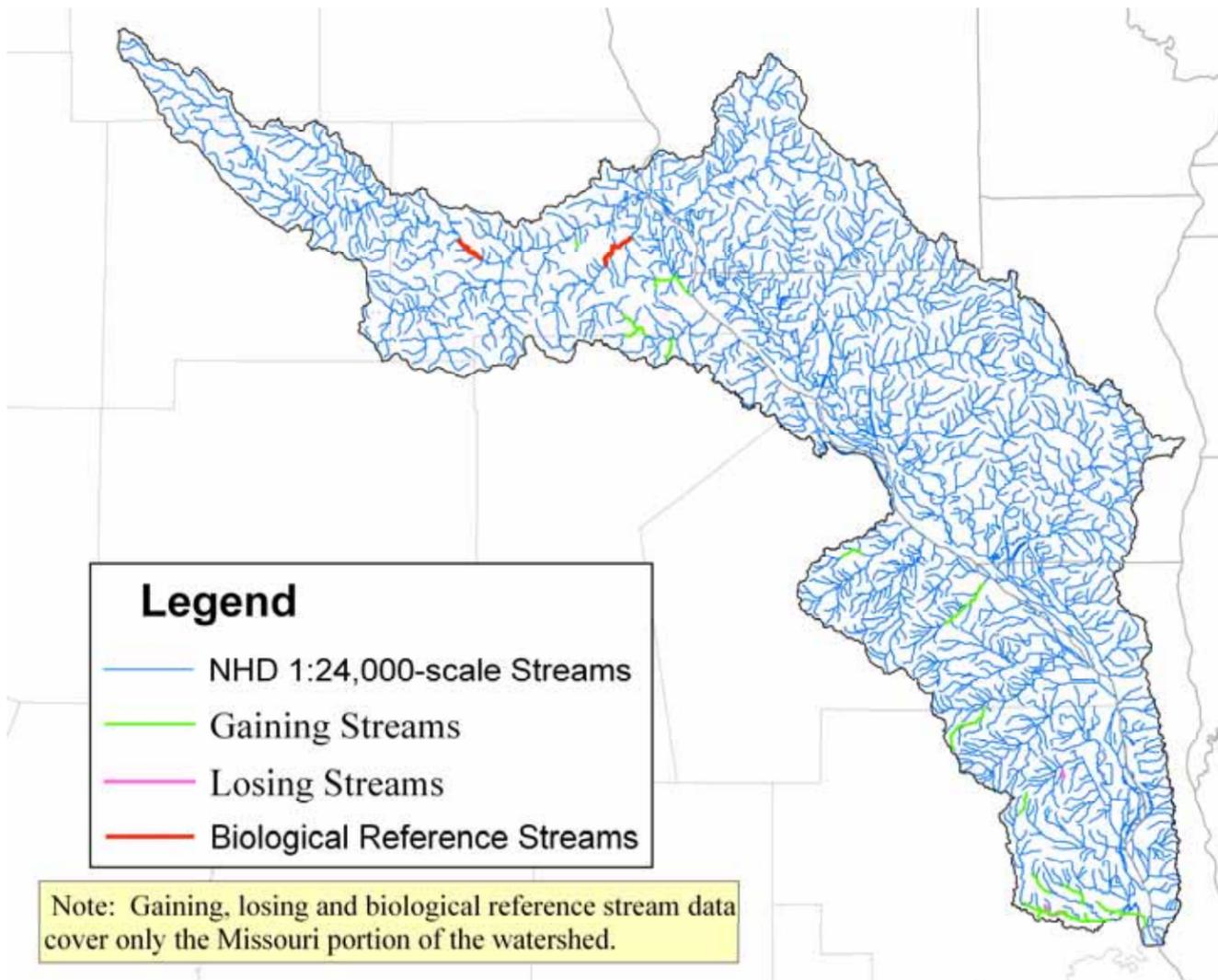
115C.3 – Mississippi River Alluvial Plains:

The Mississippi River Alluvial Plains CRA consists of the alluvial plain and channel of the Mississippi River. The alluvial plain has very deep loamy and clayey soils of variable drainage capacity. Many islands are timbered. The main bottoms are artificially drained and in cropland, but some oxbow wetlands remain.

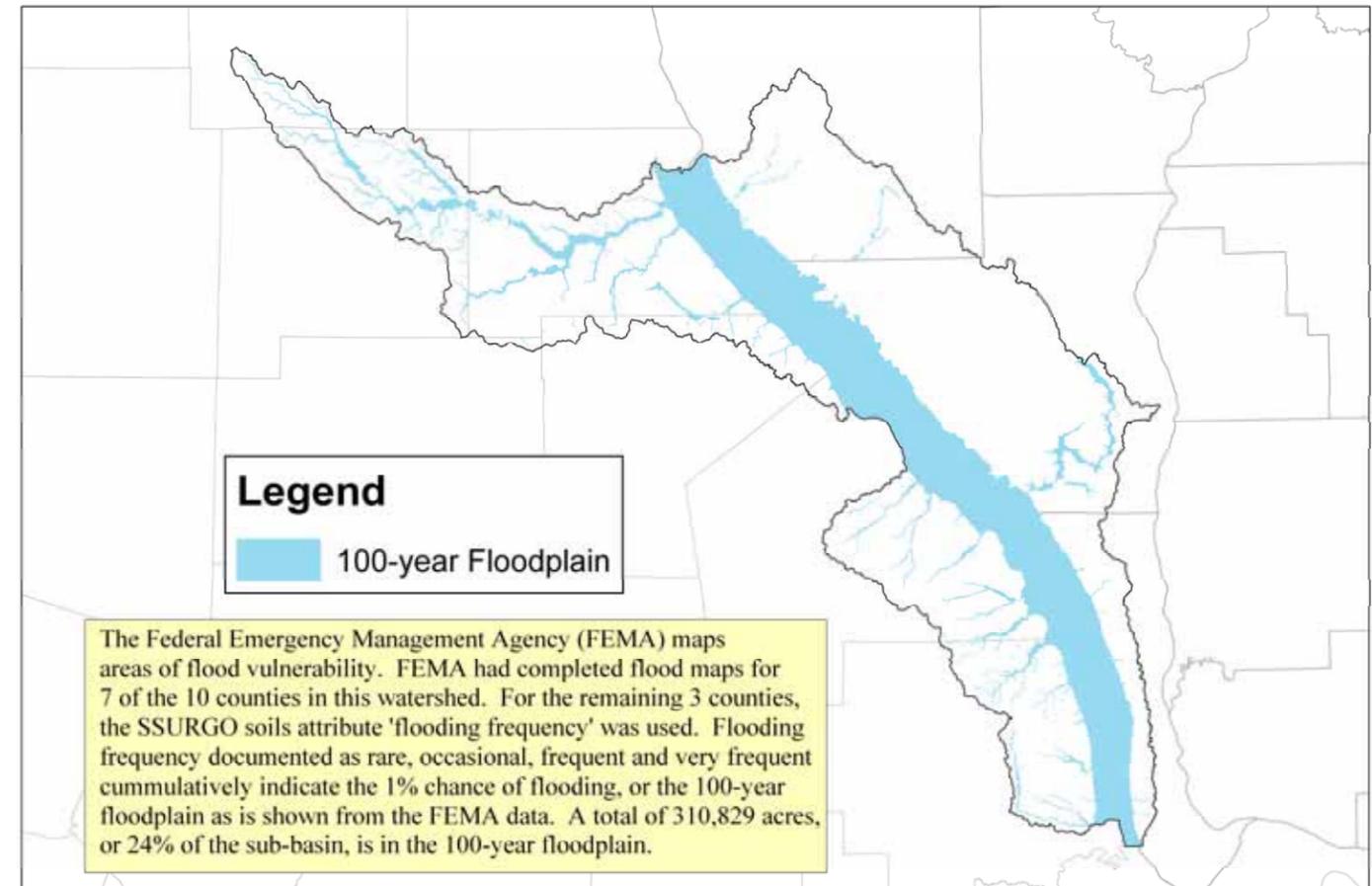
2.5 Streams

2.5.1 NHD with Gaining Streams, Losing Streams and Biological Reference Streams [/44](#)

High-resolution (1:24,000-scale) streams from the National Hydrography Dataset total 3,333 miles of intermittent and perennial streams in this sub-basin. Fifty-eight (58) miles of streams are considered gaining streams and 3 miles of streams are designated as losing streams. Stream segments are classified 'gaining' or 'losing' by the Missouri Department of Natural Resources (MoDNR), Division of Geology and Land Survey (DGLS). The classification depicts sections of streams which are either losing water flow to the subsurface or gaining water flow from the subsurface, based on change in flow rate over a set distance. Similar data were not available for Illinois. MoDNR also designates biological reference streams for watersheds. Biological reference streams are segments of streams that represent the best stream conditions to support aquatic life for a given area. A 3.3-mile stretch of North River and a 4.3-mile segment of South River are the biological reference streams in the Missouri portion of this sub-basin.

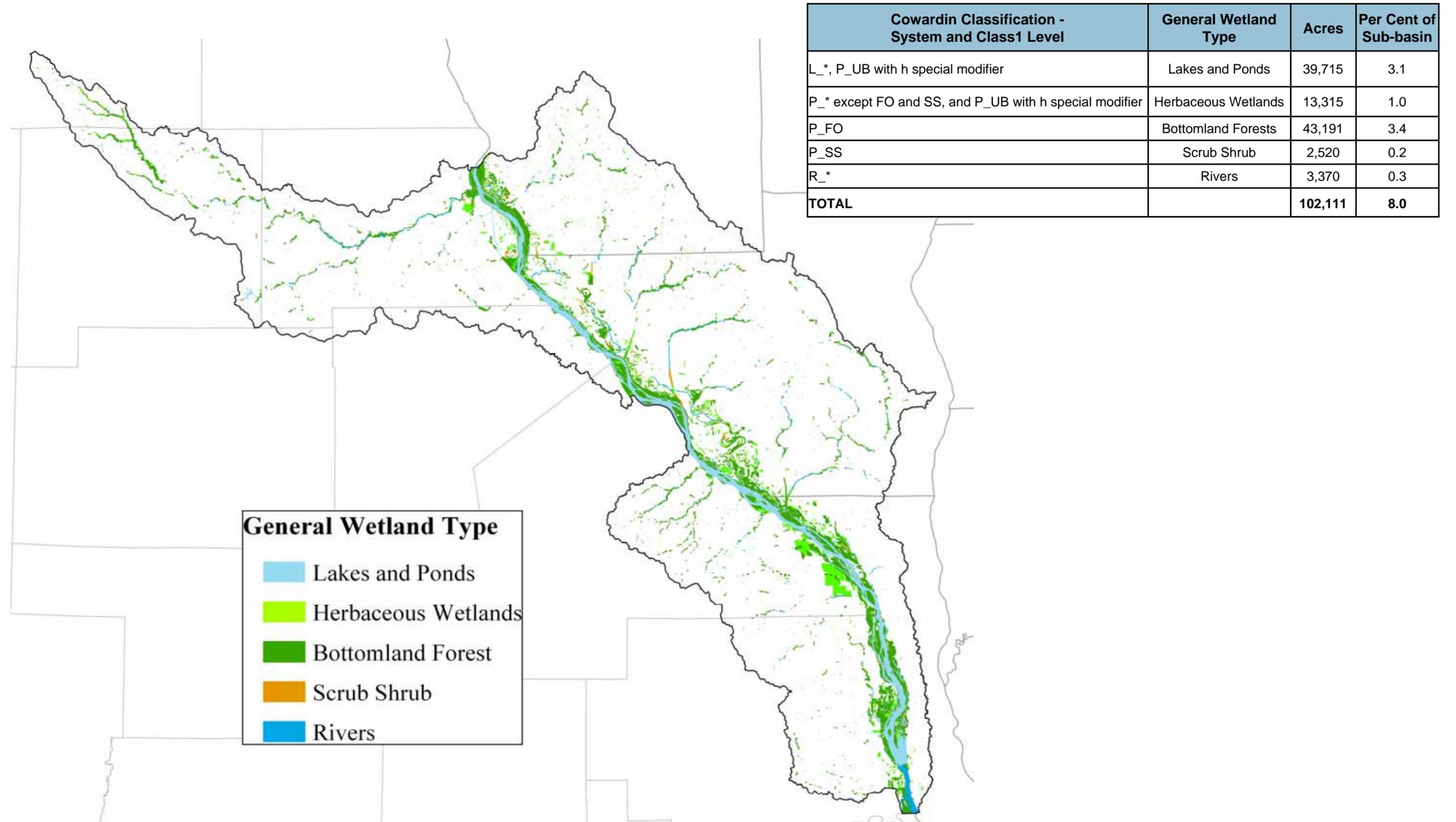


2.5.2 Floodplains [/45](#)



2.6 Wetlands [/19](#)

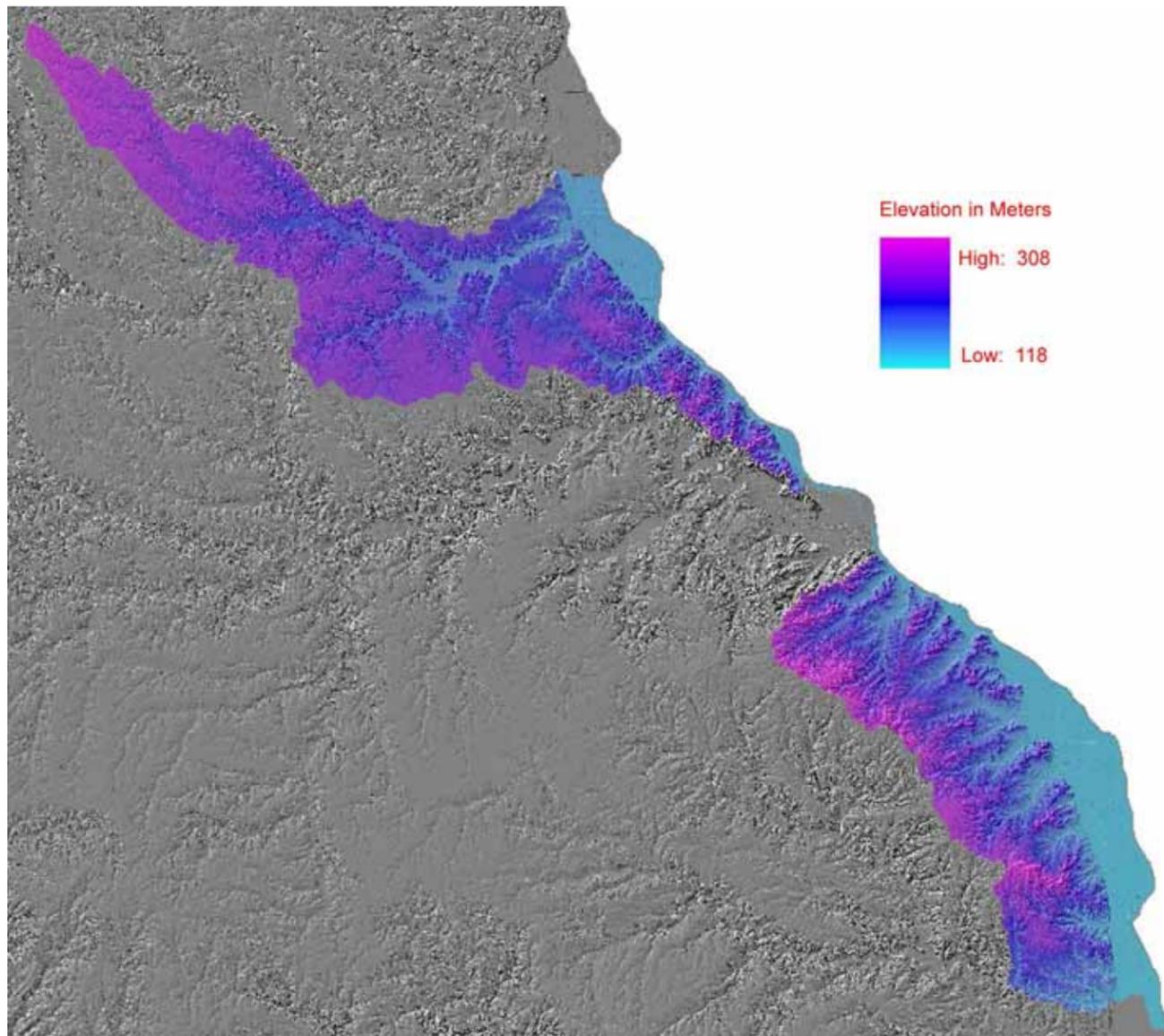
The National Wetland Inventory delineated wetlands from early 1980s aerial photography and classified the wetlands using a wetland classification scheme developed by Cowardin, et al.



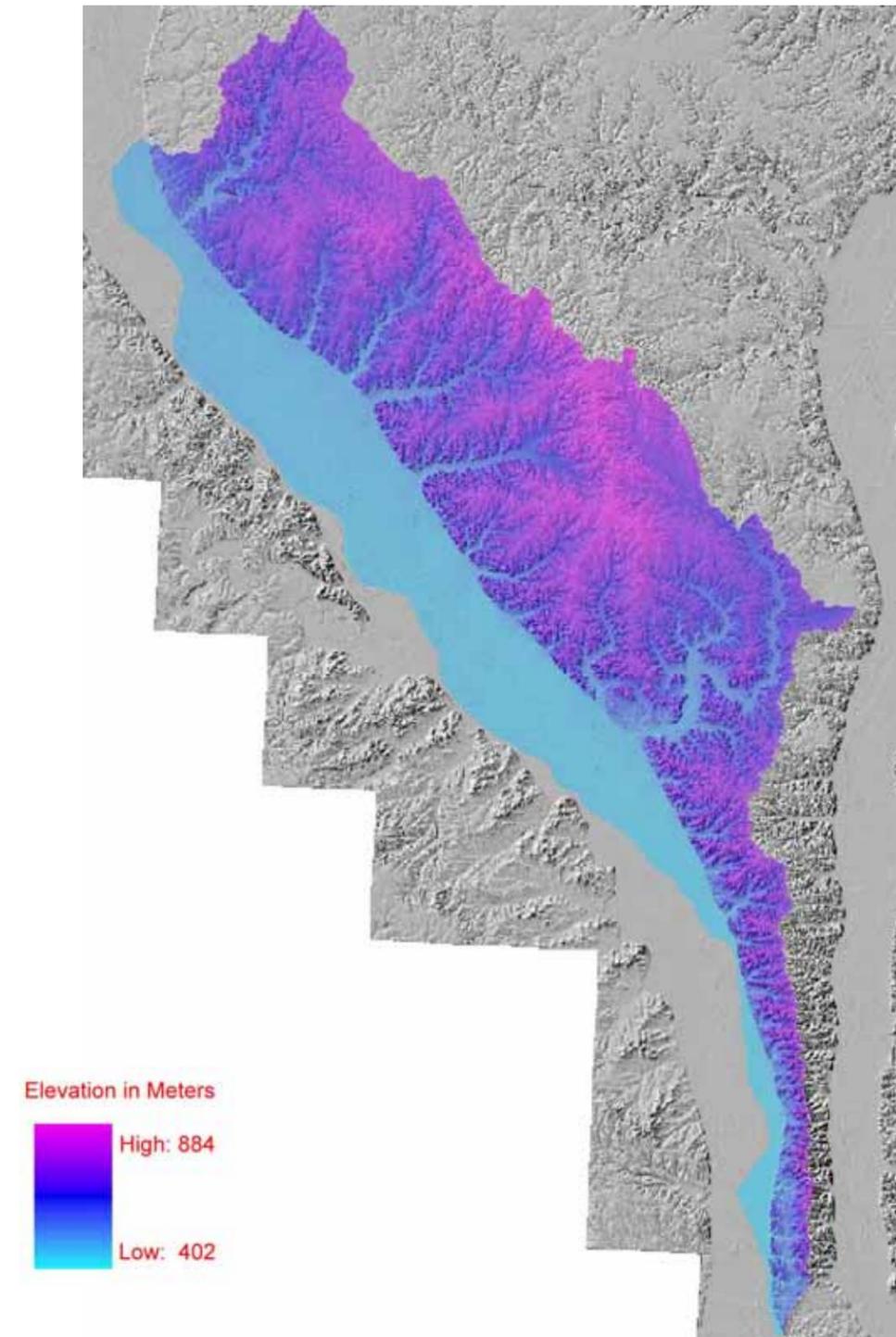
2.7 Relief Map

This shaded relief map of the sub-basin depicts elevation above sea level and generalized relief across the sub-basin. The shaded relief and elevation values are derived from digital elevation models generated from United States Geological Survey 7.5 minute elevation contours. Local relief throughout the broadly rolling uplands characterizing the North River and Galesburg Plain subdivisions of the Sny sub-basin typically averages around 100 feet. Local relief averaging 200 feet along streams is not uncommon. Local relief across the relatively flat Mississippi River alluvial plain varies from 10 to 30 feet. The rugged hills along the Mississippi River forming the Lincoln Hills exhibit local relief ranging from 200 to 350 feet.

2.7.1 Missouri Relief Map [/26 & /27](#)



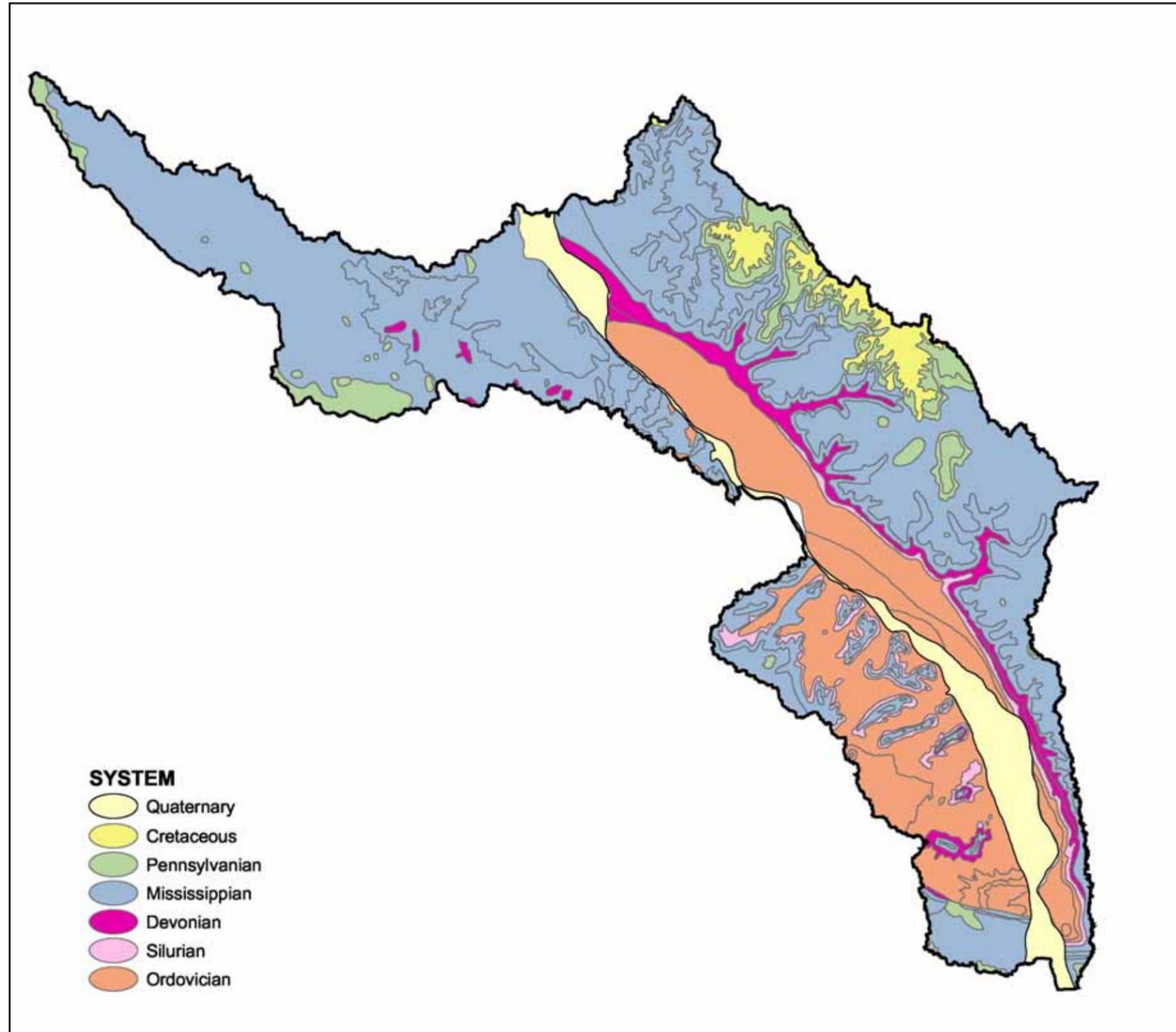
2.7.2 Illinois Relief Map [/28 & /29](#)



2.8 Geology [/25 & /50](#)

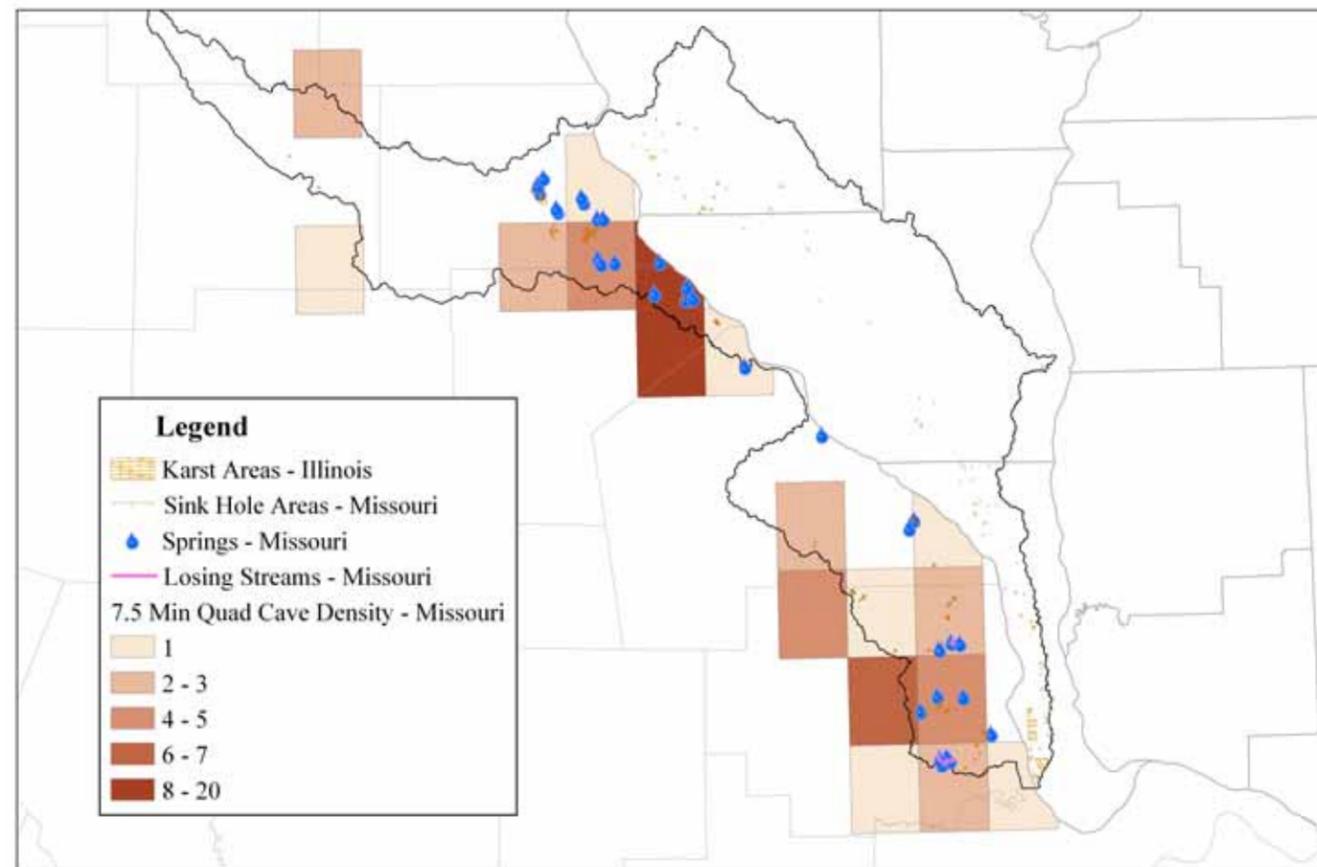
2.8.1 Geology Map

This bedrock geology map is derived from the Geologic Map of Missouri and the Bedrock Geology Map of Illinois. On the Missouri side of the sub-basin, the Mississippi River alluvial plain is represented as Quaternary aged alluvium. On the Illinois side, the alluvial plain is defined by its underlying Ordovician aged bedrock formations. The sub-basin is dominated by the Lincoln Fold anticline in Missouri that runs parallel to the Mississippi River from central Marion County southeastward into southeast Lincoln County with underlying formations of Ordovician sandstones and limestones, Silurian and Devonian dolomites and Mississippian cherty limestones. Erosion has exposed a number of Ordovician and Mississippian formations, creating a very rugged topography that is very similar to the Ozark Highlands. Karst conditions are common throughout the carbonate formations.



2.8.2 Karst features [/42 & /43](#)

This sub-basin exhibits moderate karst development, particularly along the uplands bordering the Mississippi River floodplain in both Missouri and Illinois. In Missouri, 34 springs are located in the sub-basin. One spring has a measured flow of more than 500 gallons per minute and one is 10-100 gallons per minute. The remainder have unmeasured flow. One hundred forty one (141) sinkhole areas and seventy-seven (77) caves are documented in the area. Three miles of stream are designated as losing streams, as described in section 2.7.1. Illinois karst data was an aggregate of features denoting karst geology into 'karst polygons'. Ninety-seven polygons, totaling 3,328 acres or 0.5% of the Illinois portion of the sub-basin are mapped as karst polygons.



3.0 Resource Concerns

Resource concerns are issues related to the natural environment. Natural resources include soil, water, air, plants and humans. Missouri Natural Resources Conservation Service identified major resource issues that affect the state of Missouri.

Natural Resource	Concern 1	Concern 2	Concern3
Air	Objectionable Odors		
Animals (Domestic)	Stress & Mortality		
Plants	Threatened & Endangered Species	Noxious & Invasive Plants	Plant Damage (from wind erosion)
Soil (Quality)	Sheet & Rill Erosion to "T"		
Water (Quality)	Harmful Levels of Pathogens (livestock source)	Excessive Nutrients and Organics in Surface Water	
Water (Quantity)	Inefficient water use on irrigated lands		

3.1 Soil Quality and Quantity

3.1.1 Soils

The soils in this sub-basin are highly variable due to the diversity of parent material and landscape positions present. Upland ridge tops have a loess mantle which decreases in thickness and increases in depth as distance from the Mississippi River Valley increases.

The forested loess bluffs adjacent to the Mississippi River Valley are dominated by very deep, silty, well and moderately well drained soils. Farther from the Mississippi River soils, on the broad upland divides, the soils are dominated by poorly drained soils with silty clay subsoils that formed under prairie vegetation.

In deeply dissected areas of the sub-basin where the soil parent materials are thin loess deposits overlying materials weathered from bedrock, the soils are generally very deep, well drained and have subsoils with large amounts of chert in a matrix of red clays. These soils formed under forest vegetation.

Many of the upper side slopes and narrow ridge tops in the moderately sloping areas of the sub-basin have soils that formed in a thin mantle of loess overlying clayey glacial till. These soils are very deep, moderately well drained or somewhat poorly drained and were formed under forest or savanna vegetation.

Soils in the Mississippi River Alluvial Plain are very deep and were formed in alluvial sediments. These soils are extremely variable in texture and drainage depending upon the position within the alluvial plain. Most soils are somewhat poorly to very poorly drained. Generally soils in back swamp or slack water positions are poorly and very poorly drained and contain clayey textures where soils on natural levees are somewhat poorly drained and are silty.

3.1.2 Erosion—Missouri ¹

The objectives of this section are to profile cropland erosion rates and identify cropland areas within The Sny sub-basin that would benefit the most from the application of conservation practices to limit sediment loss.

“The production practices and inputs used by agriculture can result in a number of pollutants entering water resources, including sediment, nutrients, pathogens, pesticides and salts.” (USDA-ERS).

“Sediment is the largest contaminant of surface water in the United States by weight and volume (Koltun et al., 1997) and the second leading pollution problem in rivers and streams and third leading problem in lakes” (USEPA, 2002).

Sediment losses from water erosion on cropland, stream banks and streambeds and runoff from construction sites and developed land are an ongoing resource concern throughout The Sny sub-basin. Cultivated cropland is the primary non-point source of sediment loss in this heavily cropped sub-basin and accounts for 46% of the sub-basin’s total surface area. In sub-basins like The Sny throughout the Upper Midwest Region, the acres most in need of conservation treatment are primarily the result of sediment loss and nitrogen and phosphorus lost with waterborne sediment .

The consequences of excessive soil erosion are well known. Waterborne soil sediments are inextricably linked to degraded water quality through turbidity and loss of fertilizers and pesticides attached to soil particles. Suspended sediments degrade aquatic habitats, increase water treatment costs and marginalize water recreation. Sedimentation reduces the useful life of ponds, lakes and reservoirs; increases the probability and severity of flooding; and clogs drainage networks. Excessive soil erosion is a primary contributor to soil quality degradation, limiting the productivity and sustainability of the soil.

This assessment concentrates on sheet and rill erosion on cropland for which there is scientifically based soil erosion estimates for the entire sub-basin. This focus does not suggest that sedimentation related to urban storm water runoff, stream bank erosion or ephemeral gully erosion on cropland is not significant in volume or impact; only a lack of reliable data at the sub-basin level for these other sources of sediment. The erosion rate data has been extracted from the 1997 National Resources Inventory (NRI). Erosion rates and their relationship to “T” values are reported in tons/acre/year for cultivated cropland, non-cultivated cropland, corn and soybeans on highly erodible and non-highly erodible land. Also included are erosion rates and their relationship to “T” values for pastureland.

Cropland Erosion Rates in USLE Tons/Acre/Year ¹		
CROPLAND CATEGORY	CULTIVATED CROPLAND	NON-CULTIVATED CROPLAND
HEL		
Highly Erodible Land Eroding at or below "T"	2.2	0.49
Highly Erodible Land Eroding above "T"	11.2	0
All Highly Erodible Land	10	0.49
NON-HEL		
Non-Highly Erodible Land Eroding at or below "T"	2.7	0.7
Non-Highly Erodible Land Eroding above "T"	5.2	0
All Non-Highly Erodible Land	3.2	0.7
All Land Eroding at or below "T"	2.7	0.42
All Land Eroding above "T"	9.6	0
All Land	5.9	0.42

CROPLAND EROSION RATES IN USLE TONS/ACRE/YEAR

USLE - This table reports estimated soil loss rates from the 1997 NRI based on the Universal Soil Loss Equation (USLE). USLE estimates average annual sheet and rill soil movement down a uniform slope using rainfall energy as the erosive force acting on the soil. Soil characteristics and slope for the fields in which the NRI sample points fall or those portions of the fields surrounding the points that would be considered in conservation planning are used in the NRI USLE calculations.

“T” FACTOR - This is the maximum rate of annual soil erosion that will still permit crop productivity to be sustained economically and indefinitely.

HEL – Highly erodible land (HEL) is land that has an erodibility index (EI) value of 8 or more. The EI index provides a numerical expression of the potential for a soil to erode, considering the physical and chemical properties of the soil and climatic conditions where it occurs. The higher the index value, the greater the investment needed to maintain the sustainability of the soil if intensively cropped.

Cropland Erosion in Relationship to “T” ¹												
CROPLAND CATEGORY	CULTIVATED CROPLAND				NON-CULTIVATED CROPLAND				ALL CROPLAND			
	Total	% of Cropland Category	% of all Cropland	% of Sub-basin	Total	% of Cropland Category	% of all Cropland	% of Sub-basin	Total	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL												
Highly Erodible Cropland at or below "T"	15,400	14%	5%	1%	49,400	100%	15%	5%	64,800	41%	20%	6%
Highly Erodible Cropland above "T"	93,600	86%	28%	9%	0	0%	0%	0%	93,600	59%	28%	9%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	109,000	100%	33%	10%	49,400	100%	15%	5%	158,400	100%	48%	15%
NON-HEL												
Non-Highly Erodible Cropland at or below "T"	130,500	80%	39%	12%	9,800	100%	3%	1%	140,300	81%	42%	13%
Non-Highly Erodible Cropland above "T"	32,800	20%	10%	3%	0	0%	0%	0%	32,800	19%	10%	3%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	163,300	100%	49%	15%	9,800	100%	3%	1%	173,100	100%	52%	16%
GRAND TOTALS	272,300	100%	82%	25%	59,200	100%	18%	6%	331,500	100%	100%	31%

CROPLAND EROSION IN RELATIONSHIP TO “T”

This table reports acres and percentages of cultivated cropland, non-cultivated cropland and all cropland by HEL and “T” categories for the sub-basin.

3.1.3 Erosion—Illinois [/1](#)

Cropland Erosion Rates in USLE tons/acre/year

USLE - This table reports estimated soil loss rates from the 1997 NRI based on the Universal Soil Loss Equation (USLE). USLE estimates average annual sheet and rill soil movement down a uniform slope using rainfall energy as the erosive force acting on the soil. Soil characteristics and slope for the fields in which the NRI sample points fall or those portions of the fields surrounding the points that would be considered in conservation planning are used in the NRI USLE calculations.

“T” FACTOR – This is the maximum rate of annual soil erosion that will still permit crop productivity to be sustained economically and indefinitely.

HEL – Highly erodible land (HEL) is land that has an erodibility index (EI) value of 8 or more. The EI index provides a numerical expression of the potential for a soil to erode, considering the physical and chemical properties of the soil and climatic conditions where it occurs. The higher the index value, the greater the investment needed to maintain the sustainability of the soil if intensively cropped.

Cropland Erosion Rates in USLE Tons/Acre/Year /1		
CROPLAND CATEGORY	Cultivated Cropland	Non-Cultivated Cropland
HEL		
Highly Erodible Land Eroding at or below "T"	2.79	0.77
Highly Erodible Land Eroding above "T"	12.92	0
All Highly Erodible Land	12.35	0.77
NON-HEL		
Non-Highly Erodible Land Eroding at or below "T"	2.18	0.06
Non-Highly Erodible Land Eroding above "T"	6.05	0
All Non-Highly Erodible Land	2.58	0.06
All Land Eroding at or below "T"	2.19	0.58
All Land Eroding above "T"	11.48	0
All Land	5.46	0.58

Cropland Erosion in Relationship to “T”

This table reports acres and percentages of cultivated cropland, non-cultivated cropland and all cropland by HEL and “T” categories for the sub-basin.

Cropland Erosion in Relationship to “T” /1												
CROPLAND CATEGORY	CULTIVATED CROPLAND				NON-CULTIVATED CROPLAND				ALL CROPLAND			
	Total	% of Cropland Category	% of all Cropland	% of Sub-basin	Total	% of Cropland Category	% of all Cropland	% of Sub-basin	Total	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL												
Highly Erodible Cropland at or below "T"	5,200	6%	1%	1%	8,900	100%	3%	1%	14,100	14%	4%	2%
Highly Erodible Cropland above "T"	87,400	94%	27%	14%	0	0%	0%	0%	87,400	86%	27%	14%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	92,600	100%	28%	15%	8,900	100%	3%	1%	101,500	100%	31%	16%
NON-HEL												
Non-Highly Erodible Cropland at or below "T"	198,200	90%	61%	31%	3,300	100%	1%	0.5%	201,500	90%	62%	32%
Non-Highly Erodible Cropland above "T"	23,100	10%	7%	4%	0	0%	0%	0%	23,100	10%	7%	4%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	221,300	100%	68%	35%	3,300	100%	1%	0.5%	224,600	100%	69%	36%
GRAND TOTALS	313,900	100%	96%	50%	12,200	100%	4%	1.5%	326,100	100%	100%	52%

Missouri Corn Erosion Profile ¹

This table reports USLE rates and acres by HEL, "T" and conservation practices for corn.

Table 3: Corn Erosion Profile - USLE (tons/acre/year)		
ALL CORN ACRES	All corn acres	96,700
	USLE all corn acres	5.56
	All contoured corn acres	7,900
	USLE all contoured corn acres	6.42
	All contoured and terraced corn acres	4,700
	USLE all contoured and terraced corn acres	5.63
	All contoured corn acres not terraced	3,200
	USLE contoured corn acres not terraced	7.57
	All non-contoured corn acres	88,800
	USLE all non-contoured corn acres	5.48
	All non-contoured and terraced corn acres	1,500
	USLE all non-contoured and terraced corn acres	3.63
	All non-contoured corn acres not terraced	87,300
	USLE non-contoured corn acres not terraced	4.00
HEL CORN ACRES	All HEL corn acres	31,900
	USLE all HEL corn acres	9.83
	All contoured HEL corn acres	7,900
	USLE all contoured HEL corn acres	6.42
	All contoured and terraced HEL corn acres	4,700
	USLE all contoured and terraced HEL corn acres	5.63
	All contoured HEL corn acres not terraced	3,200
	USLE contoured HEL corn acres not terraced	7.57
	All non-contoured HEL corn acres	24,000
	USLE non-contoured HEL corn acres	10.96
	All non-contoured and terraced HEL corn acres	1,500
	USLE non-contoured and terraced HEL corn acres	3.63
	All non-contoured HEL corn acres not terraced	22,500
	USLE non-contoured HEL corn acres not terraced	11.45

Missouri Soybean Erosion Profile ¹

This table reports USLE rates and acres by HEL, "T" and conservation practices for soybeans.

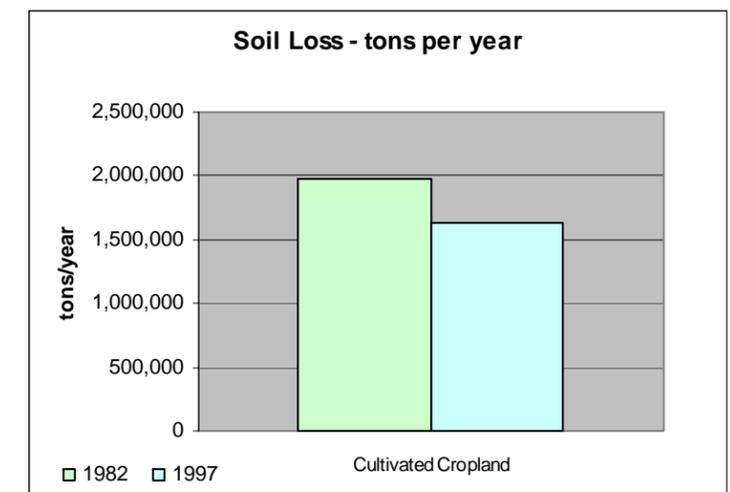
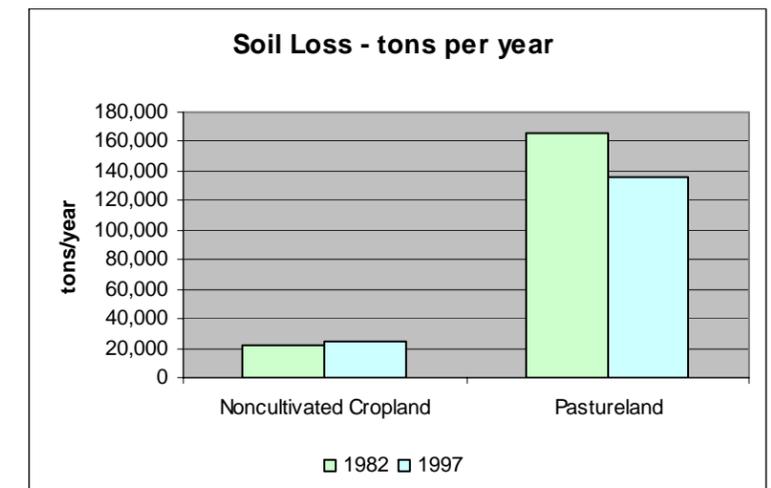
Table 4: Soybean Erosion Profile - USLE (tons/acre/year)		
ALL SOY-BEAN ACRES	All soybean acres	122,900
	USLE all soybean acres	5.48
	All contoured soybean acres	6,900
	USLE all contoured soybean acres	4.18
	All contoured and terraced soybean acres	3,000
	USLE all contoured and terraced soybean acres	2.63
	All contoured soybean acres not terraced	3,900
	USLE contoured soybean acres not terraced	21
	All non-contoured soybean acres	116,000
	USLE all non-contoured soybean acres	5.55
	All non-contoured and terraced soybean acres	2,300
	USLE all non-contoured and terraced soybean acres	11.4
	All non-contoured soybean acres not terraced	113,700
	USLE non-contoured soybean acres not terraced	5.43
HEL SOY-BEAN ACRES	All HEL soybean acres	39,800
	USLE all HEL soybean acres	9.97
	All contoured HEL soybean acres	3,500
	USLE all contoured HEL soybean acres	6.73
	All contoured and terraced HEL soybean acres	1,400
	USLE all contoured and terraced HEL soybean acres	3.88
	All contoured HEL soybean acres not terraced	2,100
	USLE contoured HEL soybean acres not terraced	8.63
	All non-contoured HEL soybean acres	36,300
	USLE non-contoured HEL soybean acres	10.28
	All non-contoured and terraced HEL soybean acres	2,300
	USLE non-contoured and terraced HEL soybean acres	11.40
	All non-contoured HEL soybean acres not terraced	34,000
	USLE non-contoured HEL soybean acres not terraced	10.21

Missouri Pastureland Erosion ¹

This table reports USLE rates and acres in relationship to "T" for pastureland.

Table 5: Pastureland in Relation to "T" Pastureland Erosion Rates tons/acre/year		
	Acres of Pastureland	USLE Rate
Pastureland Eroding At or Below "T"	66,600	0.64
Pastureland Eroding Above "T"	15,300	6.13
All Pastureland	81,900	1.66

Missouri USLE Soil Loss Rates (tons/year) ¹



Illinois Corn Erosion Profile ^{/1}

This table reports USLE rates and acres by HEL, "T" and conservation practices for corn.

Table 3: Corn Erosion Profile - USLE (tons/acre/year)		
ALL CORN ACRES	All corn acres	117,400
	USLE all corn acres	6.16
	All contoured corn acres	0
	USLE all contoured corn acres	0
	All contoured and terraced corn acres	0
	USLE all contoured and terraced corn acres	0
	All contoured corn acres not terraced	0
	USLE contoured corn acres not terraced	0
	All non-contoured corn acres	117,400
	USLE all non-contoured corn acres	6.16
	All non-contoured and terraced corn acres	0
	USLE all non-contoured and terraced corn acres	0
	All non-contoured corn acres not terraced	117,400
	USLE non-contoured corn acres not terraced	6.16
HEL CORN ACRES	All HEL corn acres	34,800
	USLE all HEL corn acres	14.84
	All contoured HEL corn acres	0
	USLE all contoured HEL corn acres	0
	All contoured and terraced HEL corn acres	0
	USLE all contoured and terraced HEL corn acres	0
	All contoured HEL corn acres not terraced	0
	USLE contoured HEL corn acres not terraced	0
	All non-contoured HEL corn acres	34,800
	USLE non-contoured HEL corn acres	14.84
	All non-contoured and terraced HEL corn acres	0
	USLE non-contoured and terraced HEL corn acres	0
	All non-contoured HEL corn acres not terraced	34,800
	USLE non-contoured HEL corn acres not terraced	14.84

Illinois Soybean Erosion Profile ^{/1}

This table reports USLE rates and acres by HEL, "T" and conservation practices for soybeans.

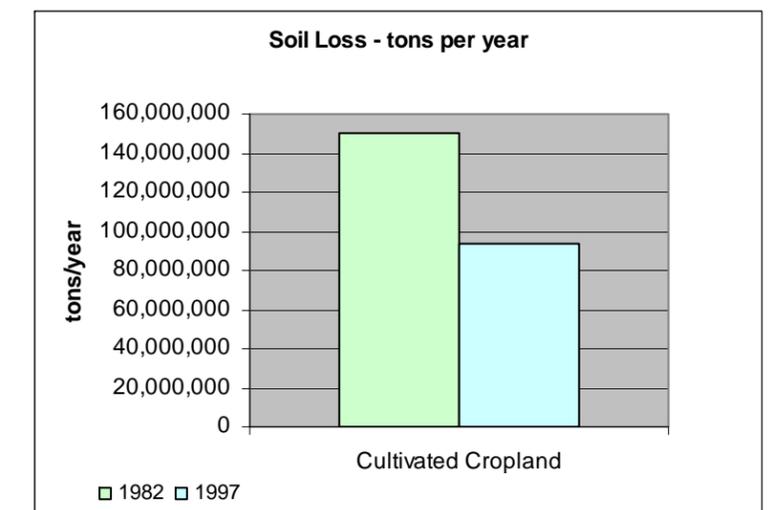
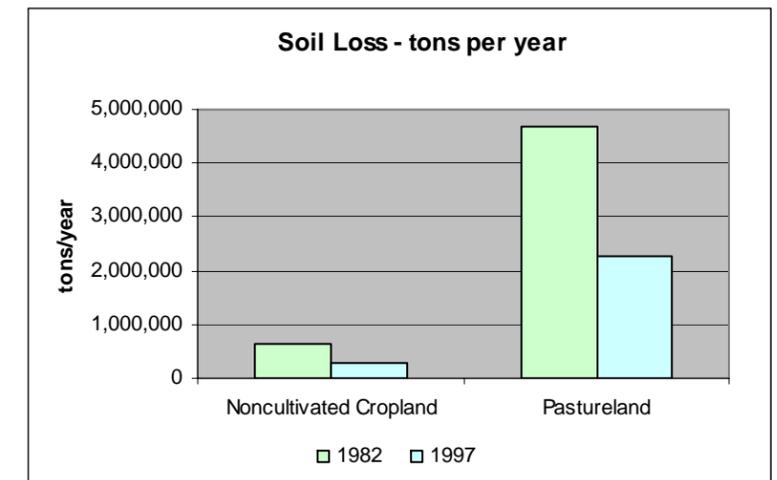
Table 4: Soybean Erosion Profile - USLE (tons/acre/year)		
ALL SOY-BEAN ACRES	All soybean acres	146,600
	USLE all soybean acres	4.45
	All contoured soybean acres	0
	USLE all contoured soybean acres	0
	All contoured and terraced soybean acres	0
	USLE all contoured and terraced soybean acres	0
	All contoured soybean acres not terraced	0
	USLE contoured soybean acres not terraced	0
	All non-contoured soybean acres	146,600
	USLE all non-contoured soybean acres	4.45
	All non-contoured and terraced soybean acres	0
	USLE all non-contoured and terraced soybean acres	0
	All non-contoured soybean acres not terraced	146,600
	USLE non-contoured soybean acres not terraced	4.45
HEL SOY-BEAN ACRES	All HEL soybean acres	26,900
	USLE all HEL soybean acres	12.02
	All contoured HEL soybean acres	0
	USLE all contoured HEL soybean acres	0
	All contoured and terraced HEL soybean acres	0
	USLE all contoured and terraced HEL soybean acres	0
	All contoured HEL soybean acres not terraced	0
	USLE contoured HEL soybean acres not terraced	0
	All non-contoured HEL soybean acres	26,900
	USLE non-contoured HEL soybean acres	12.02
	All non-contoured and terraced HEL soybean acres	0
	USLE non-contoured and terraced HEL soybean acres	0
	All non-contoured HEL soybean acres not terraced	26,900
	USLE non-contoured HEL soybean acres not terraced	12.02

Illinois Pastureland Erosion ^{/1}

This table reports USLE rates and acres in relationship to "T" for pastureland.

Table 5: Pastureland in Relation to "T" Pastureland Erosion Rates tons/acre/year		
	Acres of Pastureland	USLE Rate
Pastureland Eroding At or Below "T"	89,600	0.96
Pastureland Eroding Above "T"	2,000	9.8
All Pastureland	91,600	1.16

Illinois USLE Soil Loss Rates (tons/year) ^{/1}



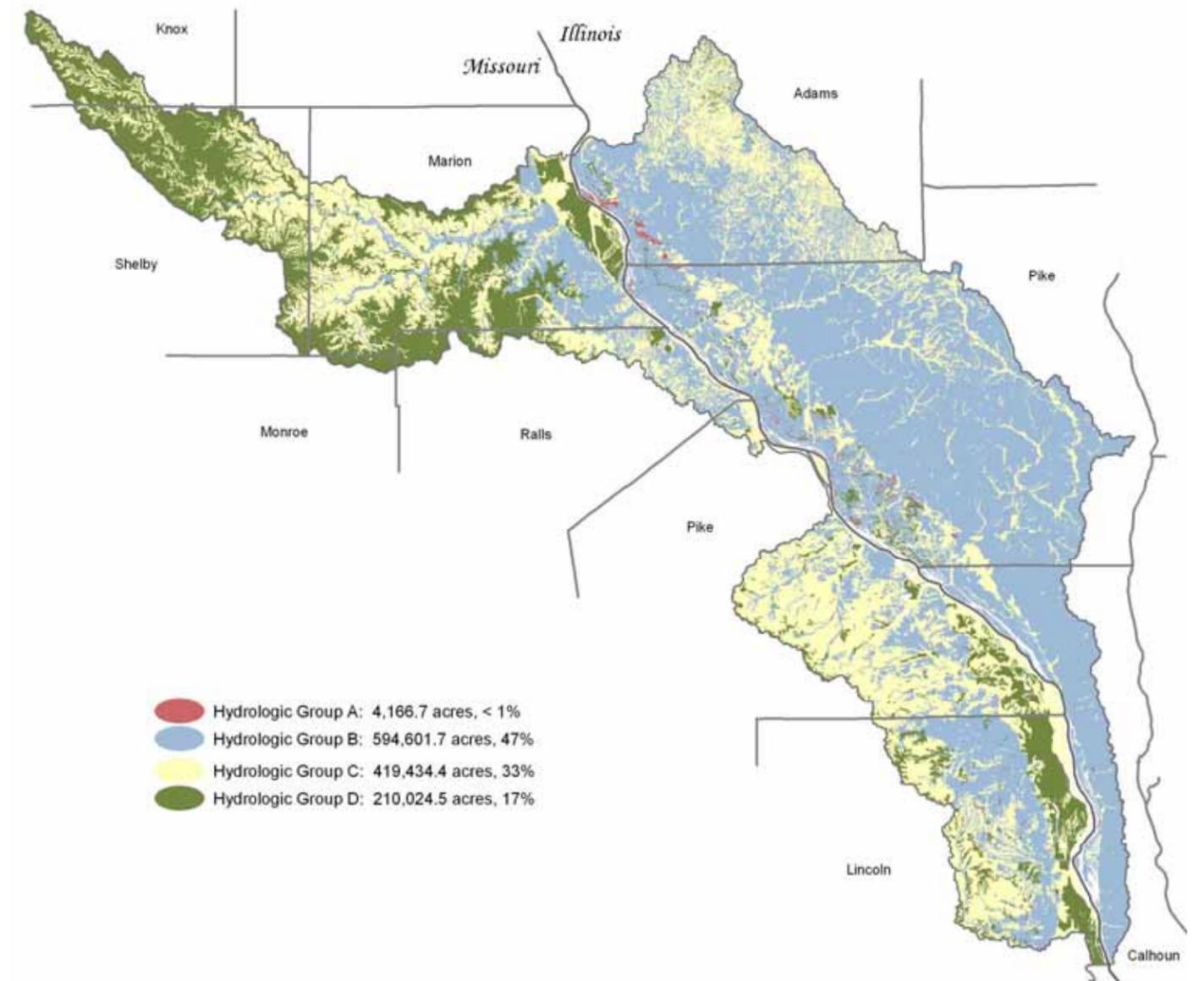
Hydrologic Soil Groups ^{/11}

Location of the Lower Missouri-Crooked River Sub-basin within Missouri and in relationship to the Upper Midwest Region.



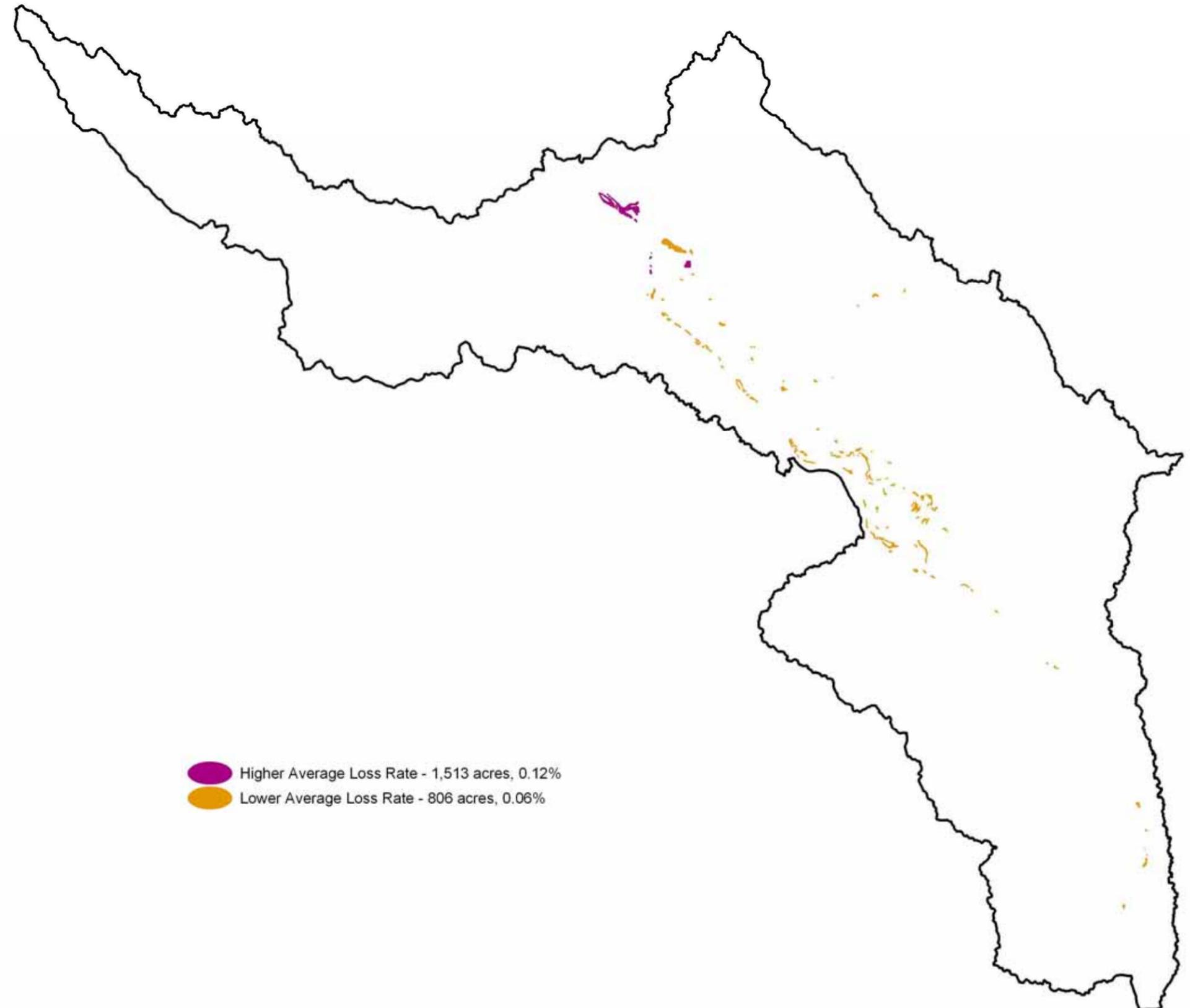
In addition to the sub-basin-wide NRI erosion estimates, a spatial assessment of erosion potential was implemented using SSURGO soils data and land cover. The acres most in need of conservation practices (acres with the highest potential for sediment loss, if cropped) have been targeted based on a major finding from model simulations of soil loss outcomes reported by the NRI-Conservation Effects Assessment Project (CEAP), (NRCS, 2006): **Hydrologic soil group and soil texture account for a large part of the variability in the loss of sediment, nitrogen and phosphorus from field to field.** Based on average per acre sediment loss rates by hydrologic soil groups and soil texture groups reported in the CEAP study, each hydrologic soil group was divided into three classes of sediment loss potential: (1) higher average, (2) moderate average and (3) lower average.

The amount of sediment loss from sheet and rill erosion is determined by the amount of precipitation, tillage practices, soil characteristics and the presence or absence of conservation practices and can vary considerably from field to field. A significant portion of this variability can be accounted for by hydrologic soil groups (HSG) and soil texture differences within the hydrologic groups. This map shows the spatial distribution of hydrologic soil groups A,B,C and D.



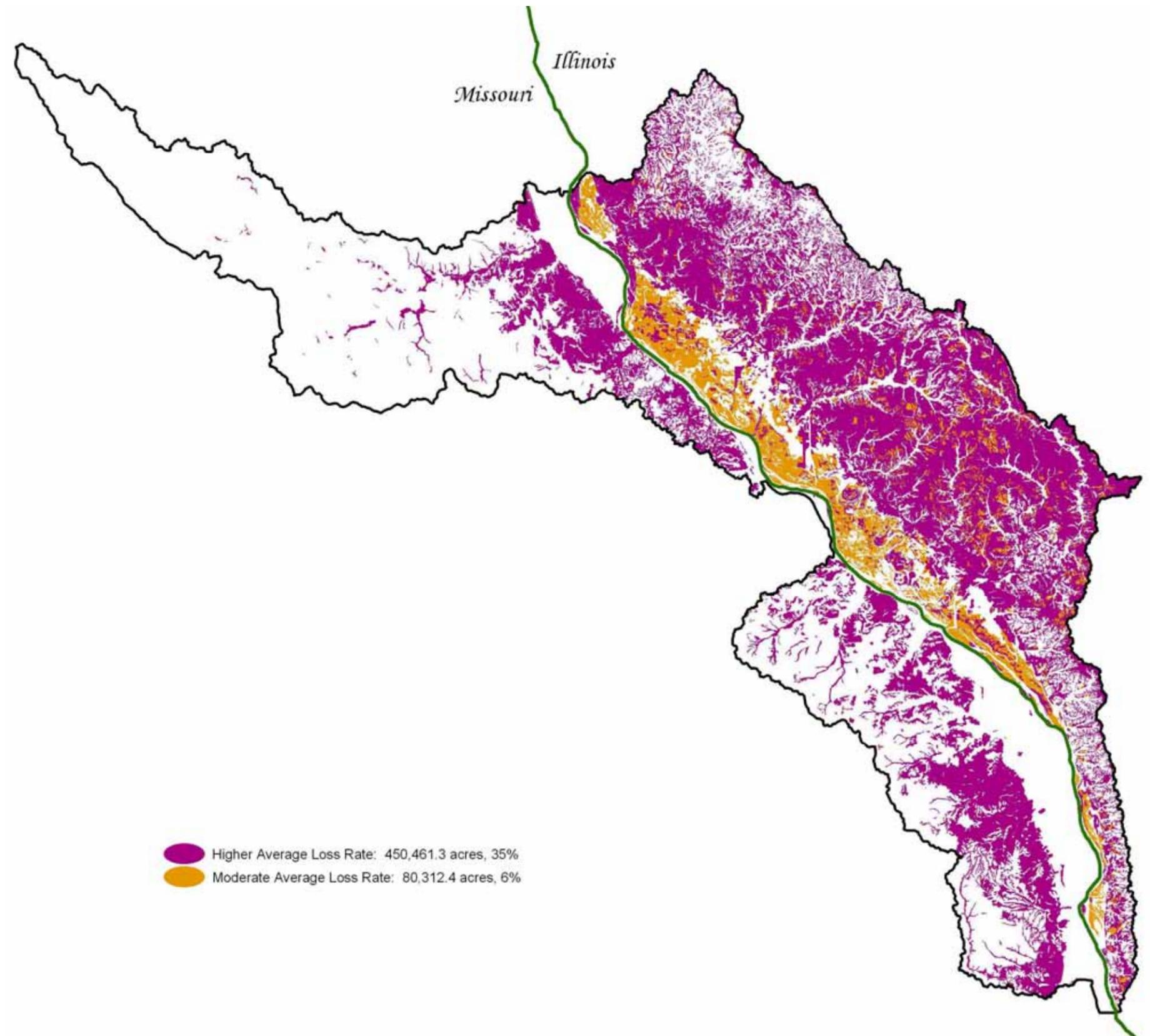
Sediment Loss Potential on Hydrologic Soil Group A (if used for cropland) [/11](#)

The lowest sediment losses can be expected on these well-drained soils with high infiltration rates. They represent a very small percentage of a sub-basin and a small percentage of cropland acres. The lower average loss rate category is defined using the moderately coarse and coarse texture groups.



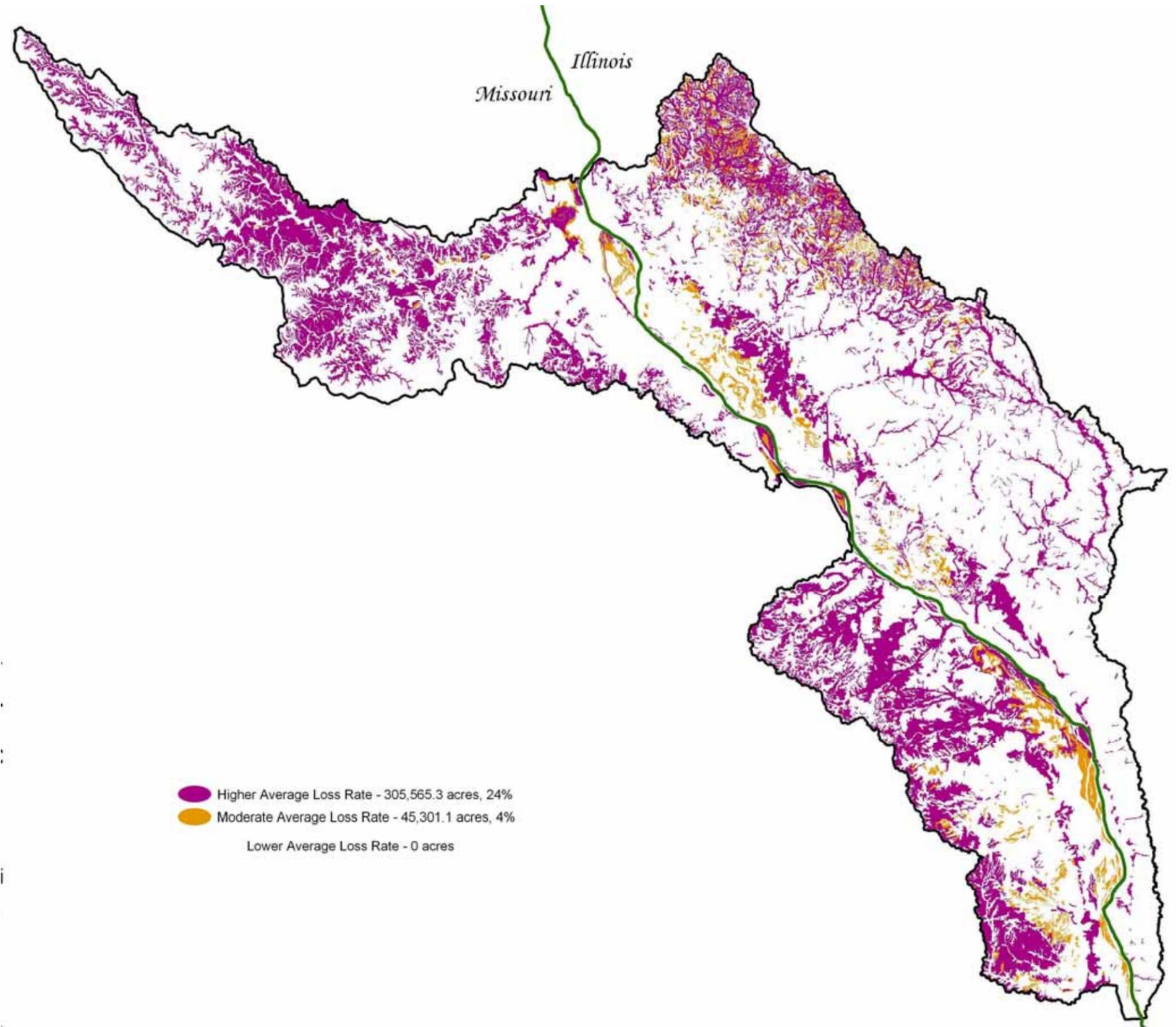
Sediment Loss Potential on Hydrologic Soil Group B (if used for cropland) [/11](#)

Acreages for this hydrologic soil group are typically high with a large number of cropland acres. Acres with the highest potential for sediment loss are defined by medium and fine soil texture groups. Soils with a medium average sediment loss potential are represented by moderately coarse and moderately fine textured soils. Coarse textured soils in hydrologic soil group B dominate the areas with the lowest average sediment loss rate potential. Average soil loss rates for all texture groups will tend to be at or below the average for the sub-basin.



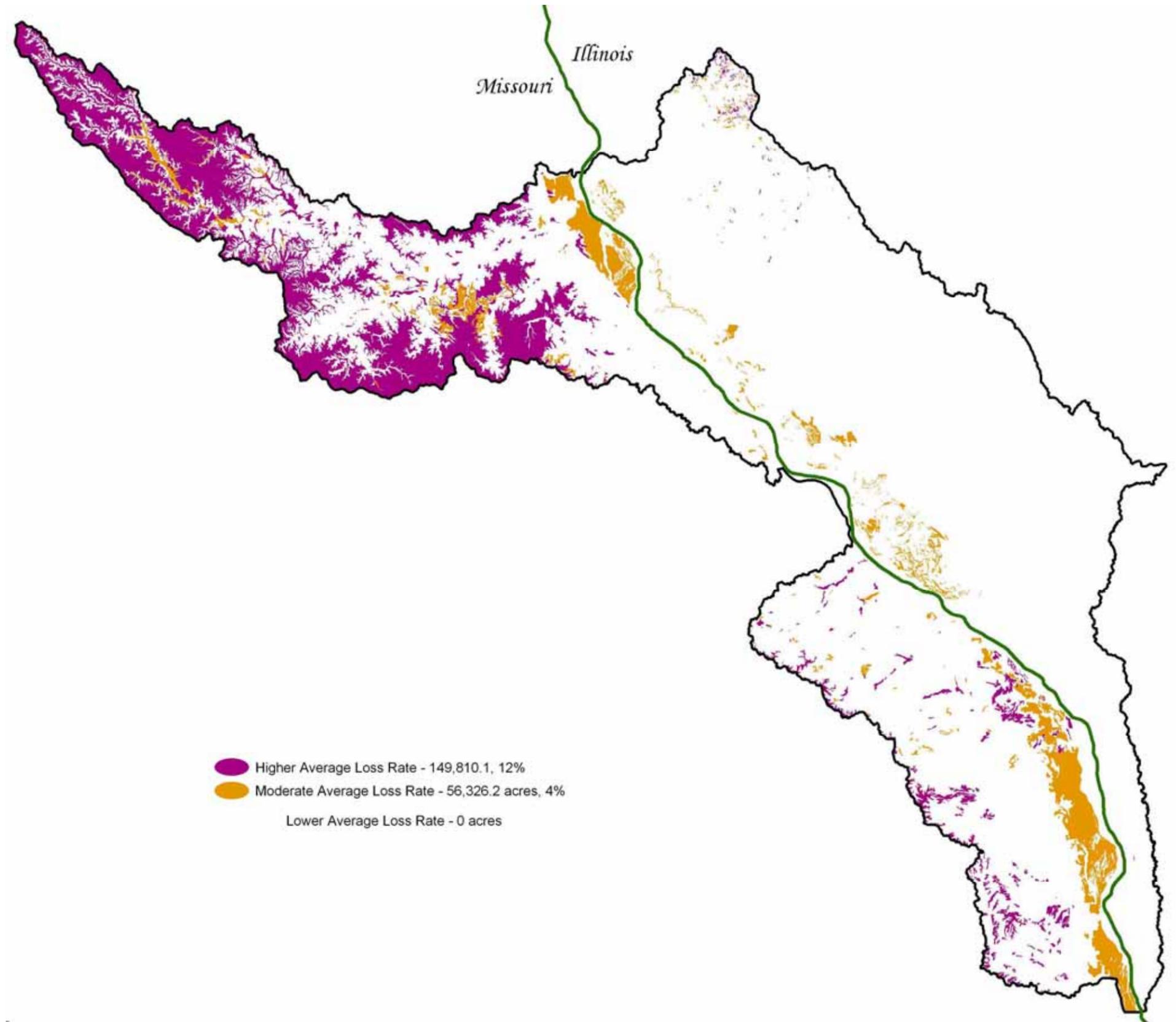
Sediment Loss Potential on Hydrologic Soil Group C (if used for cropland) [/11](#)

This is the largest hydrologic soil group in the sub-basin with a large cropland acreage. Higher average sediment loss rates are reflected in the medium texture soil group. The moderate average sediment loss rate category is made up of the coarse and moderately coarse and fine and moderately fine soil texture groups. Average soil loss rates for all the texture groups will tend to exceed the average for the sub-basin.



Sediment Loss Potential on Hydrologic Soil Group D (if used for cropland) [/11](#)

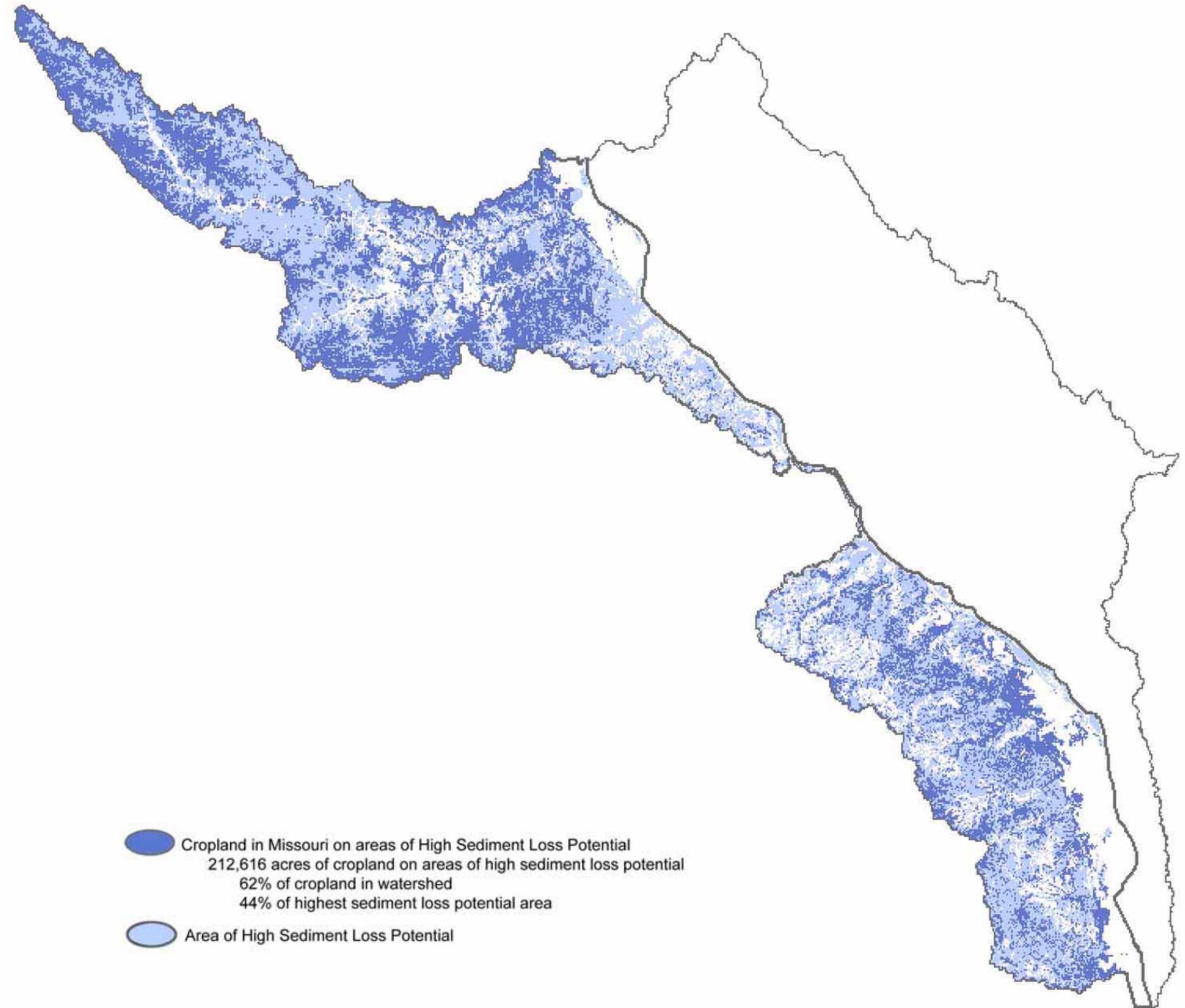
This is the second smallest hydrologic soil group in the sub-basin but it is dominated by cropland. The higher average sediment loss rates are on the medium textured soils and the moderate average sediment loss rates are produced by the fine and moderately fine soil texture groups. The coarse and moderately coarse soil texture groups generate the lower average sediment loss rates.



Acres of Cultivated Cropland on Soils with the Highest Sediment Loss Potential ¹¹

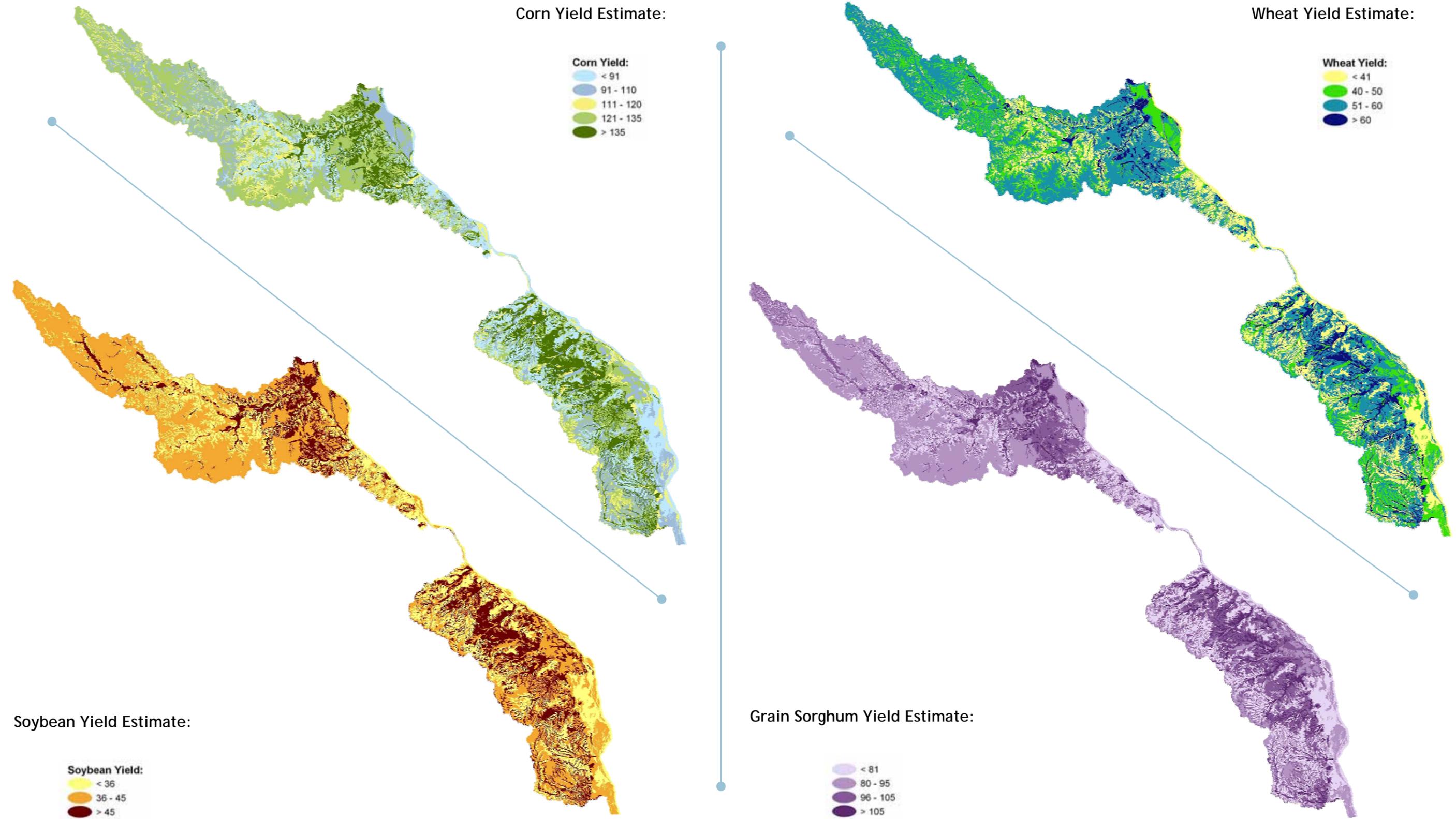
Each hydrologic soil group was divided into three classes of sediment loss potential based on texture groups: (1) higher average, (2) moderate average and (3) lower average. This rating was linked to a SSURGO soils data set to produce maps of high, medium and low soil loss potential for each hydrologic group.

This map is a composite of the acres that have the highest soil loss potential in each hydrologic soil group. The qualifying soils in each hydrologic soil group are: hydrologic soil group A – no qualifying soils; hydrologic soil group B's medium and fine textured soils; hydrologic soil group C's medium textured soils; hydrologic soil group D's medium textured soils. The dark blue areas are currently under cultivation and represent the acres that could benefit the most from the application of conservation practices, if not already implemented.



3.1.4 Soil Productivity [/11](#)

Yield estimates were developed using Missouri's Productivity Index (PI). The PI is a method developed by soil scientists that "automatically" evaluates specific soil properties directly related to plant growth. The soil properties used are a record of many years of soil survey data stored in USDA's National Soils Information System (NASIS). The properties include: nutrient-supplying power (Organic matter, cation exchange capacity and pH), root penetration (depth to barriers, retarding layers, etc.), wetness effects (depth to seasonal high water table), available water capacity, surface restrictions (rocks, clayey, etc.), flooding restrictions (frequency), phase restrictions (gullied, channeled), slope restrictions and climate. Similar data is not available for Illinois.



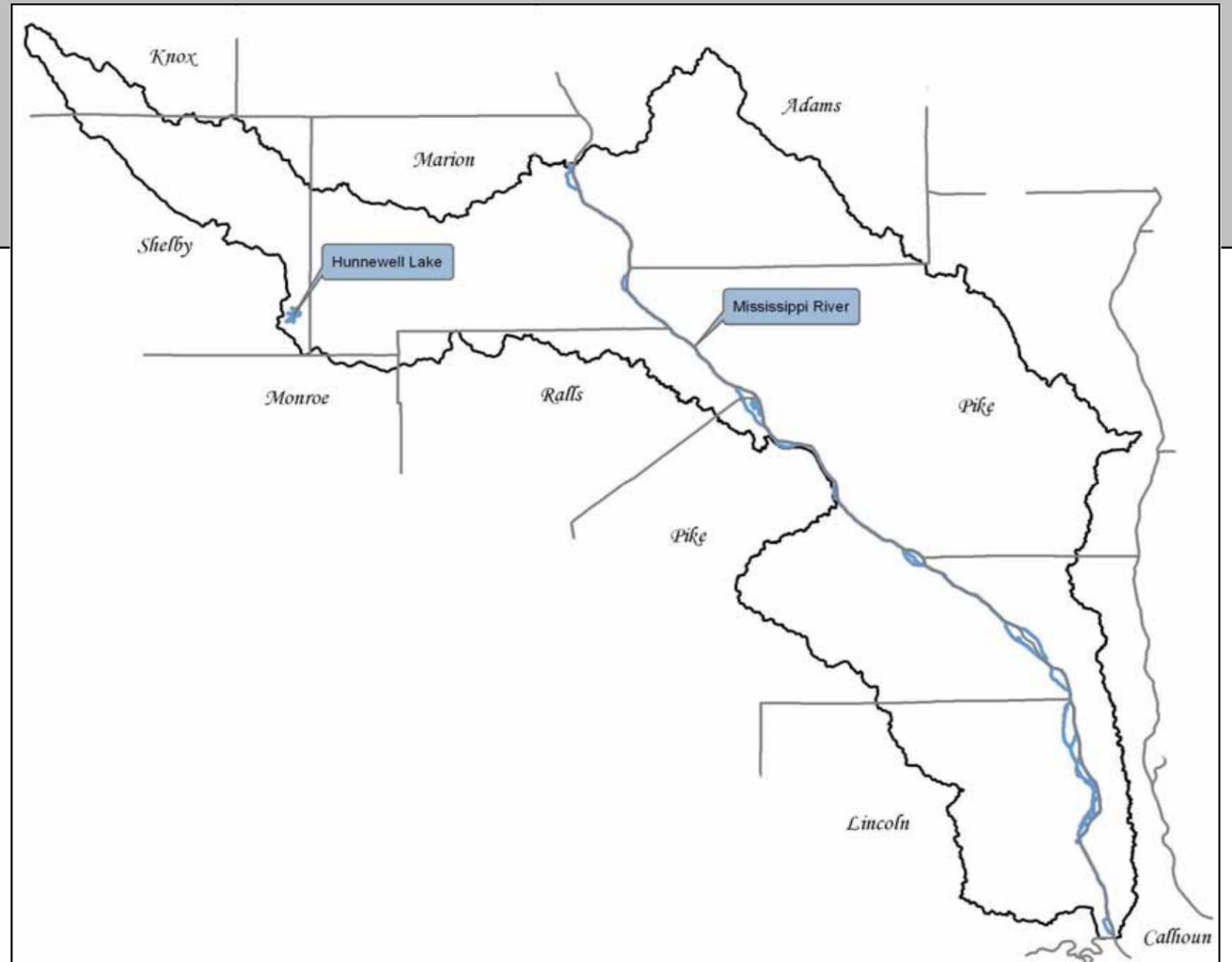
3.2 Water Quality

3.2.1 303(d) Listed Waters—Missouri ¹²

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

Waterbody	Waterbody ID	TMDL Approved	Size	Unit	Pollutant	Source	Beneficial Use(s) *	Impaired Use(s)	Counties	Priority
Hunnewell Lake	7029	No	228	Acres	Mercury	Atmospheric Deposition		Fish Consumption	Shelby	Medium
Mississippi River	1	No	165	Miles	Chlordane, PCB	Point and Non-point sources	1, 2, 3, 4, 6, 7, 8, 9	Fish Consumption	Marion, Pike, Ralls	Medium

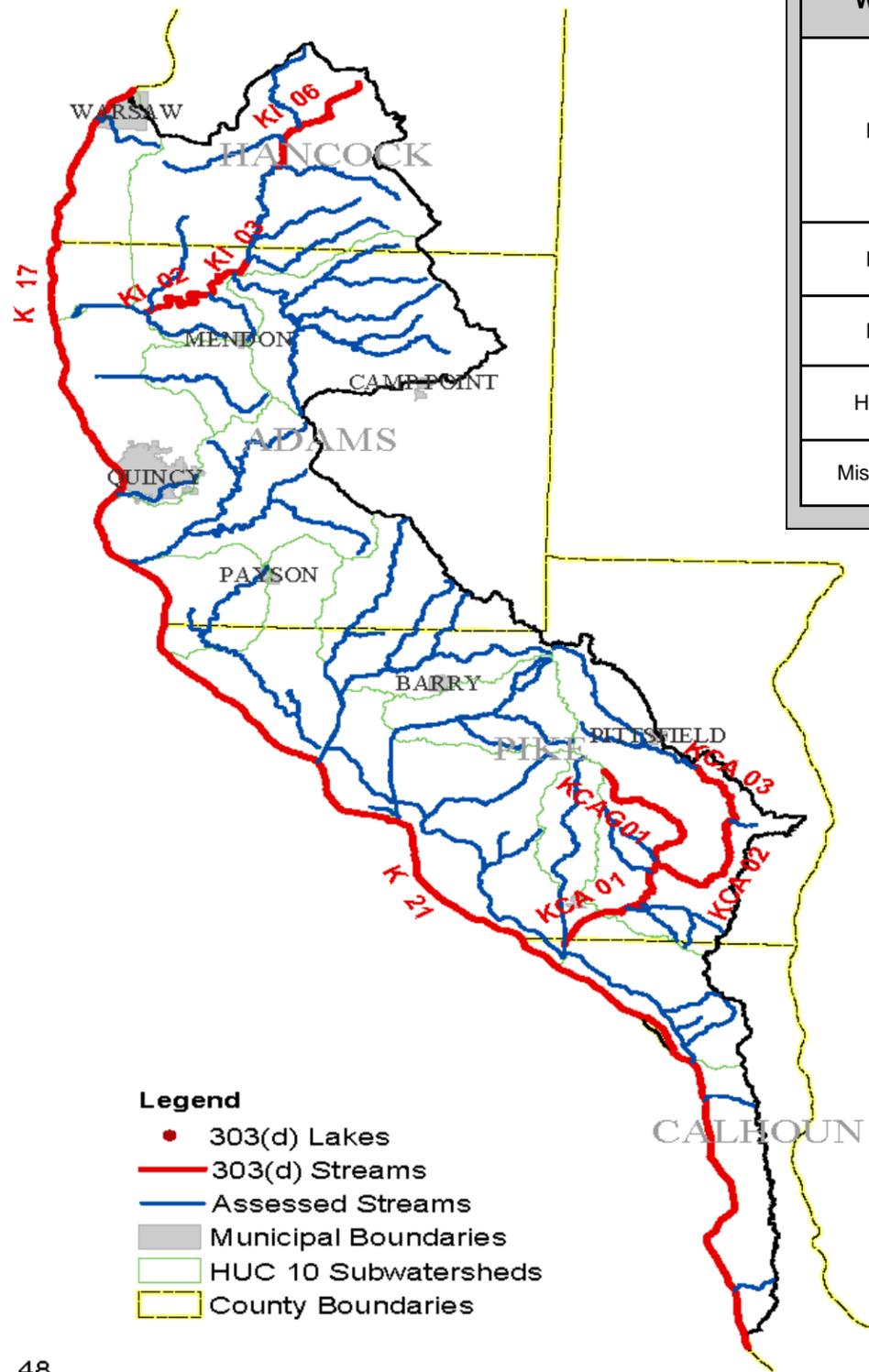
- * Beneficial Uses:
- 1 Livestock and Wildlife Watering
 - 2 Protection of Warm Water Aquatic Life
 - 3 Human Health associated with Fish Consumption
 - 4 Boating and Canoeing
 - 5 Whole Body Contact (swimming)
 - 6 Secondary Contact Reaction
 - 7 Irrigation
 - 8 Drinking Water Supply
 - 9 Industrial



3.2.2 303(d) Listed Waters— Illinois [/23](#)

Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

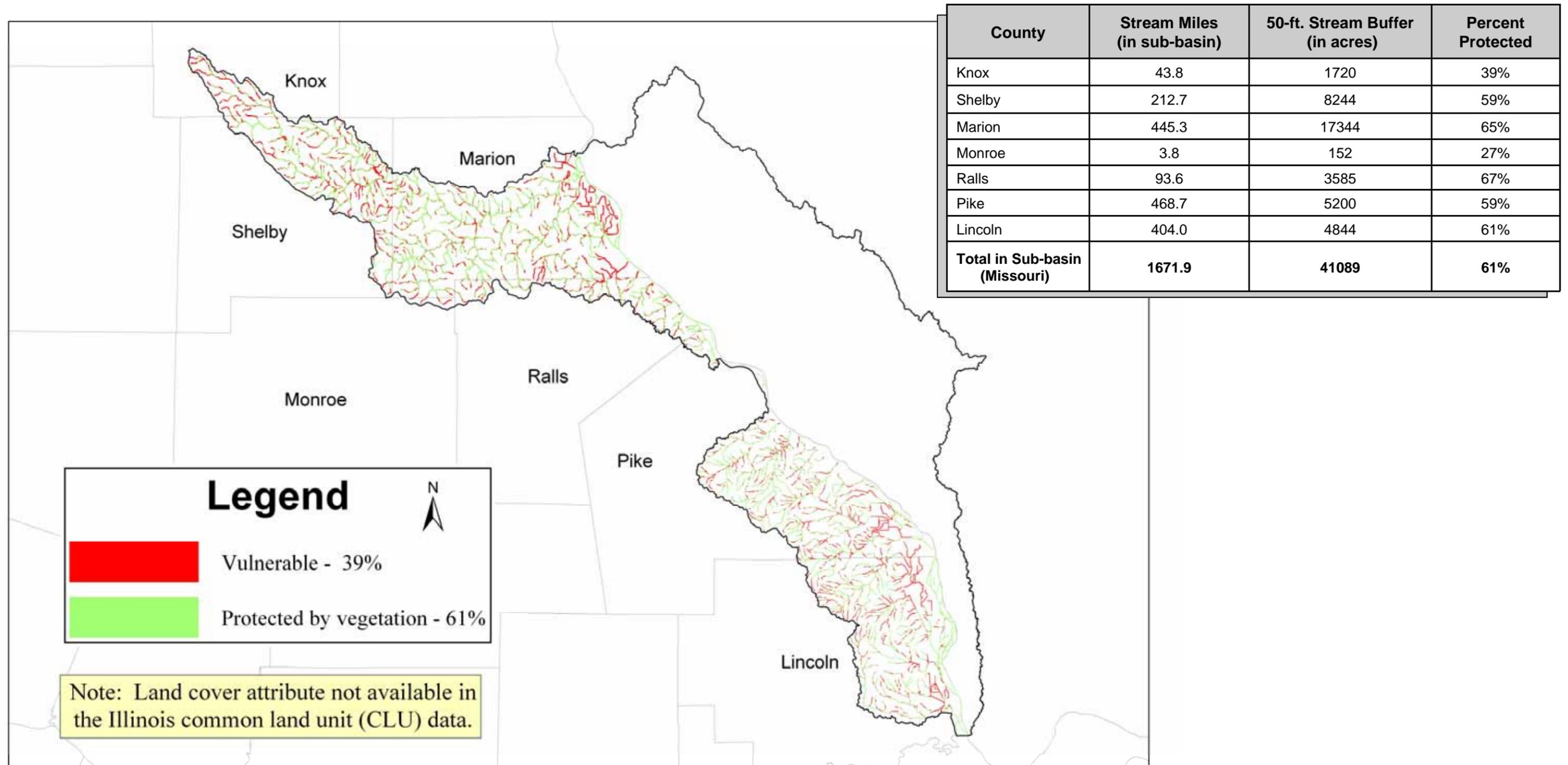
Waterbody	Waterbody ID	TMDL Approved	Pollutant	Source	Counties	Priority
Bay Creek	KCA01	No	Dissolved Oxygen, Fecal Coliform, Habitat alteration, Sedimentation/Siltation, Total phosphorus, Total suspended solids	Oxygen Depletion, Pathogens, Habitat alteration, Sediment, Nutrients, Turbidity	Pike	Medium
Bay Creek	KCA02	No	Habitat alteration, Total phosphorus	Habitat alteration, Nutrients	Pike	Medium
Bay Creek	KCA03	No	Habitat alteration, Total phosphorus	Habitat alteration, Nutrients	Pike	Medium
Honey Creek	KCAG01	No	Dissolved Oxygen, Sedimentation/Siltation	Oxygen Depletion, Sediment	Pike	Medium
Mississippi River	K21	No	PCBS	-	Adams, Calhoun, Pike	Medium



3.2.3 Riparian Corridor Condition [/44 & /46](#)

The condition of the riparian zone adjacent to streams has a critical impact on water quality. Permanent and deeply-rooted stream bank vegetation slows run-off of nutrients and pollutants, and reduces sedimentation and solar heating. NRCS riparian practice standards specify 50-foot buffers along first and second order streams and 100-feet for third order and higher streams.

The 1:24,000 National Hydrologic Dataset (NHD) stream network is the highest resolution stream representation available consistently for the State. Stream order is not an attribute of these data; therefore, the streams were all buffered by 50-feet to give the most conservative representation of riparian condition. Buffered streams were used to subset the common land unit (CLU) data, land parcel data developed and maintained by the Farm Service Agency. The land cover attribute in the CLU data was used to characterize the vegetative condition of the buffers. Cropland (which includes pasture and hayland), urban, mined and barren cover types were considered “unprotected” or “vulnerable” riparian conditions, while forestland, rangeland and water were considered “protected”. Results are presented by county and sub-basin-wide in the table and map below.



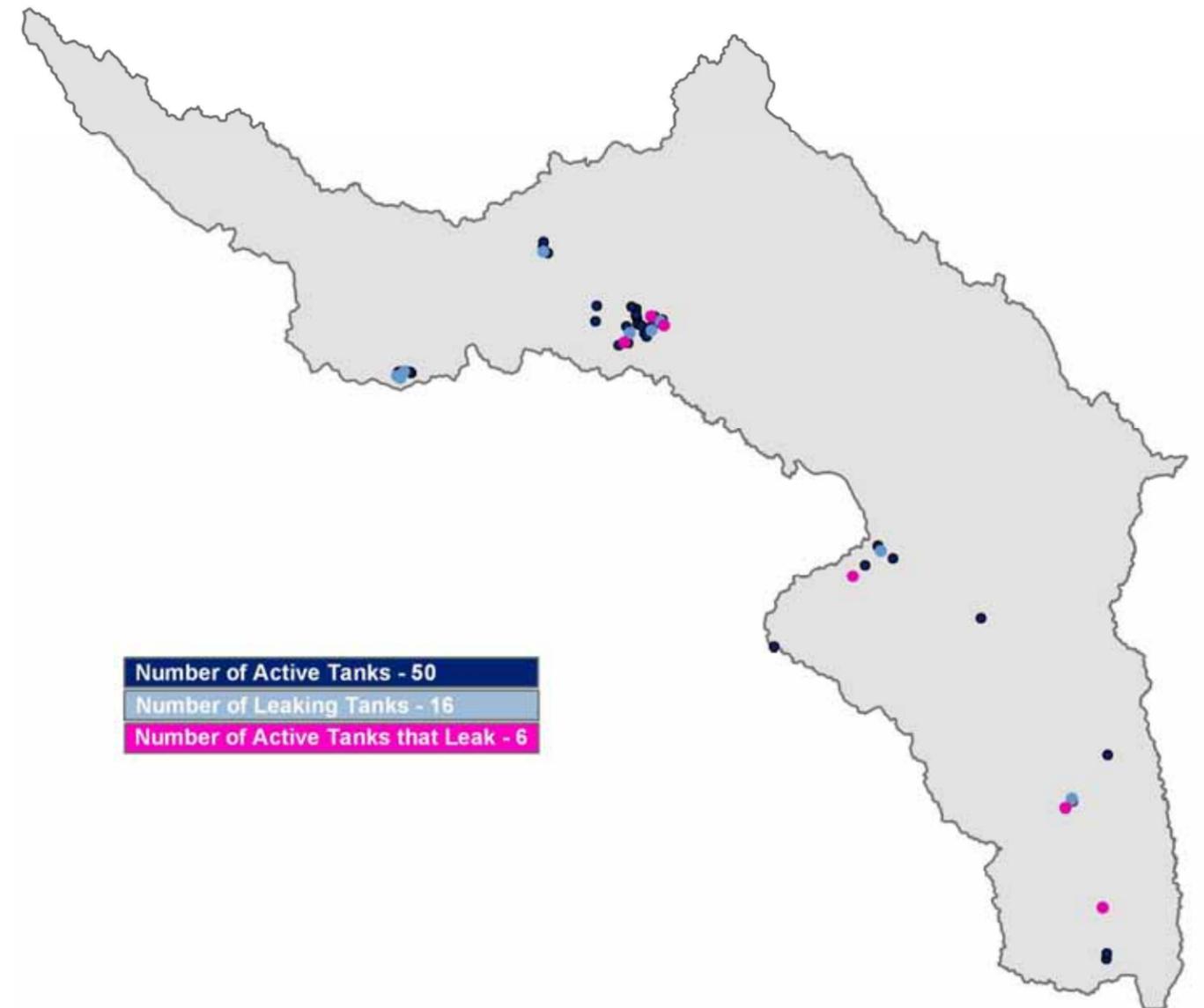
3.2.4 Transfer Stations [/16](#)

Permitted active solid waste transfer stations in sub-basin.



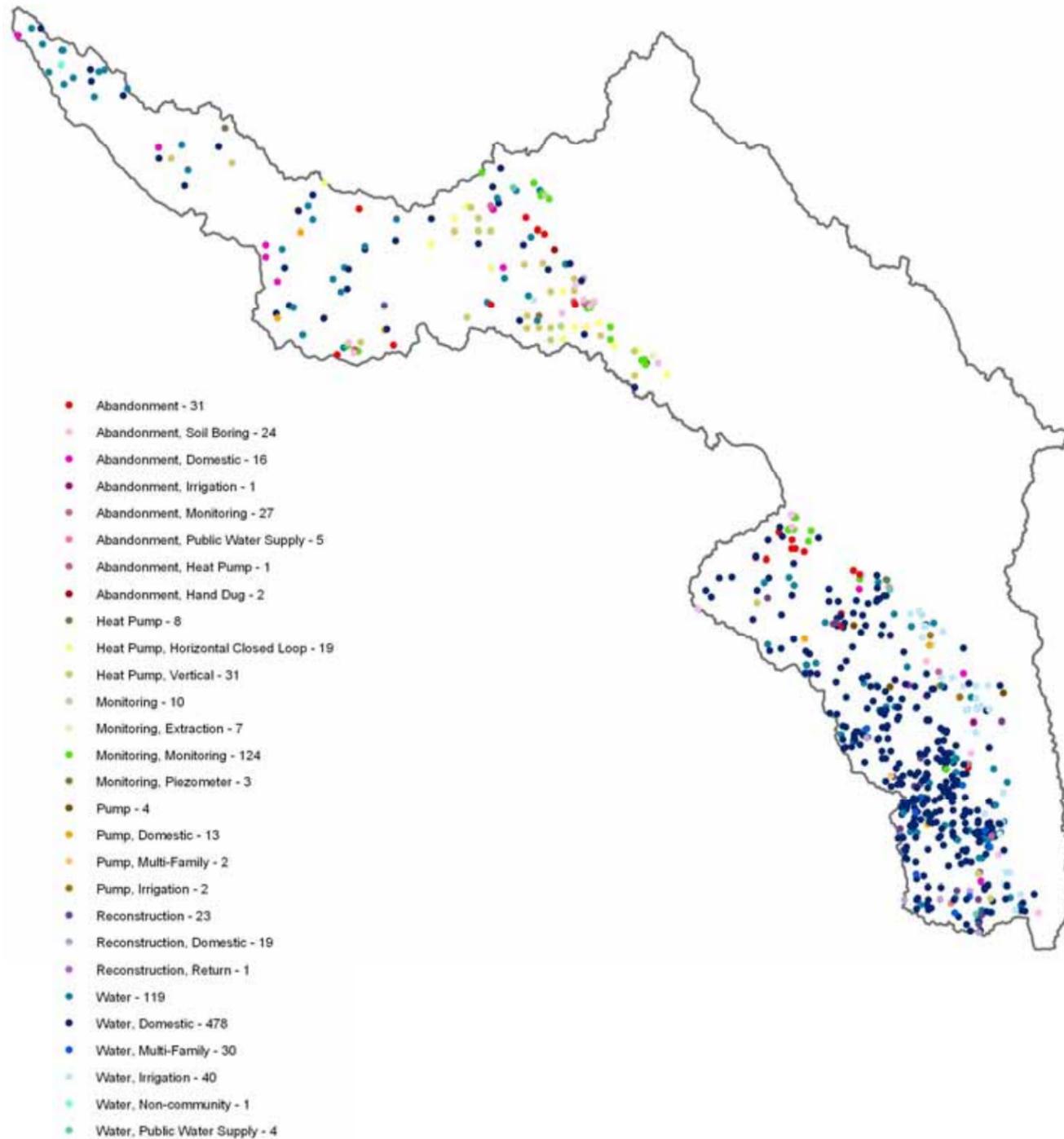
3.2.5 Underground Tanks [/14 & /15](#)

Registered active underground tanks and locations of leaking underground tanks in the sub-basin where clean-up activities are on-going.



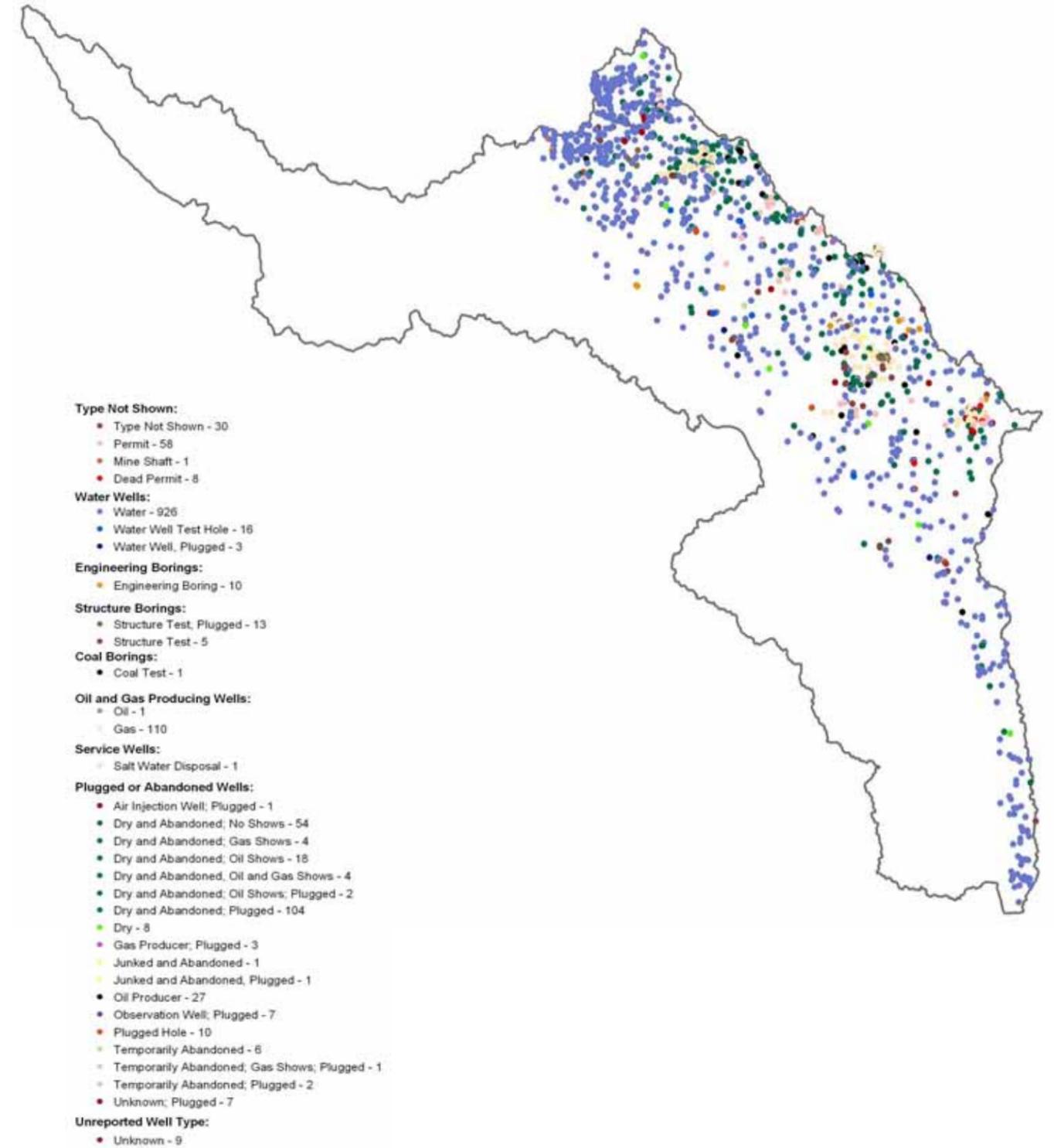
3.2.6 Wells—Missouri [/13](#)

The Missouri Well Driller's Law (Section 256.600-256.640 RSMo.) established minimum construction standards and state certification requirements of wells constructed after October, 1987. The law was created to protect Missouri groundwater from contamination due to improperly constructed wells. Contaminated groundwater exposes Missourians of all ages to serious health risks that can result from water borne diseases such as typhoid fever, dysentery, cholera, hepatitis and giardiasis. The law is administered through the Department of Natural Resources.



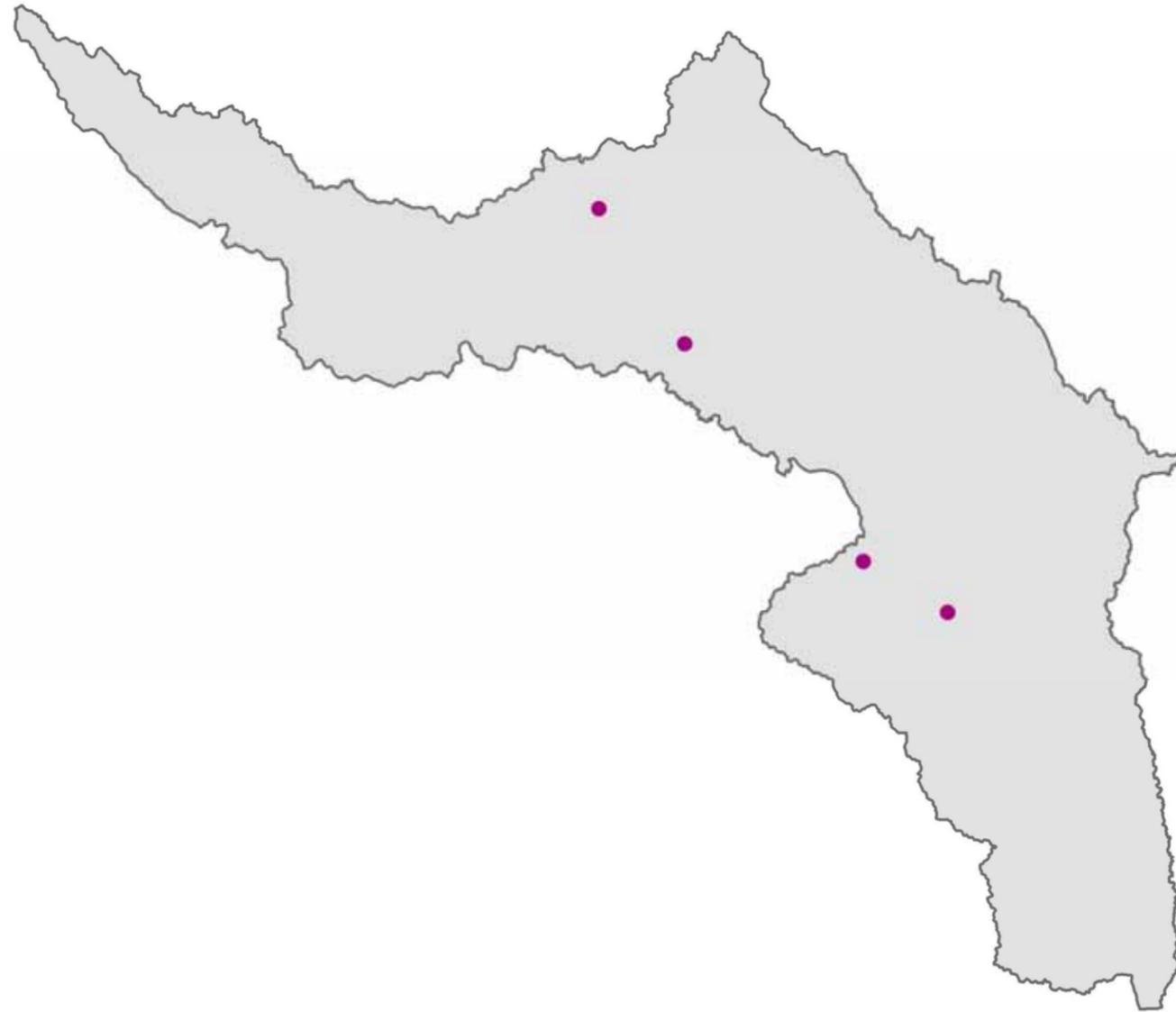
3.2.7 Wells—Illinois [/22](#)

Wells in Illinois.



3.2.8 Sites with Hazardous Waste Permits [/17](#)

Sites with hazardous waste permits are permitted to treat, store or dispose of hazardous waste or are facilities that are certified for resource recovery. There are 4 sites in the sub-basin.

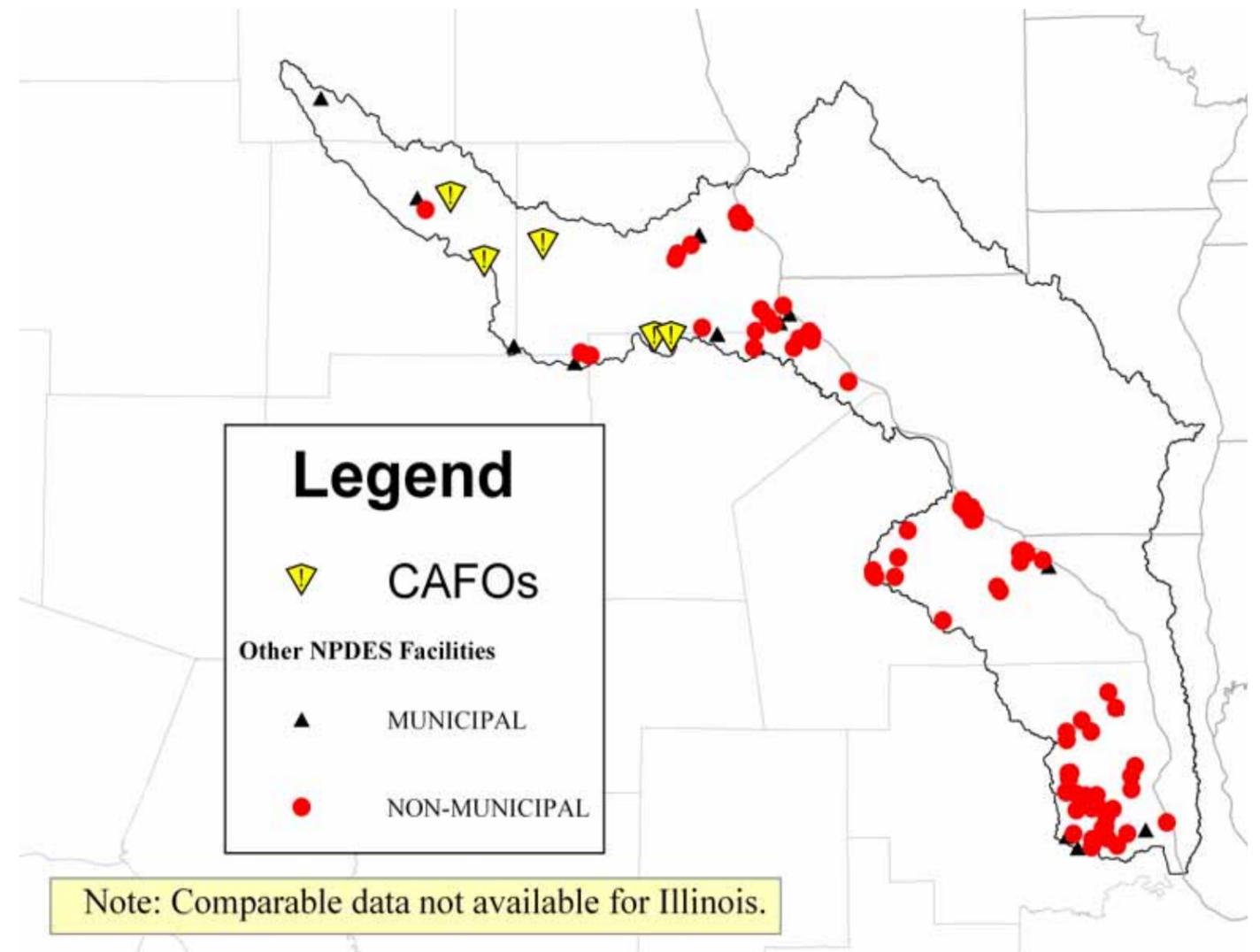


3.2.9 Waste Water Treatment Facilities and Concentrated Animal Feeding Operations [/34](#)

Five swine finishing concentrated animal feeding operations (CAFOs) are documented in the Missouri National Pollutant Discharge Eliminations System (NPDES) Facilities database in this watershed. The NPDES is a point data set maintained by the Missouri Department of Natural Resources depicting outfall locations of wastewater facilities requiring and holding Missouri NPDES operating permits.

An animal feeding operation is defined as a CAFO if it has more than 7000 animal units confined in an area with less than 50% vegetation ground cover. Smaller animal unit operations may be designated a CAFO if they discharge directly into waters of the state or have past history of discharge violations. The animal unit is a unit of measurement to compare waste produced by various animal types, using one beef feeder as a reference.

In addition to CAFOs, the NPDES identifies 124 municipal and non-municipal permitted waste water treatment facilities of a wide variety, from industry to municipal sewage.

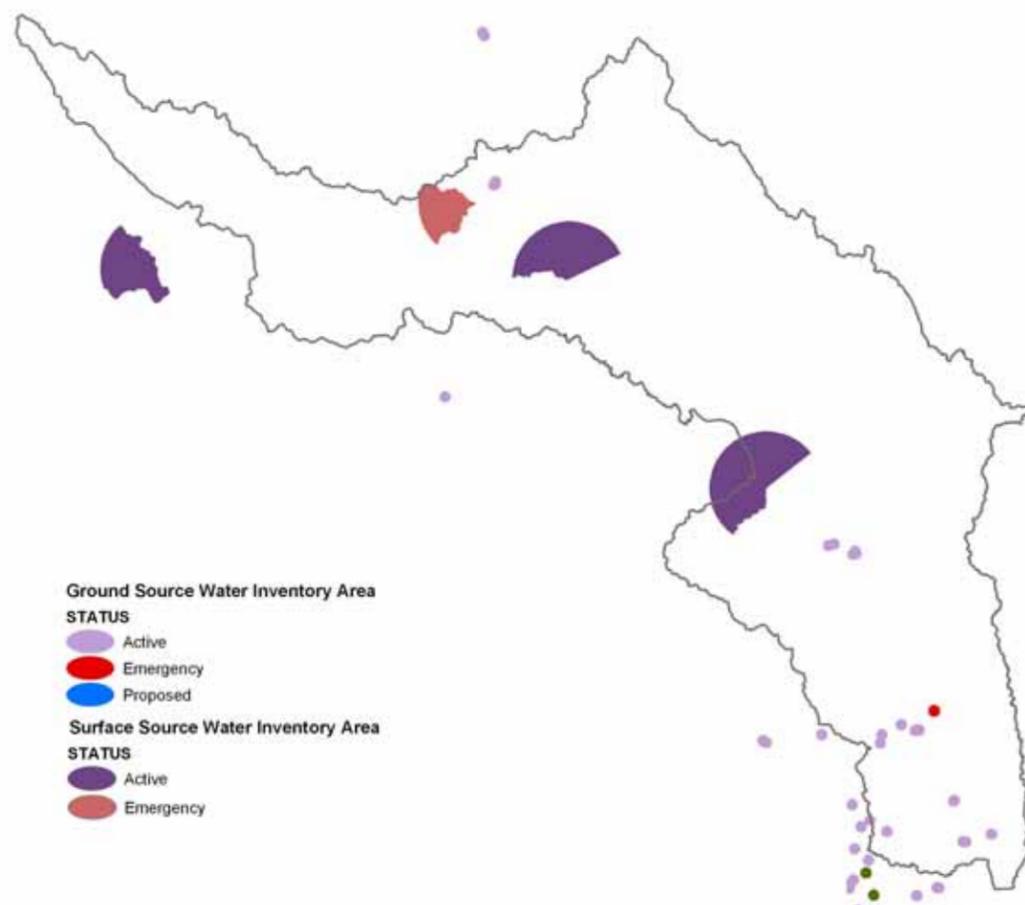


3.3 Water Quantity

3.3.1 Public Water Supply [/30, /31, /32 & /33](#)

Missouri's 5.8 million residents draw their water supplies from ground and surface sources that vary tremendously in both quality and quantity. These variations are, to a large extent, controlled by geology and land use. North of the Missouri River, herbicides and sediment are a primary concerns in surface water sources and well sources contend with heavy mineralization, nitrates and pesticides. In the Ozark Highlands, ground water, the primary water supply source, is vulnerable to aquifer degradation from contaminated surface runoff and leachates through highly permeable soils and bedrock. Missouri's alluvial aquifers supply large quantities of high quality water, primarily to population centers located near the larger rivers and the Mississippi Embayment covering most of the southeastern corner of the state. Shallow wells are vulnerable to nitrate and pesticide contamination and the deeper wells in highly urbanized areas are at risk from a wide variety of chemical pollutants.

This map shows the surface and ground source water areas that have been inventoried for potential sources of drinking water contamination compiled by MDNR. Detailed information is available for individual public drinking supply systems and the spatial distribution of other drinking water supply features (wells, intakes, tanks, treatment plants, pumping stations, springs and lakes) from MDNR. The 2006 Missouri Water Quality Report provides current water quality assessments and summarizes water quality issues around the state. The 2007 Census of Missouri Public Water Systems is a comprehensive description of city, water district, subdivision and non-community water systems including type of treatment processes and chemical analyses of community water systems. The 2005 Missouri Water Supply Study provides detailed technical hydrologic and water resource engineering data for drought planning for 34 community water systems in North and West Central Missouri.



3.4 Threatened and Endangered Species [/9](#)

The Missouri Natural Heritage Database stores locations, population status and habitat information about species and communities of conservation concern. The database is a collection of over 18,000 records on 800 species and communities. The table below was generated from a subset of the Heritage Database, restricted to Federally threatened or endangered and state endangered species recorded in the sub-basin. The subset was spatially generalized with buffers around species records that relate to the species' mobility. While Heritage data can not prove absence of a species in an area, it is the best collection available of known locations of sensitive species and is used to assess potential impacts of various land management activities in a region.

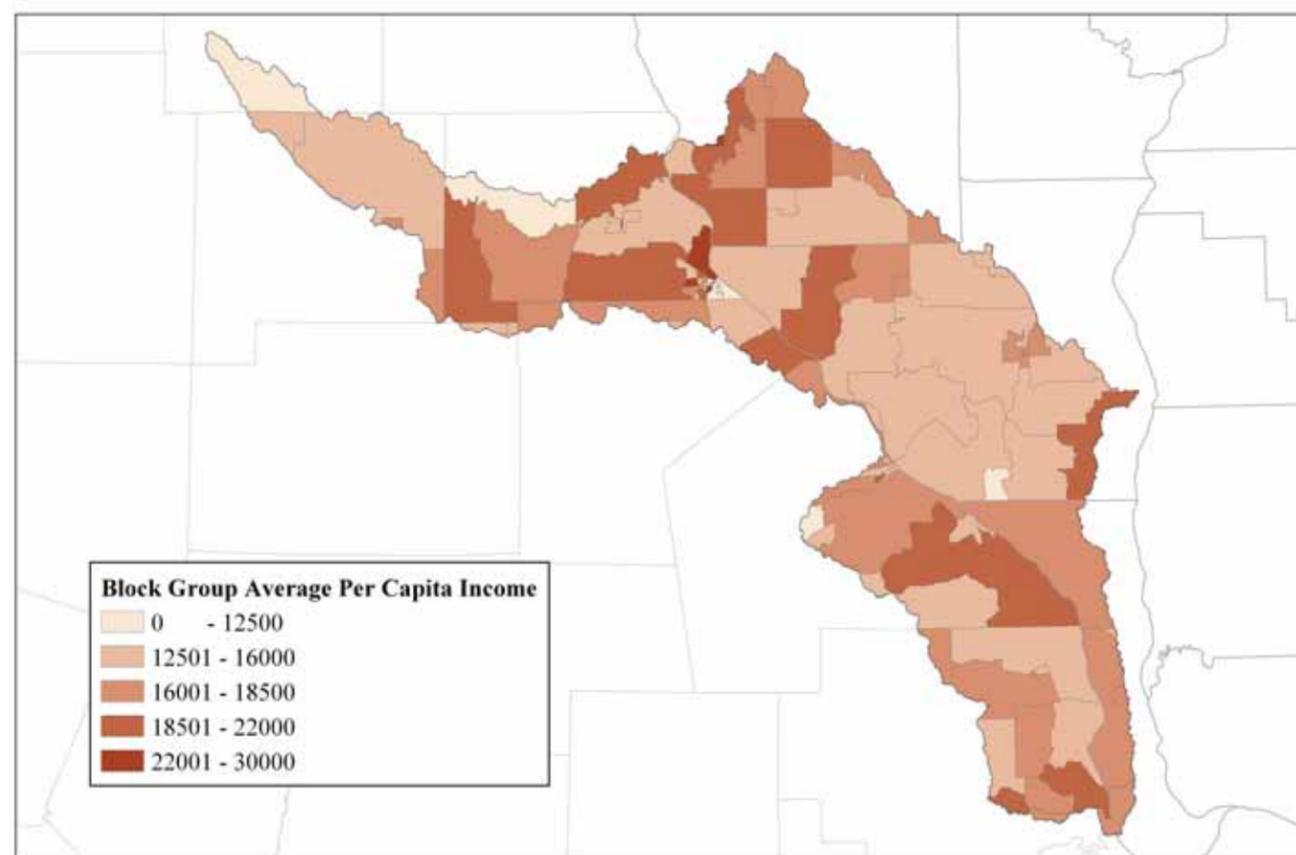
Species Common Name	Scientific Name	Threatened (T), Endangered (E), Candidate (C)	Listing: Federal (F), State (S)
Bats			
Gray Bat	<i>Myotis grisescens</i>	E/E	F/S
Indiana Bat	<i>Myotis sodalis</i>	E/E	F/S
Birds			
American Bittern	<i>Botaurus lentiginosus</i>	E	S
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T/E	F/S
King Rail	<i>Rallus elegans</i>	E	S
Reptiles			
Western Fox Snake	<i>Elaphe vulpina vulpina</i>	E	S

4.0 Census and Social Data

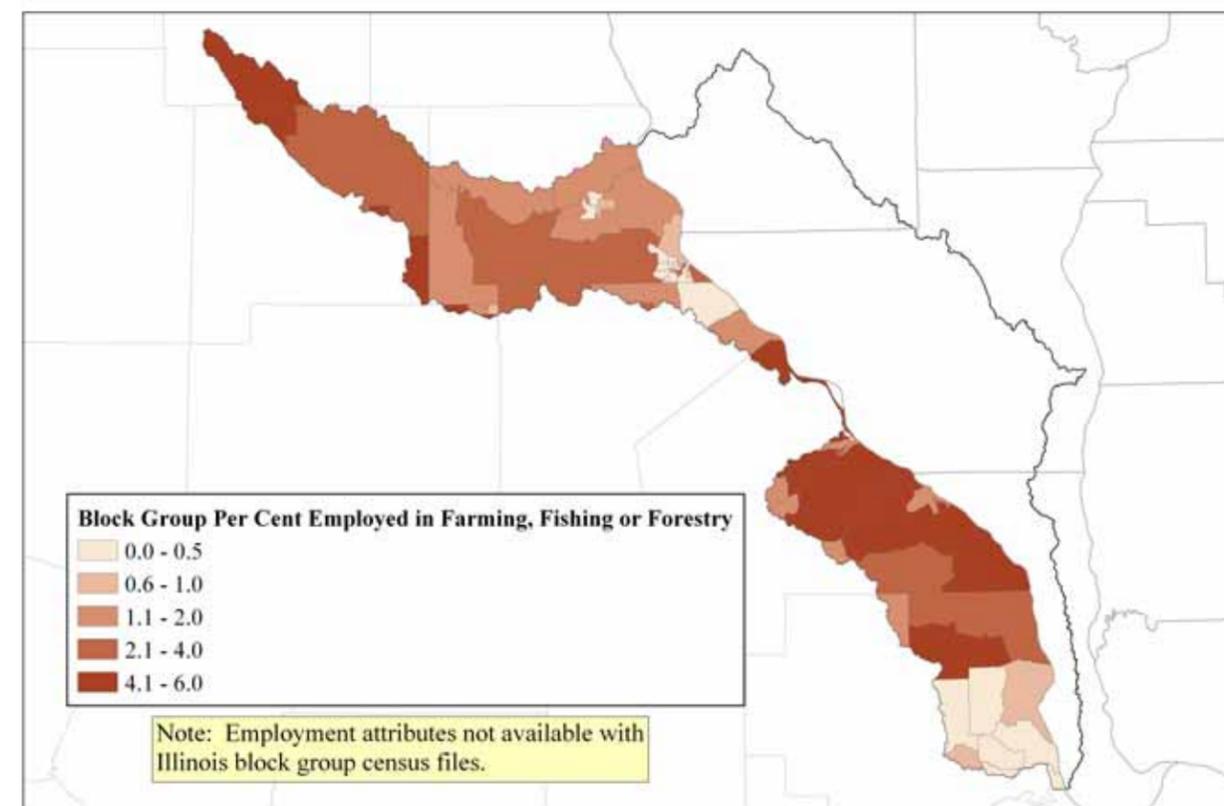
4.1 Census Bureau [/38](#)

Block group-level GIS data files from the 2000 Census, including Summary Form 3 (SF3) attributes, were used to illustrate population, population change, income and the agricultural cohort for the sub-basin. County block group spatial files were merged and clipped by the sub-basin boundary. The percent of the block group falling in the sub-basin was calculated, and population figures were prorated by this value. Although this technique erroneously assumes even distribution of the population within block groups, it is a more accurate population count for the sub-basin than including the entire block group population.

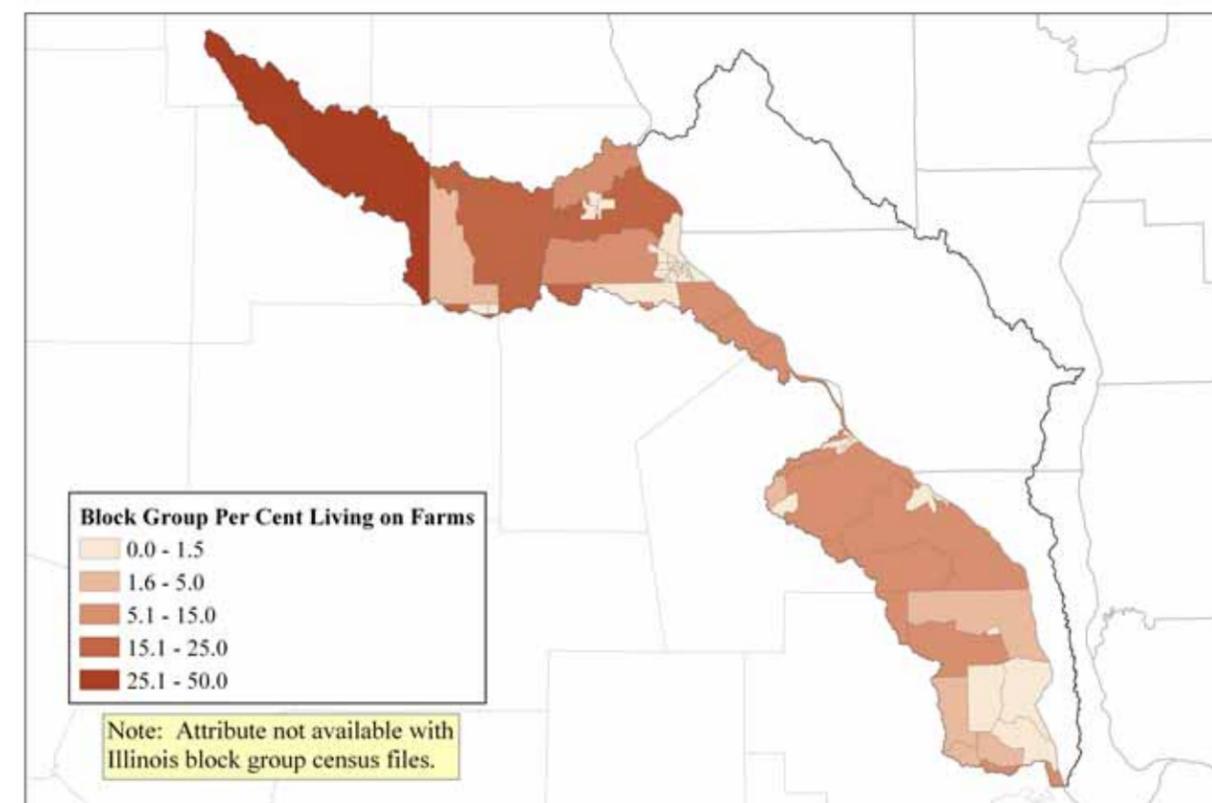
4.1.1 Income



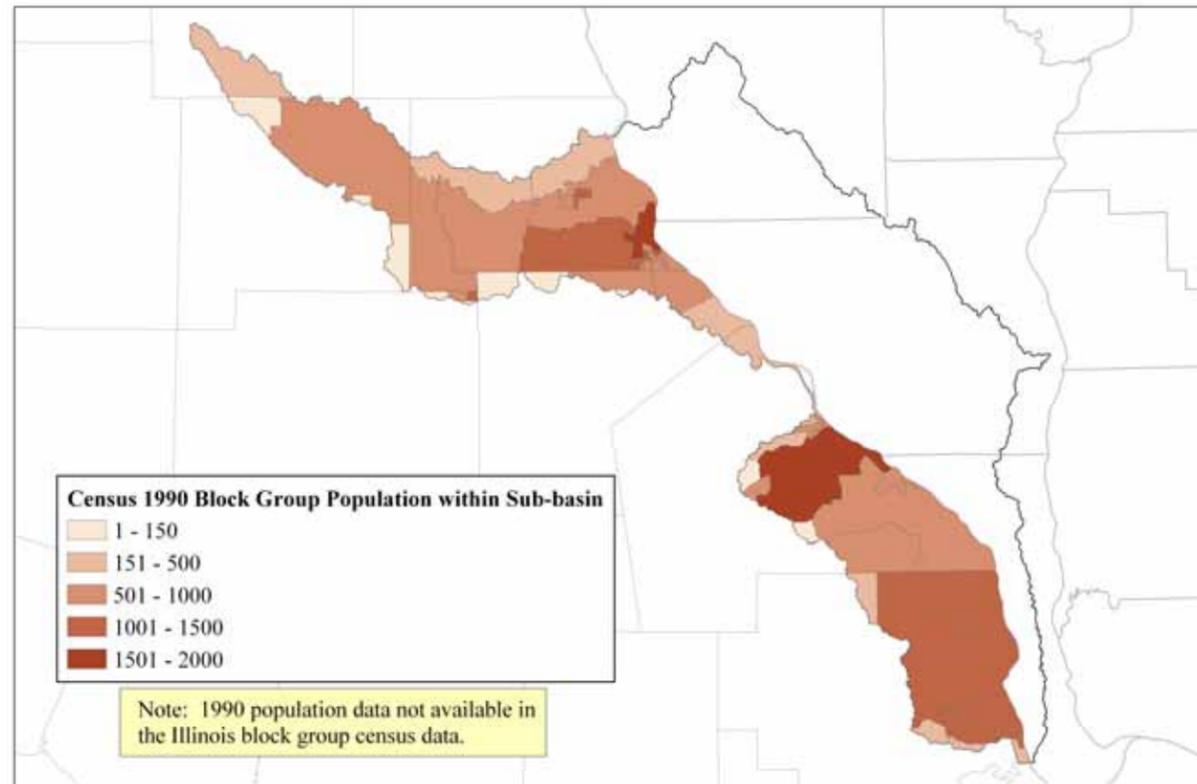
4.1.2 Employment in Agriculture, Forestry and Fishing



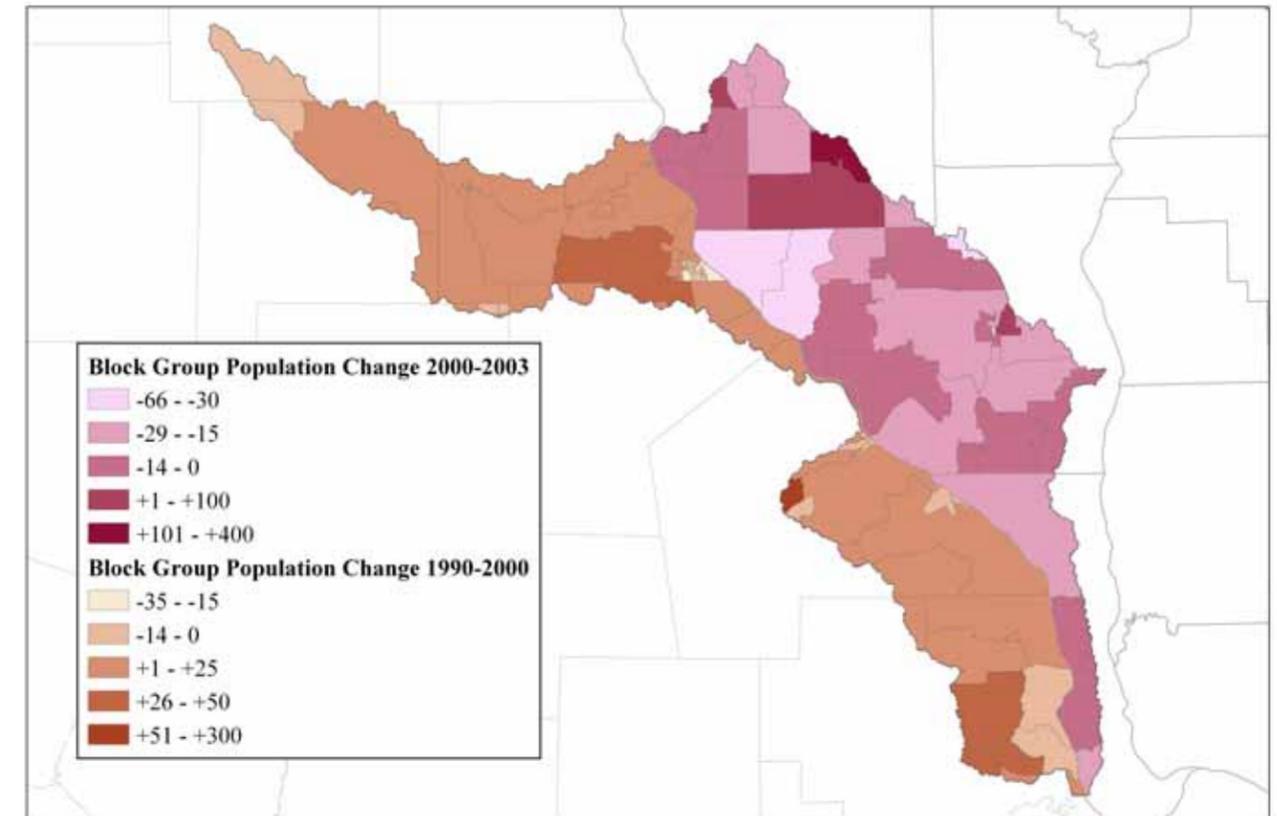
4.1.3 Farms



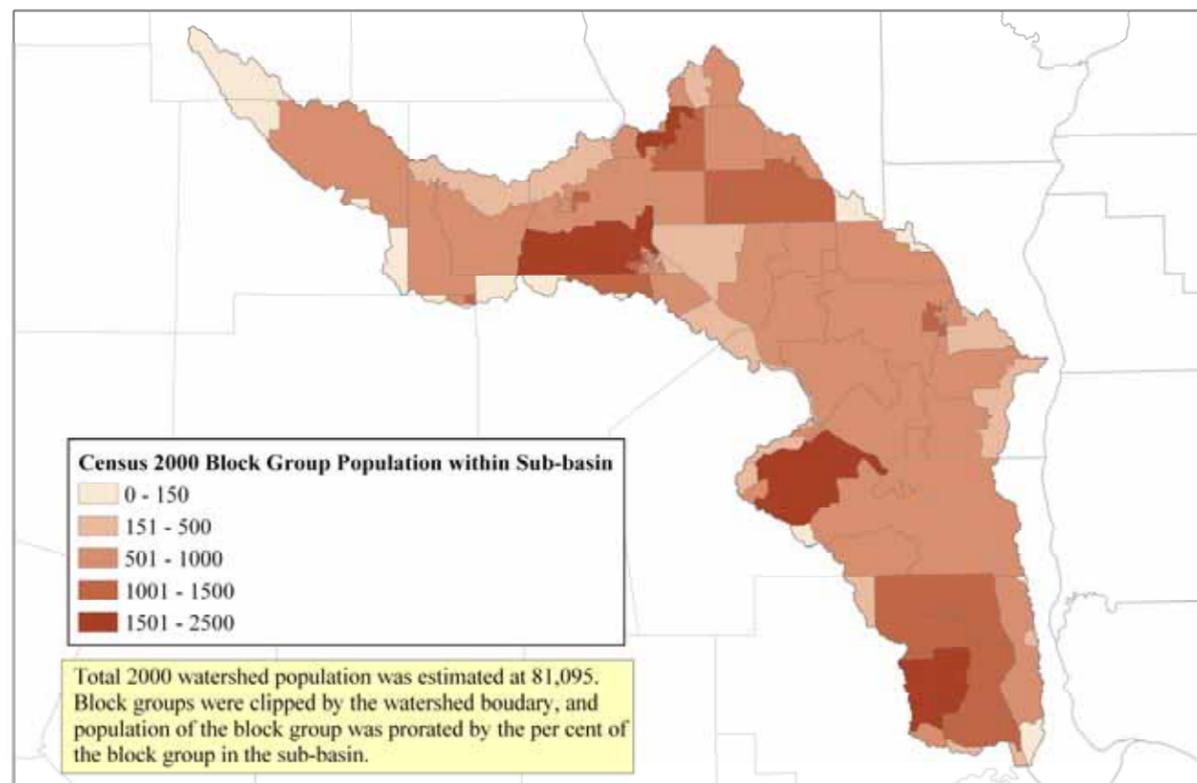
4.1.4 1990 Population



4.1.6 Change in Population



4.1.5 2000 Population



4.2 Agricultural Census

4.2.1 County Statistics [/4](#)

COUNTY SUMMARY HIGHLIGHTS, 2002												
Item		Missouri	Knox	Lincoln	Marion	Pike	Ralls	Shelby	Illinois	Adams	Calhoun	Pike
Farms	number	106,797	643	1,102	744	1,061	674	676	73,027	1,347	480	1,041
Land in farms	acres	29,946,035	249,139	251,707	230,159	344,418	253,181	299,059	27,310,833	444,087	90,355	425,817
Cattle	number	4,460,495	26,372	25,691	22,328	46,906	19,460	27,198	1,359,010	42,919	5,940	23,766
Sheep	number	76,015	1,207	2,369	553	1,032	572	1,574	66,078	2,455	187	919
Horses & Ponies	number	141,362	308	1,216	714	1,676	623	448	59,649	910	234	797
Goats	number	48,654	55	246	42	138	(D)	14	5,070	0	0	(D)
Cropland used only for pasture or grazing	acres	4,178,574	25,415	24,150	13,581	34,744	18,233	22,743	528,275	20,402	4,290	21,083
Woodland pastured	acres	2,281,064	10,090	13,860	10,992	23,172	11,744	9,539	374,571	14,791	4,161	49,758
Permanent Pastureland and rangeland	acres	4,854,438	32,863	17,411	20,663	31,449	22,241	23,853	770,995	21,003	6,378	19,537
Pastureland, all types	acres	11,314,076	68,368	55,421	45,236	89,365	52,218	56,135	1,673,841	56,196	14,829	58,179
Percent Pastureland to All Land in Farms	percent	37.8	27.4	22	19.7	25.9	20.6	18.8	6.1	12.6	16.4	13.6
Sum of All Grazing Livestock	number	4,726,526	27,942	29,522	23,637	49,752	20,655	29,234	1,489,807	46,284	6,361	25,482
Acres of Pastureland per Animal	number	2.4	2.4	1.9	1.9	1.8	2.5	1.9	1.1	1.2	2.3	2.3

4.2.2 General Statistics—Missouri and Illinois

- 540 Operators with farming as primary occupation
- Majority of farms size: 50-179 acres
- 24,600 cattle and calves
- More than 64,000 hogs and pigs (majority in Adams and Pike Counties in Illinois)
- 78,700 acres of corn harvested for grain
- 6500 acres of wheat harvested for grain

4.2.3 Forestry—Missouri and Illinois ¹⁶

AREA OF FOREST LAND BY FOREST TYPE AND STAND-SIZE CLASS																	
	Total Forest type	Eastern Red Cedar	Post Oak Blackjack Oak	White Oak Red Oak Hickory	White Oak	Northern Red Oak	Black Walnut	Black Locust	Chestnut Oak Black Oak Scarlet Oak	Mixed upland hardwoods	River Birch Sycamore	Sycamore Pecan American Elm	Sugarberry Hackberry Elm Green Ash	Silver maple American elm	Cottonwood Willow	Cherry Ash Yellow-Poplar	Elm Ash Locust
Large diameter	182,467.8	-	-	66,453.4	25,803.7	12,875.9	6,243.0	-	-	17,499.6	5,345.2	4,695.5	20,030.5	17,683.0	5,838.0	-	-
Medium diameter	36,572.3	-	6,261.1	10,336.8	-	-	1,490.5	131.1	-	5,963.1	-	-	7,519.1	-	-	-	4,870.7
Small diameter	26,825.4	1,565.0	-	227.3	-	-	-	-	3,529.4	16,808.2	-	-	-	-	-	4,695.5	-
Chaparral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nonstocked	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not collected	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Stand-size class	245,865.5	1,565.0	6,261.1	77,017.5	25,803.7	12,875.9	7,733.5	131.1	3,529.4	40,270.9	5,345.2	4,695.5	27,549.5	17,683.0	5,838.0	4,695.5	4,870.7

NET VOLUME OF SAWTIMBER BY SPECIES GROUP AND DIAMETER CLASS (BOARD FEET)									
Land Class	Total Current diameter	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+	not measured
Select white oaks	355,801,845.6	44,489,826.6	68,719,498.2	49,857,917.1	45,847,554.1	44,126,166.8	84,252,187.3	18,508,695.6	-
Select red oaks	105,394,511.6	2,056,604.6	17,336,077.8	7,635,577.1	15,608,837.0	22,674,002.9	40,083,412.2	-	-
Other white oaks	9,579,236.7	5,269,341.3	-	4,309,895.5	-	-	-	-	-
Other red oaks	227,289,535.6	16,675,803.4	17,590,531.7	45,144,641.0	39,902,431.4	35,273,039.3	72,703,088.9	-	-
Hickory	161,604,282.1	50,700,017.7	62,232,025.0	24,437,158.9	24,235,080.5	-	-	-	-
Hard maple	3,785,013.9	3,785,013.9	-	-	-	-	-	-	-
Soft maple	238,118,664.2	10,186,774.1	18,157,798.4	39,220,666.2	22,085,909.1	15,849,685.3	-	132,617,831.1	-
Ash	65,528,994.7	7,391,552.2	7,069,945.2	-	7,052,797.2	9,508,425.8	34,506,274.3	-	-
Cottonwood and Aspen	74,216,253.5	-	-	-	-	10,901,805.3	33,455,659.0	29,858,789.2	-
Basswood	25,471,540.5	7,319,504.5	4,916,377.9	-	-	13,235,658.2	-	-	-
Black walnut	88,790,076.3	9,233,476.0	20,783,440.6	18,529,931.5	7,250,461.7	18,187,850.8	14,804,915.8	-	-
Other eastern soft hardwoods	195,706,717.2	39,220,041.1	22,436,675.6	23,957,168.4	12,718,198.5	-	77,379,854.3	19,994,779.3	-
Other eastern hard hardwoods	9,640,548.6	6,190,400.8	3,450,147.8	-	-	-	-	-	-
Sub-basin Total	1,560,927,220.6	202,518,356.1	242,692,518.1	213,092,955.6	174,701,269.5	169,756,634.4	357,185,391.7	200,980,095.2	-

AREA OF FOREST LAND BY OWNERSHIP											
Land Class	Total Ownership class	National Forest	National Park Service	Bureau of Land Mgmt	Fish and Wildlife Service	Dept of Defense	Other federal	State	County and Municipal	Other local government	Private
Sub-basin Total	245,865.5	0	0	0	6,016.6	0	9,347.8	14,250.1	0	0	216,251.1

4.2.3 Forestry—continued ⁶

General Statistics				
Land Class		Total Tree species	Softwoods	Hardwoods
Net Volume of Growing-Stock	Cubic Feet	408,519,141.9	166,555.8	408,352,586.1
Net Volume of Live Trees	Cubic Feet	477,196,258.6	166,555.8	477,029,702.7
Average Net Annual Growth of Growing-Stock	Cubic Feet	13,075,718.5	64,454.3	13,011,264.2
Average Net Annual Growth of Sawtimber	Cubic Feet	56,918,013.0	0	56,918,013.0
Average Annual Mortality Rate of Growing-Stock	Cubic Feet	4,274,703.9	0	4,274,703.9
Average Annual Mortality Rate of Sawtimber	Board Feet	12,310,094.9	0	12,310,094.9
Average Annual Removals of Growing-Stock	Cubic Feet	831,037.2	0	831,037.2
Average Annual Removals of Sawtimber	Board Feet	3,121,932.0	0	3,121,932.0

Area of Forest Land by Site Productivity Class								
Land Class	Total Site productivity class	225+	165-224	120-164	85-119	50-84	20-49	0-19
Sub-basin Total	245,865.5	0	6,190.8	0	41,013.2	136,483	62,178.6	0

Area of Forest Land by Stocking Class						
Land Class	Total Growing-stock stocking	Overstocked	Fully stocked	Medium stocked	Poorly stocked	Non-stocked
Sub-basin Total	245,865.5	11,106.6	92,148.3	98,712	34,143.9	9,754.8

4.2.4 Limited Resource Producer Factor—Missouri ⁵

Missouri's average county has a limited resource producer factor of 13, with a low of 2 for St. Louis County to a high of 45 for Greene county.

Factor = number of farms in the county multiplied by the percentage of the county's population below the poverty level and then divided by 1,000.

County	Limited Resource Producer Factor
Adair	20
Andrew	7
Atchison	5
Audrain	16
Barry	28
Barton	12
Bates	19
Benton	13
Bollinger	13
Boone	20
Buchanan	10
Butler	13
Caldwell	11
Callaway	13
Camden	7
Cape Girardeau	13
Carroll	15
Carter	6
Cass	9
Cedar	17
Chariton	13
Christian	12
Clark	10
Clay	4
Clinton	8
Cole	10
Cooper	10
Crawford	12
Dade	12
Dallas	22
Daviess	16
DeKalb	9
Dent	12
Douglas	20
Dunklin	11
Franklin	13
Gasconade	8
Gentry	10

County	Limited Resource Producer Factor
Greene	45
Grundy	12
Harrison	15
Henry	14
Hickory	11
Holt	6
Howard	9
Howell	33
Iron	6
Jackson	10
Jasper	20
Jefferson	5
Johnson	27
Knox	12
Laclede	20
Lafayette	11
Lawrence	30
Lewis	13
Lincoln	9
Linn	14
Livingston	11
McDonald	23
Macon	17
Madison	8
Maries	12
Marion	9
Mercer	8
Miller	16
Mississippi	6
Moniteau	11
Monroe	11
Montgomery	9
Morgan	15
New Madrid	8
Newton	20
Nodaway	23
Oregon	19
Osage	10

County	Limited Resource Producer Factor
Ozark	18
Pemiscot	8
Perry	8
Pettis	16
Phelps	14
Pike	16
Platte	4
Polk	29
Pulaski	6
Putnam	12
Ralls	6
Randolph	12
Ray	8
Reynolds	8
Ripley	11
St. Charles	3
St. Clair	15
Ste. Genevieve	6
St. Francois	11
St. Louis	2
Saline	12
Schuyler	8
Scotland	11
Scott	8
Shannon	14
Shelby	11
Stoddard	16
Stone	8
Sullivan	14
Taney	6
Texas	34
Vernon	21
Warren	6
Washington	12
Wayne	10
Webster	29
Worth	5
Wright	29

Counties in Orange fall within The Sny Sub-basin

5.0 Status of Resources

5.1 PRS ¹⁸

5.1.1 Missouri

NRCS' Performance Results System (PRS) is a consolidated reporting system of conservation activities. The following tables summarize conservation systems and practices planned and applied in the sub-basin for the designated time periods. PRS data, in conjunction with other information, are used to assess the current state of the resources in the sub-basin and past efforts to address resource concerns.

Missouri PRMS Data	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Avg/Year
Total Acres of Conservation Systems Planned	1,346	9,881	7,104	13,205	7,823	Not reported by HU	5,347	20,190	11,641
Total Acres of Conservation Systems Applied	546	10,113	4,817	15,595	7,780	Not reported by HU	6,560	7,265	9,300
Missouri		Fiscal Year 2004		Fiscal Year 2005		Fiscal Year 2006			
Summary Conservation Practices	Planned	Applied	Planned	Applied	Planned	Applied	Planned	Applied	
Access Road (560) (ft)							1,650		
Agrichemical Mixing Facility (702) (no)							2		
Brush Management (314) (ac)							75		
Closure of Waste Impoundment (360) (no)							1		
Composting Facility (317) (no)	1		1				4	2	
Comprehensive Nutrient Mgmt Plan (100) (no)							3	1	
Conservation Cover (327) (ac)	1,829	1,208	284	535	1,579	791			
Conservation Crop Rotation (328) (ac)	4,465	1,616	2,527	1,836	12,174	4,311			
Contour Buffer Strips (332) (ac)		42			1				
Contour Farming (330) (ac)	613	440	321	55	1,999	227			
Cover Crop (340) (ac)					1,014				
Critical Area Planting (342) (ac)	11		3	88	37	4			
Dike (356) (ft)					1,774	1,775			
Diversion (362) (ft)	1,000				900	900			
Fence (382) (ft)	26,987		20,550		140,666	21,277			
Field Border (386) (ft)	27,005				112,049				
Filter Strip (393) (ac)	18	18			37	4			
Forage Harvest Management (511) (ac)	840	184	1,282	191	2,394	259			
Forest Stand Improvement (666) (ac)	439	100			56	20			
Forest Trails and Landings (655) (ac)	4								
Grade Stabilization Structure (410) (no)	9		3		1	1			
Grassed Waterway (412) (ac)	27	0	8	1	5	2			
Heavy Use Area Protection (561) (ac)	0		0		1				
Manure Transfer (634) (no)	4	13	7	15	17	2			
Mulching (484) (ac)	1								
Nutrient Management (590) (ac)	1,049	904	787	277	5,397	917			

Missouri	Fiscal Year 2004		Fiscal Year 2005		Fiscal Year 2006	
Summary Conservation Practices	Planned	Applied	Planned	Applied	Planned	Applied
Pasture and Hay Planting (512) (ac)	179	211	183	104	1,237	88
Pest Management (595) (ac)	1,051	995	776	221	3,342	978
Pipeline (516) (ft)	13,040	1,180	3,350		44,981	7,482
Pond (378) (no)	2				2	1
Prescribed Burning (338) (ac)	182	10	62		766	131
Prescribed Grazing (528) (ac)			257	58	4,183	79
Prescribed Grazing (528A) (ac)	1,294	676	994	206	26	
Residue and Tillage Management, Mulch Till (345) (ac)					7,292	3,013
Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329) (ac)					2,720	756
Residue Management, Mulch Till (329B) (ac)	1,165	420	875	782	1,647	32
Residue Management, No-Till/Strip Till (329A) (ac)	2,193	992	1,258	973	519	168
Residue Management, Ridge Till (329C) (ac)						
Residue Management, Seasonal (344) (ac)	871	207	576	281	910	540
Restoration and Management of Declining Habitats (643) (ac)	75	83				
Riparian Forest Buffer (391) (ac)	14	14	7	16	39	22
Silvopasture Establishment (381) (ac)					6	
Spring Development (574) (no)					1	
Stream Crossing (578) (no)					2	
Structure for Water Control (587) (no)			4,400	20	1	4,401
TA Application (912) (no)					52	
TA Check-Out (913) (no)					52	
TA Design (911) (no)					93	
TA Planning (910) (no)					2	
Terrace (600) (ft)	125,619	27,030	36,446		58,450	35,310
Tree/Shrub Establishment (612) (ac)	39	33	5	238	23	2
Tree/Shrub Site Preparation (490) (ac)					9	
Underground Outlet (620) (ft)	11,898	11,977	1,650		10,354	10,307
Upland Wildlife Habitat Management (645) (ac)	387	982	397	97	1,845	785
Use Exclusion (472) (ac)	1,797	1,282	296	341	1,589	735
Waste Storage Facility (313) (no)	1		1	1	5	1
Waste Treatment Lagoon (359) (no)	2	1			1	1
Waste Utilization (633) (ac)	319	265	453	332	200	50
Water Well (642) (no)			1		6	2
Watering Facility (614) (no)	8		8		69	5
Well Decommissioning (351) (no)	3					
Wetland Creation (658) (ac)			68	68		
Wetland Enhancement (659) (ac)			43	796	98	98
Wetland Restoration (657) (ac)		1,024	43	1,833	23	23
Wetland Wildlife Habitat Management (644) (ac)		2,117	111	1,875	35	23
Wildlife Watering Facility (648) (no)	1				2	1
Windbreak/Shelterbelt Establishment (380) (ft)			640		4,000	

5.1.2 Illinois ¹⁸

NRCS' Performance Results System (PRS) is a consolidated reporting system of conservation activities. The following tables summarize conservation systems and practices planned and applied in the sub-basin for the designated time periods. PRS data, in conjunction with other information, are used to assess the current state of the resources in the sub-basin and past efforts to address resource concerns.

Illinois PRMS Data	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Avg/Year
Total Acres of Conservation Systems Planned	4,903	15,187	9,773	10,446	11,102	Not reported by HU	11,849	9,813	10,803
Total Acres of Conservation Systems Applied	3,191	10,227	8,861	7,135	9,688	Not reported by HU	11,955	17,367	11,536

Illinois	Fiscal Year 2004		Fiscal Year 2005		Fiscal Year 2006	
Summary Conservation Practices	Planned	Applied	Planned	Applied	Planned	Applied
Composting Facility (317) (no)					1	
Comprehensive Nutrient Management Plan (100) (no)				1	2	1
Conservation Cover (327) (ac)	4,773	2,838	1,245	1,577	2,727	3,770
Conservation Crop Rotation (328) (ac)	3,579	1,939	6,035	5,145	5,857	8,356
Contour Farming (330) (ac)	141	141	839	18	926	1,225
Critical Area Planting (342) (ac)	4					
Critical Area Planting (342) (ac)			29	1	2	
Diversion (362) (ft)			2,075			
Early Successional Habitat Development/Management (647) (ac)	599		447	339	516	429
Fence (382) (ft)	11,950		22,225		27,744	
Field Border (386) (ft)	21,120		20,877	12,600	13,890	
Filter Strip (393) (ac)			8	30	55	56
Forage Harvest Management (511) (ac)		68				
Forest Stand Improvement (666) (ac)	115	88	136		232	121
Grade Stabilization Structure (410) (no)	5	1	15		18	2
Grassed Waterway (412) (ac)	8	1	5	1	12	4
Heavy Use Area Protection (561) (ac)	2		0	0		
Manure Transfer (634) (no)					1	
Mulching (484) (ac)	2					
Nutrient Management (590) (ac)	1,778	1,215	4,533	608	2,036	72
Pasture and Hay Planting (512) (ac)	108	147	81	42	539	163
Pipeline (516) (ft)	6,700		8,650		3,538	
Pond (378) (no)	1				1	1
Prescribed Grazing (528) (ac)			23	23	341	262
Prescribed Grazing (528A) (ac)	219	84	1,054	750		
Pumping Plant (533) (no)	1					

Illinois	Fiscal Year 2004		Fiscal Year 2005		Fiscal Year 2006	
Summary Conservation Practices	Planned	Applied	Planned	Applied	Planned	Applied
Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329) (ac)					112	5
Residue Management, Mulch Till (329B) (ac)	1,333	364	6,873	5,407	3,074	6,697
Residue Management, No-Till/Strip Till (329A) (ac)	1,894	1,500	4,807	4,263	2,766	5,562
Residue Management, Seasonal (344) (ac)	249		173	517		72
Restoration and Management of Declining Habitats (643) (ac)			17			
Riparian Forest Buffer (391) (ac)	28		17	11		
Shallow Water Management for Wildlife (646) (ac)	316	316	9	9	8	8
Streambank and Shoreline Protection (580) (ft)			400	480		
Subsurface Drain (606) (ft)	2,830					
Terrace (600) (ft)	109,380	8,920	290,289	37,281	100,420	45,055
Tree/Shrub Establishment (612) (ac)	20		211	209	26	48
Underground Outlet (620) (ft)	13,197	3,876	30,435		92,727	11,312
Upland Wildlife Habitat Management (645) (ac)	167	70	3,197	1,370	4,322	2,789
Use Exclusion (472) (ac)	360	311	322	311	181	206
Vertical Drain (630) (no)	3					
Waste Storage Facility (313) (no)					1	
Waste Utilization (633) (ac)					204	
Water and Sediment Control Basin (638) (no)	306	97	1,393	364	299	216
Water Well (642) (no)	4			1	1	
Watering Facility (614) (no)	9		6		10	
Well Decommissioning (351) (no)					4	
Wetland Creation (658) (ac)	296	296				
Wetland Enhancement (659) (ac)					8	8
Wetland Wildlife Habitat Management (644) (ac)	316	316	292	449		
Wildlife Watering Facility (648) (no)			212	411		

5.2 Watershed Projects

In addition to the conservation activities itemized for individual land units, watershed programs and Farm Bill easements contribute to the current state of resources. Past and current activities within this sub-basin are summarized in the tables below.

319 Project Name ^{/39}	Status
None In Missouri	-
Data not available for Illinois	-

PL-566 Project Name ^{/47}	Acres	Status
Route J Watershed Atrazine Abatement/Management Project (MO)	unknown	Closed
Headwaters Hadley Creek (IL)	26,238	unknown
Hadley Creek (IL)	20,752	unknown

AgNPS SALT Project Name ^{/37}	Status
None in Missouri	-
Data not available for Illinois	-

5.3 Farm Bill Programs Lands ^{/48}

In addition to the conservation activities itemized for individual land units, watershed programs and Farm Bill easements contribute to the current state of resources. Past and current activities within this sub-basin are summarized in the tables below.

Program	Number of Acres	Number of Contracts or Easements
CRP (MO)	17,149	418 contracts
CRP (IL)	42,518	
FRPP	0	-
GRP	0	-
WRP (MO)	4,543	9 easements
WRP (IL)	939	2 easements

5.4 Conservation Opportunity Areas ^{/40}

The Missouri Department of Conservation joined with resource partners to take an “all conservation” approach via a framework referred to as Conservation Opportunity Areas (COAs). COAs identify the best places where partners can combine technology, expertise and resources for all conservation, with such focused efforts providing enhanced results. Various future funding opportunities for resource projects will give priority to work addressing the conservation goals within COAs.

Stakeholder groups have been formed and resource profiles developed for thirty-three of the highest priority COAs in Missouri. The North Fabius River sub-basin contains the northern third of the 185,000-acres COA called the Missouri-Mississippi Confluence, a floodplain with excellent wetland restoration potential. Adjoining the watershed is the Cuivre River Hills COA, a large block of woodland and forest with glades and prairies embedded. Data comparable to the Conservation Opportunity Areas spatial file is not available for Illinois.



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