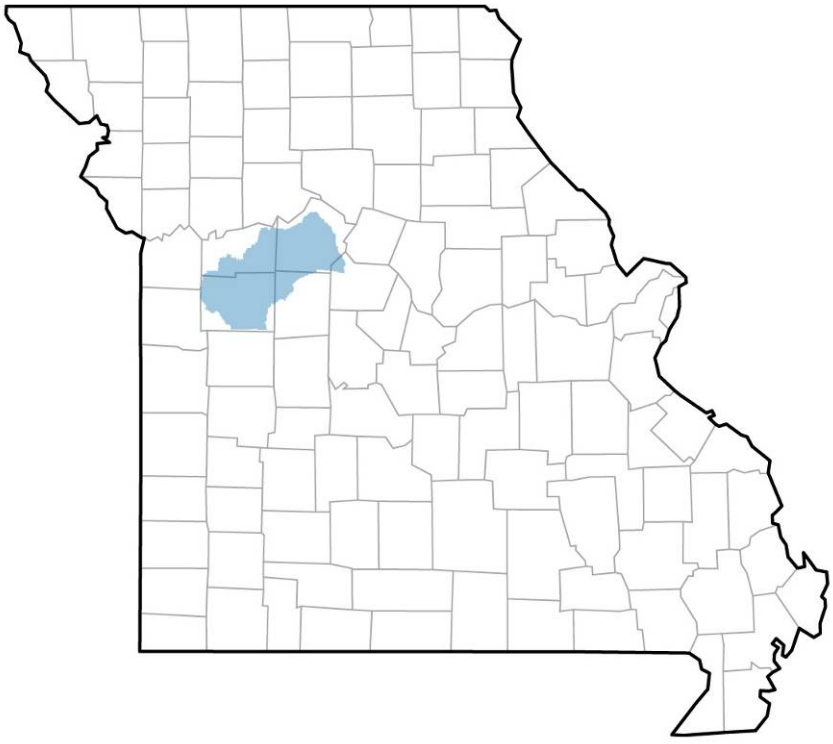
United States Department of Agriculture
Natural Resources Conservation Service

Blackwater Sub-basin

HUC # 10300104



R A P I D W A T E R S H E D A S S E S S M E N T

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Blackwater Sub-basin

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A rapid watershed assessment (RWA) evaluates resource conditions and needs on an 8-digit hydrologic unit (HU) basis. The assessment identifies the primary resource concerns for the watershed being profiled and provides estimate as to where conservation investments would best address the concerns of landowners, conservation districts, stakeholders, and others. The RWA provides information on which to base decisions about conservation priorities, allocation of resources, and funding for implementation.

Introduction[1]

Rapid watershed assessments (RWAs) provide initial estimates of where conservation investments would best address the concerns of land owners, conservation districts and other stakeholders within drainage sub-basins. These assessments are designed as quick looks over large drainage areas to provide a starting point for area-wide, watershed or site-specific planning. Missouri has 66 sub-basins averaging 628,000 acres in size.

RWAs contain two parts: a resource profile based on readily available resource information and an assessment matrix of current and future resource conditions and related installation and maintenance costs. The resource profiles provide a general description of the location and primary physical attributes of the sub-basin; known resource concerns; and selected agricultural and socio-economic characteristics. The assessment matrices contain condition tables detailing the current level of conservation in the sub-basin; future considerations tables identifying appropriate suites of conservation practices needed to deal with the primary resource concerns for each major land use; and summary tables that summarize the various costs associated with the Resource Management Systems (RMS) identified in the future considerations tables.

The Blackwater River sub-basin, divided by three major physiographic regions, lies to the south and west of the Missouri River in central Missouri. The western portion of this 985,700 acre (1,540 square mile) hydrologic unit, accounting for 40 percent of the sub-basin's land area, represents the eastern most extent of the Osage Plains. Moderately sloped rolling hills, formed in loess derived soils over Pennsylvanian limestones and sandstones encompass the headwaters of the Black River. The central and eastern portions of the sub-basin, situated between the Blackwater and Missouri Rivers, are on the southern edge of the Central Dissected Till Plain and cover about 55 percent of the sub-basin. This area is dominated by a minimally dissected plain consisting of glacial till over Pennsylvanian shales capped with a thick mantle of loess derived soils. With local relief exceeding 150 feet, the hilly area on the lower Blackwater River near its confluence with the Lamine River is an extension of the Ozark Highlands. Here, loess soils give way to deep, cherty silt loams with thinner surface layers on the steeper slopes.

Ninety-two percent of the sub-basin's land area (909,200 acres) is used for agriculture and 8 percent (76,500 acres) for non-agricultural land cover/uses. With 52 percent (509,300 acres) of its land area in cropland, this heavily cultivated sub-basin's leading crop is soybeans, followed by corn, forage, winter wheat and sorghum in decreasing acreages. Thirty percent (301,100 acres) of the sub-basin is used as grazing land and 3 percent (29,500 acres) is enrolled in the Conservation Reserve Program (CRP). Ungrazed forest land covers 7 percent (69,300 acres) of the drainage area. Concerning non-agricultural uses, 5 percent (47,200 acres) of the sub-basin is developed land; 2 percent (17,200 acres) is minor land; and 1 percent (11,600 acres) is water. Primary livestock operations include poultry, cattle and hogs.

Figure 1

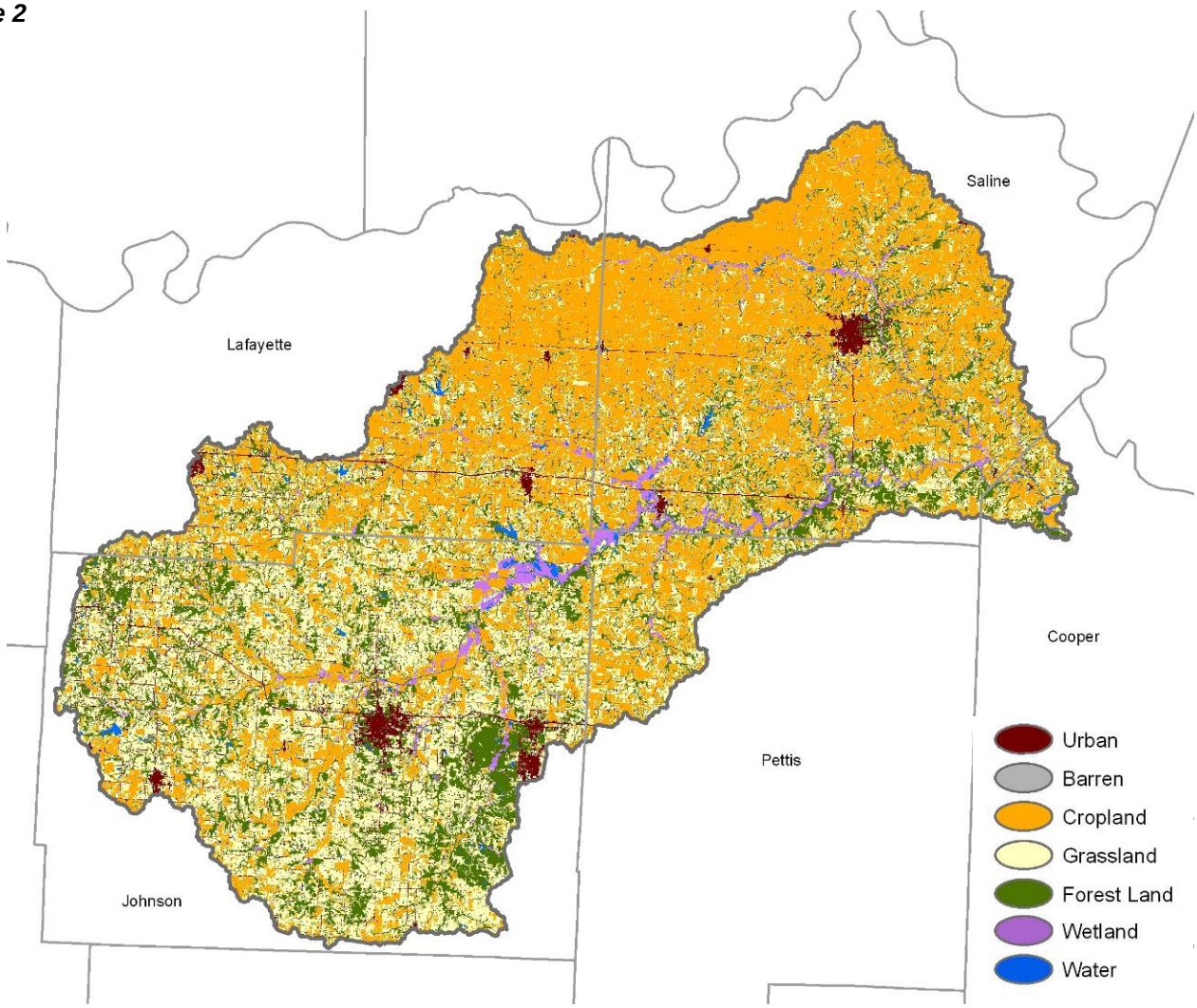
Sub-basin Primary Land Cover/Use Percentages By County

County	Cultivated Cropland	Non-Cultivated Cropland	Pasture Land	Forested Land	Developed Land
Cooper	1%	0.005%	0%	0.002%	0%
Johnson	6%	5%	18%	2%	1%
Lafayette	12%	2%	1%	2%	1%
Pettis	3%	0.005%	2%	1%	0%
Saline	21%	1%	4%	3%	2%
Sub-basin Total	43%	9%	25%	12%	5%

Physical Description

A. Land Use/ Land Cover[2]

Figure 2



Land Use/ Land Cover NRI	Urban	Cultivated cropland	Non-cultivated cropland	Pastureland	Forest land	Minor land cover/uses	Water	Federal land cover/use not recorded
1982 Acres	12,600	26,800	19,300	253,900	126,000	6,000	11,600	22,900
1987 Acres	13,600	19,500	36,500	229,300	138,600	6,000	12,500	22,900
1992 Acres	14,700	19,700	33,200	223,700	146,600	5,900	12,600	22,900
1997 Acres	16,300	9,200	88,500	159,800	163,800	5,600	13,000	22,900
Five Year trend 92-97	**Up 11%**	**Down 53%**	**Up 167%**	**Down 29%**	**Up 12%**	**Down 5%**	**Up 3%**	**No change**
Ten year trend 87-97	**Up 20%**	**Down 53%**	**Up 142%**	**Down 30%**	**Up 18%**	**Down 7%**	**Up 1%**	**No change**
Fifteen year trend 82–97	**Up 29%**	**Down 66%**	**Up 359%**	**Down 37%**	**Up 30%**	**Down 7%**	**Up 12%**	**No change**

Land Cover / Land Use Definitions

- Urban – This map category corresponds to the tabled category called Developed Land. Developed Land is a combination of the NRI land cover/use categories large urban and built-up areas, small lbuilt-up areas and rural transportation land. Rural transportation land consists of all highways, roads, railroads and associated right-of-ways outside urban and built-up areas and also includes private roads to farmsteads, logging roads and other private roads.

- Barren – This map category is typically, the surface of sand, rock or exposed soil with less than 5 percent vegetative cover. Barren land acreage is included in the tabled NRI Minor Land category. Minor land is a miscellaneous grouping of land covers and uses that includes farmsteads and farm structures, field windbreaks, and barren land.

- Cropland – This map category most closely corresponds to the tabled category called Cultivated Cropland. Cultivated Cropland comprises land in row crops, close-grown crops and hayland or pastureland in rotation with row or close-grown crops.

- Grassland – This map category includes 4 tabled NRI land cover/use categories:
  Non-cultivated cropland; Conservation Reserve Program (CRP) lands; Pastureland; Rangland. on-cultivated cropland includes permanent hayland and horticultural cropland. The CRP is a federal program established under the 1985 Food Security Act to convert highly erodible cropland to vegetative cover (primarily grass) under 10 year contracts. Pastureland is land managed primarily for the production of introduced forage plants for livestock grazing. Rangeland is land on which the climax or potential plant cover is composed principally of native grasses, grass-like plants, forbs or shrubs suitable for grazing and browsing and introduced forage species that are managed like rangeland.

- Forestland and Woodland – A majority of the acreage for these map categories is captured by the tabled NRI Forestland category, defined as land that is at least 10 percent stocked by single-stemmed woody species of any size that will be at least 4 meters tall a maturity. Ten percent stocked, equates to an areal canopy cover of 25 percent or greater.

- Wetlands – Acreage for this mapped category is not reflected in any of the NRI tabled acreage estimates. The wetland map category is a combination of satellite derived wetland classes, National Wetland Inventory (NWI) acres and Wetland Reserve Program (WRP) acres. (See Wetlands Section for NWI acreage estimates)

- Water – This map category closely corresponds to the NRI table acreage estimate representing water bodies and streams that are permanent open water.

B. Grassland[2]

	Rangeland (acres)			Pastureland (acres)			Grazed Forest Land (acres)		
Year	Total Sub-basin	Percent of sub-basin	Percent of state land use total	Total Sub-basin	Percent of sub-basin	Percent of state land use total	Total Sub-basin	Percent of sub-basin	Percent of state land use total
1997	0	0	0%	249,700	25%	2%	51,400	5%	1%

C. Crop History[2]

	Close Grown Crops (acres)	Row Crops (acres)			Hayland (acres)		
Year	Wheat	Corn	Sorghum	Soybeans	Grass	Legume	Grass-Legume
1997	41,000	149,500	3,800	216,700	79,500	7,700	6,500

D. Public Land[3]

About 12,763 acres or 1.3% of the sub-basin are in public ownership. These public lands include 7 conservation or wildlife management areas, 2 river accesses, 7 lakes, 2 state parks and 1 state historic site. Public ownership in this region is below Missouri's state average of 6.7%.

Figure 3

Public Land Ownership (acres)			
	Missouri Department of Conservation	Missouri Department of Natural Resources	Other
Total Acres	9,125	3,637	1

E. Soil Capability

Land Capability[2]

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 through 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 through IV. The remaining four classes, V through VIII, are not to be used for cropland, but may have uses for pasture, range, woodland, grazing, wildlife, recreation, and aesthetic purposes.

Figure 4

Land Capability Class	Cultivated cropland (acres)	Non-cultivated cropland (acres)	Pastureland (acres)
I - slight limitations	5,100	0	0
II - moderate limitations	216,600	10,200	85,300
III - severe limitations	189,300	47,400	132,900
IV - very severe limitations	9,400	8,600	16,100
V - no erosion hazard, but other limitations	-	-	-
VI - severe limitations, unsuited for cultivation, limited to pasture, range, forest	4,400	15,800	12,800
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	2,000	2,500	2,600
VIII - misc. areas have limitations, limited to recreation, wildlife and water supply	-	-	-
Total	**424,800**	**84,500**	**249,700**

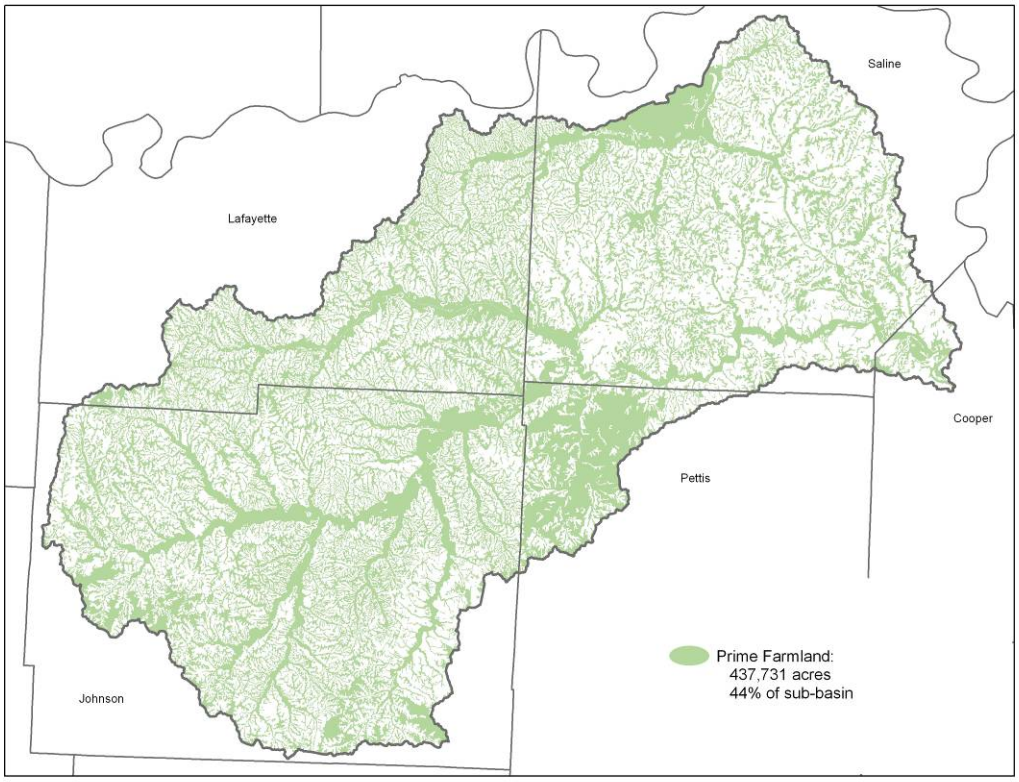
Prime Farmland[4,5]

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.

Figure 5a

Prime Farmland[2]—Change in Acres from 1982 to 1997	
1982	408,300 acres
1997	403,500 acres
Difference	**(4,800) acres**

Figure 5b. Prime Farmland in the Blackwater Sub-basin [5]



F. Common Resource Areas[6]

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 (CRA) is a geographic and ecologic subdivision of an MLRA within which there are similar resource concerns and treatment requirements.

Each Missouri 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 Blackwater Sub-basin occupies portions of MLRA 107B.1, MLRA 107B.4, MLRA 112.1, MLRA 115B.1 and MLRA 115B.3.

107B.1– Missouri River Alluvial Land

The Missouri River Alluvial Land consists of the nearly level to gently sloping bottomland and channel of the Missouri River and the lower Grand River. Native vegetation was largely wet prairie and marshes, with narrow bands and isolated pockets of bottomland forest. The Missouri River channel, which formerly meandered, has been stabilized, narrowed, and confined by levees. The major land use is cropland, with corn and soybeans being the major crop. Resource concerns are wind erosion, water management and water quality.

107B.4 – Missouri Loess Hills

The Loess Hills CRA is distinguished by a thick loess mantle (10-25 feet) and loess soils. It is a hilly region characterized by broad, rounded ridges, moderate slopes, broad stream valleys, and a local relief of 100-150 feet. Bedrock and glacial till are exposed in the deeper valleys. Most of the CRA is in farms, but substantial tracts in the breaks along the Missouri River are thickly wooded.

112.1 – Scarped Osage Plains

The Scarped Osage Plains CRA is a smooth plain interrupted by low, ragged escarpments trending southwest-northeast in which limestone bedrock is regularly exposed. Local relief reaches 150 feet in the escarpment zones but elsewhere averages less than 100 feet. Valley bottoms are exceptionally broad for the size of the streams. Geologic parent materials are mainly thin-bedded Pennsylvanian limestones and shales. Pre-settlement vegetation was mostly prairie, with belts of scattered timber along limestone scarps and valleys. Most of the land is farmed, both pasture and cropland. The Kansas City metropolitan area exerts urbanization pressure on the land use in the northwest.

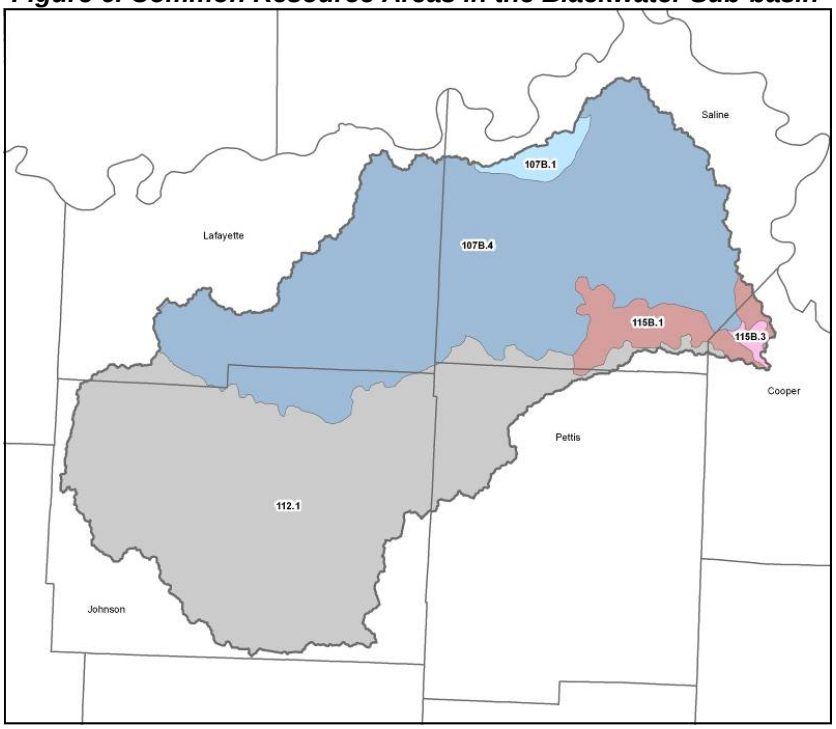
115B.1 – Outer Ozark Border

The Outer Ozark Border CRA consists of a belt of deeply dissected hills and bluffs and several relatively smooth karst plains. Relief in the river hills is 200-350 feet. Slopes are steep and bedrock exposures are common. Loess, occasionally very thick, mantles the uplands of the entire CRA. Land use is extremely varied, including row crops, improved pasture, and densely wooded valleys.

115B.3 – Missouri River Alluvial Plain

The Missouri River Alluvial Plain CRA consists of the Missouri River channel and its adjoining alluvial plain across the northern Ozarks. Formerly the channel contained numerous islands and bars, but in the last half century it has been narrowed, its islands virtually eliminated, and its banks stabilized. Soils are deep and loamy. The alluvial plain is subject to flooding. Land use is chiefly row crops.

Figure 6. Common Resource Areas in the Blackwater Sub-basin

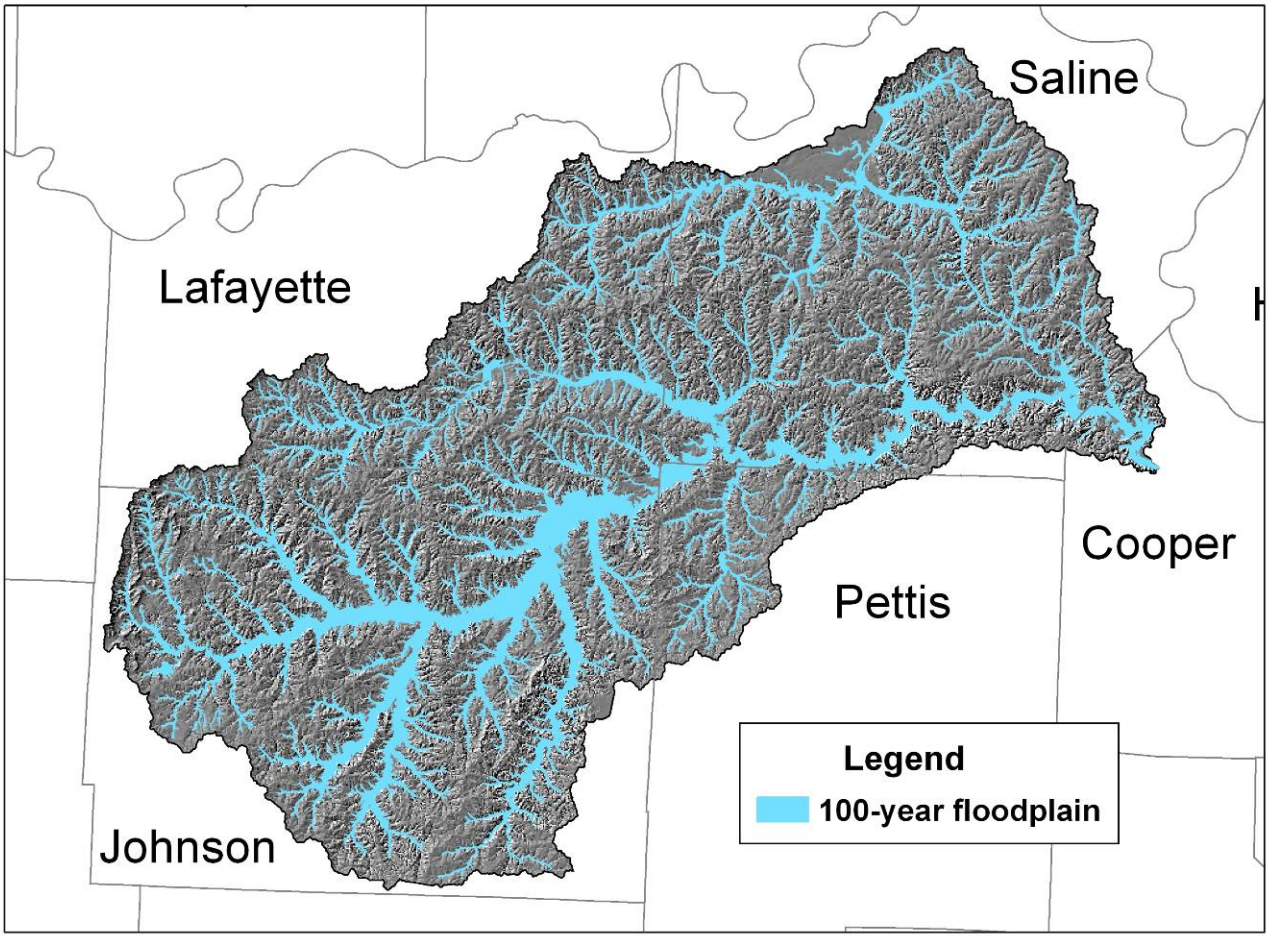


G. Streams

Floodplains[7]

The Federal Emergency Management Agency (FEMA) maps areas of flood vulnerability. FEMA has produced maps for all 5 counties in this sub-basin. About 136,981 acres (13.9%) of the sub-basin are in the 100-year floodplain.

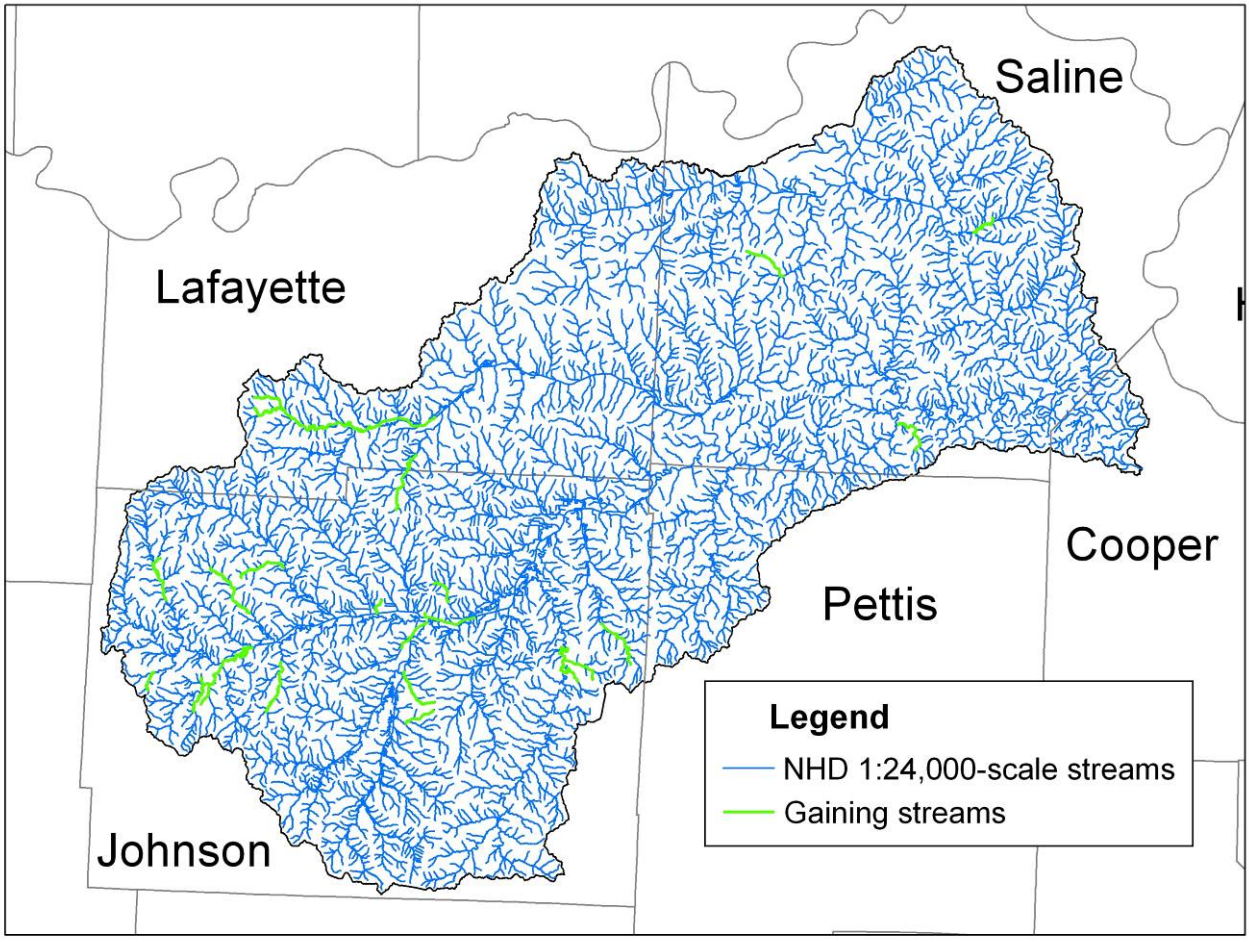
Figure 7



National Hydrography Dataset (NHD) with Gaining Streams and Biological Reference Streams [8 & 15]

High-resolution (1:24,000-scale) data from the National Hydrography Dataset show a total of 4,200 miles of intermittent and perennial streams in this sub-basin. 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. About 99 miles of Blackwater sub-basin streams are considered gaining streams and there are no designated losing streams.

Figure 8



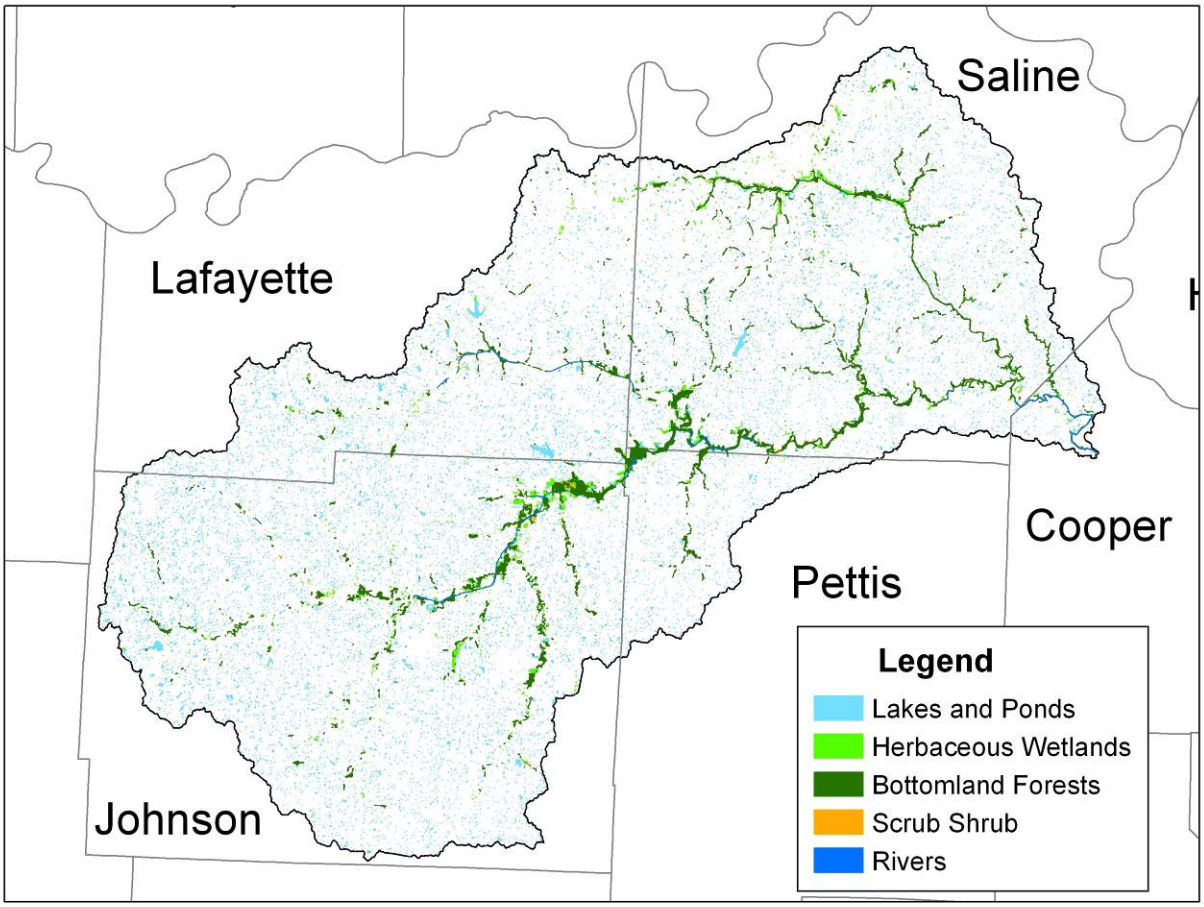
H. Wetlands[9,10]

Wetlands consist of land areas that are flooded or saturated by surface or ground water often enough to support plant and animal lifeforms that are adapted to wet environments.

The National Wetland Inventory (NWI) delineated wetlands from early 1980s aerial photography and classified wetlands using a wetland classification scheme developed by Cowardin, et al. About 29,952 acres of various wetland types were identified by NWI within the Blackwater sub-basin.

Figure 9

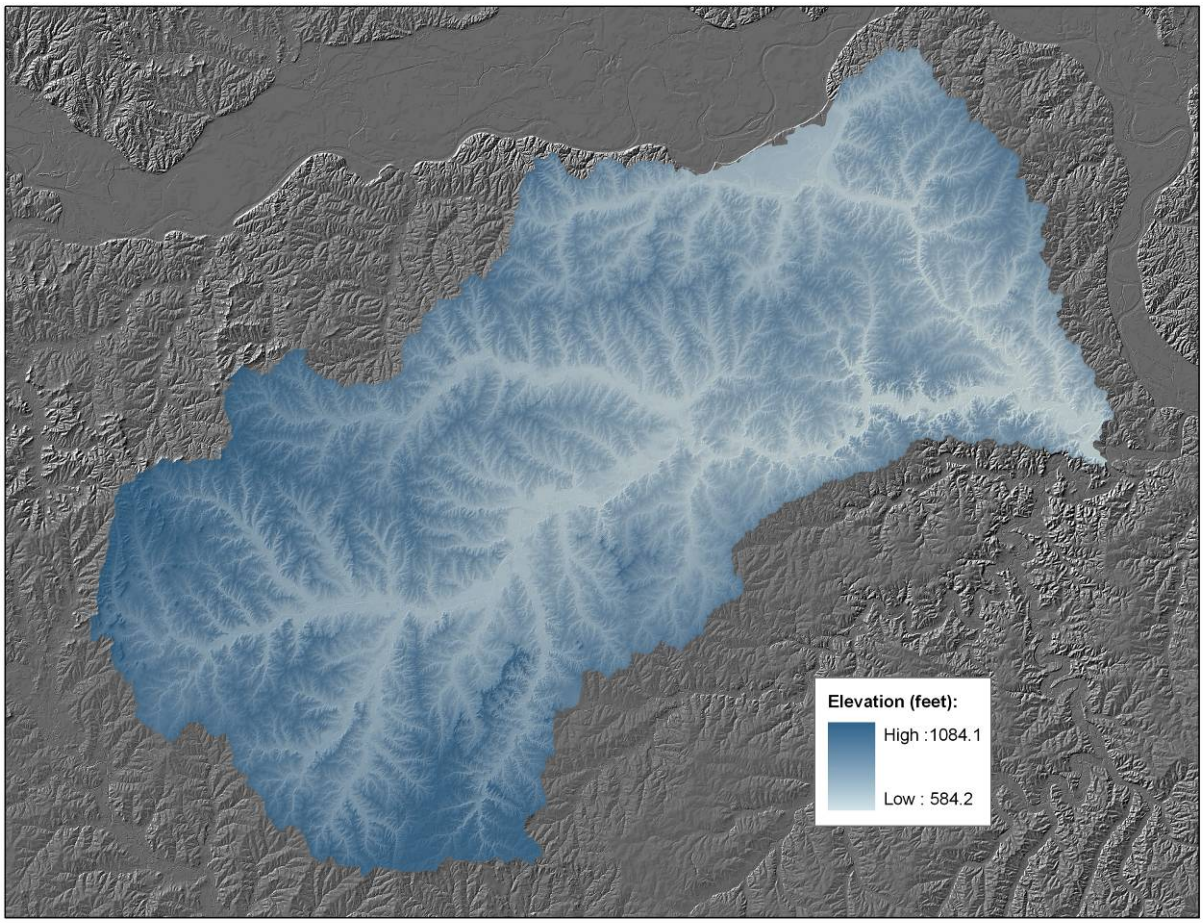
General Wetland Type	Acres	Percent of Sub-basin
Lakes and Ponds	10,474	1.06%
Herbaceous Wetlands	3,447	0.35%
Bottomland Forests	15,065	1.52%
Scrub Shrub	339	0.03%
Rivers	626	0.06%
Total	**29,951 acres**	**3.02%**



I. Relief Map[1,11,12]

The shaded relief map of the Blackwater sub-basin depicts elevations above sea level. The shaded relief and elevation values were derived from digital elevation models generated from U.S. Geological Survey 7.5 minute elevation contours. The southwest portion of the sub-basin is primarily an unglaciated, gently sloping to rolling plain. It exhibits low escarpments formed by erosion resistant limestone units. The northeast area of the sub-basin is primarily a relatively flat, minimally dissected, loess-covered plain. Elevations can range from about 580 feet to near 1,100 feet with local relief of 100 to 150 feet in the escarpment areas and as little as 50 feet in the broader plains.

Figure 10



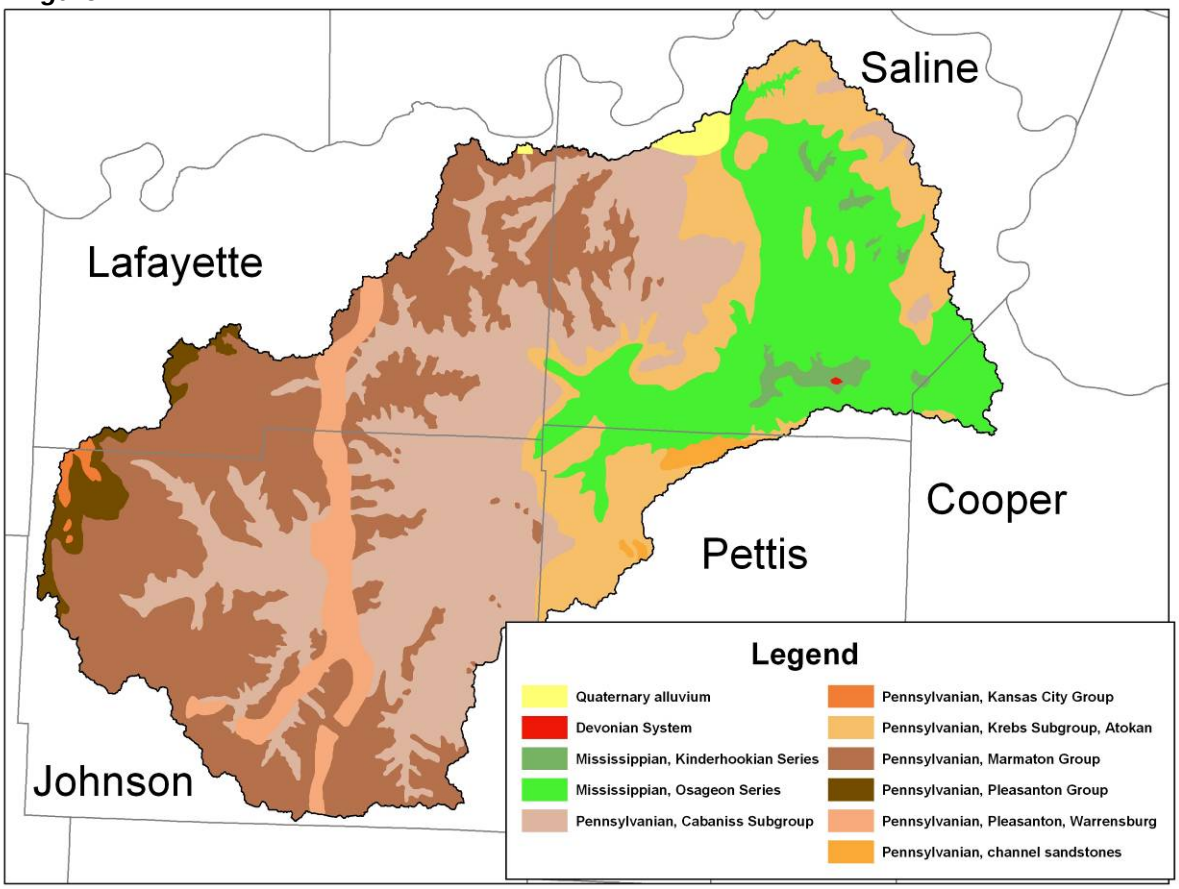
J. Geology[1,13,14]

Geology Map

This bedrock geology map is derived from the Geologic Map of Missouri. The Blackwater sub-basin, like much of western and northern Missouri, is dominated by Pennsylvanian-age bedrock formations consisting of limestones, shales, sandstones, and coal members. Mississippian-age units, composed primarily of cherty carbonates, are found in Saline, Pettis, and Cooper counties. The sub-basin lies on the flank of the Ozark uplift and geologic strata dip to the northwest. The southwest portion of the sub-basin is unglaciated while the northeast portion has been glaciated and is mantled by till and loess.

Bedrock units in the Blackwater sub-basin can be further divided into the following stratigraphic groups in descending order:

Figure 11



<u>Pennsylvanian Sub-System</u>

- Kansas City group – Consists of alternating beds of limestone and shale. Occasional beds of sandstone and thin coal beds can be present.
- Pleasanton group – Consists predominantly of clastic materials which have formed sandstones and shales. Thin beds of coal and conglomerate are sometimes present. Channel-fill sandstone deposits can occur in the upper protion of the Pleasanton Group (often referred to as the Warrensburg Sandstone).

- Marmaton group – Consists of a succession of shales, escarpment-forming limestones, sandstones, clays, and coal beds.
- Cherokee group (Cabaniss Subgroup) – Consists of cyclic deposits of sandstone, siltstone, shale, underclay, limestone and coal beds.
- Cherokee Group (Krebs Subgroup) - Consists of alternating beds of sandstone, siltstone, shale , clay, limestone, and coal beds. Sandstone can make up a greater part of the group in some areas.

Mississippian System

- Osagean and Kinderhookian Series—Characteristically composed of cherty, fossiliferous and generally coarsely crystalline limestones.

Devonian System—A very small area of Devonian-age is shown on the Geologic Map of Missouri. It appears in the eastern portion of the sub-basin in Saline County.

Karst features[15]

Karst topography is generally formed over carbonate bedrock such as limestone and dolomite by dissolving or solution. It is often characterized by sinkholes, caves, underground drainage and losing streams. Fifteen (15) named and nine (9) unnamed springs are located in this sub-basin. All springs have flows less than 100 gpm or unmeasured flow. Five (5) sinkholes and seven (7) caves are mapped in the area. As noted in section 2.5, about 99 miles of Blackwater sub-basin streams are considered gaining streams and there are no designated losing streams.

Resource Concerns

Resource concerns are issues related to the natural environment. Natural resources include soil, water, air, plants, animals, and humans. Field office personnel of the USDA-Natural Resources Conservation Service were asked to complete inventory sheets in order to identify the 4 primary resource concerns for 5 landuse categories within the Blackwater River Watershed (Hydrologic Unit 10300104). The identified concerns are: PASTURELAND - (1) soil erosion-classic gully; (2) plant condition-productivity, health, and vigor; (3) plant condition-forage quality and palatability; (4) domestic animals-inadequate quantities and quality of feed and forage. CULTIVATED CROPLAND - (1) soil erosion-sheet and rill; (2) soil erosion-ephemeral gully; (3) soil erosion- classic gully; (4) soil condition-organic matter depletion. DEVELOPED LAND - (1) soil condition-contaminants: salts and other chemicals; (2) soil condition-contaminants: residual pesticides; (3) water quality-harmful levels of pesticides in surface water; (4) water quality-excessive nutrients and organics in surface water. FORESTLAND - (1) soil erosion-classic gully; (2) soil condition-compaction; (3) plant condition-productivity, health, and vigor; (4) plant condition-noxious and invasive plants. NON-CULTIVATED CROPLAND - (1) soil erosion-classic gully; (2) plant condition-productivity, health, and vigor; (3) plant condition-noxious and invasive plants; (4) fish and wildlife-inadequate cover/shelter.

Figure 12

Resource Concerns/Issues by Land Use

Soil, Water, Air, Plant, Animal, plus Human (SWAPA+H) Concerns	Specific Resource Concern/Issue	Pasture/Grass	Cropland	Non-Cultivated Cropland	Forestland	Urban	Floodplain	Developed Land	Water
Soil Erosion	48% of all cropland eroding at levels above "T"		X						
	Erosion on streambanks and streambeds	X	X		X	X	X		
	Erosion and runoff from construction sites					X			
	Erosion from ephemeral gullies		X						
	Erosion from classical gullies	X	X	X	X	X			
Sedimentation	Damages to waterbodies, increased flooding						X		X
Prime Farmland	4,800 acres lost between 1982 and 1997	X	X		X		X		
Soil Condition	Contaminants: salts and other chemical							X	
Water Quality	Cultivated cropland primary nonpoint source of pollutants		X						X
Floodplains	Nearly 137,000 acres fall within the 100-year flood area						X		
Riparian Corridors	Certain riparian zones unprotected or vulnerable	X	X			X	X		

Soil Erosion

- Streambank, streambed, and classical gully erosion occurs in pasture/grassland, cropland, forestland, and urban areas. However, due to a lack of reliable data at the sub-basin (8-digit hydrologic unit) level, the degree and amount of soil loss from these sources is not known.
- Ephemeral gully erosion occurs primarily on cultivated cropland eroding at levels above the tolerable limit ("T"). No sub-basin level data are available to determine the degree and extent.
- An estimated 48 percent (203,100 acres) of all cultivated cropland is eroding at levels above "T".
- The estimated USLE soil loss on highly erodible, cultivated cropland (eroding above "T") is 9.5 tons/acre/year.
- Erosion and runoff is occurring from construction sites primarily found in and near urban areas.

Sedimentation

- Excessive sedimentation can reduce the useful life of ponds, lakes, reservoirs, and wetlands and can increase the severity and frequency of flooding by reducing the water carrying capacity of streams and rivers.

Soil Quality

- Excessive soil erosion is a primary contributor to soil quality degradation. This limits the productivity and sustainability of the soil resource.

Water Quality

- Highly erodible and cultivated croplands with USLE soil losses above tolerable limits ("T") are a primary non-point source of sediment, nitrogen, and phosphorus pollutants that enter the stream system.

Floodplains

- An estimated 136,981 acres fall within the 100-year return period flood area. This can result in damages to crops, pastures, and other resources, as well as damages to roads, bridges, and buildings.

Riparian Corridors

- The data suggest that about 44 percent of the riparian corridors, primarily in cropland, pasture/grass, and urban areas, are unprotected or vulnerable. Protected riparian corridors can act as filters to trap nutrients, sediment, and other pollutants.

A. Soils

The upland soils of this sub-basin formed mainly in loess (silty wind blown sediments). The loess deposits are thickest in the northern and central parts of this area. The soils in the southern part typically formed in residuum weathered from Pennsylvanian age shale, sandstone, and limestone, with or without a thin mantle of loess. The soils throughout the area are moderately deep to very deep, and range from well drained to poorly drained.

The soils in the deep loess areas on the broad upland divides formed under prairie vegetation and as a result have thick dark surface layers (mollisols). The soils on the moderately sloping to steep slopes adjacent to the larger streams formed under forest vegetation and have thinner surface layers (alfisols). Typically the loess soils have silt loam surface layers with silty clay loam or silty clay subsoils.

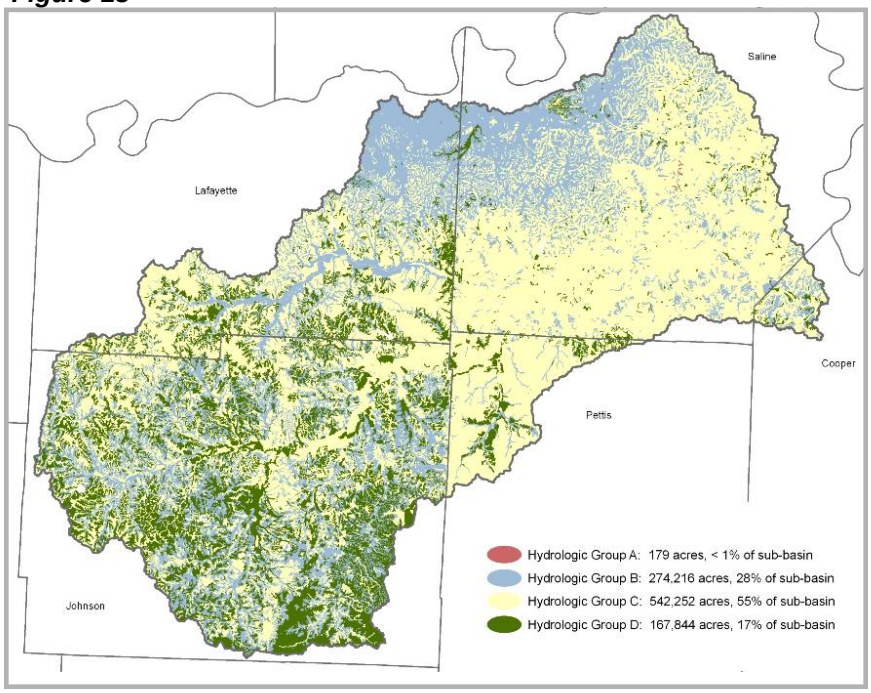
The soils that formed in the Pennsylvanian age materials typically formed in savanna or forest vegetation and have relatively thin loamy surface layers and clayey and loamy subsoils. Depth to bedrock is variable.

The floodplain soils are very deep. They formed in alluvium washed mainly from the surrounding uplands. They are typically loamy or clayey in texture.

Hydrologic Soil Groups[5]

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.

Figure 13



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)

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)

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)

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.

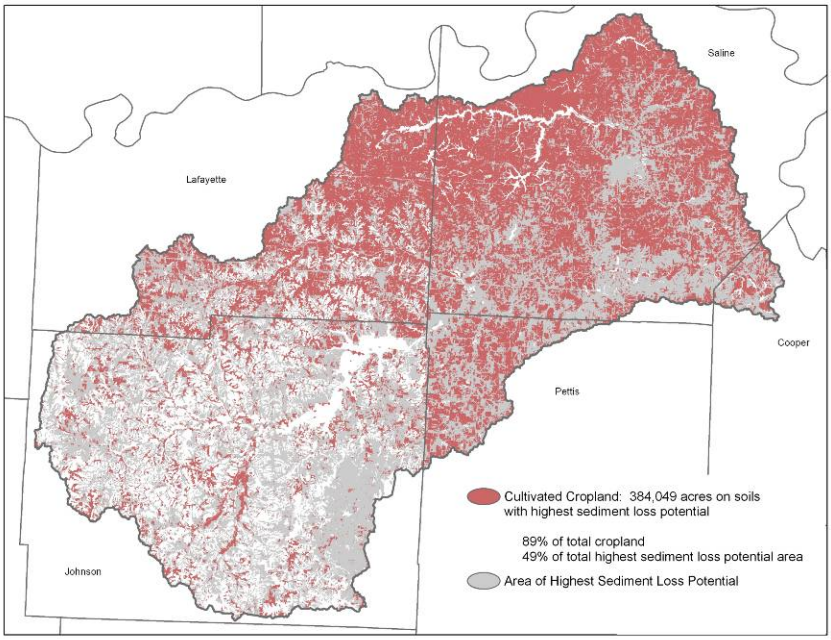
Sediment Loss Potential on Hydrologic Soil Group D (if used for cropland)

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[5]

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: Group A (no qualifying soils);Group B medium and fine textured soils); Group C medium textured soils); and Group D (medium textured soils). The salmon colored areas are currently under cultivation and represent the acres that could benefit the most from the application of conservation practices, if not already implemented.

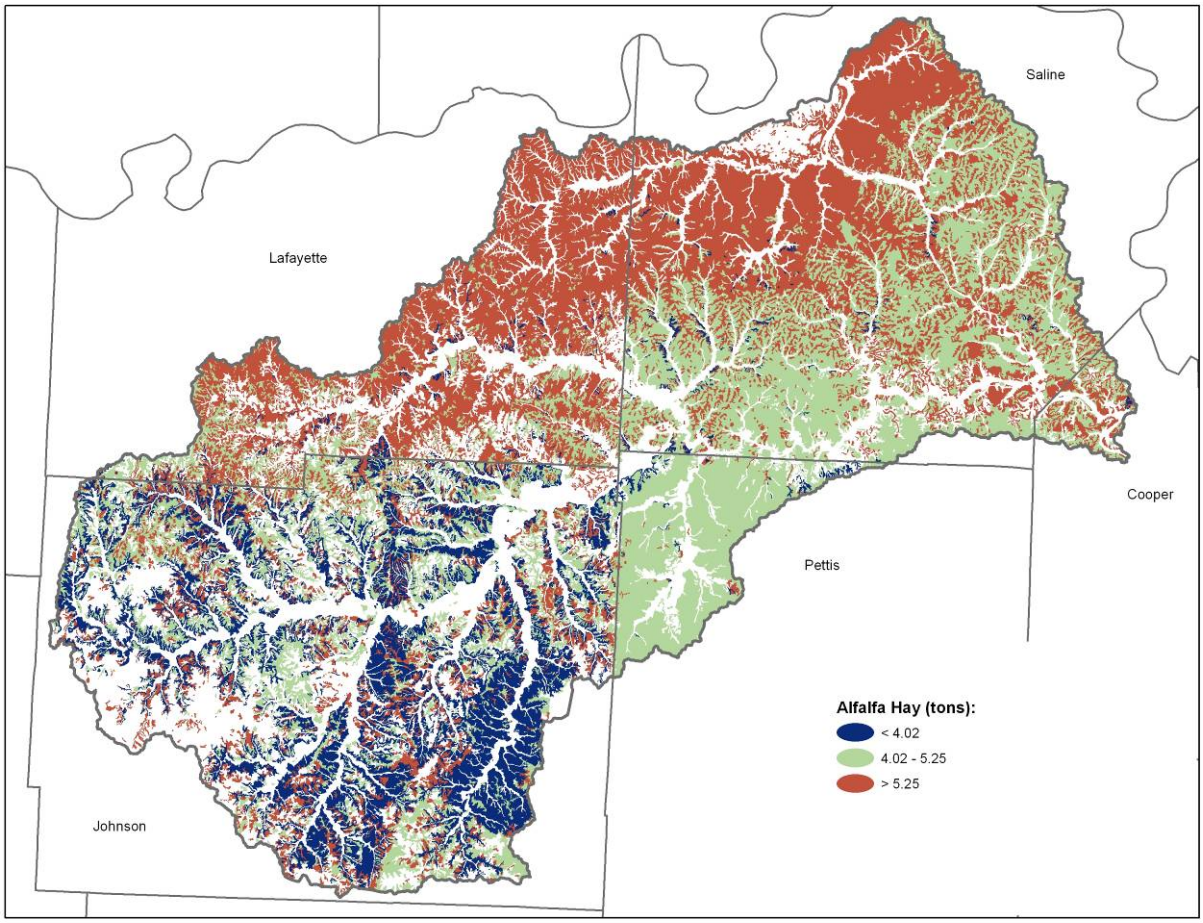
Figure 14



Pasture Productivity[5,30]

"Alfalfa is the most productive legume for Missouri, with potential yields exceeding six tons of hay per acre on good soils. Unlike red or white clover, established alfalfa is productive during midsummer except during extreme drought. Alfalfa is a tap-rooted crop and can last five years and longer under proper management. Whether grazed or fed as hay, alfalfa is an excellent forage for cattle and horses. Alfalfa is best adapted to deep, fertile, well-drained soils with a salt pH of 6.0 to 6.5, but it can be grown with conservative management on more marginal soils."

Figure 15

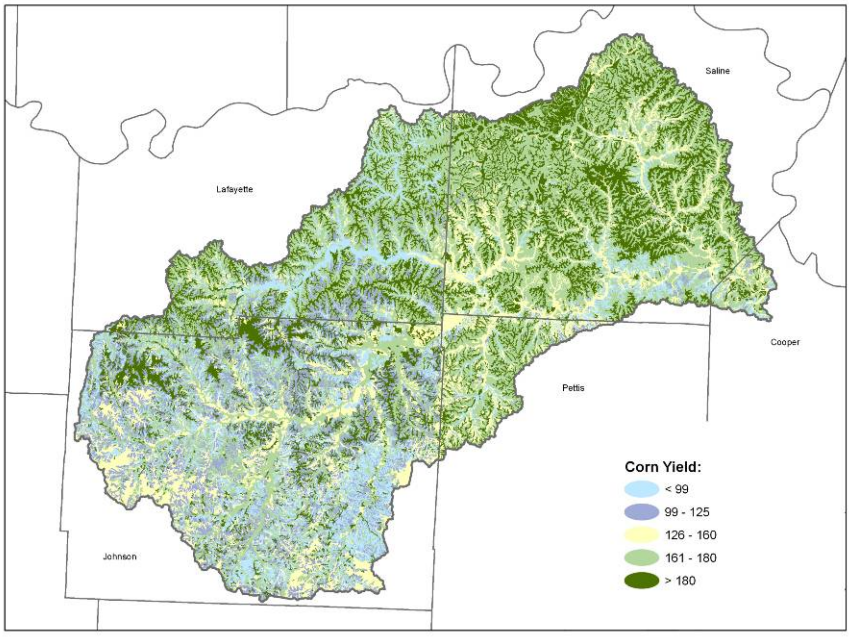


Soil Productivity[5]

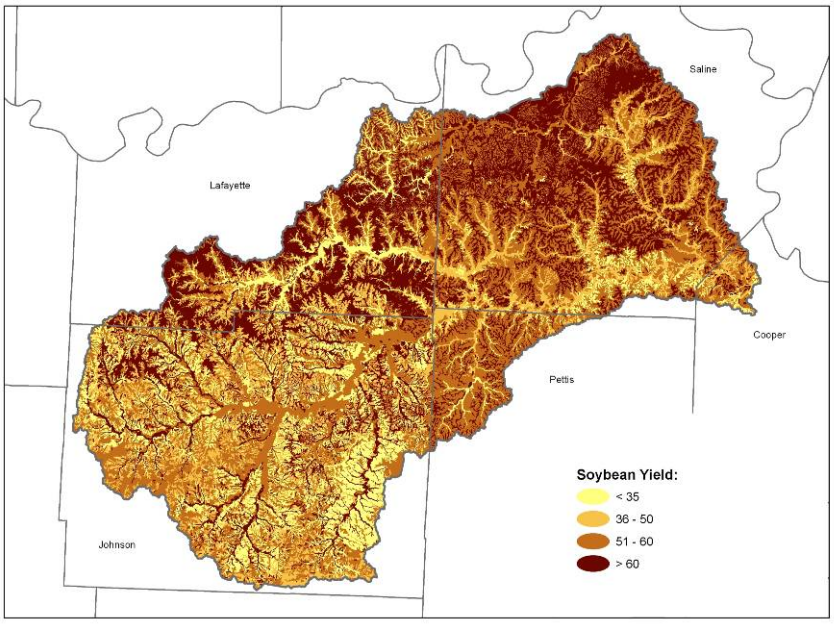
Yield estimates were developed using Missouri's Productivity Index (PI). The PI is a method developed by soil scientists that "automatically" evaluates specific soil properties directly related to plant growth. The soil properties used are a record of many years of soil survey data stored in USDA's National 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.

Figure 16

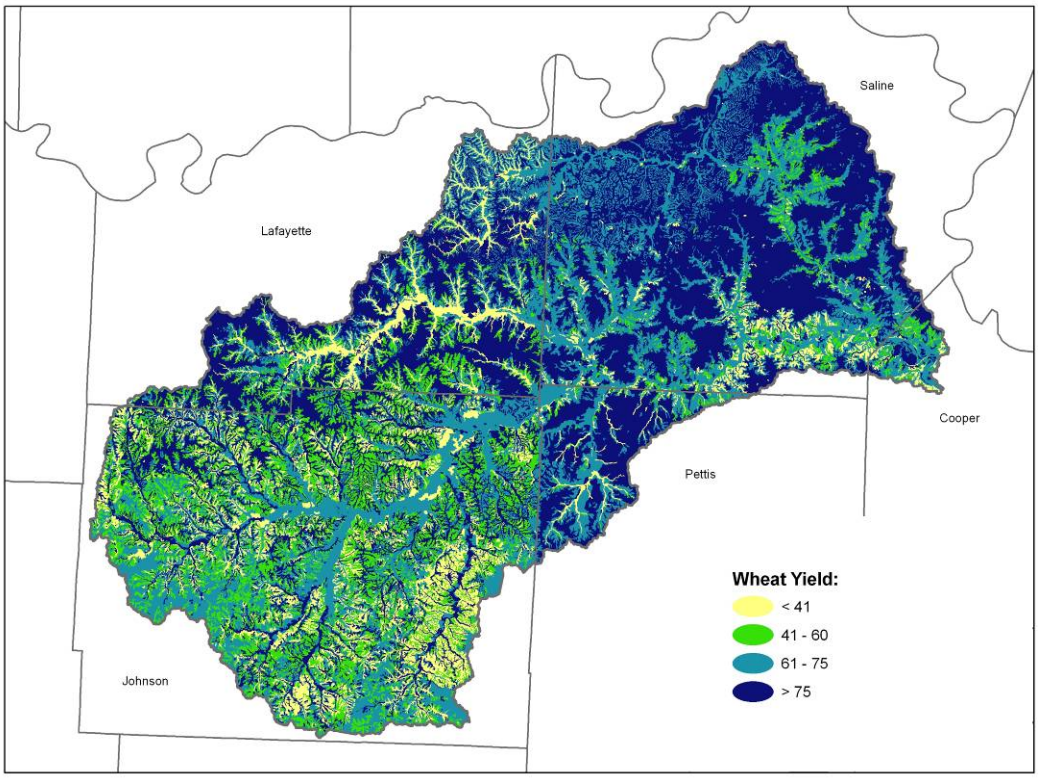
Corn Yield Estimates (bushels per acre)



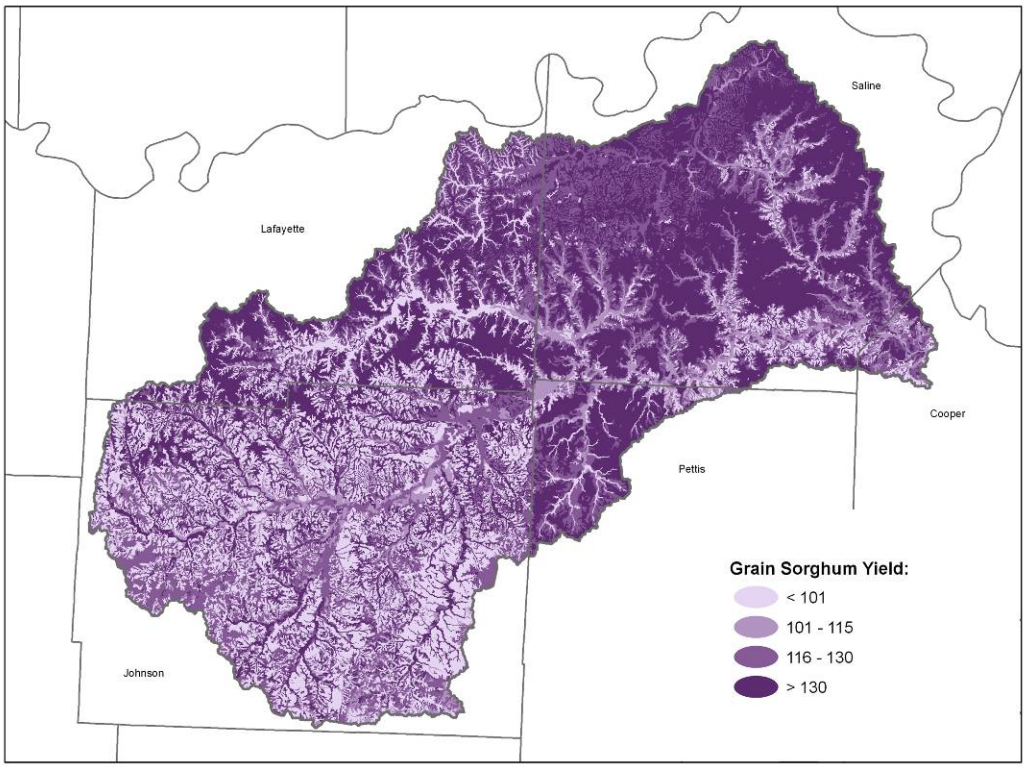
Soybean Yield Estimates (bushels per acre)



Wheat Yield Estimates (bushels per acre)



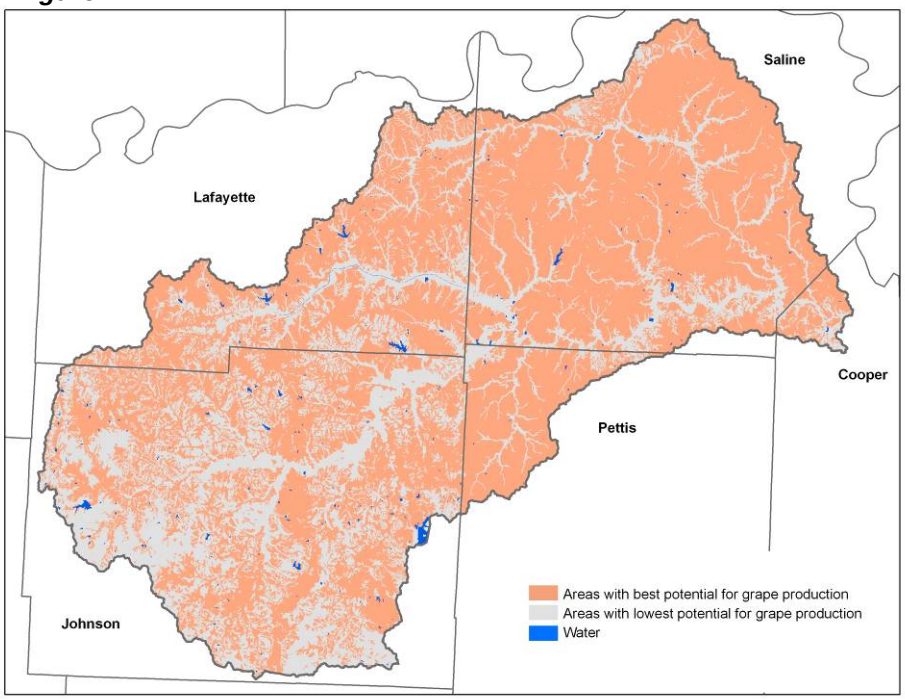
Grain SorghumYield Estimates (bushels per acre)



Grape Production[5]

There are many soils that have a good potential for grape production. Limiting factors include site and soil properties such as clayey subsoil, low available water capacity, high seasonal water tables, low organic matter, flooding and ponding. Most of the limitations can be overcome with some type of corrective management measure.

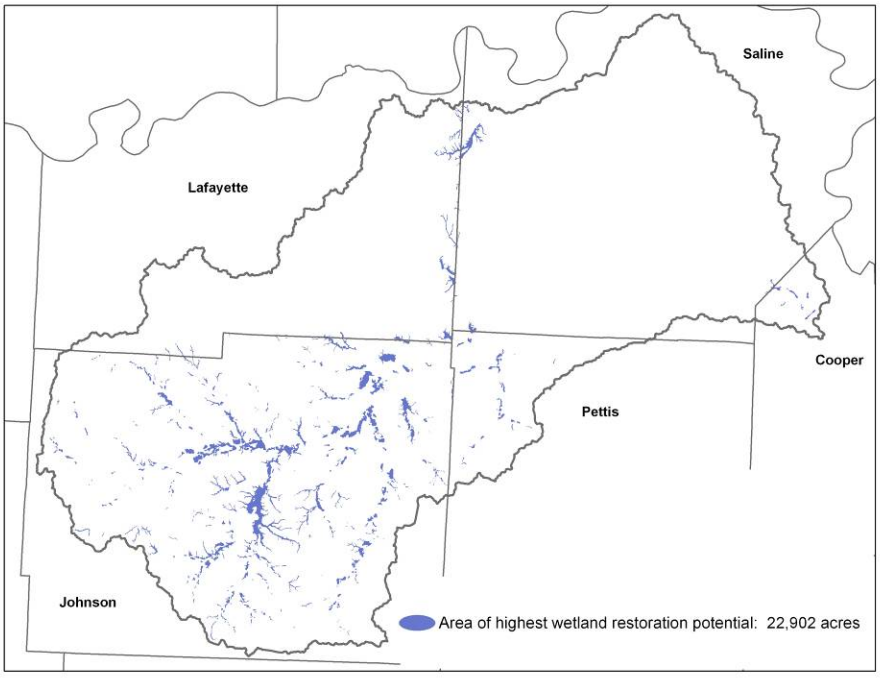
Figure 17



Wetland Restoration Potential[5]

Soils with the greatest potential for wetland restoration are located on flood plains, have a high runoff potential when thoroughly wet. Typically, they have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential.

Figure 18



B. Soil Erosion[16]

The objectives of this section are to profile cropland erosion rates and identify cropland areas within the Blackwater River 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-Economic Research Service).**

"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 soil erosion on cropland, streambanks and streambeds and runoff from construction sites and developed land are an ongoing resource concern throughout the Blackwater sub-basin. Cultivated cropland is the primary nonpoint source of sediment loss in this heavily cropped sub-basin and accounts for 43 percent of the sub-basin's total surface area**.** In sub-basins like the Blackwater, the acres most in need of conservation treatment are those with waterborne sediment, nitrogen and phosphorus losses.

The consequences of excessive soil erosion are well known. Waterborne 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 are scientifically based soil erosion estimates for the entire sub-basin. This focus does not suggest that sedimentation related to urban stormwater runoff, stream bank erosion, classical gully erosion and ephemeral gully erosion on cropland is not significant in volume or impact. However, there is a lack of reliable data at the sub-basin level for these other sources of sediment. The erosion rate data have 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 and non-cultivated cropland on highly erodible and non-highly erodible land. Also included are erosion rates and their relationship to "T" values for pastureland.

Universal Soil Loss Equation (USLE) Cropland Erosion Rates in Tons/Acre/Year[2]

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 erodiblity 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.

Figure 19

USLE Cropland Erosion Rates Tons/Acre/Year[2]

CROPLAND CATEGORY	CULTIVATED CROPLAND	NON-CULTIVATED CROPLAND
HIGHLY ERODIBLE LAND (HEL)		
HEL Eroding at or below "T"	3.14	0.88
HEL Eroding above "T"	9.53	2.39
All HEL	8.95	0.9
NON-HIGHLY ERODIBLE LAND (Non-HEL)		
Non-HEL Eroding at or below "T"	2.57	0.3
Non-HEL Eroding above "T"	6.16	0
All Non-HEL	2.97	0.3
ALL CROPLAND		
All Land Eroding at or below "T"	2.61	0.8
All Land Eroding above "T"	9.1	2.39
All Land	5.7	0.82

Cropland Erosion in Relationship to "T"[2]

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

Cultivated Cropland

CROPLAND CATEGORY	Total Acres	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	17,700	9%	4%	2%
Highly Erodible Cropland above "T"	176,500	91%	42%	18%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**194,200**	**100%**	**46%**	**20%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	204,900	89%	48%	21%
Non-Highly Erodible Cropland above "T"	25,700	11%	6%	3%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**230,600**	**100%**	**54%**	**24%**
GRAND TOTALS	**424,800**	**100%**	**100%**	**44%**

Non-Cultivated Cropland

CROPLAND CATEGORY	Total Acres	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	72,000	99%	85%	7%
Highly Erodible Cropland above "T"	900	1%	1%	0.001%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**72,900**	**100%**	**86%**	**7%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	11,600	100%	14%	1%
Non-Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**11,600**	**100%**	**14%**	**1%**
GRAND TOTALS	**11,600**	**100%**	**100%**	**8%**

All Cropland

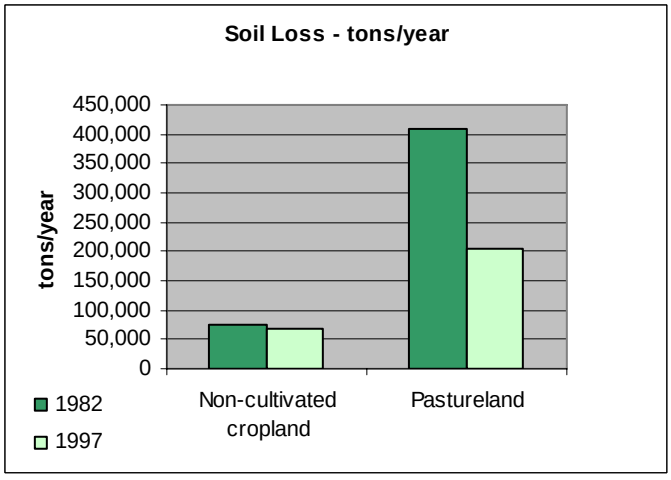
CROPLAND CATEGORY	Total Acres	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	89,700	34%	18%	9%
Highly Erodible Cropland above "T"	177,400	66%	35%	18%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**267,100**	**100%**	**53%**	**27%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	216,500	89%	42%	22%
Non-Highly Erodible Cropland above "T"	25,700	11%	5%	3%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**242,200**	**100%**	**47%**	**25%**
GRAND TOTALS	**509,300**	**100%**	**100%**	**52%**

Pastureland Erosion[2]

This table reports USLE rates and acres in relationship to “T” for pastureland (tons/acre/year).

PASTURELAND CATEGORY	Total Acres	% of Category	USLE tons/acre/year	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	0	0%	0	0%
Highly Erodible Cropland above "T"	0	0%	0	0%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**0**	**00%**	**0**	**0%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	244,300	98%	0.76	25%
Non-Highly Erodible Cropland above "T"	5,400	2%	3.36	1%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**249,700**	**100%**	**0.82**	**26%**
GRAND TOTALS	**249,700**	**100%**	**0.82**	**26%**

USLE Soil Loss Rates (tons/year)[2]



Non-cultivated Cropland

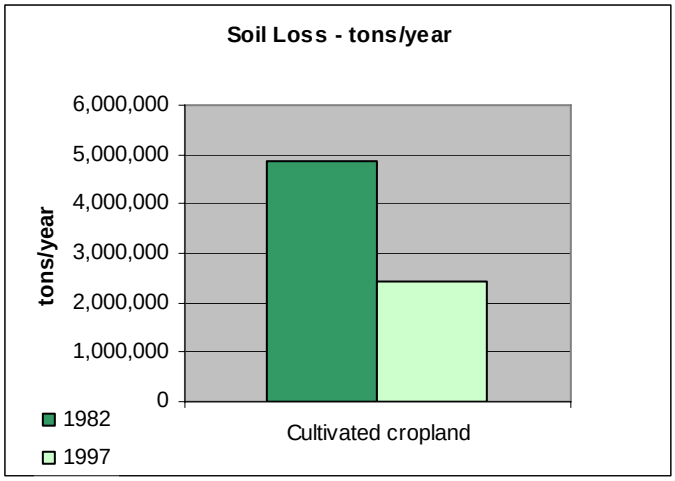
1982 75,500 tons per acre

1997 69,400 tons per acre

Pastureland

1982 409,400 tons per acre

1997 206,000 tons per acre



Cultivated Cropland

1982 4,878,400 tons per acre

1997 2,423,800 tons per acre

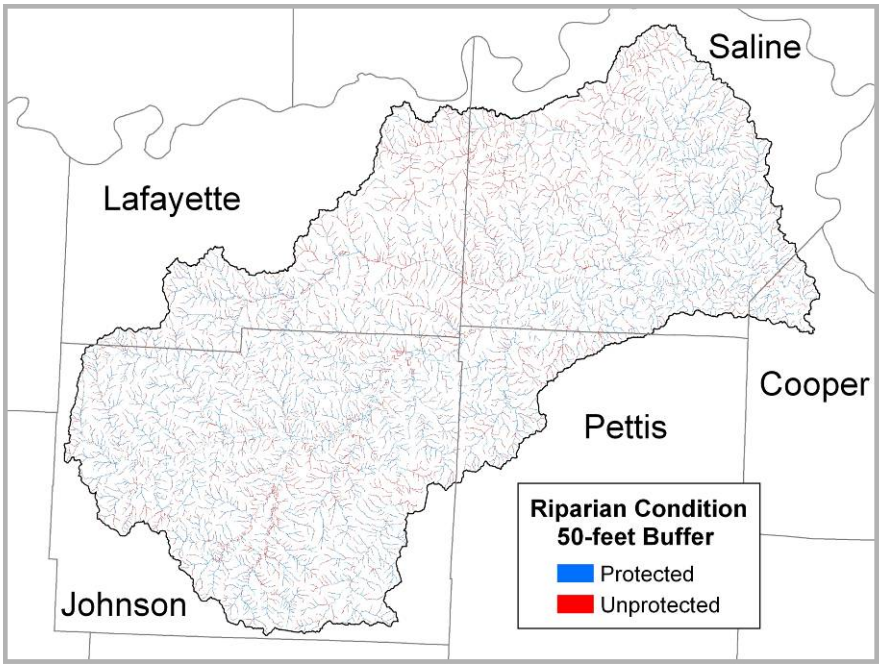
C. Water Quality

Riparian Corridor Condition[8,18]

The condition of the riparian zone adjacent to streams has a critical impact on water quality. Permanent and deeply-rooted streambank vegetation slows run-off of nutrients and pollutants, and reduces sedimentation and solar heating. NRCS riparian practice standards specify 50-feet vegetated 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 sub-basin states. 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 USDA-Farm Service Agency. The land cover attribute in the CLU 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 in the table and map below.

Figure 20



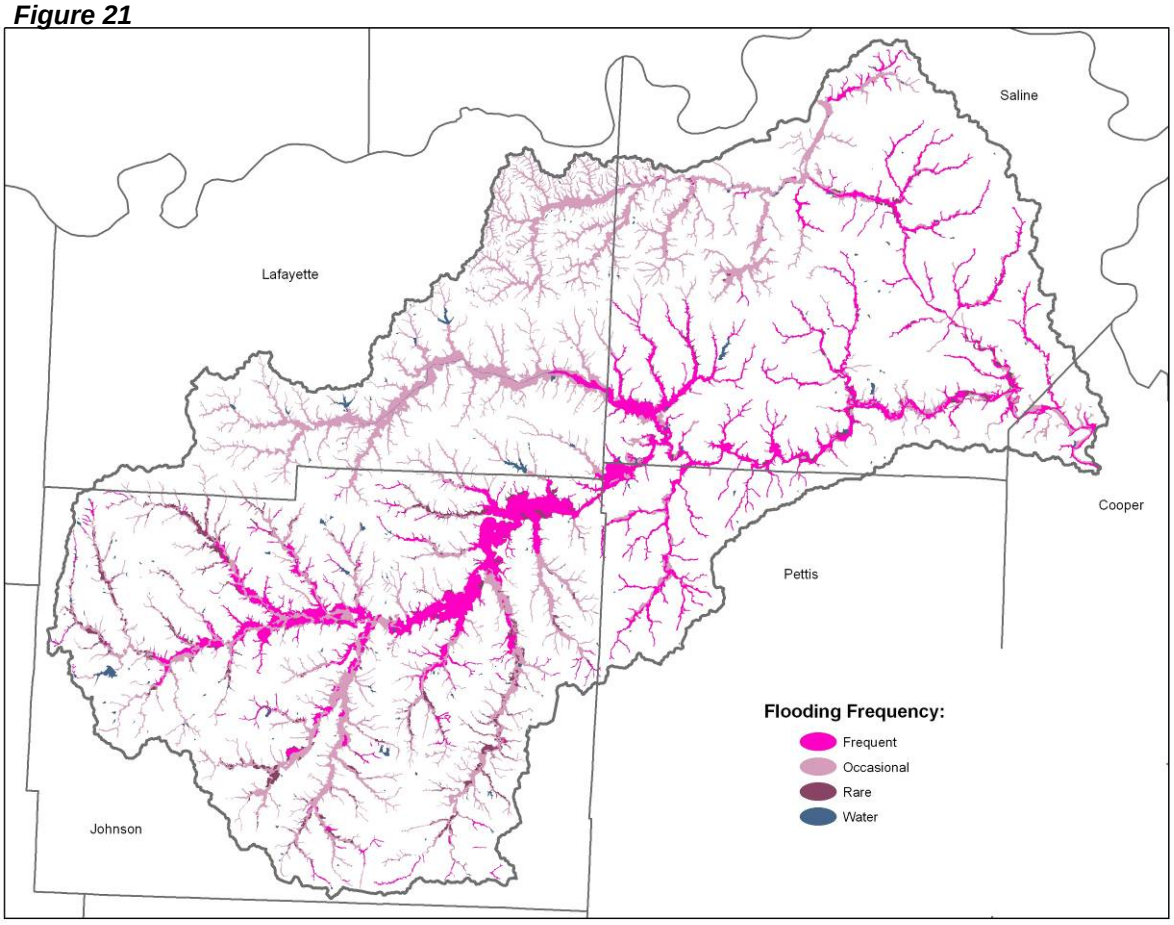
County	Stream Miles (in sub-basin)	50-ft. Stream Buffer (in acres)	Percent Protected
Lafayette	678	8,053	45%
Saline	1,347	15,973	54%
Cooper	65	666	64%
Pettis	235	2,795	55%
Johnson	1,876	20,892	62%
Total in Sub-basin	**2,118**	**25,261**	**61%**

Flooding Frequency[5]

Flooding frequencies are defined by the number of times flooding occurs over a period of time and expressed as a class. The classes of flooding are defined as follows:

- Rare—Flooding unlikely but possible under unusual weather conditions; 1 to 5 percent chance of flooding in any year or nearly 1 to 5 times in 100 years
- Occasional—Flooding is expected infrequently under usual weather conditions; 5 to 50 percent chance of flooding in any year or 5 to 50 times in 100 years.
- Frequent—Flooding is likely to occur often under usual weather conditions; more than a 50 percent chance of flooding in any year or more than 50 times in 100 years, but less than a 50 percent chance of flooding in all months in any year.

Figure 21



D. Water Quantity

Public Water Supply[20,21,22,23]

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, sediments, and nutrients are the primary concerns in surface water sources while 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 wills in highly urbanized areas are at risk from a wide variety of chemical pollutants.

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.

Waste Water Treatment Facilities and Concentrated Animal Feeding Operations[19]

The National Pollutant Discharge Eliminations System (NPDES) facilities database is a point data set depicting outfall locations of waste water facilities requiring and holding NPDES operating permits. One type of NDPES facility is a concentrated animal feeding operation, or CAFO. A CAFO is defined as having 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 a post 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.

The Blackwater sub-basin has 16 confined hog operations, 3 poultry CAFOs and one livestock auction. Also documented are 32 municipal and 99 non-municipal waste water facilities. A majority of the municipal sites are for sewage treatment.

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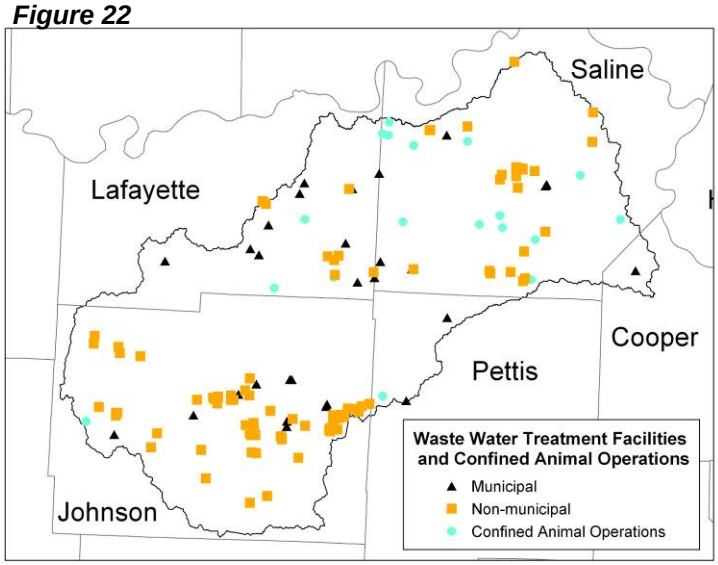
Figure 22



D. Forestry

Forests cover about a third of Missouri - forests containing some of the finest oak, walnut, and red cedar found anywhere. Forests are Missouri's greatest renewable resource, providing many economic, environmental and social benefits. They protect hillsides from erosion, keeping streams and rivers clean. They filter the air, soften the extremes of the weather, and add beauty to cities and towns. Much of Missouri's recreation and tourism industry is centered in the forested regions of the state. And forests are a diverse resource of plants, animals, birds, and other life forms. Annual growth of forests in Missouri far exceeds the amount harvested, ensuring ample forests for future generations. The majority of tree species are hardwoods with softwoods locally important in certain regions of the state. Forest products are also important to Missouri. Harvesting and processing trees into wood products gives thousands of people jobs and contributes about $3 billion each year to Missouri's economy. Private landowners control 85 percent of the forest land in Missouri. Most of these private forested acres in Missouri are not following a management plan.

The following tables for this sub-basin are based on data compiled from The Forest Inventory and Analysis (FIA) Program of the U.S. Department of Agriculture (USDA) Forest Service. Information from USDA-Forest Service, National Forest Inventory and Analysis Database, 2005 is available at www.fia.fs.fed.us/tools-data/default.asp.

Area of Forestland by Ownership in Sub-Basin

Private	58,745 acres
Federal	5,801 acres
State	6,683 acres
County and municipal	0 acres
Other	0 acres
Total	71,229 acres

Area of Forestland by Stocking Class in Sub-Basin

Overstocked	0 acres
Fully stocked	32,905 acres
Medium stocked	11,253 acres
Poorly stocked	25,988 acres
Non-stocked	1,083 acres
Total Growing Stock	71,229 acres

Area of Forestland by Productivity Site Class in Sub-Basin

165-224	0 acres
120-164	0 acres
85-119	28,088 acres
50-84	18,572 acres
0-49	24,570 acres
Total	71,229 acres

Net Volume of Growing Stock on Forestland by Species Type in Sub-Basin

Softwoods	193,051 cubic feet
Hardwoods	77,596,807 cubic feet
Other	0 cubic feet
Total	77,789,858 cubic feet

E. Threatened and Endangered Species[20]

The Missouri Natural Heritage databases store locations, population status and habitat information about species and communities of conservation concern. The table below is a subset of the Heritage records that occur in the Blackwater sub-basin, restricted to federally threatened, endangered or candidate and state threatened or endangered species. While Heritage data can not prove the 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 the region.

Figure 23

Species Common Name	Scientific Name	Threatened, Endangered, or Candidate	Federal or State Listing
Birds			
American Bittern	Botaurus lentiginosus	Endangered	State
Bald Eagle	Haliaeetus leucocephalus	Threatened/ Endangered	Federal/ State
Barn Owl	Tyto alba	Endangered	State
Greater Prairie Chicken	Tympanchus cupido	Endangered	State
King Rail	Rallus elegans	Endangered	State

Census and Social Data

A. Census Bureau[21]

Block group-level GIS data files from the 1990 and 2000 Census were used to illustrate population, population change, income and the agricultural cohort for the sub-basin. Spatial files were clipped by the sub-basin boundary. The percent of the block group falling in the watershed was calculated, and population figures were prorated by this value. Although this technique erroneously assumes even spatial distribution of population, it is a more accurate population count for the sub-basin than including the entire block group population.

Figure 24a. 1990 Population-The 1990 estimated population of the sub-basin was 70,810.

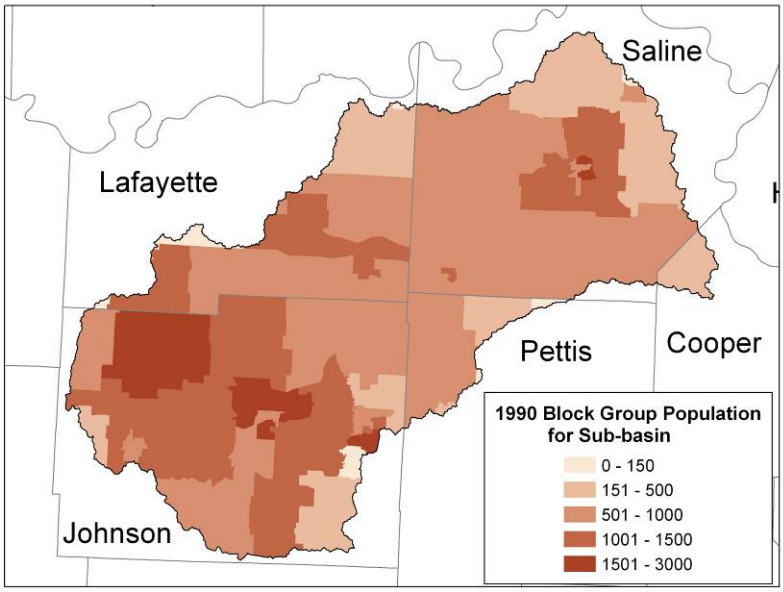
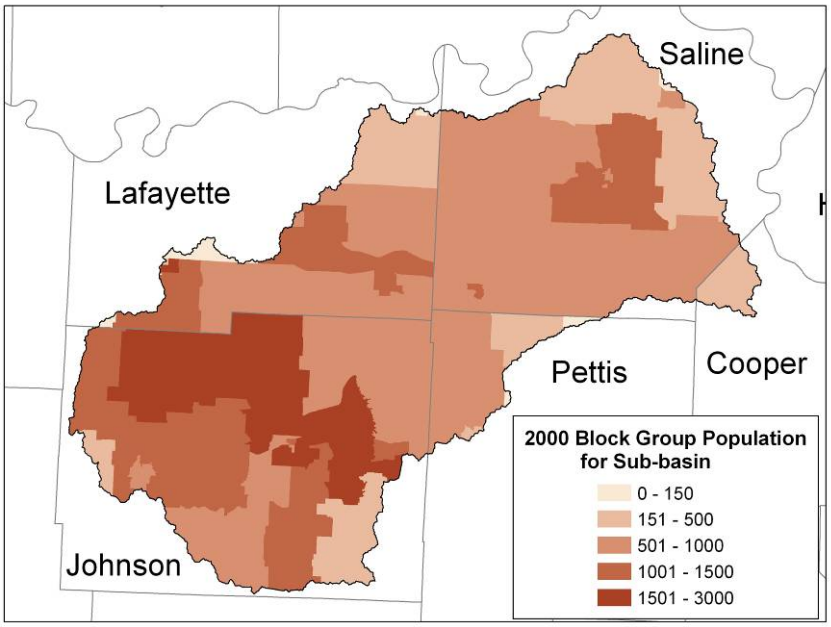


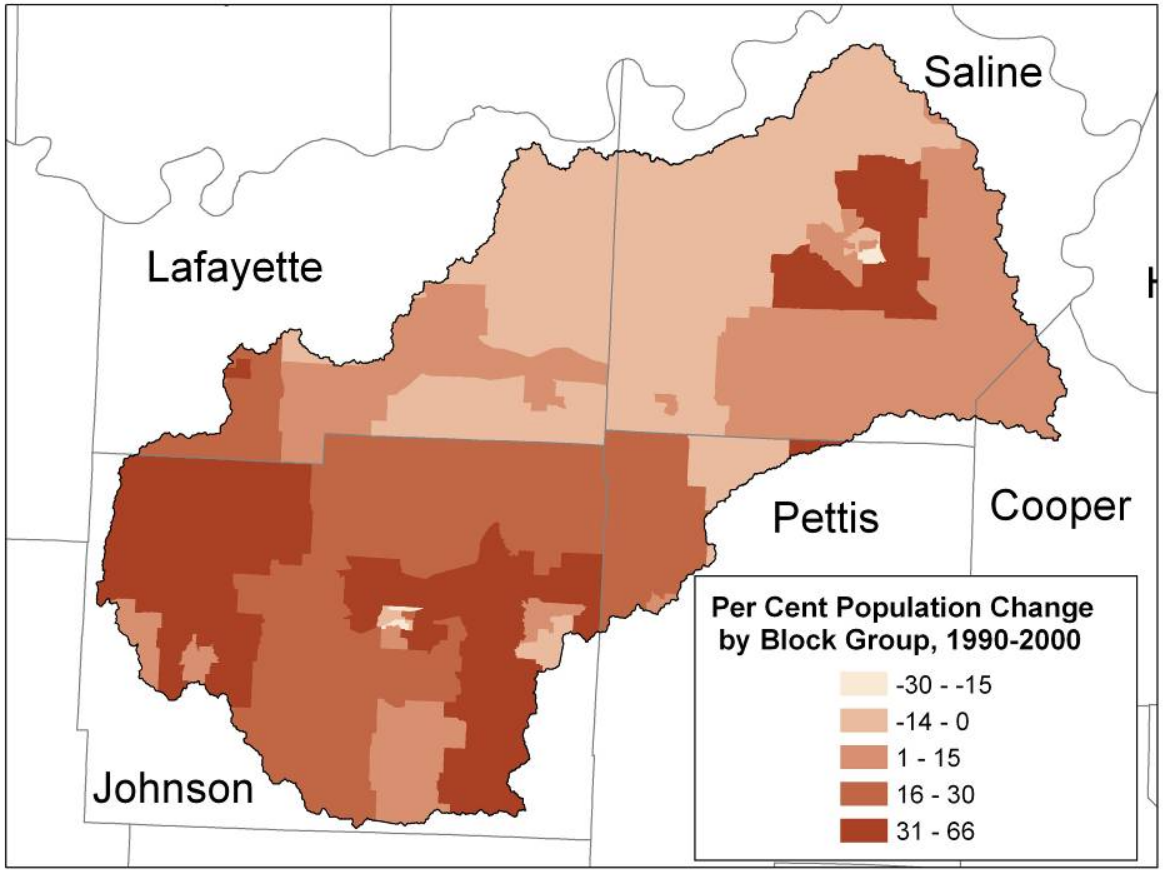
Figure 24b. 2000 Population—The 2000 estimated population of the sub-basin was 77,279.



Change in Population

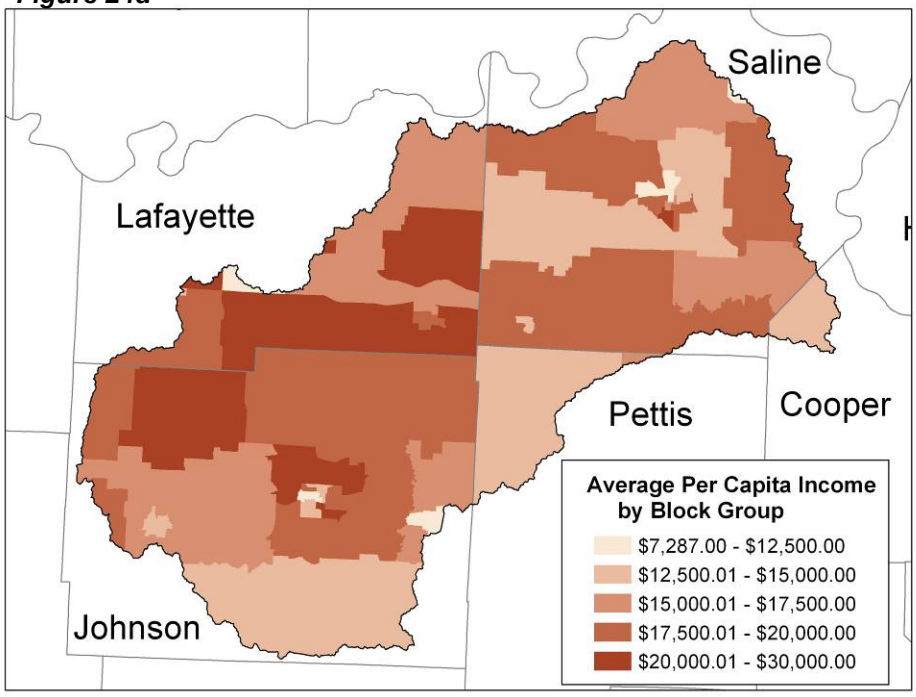
The 1990 estimated population of the sub-basin was 70,810 and grew to 77,279 by 2000, representing a 6,469 person increase or about 9 per cent. With a total of 83 block groups in the sub-basin, 55 showed a gain in population while 18 lost population.

Figure 24c



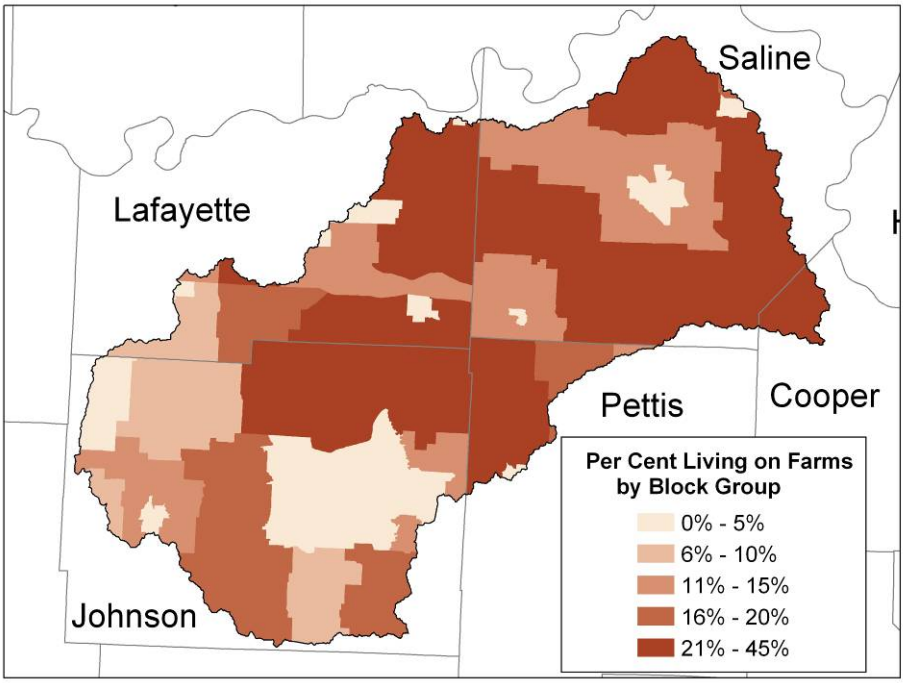
Income

Figure 24d



Farms

Figure 24e



B. Agricultural Census[23]

The data shown in the table are totals for complete counties. County land area acreages and percentages are supplied to assist the user in calculating sub-county estimates. Grazing livestock includes cattle, sheep, horses and ponies and goats.

Figure 25

COUNTY SUMMARY HIGHLIGHTS, 2002					
	Cooper	**Johnson**	**Lafayette**	**Pettis**	**Saline**
Farms	923	1,811	1,286	1,278	945
Land in Farms	293,966	412,979	363,186	402,390	413,166
Hogs & Pigs	24,805	4,885	70,677	36,731	88,265
Poultry	388,058	7,116	2,161	3,516,369	752
Cattle	48,355	78,942	40,408	61,874	34,275
Sheep	575	1,161	685	1,167	621
Horses & Ponies	695	2,411	1,112	1,335	505
Goats	235	314	431	518	221
Cropland Used only for Pasture or Grazing	37,111 acres	60,741 acres	25,913 acres	56,207 acres	27,558 acres
Woodland pastured	21,308 acres	18,309 acres	9,336 acres	20,845 acres	14,486 acres
Permanent Pastureland and Rangeland	35,277 acres	89,951 acres	33,099 acres	62,043 acres	28,491 acres
Pastureland, All Types	93,696 acres	169,001 acres	68,378 acres	139,095 acres	70,535 acres
Percent Pastureland to All Land in Farms	32%	41%	19%	35%	17%
Sum of All Grazing Livestock	49,860	82,828	42,636	64,894	35,622
Pastureland per Animal	1.9 acres	2 acres	1.6 acres	2.1 acres	2 acres

Status of Resources

A. PRS[24]

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.

FY = Fiscal Year

PRS Data	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Average per Year
Total Acres Conservation Systems Applied	48,702	38,594	21,448	27,047	Not reported by Hydrologic Unit (HU)	57,406	46,556	43,335	49,099

Figure 26. Conservation Practices Applied

Summary Conservation Practices (PRS Number)	FY 05	FY 06	FY 07
Animal Mortality Facility (316)			1
Composting Facility (31)		1	
Comprehensive Nutrient Management Plan (100)		1	7
Conservation Cover (327)	1.337 acres	1.286 acres	1,623 acres
Conservation Crop Rotation (328)	36,176 acres	26,631 acres	21.446 acres
Contour Farming (330)	20,685 acres	14,335 acres	11,147 acres
Critical Area Planting (342)	12 acres	21 acres	18 acres
Dike (356)		2,400 acres	650 acres
Diversion (362)	3,843 feet	8,239 feet	3,929 feet
Early Successional Habitat Development/Management (647)	47 acres	346 acres	446 acres
Fence (382)	6,220 feet	10,460 feet	41,984 feet
Field Border (386)		53,186 feet	479,979 feet
Filter Strip (393)	32 acres	25 acres	49 acres
Forage Harvest Management (511)	1,085 acres	687 acres	404 acres
Grade Stabilization Structure (410)	10	3	13
Grassed Waterway (412)	83 acres	141 acres	66 acres
Nutrient Management (590)	11,411 acres	6,799 acres	5,888 acres
Pasture and Hay Planting (512)	70 acres	555 acres	190 acres
Pest Management (595)	26,875 acres	6,809 acres	5,684 acres
Pipeline (516)	100 feet	3,364 feet	22,913 feet

Conservation Practices Applied (continued)

Summary Conservation Practices	FY 05	FY 06	FY 07
Prescribed Burning (338)	40 acres		22 acres
Prescribed Grazing (528)	1,054 acres	3,566 acres	1,909 acres
Prescribed Grazing (528A)	6,746 acres	355 acres	418 acres
Residue and Tillage Management, Mulch Till (345)		2,183 acres	2,529 acres
Residue and Tillage Management, No-Till/Strip Till/ Direct Seed (329)		3,854 acres	5,239 acres
Residue Management, Mulch Till (329B)	11,016 acres	3,493 acres	349 acres
Residue Management, No-Till/Strip Till (329A)	13,262 acres	4,073 acres	1,977 acres
Residue Management, Seasonal (344)	1,137 acres	2,746 acres	4,508 acres
Restoration and Management of Declining Habitats (643)	62 acres	114 acres	235 acres
Riparian Forest Buffer (391)	13 acres	168 acres	15 acres
Structure for Water Control (587)	2	6	2
Terrace (600)	519,495 feet	840,129 feet	616,530 feet
Tree/Shrub Establishment (612)	16 acres	71 acres	
Tree/Shrub Site Preparation (490)		8 acres	
Underground Outlet (620)	254,464 acres	346,776 acres	271,942 acres
Upland Wildlife Habitat Management (645)	318 acres	1,923 acres	1,203 acres
Use Exclusion (472)	499 acres	2,019 acres	1,808 acres
Waste Storage Facility (313)		1	1
Waste Treatment Lagoon (359)		1	
Water Well (642)	1	1	5
Watering Facility (614)	4	6	24
Wetland Restoration (657)	123 acres	436 acres	5 acres

B. Watershed Projects

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

Figure 27

319 Project Name[31]	Status
Bermuda Grass Demonstration Project	Completed

PL-566 Project Name[32]	Acres	Status
South Fork Blackwater	48,545	Completed

AgNPS SALT Project Name[25]	Acres	Status
Cow Creek	20,405	Completed
Finney Creek	34,388	In-Progress
Muddy Creek	68,690	In-Progress
Salt Fork Creek	44,026	In-Progress

C. Farm Bill Program Lands[26]

USDA programs involving long-term contracts or long-term to permanent easements on land units allow for sustained conservation and restoration goals. In this sub-basin, the Conservation Reserve and Wetlands Reserve programs have considerable participation, as summarized in the table below.

Figure 28

Program	Number of Acres	Number of Contracts or Easements
Conservation Reserve Program (CRP)	28,045	820 contracts
Wetland Reserve Program (WRP)	4,233	51 easements

D. Conservation Opportunity Areas[27]

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.

No COAs are contained in the Blackwater sub-basin. The Wakenda Bottoms wetland/bottomland forest complex borders to the north and actually overlaps the Blackwater sub-basin by a few acres, but it is believed to be a mapping resolution error.

E. Environmental Protection Agency Priority Watersheds[28,29]

The Environmental Protection Agency (EPA) has worked in conjunction with Kansas Department of Health and Environment and Missouri Departments of Natural Resources to identify priority watersheds in each state. The prioritization process paid particular attention to those watersheds where there is a high potential to accomplish measurable water quality improvements in a relatively short time. The target watersheds are used to target requests for Clean Water Act 319 funds. No EPA target watersheds are in the Blackwater sub-basin.

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