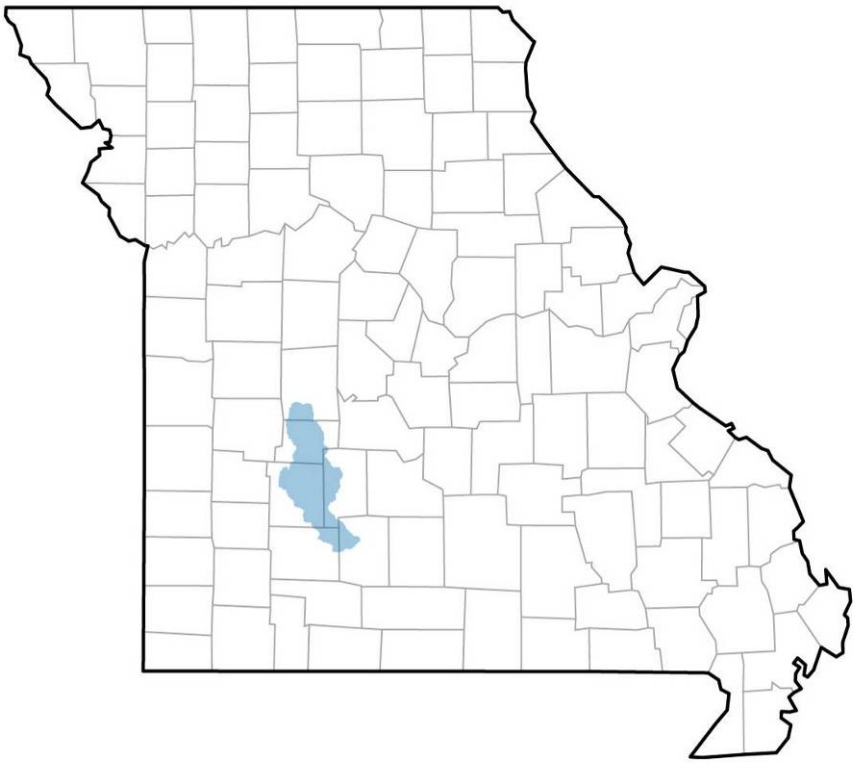
United States Department of Agriculture
Natural Resources Conservation Service

Pomme de Terre Sub-basin

HUC # 10290107



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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Pomme de Terre 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 Pomme de Terre sub-basin covers 479,100 acres (749 square miles), across six counties, in southwestern Missouri. Situated between the Sac River drainage area to the west, the Niangua River sub-basin to the east and the James River hydrologic unit to the south, the sub-basin drains north through the Pomme de Terre River to the Harry S Truman reservoir on the Osage River. The sub-basin, underlain by dolomites and covered with cherty,loam soils, is dominated by moderately rolling to steep-sided hills across its central portions and flat upland plains on the sub-basin drainage divides to the east and west. Above Pomme de Terre Lake, the relief is generally less than 150 feet and the rolling hills are primarily used for cool season pasture. Below the lake, the hills are steeper and timbered. On the west side of the sub-basin, the rolling hills on the upper reaches of the Pomme de Terre River give way to a flat, loess covered plain on the drainage divide with the Sac River. The east side of the sub-basin is defined by a long, narrow plain forming the divide with the Niangua River drainage system.

Eighty-eight percent of the sub-basin's land area (421,300 acres) is in agricultural land uses and land covers: 48 percent (231,100 acres) is used for grazing; 21 percent (97,700 acres) is cropland, led by forage production and followed by grass seed, soybeans, corn and wheat in decreasing acreages; and 19 percent (92,500 acres) is ungrazed forest land. The remaining 12 percent (57,800 acres) of the sub-basin's land area is non-agricultural: 3 percent (16,300 acres) has been developed; 3 percent (13,000 acres) is water; 1 percent (5,600 acres) is in minor uses; and 5 percent (22,900 acres) is federal land. Livestock production is led by poultry, followed by cattle and calves, hogs and pigs and horses.

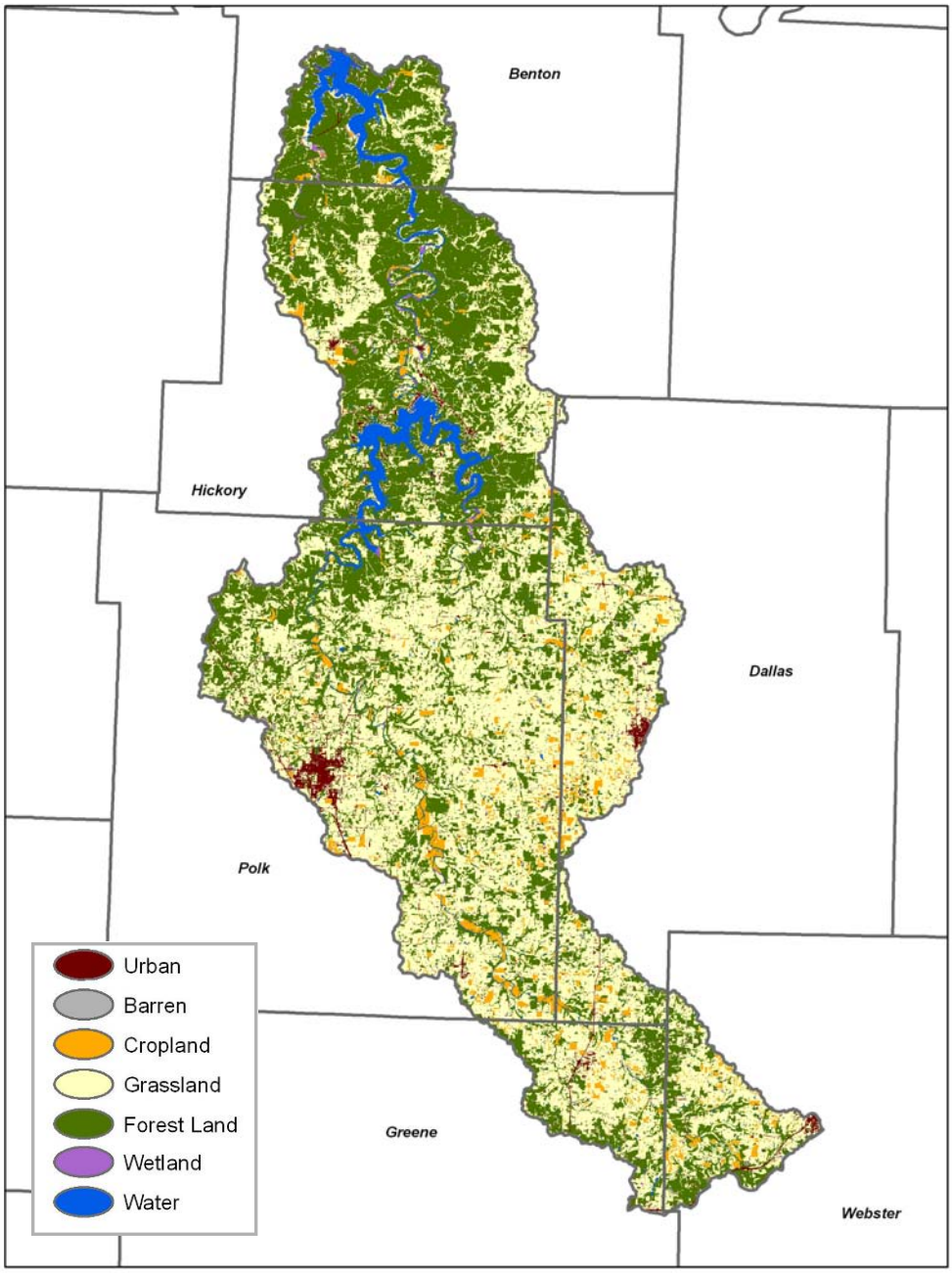
Figure 1

Sub-basin Primary Land Cover/Use Percentages By County

County	Cultivated Cropland	Non-Cultivated Cropland	Pasture Land	Forested Land	Developed Land
Benton	0%	1%	1%	2%	0.001%
Dallas	1%	2%	5%	1%	0.0003%
Greene	0%	2%	3%	4%	0.004%
Hickory	0%	6%	7%	11%	1%
Polk	1%	9%	19%	12%	1%
Webster	0%	0%	0%	4%	0.0002%
Sub-basin Total	2%	20%	35%	34%	3%

Physical Description
A. Land Use/ Land Cover[2]

Figure 2a



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.

Figure 2b

Land Use/ Land Cover NRI	Urban	Cultivated cropland	Conservation Reserve Program	Non-cultivated cropland	Pastureland	Forest land	Minor land cover/uses	Water	Federal land cover/use not recorded
1982 Acres	12,600	26,800	0	19,300	253,900	126,000	6,000	11,600	22,900
1987 Acres	13,600	19,500	0	36,500	229,300	138,600	6,000	12,500	22,900
1992 Acres	14,700	19,700	0	33,200	223,700	146,600	5,900	12,600	22,900
1997 Acres	16,300	9,200	0	88,500	159,800	163,800	5,600	13,000	22,900
Five Year trend 92-97	**Up 11%**	**Down 53%**	**No change**	**Up 167%**	**Down 29%**	**Up 12%**	**Down 5%**	**Up 3%**	**No change**
Ten year trend 87-97	**Up 20%**	**Down 53%**	**No change**	**Up 142%**	**Down 30%**	**Up 18%**	**Down 7%**	**Up 1%**	**No change**
Fifteen year trend 82–97	**Up 29%**	**Down 66%**	**No change**	**Up 359%**	**Down 37%**	**Up 30%**	**Down 7%**	**Up 12%**	**No change**

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%	159,800	33%	1%	71,300	15%	2%

C. Crop History[2]

	Close Grown Crops (acres)	Row Crops (acres)			Hayland (acres)		
Year	Wheat	Corn	Sorghum	Soybeans	Grass	Legume	Grass-Legume
1997	4,300	2,500	0	0	48,700	2,600	37,200

D. Public Land[3]

Publicly-owned land in the Pomme de Terre sub-basin accounts for 7.6% of the land area, slightly above the state average of 6.7%. The 41,203 acres of public land include 4 conservation areas, 3 river accesses, 1 state park and 4 Corps of Engineers management units associated with Truman and Pomme de Terre reservoirs.

Figure 3

Public Land Ownership (acres)			
	Missouri Department of Conservation	Missouri Department of Natural Resources	U.S. Army Corps of Engineers
Total Acres	875	757	39,571

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	-	-	-
II - moderate limitations	4,500	49,700	61,100
III - severe limitations	4,700	19,600	38,800
IV - very severe limitations	-	16,800	33,400
V - no erosion hazard, but other limitations	-	-	2,100
VI - severe limitations, unsuited for cultivation, limited to pasture, range, forest	-	2,400	12,400
VII - very severe limitations, unsuited for cultivation, limited to grazing, forest, wildlife	-	-	12,000
VIII - misc. areas have limitations, limited to recreation, wildlife and water supply	-	-	-
Total	**9,200 acres**	**88,500 acres**	**159,800 acres**

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 Pomme de Terre Sub-basin occupies portions of MLRA 116A..3, MLRA 116A.4 and MLRA 116B.1.

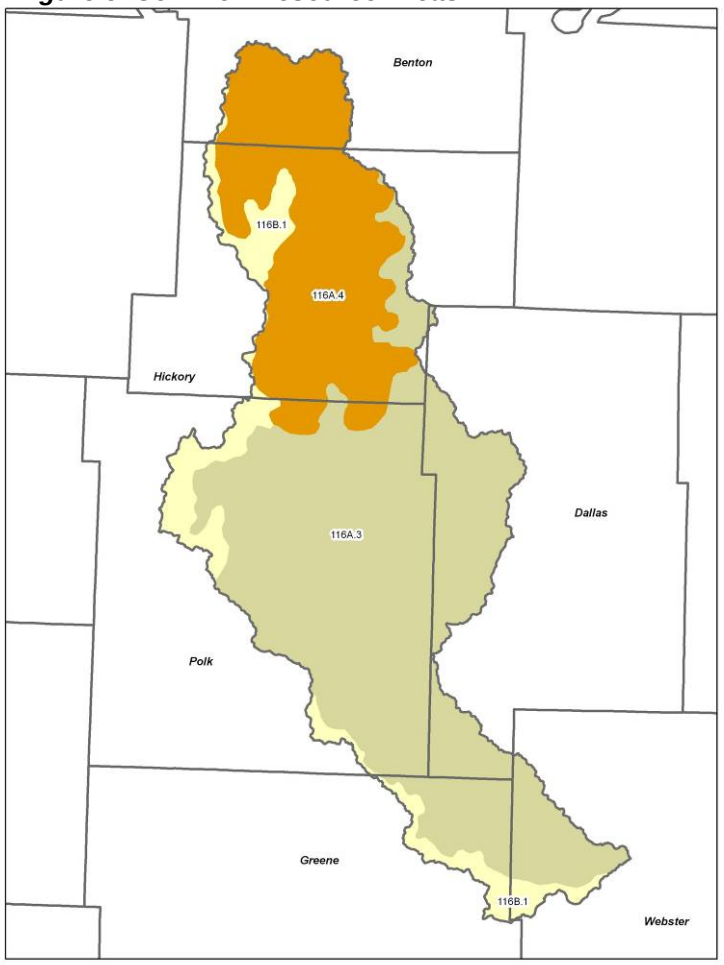
116A.3 – Central Plateau

The Central Plateau CRA consists of some of the least dissected portions 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.

116A.4 – Osage River Hills

The Osage River Hills CRA is composed of the hilly to rugged lands. Lithology varies from Jefferson City-Cotter-dominated areas in the west to areas underlain by Roubidoux, Gasconade, and Eminence-Potosi Formations in the east. Small areas of Mississippian and Pennsylvanian parent materials occur on the western fringe. Rural lands are a nearly even mix of pasture and oak forests.

Figure 5. Common Resource Areas



116B.1 – Springfield Plain

The Springfield Plain CRA is a large smooth plain. Relief is generally less than 150 feet, which is accounted for by slight dissection along streams. The plain is underlain by Mississippian cherty limestones that are responsible for several areas of well-developed karst and numerous springs. Much of the subsection is pasture, but forests occur in hillier portions.

G. Streams

Floodplains[7]

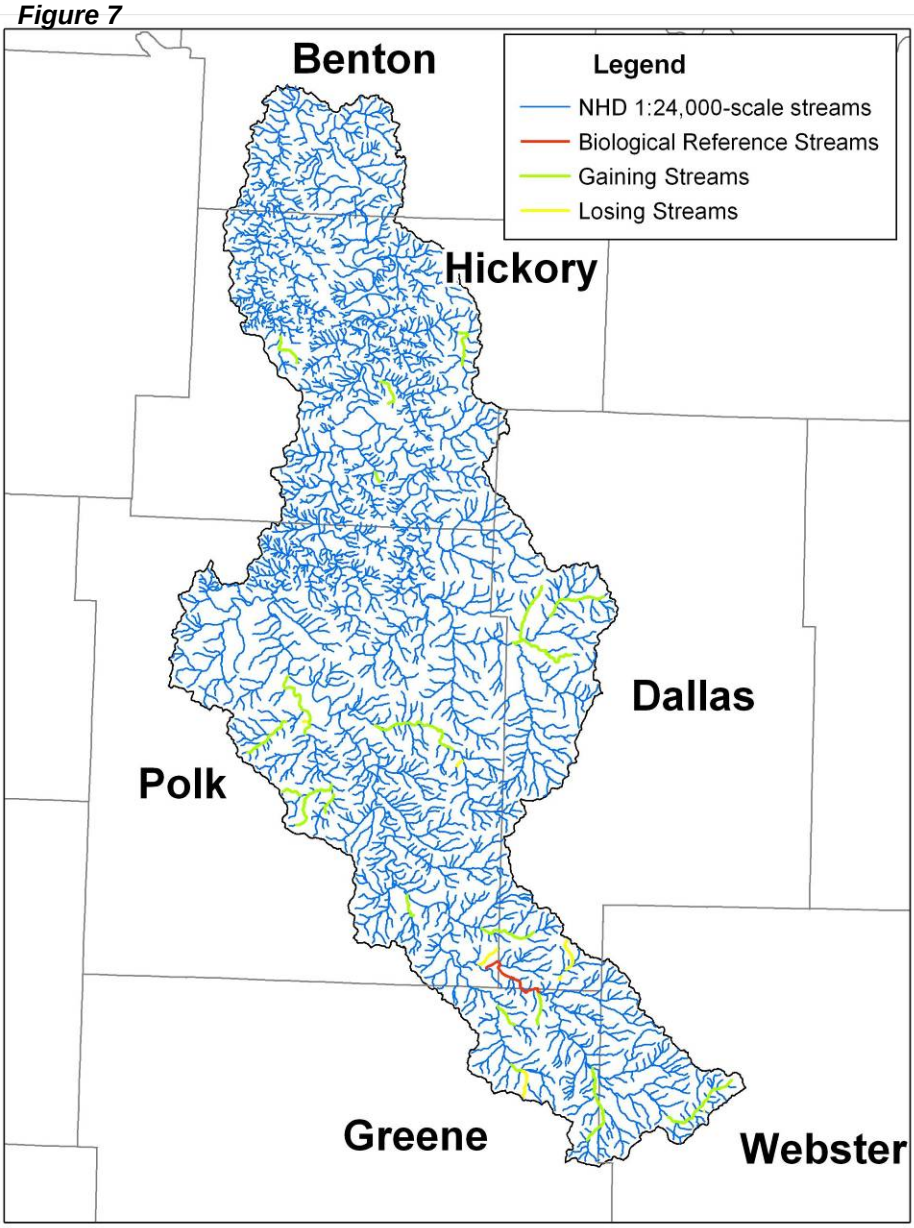
The Federal Emergency Management Agency (FEMA) maps areas of flood vulnerability. FEMA has produced maps for 2 of the 6 counties in this sub-basin. For the remaining counties, the SSURGO soil attribute 'flooding frequency' was used. Flooding frequency documented a rare, occasional, frequent and very frequent cumulatively represent the 1% annual chance of flooding, or 100-year floodplain, as shown from the FEMA data. Using these combined methods, 51,753 acres (14.0%) of the sub-basin are in the 100-year floodplain.

Figure 6

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

High-resolution (1:24,000-scale) streams from the National Hydrography Dataset total 2,119 miles of intermittent and perennial streams in this watershed. Sixty-six (66) miles of streams are considered gaining streams while 7 miles are designated 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. 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 5-mile stretch of Pomme de Terre River is the biological reference stream in this sub-basin.

Figure 7



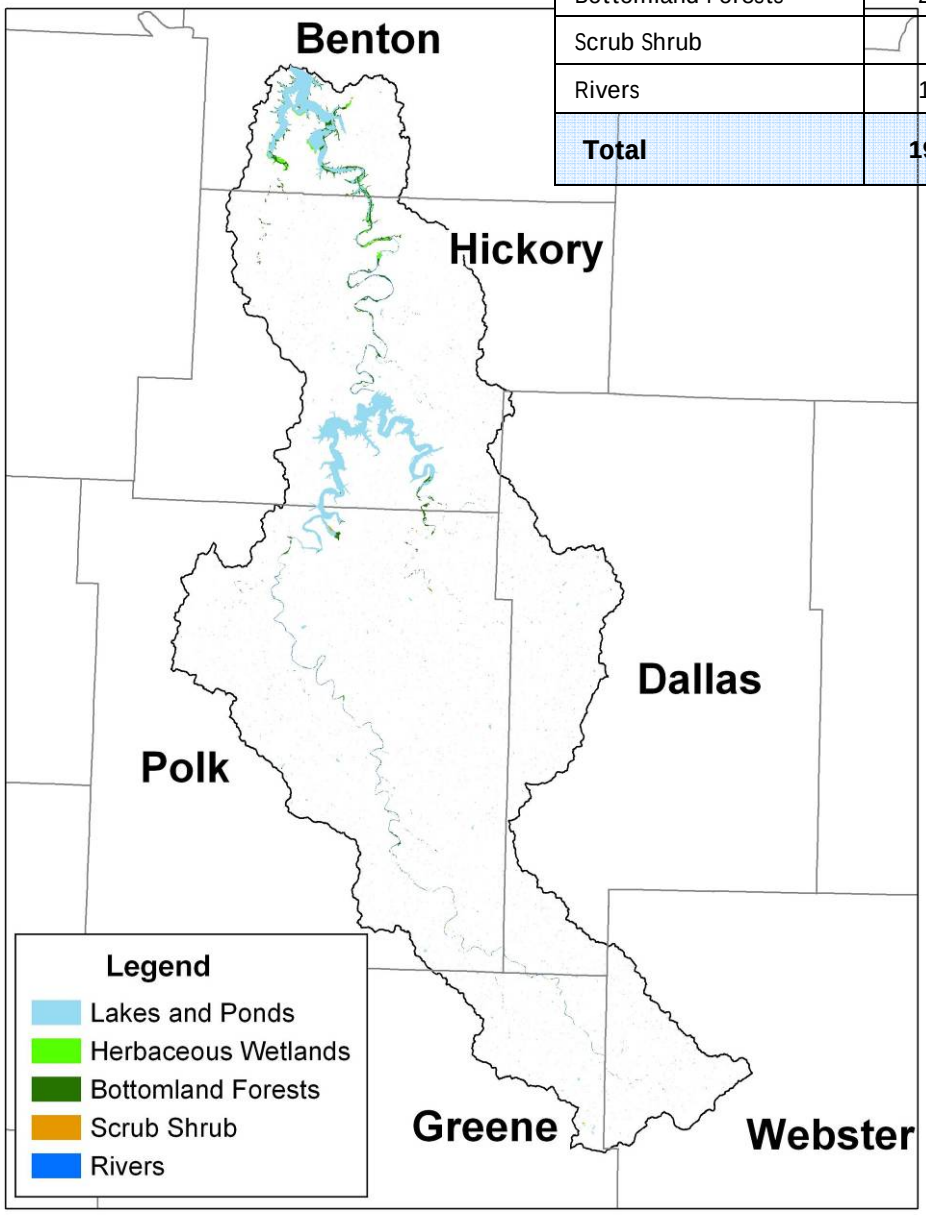
H. Wetlands[9,10]

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 19,268 acres of various wetland types were identified by NWI within the Pomme de Terre sub-basin.

Figure 8

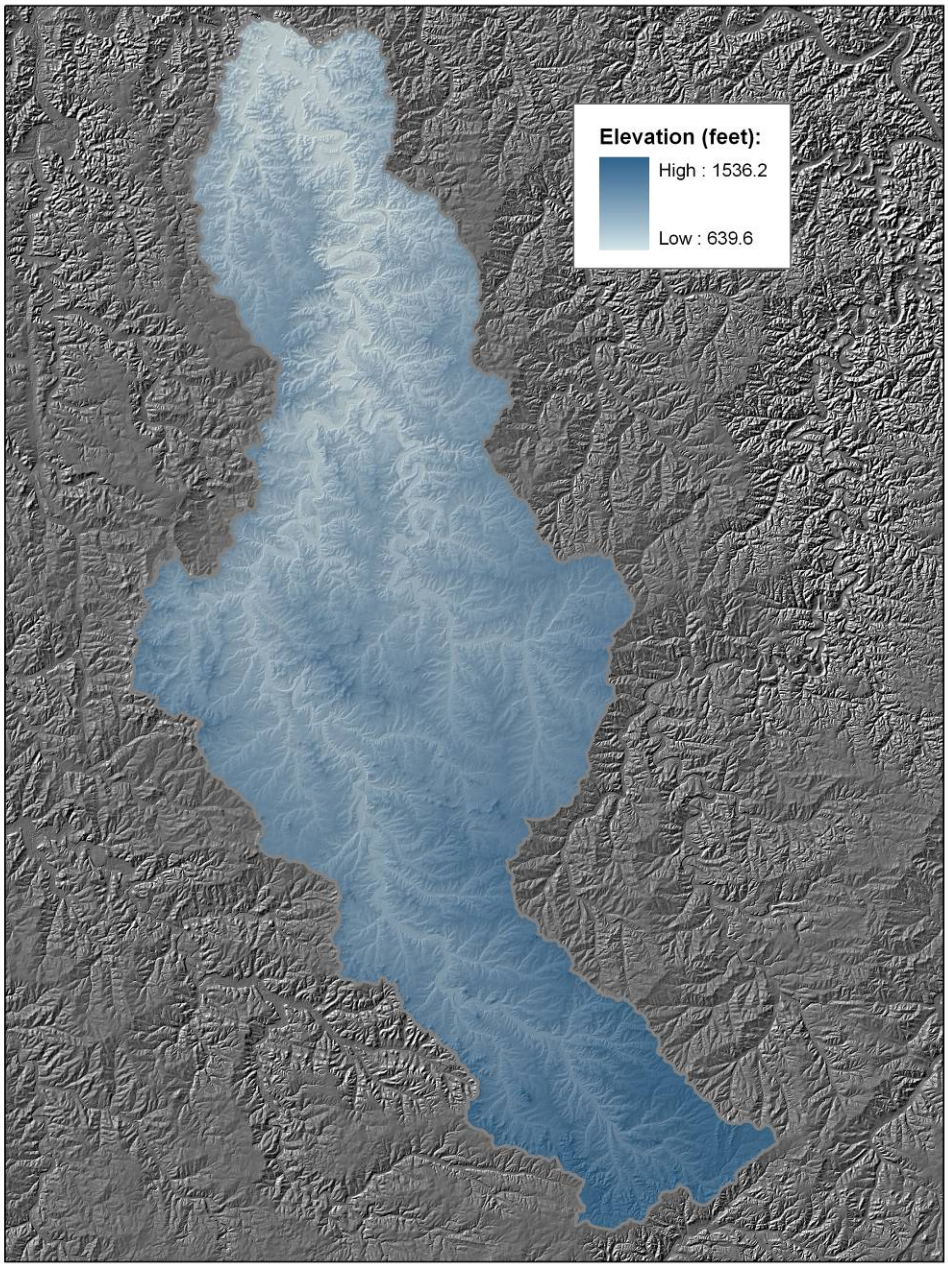
General Wetland Type	Acres	Percent of Sub-basin
Lakes and Ponds	15,592	2.88%
Herbaceous Wetlands	500	0.09%
Bottomland Forests	2,074	0.38%
Scrub Shrub	69	0.01%
Rivers	1,033	0.19%
Total	**19,268**	**3.55%**



I. Relief Map[1,11,12]

The shaded relief map of the Pomme de Terre 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 southern portion of the sub-basin includes some of the least dissected areas of the Ozark Highlands. This plateau area exhibits a local relief of 50 to 100 feet. The northern portion contains hilly to rugged lands along the Pomme de Terre River. This area is dissected and exhibits moderate to steep slopes and narrow to broader ridges. Local relief can range from 200 to more than 350 feet. Elevations can range from approximately 640 feet to nearly 1,540 feet on the highest ridges.

Figure 9



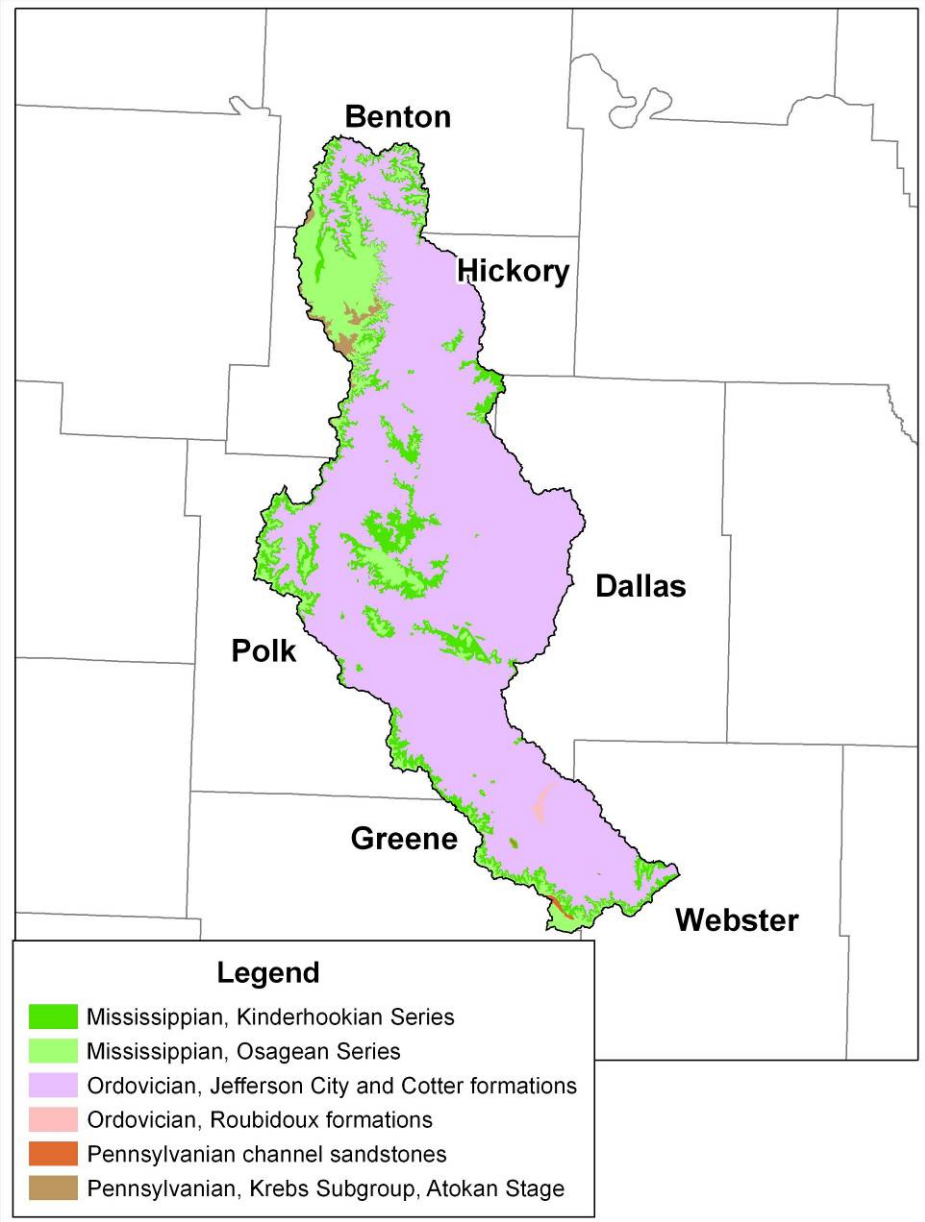
J. Geology[1,13,14,34]

Geology Map

This bedrock geology map is derived from the Geologic Map of Missouri. The Pomme de Terre sub-basin is dominated by Mississippian-age limestones and Ordovician-age dolomites. To the north, bedrock units lie on the flank of the Ozark uplift and dip to the northwest. The sub-basin is underlain by cherty dolomites and sandstones with lesser amounts of shaley dolomites, shales, and limestones. Many areas are covered with thick residuum and rock outcrops can be common. A moderately significant number of springs, sinkholes, caves, and losing streams, associated with a karst terrain, are found within the sub-basin.

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

Figure 10



Pennsylvanian System

- 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.
-

Ordovician System—Consists primarily of cherty dolomites, dolomites, and sandstones belonging to the Jefferson City-Cotter and Roubidoux formations.

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. The Pomme de Terre sub-basin is moderately developed karst region. Eighteen (18) named and nineteen (19) unnamed springs are located in the sub-basin. Five springs have significant flows of 0.2 – 10 cubic feet per second, while the remainder have lesser or unmeasured flows. Fifty-three (53) sinkholes and 124 caves are mapped in the area. No dye-tracing for studying groundwater flow has been done in the sub-basin. As noted in section 2.5, 66 miles of streams are considered gaining streams while 7 miles are 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 Pomme de Terre Watershed (Hydrologic Unit 10290107). The identified concerns are: PASTURELAND - (1) soil erosion-sheet and rill; (2) water quality-excessive nutrients and organics in surface water; (3) plant condition-productivity, health, and vigor; (4) domestic animals-inadequate quantities and quality of feed and forage. CULTIVATED CROPLAND - (1) soil erosion-sheet and rill; (2) soil condition-organic matter depletion; (3) water quantity-excessive runoff, flooding, or ponding; (4) water quality-excessive nutrients and organics in surface water. DEVELOPED LAND - (1) soil erosion-sheet and rill; (2) soil condition-compaction; (3) soil condition-contaminants: animal waste and other organics; (4) plant condition-productivity, health, and vigor. FORESTLAND - (1) soil condition-compaction; (2) soil condition-contaminants: animal waste and other organics; (3) plant condition-productivity, health, and vigor; (4) plant condition-noxious and invasive plants. NON-CULTIVATED CROPLAND - (1) soil erosion-sheet and rill; (2) soil condition-contaminants: animal waste and other organics; (3) water quality-excessive nutrients and organics in groundwater; (4) plant condition-noxious and invasive plants.

Figure 11

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	Sheet and Rill erosion (below "T" but still a concern)	X	X	X				X	
Prime Farmland	2,200 acres lost between 1982 and 1997	X	X		X		X		
Plant Condition	Productivity, health and vigor	X			X			X	
Soil Condition	Compaction, contaminants, organic matter depletion		X	X	X			X	
Water Quality	Cultivated cropland primary nonpoint source of pollutants		X						X
	Certain waterbodies are not meeting water quality standards								X
Floodplains	Approximately 41,000 acres fall within the 100-year flood area						X		
Riparian Corridors	38% of 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.
- There is no documented cultivated cropland eroding at levels above "T" within the sub-basin.
- Erosion and runoff is occurring from construction sites primarily found in and near urban areas.

Sedimentation

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

Soil Quality

- Soil erosion can be a primary contributor to soil quality degradation. This limits the productivity and sustainability of the soil resource.

Water Quality

- Two waterbodies, Brush Creek and Piper Creek (Town Branch) in Polk County appear on the 303(d) list and are not meeting water quality standards. Pollutants listed include low dissolved oxygen and organic sediment..

Floodplains

- An estimated 41,203 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 38 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 in material weathered mainly from Mississippian age and Ordovician age formations. Soils on the gently sloping to moderately sloping upland divides are frequently mantled by a thin layer of loess (silty wind blown sediments). Depth to bedrock on these upland soils ranges from shallow to very deep. Drainage ranges from somewhat excessively drained to somewhat poorly drained.

Soils on the broad loess mantled areas frequently have a fragipan at the contact between the loess and the underlying residual material. Fragipans are dense subsoil layers that restrict both root growth and water movement within the soil. These soils typically formed under forest or savanna type vegetation and have thin to moderately thick surface layers.

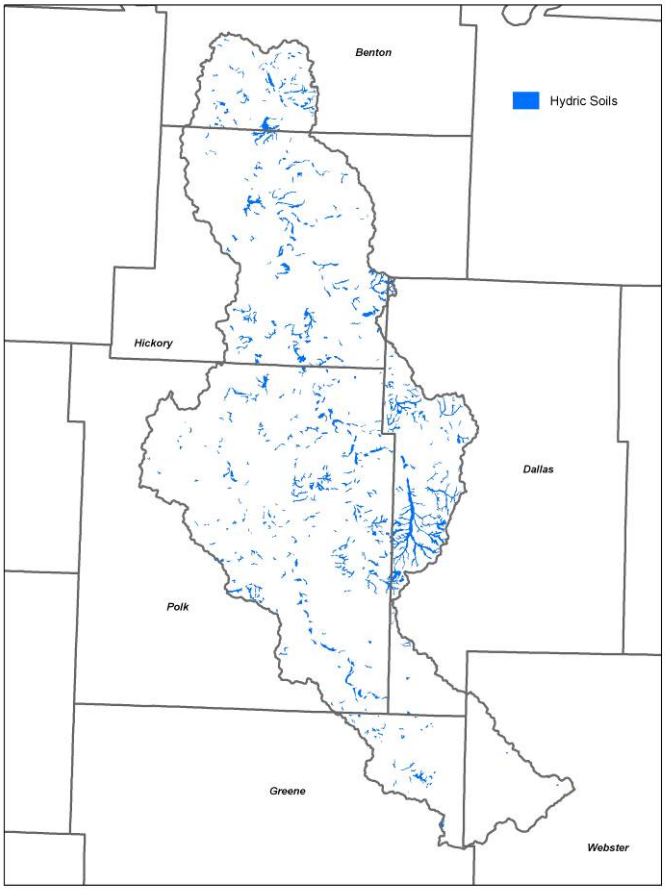
The soils that formed in the material weathered from Mississippian and Ordovician age materials are typically gravelly to extremely gravelly throughout the profile. They formed under forested or savanna type vegetation and have thin to moderately deep surface layers. The textures are typically loamy in the upper part and clayey in the lower part. They are generally on strongly sloping to steep hill slopes.

The floodplain soils are not extensive in this sub-basin. They formed in loamy and gravelly material washed mainly from the adjacent uplands. They are very deep and range from well drained to poorly drained.

Hydric Soils[5]

Hydric soils are those that developed under sufficiently wet conditions (saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions) to support the growth and regeneration of hydrophytic (water-loving) vegetation. Soils that are sufficiently wet because of artificial measures are included in hydric soils.

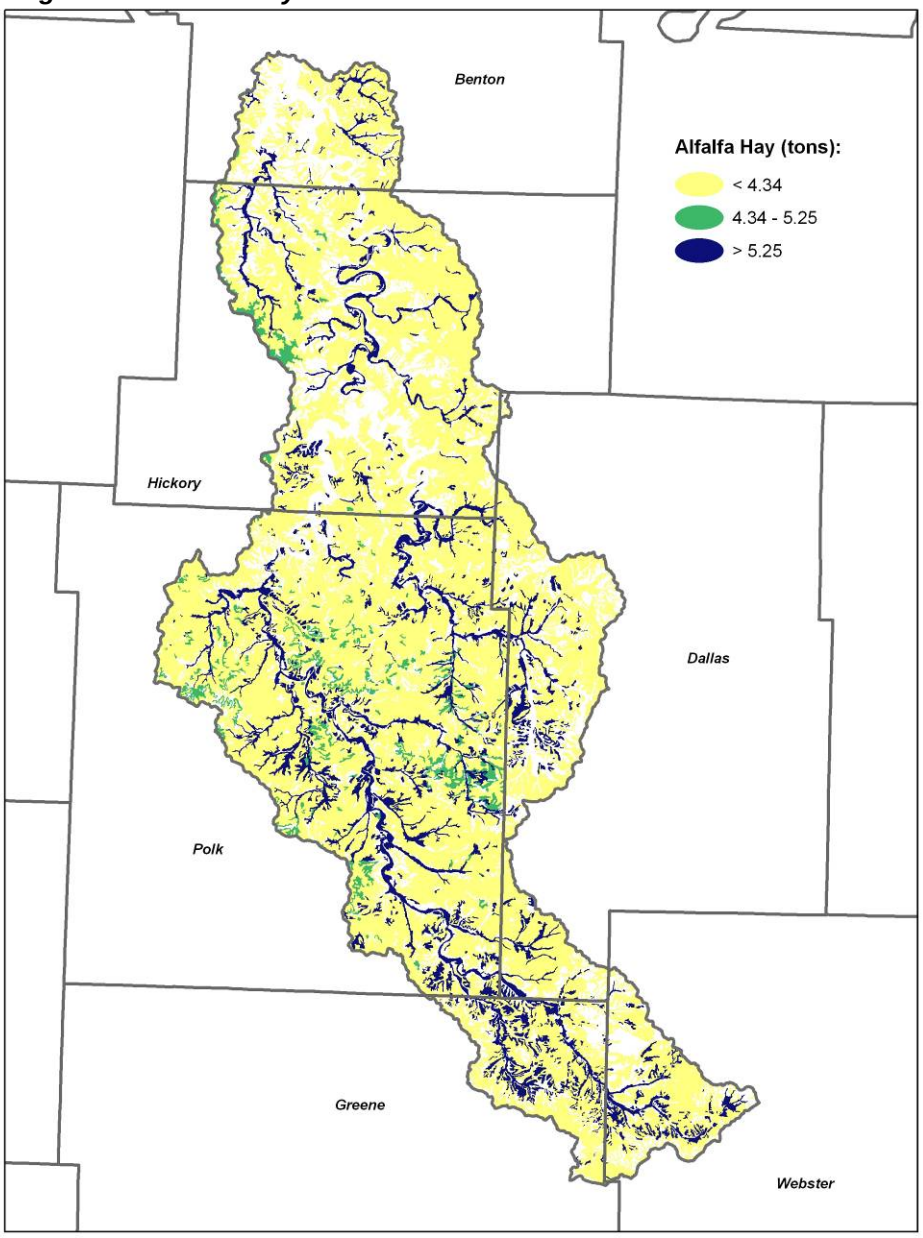
Figure 12



Pasture Productivity[5,35]

"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 13 Alfalfa Hay Yield Estimate



B. Soil Erosion[16]

The objectives of this section are to profile cropland erosion rates and identify cropland areas within the Pomme de Terre 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 Pomme de Terre sub-basin. Cropland and pastureland are the primary nonpoint sources of sediment loss in this sub-basin and account for 55 percent of the sub-basin's total surface area**.** In sub-basins like the Pomme de Terre, 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 14

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"	3.04	0.46
HEL Eroding above "T"	0	0
All HEL	3.04	0.46
NON-HIGHLY ERODIBLE LAND (Non-HEL)		
Non-HEL Eroding at or below "T"	2.75	0.2
Non-HEL Eroding above "T"	0	0
All Non-HEL	2.75	0.2
ALL CROPLAND		
All Land Eroding at or below "T"	2.81	0.32
All Land Eroding above "T"	0	0
All Land	2.81	0.32

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"	2,100	100%	23%	0.004%
Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**2,100**	**100%**	**23%**	**0.004%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	7,100	100%	77%	1%
Non-Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**7,100**	**100%**	**77%**	**1%**
GRAND TOTALS	**9,200**	**100%**	**100%**	**1.004%**

Non-Cultivated Cropland

CROPLAND CATEGORY	Total Acres	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	38,700	100%	44%	8%
Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**38,700**	**100%**	**44%**	**8%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	49,800	100%	56%	10%
Non-Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**49,800**	**100%**	**56%**	**10%**
GRAND TOTALS	**88,500**	**100%**	**100%**	**18%**

All Cropland

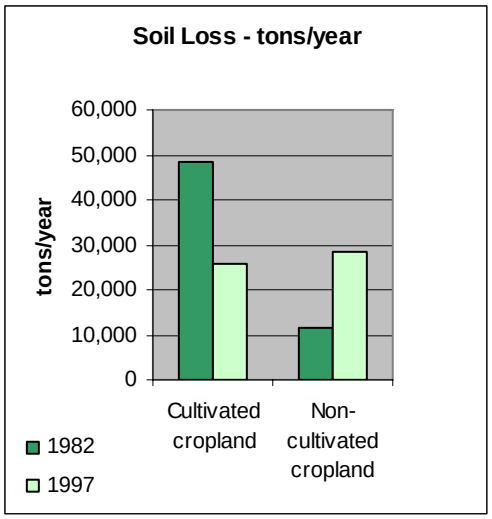
CROPLAND CATEGORY	Total Acres	% of Cropland Category	% of all Cropland	% of Sub-basin
HEL				
Highly Erodible Cropland at or below "T"	40,800	100%	42%	9%
Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR HIGHLY ERODIBLE CROPLAND	**40,800**	**100%**	**42%**	**9%**
NON-HEL				
Non-Highly Erodible Cropland at or below "T"	56,900	100%	58%	12%
Non-Highly Erodible Cropland above "T"	0	0%	0%	0%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**56,900**	**100%**	**58%**	**12%**
GRAND TOTALS	**97,700**	**100%**	**100%**	**21%**

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"	148,500	93%	0.47	31%
Non-Highly Erodible Cropland above "T"	11,300	7%	3.05	2%
TOTALS FOR NON-HIGHLY ERODIBLE CROPLAND	**159,800**	**100%**	**0.65**	**33%**
GRAND TOTALS	**159,800**	**100%**	**-**	**33%**

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



Non-cultivated Cropland

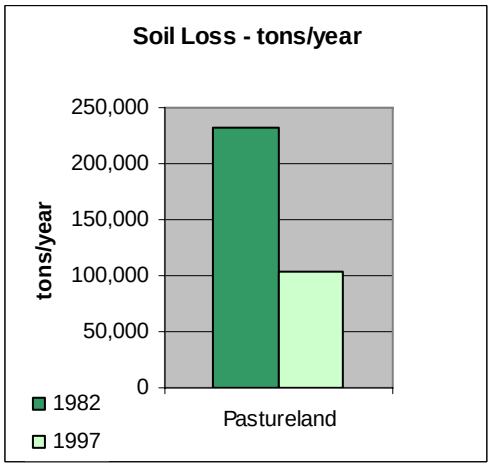
1982 11,400 tons per acre

1997 28,500 tons per acre

Cultivated Cropland

1982 48,300 tons per acre

1997 25,900 tons per acre



Pastureland

1982 233,000 tons per acre

1997 104,400 tons per acre

C. Water Quality

303d Listed Waters[17]

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 and secondary contact recreation, maintaining fish and other aquatic life, and providing drinking and processing water for people, wildlife, livestock and industry. 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.

Figure 15

Water Body	County	Pollutant	Impaired Use(s)*	Other Designated Uses*
Brush Creek	Polk	Low Dissolved Oxygen	AQL	FC, LWW, WBC
Piper Creek (Town Branch)	Polk	Organic Sediment	AQL	FC, LWW, WBC

*** Impaired and Other Designated Uses:**

AQL Protection of Aquatic Life (Warm, Cool or Cold Water)
FC Fish Consumption
WBC Whole Body Contact
SCR Secondary Contact Reaction
DWS Drinking Water Supply
IRR Irrigation
LWW Livestock and Wildlife Watering
IND Industrial

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 16.

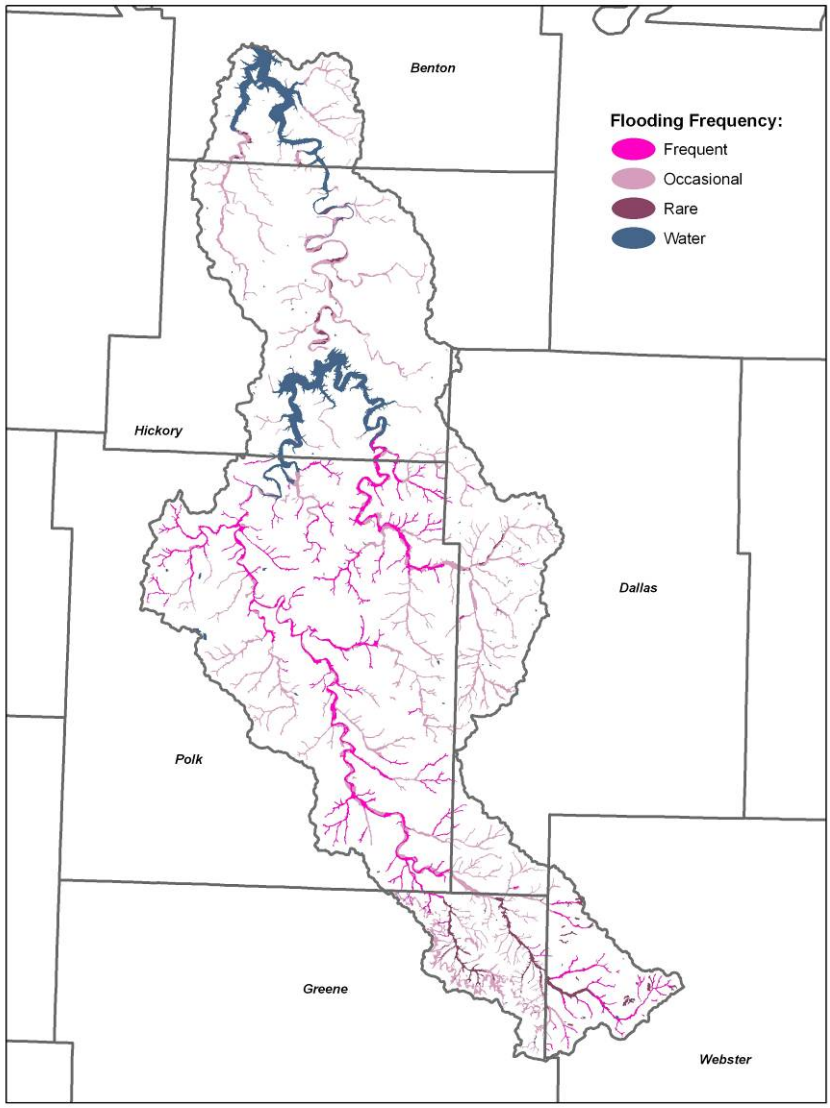
County	Stream Miles (in sub-basin)	50-ft. Stream Buffer (in acres)	Percent Protected
Benton	155	1,845	30%
Hickory	632	7,577	77%
Dallas	856	10,282	59%
Polk	227	2,723	50%
Greene	134	1,462	43%
Webster	114	1,372	67%
Total in Sub-basin	**2,118**	**25,261**	**61%**

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 17—Flooding Frequency in the Pomme de Terre Sub-basin



D. Water Quantity

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

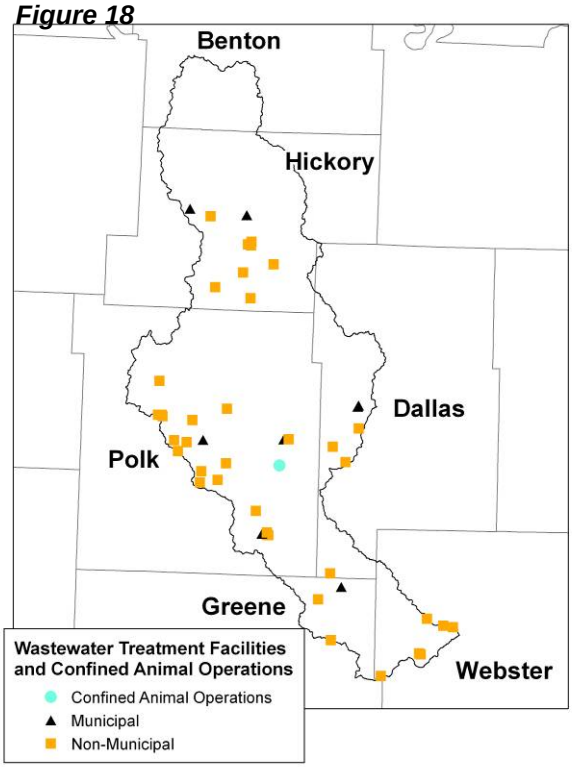
Missouri's 5.8 million residents draw their water supplies from ground and surface sources that vary tremendously in both quality and quantity. These variations are, to a large extent, controlled by geology and land use. North of the Missouri River, herbicides, sediments, and nutrients are the primary 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.

Figure 18



The Pomme de Terre sub-basin has 1 permitted dairy CAFO. Also documented are 9 municipal and 41 non-municipal waste water facilities. A majority of the municipal sites are for sewage treatment and the non-municipal range from quarries and concrete plants to meat processing facilities.

E. 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	162,629 acres
Federal	21,214 acres
State	0 acres
County and municipal	0 acres
Other	0 acres
Total	183,843 acres

Area of Forestland by Stocking Class in Sub-Basin

Overstocked	1,669 acres
Fully stocked	54,659 acres
Medium stocked	77,259 acres
Poorly stocked	46,499 acres
Non-stocked	3,757 acres
Total Growing Stock	183,843 acres

Area of Forestland by Productivity Site Class in Sub-Basin

165-224	0 acres
120-164	0 acres
85-119	14,523 acres
50-84	63,832 acres
0-49	105,488 acres
Total	183,843 acres

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

Softwoods	12,854,346 cubic feet
Hardwoods	143,794,684 cubic feet
Other	0 cubic feet
Total	156,649,030 cubic feet

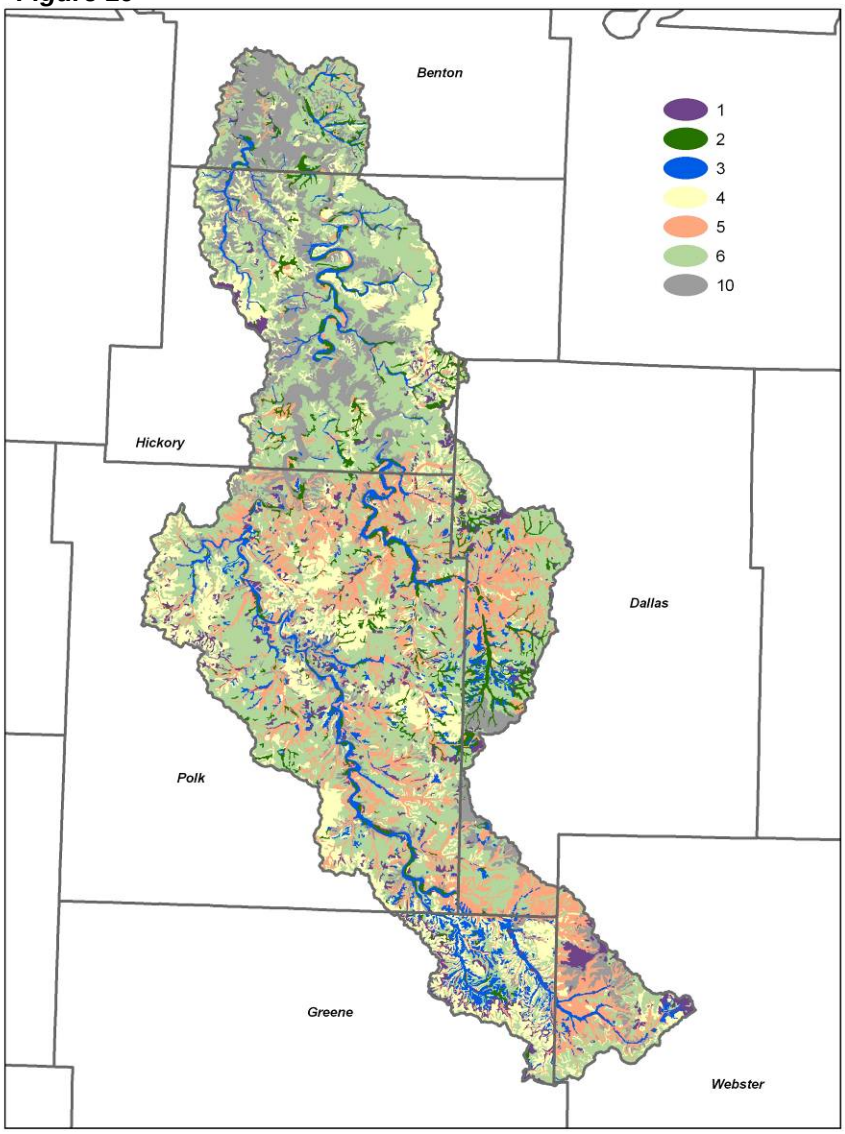
Forest Productivity[5]

This information can help forestland owners or managers plan the use of soils for wood crops. It shows the potential productivity of the soils for wood crops by Conservation Tree and Shrub Groups (CTSG).

The CTSGs were developed by foresters and soil scientists from soil properties stored in USDA's National Soils Information System (NASIS). A report build in NASIS "automatically" evaluates specific soil properties directly related to growth. The properties include: depth to limiting layer (water table, limiting layer, bedrock, etc.), available water capacity, calcium carbonates, pH, flooding frequency and duration.

Vegetation examples are commonly grown trees that forestland managers prefer for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Figure 19



CSTG Definitions:

- **Group 1 - 4% of sub-basin**
  Soils in CTSG-1 are somewhat poorly drained to moderately well-drained and at least moderately deep. They receive beneficial moisture or have a **seasonable high water table from .5-1.5 feet** during the growing season. Flooding frequency ranges from none to rare. The **available water capacity is at least 3 inches.** Sodium adsorption rates are less than 1. Subgroups may be acid, clayey, shallow, flooded, calcareous, strongly contrasting horizon, or sandy.

  Vegetation examples: Shumard Oak, Red Maple, Shingle Oak, Bur Oak, Pecan, American Sycamore, Shellbark Hickory, American Basswood, Musclewood, Eastern Cottonwood

- **Group 2 – 4% of sub-basin**
  Soils in CTSG-2 are poorly drained or very poorly drained and at least moderately deep. They have a **seasonal high water table from 0-.5 feet** during the growing season. Flooding frequency ranges from none to rare. Available water capacity is greater than 3 inches. This group also **includes peat, muck, or muck-peat soils**. Sodium adsorption rates are less than 1. Subgroups may be acid, clayey, shallow, flooded, organic, calcareous, or sandy.

  Vegetation Examples: Green Ash, Red Maple, Black Willow, Pecan, Silver Maple, River Birch, Swamp White Oak, Pin Oak, Green Hawthorn, Pecan

- **Group 3 – 6% of sub-basin**
  Soils in CTSG-3 are deep loamy, moderately well drained to well drained soils. The **depth to a water table during the growing season is greater than 1.5 feet.** Flooding frequency ranges from none to rare. The **available water capacity is at least 9 inches**. **Soil depth is greater than 40 inches to a restrictive layer.** Sodium adsorption rates are less than 1. Subgroups may be acid, flooded, or calcareous.

  Vegetation examples: Blackgum, Tuliptree, Scarlet Oak, Cucumber-tree, Shumard Oak, White Ash, Black Cherry, Eastern Redbud, Flowering Dogwood, Serviceberry, Kentucky Coffeetree

- **Group 4 – 16% of sub-basin**
  Soils in CTSG-4 are moderately well to well drained with **some or all horizons that are clayey or clayey skeletal or fine and very fine.** The depth to a water table during the growing season is at least 1.5 feet. Flooding frequency ranges from none to rare. The available water capacity is at least 6 inches. Soil depth is at least 40 inches to a restrictive layer. Sodium adsorption rates are less than 1. Subgroups may be acid, clayey, flooded, calcareous, or dry.

  Vegetation examples: Pignut Hickory, Black Hickory, Blue Ash, Shortleaf Pine, Southern Red Oak, Mockernut Hickory, Persimmon, White Oak, Black Oak, Flowering Dogwood

- **Group 5 – 16% of sub-basin**
  Soils in CTSG-5 are deep **loamy moderately well to well drained with moderate AWC**. Depth to the water table is at least 1.5 feet. Flooding frequency ranges from none to rare. The **available water capacity is between 6 and 9 inches.** Sodium adsorption rates are less than 1. Subgroups may be acid or flooded.

  Vegetation examples: Shortleaf Pine, Sassafras, Northern Red Oak, Shagbark Hickory, Red Mulberry, Post Oak, Bur Oak, Eastern Redcedar, American Sycamore, American Cottonwood

- **Group 6 – 40% of sub-basin**
  Soils in CTSG-6 are moderately well to well drained with a **root restrictive zone (bedrock, fragipan, sand and gravel) at 20-40 inches**. Flooding frequency ranges from none to rare. The depth to a water table during the growing season is at least 1.5 feet. The available water capacity is 6 inches or less. Sodium adsorption rates are less than 1. Subgroups may be acid, calcareous, or strongly contrasting horizon.

  Vegetation examples: Sweet Crabapple, Big Tree Plum, Blackgum, Pignut Hickory, Sassafras, Scarlet

Oak, Shortleaf Pine, Slippery Elm, Blackjack Oak, Cockspur Hawthorn

- **Group 10 – 14% of sub-basin**
  Soils in CTSG-10 have **one or more characteristics that are severely limiting to the planting and growth of trees and shrubs**. Soil depth is less than 20 inches; available water capacity is less than 3 inches; depth to a water table during the growing season is less than 0.5 feet; pH is less than 4.0 or greater than 8.5, sodium adsorption rate is greater than 25; flooding duration is very long. This group also includes urban land and water.

  Vegetation examples: none

F. Threatened and Endangered Species[24]

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 Pomme de Terre 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 20

Species Common Name	Scientific Name	Threatened, Endangered, or Candidate	Federal or State Listing
Birds			
Bald Eagle	Haliaeetus leucocephalus	Threatened/ Endangered	Federal/ State
Greater Prairie Chicken	Tympanchus cupido	Endangered	State
Fish/Mollusks/Crustaceans			
Niangua Darter	Etheostoma nianguae	Threatened/ Endangerd	Federal/ State
Mammals			
Black-tailed Jackrabbit	Lepus californicus	Endangered	State
Gray Bat	Myotis grisescens	Endangered/ Endangered	Federal/ State
Plants			
Mead's Milkweed	Asclepias Meadii	Threatened/ Endangered	Federal/ State-MO

Census and Social Data

A. Census Bureau[25]

Block group-level GIS data files from the 2000 Census were used to illustrate population, 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 21a. 1990 Population—The 1990 estimated population of the sub-basin was 28,062.

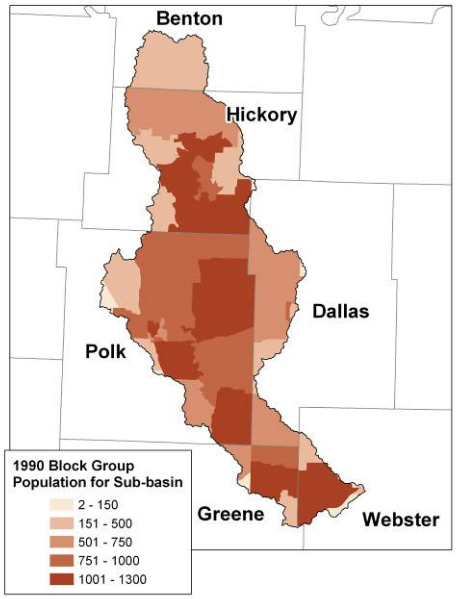
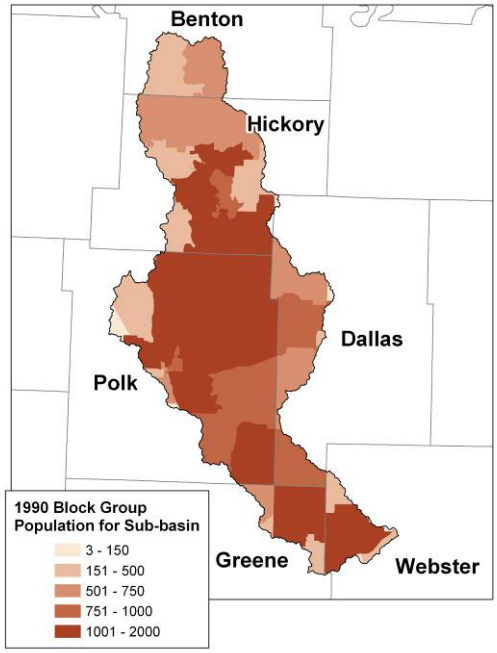


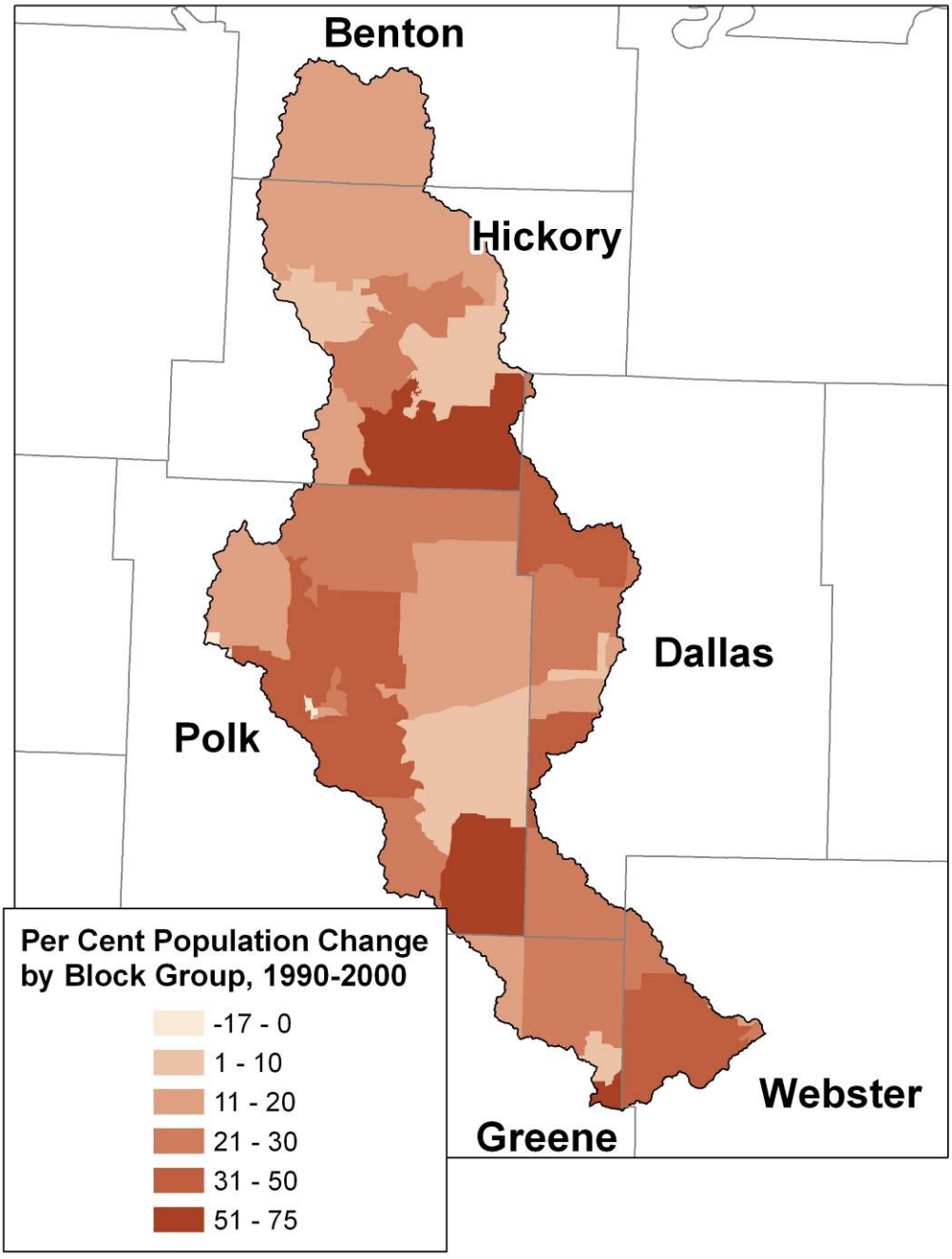
Figure 21b. 2000 Population—The 2000 estimated population of the sub-basin was 34,986.



Change in Population

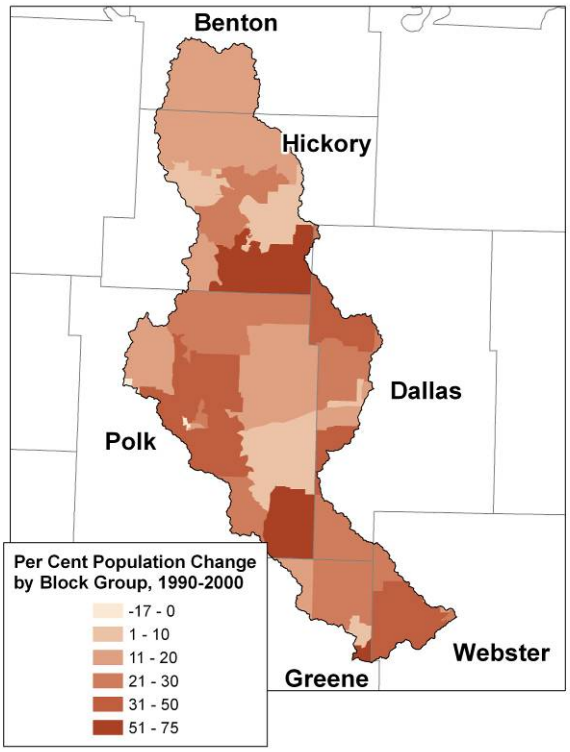
The 1990 estimated population of the sub-basin was 28,062 and grew to 34,986 by 2000, representing a 6,924 person increase or about 25 per cent. With a total of 52 block groups in the sub-basin, 49 showed a gain in population while 3 lost population.

Figure 21c



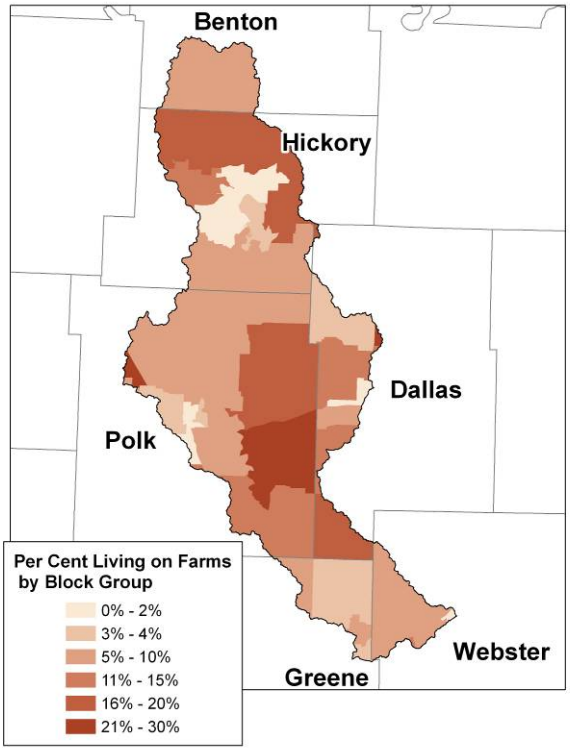
Income

Figure 21d



Farms

Figure 21e



B. Agricultural Census[27]

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 22

COUNTY SUMMARY HIGHLIGHTS, 2002						
	Benton	**Dallas**	**Greene**	**Hickory**	**Polk**	**Webster**
Farms	839	1,243	2,122	534	1,768	1,962
Land in Farms	258,867	234,739	274,815	156,143	369,396	319,883
Hogs & Pigs	1,501	622	1,216	556	6,036	11,613
Poultry	758,118	234,217	3,868	494	361,440	195,529
Cattle	44,897	59,739	73,560	36,876	109,365	90,344
Sheep	595	627	747	unavailable	400	667
Horses & Ponies	1,195	2,324	3,789	702	2,824	4,633
Goats	349	458	419	460	654	573
Cropland Used only for Pasture or Grazing	39,848 acres	54,241 acres	70,367 acres	26,370 acres	95,567 acres	75,797 acres
Woodland pastured	45,385 acres	39,800 acres	25,972 acres	33,312 acres	50,178 acres	44,594 acres
Permanent Pastureland and Rangeland	61,526 acres	46,105 acres	61,808 acres	36,035 acres	88,600 acres	67,222 acres
Pastureland, All Types	146,759 acres	140,146 acres	158,147 acres	95,717 acres	234,345 acres	187,613 acres
Percent Pastureland to All Land in Farms	56.7%	59.7%	57.5%	61.3%	63.4%	58.7%
Sum of All Grazing Live-stock	47,036	63,148	78,515	38,038	113,243	96,217
Pastureland per Animal	3.1 acres	2.2 acres	2 acres	2.5 acres	2.1 acres	3 acres

Status of Resources

A. PRS[28]

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	1,969	3,538	1,729	3,562	Not reported by Hydrologic Unit (HU)	4,662	5,761	5,802	5,408

Figure 23. Conservation Practices Applied

Summary Conservation Practices (PRS Number)	FY 05	FY 06	FY 07
Conservation Cover (327)	26		8
Conservation Crop Rotation (328)	193 acres		231 acres
Critical Area Planting (342)		1	
Fence (382)	48,523 feet	57,740 feet	50,684 feet
Filter Strip (393)			8 acres
Forage Harvest Management (511)	515 acres	69 acres	1,611 acres
Forest Stand Improvement (666)	52 acres		
Grade Stabilization Structure (410)		2	
Manure Transfer (634)	319	4	
Nutrient Management (590)	1,142 acres	2,267 acres	1,376 acres
Pasture and Hay Planting (512)	953	1,068 acres	1,197 acres
Pest Management (595)	22		
Pipeline (516)	8,135 feet	31,025 feet	12,355 feet
Pond (378)	1		
Prescribed Burning (338)	58 acres		11 acres
Prescribed Grazing (528)	79 acres	1,669 acres	2,709 acres
Prescribed Grazing (528A)	2,246 acres	1,134 acres	40 acres
Residue Management, Mulch Till (329B)	83 acres		
Restoration and Management of Declining Habitats (643)	15 acres		
Riparian Forest Buffer (391)	76 acres	150 acres	22 acres

Conservation Practices Applied (continued)

Summary Conservation Practices	FY 05	FY 06	FY 07
Tree/Shrub Establishment (612)	2 acres		
Upland Wildlife Habitat Management (645)	29 acres		74 acres
Use Exclusion (472)	57 acres	188 acres	36 acres
Water Well (642)	5	14	8
Watering Facility (614)	20	53	16
Wetland Wildlife Habitat Management (644)	42		

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 24

319 Project Name[36]	Status
Dallas County Intensive Grazing Follow-Up Assistance	Closed
Hickory County Outdoor Classroom	Active

AgNPS SALT Project Name[29]	Acres	Status
Deer Creek	46,606	In-Progress
Hominy Creek	52,582	In-Progress
Lower Pomme de Terre River	40,582	In-Progress

C. Farm Bill Program Lands[30]

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 25

Program	Number of Acres	Number of Contracts or Easements
Conservation Reserve Program (CRP)	555	31 contracts
Wetland Reserve Program (WRP)	0	0 easements

D. Conservation Opportunity Areas[31]

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 Pomme de Terre sub-basin. The Niangua Basin borders to the east.

E. Environmental Protection Agency Priority Watersheds[32,33]

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 Pomme de Terre sub-basin.

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