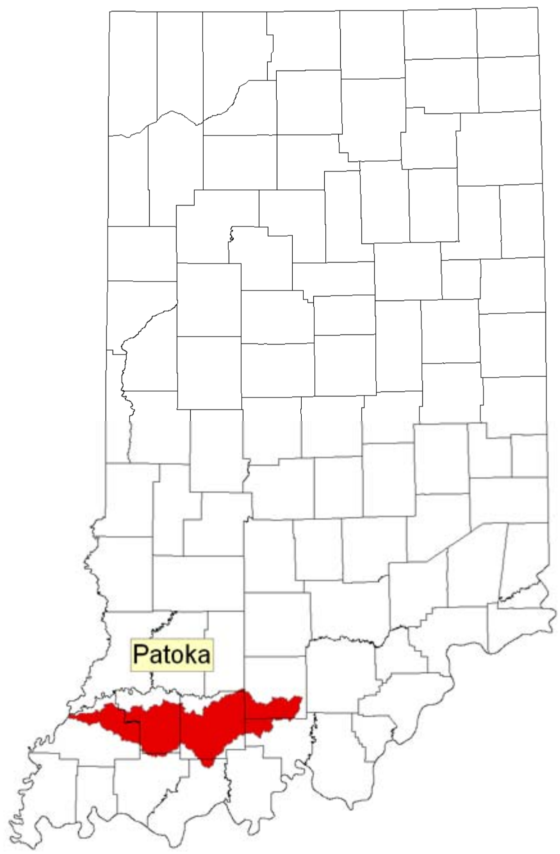
Rapid Watershed Assessment
Patoka Watershed

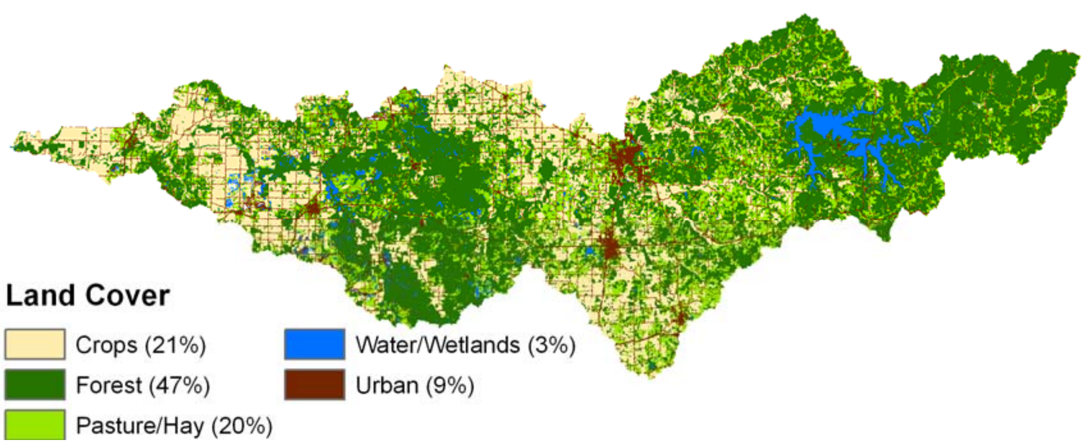
Rapid Watershed Assessments provide initial estimates of where conservation investments would best address the concerns of land owners, conservation districts, and community organizations and stakeholders. These assessments help land owners and local leaders set priorities and determine the best actions to achieve their goals.



Patoka Watershed

Introduction

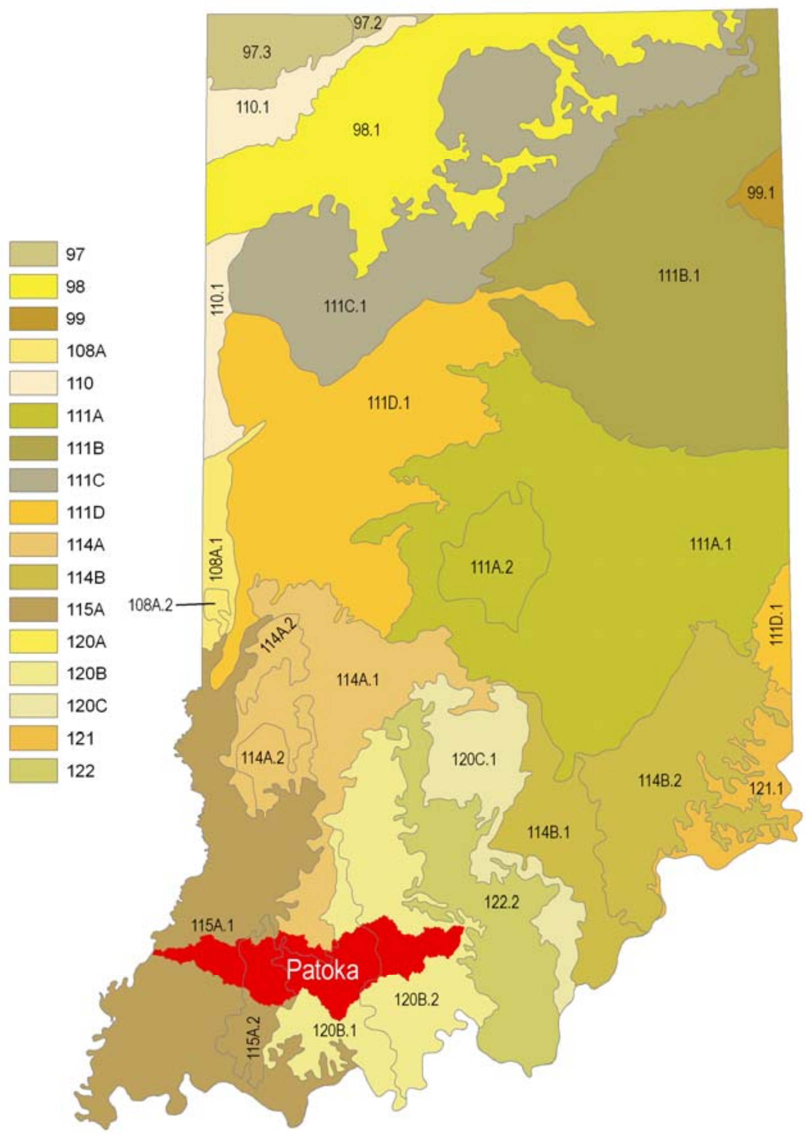
The Patoka watershed is an eight digit (05120209) hydrologic unit code HUC) watershed located in the Southwestern part of Indiana. The watershed drainage area is just over 549,400 acres. The watershed covers eight different Indiana counties. It is subdivided into 35 subbasins represented on the map by 12 digit HUCs (Figure 2-1).



Common Resource Area

There are five common resource areas for the watershed:

The Interior River Lowland Central Mississippi Valley Wooded Slopes, Eastern Part – (115A.1). Wabash bottomland along the lower Wabash and Ohio Rivers. Low, nearly level flood plains, terraces, and bayous are composed of alluvial and outwash deposits. Hardwood forest dominate in the woodland that remains. Corn, soybeans, wheat, alfalfa, or livestock farming are dominant. Poor drainage and droughtiness are concerns. Soils are very poorly drained to well drained, formed in loamy and silty alluvial and lacustrine sediments.



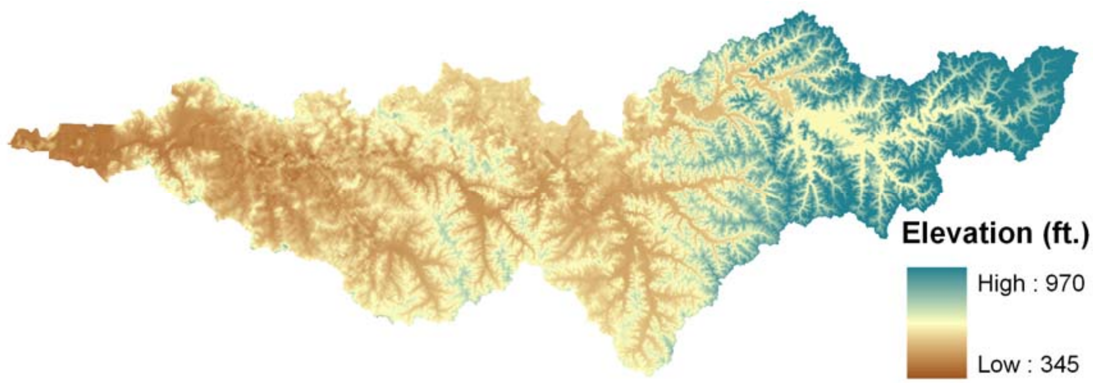
The Mined subsection – Interior River Lowland Central Mississippi Valley Wooded Slopes, Eastern Part – (115A.2). Glaciated Wabash Lowland is often mantled by till or windblown silt and sand. The loamy to sandy till deposits are pre-Wisconsinan age, older and leached. Extensive mining operations, permanent pasture and man-made lakes are dominant. Some woodland and urban development in older mined areas. Compaction and erosion are concerns. Soils are very poorly drained to excessively drained, formed in silty to sandy glacial deposits.

The Illinois, Indiana and Ohio Thin Loess and Till Plain, Eastern Part – (114A.1). Pre-Wisconsin till plain with a moderately thinck mantle of loess in most places. Corn, soybeans, livestock, and general farming are the main uses with some woodland and tobacco farms. Soils are poorly drained to well drained, formed in Illinoian Age till and overlain in many areas with a layer of loess.

The Forested subsection – Interior plateau of Kentucky and Indiana Sandstone and Shale Hills and Valleys, Northwestern Part – (120B.1 – 120B.2). This area is heavily dissected by medium to high gradient streams, more rugged and wooded. Permanent forest is the main use. Oaks are found on well-drained upper slopes. Mixed mesophytic forest occurs in coves as well as on north facing slopes. Specialized plant communities dominate the eastern sandstone-limestone cliffs. Soils are well drained to very poorly drained, formed in loess and in sandstone and shale residuum.

Physical Description

The Patoka watershed is an eight digit (05120209) hydrologic unit code HUC) watershed located in the Southwestern part of Indiana. The watershed drainage area is just over 549,400 acres. The watershed covers eight different Indiana counties. It is subdivided into 35 subbasins represented on the map by 12 digit HUCs (Figure 2-1).

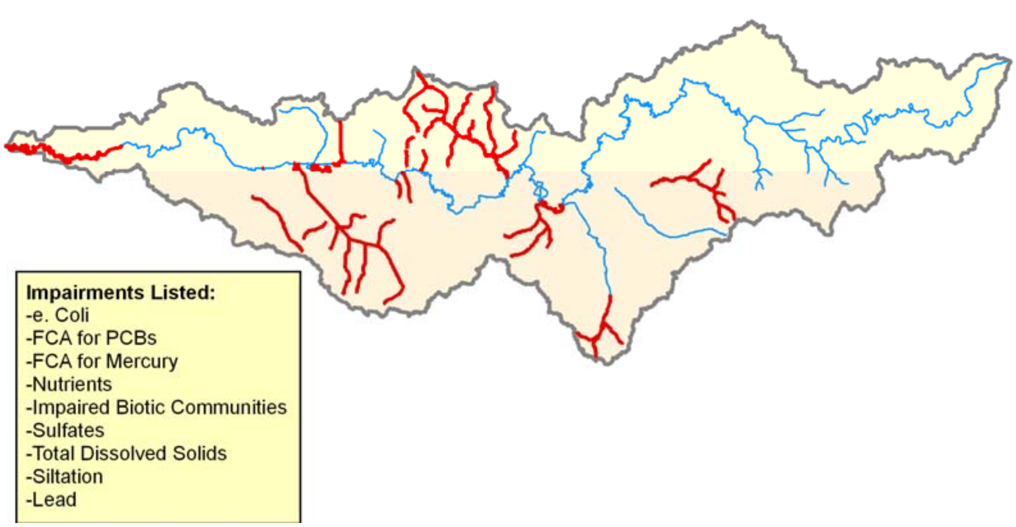


Assessment of waters

Section 303(d) of the Clean Water Act requires states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. The Clean Water Act Section 303(d) list for Indiana provides a basis for understanding the current status of water quality in the Patoka Watershed.

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INP0982_00	EAST FORK KEG CREEK	E. COLI
INP0947_00	ELL CREEK AND TRIBUTARIES	NUTRIENTS
INP0953_00	FLAT CREEK	E. COLI
INP0951_00	FLAT CREEK HEADWATERS	E. COLI
INP0951_00	FLAT CREEK HEADWATERS	IMPAIRED BIOTIC COMMUNITIES
INP0951_00	FLAT CREEK HEADWATERS	SULFATES
INP0951_00	FLAT CREEK HEADWATERS	TOTAL DISSOLVED SOLIDS
INP0952_00	FLAT CREEK-BUCK CREEK	E. COLI
INP0952_00	FLAT CREEK-BUCK CREEK	IMPAIRED BIOTIC COMMUNITIES
INP0952_00	FLAT CREEK-BUCK CREEK	SULFATES
INP0952_00	FLAT CREEK-BUCK CREEK	TOTAL DISSOLVED SOLIDS
INP0931_00	HALL CREEK-HEADWATERS	E. COLI
INP0974_00	HONEY CREEK (SOUTH FORK PATOKA) TRIBUTARIES	TOTAL DISSOLVED SOLIDS
INP0972_00	HOUCHIN DITCH	TOTAL DISSOLVED SOLIDS
INP0941_00	HUNLEY CREEK-HEADWATERS	NUTRIENTS
INP0941_00	HUNLEY CREEK-HEADWATERS	SILTATION
INP0953_T1065	LITTLE FLAT CREEK	E. COLI
INP0953_T1065	LITTLE FLAT CREEK	SILTATION
INP0953_T1065	LITTLE FLAT CREEK	TOTAL DISSOLVED SOLIDS
INP0947_T1025	OUTLET OF HUNTINGBURG CITY LAKE	IMPAIRED BIOTIC COMMUNITIES
INP09P1001_00	PATOKA RESERVOIR	FCA for MERCURY
INP0947_T1007	PATOKA RIVER	E. COLI
INP0947_T1007	PATOKA RIVER	LEAD
INP0961_T1009	PATOKA RIVER	FCA for MERCURY
INP0962_T1010	PATOKA RIVER	FCA for MERCURY
INP0964_T1011	PATOKA RIVER	FCA for MERCURY
INP0965_T1012	PATOKA RIVER	FCA for MERCURY
INP0966_T1013	PATOKA RIVER	FCA for MERCURY
INP0968_T1014	PATOKA RIVER	FCA for MERCURY
INP0969_T1015	PATOKA RIVER	FCA for MERCURY
INP0981_T1016	PATOKA RIVER	FCA for MERCURY
INP0987_T1019	PATOKA RIVER	FCA for MERCURY
INP0988_T1020	PATOKA RIVER	E. COLI
INP0988_T1020	PATOKA RIVER	FCA for MERCURY
INP0921_T1002	PATOKA RIVER	FCA for MERCURY
INP0921_T1002	PATOKA RIVER	FCA for PCBs
INP0924_T1003	PATOKA RIVER	FCA for MERCURY
INP0924_T1003	PATOKA RIVER	FCA for PCBs
INP0928_T1005	PATOKA RIVER	FCA for MERCURY
INP0928_T1005	PATOKA RIVER	FCA for PCBs
INP0946_T1006	PATOKA RIVER	FCA for MERCURY
INP0946_T1006	PATOKA RIVER	FCA for PCBs
INP0947_T1007	PATOKA RIVER	FCA for MERCURY

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INP0947_T1007	PATOKA RIVER	FCA for PCBs
INP0948_T1008	PATOKA RIVER	FCA for MERCURY
INP0948_T1008	PATOKA RIVER	FCA for PCBs
INP0961_T1009	PATOKA RIVER	FCA for PCBs
INP0962_T1010	PATOKA RIVER	FCA for PCBs
INP0964_T1011	PATOKA RIVER	FCA for PCBs
INP0965_T1012	PATOKA RIVER	FCA for PCBs
INP0966_T1013	PATOKA RIVER	FCA for PCBs
INP0968_T1014	PATOKA RIVER	FCA for PCBs
INP0969_T1015	PATOKA RIVER	FCA for PCBs
INP0981_T1016	PATOKA RIVER	FCA for PCBs
INP0985_T1017	PATOKA RIVER	FCA for PCBs
INP0986_T1018	PATOKA RIVER	FCA for PCBs
INP0987_T1019	PATOKA RIVER	FCA for PCBs
INP0988_T1020	PATOKA RIVER	FCA for PCBs
INP0986_T1018	PATOKA RIVER - DOWNSTREAM HOUCHINS DT	FCA for MERCURY
INP0985_T1017	PATOKA RIVER - CUTOFF BY HOUCHINS DT	FCA for MERCURY
INP0965_00	PATOKA RIVER-LICK MILL CREEKS	IMPAIRED BIOTIC COMMUNITIES
INP0965_00	PATOKA RIVER-LICK MILL CREEKS	SULFATES
INP0965_00	PATOKA RIVER-LICK MILL CREEKS	TOTAL DISSOLVED SOLIDS
INP0926_T1004	PATOKA RIVER-LOND DITCH	FCA for MERCURY
INP0926_T1004	PATOKA RIVER-LOND DITCH	FCA for PCBs
INP0971_T1021	SOUTH FORK PATOKA RIVER	IMPAIRED BIOTIC COMMUNITIES
INP0972_T1022	SOUTH FORK PATOKA RIVER	IMPAIRED BIOTIC COMMUNITIES
INP0973_T1023	SOUTH FORK PATOKA RIVER	IMPAIRED BIOTIC COMMUNITIES
INP0975_T1024	SOUTH FORK PATOKA RIVER	IMPAIRED BIOTIC COMMUNITIES
INP0973_00	SOUTH FORK PATOKA R-SPURGEON TRIBUTARIES	TOTAL DISSOLVED SOLIDS
INP0975_00	SOUTH FORK PATOKA R-WHEELER/LICK CREEKS	TOTAL DISSOLVED SOLIDS
INP0968_00	SUGAR CREEK (PIKE COUNTY)	DISSOLVED OXYGEN
INP0968_00	SUGAR CREEK (PIKE COUNTY)	SULFATES
INP0968_00	SUGAR CREEK (PIKE COUNTY)	TOTAL DISSOLVED SOLIDS
INP0953_T1066	UNNAMED TRIBUTARY (HOBBS CEMETARY)	NUTRIENTS
INP0953_T1066	UNNAMED TRIBUTARY (HOBBS CEMETERY)	E. COLI



Soils

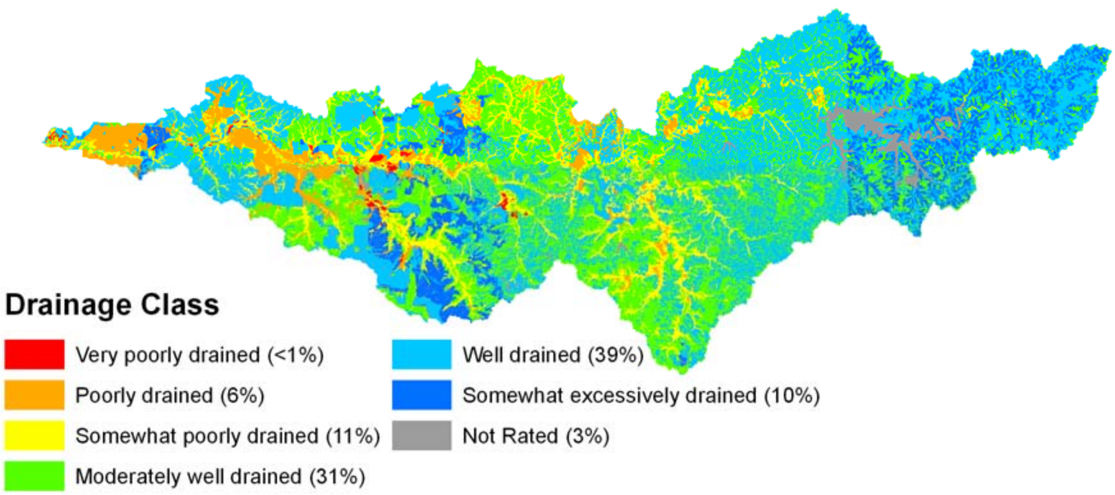
The dominant soil orders in Major Land Resource Area (MLRA) (115A1 – 115A.2) are Alfisols, Entisols, Inceptisols, and Mollisols. The soils in the area have a mesic soil temperature regime, a udic or aquic soil moisture regime, and dominantly mixed or smectitic mineralogy. The soils are very deep, poorly drained to excessively drained, and loamy, silty, or clayey. Nearly level Endoaqualfs (Iva series) and Argiaquolls (Ragsdale series) formed in loess on broad upland summits and flats. Nearly level to steep Hapludalfs (Alford, Iona, Muren, Stoy, and Sylvan series) and Fragiudalfs (Hosmer series) formed in loess on uplands. Hapludalfs (Alvin, Bloomfield, and Princeton series) and Argiudolls (Ade series) formed in sandy eolian material in areas of dunes on uplands and stream terraces. Steep and very steep Hapludalfs (Hickory series) formed in Illinoian till along the major streams and dissected upland drainageways. Hapludalfs (Wellston series) formed in siltstone or sandstone residuum on strongly sloping to steep side slopes underlain by bedrock. The soils in the major stream valleys include Hapludolls (Carmi series), Argiudolls (Elston series), and Hapludalfs (Skelton series), all of which formed in outwash on nearly level to moderately sloping stream terraces and outwash plains. Endoaquolls (Montgomery series), Endoaquepts (Zipp series), Epiaqualfs (McGary series), and Hapludalfs (Shircliff and Markland series) formed in clayey lacustrine sediments on nearly level to strongly sloping lacustrine terraces or lake plains. Endoaquepts (Evansville series), Endoaquolls (Patton series), and Hapludalfs (Henshaw and Uniontown series) formed in silty sediments on terraces and lake plains. Endoaquolls (Beaucoup and Wabash series), Hapludolls (Armiesburg, Landes, and Tice series), Eutrudepts (Nolin series), and Endoaquepts (Petrolia series) formed in alluvium on nearly level, broad flood plains. Fluvaquents (Birds and Wakeland series) and Eutrudepts (Haymond and Wilbur series) are along the smaller upland drainageways. Udorthents (Bethesda, Fairpoint, Nawakwa, and Tapawingo series) and Udarents (Hollybrook, Minnehaha, and Swanwick series)
formed in regolith from surface-mining operations.

The dominant soil orders in MLRA (114A.1) are Alfisols and Inceptisols. The MLRA also has small areas of Entisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They formed in loess, Illinoian glacial till or outwash, and alluvium derived from these deposits. The soils are deep or very deep, poorly drained to well drained, and loamy, silty, or clayey. Glossaqualfs (Avonburg, Clermont, and Cobbsfork series) are on broad, flat till plains. Fragiudalfs (Cincinnati, Homewood, Nabb, and Rossmoyne series) are on gently sloping to strongly sloping side slopes on till plains. Hapludalfs (Blocher, Bonnell, and Hickory series) are on moderately sloping to very steep side slopes on till plains. Hapludalfs (Cana, Grayford, and Jessup series), Paleudalfs (Ryker series), and Fragiudalfs (Weisburg series) are on gently sloping to steep side slopes that are underlain by bedrock residuum. Paleudalfs (Negley series), Hapludalfs (Parke and Pike series), and Fragiudalfs (Medora series) formed in outwash deposits on high stream terraces, kames, and moraines. Fragiudalfs (Otwell and Haubstadt series) and Fragiaqualfs (Dubois series) formed in a thin layer of loess and the underlying weathered outwash, lacustrine sediments, or old alluvium on high stream terraces or lake plains. Eutrudepts (Haymond, Oldenburg, Wilbur, and Wirt series), Endoaquepts (Holton and Stendal series), and Fluvaquents (Birds, Bonnie, and Wakeland series) formed in alluvium on flood plains.

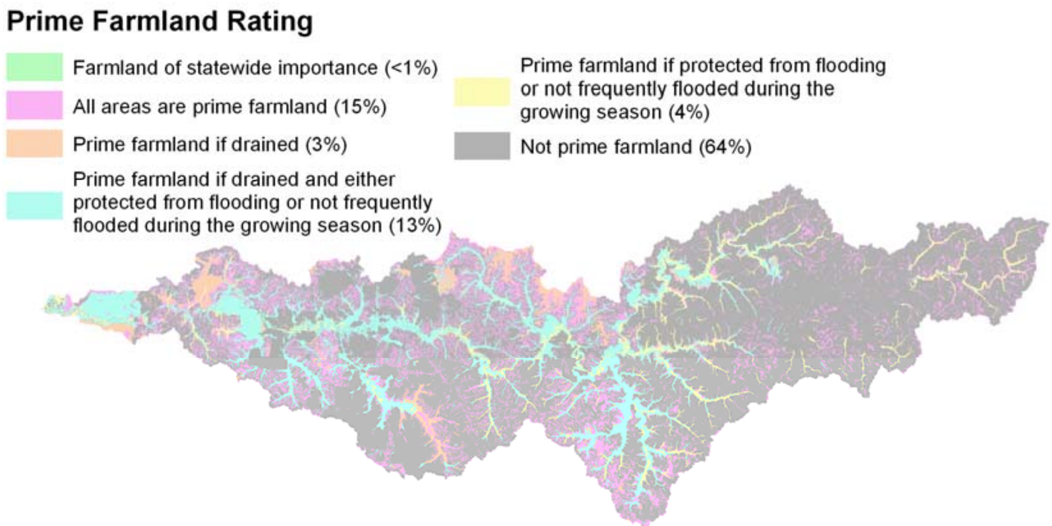
The dominant soil orders in MLRA (120B.1 – 120B.2) are Alfisols, Ultisols, and Inceptisols. The soils in the area have a mesic soil temperature regime, a udic or aquic soil moisture regime, and dominantly mixed mineralogy. They formed dominantly in less than 40 inches of loess and in residuum or colluvium derived from sandstone, shale, and siltstone. The soils range from moderately deep to very deep and from poorly drained to somewhat excessively drained and are loamy, silty, or clayey. Fragiudalfs (Apalona and Zanesville series) and Hapludalfs (Wellston series) are the dominant soils on ridgetops and the upper part of side slopes. Hapludults (Adyeville series) and Dystrudepts (Tipsaw series) are on strongly sloping to very steep side slopes, and Hapludults (Tulip series) are on strongly sloping and steep footslopes. Hapludalfs (Deuchars, Ebal, and Kitterman series) are on moderately sloping to steep structural benches and scarps. Endoaquepts (Zipp series), Epiaqualfs (McGary series), and Hapludalfs (Shircliff and Markland series) formed in lacustrine sediments on nearly level to strongly sloping lacustrine terraces or lake plains. Hapludults (Millstone series), Hapludalfs (Elkinsville series), Fragiudalfs (Sciotoville series), and Epiaqualfs (Hatfield series) are on terraces along the Ohio River. Hapludolls (Huntington series), Eutrudepts (McAdoo and Lindside series), and Endoaquepts (Newark series) are on flood plains along the major streams. Dystrudepts (Cuba and Steff series), Eutrudepts (Gatchel and Haymond series), Endoaquepts (Belknap and Stendal series), and Fluvaquents (Birds and Bonnie series) are on local flood plains. Udorthents (Bethesda and Fairpoint series) formed in regolith from surface-mining operations.

Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized–excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."



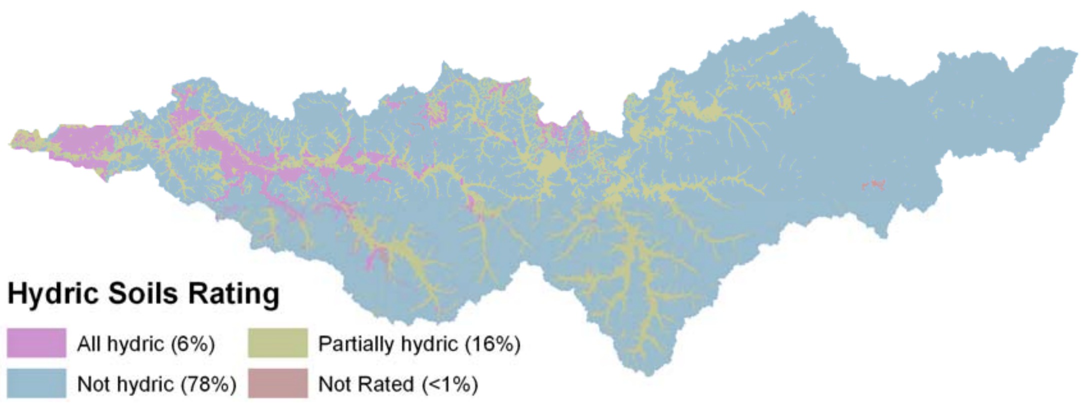
Farmland Classification Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



Hydric Soils This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of non-hydric soils in the higher positions on the landform, and map units dominantly made up of non–hydric soils may have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make on site determinations of hydirc soils are specified in “Field Indicators of Hydric Soils in the United States” (Hurt and others, 2002).

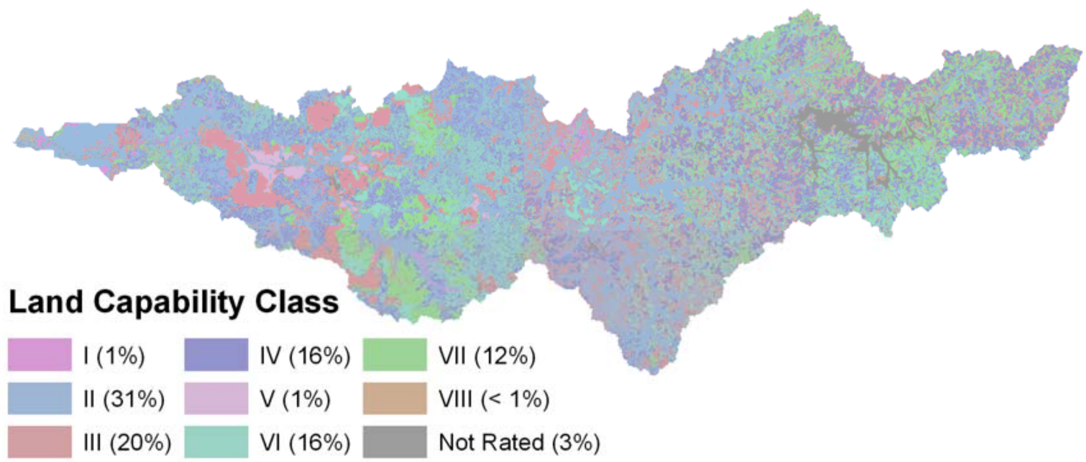


Highly Erodible Land (HEL)

A soil map unit with an erodibility index (EI) of 8 or greater is considered to be highly erodible land (HEL). The EI for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990. Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.

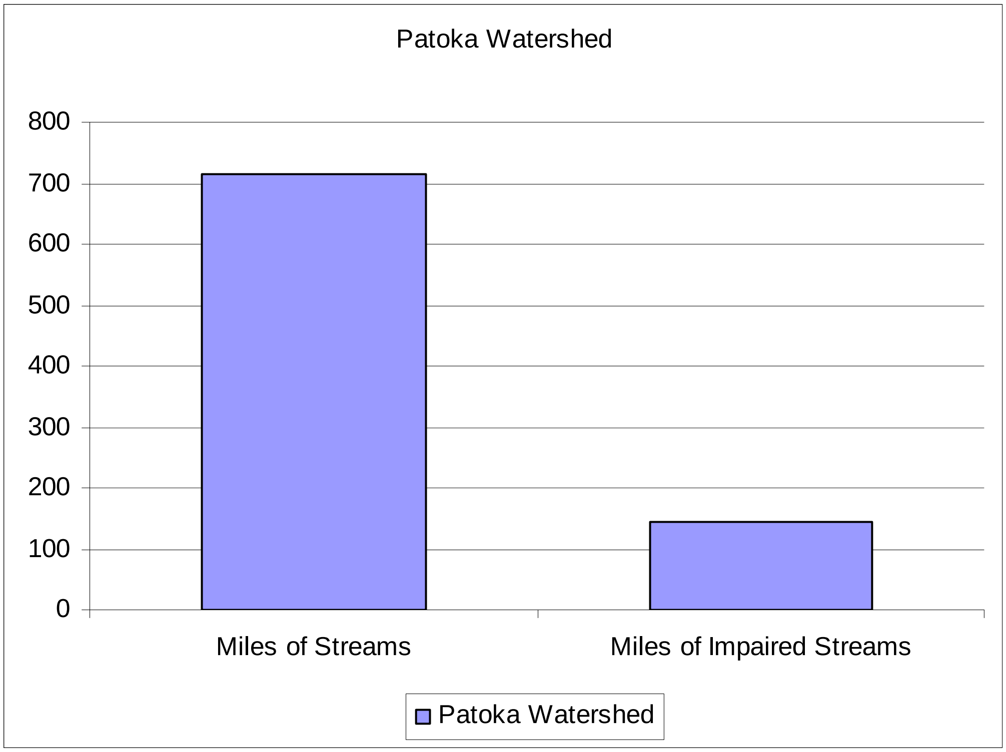
Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



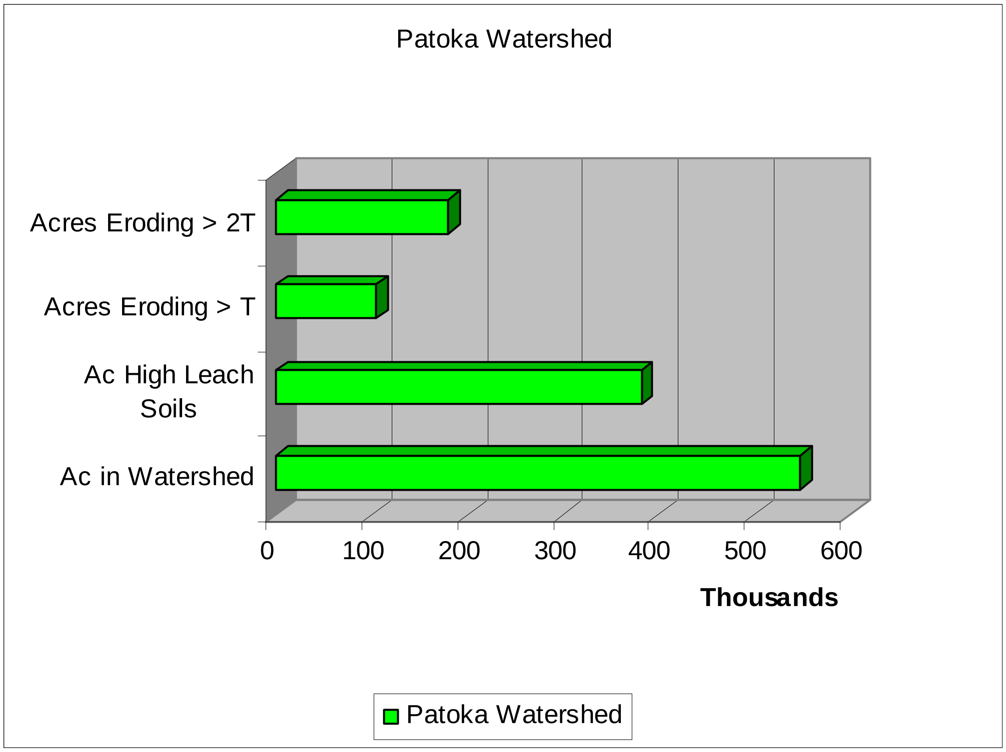
Resource Concerns
Stakeholders and electronic analysis have been identified the following resource concerns as being the top priority:

- Surface Water Quality – There is approximately 20 percent or 143 miles of the 716 total miles of the streams within the watershed that have identified impairments. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing an unbalanced fish community with depressed populations and limited diversity.

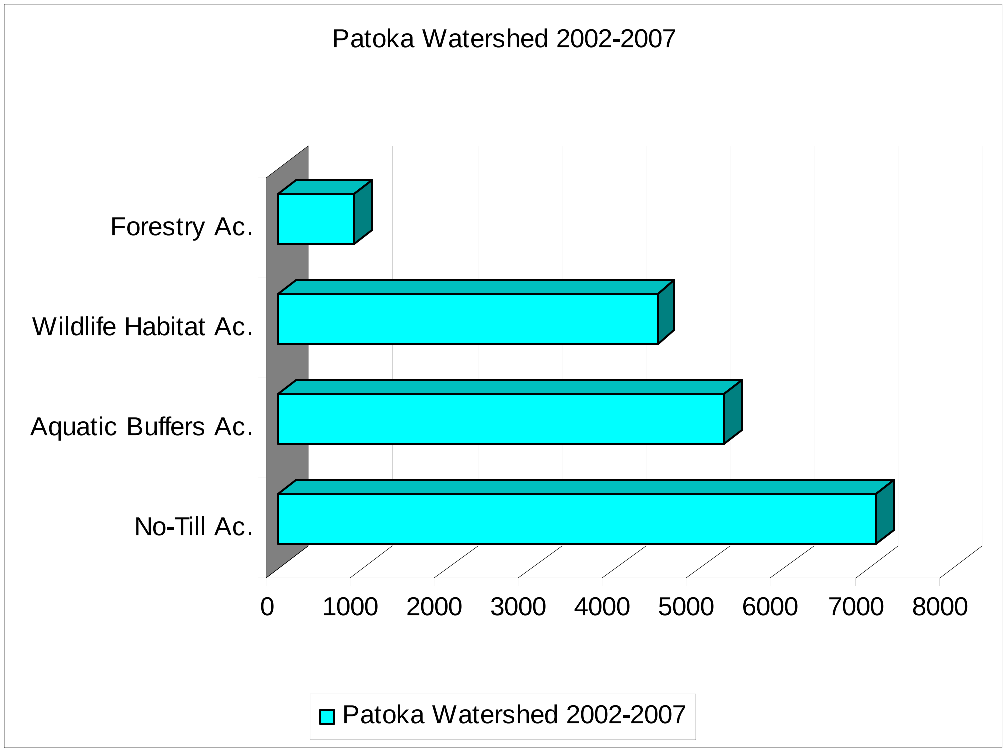


- Ground Water Quality - The watershed has in excess of 382,500 acres of soils with high leaching index (> 10) which allows containments on the land surface to be carried easily into the ground water from infiltrating water. There are an additional 2,000 acres of wellhead protection areas. Because of this condition, non–point pollutants such as fertilizers, pesticides, and livestock waste have the potential to contaminate the ground water aquifer.
- Air Quality – 1.0 percent of the watershed has been identified by the Environmental Protection Agency as have an air quality concern.
- Threatened & Endangered Species – Just over 27.4 percent of the 549,400 acres in the watershed lie within the range of know Threatened and Endangered Species.

- Soil Quality – The watershed has over 287,900 acres of soils subject to soil erosion. There is over 181,000 acres eroding at twice the tolerable level or "T". There are also just less than 2,000 acres of soils subject to wind erosion.



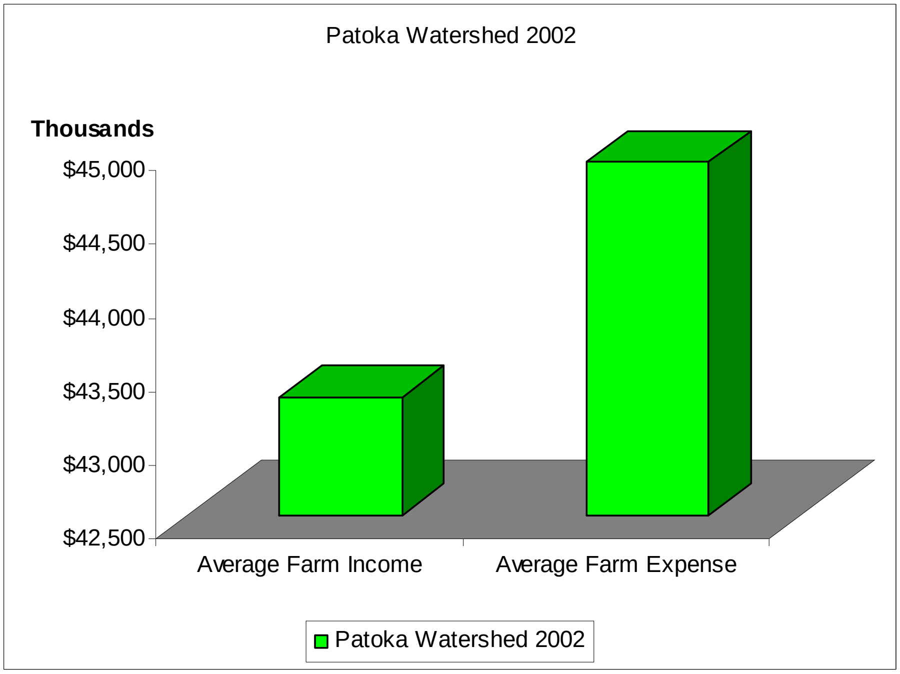
Performance Results System and Other Data
The producers within the watershed have implemented a variety of conservation practices over the past five years.



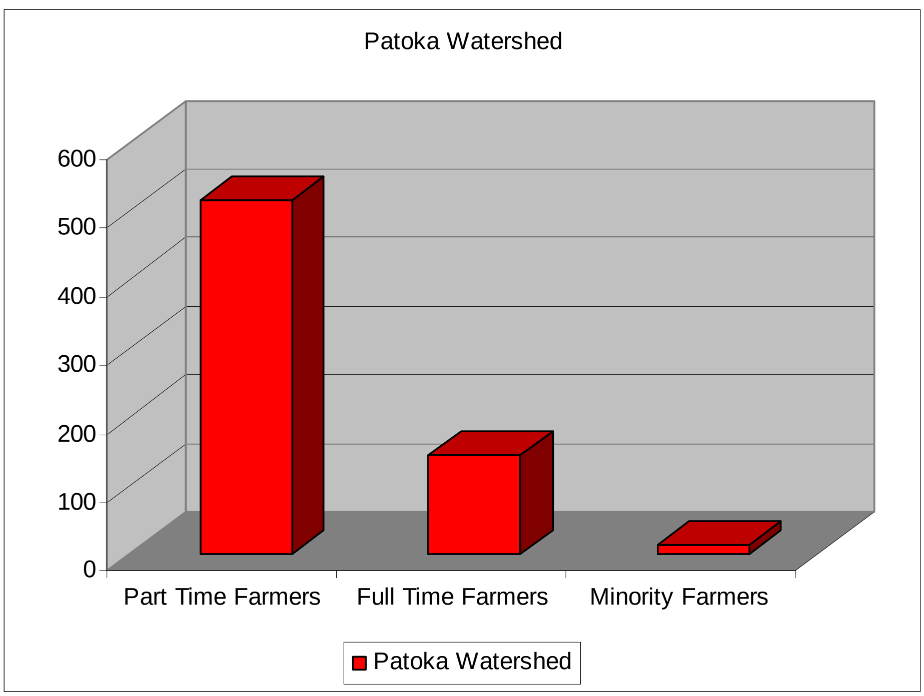
Since 2002 through 2007 landowners have implemented over 7,100 acres of No-Till, approximately 121,700 feet of upland buffers, and just over 5,300 acres of aquatic buffers. Wildlife habitat has been improved or established on more than 4,500 acres within the watershed and just over than 900 acres of forestry practices have been applied.

Census and Social Data (Relevant)
There are approximately 3900 farms in the watershed that average approximately 237 acres in size.

The 2002 average farm total income for all the counties was $43,300,000 while average expense was $44,900,000.



There are approximately 515 part time farmers, 145 full time farmers and 14 minority farmers.



All data is provided “as is.” There are no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for general planning purposes only.

Data Sources:

Indiana Common Resource Area (CRA) Map delineations are defined as geographical areas where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a CRA.

Indiana Agricultural Statistics 2003 – 2004 - Indiana Agricultural Statistics, 1435 Win Hentshcel Blvd., Suite B105, West Lafayette

Major Land Resource Area Map Tool - Indiana NRCS Soils Page - http://www.in.nrcs.usda.gov/mlra11/soils.html

Indiana Hydrologic Units Indiana Geodata

Indiana Watershed Action Strategy Plan

Indiana Rapid Watershed Assessment (Electronic Data Sets – Web based application.

Indiana 2006 303d List – Indiana Department of Agriculture, Division of Natural Resources