USDA NRCS
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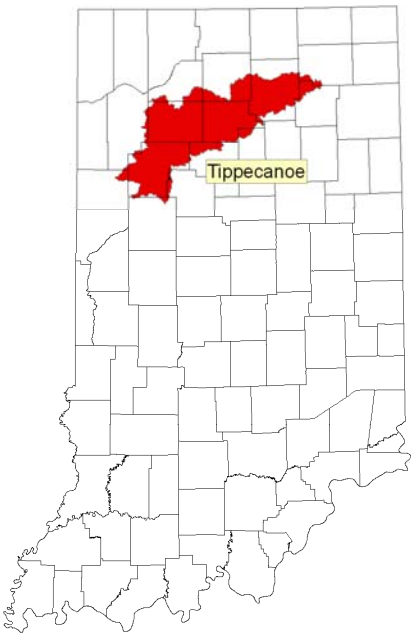
Natural Resources Conservation Service

Rapid Watershed Assessment
Tippecanoe 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.

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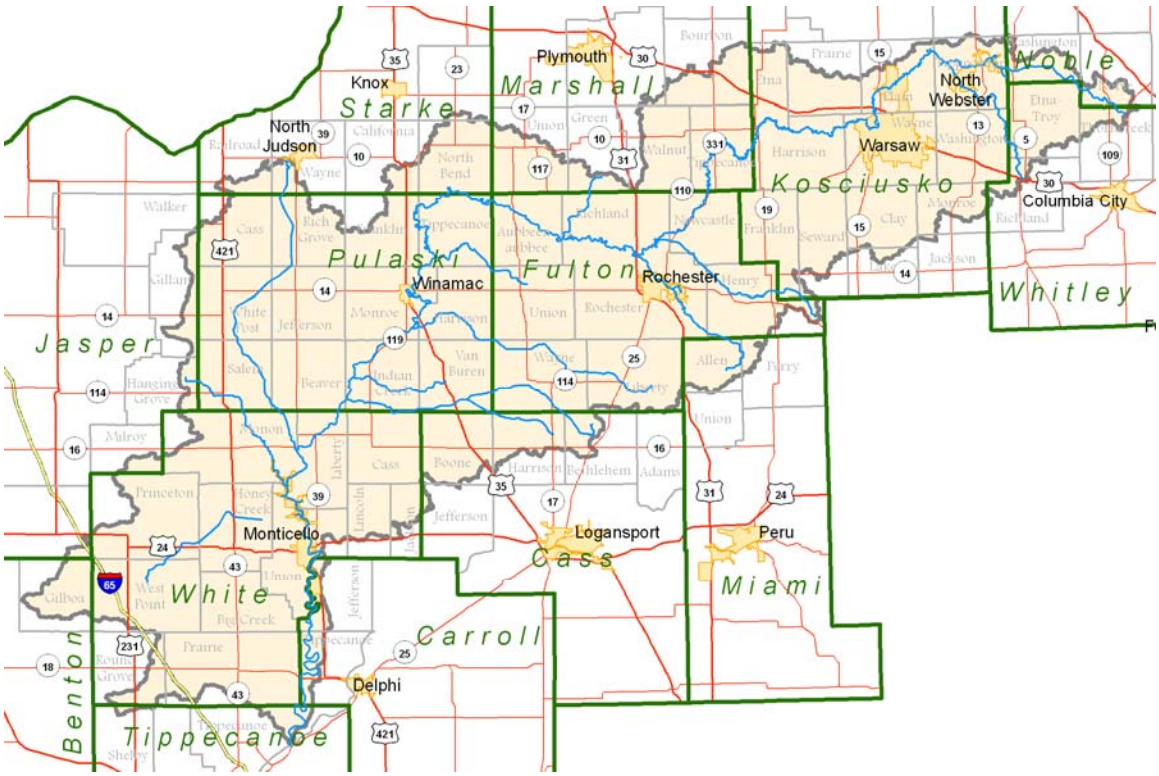
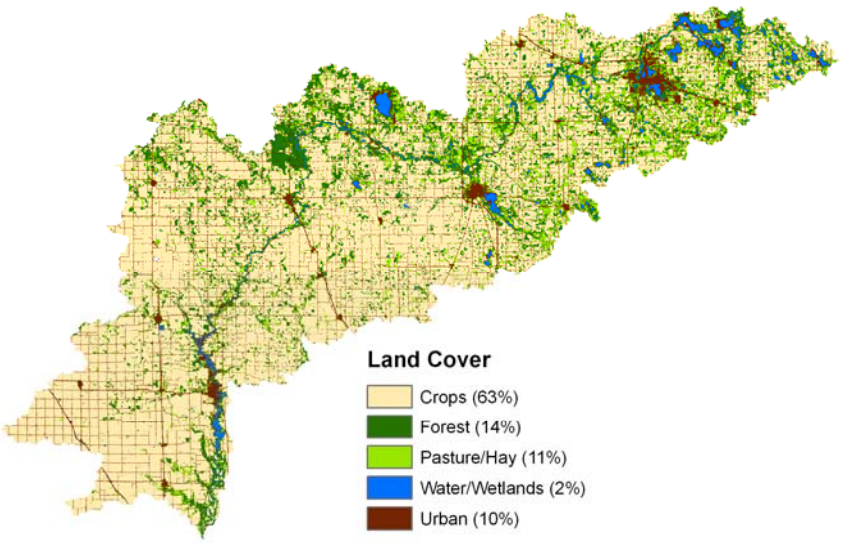


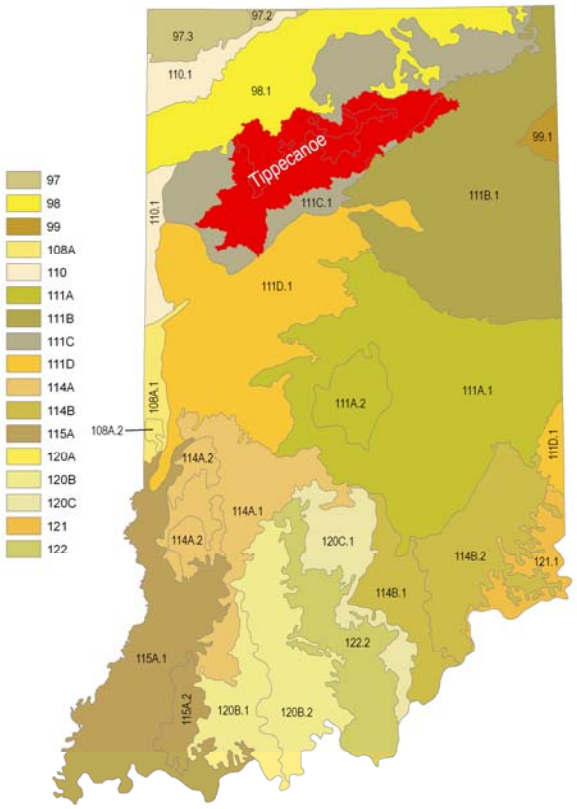
Introduction

The Tippecanoe watershed is an eight digit (05120106) hydrologic unit code HUC) watershed located in the North Central part of Indiana. The watershed drainage area is just over 1,253,300 acres. The watershed covers fourteen different Indiana counties. It is subdivided into 84 subbasins represented on the map by 12 digit HUCs (Figure 2-1).



Common Resource Area

There are three common resource areas in the watershed:



The Central Corn Belt Drift Plains – (98.1). Broad flat and slightly rolling upland hill slopes, mainly cropland. Corn, other feed grains, and hay for dairy cattle and other livestock are the crops. Soft winter wheat and dry beans are important cash crops. Fruits and vegetables are grown in places where soils and markets are favorable. Few scattered areas are used for permanent pasture, woodlots and urban uses. Soils are very poorly drained to excessively drained, formed in loamy glacial drift.

The Indiana and Ohio Till Plain, Northeastern Part – (111B.1). Broad, level clayey till plain with some end moraines, lake basins, and sand and gravel outwash.

Extensive corn, soybean, wheat, and livestock farming on artificially drained soils with scattered woodlots. Soils are well drained to very poorly drained, formed in Wisconsin Age glacial drift derived mostly from limestone and dolomite.

The Southern Michigan and Northern Indiana Drift and Till Plains, Northwestern Part – 111C.1). Hummocky, pitted moraine characterized by many pothole lakes, ponds, marshes, bogs, and clear streams. End moraines and kames supported oak-hickory forests. Ground moraines supported swamp forest to sphagnum bogs. Marsh and woodland remains. Corn, soybean, and livestock farming are dominant. Recreational and residential areas are common. Soils are well drained to very poorly drained, formed in loamy glacial drift and lacustrine sediment.

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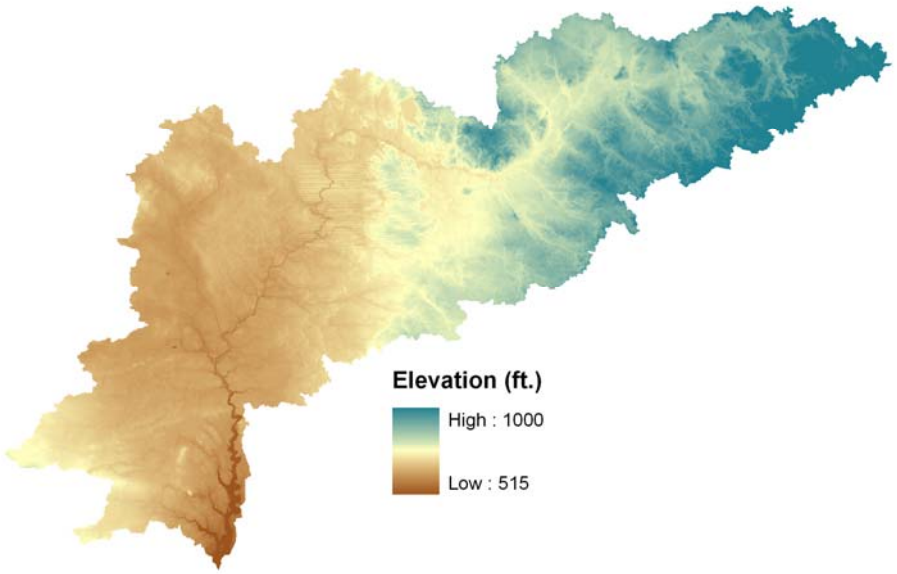
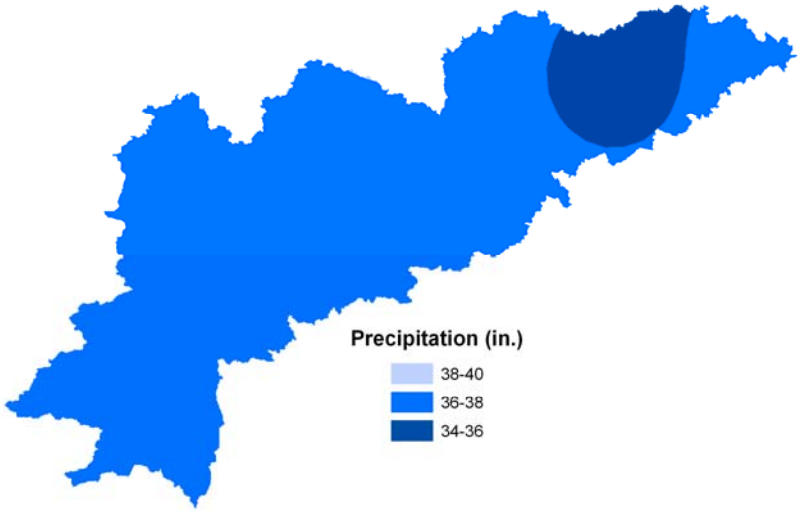
Physical Description

The Tippecanoe watershed is an eight digit (05120106) hydrologic unit code HUC) watershed located in the North Central part of Indiana. The watershed drainage area is just over 1,253,300 acres. The watershed covers fourteen different Indiana counties. It is subdivided into 84 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 Tippecanoe Watershed.

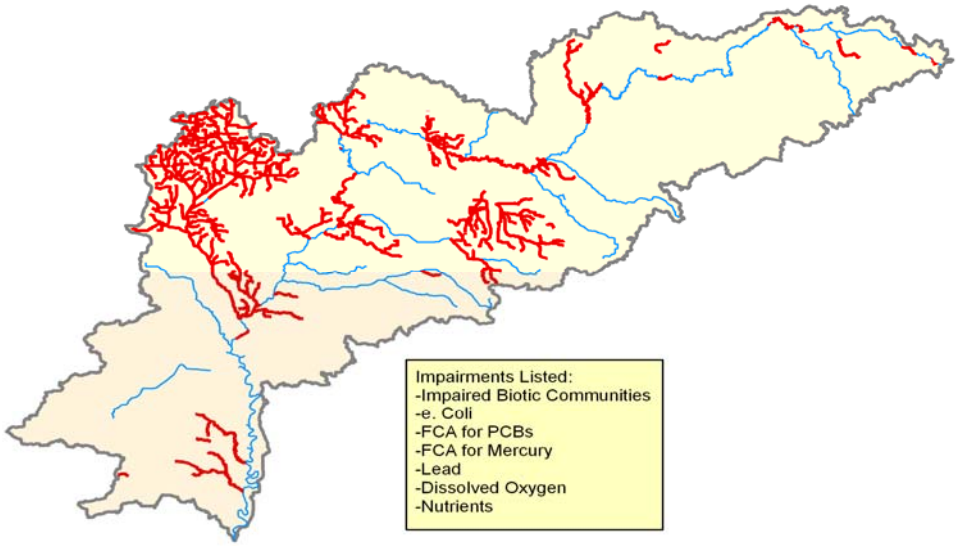


WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INB06A2_01	ACKERMAN DITCH (DOWNSTREAM OF CR 1000N)	IMPAIRED BIOTIC COMMUNITIES
INB06B7_00	ATRIUM DITCH - DUNKER DITCH	E. COLI
INB06B6_00	ATRIUM DITCH - STUMP DITCH	E. COLI
INB0657_T1007	BAKER DITCH-ULCH DITCH	IMPAIRED BIOTIC COMMUNITIES

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INB06F3_00	BIG CREEK - MOUTH	E. COLI
INB06BA_00	BIG MONON DITCH	E. COLI
INB06BB_00	BIG MONON DITCH	E. COLI
INB06BB_00	BIG MONON DITCH	IMPAIRED BIOTIC COMMUNITIES
INB06B3_00	BIG MONON DITCH - DRESSKE DITCH	E. COLI
INB06B1_00	BIG MONON DITCH - HEADWATERS	E. COLI
INB06B8_00	BIG MONON DITCH - LOWER ATRIUM DITCH/ STEIN DITCH	E. COLI
INB06B4_00	BIG MONON DITCH - THOMPSON DITCH	E. COLI
INB06BA_T1002	BIG MONON DITCH-UNNAMED TRIBUTARY	E. COLI
INB06BB_T1003	BIG MONON DITCH-UNNAMED TRIBUTARY	E. COLI
INB06BB_T1003	BIG MONON DITCH-UNNAMED TRIBUTARY	IMPAIRED BIOTIC COMMUNITIES
INB06BB_T1004	BIG MONON DITCH-UNNAMED TRIBUTARY	E. COLI
INB06BB_T1004	BIG MONON DITCH-UNNAMED TRIBUTARY	IMPAIRED BIOTIC COMMUNITIES
INB06BB_T1005	BIG MONON DITCH-UNNAMED TRIBUTARY	E. COLI
INB06BB_T1005	BIG MONON DITCH-UNNAMED TRIBUTARY	IMPAIRED BIOTIC COMMUNITIES
INB0672_T1006	CALLAHAN DITCH	E. COLI
INB06P1008_00	CENTER LAKE	FCA for PCBs
INB0672_T1001	CONN DITCH	E. COLI
INB06P1001_00	CROOKED LAKE	FCA for MERCURY
INB06P1001_00	CROOKED LAKE	IMPAIRED BIOTIC COMMUNITIES
INB0643_00	DEER CREEK	E. COLI
INB0643_T1001	DEER CREEK-HEADWATER TRIBUTARY	E. COLI
INB0672_T1003	DEWEESE DITCH	E. COLI
INB0636_T1002	EASTERDAY DITCH-MILLER ARM	E. COLI
INB06F4_T1003	EMGE DITCH	E. COLI
INB0672_T1005	FRIEDRICK DITCH	E. COLI
INB0614_T1001	GAFF DITCH	E. COLI
INB0614_T1001	GAFF DITCH	IMPAIRED BIOTIC COMMUNITIES
INB0614_T1001	GAFF DITCH	LEAD
INB0675_T1002	GRAFFIS DITCH	E. COLI
INB06A3_00	Harp Ditch and other tributaries	E. COLI
INB06BA_T1001	HUBBELL DITCH	E. COLI
INB0675_T1003	HUMES DITCH	E. COLI
INB06P1056_00	JAMES LAKE	IMPAIRED BIOTIC COMMUNITIES
INB06P1016_00	LAKE MANITOU	FCA for MERCURY
INB06P1019_00	LAKE MAXINKUCKEE	FCA for MERCURY
INB06P1019_00	LAKE MAXINKUCKEE	FCA for PCBs
INB06A3_P1031	LAKE SHAFER	E. COLI
INB06P1033_00	LAKE SHAFER	FCA for PCBs
INB0672_00	MILL CREEK	E. COLI
INB0675_00	MILL CREEK	E. COLI
INB0675_T1001	MILL CREEK-UNNAMED TRIBUTARY	E. COLI
INB06B9_00	MOSLEY DITCH - MOSLEY BRANCH	E. COLI
INB0658_00	MUD CREEK - GRUBE/ WILSON DITCHES	E. COLI
INB0656_00	MUD CREEK - SMITH DITCH	IMPAIRED BIOTIC COMMUNITIES
INB065A_00	MUD CREEK (UPSTREAM OF CESSNA DITCH)	E. COLI
INB0657_00	MUD CREEK (UPSTREAM OF ROBBINS WALTERS DITCH)	IMPAIRED BIOTIC COMMUNITIES
INB06F6_01	MYERS DITCH (ROUND GROVE TWP)	DISSOLVED OXYGEN
INB06F6_01	MYERS DITCH (ROUND GROVE TWP)	IMPAIRED BIOTIC COMMUNITIES
INB0657_T1006	NEFF DITCH	IMPAIRED BIOTIC COMMUNITIES
INB06P1063_00	OSWEGO LAKE	IMPAIRED BIOTIC COMMUNITIES
INB0643_01	OUTLET CREEK	E. COLI

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INB0643_T1006	OUTLET CREEK-UNNAMED TRIBUTARY	E. COLI
INB06P1077_00	PALESTINE LAKE	FCA for MERCURY
INB06P1077_00	PALESTINE LAKE	FCA for PCBs
INB06P1005_00	PIKE LAKE	FCA for MERCURY
INB06P1005_00	PIKE LAKE	FCA for PCBs
INB0675_T1004	PRATHER DITCH	E. COLI
INB0672_T1002	REED OLMSTEAD DITCH	E. COLI
INB0657_T1008	ROBBINS WALTERS DITCH	IMPAIRED BIOTIC COMMUNITIES
INB0672_T1004	ROUCH DITCH	E. COLI
INB06B2_00	SCHOLTZ DITCH	E. COLI
INB06P1067_00	SECHRIST LAKE	IMPAIRED BIOTIC COMMUNITIES
INB06F4_01	SPRING CREEK (DOWNSTREAM OF EMGE DITCH)	E. COLI
INB06F4_00	SPRING CREEK (UPSTREAM OF EMGE DITCH)	E. COLI
INB06F4_T1002	SPRING CREEK-UNNAMED TRIBUTARY	E. COLI
INB06P1002_00	TIPPECANOE LAKE	FCA for MERCURY
INB06P1002_00	TIPPECANOE LAKE	IMPAIRED BIOTIC COMMUNITIES
INB0663_T1021	TIPPECANOE RIVER	FCA for MERCURY
INB0666_T1022	TIPPECANOE RIVER	FCA for MERCURY
INB0667_T1023	TIPPECANOE RIVER	FCA for MERCURY
INB0669_T1024	TIPPECANOE RIVER	FCA for MERCURY
INB066B_T1025	TIPPECANOE RIVER	FCA for MERCURY
INB0682_M1026	TIPPECANOE RIVER	FCA for MERCURY
INB0686_M1028	TIPPECANOE RIVER	FCA for MERCURY
INB0686_M1028	TIPPECANOE RIVER	FCA for PCBs
INB0684_M1027	TIPPECANOE RIVER	FCA for MERCURY
INB0684_M1027	TIPPECANOE RIVER	FCA for PCBs
INB06A1_M1029	TIPPECANOE RIVER	FCA for MERCURY
INB0611_00	TIPPECANOE RIVER	DISSOLVED OXYGEN
INB0611_00	TIPPECANOE RIVER	E. COLI
INB0611_00	TIPPECANOE RIVER	NUTRIENTS
INB0618_T1003	TIPPECANOE RIVER	FCA for PCBs
INB0621_T1004	TIPPECANOE RIVER	FCA for PCBs
INB0621_T1037	TIPPECANOE RIVER	FCA for PCBs
INB0624_T1006	TIPPECANOE RIVER	FCA for PCBs
INB0631_T1009	TIPPECANOE RIVER	FCA for PCBs
INB0632_T1010	TIPPECANOE RIVER	FCA for PCBs
INB0635_T1011	TIPPECANOE RIVER	FCA for PCBs
INB0635_T1040	TIPPECANOE RIVER	E. COLI
INB0635_T1040	TIPPECANOE RIVER	FCA for PCBs
INB0638_T1012	TIPPECANOE RIVER	FCA for PCBs
INB0648_T1014	TIPPECANOE RIVER	FCA for MERCURY
INB0648_T1014	TIPPECANOE RIVER	FCA for PCBs
INB0648_T1042	TIPPECANOE RIVER	FCA for MERCURY
INB0648_T1042	TIPPECANOE RIVER	FCA for PCBs
INB0649_T1015	TIPPECANOE RIVER	FCA for MERCURY
INB0649_T1015	TIPPECANOE RIVER	FCA for PCBs
INB0653_T1017	TIPPECANOE RIVER	E. COLI
INB0653_T1017	TIPPECANOE RIVER	FCA for MERCURY
INB0653_T1017	TIPPECANOE RIVER	FCA for PCBs
INB0654_T1018	TIPPECANOE RIVER	E. COLI
INB0654_T1018	TIPPECANOE RIVER	FCA for MERCURY
INB0654_T1018	TIPPECANOE RIVER	FCA for PCBs

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INB0662_T1020	TIPPECANOE RIVER	E. COLI
INB0662_T1020	TIPPECANOE RIVER	FCA for MERCURY
INB0662_T1020	TIPPECANOE RIVER	FCA for PCBs
INB0663_T1021	TIPPECANOE RIVER	FCA for PCBs
INB0666_T1022	TIPPECANOE RIVER	E. COLI
INB0666_T1022	TIPPECANOE RIVER	FCA for PCBs
INB0667_T1023	TIPPECANOE RIVER	FCA for PCBs
INB0669_T1024	TIPPECANOE RIVER	FCA for PCBs
INB066B_T1025	TIPPECANOE RIVER	E. COLI
INB066B_T1025	TIPPECANOE RIVER	FCA for PCBs
INB0682_M1026	TIPPECANOE RIVER	FCA for PCBs
INB06A1_M1029	TIPPECANOE RIVER	FCA for PCBs
INB0682_00	TIPPECANOE RIVER - AGNEW DITCH - MOSS DITCH	E. COLI
INB0666_00	TIPPECANOE RIVER - BARTEE/ TAYLOR DITCHES	E. COLI
INB0653_00	TIPPECANOE RIVER - MCMAHAN DT	E. COLI
INB0662_00	TIPPECANOE RIVER - WILSON/ COLLINS DITCHES	E. COLI
INB06D1_01	TIPPECANOE RIVER (DOWNSTREAM OF TIMMONS DITCH)	NUTRIENTS
INB0618_T1003	TIPPECANOE RIVER (DOWNSTREAM OF TIPPECANOE LAKE)	FCA for MERCURY
INB0644_T1041	Tippecanoe River and tributary	FCA for MERCURY
INB0644_T1041	Tippecanoe River and tributary	E. COLI
INB0692_T1003	TRAVERS DITCH	E. COLI
INB0692_T1003	TRAVERS DITCH	IMPAIRED BIOTIC COMMUNITIES
INB11P1028_00	TURTLE CREEK RESERVOIR	FCA for PCBs
INB06F4_T1001	UNNAMED STREAM (NW OF CHALMERS, IN)	E. COLI
INB0657_T1002	UNNAMED TRIBUTARY	IMPAIRED BIOTIC COMMUNITIES
INB0657_T1003	UNNAMED TRIBUTARY	IMPAIRED BIOTIC COMMUNITIES
INB0657_T1001	UNNAMED TRIBUTARY (NEAR WOODROW, IN)	IMPAIRED BIOTIC COMMUNITIES
INB0657_T1004	UNNAMED TRIBUTARY TO NEFF DITCH	IMPAIRED BIOTIC COMMUNITIES
INB06P1034_00	WEBSTER LAKE	FCA for MERCURY
INB0657_T1005	WHITE DITCH	IMPAIRED BIOTIC COMMUNITIES
INB06P1007_00	WINONA LAKE	FCA for MERCURY
INB06P1007_00	WINONA LAKE	FCA for PCBs
INK01P1066_00	WORSTER LAKE	FCA for PCBs



Soils

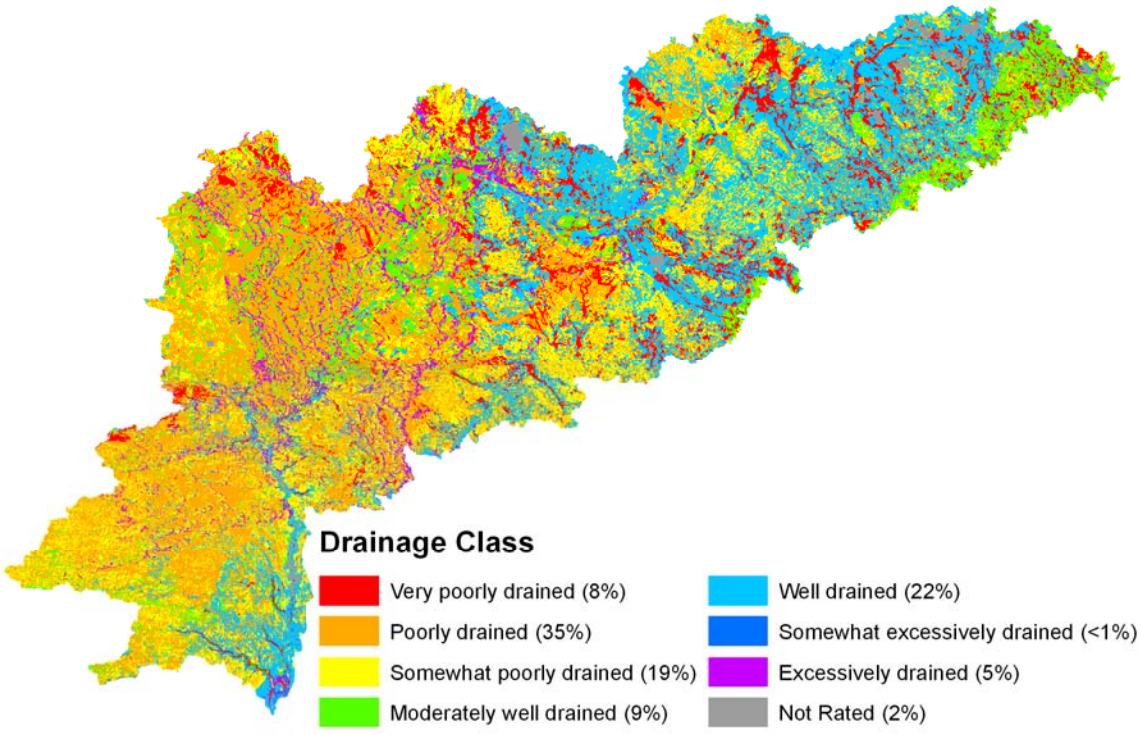
The dominant soil orders in Major Land Resource Area (MLRA) (98.1) are Alfisols, Histosols, and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They are very deep, well drained to very poorly drained, and loamy or sandy. Hapludalfs formed in outwash or glacial drift over outwash on outwash plains, kames, terraces, and deltas (Boyer, Oshtemo, and Spinks series) or in till (Hillsdale and Riddles series) or loess over till (Miami series) on till plains and moraines. Glossudalfs (Capac and Marlette series) and Endoaqualfs (Conover series) formed in till on till plains and moraines. Haplosaprists (Houghton series) formed in organic deposits in depressions on lake plains, till plains, and outwash plains. Argiaquolls (Sebewa series) and Endoaquolls (Gilford and Maumee series) formed in outwash in depressions on outwash plains, flood plains, and lake plains. Argiaquolls (Brookston series) also formed in silty material over till in depressions on till plains and moraines.

The dominant soil orders in MLRA (111B.1) are Alfisols, Inceptisols, and Mollisols. The soils in the area have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or illitic mineralogy. They are very deep, generally are very poorly drained to somewhat poorly drained, and are loamy or clayey. The dominant kinds of parent material are clayey till and lacustrine sediments. Others include outwash, alluvium, loess, and organic deposits. Hapludalfs (Glynwood and Morley series), Epiaqualfs (Blount, Nappanee, and Pandora series), Endoaqualfs (Wetzel series), and Argiaquolls (Pewamo series) are on till plains. Endoaquolls (Milford and Montgomery series) and Epiaqualfs (Del Rey series) are on lake plains. Haplosaprists (Houghton and Linwood series), Humaquepts (Roundhead and Wallkill series), and Endoaquepts (Wunabuna series) are in deep depressions or potholes. Hapludalfs (Belmore, Eldean, and Fox series), Endoaqualfs (Sleeth series), and Argiaquolls (Millgrove, Rensselaer, and Westland series) are on terraces and outwash plains. Eutrudepts (Genesee series), Endoaquepts (Shoals series), and Endoaquolls (Saranac and Sloan series) are on flood plains.

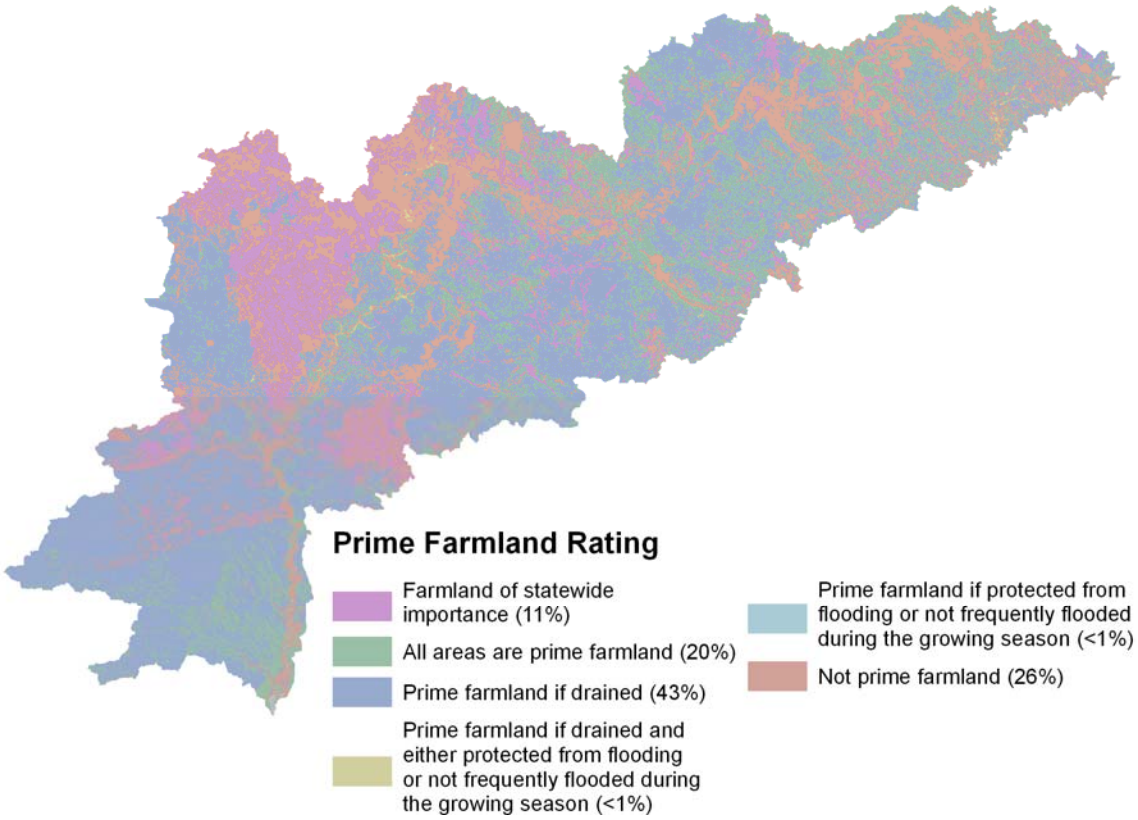
The soils in this area, MLRA (111C.1), are mostly Alfisols, Mollisols, Entisols, Inceptisols, or Histosols. They generally are deep and medium textured to fine textured and have a mesic soil temperature regime, an aquic or udic soil moisture regime, and mixed or illitic mineralogy. They formed in calcareous, loamy glacial till. Gently sloping or moderately sloping, moderately well drained or well drained Hapludalfs (Miami, Riddles, Williamstown, and Oshtemo series) are on summits. Level or nearly level, somewhat poorly drained, clayey Epiaqualfs (Conover, Baugo, and Crosier series) are on flat uplands; in broad, flat depressions; and in drainageways. Poorly drained or very poorly drained Argiaquolls (Brookston, Treaty, and Rennselaer series), Endoaquolls (Milford, Patton, and Pella series), and Haplosaprists (Adrian, Edwards, Houghton, Muskego, and Madaus series) are on narrow flats and in deep depressions or potholes.

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."



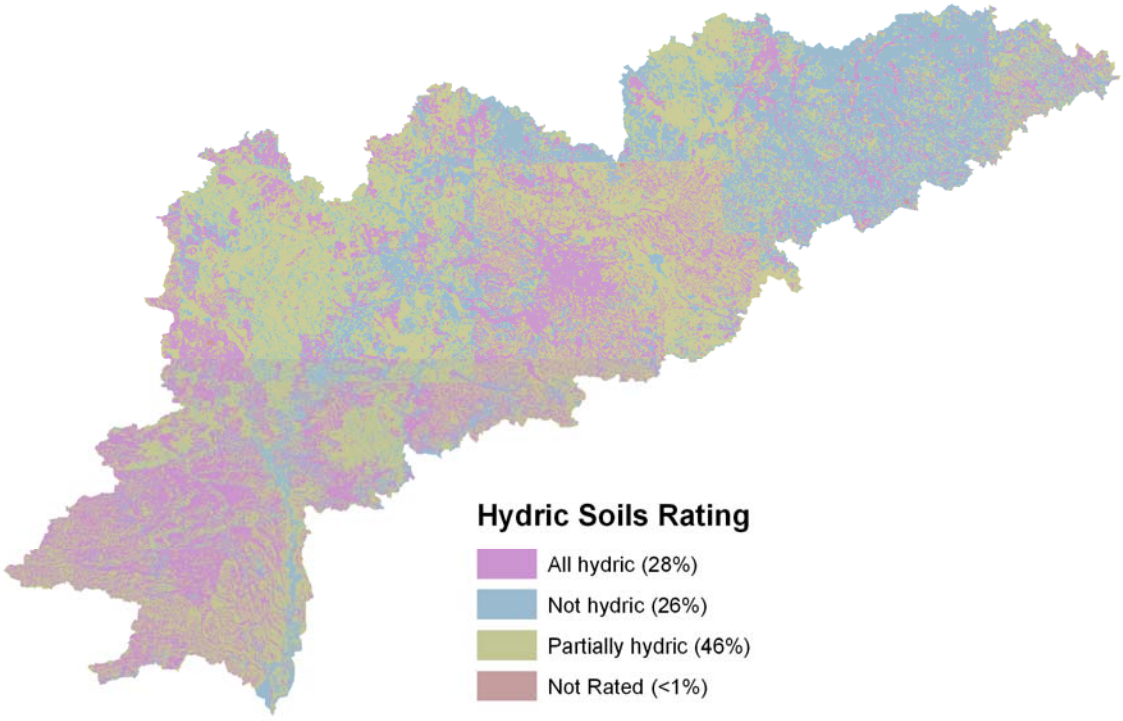
Farmland Classification Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and 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).

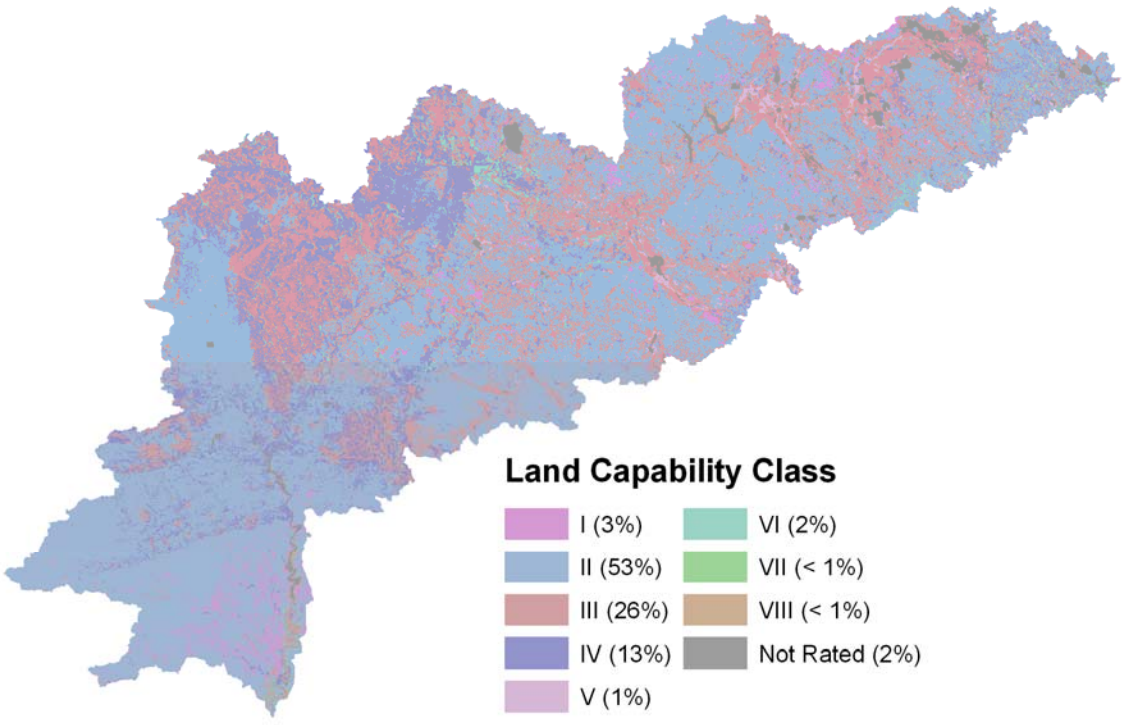


Highly Erodible Land (HEL)

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.

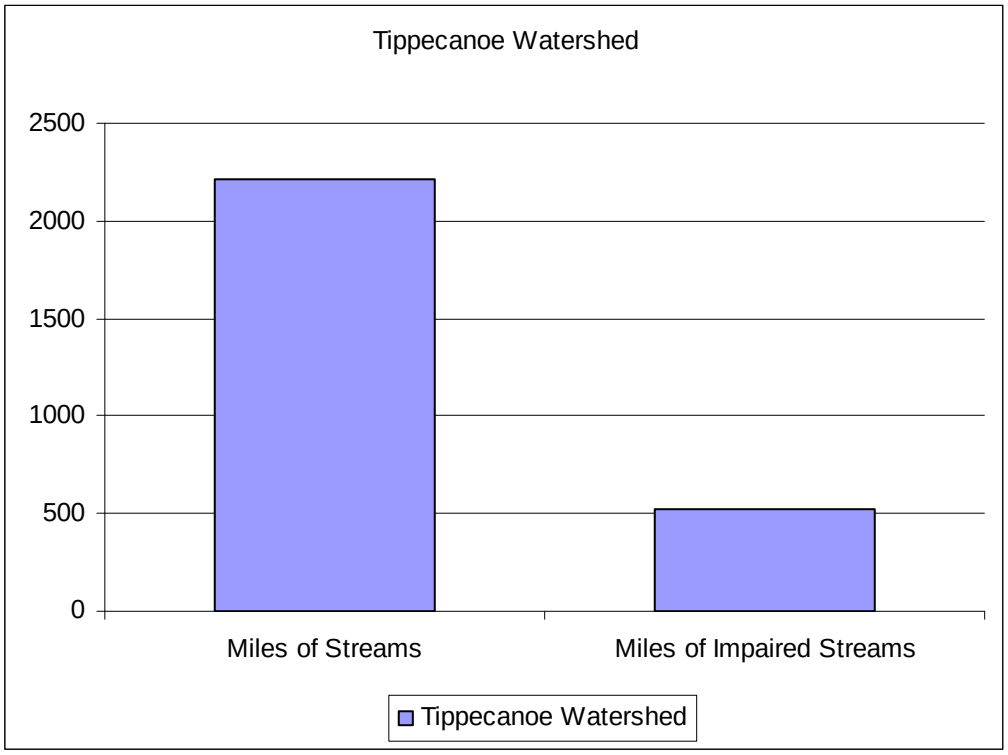
Land Capability Classification

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.

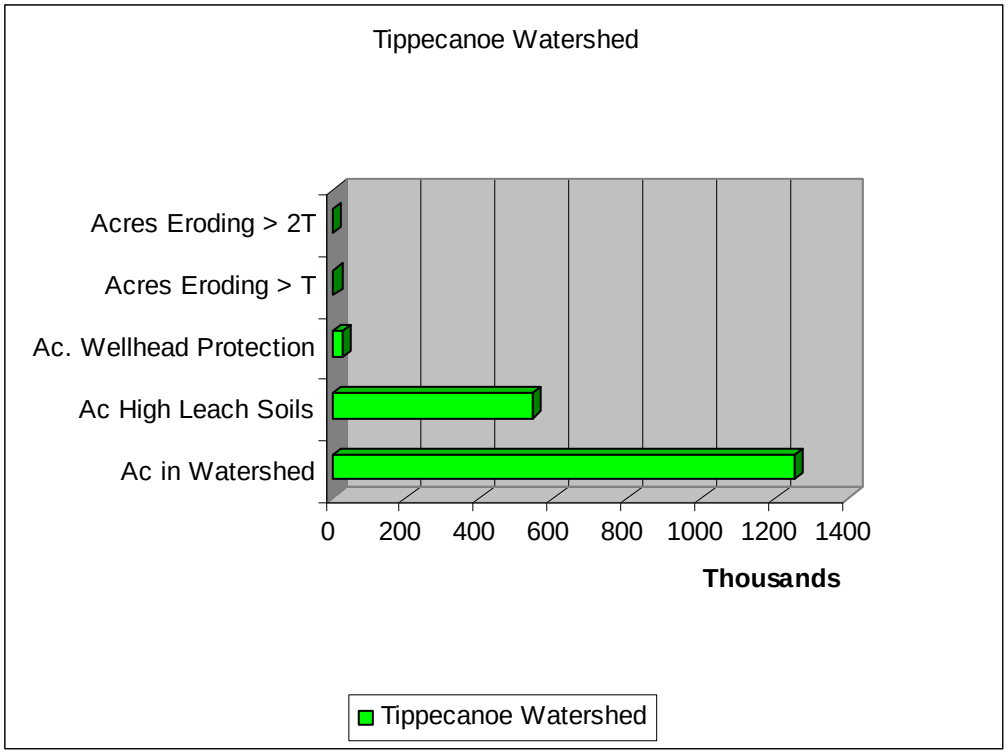


Resource Concerns
Stakeholders and electronic analysis have been identified the following resource concerns as being the top priority:

- Surface Water Quality – There is approximately 24 percent or 524 miles of the 2,209 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.

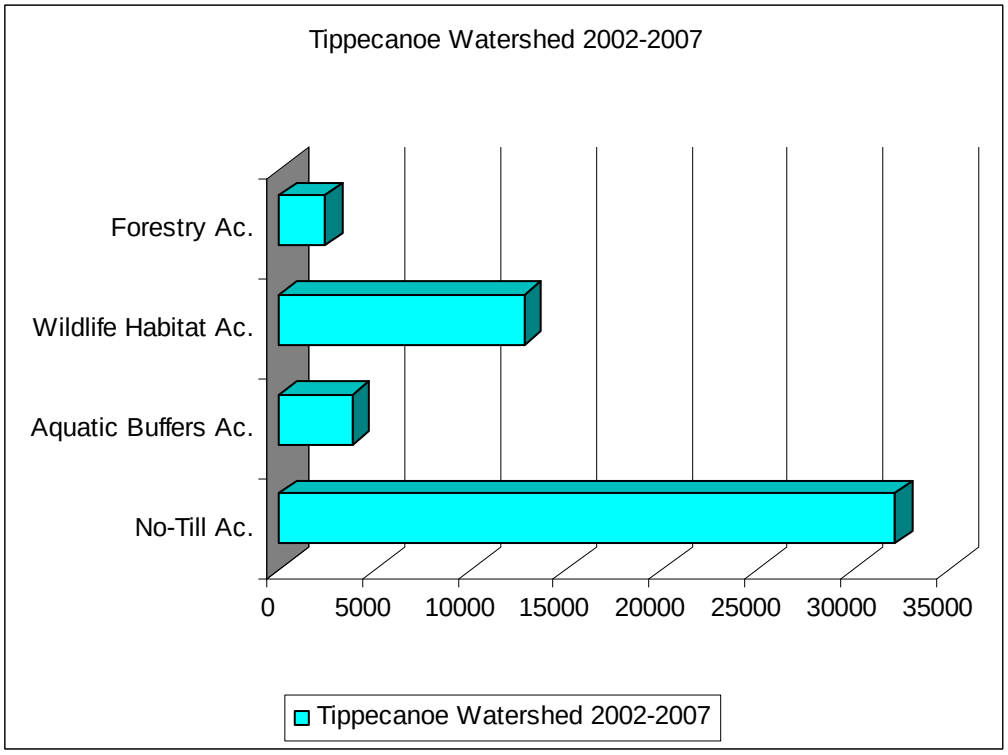


- Ground Water Quality - The watershed has in excess of 543,700 acres of soils with high leaching index (> 10) which allows containments on the land surface to be carried easily into the ground water from infiltrating water. There are an additional 30,400 acres of wellhead protection areas. Because of this condition, non–point pollutants such as fertilizers, pesticides, and livestock waste have the potential to contaminate the ground water aquifer.
- Threatened & Endangered Species – Just over 9.8 percent of the 1,253,300 acres in the watershed lie within the range of know Threatened and Endangered Species.



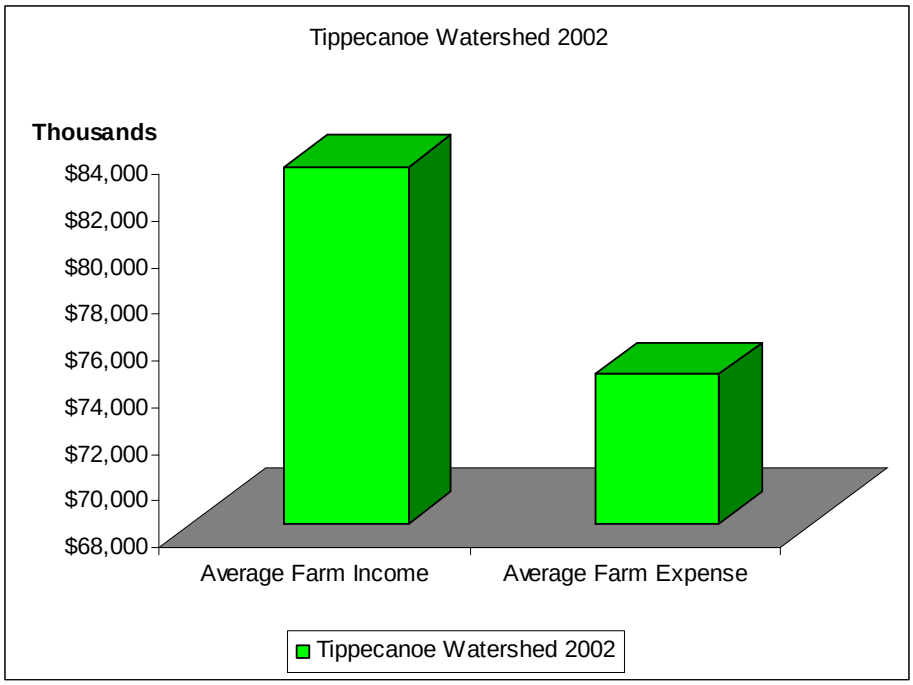
- Soil Quality – The watershed has over 4,400 acres of soils subject to soil erosion. There is over 1,700 acres eroding at twice the tolerable level or "T". There are also some 427,800 acres within the watershed that are subject to wind erosion.

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



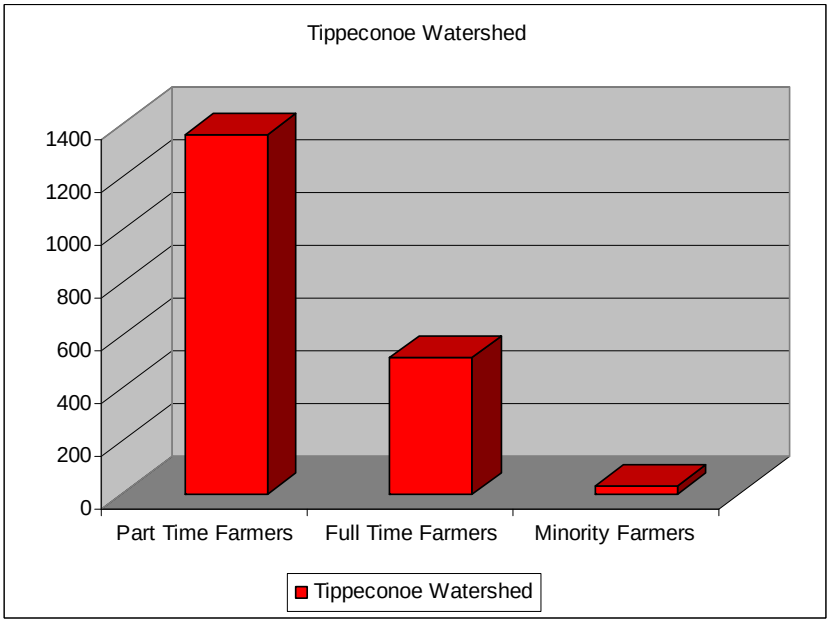
Since 2002 through 2007 landowners have implemented over 32,200 acres of No-Till, approximately 217,800 feet of upland buffers, and just over 3,800 acres of aquatic buffers. Wildlife habitat has been improved or established on more than 12,800 acres within the watershed and just over than 2,400 acres of forestry practices have been applied.

Census and Social Data (Relevant)
There are approximately 9,832 farms in the watershed that average approximately 332 acres in size.



The 2002 average farm total income for all the counties was $83,300,000 while average expense was $74,400,000.

There are approximately 1,359 part time farmers, 516 full time farmers and 33 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