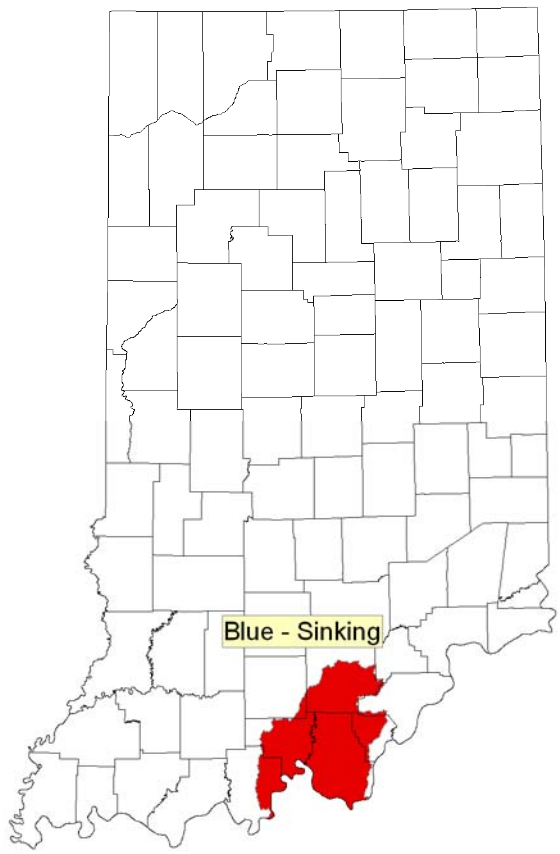
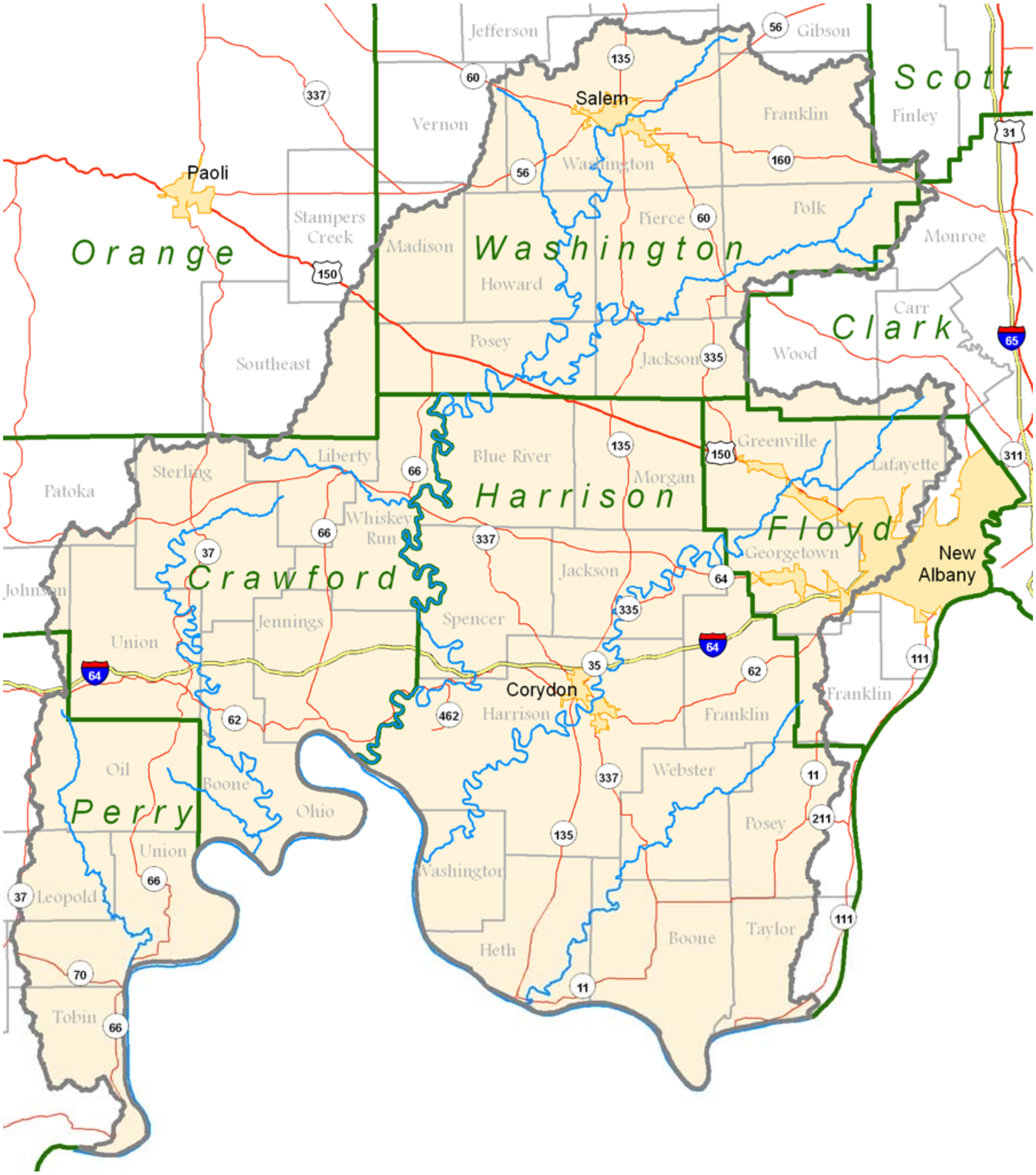
Rapid Watershed Assessment
Blue-Sinking Watershed

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.

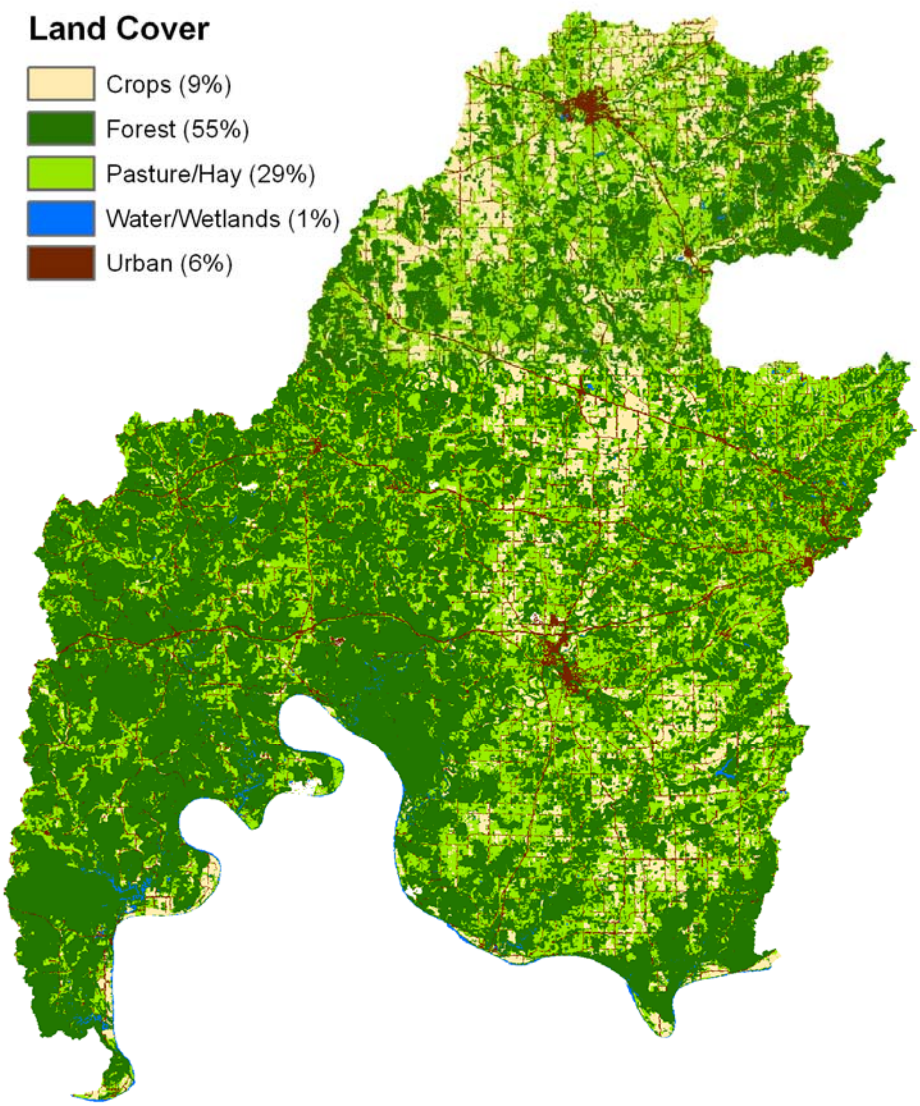


Blue-Sinking Watershed



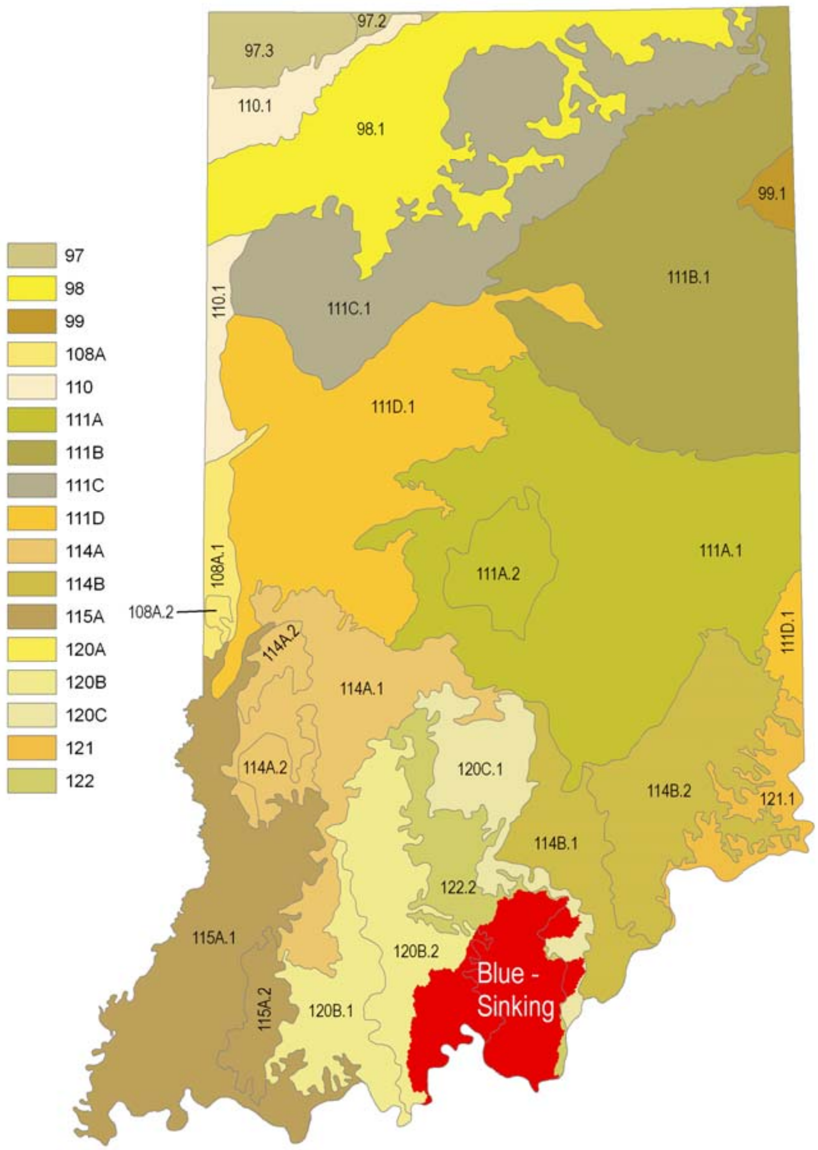
Introduction

The Blue-Sinking watershed is an eight digit (05140104) hydrologic unit code HUC) watershed located in extreme southern part of Indiana. The watershed drainage area is just over 795,000 acres. The watershed covers eight different Indiana counties. It is subdivided into 68 subbasins represented on the map by 12 digit HUCs (Figure 2-1). The Blue River originates in Washington County in southern Indiana, and for a portion of its journey to the Ohio it forms the boundary between Harrison and Crawford Counties. It is an entrenched stream whose meanders have cut deep into the Mississippian limestone bedrock. A series of "half canyons" lie astride the Blue River, never completely enclosing it. The Crawford Upland region is typical of karst (limestone) topography with its many sink holes and caves formed as water dissolved the rock. The limestone walls along the river are usually shrouded in a heavy cover of trees and shrubs. Rock is a constant feature of the stream bed, but much of it is covered by sediment. The width, depth, and gradient of the river vary, but it is about 85 feet wide. Average depth is about five feet deep, and the river falls at about four feet per mile. The Blue River area was first explored by Squire Boone, Daniel Boone's brother. He found large Indian populations whose sites can still be found today (IDNR 1999).



Common Resource Area

There are two common resource areas in the watershed:

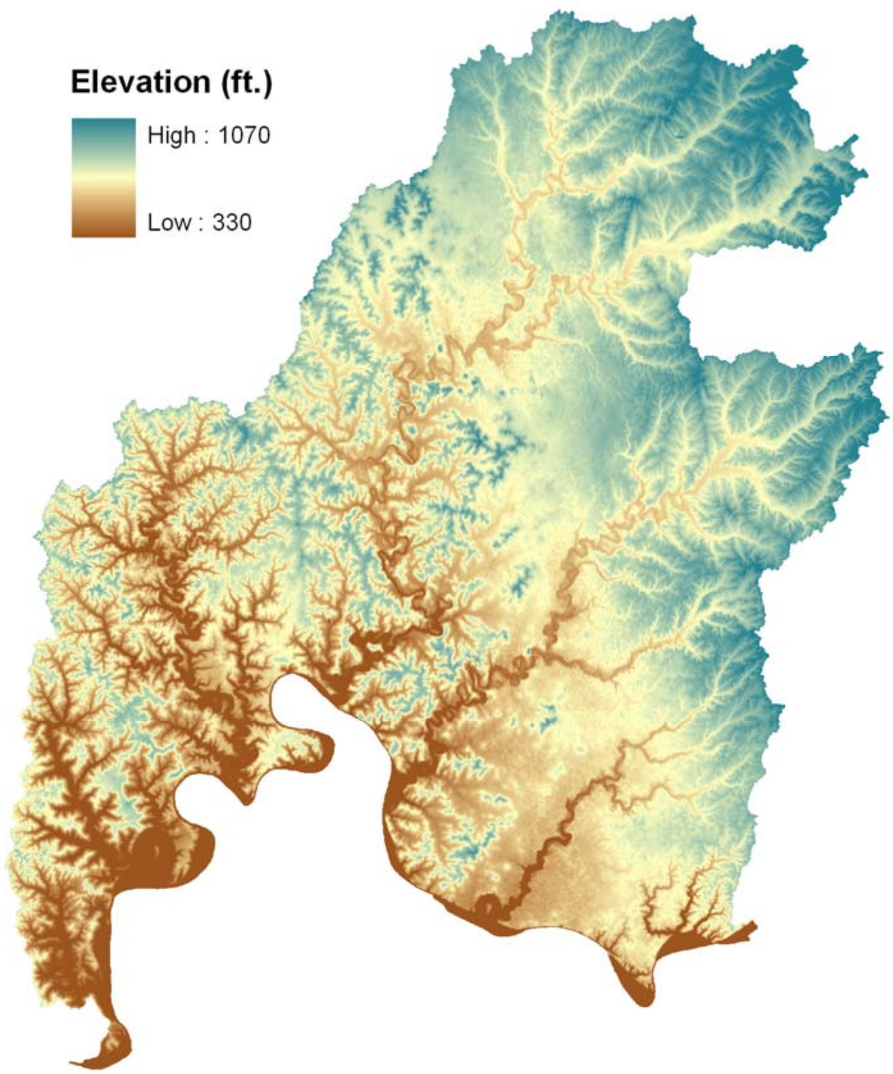


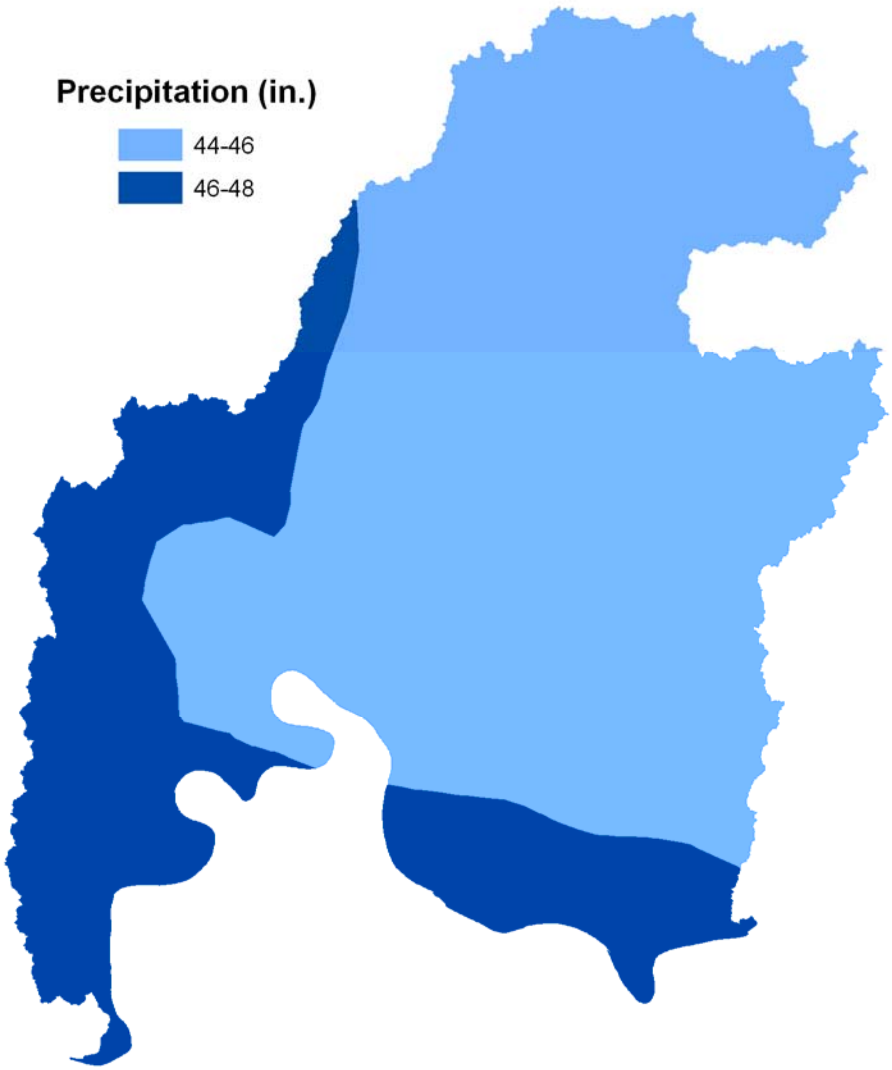
The Forested subsection – Interior Plateau of Kentucky and Indiana Sandstone and Shale Hills and Valley, Northwestern Part - (120B.2). This area is heavily dissected by medium to high gradient streams, more rugged and wooded. Permanent forest is main use. Oaks are found on well-drained upper slopes. 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.

The Interior Plateau of Highland Rim and Pennyroyal – (122.1). The Mitchell Plain in Indiana differentiated by its karst topography and low relief, residential-urban areas, and limestone quarries. Peripheral hills are wooded. Sink holes and underground drainage and terra rossa soils dominate. Karst wetland communities and limestone glades also occurred. Pre-Wisconsinan glaciation, in the north and is flatter and wetter. Soils are moderately well drained and well drained, leached, formed in loess and limestone residuum.

Physical Description

The Blue-Sinking watershed is located in extreme southern part of Indiana. The watershed encompasses approximately 1,242 square miles in eight different counties. It is subdivided into 68 subbasins represented on the map by 12 digit HUCs. The Crawford Upland region is typical of karst (limestone) topography with its many sink holes and caves formed as water dissolved the rock. The limestone walls along the Blue River are usually shrouded in a heavy cover of trees and shrubs. Rock is a constant feature of the stream bed, but much of it is covered by sediment. The width, depth, and gradient of the river vary, but it is about 85 feet wide. Average depth is about five feet deep, and the river falls at about four feet per mile. The Blue River area was first explored by Squire Boone, Daniel Boone's brother. He found large Indian populations whose sites can still be found today (IDNR 1999).

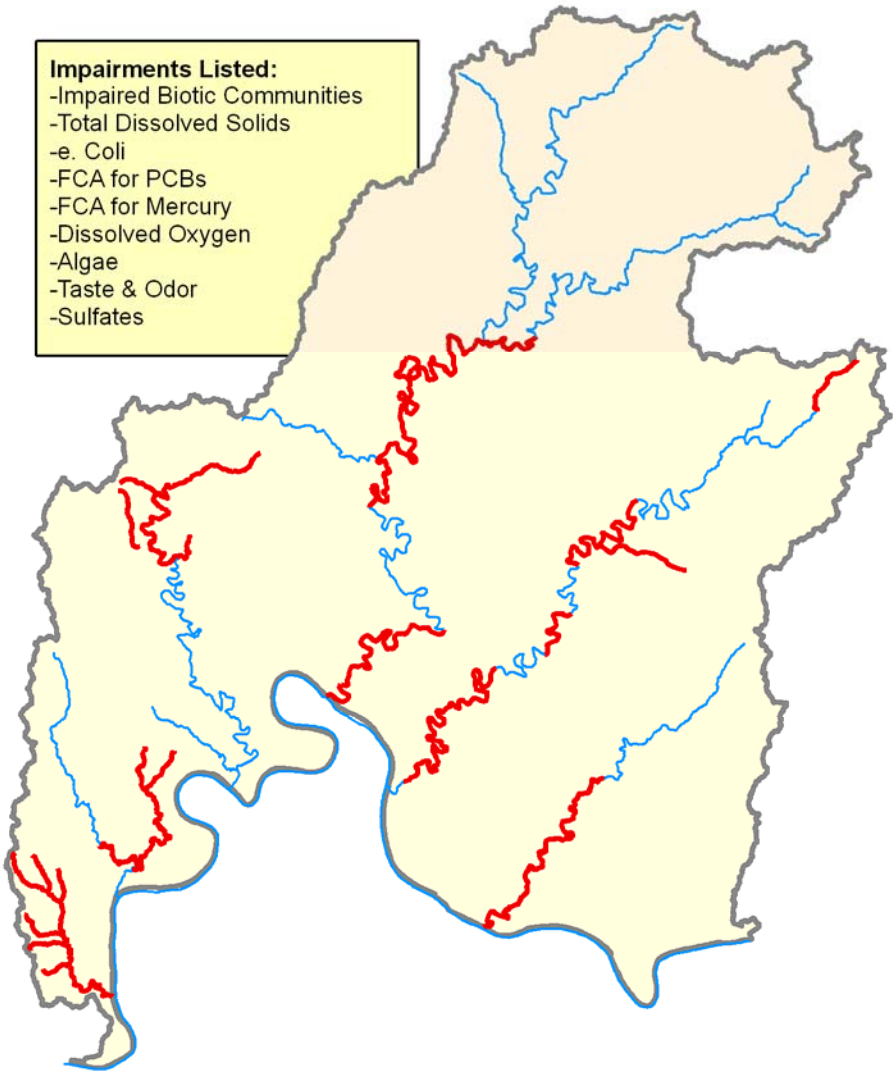




Assessment of waters
Section 303(d) of the Clean Water Act requires states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. The Clean Water Act Section 303(d) list for Indiana provides a basis for understanding the current status of water quality in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

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INN0457_00	BUCK CREEK-MAIN STEM	E. COLI
INN0457_00	BUCK CREEK-MAIN STEM	IMPAIRED BIOTIC COMMUNITIES
INN0482_00	LITTLE INDIAN CREEK (NORTH)	IMPAIRED BIOTIC COMMUNITIES
INN0494_00	INDIAN CREEK-CRANDALL BRANCH	E. COLI
INN0496_T1051	INDIAN CREEK	E. COLI

WATERBODY SEGMENT ID	WATERBODY SEGMENT NAME	CAUSE OF IMPAIRMENT
INN04A3_00	INDIAN CREEK-DEVILS BACKBONE	DISSOLVED OXYGEN
INN04A3_00	INDIAN CREEK-DEVILS BACKBONE	E. COLI
INN04P1029_00	LAKE SALINDIA	ALGAE
INN04P1029_00	LAKE SALINDIA	TASTE AND ODOR
INN04D8_T1041	SOUTH FORK BLUE RIVER	IMPAIRED BIOTIC COMMUNITIES
INN04D8_T1044	SOUTH FORK BLUE RIVER	IMPAIRED BIOTIC COMMUNITIES
INN04E1_T1001	BLUE RIVER	E. COLI
INN04E1_T1001	BLUE RIVER	FCA for MERCURY
INN04E1_T1001	BLUE RIVER	FCA for PCBs
INN04E1_T1040	BLUE RIVER	E. COLI
INN04E1_T1040	BLUE RIVER	FCA for MERCURY
INN04E1_T1040	BLUE RIVER	FCA for PCBs
INN04E5_T1002	BLUE RIVER	E. COLI
INN04E5_T1002	BLUE RIVER	FCA for MERCURY
INN04E5_T1002	BLUE RIVER	FCA for PCBs
INN04F1_T1003	BLUE RIVER	E. COLI
INN04F1_T1003	BLUE RIVER	FCA for MERCURY
INN04F1_T1003	BLUE RIVER	FCA for PCBs
INN04F2_T1004	BLUE RIVER	E. COLI
INN04F2_T1004	BLUE RIVER	FCA for MERCURY
INN04F2_T1004	BLUE RIVER	FCA for PCBs
INN04F3_T1005	BLUE RIVER	FCA for MERCURY
INN04F3_T1005	BLUE RIVER	FCA for PCBs
INN04F5_T1006	BLUE RIVER	FCA for MERCURY
INN04F5_T1006	BLUE RIVER	FCA for PCBs
INN04F6_T1007	BLUE RIVER	E. COLI
INN04F6_T1007	BLUE RIVER	FCA for MERCURY
INN04F6_T1007	BLUE RIVER	FCA for PCBs
INN04F6_T1039	BLUE RIVER	E. COLI
INN04F6_T1039	BLUE RIVER	FCA for MERCURY
INN04F6_T1039	BLUE RIVER	FCA for PCBs
INN04F7_T1008	BLUE RIVER	E. COLI
INN04F7_T1008	BLUE RIVER	FCA for MERCURY
INN04F7_T1008	BLUE RIVER	FCA for PCBs
INN04F7_T1008	BLUE RIVER	IMPAIRED BIOTIC COMMUNITIES
INN04J3_T1047	LITTLE BLUE RIVER	IMPAIRED BIOTIC COMMUNITIES
INN04J3_T1047	LITTLE BLUE RIVER	SULFATES
INN04J3_T1047	LITTLE BLUE RIVER	TOTAL DISSOLVED SOLIDS
INN04J4_T1048	OTTER CREEK TRIB	IMPAIRED BIOTIC COMMUNITIES
INN04J5_00	LITTLE BLUE RIVER-GRANTSBURG	E. COLI
INN04J7_T1046	BOGARD CREEK	IMPAIRED BIOTIC COMMUNITIES
INN04M7_00	OIL CREEK-WEBB BRANCH	IMPAIRED BIOTIC COMMUNITIES
INN04M8_00	LITTLE OIL CREEK	DISSOLVED OXYGEN
INN04M8_00	LITTLE OIL CREEK	E. COLI
INN04N3_00	BIG POISON CREEK	DISSOLVED OXYGEN


Impairments Listed:
-Impaired Biotic Communities
-Total Dissolved Solids
-e. Coli
-FCA for PCBs
-FCA for Mercury
-Dissolved Oxygen
-Algae
-Taste & Odor
-Sulfates

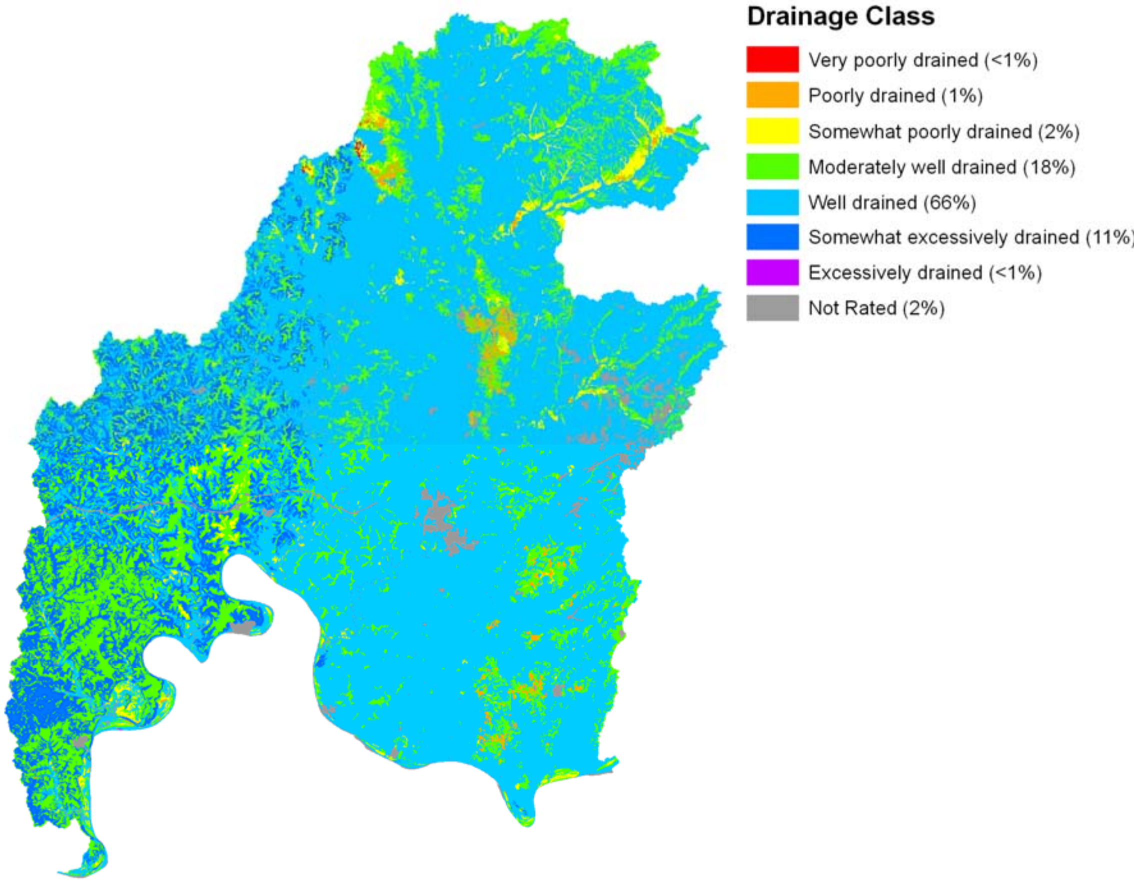
Soils

The dominant soil orders in MLRA (120) 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.

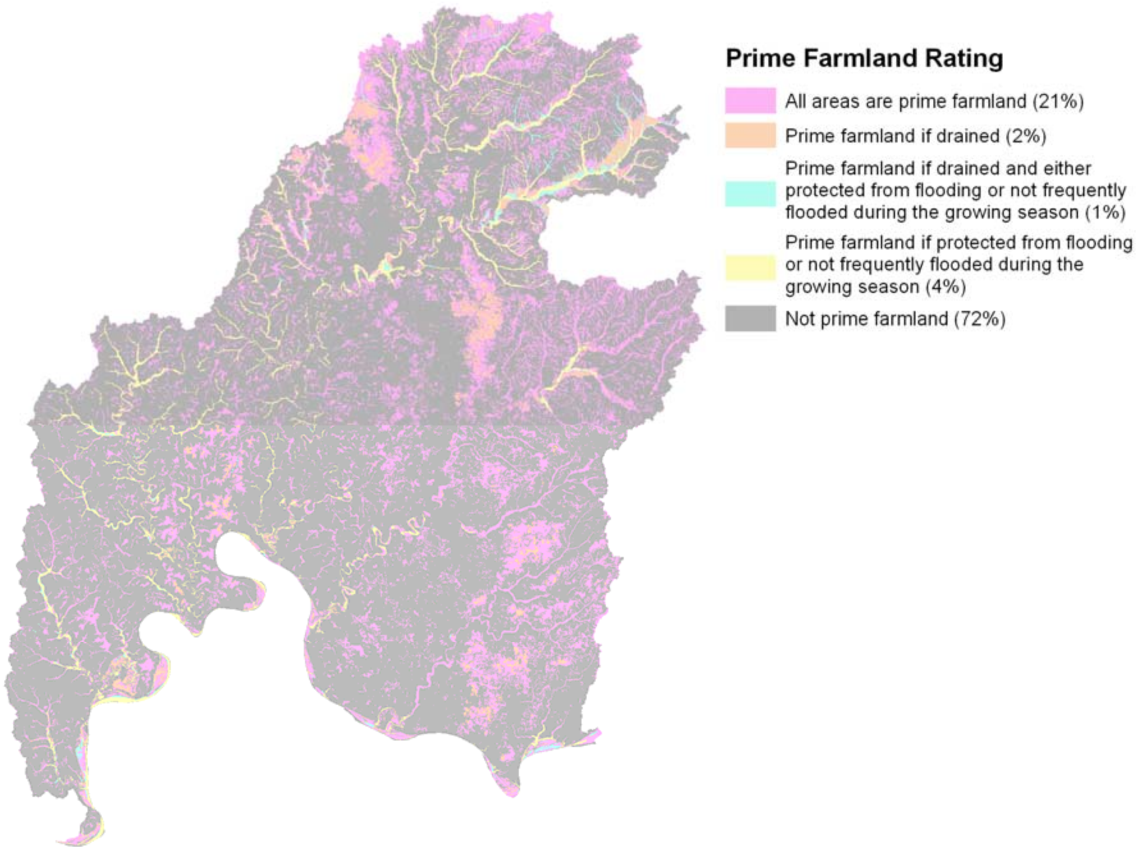
The dominant soil orders in MLRA (122) are Alfisols, Inceptisols, and Ultisols. The soils in the area dominantly have a mesic soil temperature regime, a udic soil moisture regime, and mixed or siliceous mineralogy. They are moderately deep to very deep, generally moderately well drained or well drained, and loamy or clayey. Paleudalfs formed in residuum (Baxter and Vertrees series) and loess over residuum or old alluvium (Crider, Hammack, and Pembroke series) on hills and ridges. Hapludalfs (Caneyville series) and Hapludults (Frankstown series) formed in residuum on hills and ridges. Fragiudalfs (Bedford and Nicholson series) and Fragiudults (Dickson series) formed in loess over residuum on hills and ridges. Eutrudepts formed in residuum on hills (Garmon series) and in alluvium on flood plains (Nolin series). Paleudults formed in residuum on uplands (Frederick series) and in loess over residuum on ridges and plateaus (Mountview series).

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.”



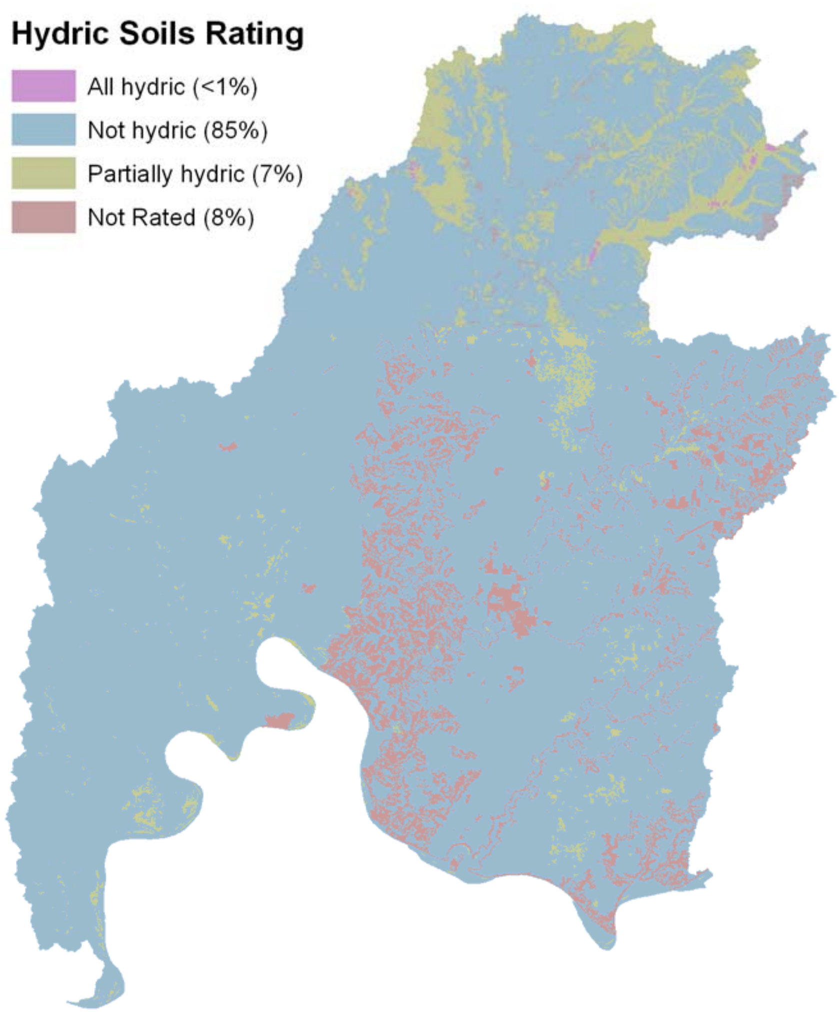
Farmland Classification Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and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

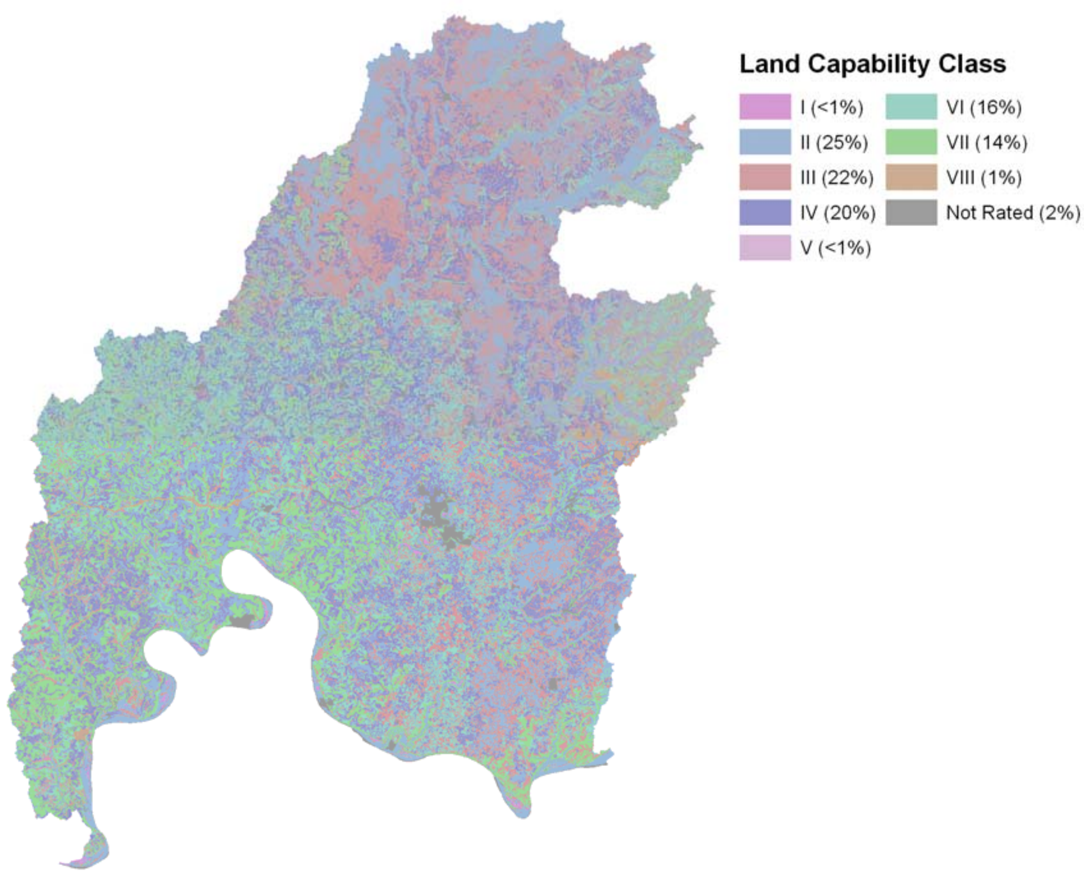
Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils, under natural conditions,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



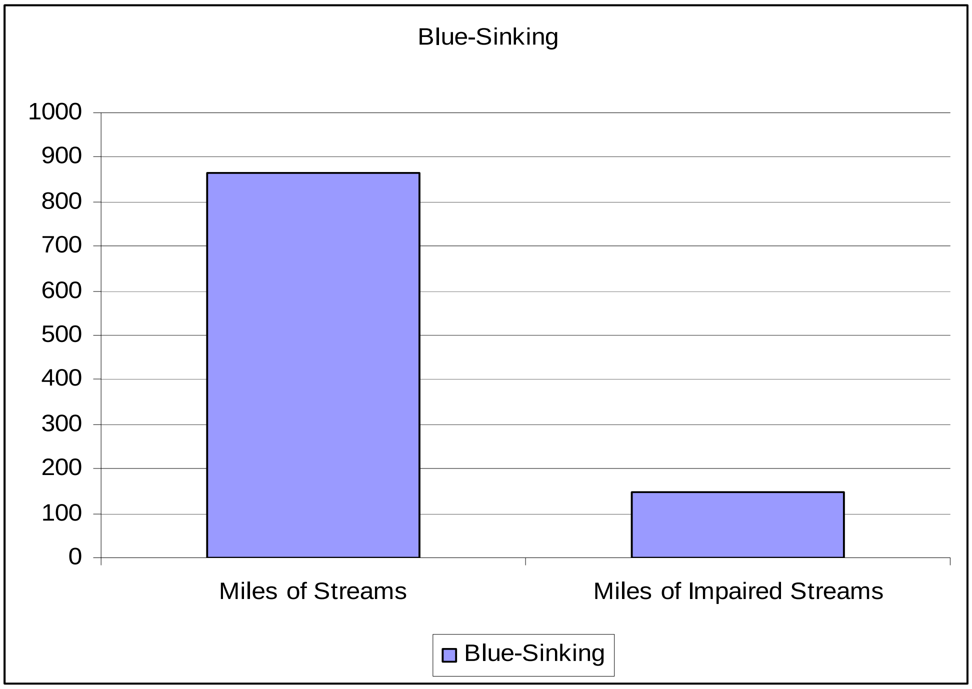
Highly Erodible Land (HEL)
A soil map unit with an erodibility index (EI) of 8 or greater is considered to be highly erodible land (HEL). The EI for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil 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.

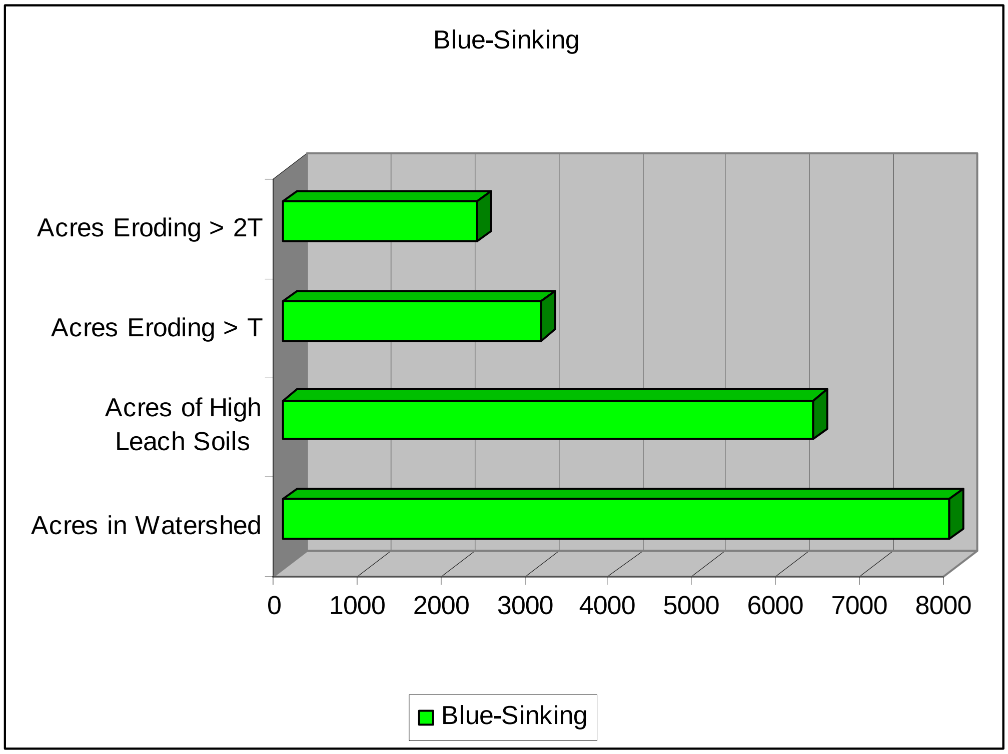


Resource Concerns
Stakeholders and electronic analysis have been identified the following resource concerns as being the top priority:

- Surface Water Quality – There is approximately 17 percent or 146 miles of the 864 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.



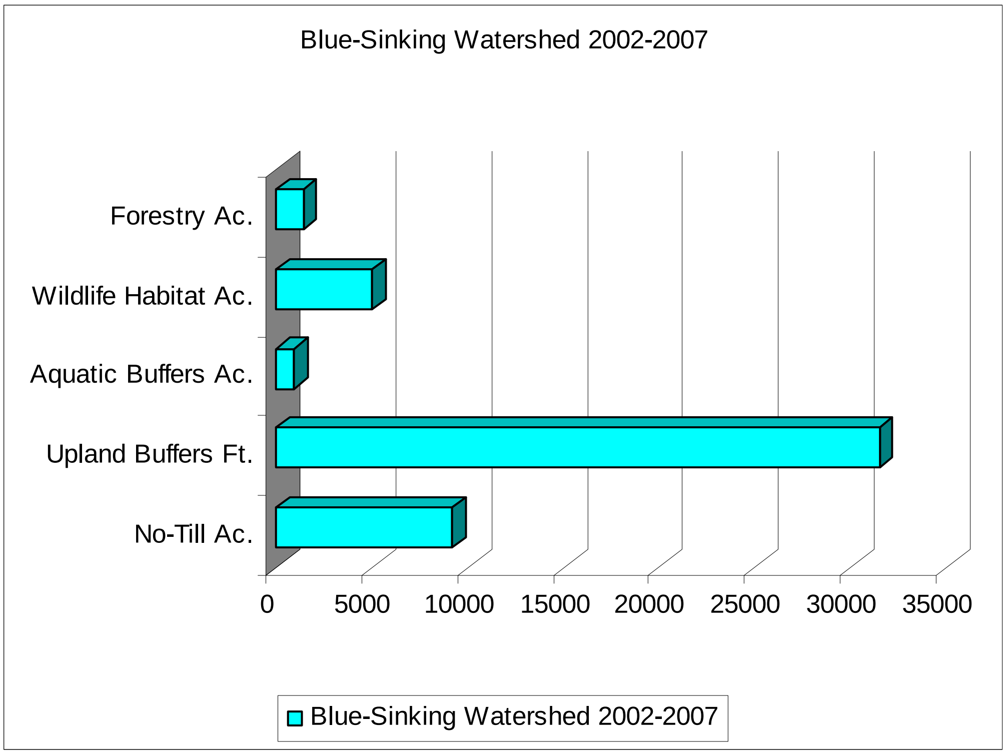
- Ground Water Quality - The watershed has in excess of 630,700 acres of soils with high leaching index (> 10) which allows containments on the land surface to be carried easily into the ground water from infiltrating water. Because of this condition, non–point pollutants such as fertilizers, pesticides, and livestock waste have the potential to contaminate the ground water aquifer. This watershed is dominated (91%) by karst topography. There are an estimated 725,600 plus acres of karst topography within the watershed.
- Air Quality – 36 percent of the watershed has been identified by the Environmental Protection Agency as having an air quality concern.
- Threatened & Endangered Species – Just over 25 percent of the 795,000 acres in the watershed lie within the range of known Threatened and Endangered Species.



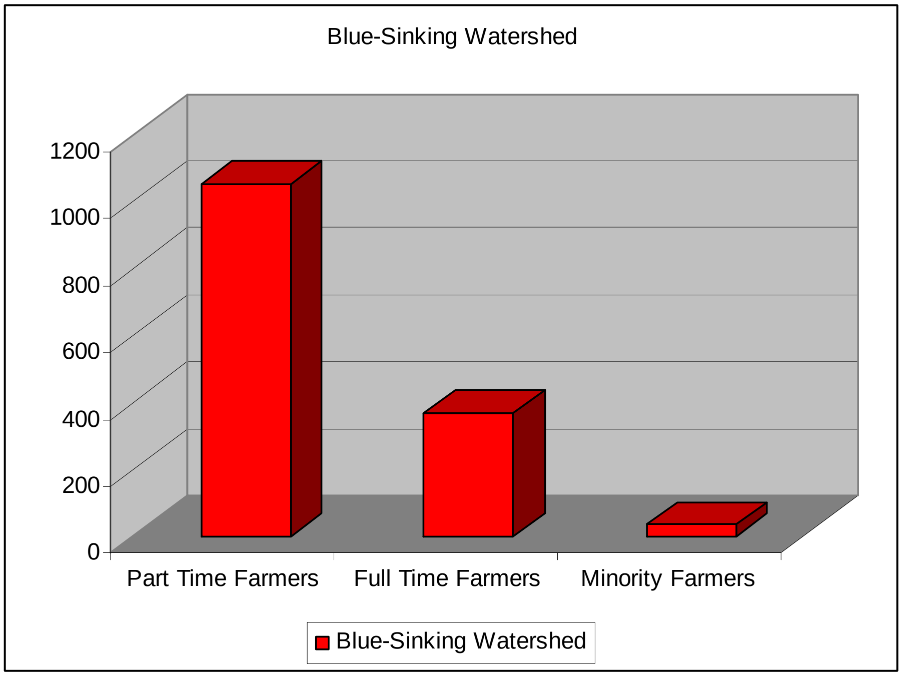
- Soil Quality – The watershed has over 308,400 acres of soils subject to soil erosion. There is over 232,000 acres eroding at twice the tolerable level or “T”. These totals represent some 39 percent of the watershed.

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 9,200 acres of No-Till, approximately 31,500 feet of upland buffers, and just over 900 acres of aquatic buffers. Wildlife habitat has been improved or established on more than 5000 acres within the watershed and just over than 1400 acres of forestry practices have been applied.

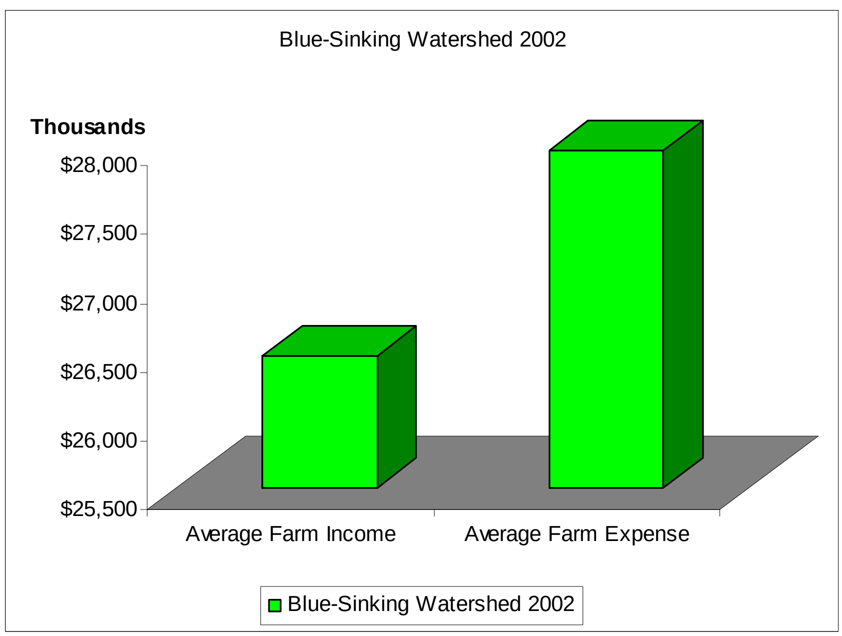


Census and Social Data (Relevant)
There are approximately 1,050 part time farmers, 370 full time farmers and 34 minority farmers.



There are approximately 4835 farms in the watershed that average approximately 194 acres in size.

The 2002 average farm total income for all the counties was $26,461,000 while average expense was $27,956,000.



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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