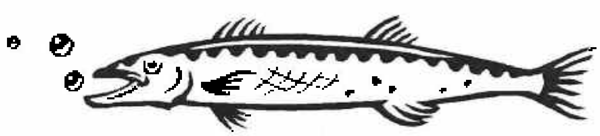
Conns Creek Watershed Management Plan



Prepared for Conns
Creek Watershed
June, 2003

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1.0 INTRODUCTION

1.1 Watershed Maps

Watershed maps are included here that illustrate the location of Conns Creek watershed. **Figure 1.** shows the watershed as a subwatershed of Flatrock River in east central Indiana..

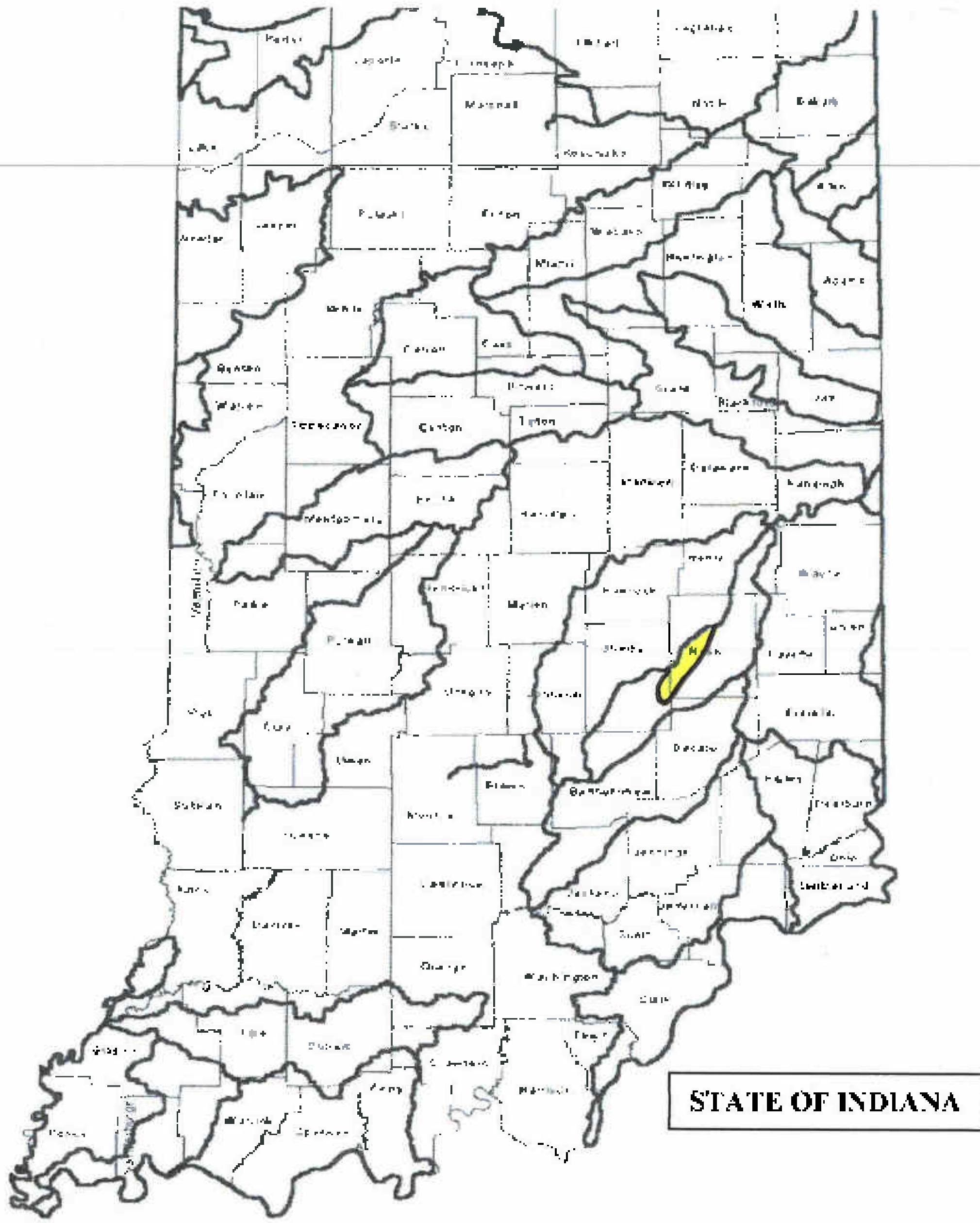
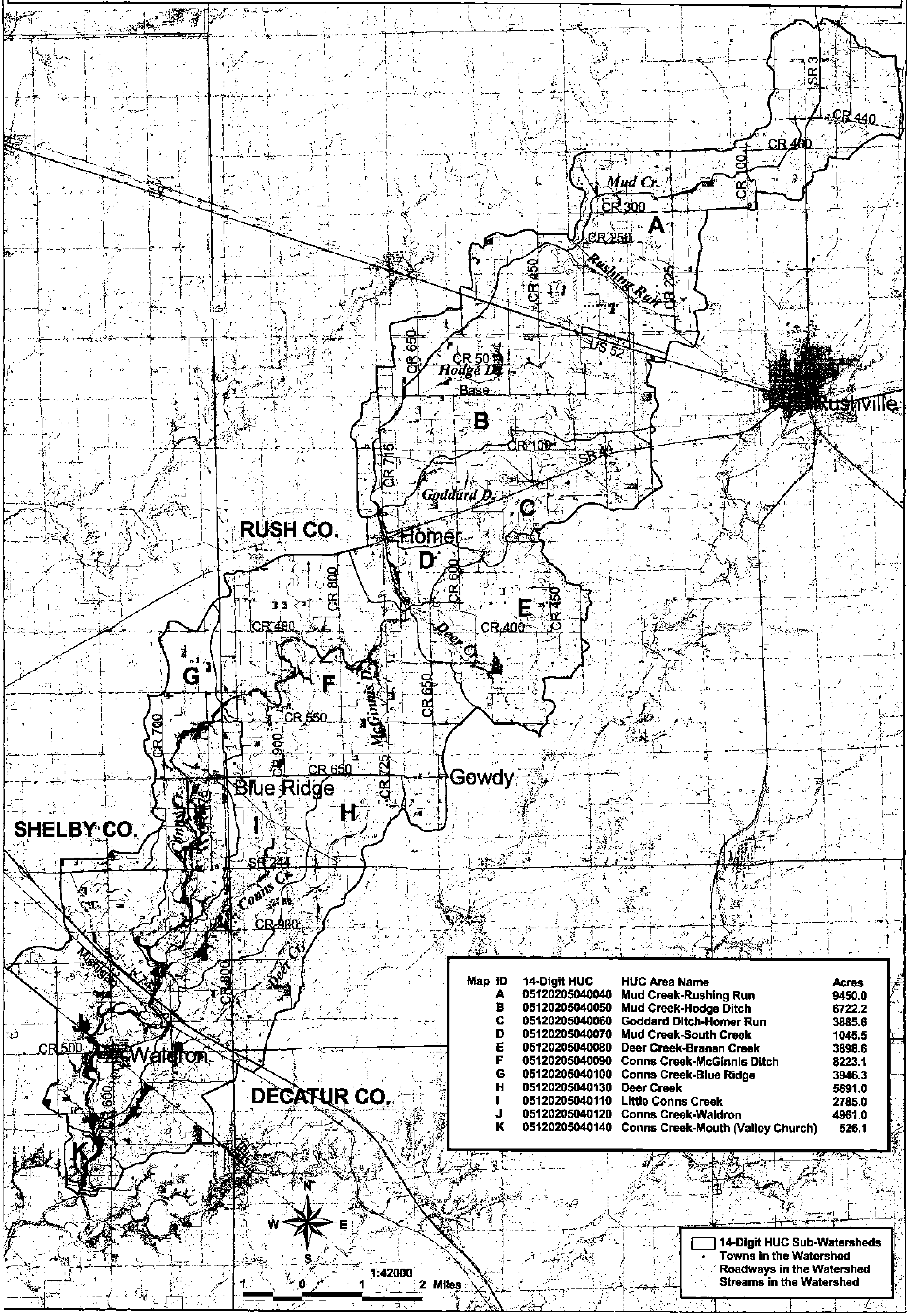


Figure 2. is the map showing watershed boundaries, streams, lakes, roads, towns, township lines, and county boundaries.

Figure 3. is the map showing the location of the legal drain in Rush County.

Conns Creek Watershed



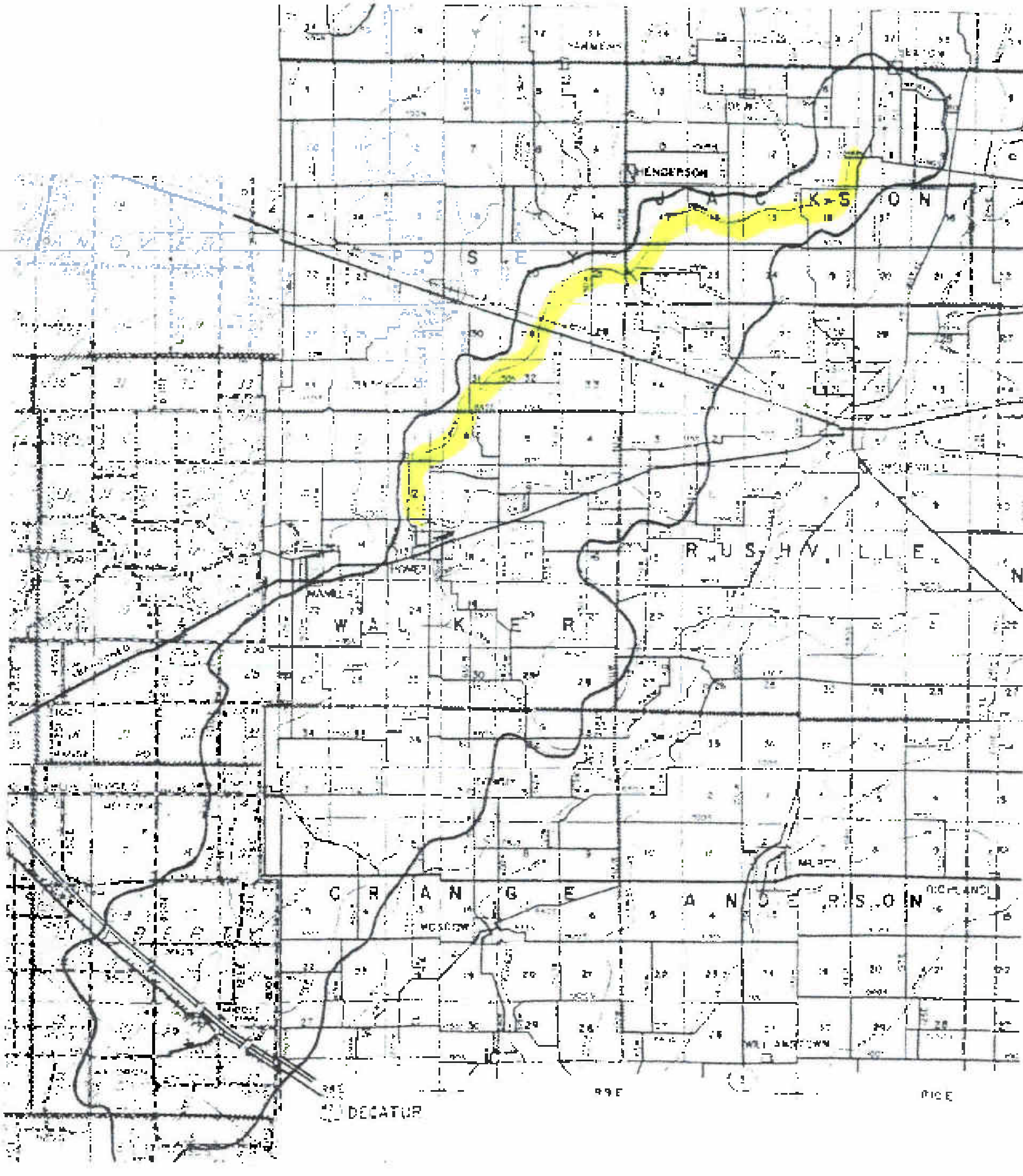


Figure 3. Map showing legal drain designation.

1.2 Description and History

Conns Creek begins in north central Rush County as a tile drain on the Edith Crawley property, becoming an open drain at County Road 450N. The creek continues in a south to southwest path through Rush County, on the east side of Arlington, through Homer to the Rush-Shelby county line. Widening as it crosses the Shelby County line, the creek continues through Blue Ridge, Middletown, and Waldron and empties into the Flatrock River approximately six miles south of Waldron. The creek has traditionally been called Mud Creek in Rush County, because of the narrow, shallow conditions at its beginning. The designation to Conns Creek begins at the county line, where the creek picks up a more rock lined bottom to its end at the Flatrock River. The Rush County portion of the creek is the "Mud Creek Legal Drain" from its beginning to County Road 200N, just north of Homer. The legal drain designation was enacted in 1883 and included the Elbridge Jones and William C. Mauzy drains. In 1901 the William Cross East drain was added to the legal drain. A mile section through the Winkler-Offutt property, west of Arlington, was not included in the original legal drain status. On November 4, 2002, the Rush County Drainage Board voted to combine all of these separate drains into one drain and it became the Mud Creek drain. The creek through the Winkler-Offutt property was also included in the new combined legal drain. The remainder of Mud Creek in Rush County and Conns Creek in Shelby County are not designated as legal drains. Additional tributaries that flow into the creek are Little Conns Creek, Deer Creek, Beabout Creek, Homer Run, Boone Smelser, and Rushing Run.

Ninety percent of the acres in this watershed are flat to gently rolling. The remaining acres range from six to twenty-five percent slope. These hilly acres are mostly adjacent to the channels, and are primarily forested or pastured. Cropland percentage in the watershed is ninety percent. Primary crops are corn and soybeans. Crop residue transect surveys conducted annually by the Indiana Department of Natural Resources and Purdue University indicate both counties rank high in the state for no till acres planted in corn and soybeans. According to the 2002 survey results, Shelby County ranks 16^{th} in the state for no till corn with 19,772 acres (23 percent of corn acres) and Rush County ranks 18^{th} with 19,342 acres (19 percent of corn acres). In no till soybean plantings, Shelby County ranks 7^{th} in the state with 64,904 acres (75 percent of soybean acres) and Rush County is 27^{th} with 45,982 acres (57 percent of soybean acres).

Soil types in the watershed are similar for both counties. According to the Soil Survey of Rush County and the Soil Survey of Shelby County, developed by the United States Department of Agriculture, Soil Conservation Service, soil types in the watershed are primarily Miami silt loam, Crosby silt loam with small pockets of Treaty silt clay loam and Miami silt loam with a gravely substrate in the northern part of the watershed. The Crosby-Treaty soil series is classified as deep, nearly level, somewhat poorly drained and very poorly drained soils formed in loess and the underlying glacial till. The Miamian series is classified as deep, gently sloping to steep, well-drained soils formed in loess and underlying glacial till. As the creek continues toward Arlington, these major soil types continue with the addition of Celina silt loam. On the west side of the creek as it approaches Homer, there is documented Shoals silt loam, a type subject to frequent flooding. The Genesse-Sloan-Shoals series is deep, nearly level soils formed in alluvial deposits on bottomlands. There are also pockets of the Ockley-Westland-Sleeth series that is classified as deep, nearly level and gently sloping soils formed in glacial outwash deposits. South of Homer and to the county line, the major Miami and Crosby soil types continue with the Shoals silt loam along both sides of the creek. The Miami-Crosby-Hennepin series continues on into Shelby County. This series is described as deep, well-drained soil on nearly level to steep slopes and is a medium textured soil. Areas of the Genesee-Ross-Shoals series, another medium textured soil, is found further south into Shelby County. A Crosby-Brookston series is also indicated on the soil survey. This is a deep, somewhat poorly drained, gently sloping, medium textured to fine textured soil area. Closer to the Flatrock River, soil changes to Fox-Nineveh-Ockley medium textured soils that are moderately deep and deep over gravel and sand. One notable feature of the southernmost portion of the watershed is the presence of an abandoned quarry almost due west of the Decatur County town of St. Paul. This has been transformed into a recreation area, used primarily for scuba diving. Called Blue Springs Quarry, the lake is fed by underground springs and averages 30 to 40 feet in depth.

The Bedrock Geologic Map of Indiana (1987) indicates bedrock types throughout the watershed. In the northern part begins the Whitewater Formation, a skeletal limestone and calcareous shale, dolomitic mudstone at base. Through the central portion is Salamonie Dolomite Cataract Formation and Brassfield Limestone. At the southern end is the Mustatuck Group, a limestone and dolomite. Soil depth to bedrock through the watershed varies from greater than sixty inches through Rush County and into Shelby County to just greater than twenty inches towards the end of Conns Creek, close to the Flatrock River.

All land is privately owned in the watershed. According to DNR, there are no public access areas to the streams in Rush County. Shelby County has one access area at the confluence of Conns Creek and Flatrock River. The small towns—Homer, Middletown, and Waldron—are unincorporated. County townships included in the watershed are portions of Jackson, Posey, and Walker in Rush County, and Union and Liberty in Shelby County. The majority of wells are privately owned with the exception of the town of Waldron. Formed in 1966, the Waldron Conservancy District currently stores 40,000 gallons of water for daily use by its 255 customers. Plans are being developed for adding an additional water tower that will provide almost two days of water storage for the town. Water wells are located north of the town. The conservancy district has submitted a wellhead protection plan to IDEM and is in the second phase of the process. The district also serves 285 sewer customers. Effluent from the sewage treatment plant discharges into Conns Creek. There have been no reported problems with either the water or sewer facilities in Waldron.

According to a fisheries survey conducted by DNR in 1996, the most prevalent fish species found in Conns Creek were striped shiner, central stoneroller, longear sunfish and bluntnose minnow. In this survey, a total of 5,165 fish were collected which represented 38 species. The dominant species collected by weight included striped shiner, golden redhorse, white sucker, black redhorse, smallmouth bass, and longear sunfish. A previous fisheries survey conducted in 1980 showed a high percentage of emerald shiner, common shiner, longear sunfish, brook silverside, and northern hog sucker.

There are varieties and sizes of fish and macroinvertebrates species and communities that have diminished in Rush and Shelby counties over the years and the following species are either endangered, threatened, rare, or gone from the area according to documentation from the IDNR:

Gone From Area	Popeye Shiner
Endangered	Clubshell Mussel, Northern Riffleshell Mussel, Snuffbox Mussel, Rabbitsfoot Mussel
Threatened or Rare	Brook Pimpernell (Veronica anagallis-aquatica)
Of Special Concern	Eastern Sand Darter, Northern Studfish, Wavy-Rayed Lampmussel, Kidneyshell Mussel, Purple Lilliput Mussel, Little Spectaclecase Mussel, Salamander Mussel, Northern Leopard Frog
Of Concern	Slippershell Mussel, Lilliput Mussel

1.3 Partnership

The Steering Committee included the following landowners and county and community leaders:

Darwin Brewer: Chairman of steering committee, landowner, farmer
Max Miller: Steering committee, landowner, farmer
Neal Kuhn: Steering committee, landowner, farmer
Jerry Sitton: Steering committee, landowner, Rush County Highway superintendent
John Kuhn: Steering committee, landowner, farmer
Dan Scott: Steering committee, landowner, Homer spokesperson
Linda Weintraut: Steering committee, landowner, educator
Marvin Rees: Rush County Surveyor
Kevin Nigh: Shelby County commissioner
Richard Lyles: NRCS engineering technician
Bernie Crafton: SWCD employee

This list of volunteer steering committee members was formed following the first public meeting of the watershed in September, 2001. The roles and responsibilities of the first seven individuals in this list were to assist in information gathering, to contact landowners about concerns in the watershed, and to aid in inventorying the stream and adjacent land. The county surveyor and county commissioner contributed vital information concerning the legal drain status and county government policies for both Rush and Shelby counties. The NRCS and SWCD representatives provided technical assistance and information in developing the goals and projects discussed later in this plan. A watershed coordinator contracted by the Rush County SWCD took on most of the responsibility of public outreach development, event scheduling, data collection, plan development, and with the steering committee's assistance, stream walks and door-to-door visits with landowners to discuss the project and their concerns. The SWCD assisted with the data collection, distribution of outreach materials, the fair displays, field days, and record keeping of materials and events. Additional partners in the project included the County Commissioners and SWCDs for Rush and Shelby counties along with the Waldron Elementary School, the communities of Homer, Middletown, and Waldron, local radio station WKWH, the *Rushville Republican* and *The Shelbyville News*, Western Regional Sewer District, and the Waldron Conservancy District.

1.3.1 Mission of the Group

The mission of the group was established as: ***Conns Creek Watershed group is a partnership of concerned citizens dedicated to developing and implementing a watershed plan to protect and maintain water resources in the Conns Creek area.***

1.3.2 Vision of the Group

The vision of the group was established as: ***A clear, free running stream with a renewed fish population***

1.4 Public Involvement

The public was involved in the project through their attendance at public meetings providing current and historic information and through their stream walks and windshield surveys. The outreach efforts conducted through the development of this plan included adult and student education programs, in addition to water quality monitoring activities using the Hoosier Riverwatch methods. Data from the sampling activities was not used in the development of the plan. However, visual and pictorial observations from the public were included in the plan. Other outreach programs included newspaper articles, radio public service announcements, newsletters, county fair displays, and field day displays.

The first public meeting was advertised in Rush and Shelby counties and was held in Manilla in September, 2001. Watershed landowners, county government officials, including commissioners and surveyors from both counties, and conservation partners attended this initial meeting. Concerns for the watershed area were listed and attendees were asked to volunteer for a steering committee. The concerns that were prioritized by the established steering committee and were addressed in this plan were drainage, bank erosion, livestock runoff, fish populations, and sanitation systems, particularly adding additional water to the creek.

Concerns that were discussed at the initial public meeting but are not addressed specifically in this plan include dredging sediment, tree and beaver dam removal, flooding roads, high residue piles, and abandoned wells. The steering committee initially felt that tree removal from the stream would alleviate the need to dredge sediment. The committee further felt that flooding roads are more a problem of drainage and an issue for the county highway department. Independent investigation revealed that the flooded road in question was an isolated incident and not a recurring issue. Abandoned well concerns were addressed with an available cost share program for watershed residents. Education and displays about proper plugging techniques for abandoned water wells were well received in both counties. However, the privacy issue of registering abandoned wells was a deterrent to any participants in the cost share program. Well owners also discovered that it was more cost effective to study the available video and educational materials and perform the plugging themselves, without hiring a licensed well driller as required by DNR standards.

Rush County commissioners and Shelby County commissioners, along with county surveyors from both counties and steering committee members, participated in a driving tour of the watershed in December, 2001. Beginning at the northernmost point in Rush County, the group verified the condition of the stream and the adjacent properties through to the point south of Waldron where Conns Creek joins the Flatrock River. The steering committee members also spent many hours visiting one-on-one with watershed residents, updating them on the project's progress, and soliciting information about their land. They also encouraged landowners to accept responsibility for the condition of the stream through their property. As evidenced through the initial windshield survey in December, 2001, there was a wide variation in how each landowner cared for their portion of the stream.

Log jams and trees in danger of falling into the stream were cooperatively removed by landowners, which allowed for a more constant flow of water down stream. The amount of silt that had accumulated in the stream was reduced at one location from two feet to less than six inches over the course of one month. This verified to the landowners and steering committee that proper maintenance of the stream bank and the present riparian area was a legitimate concern with regard to drainage. Once the quantity of water was addressed, water quality became a more important issue to the steering committee.

Homer residents accomplished their own mini project during this time frame. During the spring of 2002, the watershed area along with the entire two-county area was inundated with twenty inches of rain. The town of Homer relied on an antiquated tile system to remove storm water and septic system drainage to Mud Creek. Homeowners were specifically invited by letter and general postings to attend a public meeting with the steering committee to discuss their situation. Homer residents knew it was important to drain the flood water to reduce property damage. Working together as private citizens, the homeowners were able to finance and replace damaged/plugged tiles throughout the town and remove standing water for individual property owners. It was discovered that the septic systems were tied into these drainage tiles, allowing the effluent to directly enter Mud Creek. **Figure 4.** illustrates the extent of the standing water problem in Homer and the resulting change in the landscape following the repairs.

Figure 4. Before and after pictures of Homer, Indiana, cooperative drain repair project.

2.0 IDENTIFYING PROBLEMS

2.1 What was already known

Four of the major concerns were chosen by the group to explore more extensively. These were *E. coli*, siltation, atrazine and other pesticides, and trash. The decision to explore these areas was based on previous information collected in applying for the grant and concerns expressed in the initial public meeting.

2.1.1 About *E. coli* and other health concerns:

A septic systems survey of Indiana county health departments was conducted in 1997 by the Indiana State Department of Health and Purdue University agricultural engineers. This information was reported on a statewide basis to the participating sanitarians. Results showed that sixty-five percent of pre-1970's homes had failing or substandard residential septic systems. There are only two areas in the watershed where sewage treatment plants handle residential sewers. Septic systems in Homer discharge into the newly repaired/replaced tile system which then directly discharges into Mud Creek on the south side of State Road 44. This raw effluent will be eliminated with the current construction of the Western Rush County Regional Sewer and Water District. This plant will provide sewer service for Arlington, Manilla, and Homer residents and residents living along the sewer line between Arlington and Homer, and Manilla and Homer. Approximately 300 customers will be serviced by the sewer plant when it is completed in the winter of 2003. The plant will discharge 100,000 gallons of effluent per day into Mud Creek. This amount of effluent has the potential of raising the water level of Mud Creek between .8 and .9 inches. The Waldron Conservancy District currently discharges treated effluent from its sewer plant for the 285 sewer customers within the town of Waldron.

Section 303 (d) of the Clean Water Act requires states to identify waters that do not meet water quality standards. The Flatrock River was listed on the 1998 303(d) list for PCB's and mercury. A draft list in 2002 including this stretch of the Flatrock River, into which Conns Creek enters, continues to be listed for *E. coli*, PCBs, and Mercury. While Conns Creek/Mud Creek is not a significant contributor of PCBs or Mercury, the Conns Creek watershed contributes to the *E. coli* found in the Flatrock River.

EPA has also listed fish and wildlife consumption advisories for the Driftwood watershed, which includes the Conns Creek watershed. This is supported by the Indiana State Department of Health's *2002 Indiana Fish Consumption and Advisory*. The report lists Northern Hogsucker, Longear Sunfish, and Rock Bass as Group 2 and Group 3 for mercury. Group 2 means limiting consumption to one meal per week of a particular species and Group 3 limits consumption to one meal per month of a species.

2.1.2 About Siltation:

Siltation has been an issue on Conns Creek, known as Mud Creek in Rush County. The presence of Shoals silt loam, a soil type that frequently floods, is found along the stream in areas just north of Homer and south of Homer to the county line. Eroding stream banks were observed in both of these areas during stream walks and inventory. Stream banks through the southern portion of the creek were stabilized by trees and tree roots.

2.1.3 About Atrazine and Other Chemicals:

The Natural Resources Conservation Service notes in its Field Office Technical Guide that eighty percent of the soils in the watershed have a severe potential for pesticide leaching. Also, the USGS National Water Quality Assessment Program, White River Basin Study, showed unacceptable levels of Atrazine at the southern end of the watershed.

2.1.4 About Trash:

Floating trash was also indicated close to educational monitoring sites. This was observed by the Waldron Elementary group during their Hoosier Riverwatch monitoring experience. Large amounts of trash are noted on a routine basis by Shelby County law enforcement and area landowners in the southernmost portion of the watershed along Conns Creek. The "Flats", as this area is known, is a popular picnic and recreation area at the point just south of where Conns Creek joins the Flatrock River. Volunteer river monitors observed debris along the stream banks between Middletown and Waldron. This was confirmed in 2001 by a volunteer stream walker and local landowner.

2.2 What was found out

Several types of investigations were completed during the planning process for the management plan. A windshield survey was completed during the fall of 2001 for the watershed. This involved county commissioners, county surveyors, landowners, and conservation partnership from Rush and Shelby counties. Digital photographs were taken from both directions (north-south, or east-west) at each county or state bridge through the entire watershed. *(See Appendix C)* This was a benchmark for later visual observations. Using these photographs, additional photographs taken, and plat maps, the committee was able to identify landowners throughout the watershed. These pictures also served as a starting point to identify potential problem areas along the creek.

Stream walks were conducted by individual steering committee members, county surveyor, and watershed coordinator. These walks were continued throughout the planning process to note changes in the land bordering the creek during different seasons of the year.

2.2.1 About *E. coli:*

The educational monitoring program was conducted solely for school age children and adults to learn about water quality. Water monitoring results at two sites on the Flatrock River, one upstream and one downstream from the Mud Creek/Conns Creek watershed indicate the presence of *E. coli*. Obtained from IDEM's Surveys Section database, the data shows an increase on particular sampling days from the northern site to the southern site, a stretch of stream that includes the Conns Creek area.

The Indiana State Water Quality standard for *E. coli* states that "*E. coli* bacteria shall not exceed 125 cfu per 100 ml as a geometric mean based on 5 samples evenly spaced over a 30 day period nor exceed 235 cfu per 100 ml in any one sample in a thirty day period." Applying this standard to the data collected at the two Flatrock River sites and shown in **Table 1.** indicates violations on eight of the fifteen sampling days from June, 2000, to October,2002. **Figure 5.** indicates the two sampling sites on Flatrock River.

Figure 5. ○ Location of sampling sites on Flatrock River

Table 1. ***E. coli*** **sample data from two sites on Flatrock River from IDEM Surveys Section Database**

Table 1. *E. coli* sample data

The two sites are identified as:

WEF020-0002 on Flatrock River and Gings Road Bridge, Northeast of Rushville
Latitude 39 40 24
Longitude -85 25 4

WEF050-0002 on Flatrock River and SR 252, near the Town of Flat Rock
Latitude 39 21 49
Longitude -85 51 19

LSITE	SAMPLE NUMBER	SAMPLE DATE	PARAMETER	UNIT VALUE	PROJECT	LAB RESULTS
WEF050-0002	DI29697	6/16/00	Coliform, E.coli	CFU/100mL	2000 Fixed Station Monitoring Project	830.0
WEF050-0002	DI29894	7/27/00	Coliform, E.coli	CFU/100mL	2000 Fixed Station Monitoring Project	120.0
WEF050-0002	DI31835	5/31/01	Coliform, E.coli	CFU/100mL	2001 Fixed Station Monitoring Project	200.0
WEF020-0002	AA10966	5/30/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	220.0
WEF050-0002	AA10971	5/30/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	340.0
WEF050-0002	AA11331	6/6/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	1700.0
WEF020-0002	AA11398	6/13/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	460.0
WEF050-0002	AA11403	6/13/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	820.0
WEF050-0002	AA11494	6/27/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	440.0
WEF020-0002	AA11506	6/20/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	235.0
WEF050-0002	AA11511	6/20/02	Coliform, E.coli	CFU/100mL	2002 Flatrock River E. coli TMDL	240.0
WEF050-0002	AA13599	9/16/02	Coliform, E.coli	CFU/100mL	2002 E.coli Monitoring of Muscatatuck R./Upper EFWR	152.9
WEF050-0002	AA13674	9/23/02	Coliform, E.coli	CFU/100mL	2002 E.coli Monitoring of Muscatatuck R./Upper EFWR	48.8
WEF050-0002	AA13943	9/30/02	Coliform, E.coli	CFU/100mL	2002 E.coli Monitoring of Muscatatuck R./Upper EFWR	54.6
WEF050-0002	AA14038	10/7/02	Coliform, E.coli	CFU/100mL	2002 E.coli Monitoring of Muscatatuck R./Upper EFWR	52.0

2.2.2 About Fish and their Habitat

Results from the fisheries study conducted on Conns Creek in 1996 by DNR concluded that 36 percent of the fish collected were intolerant to pollution and sedimentation. These species included longear sunfish, northern hog sucker, greenside darter, hornyhead chub, big eye chub, golden and black redhorse, and smallmouth bass. Only 16 percent of the fish community was composed of tolerant species including bluntnose minnow, white sucker, creek chub, yellow bullhead, green sunfish, and carp. It was noted in the fisheries study that while the habitat and diversity of fish species were good for Conns Creek, habitat could be improved by widening the riparian corridor. The highest number of smallmouth bass and rock bass were found at the two locations where the habitat scores were the highest. Game fish were scarce in channelized sections of the stream due to the lack of suitable habitat such as deep pools and instream cover.

This fisheries study did not include the Mud Creek portion of the stream. This area of the stream would provide nursery and spawning areas for game fish such as smallmouth bass. Once spawning has concluded, the adults move to deeper water while the young remain in the small stream. The increase in sediment in the northern portion of the stream restricts the amount of nursery and spawning areas available for game fish species.

2.2.3 About Sewage Systems

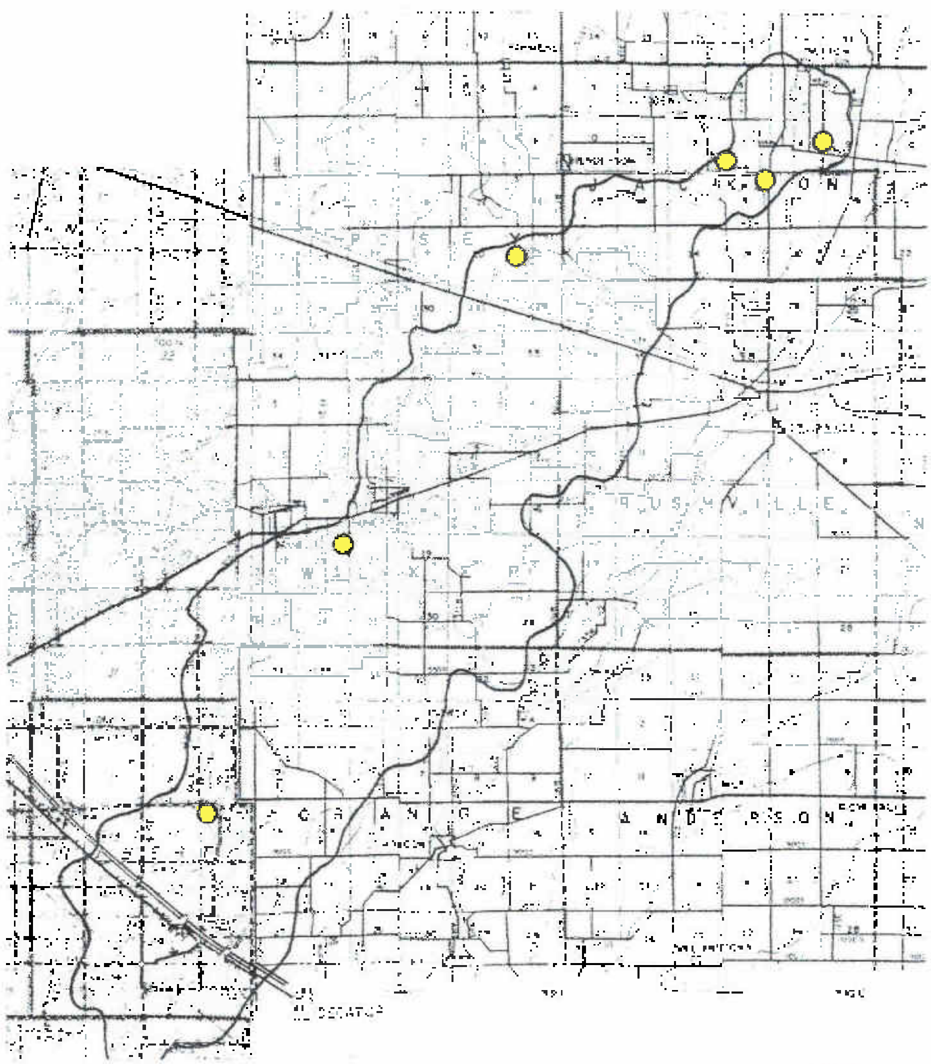
The residents of Homer outlet their septic systems' raw effluent directly into the existing tile lines that were replaced and repaired in May, 2002. Prior to this time the effluent was hampered in its flow by broken tiles or nonexistent drains. These new lines continue to discharge black sewage directly into Mud Creek. When the Western Rush County Regional Sewer and Water District is completely operational, the effluent from the sewer plant will discharge up to 100,000 gallons of material per day into Mud Creek. Expected completion date of the system is late 2003. The regional sewer district includes the towns of Arlington, Homer, and Manilla. Sewer lines begin in Arlington and run down County Road 725 W to the sewer plant located on the east edge of Homer. Sewer lines from Manilla and Homer will also link into the sewer plant. The Waldron Conservancy District discharges treated effluent from its 285 customers into Conns Creek.

Private septic systems are the most common method of sewage disposal in the primarily rural watershed area. The conditions of these systems are undocumented. The only records that are required to be filed with the county health departments are in cases of system failure or new construction applications.

2.2.4 About CAFOs

The number of confined livestock operations was also investigated through IDEM records. A confined feeding operation is defined as having 300 or more cattle or 600 or more hogs in a building or group of buildings on a farm unit. According to numbers obtained from IDEM and illustrated on **Figure 6.**, there are six confined operations located in the watershed. Zoning regulations in the counties help to control the number of animal units allowed on a farm. These operations are permitted with special exception for the county area plan commission. IDEM regulations also guide the livestock producer and local government agencies in determining the minimum number of acres necessary for manure application based on the number of animal units. IDEM permits allow for manure injection and restrict the area where the manure can be applied. Those set backs include 200 feet from a residence, 50 feet from road, 50 feet from neighboring property, and 50 feet from ditches or streams.The county area plan commission executive director has the authority to impose fines for violations to county or IDEM regulations. These fines range from $50 to $2500 per day and can increase for each day of violation occurrence or each day the situation is not corrected by those same amounts. An estimated ten violations have been reported over the last three years. These violations have been for improper manure application.

Figure 6. CAFO Location Map



Map Legend: Location of CAFO

2.2.5 About No Till/Minimum Till Acreage

Transect results for both counties indicate a slight decrease in the amount of no till and conservation tillage acres for both corn and soybeans. Results from 2002 **(Table 2.)** indicate a 16 percent decrease in no-till soybean acres in Rush County from 2001 and a 15 percent decrease from 2001 to 2002 in Shelby County. No till acres for corn increased in Rush County by 7 percent and decreased in Shelby County by 28 percent from 2001 to 2002. Corn acres in Rush County in crop year 2002 were 81 percent conventional tillage, 0 percent mulch tillage, and 19 percent no tillage. Soybean acres in Rush County for 2002 were 37 percent conventional tillage, 6 percent mulch tillage, and 57 percent no tillage. Shelby County corn acres in crop year 2002 were 71 percent conventional tillage, 6 percent mulch tillage, and 23 percent no tillage. Soybean acres in Shelby County for 2002 were 24 percent conventional tillage, 1 percent mulch tillage, and 75 percent no tillage.

Table 2: 2002 TRANSECT Evidence for Rush and Shelby counties

Percent present crop fields with indicated Tillage system

County	Crop	No-till	Mulch-till	Reduced-till	Conventional	No-till Difference from 2001Percentage
Rush	Corn	19	0	4	76	7
Shelby	Corn	23	6	8	62	-28
Rush	Soybeans	57	6	10	26	-16
Shelby	Soybeans	75	1	6	17	-15

2.3 Causes and Sources of Identified Problems

A number of causes contribute in varying amounts to the problems found. Based upon extensive research and investigations, failing septic systems, highly erodible soils, changes in conservation farming practices, poorly managed confined livestock operations, and trash and incidental obstructions in the stream are the primary causes. Pastured livestock operations are present in the watershed, but are considered a secondary cause of identified problems. Changes or the lack of changes in landowner responsibility are a part of the causes of these problems.

2.3.1 *E. Coli* Problems

Causes

Septic discharge from residential systems is a cause of pollutants to the stream. Successful completion of the Western Rush County Regional Sewer and Water District will rectify the sewage discharge problem for the residents of Homer. Also, proper maintenance of the Waldron Conservancy District sewer system will be necessary to continue the water quality safety for its patrons. However, sewage discharge from private systems outside the regional district or the conservancy district continues to be of concern. As indicated in **Figure 7.** and **Figure 8.**, of the 54,040.4 acres in the watershed, only 287 acres are in the sewage districts, leaving 53,753.4 acres outside the regional and conservancy districts.

The magnitude of the potential *E. coli* contamination from septic systems was verified with the local regional sewer district personnel. There are approximately 1,000 households in the Conns Creek watershed. The Waldron Conservancy District serves 285 customers and the Western Rush Regional Sewer and Water District will serve 60 customers in the Homer area. Those customers represent 34.5% of the households with public sewer hook up. The remaining 655 (65.5%) households in the watershed operate with private septic systems.

Figure 7. Western Rush County Regional Sewer District Acreage Map

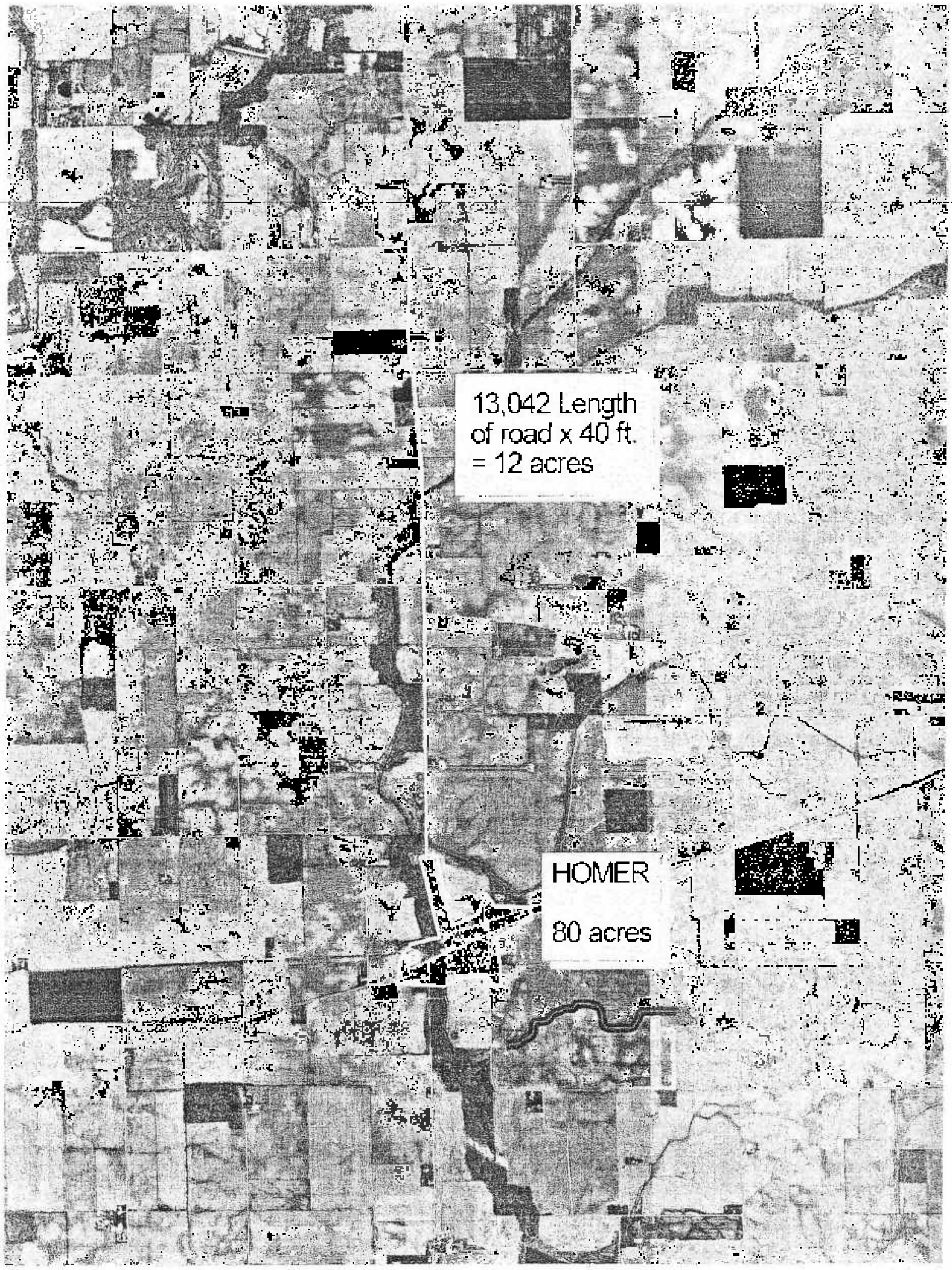
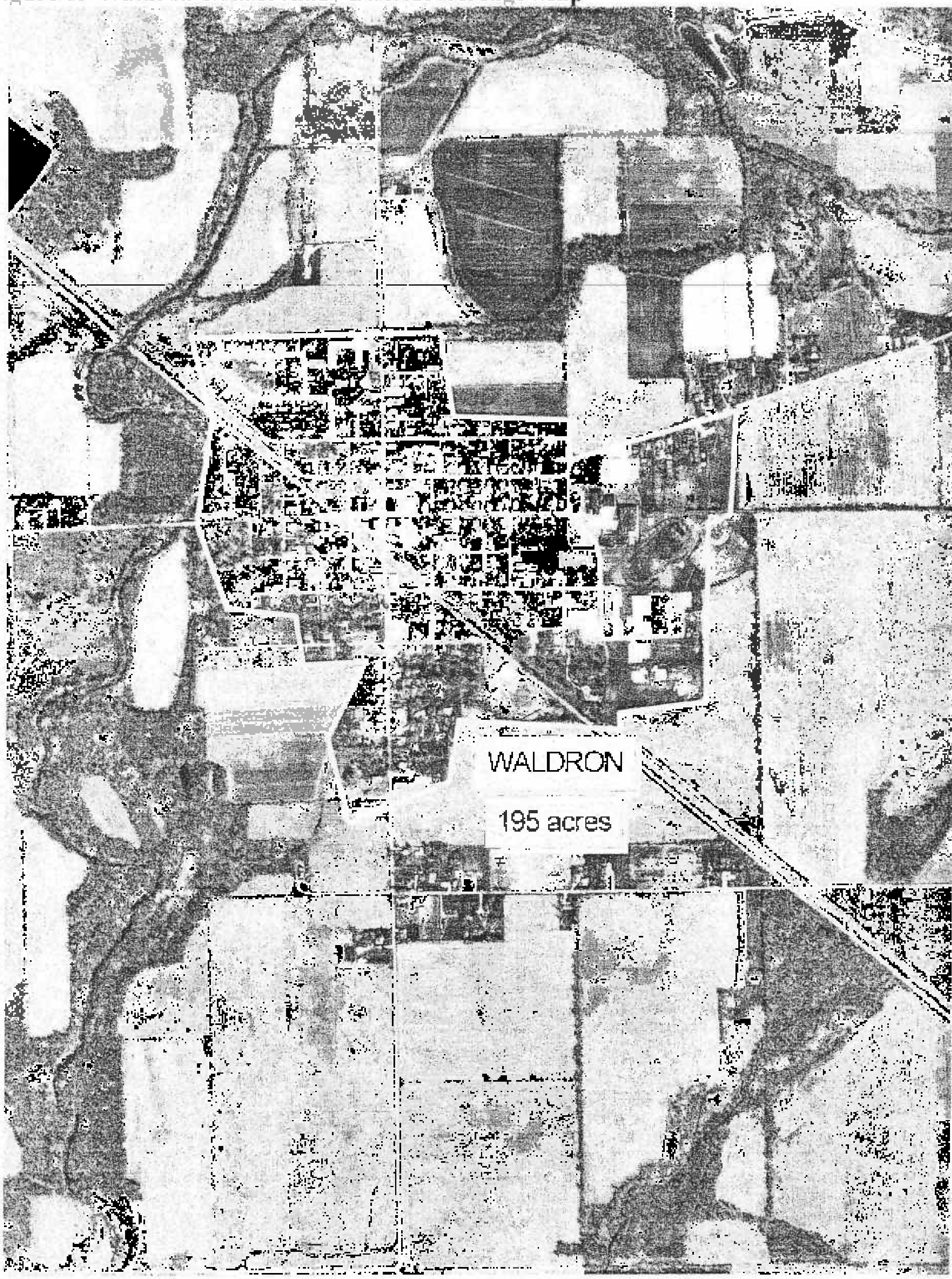


Figure 8. Waldron Conservancy District Acreage Map



Animal waste from confined animal feeding operations (CAFOs) in the watershed is also a cause of pollutants to the stream. The large CAFOs are permitted and regulated by local and state authorities. The livestock owner with smaller numbers of livestock in confined facilities is subject to zoning ordinances in the county. However, with either the large or small CAFO, the ultimate responsibility of causing or preventing *E. coli* contamination in the stream lies with the livestock operator.

Pastured livestock waste that enters the stream contributes to *E. coli* contamination. The amount of animal waste generated by livestock with direct access to the stream is minimal. The number of animals with direct access to the stream fluctuates with the seasons (more in spring and summer than in fall and winter) and would never exceed fifty during the course of the year.

Sources

County health department records identify failing residential septic systems as contributors to the *E. coli* contamination in the stream because of the advanced age of the system, lack of maintenance to the system through the years, and changes in homeowner lifestyle. Septic systems fail to do their job for several reasons. The septic tank can overflow if the soil percolation is not rapid enough, if the drainage system is not well designed, or if the tank itself is too small. The system can also fail by inability of the microorganisms to metabolize the waste. If the solid material accumulated in the septic tank is not removed, the sludge will reach the outlet level and begin flowing into the leaching bed where it can plug the pipes and raw sewage will drain into the soil. Many older homes were not built to handle the volume of sewage created today. The addition of conveniences overtaxes the system. Improper maintenance of the system can also lead to failure. A failed septic system also includes systems that drain into field tile or onto the land. These direct sources can add contaminants to ditches or tiles that eventually empty into a tributary or directly into the creek.

Confined animal feeding operations (CAFOs) in the watershed continue to be regulated to prevent contamination of water supplies. The numbers of livestock in a CAFO are defined as 300 or more cattle or 600 or more hogs in a building or group of buildings on a single farm unit. Zoning regulations within the counties as well as IDEM and federal regulations provide guidelines for proper manure handling procedures for the livestock unit. CAFOs can still be a source of *E.coli* even with these regulatory controls because of the accidental spills or operator error in manure applications. Continued regulation of the five large CAFOs throughout the watershed is necessary to prevent contamination of water supplies due to over-application of manure or direct manure spills.

Additional possible sources of *E. coli* are the livestock operations using the stream as a source of water. However, the responsibility of preventing *E. coli* contamination by direct livestock access is the livestock owner's. Ongoing education concerning sources of *E. coli* will improve understanding about the addition of livestock fencing along the stream, and proper transport and application of manure to farm fields.

2.3.2 Sedimentation Problems

Causes

Sedimentation due to stream bank erosion is a historical problem in the creek (hence the name Mud Creek for the portion in Rush County). The sediment builds up in the stream causing sand bars and shallow areas. Blockages cause additional diversions of water towards the stream banks, causing more erosion and sedimentation.

Sources

Fallen trees, caused by weather and neglect by landowners, led to the erosion of stream banks that contributed to the sediment problem in the stream as with most legal drains. Landowners have been responsible for tree removal on their own property bordering the creek. Many areas of the stream have been maintained or cooperatively cleared by landowners. Other areas have been neglected either because of disinterest or inability of the landowner to safely remove fallen trees from the stream.

Maintaining the stream bank by removing trees that are in danger of falling would reduce the amount of erosion occurring around the root areas of the trees. The root systems of large trees are impacted by the rerouting of water due to obstructions in the stream. The natural behavior of the creek is to meander through soils. The problem compounds itself when the tree is not removed and high water events occur, resulting in further erosion at the root area of the tree. When trees are removed, the root system can be left to help stabilize the bank area, in addition to reseeding the area with grasses or planting appropriate shrubs.

Traffic up and down the steep banks by recreational vehicles using the stream bank as a four wheeler access to the creek bed in low water times has contributed to the sediment build up in the stream as well as destabilizing the stream banks. This practice has occurred in one documented location and on non-farmer owned property. There is also one documented ford that is used for agricultural purposes. The natural stone bottom protects the streambed. However, additional stone on the streambanks would stabilize and reduce erosion and additional sedimentation. Education about this privately owned recreation area, along with stabilizing the stream bank with stone, would reduce the amount of sediment entering the stream in this area.

County road and bridge repair practices have added to the sediment trapping problem and stream bank scouring. Twenty-five or thirty years ago, the common practice when replacing or repairing bridges was to drop the old bridge directly into the stream. The remaining concrete pieces restrict the flow of water underneath the bridge, contributing to the sedimentation problem in the stream. This bridge debris also causes further stream bank erosion. By reducing the flow of water in the main channel, the water has been forced to scour higher up the banks during high flow events. This causes additional bank erosion in the areas before and after the bridge on the stream.

The county has been contacted about relocating the old concrete pieces to the stream bank. Removing the concrete bridge pieces from the main channel will reduce the amount of bank scouring in the areas surrounding the bridges. There are three bridge locations where the old concrete pieces need to be removed from the stream. Maintaining a working relationship with the county highway departments is important to correct the effects of this practice.

Livestock access for watering along the stream is one of the sources of erosion of stream banks in livestock pasturing areas. As the livestock enter the stream, their access is generally down the slope and directly into the water. These bank sections tend to be less steep in slope, but are subject to repeated erosion by livestock in the adjacent pasture. Fencing to restrict livestock access, along with stabilizing the banks by reseeding, would improve the stream bank stability in a wider area. The pasturing of livestock along the stream is minimal and localized. There is one active location and one inactive location where livestock have access to the stream. However, as evidenced in **Figure 9.**, the evidence of bank erosion is especially prevalent in these areas.

Figure 9.

The decrease in conservation tillage practices is a source of sedimentation in the stream. This reduction in conservation acreage adds to the potential accumulation of sediment in the stream channel. Improved weather conditions during planting season can influence farming practices over coming seasons. No till acreage dropped slightly over the state of Indiana in 2002 from all time highs recorded in 2001. These changes can be attributed to a wetter than normal spring with twenty inches of rain recorded in Rush and Shelby counties during optimum planting season of May 1—May 31. The effect of these changes shows a ten percent decrease in acres farmed to "T" from 1999--2002 for all of Rush and Shelby counties. "T" for this area is four tons of soil lost in a year. **Table 3.** displays collected data from previous twelve years and the percent of fields in the watershed with the indicated soil loss greater than the "T" value for each year. These results indicate a slight increase in percent of fields equal to or less than the "T" value over the period, a five percent decrease in percentage in fields losing 0-1 values of "T", and an increase in the percentage of fields losing 1-2, 2-3, and greater than 3 values of "T" over the twelve year period.

Table 3. Percent of Watershed Fields = or > than "T"

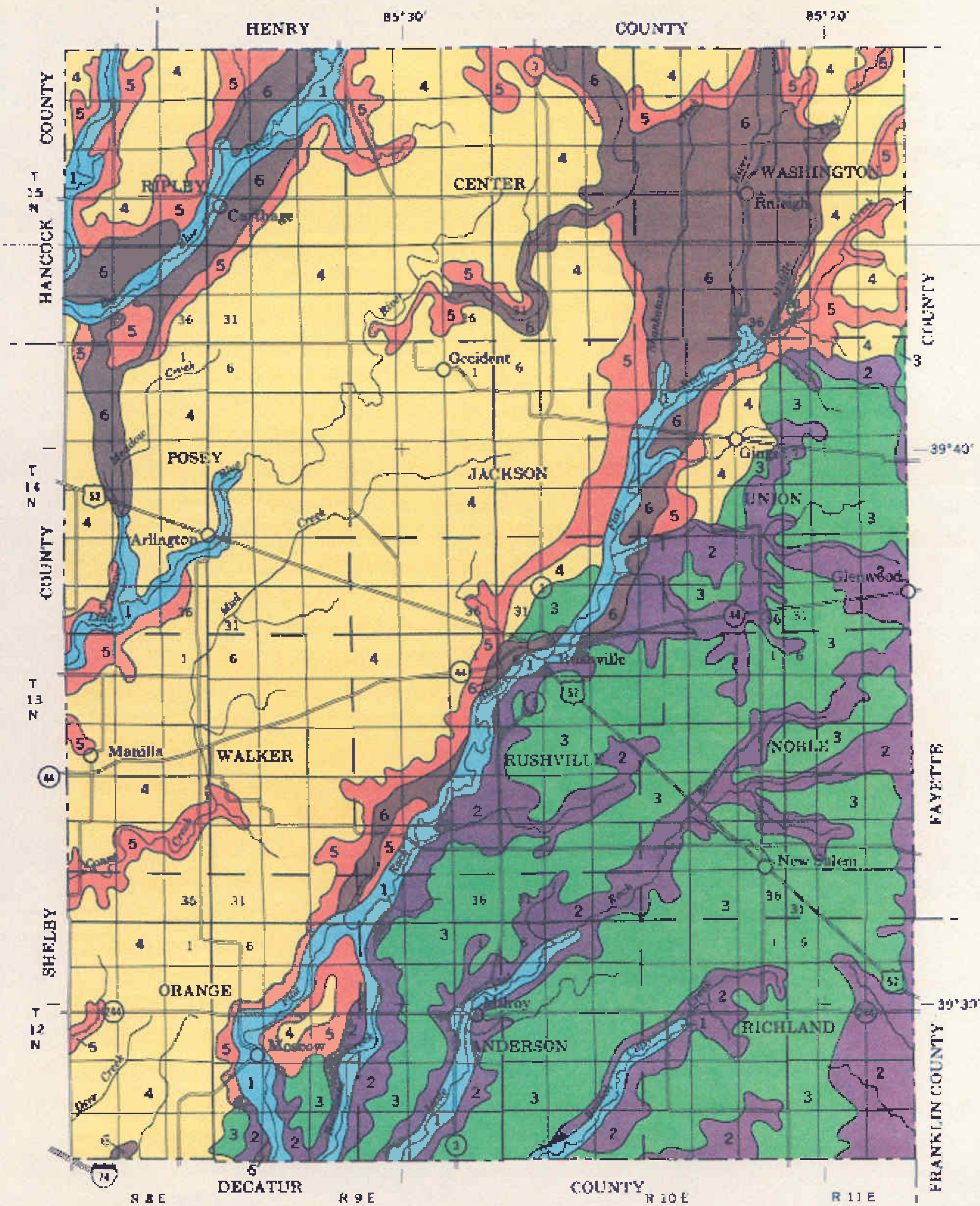
Percent (Number) of Watershed 05120205 040 fields with indicated USLE SL > "T" for each Year.

		USLE SL > "T"				
Year Total	<="T"	0-1 T/A	1-2 T/A	2-3 T/A	>3 T/A	Unknown
1990 (108)	71 (77)	8 (9)	4 (4)	3 (3)	8 (9)	6 (6)
1993 (106)	80 (85)	4 (4)	1 (1)	2 (2)	10 (11)	3 (3)
1995 (257)	71 (187)	6 (15)	8 (16)	3 (7)	11 (27)	1 (3)
1996 (250)	73 (194)	6 (14)	5 (13)	3 (7)	9 (21)	4 (9)
1997 (267)	74 (201)	6 (15)	5 (14)	1 (2)	10 (25)	4 (10)
1998 (126)	72 (91)	6 (7)	8 (10)	3 (4)	8 (10)	3 (4)
2000 (235)	82 (193)	4 (9)	4 (9)	2 (5)	5 (13)	3 (6)
2001 (236)	86 (202)	5 (11)	2 (5)	1 (3)	6 (13)	1 (2)
2002 (126)	74 (93)	3 (4)	8 (10)	3 (4)	10 (12)	2 (3)
All (1719)	76 (1323)	5 (88)	5 (84)	2 (37)	8 (141)	3 (46)

2.3.3 Atrazine and Other Chemical Problems

Causes

Changes in farming practices throughout the watershed have included a slight decrease in no till acreage in both Rush and Shelby counties. Weather conditions during the planting seasons in 2001 and 2002 may have been a contributing factor in farming changes. Soil compaction issues that contribute to reduced soil tilth would have encouraged farmers to deep till the soil in those specific areas between the two growing seasons studied during this grant period of 2001-2002. Heavy rainfall during the 2002 planting season delayed field work and encouraged heavy weed growth in unplanted fields. Herbicide amounts were increased to handle the extra weed pressure in farm fields. Soil types in the watershed have been identified through general soil maps in the soil survey. **Figure 10.** shows general soils maps for Rush County and Shelby County.



HENRY
COUNTY
85°30'
85°20'
HANCOCK COUNTY
SHELBY COUNTY
FAYETTE COUNTY
FRANKLIN COUNTY
DECATUR
COUNTY
RIPLEY
CENTER
WASHINGTON
POSEY
JACKSON
UNION
WALKER
RUSHVILLE
NOBLE
ORANGE
ANDERSON
RICHLAND
Carthage
Raleigh
Occident
Arlington
Glenwood
Rushville
Manilla
New Salem
Milroy
Moscow
T 15 N
T 14 N
T 13 N
T 12 N
R 8 E
R 9 E
R 10 E
R 11 E
39°40'
39°30'

LEGEND

- **1** — GENESEE-SLOAN-SHOALS: Deep, nearly level, well drained, very poorly drained, and somewhat poorly drained soils formed in alluvial deposits; on bottom land
- **2** — MIAMI-XENIA-RUSSELL: Deep, nearly level to steep, well drained and moderately well drained soils formed in loess and the underlying glacial till; on uplands
- **3** — FINCASTLE-CYCLONE-XENIA: Deep, nearly level and gently sloping, somewhat poorly drained, poorly drained, and moderately well drained soils formed in loess and the underlying glacial till; on uplands
- **4** — CROSBY-TREATY: Deep, nearly level, somewhat poorly drained and very poorly drained soils formed in loess and the underlying glacial till; on uplands
- **5** — MIAMIAN: Deep, gently sloping to steep, well drained soils formed in loess and the underlying glacial till; on uplands
- **6** — OCKLEY-WESTLAND-SLEETH: Deep, nearly level and gently sloping, well drained, very poorly drained, and somewhat poorly drained soils formed in glacial outwash deposits; on terraces and outwash plains

Compiled 1983

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION AND
INDIANA DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER CONSERVATION COMMITTEE

GENERAL SOIL MAP

RUSH COUNTY, INDIANA

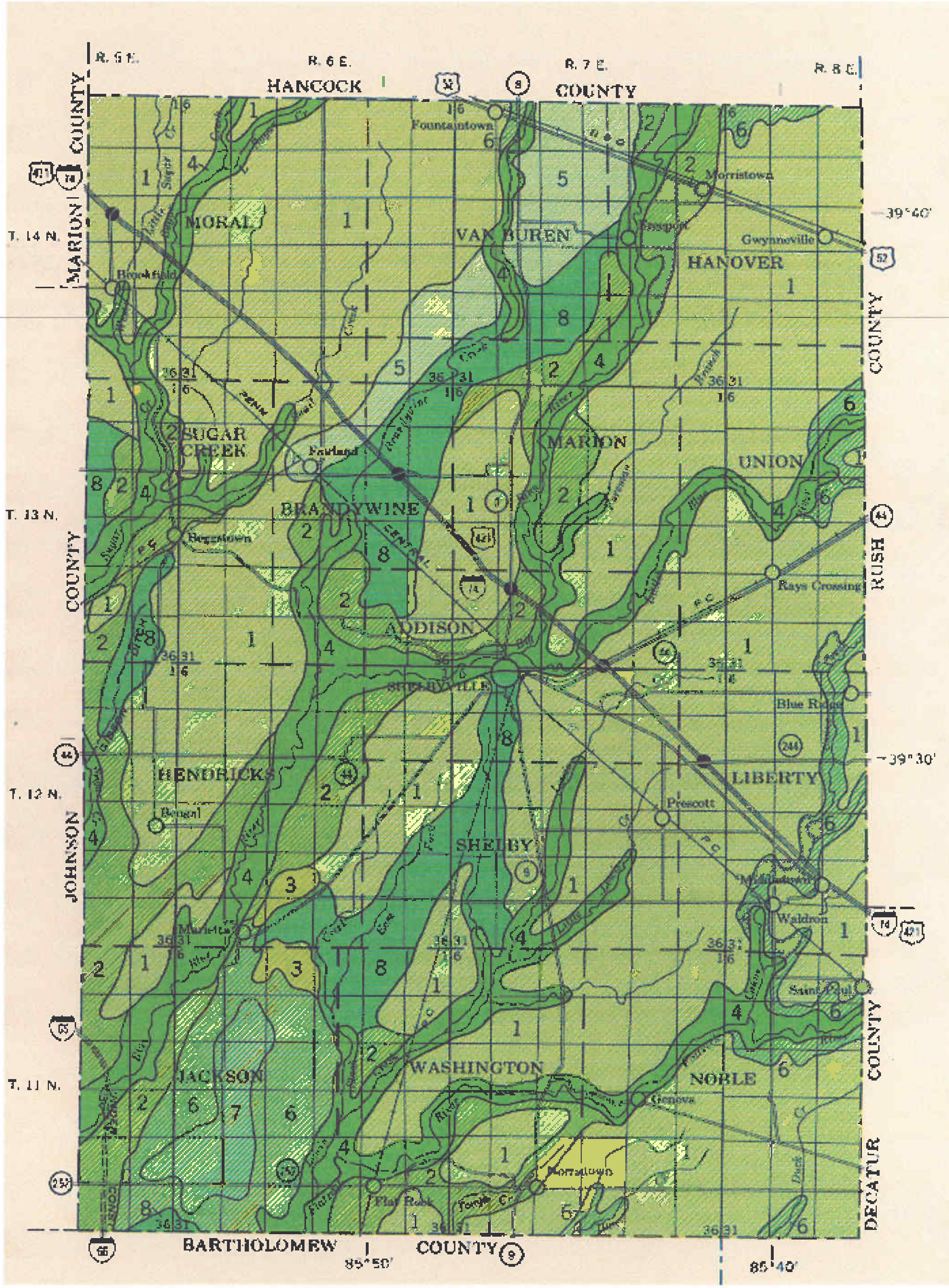
Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36



R. 5 E.
R. 6 E.
R. 7 E.
R. 8 E.
HANCOCK COUNTY
MARION COUNTY
JOHNSON COUNTY
RUSH COUNTY
DECATUR COUNTY
BARTHOLOMEW COUNTY
T. 14 N.
T. 13 N.
T. 12 N.
T. 11 N.
39°40'
39°30'
85°50'
85°40'
MORAL
VAN BUREN
HANOVER
SUGAR CREEK
BRANDYWINE
MARION
UNION
ADDISON
SHELBYVILLE
HENDRICKS
SHELBY
LIBERTY
JACKSON
WASHINGTON
NOBLE
Fountaintown
Morristown
Gwynneville
Brookfield
Fairland
Boggstown
Rays Crossing
Blue Ridge
Prescott
Bengal
Marietta
Waldron
Saint Paul
Flat Rock

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

SHELBY COUNTY, INDIANA

Scale 1:190,080

1 0 1 2 3 4 Miles

N

SOIL ASSOCIATIONS*

1 — Crosby-Brookston association: Deep, somewhat poorly drained and very poorly drained, nearly level and gently sloping, medium-textured and moderately fine textured soils; on uplands

2 — Fox-Nineveh-Ockley association: Well-drained, nearly level to gently sloping, medium-textured soils that are moderately deep and deep over gravel and sand; on terraces

3 — Fox-Rodman association: Well-drained, moderately steep and steep, medium-textured and moderately coarse textured soils that are moderately deep to shallow over gravel and sand; on kames

4 — Genesee-Ross-Shoals association: Deep, well-drained and somewhat poorly drained, nearly level, medium-textured soils; on flood plains

5 — Miami-Crosby association: Deep, well-drained and somewhat poorly drained, nearly level to rolling, medium-textured soils; on uplands

6 — Miami-Crosby-Hennepin association: Deep, well-drained and somewhat poorly drained, nearly level to steep, medium-textured soils; on uplands

7 — Parke-Miami-Negley association: Deep, well-drained, gently sloping to steep, medium-textured soils; on uplands and terraces

8 — Westland-Sleeth association: Deep, very poorly drained and somewhat poorly drained, nearly level, moderately fine textured and medium-textured soils; on glacial outwash plains and on terraces

*Texture refers to surface layer in major soils of each association.

Compiled 1972

Eighty percent of the soil in the Rush County portion and sixty percent of the soil in the Shelby County portion of the watershed were rated as having severe potential for chemical leaching. **Table 4.** shows the percentage of soils, number of acres for each general soil type, and its potential for leaching in the watershed.

Table 4. Soils ranked by sensitivity to pesticide leaching

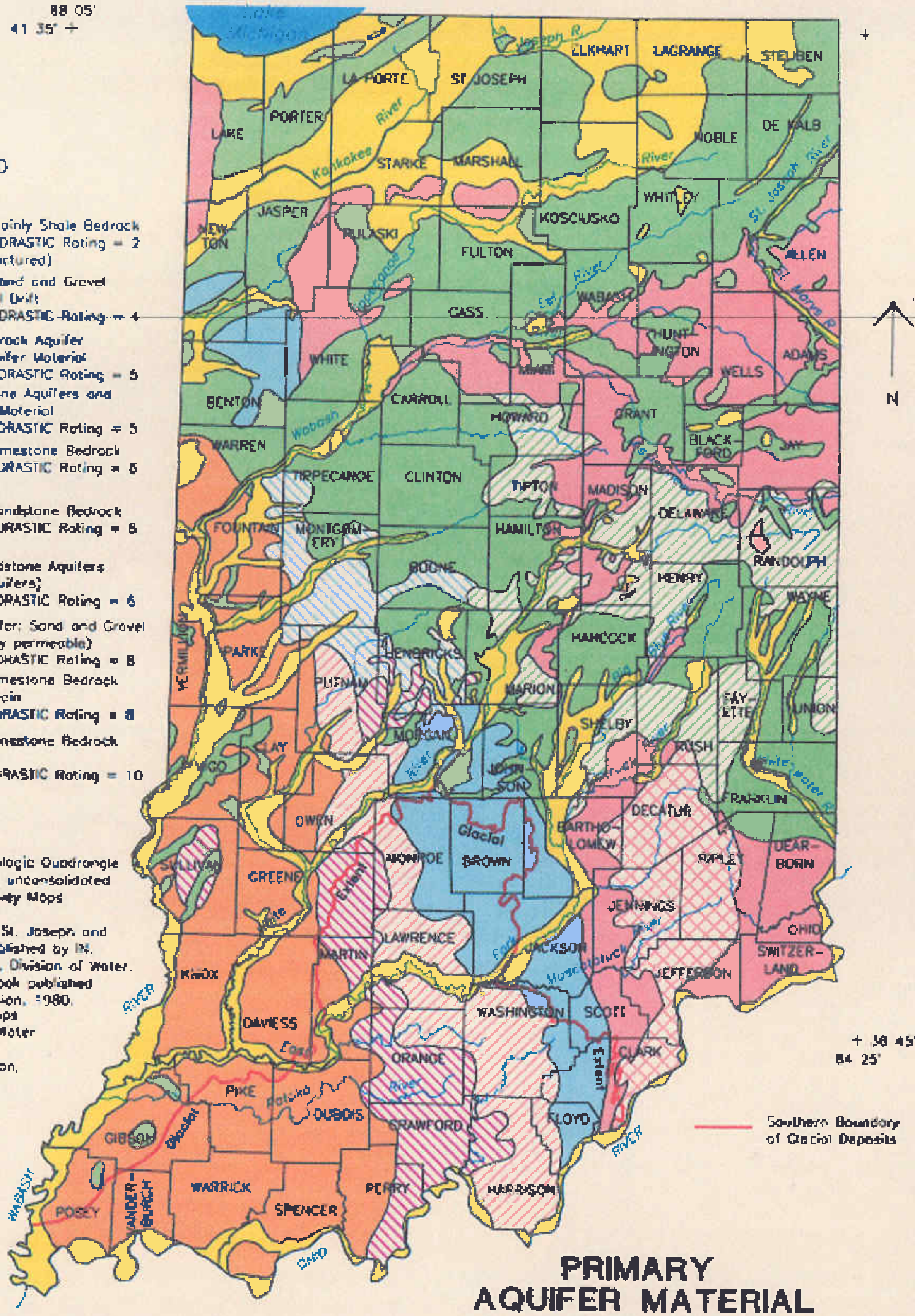
General Soil Types	Pesticide Loss Potential--Leaching	Percentage of Soils	Number of Acres
Rush County Crosby-Treaty Series	severe	80	30,332.80
Rush County Miamian series	slight	20	7,583.20
Shelby County Crosby Brookston series	severe	60	9,674.64
Shelby County Miami-Crosby Hennepin series	moderate to severe	30	4,837.32
Shelby County Genesee-Ross-Shoals series	moderate to severe	10	1,612.44

According to a USDA Primary Aquifer Material map **Figure 11. Primary Aquifer Map**, the principal aquifer material of limestone bedrock has a seepage rating of 6 on a scale of 1 to 10, with 10 being highest.

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

88 05'
41 35' +



+ 38 45'
84 25'

Southern Boundary of Glacial Deposits

LEGEND

Symbol	Description
2	Principle Aquifer: Mainly Shale Bedrock. Typical SEEPAGE/DRASTIC Rating = 2 (Rate higher if fractured)
4	Principle Aquifer: Sand and Gravel Lenses within Glacial Drift. Typical SEEPAGE/DRASTIC Rating = 4
5	Both Limestone Bedrock Aquifer and Glacial Drift Aquifer Material. Typical SEEPAGE/DRASTIC Rating = 5
5	Both Shale/Sandstone Aquifers and Glacial Drift Aquifer Material. Typical SEEPAGE/DRASTIC Rating = 5
6	Principle Aquifer: Limestone Bedrock. Typical SEEPAGE/DRASTIC Rating = 6
6	Principle Aquifer: Sandstone Bedrock. Typical SEEPAGE/DRASTIC Rating = 6
6	Both Shale and Sandstone Aquifers (minor limestone aquifers). Typical SEEPAGE/DRASTIC Rating = 6
8	Glacial Outwash Aquifer: Sand and Gravel with some Silt (highly permeable). Typical SEEPAGE/DRASTIC Rating = 8
8	Principle Aquifer: Limestone Bedrock with Minor Karst Terrain. Typical SEEPAGE/DRASTIC Rating = 8
10	Principle Aquifer: Limestone Bedrock in Karst Terrain. Typical SEEPAGE/DRASTIC Rating = 10

References

1) 1 x 2 degree Regional Geologic Quadrangle Maps showing bedrock and unconsolidated deposits. 8 U.S. Geol. Survey Maps covering state.
2) River Basin Studies of the St. Joseph and Whitewater River Basins published by IN. Dept. of Natural Resources, Division of Water.
3) Indiana Water Resources book published by the Governor's Commission, 1980.
4) County water resources maps published by IDNR, Div. of Water for counties of: Shelby, Hendricks, Randolph, Madison, Hamilton, Johnson, Morgan, Tipton, Henry, Grant and Marion.
5) Water Resources studies completed by the U.S. Geological Survey for River Basins of: Upper Wabash, Middle Wabash, Maumee, and St. Joseph.

Note: SEEPAGE/DRASTIC Rating value for use with SCS Geology Tech. Note No. 5 ("SEEPAGE" pollution potential model) and "DRASTIC" model.

PRIMARY AQUIFER MATERIAL INDIANA

DECEMBER 1989

0 25 50 75 100 MI

SOURCE: BOUNDARIES ARE GENERALIZED FROM SMALL SCALE MAPS. FOR MORE SPECIFIC INFORMATION REFER TO ABOVE SOURCE LIST. DATA PROVIDED BY SCS FIELD PERSONNEL. MAP COMPILED USING AUTOMATED MAP CONSTRUCTION WITH THE FOCAS EQUIPMENT. NATIONAL CARTOGRAPHIC CENTER, FORT WORTH, TEXAS 1989.

DECEMBER 1989 1004786

USDA SCS NATIONAL CARTOGRAPHIC CENTER, FT. WORTH, TX 1990

USDA-SCS-INDIANA
NOVEMBER, 1989

Sources

Decreased use of conservation tillage practices can be a source of herbicides and other chemical pollutants, as well as field erosion, during less than ideal planting seasons. Changes in tillage practices along with weather related changes affect how crops are planted. These changes also affect the amounts of chemicals and nutrients that are applied during the growing season. These changes have an impact on the water quality from growing season to growing season. In a prolific weed situation such as the 2002 growing season, farmers increased their herbicides by one half, and, in some cases, doubled the amounts of weed killing chemicals needed to control the extra pressure on the growing crops. The soils properties discovered through the general soils maps (**Figure 10.**) and the primary aquifer material map (**Figure 11.**) indicate a moderate to severe potential for leaching and seepage of chemicals throughout the watershed.

2.3.4 Trash Problems

Causes

As a trash problem, the practice of dropping the old bridge directly into the stream has been addressed under the streambank erosion and sedimentation section. However, these concrete pieces are wastes, but could be used for stabilization of stream banks in the area around the bridges. Trash was also inventoried as in **Figure 12.** along Conns Creek between Middletown and Waldron. This trash was estimated at being at least ten to fifteen years old. There is no evidence of new trash being added.

Figure 12.

Sources

These remaining concrete pieces that restrict the flow of water underneath the bridge contribute to the sediment problem in the stream. The county has been approached about relocating the pieces to the stream bank on three bridges in the watershed. These concrete pieces would help conserve the integrity of the bank and prevent further erosion around the bridge area.

Because of the estimated age of the trash observed in the stream, dumping is not still occurring in the area. Removal of the existing trash is the only issue that needs to be resolved in this area. There are two major trash sites that need to be cleaned up.

2.4 Prioritization

From the first public meeting held for the watershed, the biggest concern for this project was sediment in the stream. Public concern and steering committee focus centered on reducing the sediment in the stream, recognizing several possible sources for the increased load in the stream, particularly in the upper portion of Mud Creek north of Homer. Despite a continued emphasis on the quantity of water that flowed in high water times, the steering committee realized the importance of studying other issues for Conns Creek. Continued inventorying of the stream and watershed, led to awareness of practices that contributed to water quality problems, including septic and livestock waste discharges and changes in farming practices along the stream.

All of the water quality concerns have an impact on the established vision for the group: *a clear, free running stream with an enhanced fish habitat in the stream.* The resolution of several of these concerns is conducive to the macroinvertebrate and fish habitat in the stream. Being aware of the factors that impact the habitat is a continuing educational priority. The differences in fish species from an historic view to present time is noted through the fisheries studies conducted on Conns Creek and the Flatrock River in 1980 and 1996 by DNR. The concern of DNR fish biologists following the latest study was the diminishing riparian corridor along the creek and the increase in sediment in spawning and nursery areas. There is a need for further study on how to provide adequate habitat within a channelized stream and legal drain.

The legal drain issue is of importance to the scope of this entire project. Northern portions of the creek are already designated as legal drain. This designation is a legal means to collect a tax assessment from each landowner in the watershed area to use as a maintenance fund for the stream. The steering committee has worked closely with the Rush County surveyor to understand this issue and to possibly expand the legal drain designation to the Rush-Shelby county line. Shelby County commissioners have expressed their desire to not be included in the legal drain expansion. Rush County drainage board (commissioners) would be responsible for maintaining the stream. This would include tree removal to reduce sediment trapping and stream bank stabilization in unstable areas.

A second priority for the watershed project is the reduction of sediment in the creek. Sediment has been steadily increasing in areas of fallen trees and around county bridges. Landowners have been encouraged to remove trees that have fallen into or across the stream, thereby reducing the flow of water downstream. One of the priority areas is north of Homer where landowners have been working individually and collectively to remedy this problem over the past few years and more intensely since the fall of 2001. Additional areas of trees in danger of falling will be identified and recommended for attention. The county highway department has been contacted about removing the old concrete pieces and placing them on the stream bank around the county bridges to reduce further erosion. Reseeding the stream banks, installing rip rap, establishing riparian areas, and installing other stream bank stabilization methods can be utilized in the bridge areas, as well as in other eroded bank areas along the stream.