VFC Index - Watershed (Plan)

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WATERSHED MANAGEMENT PLAN
Mud Creek Headwaters

Prepared by:

Tipton County Soil & Water Conservation District

June, 2003

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Section 1. INRODUCTION

1.1 **Location & Maps**

The Mud Creek Headwaters is located in the northwest portion of Tipton County and encompasses the southern portion of the Town of Sharpsville. The Mud Creek Headwaters (Hydrologic Unit Code 05120107010030) drains approximately 10,435 acres, and represents approximately 6% of the total land area of Tipton County (166,660 acres). This watershed is a headwater tributary to Wildcat Creek, which is a contributor to the Wabash River.

1.1.1 Regional Watershed Map

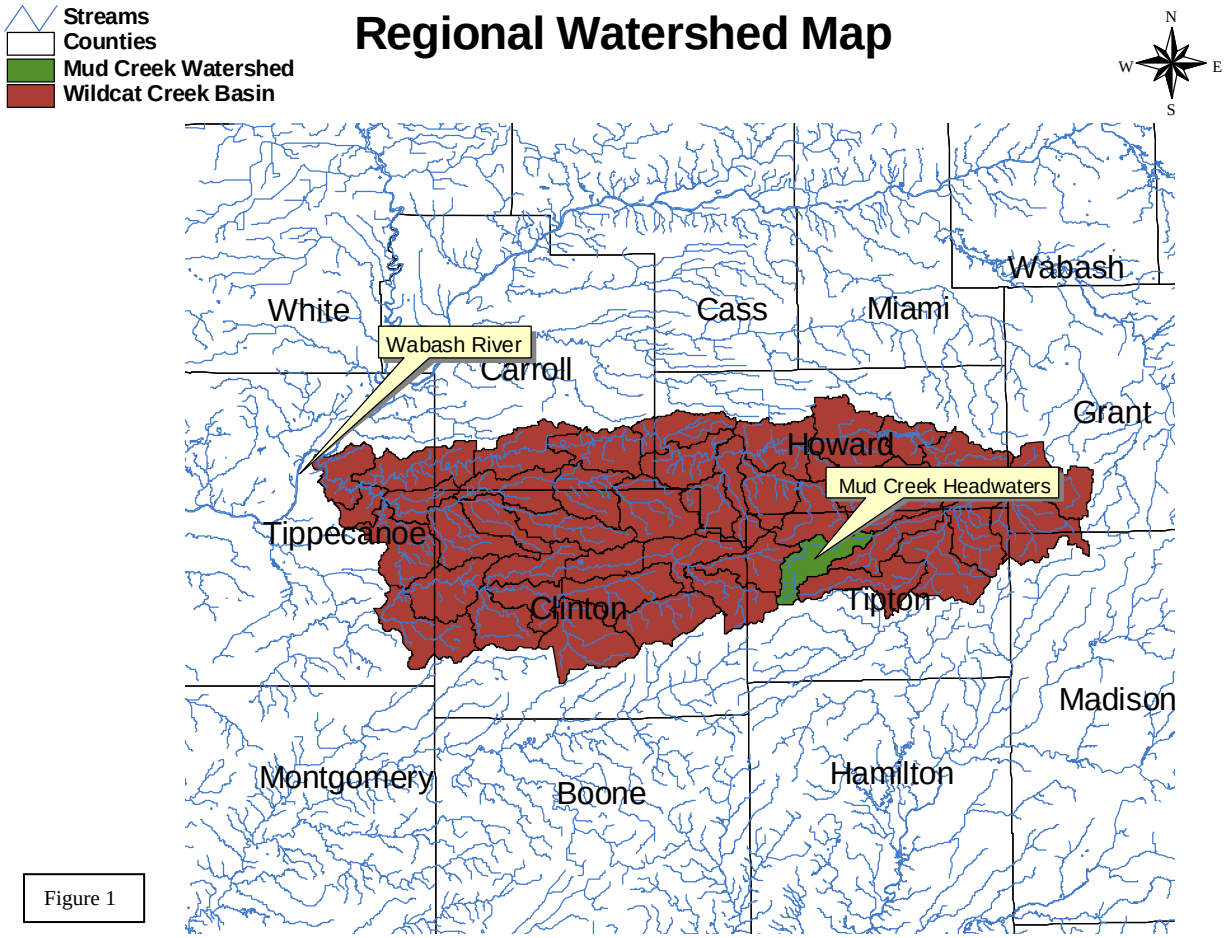


Figure 1

1.1.2 Local Watershed Map

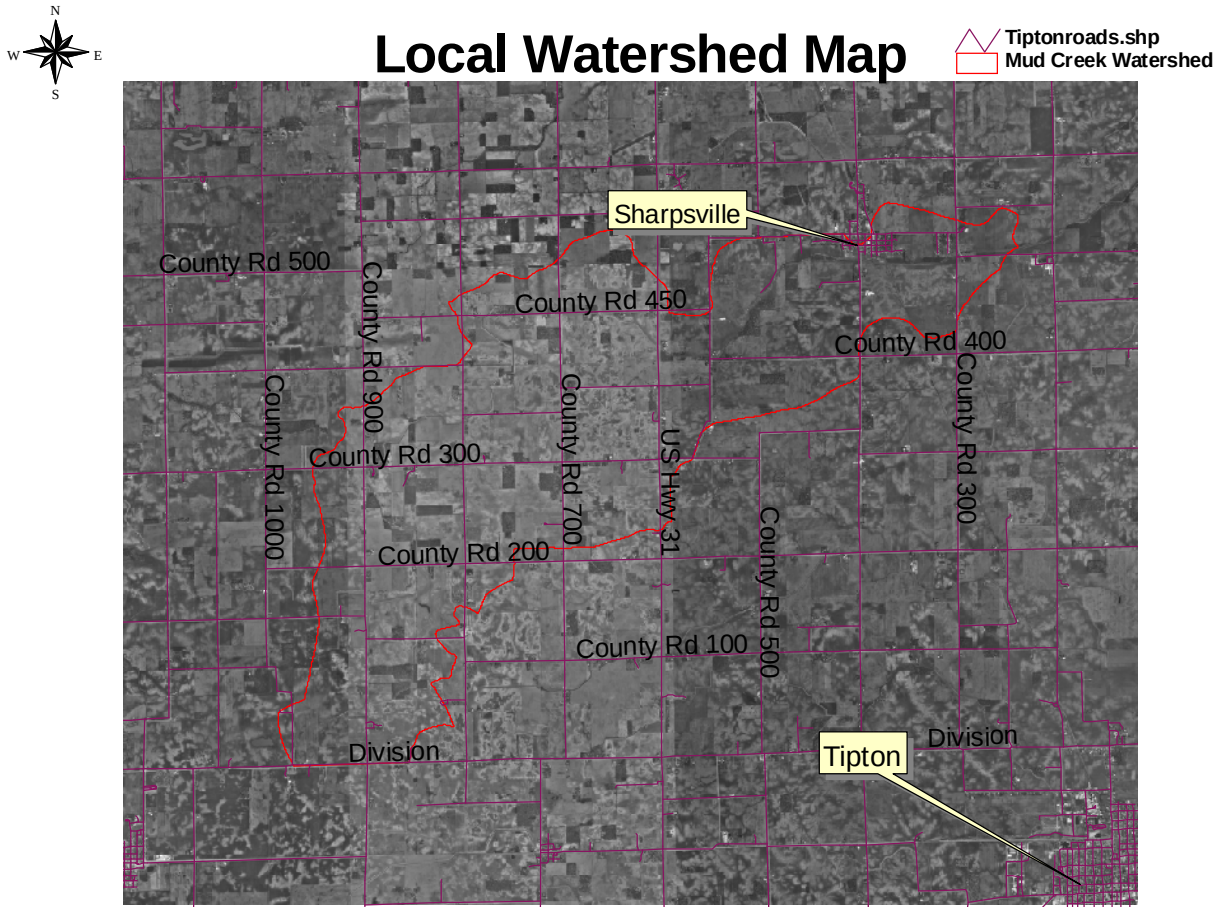


Figure 2

1.2 **Description & History**

1.2.1 Waterways: Approximately 13 miles of perennial and intermittent streams are located in the watershed, for which agricultural drainage is their primary human use. All of the streams are classified as "county legal drains" and are maintained by local drainage boards. The drainage boards maintain a 75' right-of-way easement on both sides of all legal drains. Their primary function is to ensure adequate drainage. See *Figure 3*.

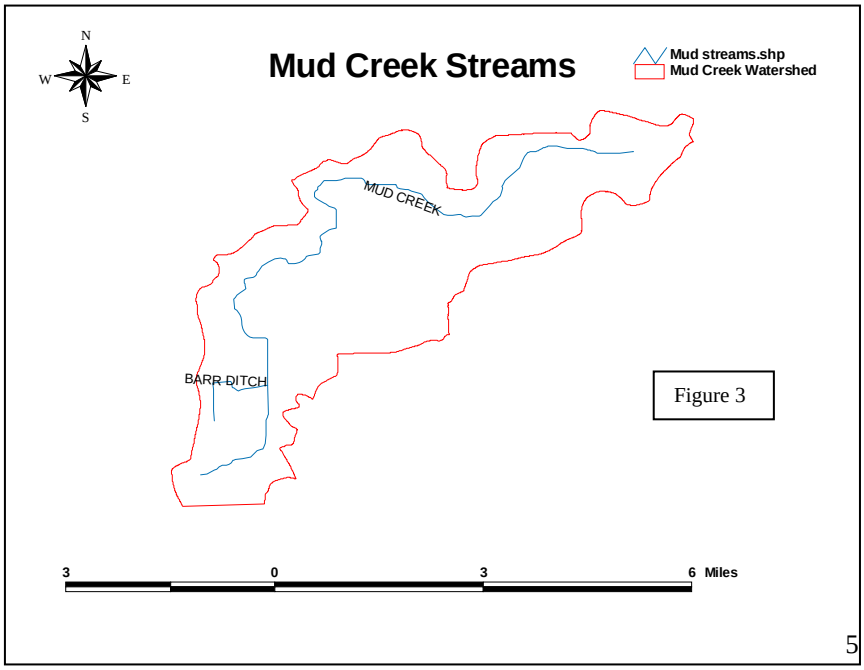


Figure 3

1.2.2 Topography & Hydrology: Tipton County and the Buck Creek watershed lie on a depositional plain of low relief called the "Tipton Till Plain".

Glaciation from the late Wisconsin glacial period is the chief factor responsible for the landforms of the area. Relief in topography is strongest along breaks between the nearly level uplands and the bottomland along streams. Due to the low relief, natural drainage is poor throughout the area. Marshes and swamps were common before drainage systems of open ditches and sub-surface tiles were installed. In most areas, this drainage is essential to the production of crops. Source- *Tipton County Soil Survey*

1.2.3 Water Supply/Groundwater: According to information from the *Indiana Geological Survey*, Tipton County, and the Mud Creek Headwaters watershed, are situated in the Silurian-Devonian Aquifer, comprised mostly of carbonate-rock aquifers. See *Figure 4*.

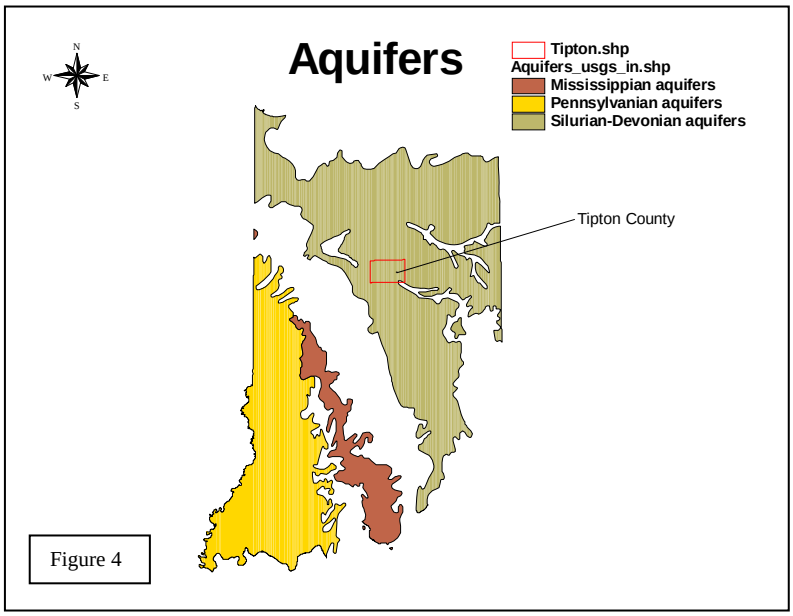


Figure 4

Water supply for agricultural, industrial , and residential use is derived solely from well supplies. (See *Figure 5*) There are no surface drinking water intakes located in the watershed or Tipton County. Average depth to suitable drinking water source is approximately 75 feet. All public water supplies come from deep wells dug into sand and gravel formations underlying glacial till. The town of Sharpsville is served by a public drinking water supply from 1 large capacity wells located within the city limits. This well produces approximately 160 gallons per minute and serves 325 customers. An additional high capacity is scheduled to go on-line within the next few years. The Sharpsville Water Utility has initiated a well-head protection program and manages access to the source wells. Public water supplies are monitored according to state requirements and periodic adjustments to treatment and distribution are made as needed. Utility managers indicate that there have not been any problems noted with contaminates in source groundwater.
Source- *Tipton County Soil Survey and conversations with Mike Beck, Sharpsville Utilities.*

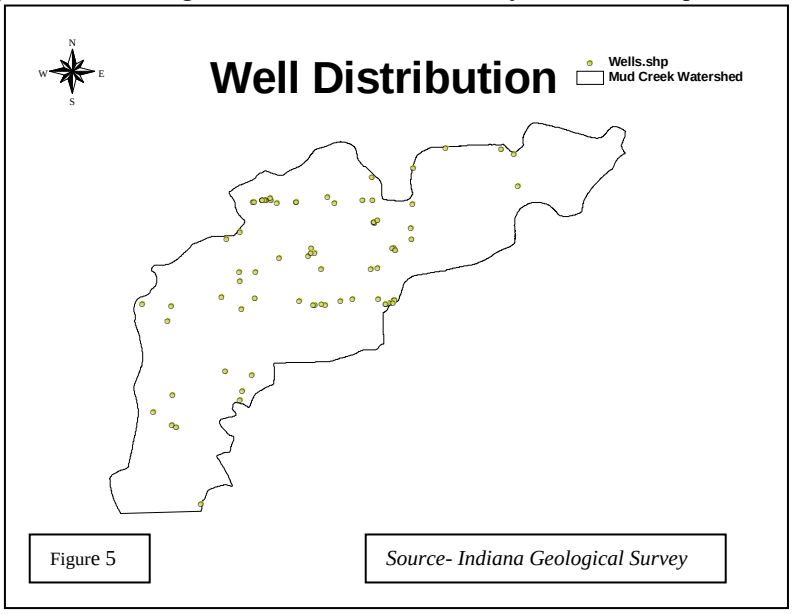


Figure 5

Source- Indiana Geological Survey

1.2.4 Soils: The *Patton-Del Rey-Crosby* association is the most prevalent soil formation in the Mud Creek Headwaters watershed. This association is situated in depressional areas and on slight rises and low flats. The landscape is characterized by very little relief and many depressions. Slopes range from 0-2% percent. The association is characterized by the following traits:
Nearly level, poorly drained and somewhat poorly drained soils that formed in silty sediments, in silty and sandy sediments, or in a thin mantle of silty material and underlying loamy and clayey glacial till, on lake plains and till plains.

Patton soils- poorly drained in depressional areas with very dark gray silty clay loam surface and gray, mottled, firm subsoil.

Del Rey soils- somewhat poorly drained on low flats and till plains with a dark grayish/brow surface layer and brow and grayish brow, mottled, firm silty clay loam subsoil.

Crosby soils- somewhat poorly drained on slight rises and till plains with a dark grayish brown silt loam surface layer and a grayish brown, mottled, firm silty clay loam subsoil.

The Sloan-Tuscola-Strawn association is prevalent immediately adjacent to Mud Creek. Slopes range from 0-12 percent and most areas are drained by streams or open ditches. This association is characterized as follows: *Nearly level to moderately sloping, very poorly drained, moderately well drained, and well drained soils that formed in alluvium,in stratified silty, loamy, and sandy sediments over loamy glacial till, or in loamy glacial till; on flood plains, and till plains.* Source- *Tipton County Soil Survey*

1.2.5 Demographics: There are six Census 2000 block groups that intersect the area of the Mud Creek Headwaters watershed. These six blocks account for a total of 79,351 acres, of which, 13% comprises the area of the Mud Creek Headwaters watershed. According to this estimate, the total population for watershed is approximately 715 people. Approximately 23.3% fall at or below poverty levels, approximately 42.9 percent have obtained a high school degree, and less than 6 percent have received a bachelor's degree. The area has little ethnic diversity, with approximately 98.9 percent of the population being white.

1.2.6 History: "Tipton county (and the Mud Creek Headwaters Watershed) was originally a hunting ground for the Miami, Delaware, and Potawatomi Indians. In 1826, the Indians ceded all of northwest Indiana, including the land that makes up Tipton County. The county was established by the legislature in 1844. It was one of the last counties in the state to be settled. The poorly drained, nearly level soils of the county could not be farmed until the wetness was reduced by ditches and tile. The county has been transformed from a swampy prairie and dense forest to one of the most productive agricultural counties in Indiana." Source- *Soil Survey of Tipton County, Indiana*

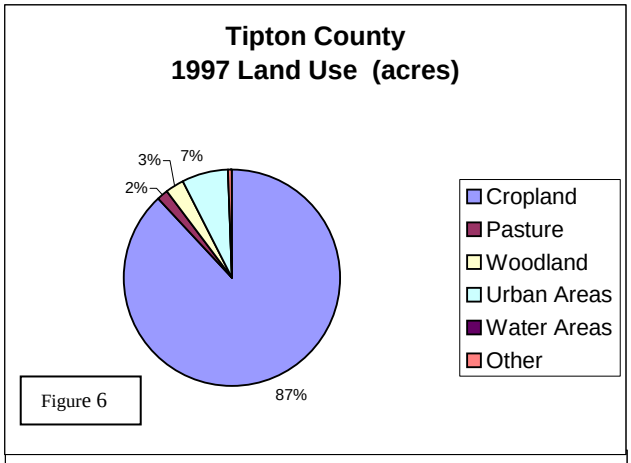


Figure 6

1.2.7 Landuse: Landuse in the Mud Creek Headwaters watershed and Tipton County is dominated by row crop agriculture, as indicated in *Figure 6*.
Source "Indiana Agricultural Statistics 1998-1999"

1.2.7.1 Agriculture: Row crop production of corn and soybeans is both the primary land use and main industry in the watershed and in Tipton County. *Figure 7* illustrates the production of crops in Tipton County.
Source "Indiana Agricultural Statistics 1996 - 2000"

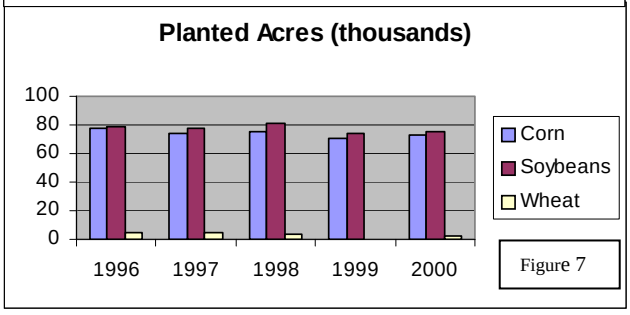


Figure 7

1.2.7.2 Livestock: According from sources at USDA and Purdue University Cooperative Extension, livestock numbers in the County and the watershed have been steadily declining in recent years. This trend can be directly be seen in *Figure 8*, which depicts the number of cattle over a six year period. See Section 2.4 for further discussion.

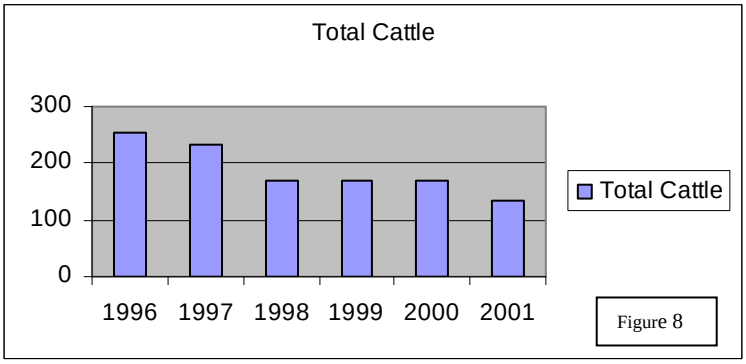
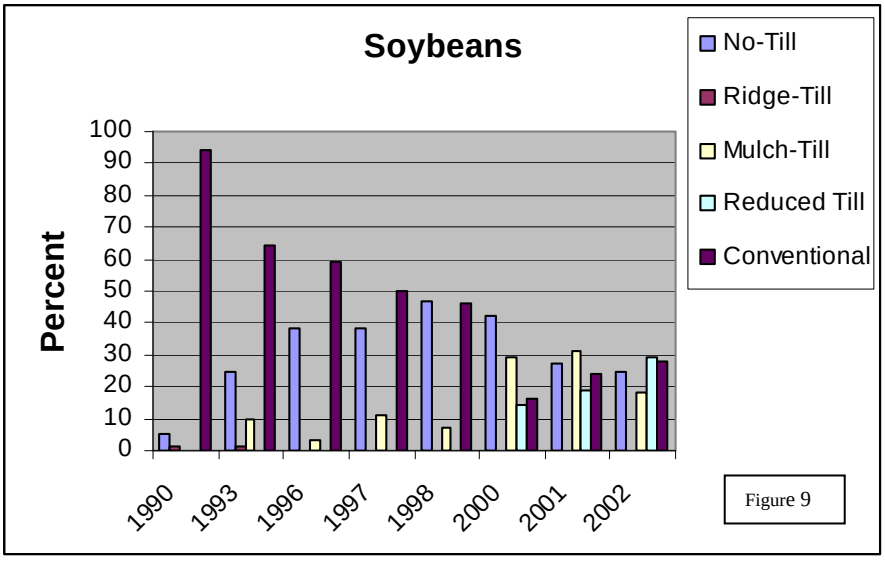
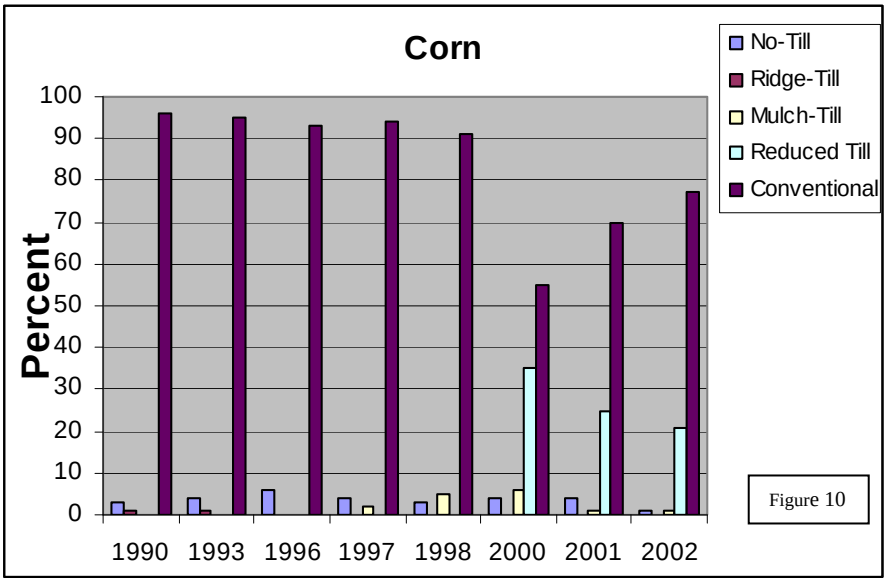


Figure 8

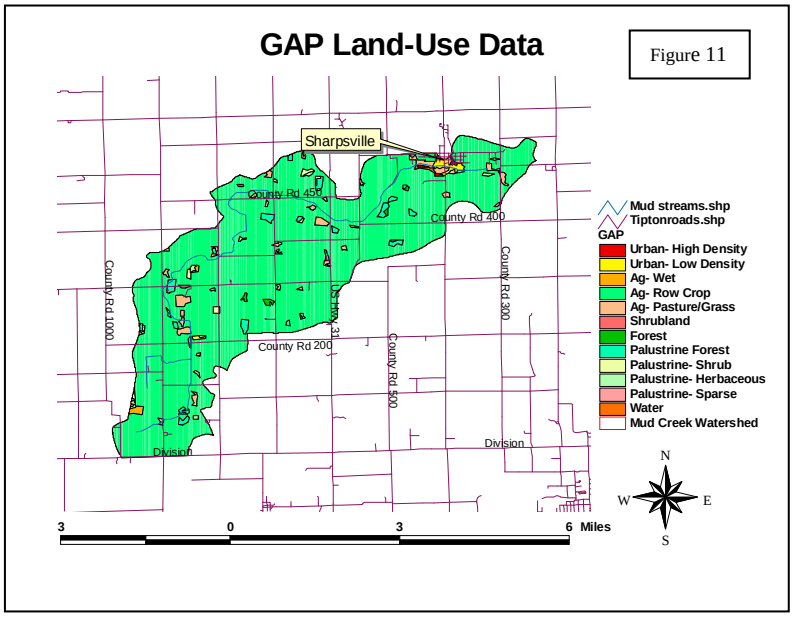
1.2.7.3 Tillage Systems: According to information from the Purdue University *Indiana T by 2000 Watershed Soil Loss Transects* data, conventional tillage systems are still the most widely used throughout the watershed, although more *minimum till* systems appear to be becoming incorporated into local farming methods. *Figures 9 & 10* display information from the Purdue University *Indiana T by 2000 Watershed Soil Loss Transects* collected for the Wildcat Creek 11-digit HUC watershed, of which the Mud Creek Headwaters watershed is a subset.





1.2.7.4 GAP Analysis: The US Fish & Wildlife Service has compiled land cover information known as the "GAP" data. GAP is the acronym used to refer to the Gap Analysis Program of USGS. It could also refer to the fact that GAP is a geographic approach to planning.

Figures 11 & 12 depict the major land-cover forms and their distribution, as mapped in the watershed.



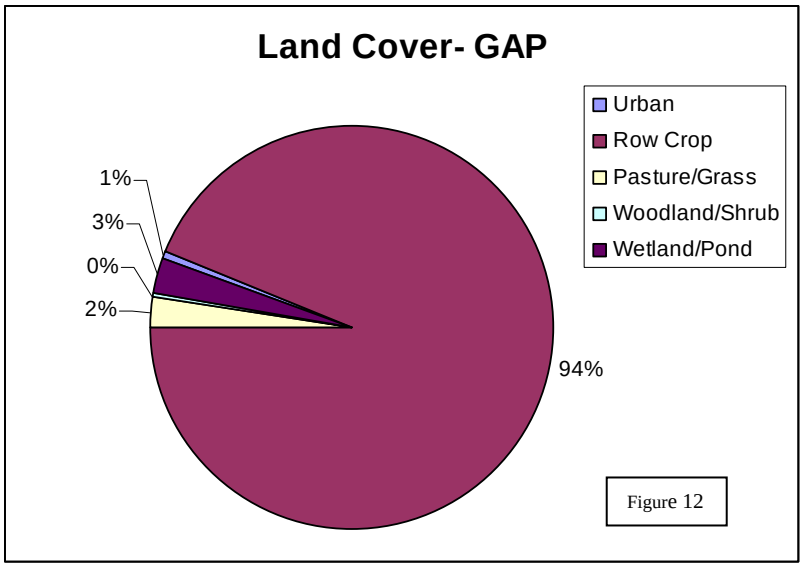


Figure 12

1.2.7.5 Wetlands: According to the US Fish & Wildlife Service "National Wetland Inventory" maps, wetlands are distributed throughout the watershed as represented in *Figures 13 & 14*. According to the National Wetland Inventory map information, approximately 63 wetland polygons are identified in the Mud Creek Headwaters watershed totaling approximately 377 acres.

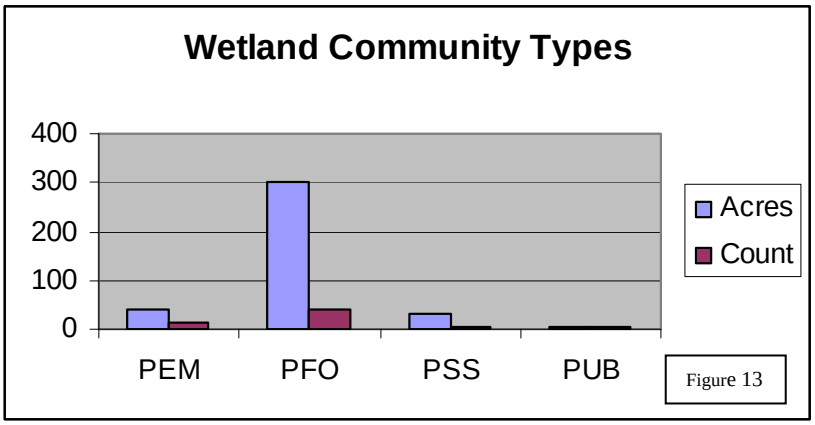


Figure 13

Four major types of wetlands are represented in the watershed.

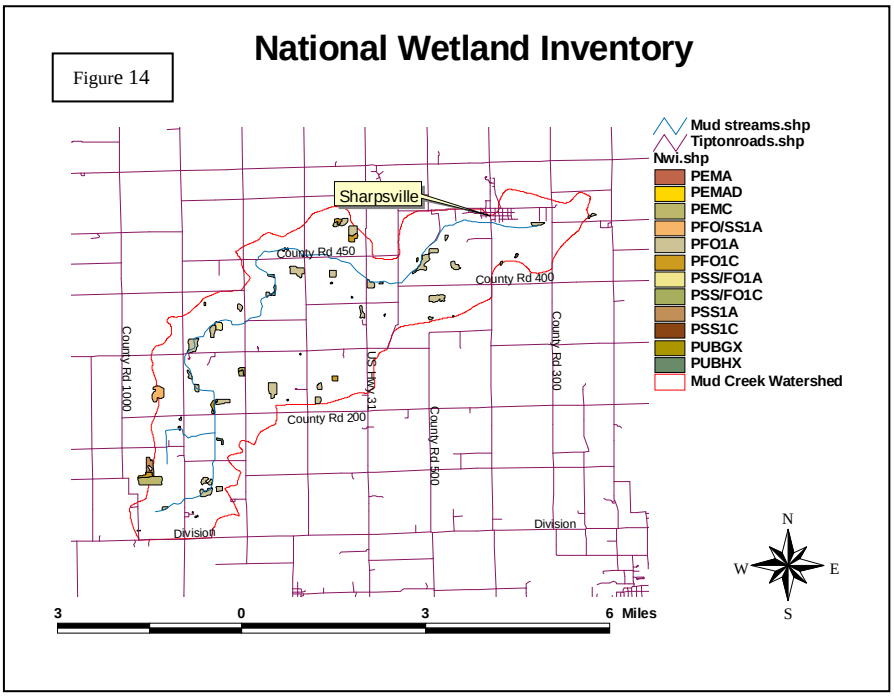
Palustrine Emergent (PEM)

Palustrine Forested (PFO)

Palustrine Scrub/Shrub (PSS)

Palustrine Unconsolidated Bottom *Open Water* (PUB)

Figure 14



1.2.8 Recreation: Outdoor recreational opportunities directly within the Mud Creek watershed are limited. There are no publicly accessible forests, wilderness areas, lakes, or reservoirs in the watershed.

According to information from the Indiana Department of Natural Resources *Statewide Comprehensive*

Outdoor Recreation Plan (SCORP 2000), The Buck Creek watershed falls into the management unit Region 5, which is composed of Tipton, Howard, Fulton, Cass, Miami, and Wabash counties. SCORP 2000 identifies the following recreational lands available to the public in Region 5:

	# Sites	# Acres
Federal Recreational Lands	4	3,485
State Recreational Lands	24	16,797
County Recreational Lands	6	595
Municipal Recreational Lands	92	1,447
Township Recreational Lands	2	13
Other Public Lands	9	33
Commercial Recreational Lands	21	1,059
Private Recreational Lands	29	2,605
TOTAL	187	26,033

Figure 15

1.2.9 Threatened & Endangered Species: According to information from the Indiana Department of Natural Resources, *Heritage Trust Database*, there are no listings of state of federal threatened or endangered species in the Mud Creek Headwaters watershed.

1.2.10 Permitted Discharge Facilities: "The State of Indiana's efforts to control the direct discharge of pollutants to waters of the State were inaugurated by the passage of the Stream Pollution Control Law of 1943. The vehicle currently used to control direct discharges to waters of the State is the NPDES (National Pollutant Discharge Elimination System) Permit Program. This was made possible by the passage of the Federal Water Pollution Control Act Amendments of 1972 (also referred to as the Clean Water Act). These permits place limits on the amount of pollutants that may be discharged to waters of the State by each discharger. These limits are set at levels protective of both the aquatic life in the waters which receive the discharge and protective of human health.

The purpose of the NPDES permit is to control the point source discharge of pollutants into the waters of the State such that the quality of the water of the State is maintained in accordance with the standards contained in 327 IAC 2. The NPDES permit requirements must ensure that the minimum amount of control is imposed upon any new or existing point source through the application of technology-based treatment requirement contained in 327 IAC 5-5 2. According to 327 IAC 5-2-2, "Any discharge of pollutants into waters of the State as a point source discharge, except for exclusions made in 327 IAC 5-2-4 is prohibited unless in conformity with a valid NPDES permit obtained prior to discharge." This is the most basic principal of the NPDES permit program."
Source- IDEM (www.in.gov/idem/water/npdes)

According to information from IDEM and the USEPA *Envirofacts* website (www.epa.gov/enviro/html), only two NPDES permitted discharge facilities exist in the watershed. Their information is summarized in the table below:

Permit #	Facility Name	Location	Permit Type	Owner Type	Status
INU000205	B&R Oil Company	Sharpsville	Un-permitted	Private	Active
IN0041866	Prairie Utilities, Inc.	Sharpsville	Standard	Private	Active

Figure 16

1.2.11 Indiana Water Quality Report- 2000 305(b): Section 305(b) of the federal Water Pollution Control Act (Clean Water Act most recently amended in 1987) requires states to prepare and submit to the USEPA a water quality assessment report of state water quality every two years. The report indicates that the Indiana State Department of Health has issued a general fish consumption advisory for carp, in all Indiana rivers and streams. The 2000 305(b) report provides the following information on Overall Use Support for the Mud Creek Headwaters watershed:

ID	Waterbody	Size in Miles	Aquatic Life	Fish Consumption	Contact Recreation	Cause/Stressor
INB0713_00	Mud Creek Headwaters (Tipton)	12.7	Full Support	Not Assessed	Non Supportive	Pathogens (Slight)

Figure 17

1.2.12 Indiana List of Impaired Waterbodies- 2002 303(d) List: The Mud Creek Headwaters is listed as "impaired" due to *E. coli* contamination. Additionally, the Wildcat Creek mainstem, to which Mud Creek is a tributary, is listed for Cyanide, Lead, Nitrates, and *E. coli* contamination.

1.2.13 Unified Watershed Assessment: "The Clean Water Action Plan, released by the President in February 1998, presents a plan and certain incentives directed toward accelerating the control of non-point source pollution in America. States have been requested, as one of the 111 Action Items presented in the Plan, to prepare a Unified Watershed Assessment (UWA). This Assessment is to be developed through the cooperation of state, federal, and local agencies and the public, hence the term "Unified". The Guidance for completing the UWA, published by the USEPA in June 1998, charged the USDA Natural Resources Conservation Service (NRCS) and the state water quality agency (IDEM) with convening the assessment process. What sets this assessment apart from other lists and reports regarding watersheds is the involvement of numerous organizations, the participation of all states, and the recognition of both impaired and healthy watersheds." *Source*- Unified Watershed Assessment for Indiana

The UWA establishes the Wildcat basin as a priority for restoration funding. The 11-digit hydrologic unit area (watershed) in which the Mud Creek Headwaters is located, has been given a high priority for restoration, based on the following information:

11Digit Hydrologic Unit	Mussel Diversity & Occurrence	Aquatic Life Use Support	Recreational Use Attainment	Stream Fishery	Lake Fishery
	nd	nd	nd	nd	4
	Eurasion Milfoil Infestation Satus	**Lake Trophic Status**	**Critical Biodiversity Resource**	**Aquifer Vulnerability**	**Population Using Surface Water Drinking**
05120107010	nd	3	2	5	2
	Residential Septic System Density	**Density of Livestock**	**% Cropland**	**Mineral Extraction Activities**	
	4	2	5	3	
1= Lowest Concern 5=Highest Concern nd=No Data					

Figure 18

For complete results of the UWA, priority area maps, and explanation of evaluation procedures, see **Appendix #5**.

1.3 **Purpose & Objectives**

This watershed management plan was developed for the following reasons:

- Improve water quality in Tipton County
- Promote adoption of voluntary conservation.
- Provide a forum to identify and discuss local watershed resources and concerns.
- Identify and seek funding to address priority concerns.

1.3.1 Development Process: The Mud Creek Headwaters watershed was selected for plan development through a prioritization process. This process is detailed in **Appendix #1 (Watershed Prioritization).** This watershed management plan (Plan) was developed by a stepwise process driven by local interests to reflect the water quality concerns of local stakeholders. A watershed team was assembled from members of the community and residents of the watershed in the early stages of the project. At the first public meeting to introduce the project, a questionnaire survey of the participants was conducted to evaluate local opinions of water quality and it's importance. Answers to the survey questions closely mirrored priority issues developed in the later stages of the planning. Full results of the

survey are included as **Appendix #3**. Once the team was assembled, the following events occurred in sequential order to develop the Plan. Quarterly watershed team meetings and monthly Steering Committee meetings provided the forum to undertake the process.

- Introduction of project, background of watershed resources, group dynamics, and ground-rules for participation.
- Identification of water quality concerns important to local stakeholders via Nominal Group Technique.
- Assessment of water quality conditions in context of concerns identified above, which provided reference points for next steps. Incorporated information from many sources.
- Presentation of results of assessment and discussed sources/causes.
- Development of goals and solutions to concerns identified above via brainstorming and team consensus.
- Draft plan that incorporates all steps above.
- Implement plan; develop projects that address goals/solutions identified above.

1.3.2 Group Structure/Partnership:

To ensure the Plan was developed in a manner reflective of the community's priorities, needs, and resources, the Planning Group, or watershed team, was assembled to provide input and direction to the Plan. The entire local public was invited to participate in the Plan development, with the intent of having broad representation of local interests reflected in the team composition. All planning decision-making was conducted at public meetings. Decisions were reached through group consensus with equal representation given to each participant. A five person Steering Committee was assembled from the group at-large. The Steering Committee met monthly and provided decision-making, direction, and assisted with the collection of information. The principles of *Coordinated Resource Management* were discussed at the first public meeting and were adopted to guide the process.

The following groups and organizations provided representation to the watershed team and contributed to the Plan development:

- Local Farmers, Developers, & Landowners
- Tipton County Soil & Water Conservation District
- Tipton County Surveyor-s Office
- Tipton County Health Department
- IMPACT Co-op
- USDA-NRCS

1.3.3 Vision & Mission Statements: A Vision statement describes what the group wants to look like or be like in the future, and the desired future conditions of the watershed. A Mission statement is intended to describe why the group exists, what is their business, who they are, what they offer, and who they serve. The Steering Committee developed the following Vision & Mission Statements to define the group's identity and purpose through a consensus process:

Vision: "The Mud Creek Headwaters watershed maintains safe water quality and a healthy aquatic community, while supporting a variety of human uses and needs."

Mission: "Promote the use of voluntary conservation, education, and stewardship to improve the water quality in the Mud Creek Headwaters watershed."

1.3.4 Outreach Efforts: Membership for the watershed planning team and community involvement were solicited in a variety of ways. The goal of the outreach process was to promote awareness of the project to as many different sectors of the community as possible to encourage broad representation and participation. Outreach efforts included:

- Approximately 500 targeted mailings to watershed residents. Utilized County Surveyor drainage assessment records.
- Articles in the Soil & Water Conservation District newsletter.
- Personal contacts and invitations to "key" individuals from SWCD Supervisors.
- Phone calls to "key" individuals from coordinator.
- Repeated articles in two local newspapers.
- Presentations and project updates delivered at regular meetings of the *Upper White River Watershed Alliance*.

- Developed a brochure for distribution at local events.

Section 2. IDENTIFYING PROBLEMS

2.1 Problem Identification: At the second public planning meeting, participants identified what they perceived to be the greatest threats to water quality in the watershed.

2.1.1 Nominal Group Technique: The planning team accomplished problem identification by using the Nominal Group technique. The first step of this process is to is to brainstorm all potential water quality threats and discuss each. The ideas are recorded and the group determines which ones require further clarification, or if combining is appropriate. Once the issues are recorded per group consensus, participants rank them in terms of highest priority by assigning points to each.

2.1.2 Results: The water quality issues and their associated water quality pollutants, to be discussed in this plan are indicated below, and are listed in terms of priority:

1. Failing Septic Systems- *Pathogens, nutrients*
2. Runoff & Sedimentation- *Sediment, nutrients, pesticides*
3. Animal Waste- *Pathogens, nutrients*

2.2 **Failing Septic Systems.** Planning group participants determined, through brainstorming and consensus exercises, that failing residential septic systems is the number one water quality issue facing the Mud Creek Headwaters watershed. Fecal bacteria/pathogenic contamination and nutrient loading of waterways from these failed systems are the primary pollutants of concern.

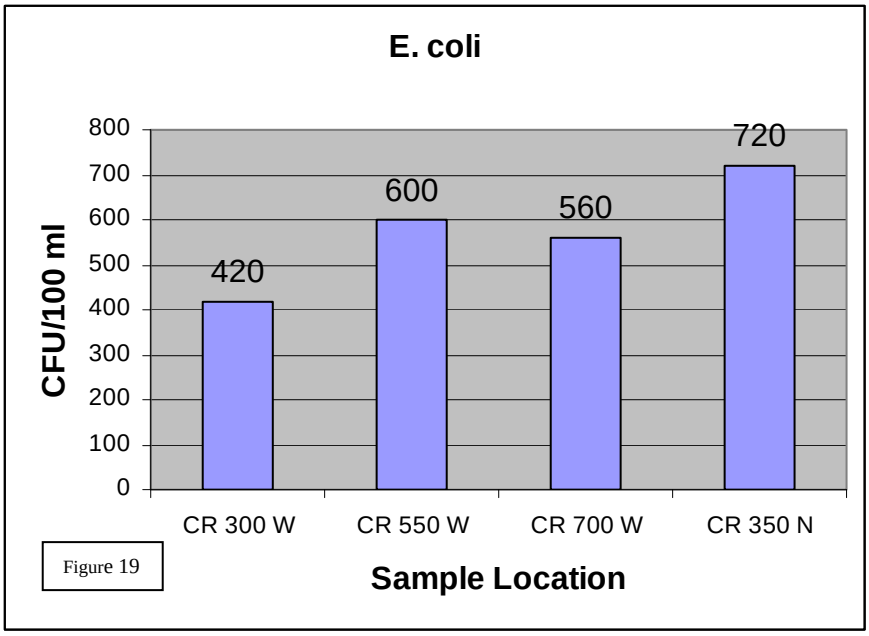


Figure 19

2.2.1 Assessment. The Steering Committee met on February 20, 2003, to discuss methods to assess and characterize the extent of the water quality problem resulting from failed septic systems. Since no new water quality data is to be collected under the scope of this project, assessment methods target the collection of data from existing sources. The goal of the assessment procedure is to collect evidence that will identify causes and sources of pollution resulting from failed septic systems, and to identify priority areas in which to concentrate remediation efforts.

2.2.1.1 IDEM Data: The Indiana Department of Environmental Management, Surveys Section, provided the following information concerning *E. coli* levels in Mud Creek. Samples were collected at four different locations in the Mud Creek watershed on August 14, 1998. *Figure 19* depicts the results of the *E. coli* sampling. Note that the levels at each of the sampling locations exceeds the Indiana water quality standard of **235** colonies per 100/ml.

E. coli is a bacterium found in the intestinal tracts of warm blooded animals, and is often used as an indicator for the presence of fecal material in water. Fecal material can contain various bacteria and pathogens capable of causing illness in humans. It is often difficult and expensive to differentiate the origin of *E. coli*, whether from human, livestock, or wildlife sources. The Mud Creek Headwaters watershed is listed on the Indiana 303(d) List of Impaired Waterbodies due to elevated levels of *E. coli*.

Additionally, the *Unified Watershed Assessment* indicates a concern level of four out of five (5=Highest Concern) for the parameter of "Residential Septic System Density" in the watershed.

2.2.1.2 Geology & Hydrology: In the *Hoosier Environmental Council* publication "Watershed Restoration Toolkit: *A Citizen's Guide to Improving Water Quality*", a table discussing septic systems and soil suitability indicates that approximately 54% of Tipton County residents rely on on-site wastewater disposal systems (septics) and **100%** of the county area contains soils having "severe" limitations for septic systems.

According to information from the USDA *Soil Survey for Tipton County, Indiana*, the dominant soil association in the Mud Creek Headwaters watershed is the *Patton-Del Rey-Crosby Association*. In the description of this soil association, the *Soil Survey* says "The major soils are generally unsuited or poorly suited to dwellings and sanitary facilities, mainly because of wetness and ponding. Slow or moderately slow permeability also is a problem." *Figure 20* below indicates septic tank suitability and water table information, by predominant soil type.

Soil Name	Suitability for Septic Tank Absorption Fields	High Water Table	
		Depth	Months Affected
Patton	Severe: ponding, percs slowly	+0.5 - 2.0	Mar - Jun
Del Rey	Severe: wetness, percs slowly	1.0 - 2.5	Jan - May
Crosby	Severe: wetness, percs slowly	1.0 – 3.0	Jan - Apr

Source- *Soil Survey for Tipton County, Indiana*

Figure 20

2.2.1.3 County Health Department Information: Indiana State Septic law (410 IAC 6-8.1) gives local health departments authority to require more information and use more strict guidelines than the State requires. In approximately May, 1996, the Tipton County Health Department initiated the following requirements (Chapter 51, county code) before issuance of a local septic permit:

- a detailed soil evaluation by a qualified soil scientist
- installation of perimeter drains
- appropriate set-back distances from: wells, public water supplies, water lines, lot lines, streams/ditches/tiles, dwellings
- appropriate system design and sizing, including: trenches, absorption fields, settling & distribution tanks
- installation of access manholes to allow for inspection.

Additionally, in 1990, the Tipton County Plan Commission adopted the Sub-Division Control Ordinance, as part of the Tipton County Comprehensive Plan. This ordinance established a minimum lot size of one acre, which allows for more room to install septic systems and provides space for contingency in case of system failure. Prior to 1996, there were few local requirements concerning septic system installation, and very little enforcement of state or local regulations.

These new requirements affect only the construction of new homes, the addition of a bedroom to an existing home, or, in some cases, as a requirement by a loan institution. Consequently, the majority of older homes in the watershed have not been affected by the new requirements. The county Health Department can also take action, at the direction of the County Commissioners, if there is direct evidence of system failure. This most commonly occurs when the homeowner reports a problem with flushing the toilet, or a neighbor reports sewage visible on the ground surface. In these instances, compliance with the county and state requirements may not always be possible, due to existing site constraints. Consequently, flexibility with the requirements is provided and a "best possible solution" approach is applied to the system repair.

Due to recordkeeping issues, no information on new system installation, system repairs or modifications, or system failures in the watershed were available.

Also of note, the Tipton County Health Department is currently operating with no valid local ordinance governing septic systems. The validity of the current county ordinance (3-41-3), was challenged in litigation. Apparently, no written approval of the county ordinance was ever received by the county from the State Department of Health. Therefore, in June, 2002, the Indiana Court of Appeals ruled that the ordinance was invalid per state requirements. The Health Department is currently using the authority of Indiana state law and the requirements of "Indiana State Department of Health- Residential Sewage Disposal Systems" (410 IAC 6-8.1) to administer it's program. This state rule is scheduled to be updated soon, with the addition of new requirements. Tipton County plans to wait for

the adoption of this state rule, and then develop a new county ordinance that reflects the updated state regulations. A request for ordinance approval from the State Department of Health is planned.

Source- Interview with Nolan Pyke, Tipton County Sanitarian

2.2.1.4 Survey of Homes in Watershed: Representatives from the Tipton County Health Department indicate that a significant potential for septic system failure is present in homes older than 30 years, unless major system repairs or replacements have occurred. According to information obtained from the Tipton County Assessor's office, there are approximately 6,370 dwellings in unincorporated Tipton County. Of these, 4,707 were built prior to 1973. This indicates a potential for approximately 74% of the residential dwellings in the county to have sub-standard functioning septic systems. Best estimates from civil township records, applied as a percentage of area in the watershed, indicate approximately 185 homes older than 30 years are located in the Mud Creek Headwaters watershed.

2.2.1.5 Volunteer Monitoring: The Tipton Soil & Water Conservation District has been conducting volunteer water quality monitoring at sites in the County in cooperation with the Cargill Seed Company. No Quality Assurance/Quality Control plan was developed as part of the SWCD project. Samples are collected from bridges by using buckets. 3 mL of the sample are extracted from the bucket and added to a *Coliscan* media container via the use of a pipet. The *Coliscan* media and mixed sample are poured into a Petri dish for incubation, usually 48 hours. *E. coli* colonies are counted according to *Coliscan* instructions following the incubation period. *E. coli* levels in Mud Creek were sampled using this procedure in April and May of 2003. The results are as follows:

Sample Date	Stream	Location	E. coli cfu/100 ml
4/12/03	Mud Creek	CR 300 W at CR 500 N	632.7
5/20/03	Mud Creek	CR 300 W at CR 500 N	2145*

Figure 21

* The tester indicates that the procedure for counting the number of bacterial colonies is very subjective, particularly differentiating between single and multiple colonies. He included the count of "blue" colonies in the results of this sample, per the instructions of the test. These blue clusters were not included in the sample on 4/12/03. He indicated that more training would help to improve test accuracy.

2.2.1.6 Sewage Treatment: The Town of Sharpsville provides a sanitary sewer system for it's approximately 325 customers. However, no sewage treatment plant is located in the town. The sewage is transported via force main to the City of Tipton's wastewater treatment plant for processing.

2.2.2 Causes: According to information from local Health Department officials, the causes of septic system failure, and subsequent bacterial and nutrient pollution of waterbodies, can be attributed to the following:

- No system or "straight pipe" discharge through tile lines.
- Sub-standard system with no, improper, or undersized settling tank and absorption field.
- Overloaded leach field due to clogged lines from lack of maintenance or from unsuitable soil types.
- Systems with direct interaction with ground water resulting from high water tables and lack of, or inadequate perimeter drains.

2.2.3 Sources: Although the only true method to identify direct sources of failing septic systems is to conduct a dye test of the individual system, common sources of the causes of failure listed above are found in homes over 30 years old. Additionally, septic systems installed prior to 1996, when the county started to thoroughly review septic system installation, may be at risk of failure.

2.2.4 Priority Areas: Priority areas for focusing septic system improvement efforts in the watershed include the approximately 185 homes that are older than thirty years in unincorporated county areas.

2.3 **Run-off & Sedimentation**: Planning group participants determined, through brainstorming and consensus exercises, that run-off and sedimentation is the number two water quality issue facing the Mud Creek Headwaters watershed. Sediment and attached chemicals and nutrients are the primary pollutants of concern.

2.3.1 Assessment: The Steering Committee met on February 20, 2003, to discuss methods to assess and characterize the extent of the water quality problem resulting from run-off. Since no new water quality data is to be collected under the scope of this project, assessment methods target the collection of data from existing sources. The goal of the assessment procedure is to collect evidence that will identify causes and sources of pollution resulting from run-off to waterbodies, and to identify priority areas in which to concentrate remediation efforts.

2.3.1.1 Soil & Slope: Information from the *Tipton County Soil Survey*, and conversations with the USDA, Natural Resources Conservation Service, District Conservationist, indicate that *Patton* silty clay loam is the most prevalent soil type in the watershed. *Patton* soils typically have slopes ranging from 0-2%. The "erosion hazard" for *Patton* soils is listed as "slight".

2.3.1.2 Land Cover: Data from the US Fish & Wildlife Service "GAP" analysis of land cover types indicates that with approximately 9,768 acres, "Row Crop Agriculture" is the dominant land cover type in the Mud Creek Headwaters watershed. *(See Section 1.2.6.4)*

According to information from the Purdue University *Indiana T by 2000 Watershed Soil Loss Transects* data, the vast majority of fields within the Wildcat Creek watershed, of which the Mud Creek Headwaters is a subset, are eroding at an annual soil loss rate below 'T". Soil Loss Tolerance (T), expressed in tons/acre/year, is an important criteria when we begin our management to control soil loss. "T" - Soil Loss Tolerance - is the maximum amount of soil loss, in tons/acre/year , that a given soil type can tolerate and still permit a high leva1 of crop production to be sustained economical1y and indefinitely. Erosion at a rate at or below 'T" indicates sustainable soil loss rates where soil formation is greater than soil loss. Erosion above "T" means that soil is eroding from an area faster than it regenerates, often times indicating non-sustainable land use or activity.

Figure 22 displays information from the Purdue University *Indiana T by 2000 Watershed Soil Loss Transects* collected for the Wildcat Creek 11-digit HUC watershed, of which the Mud Creek watershed is a subset, from 1990-2002.

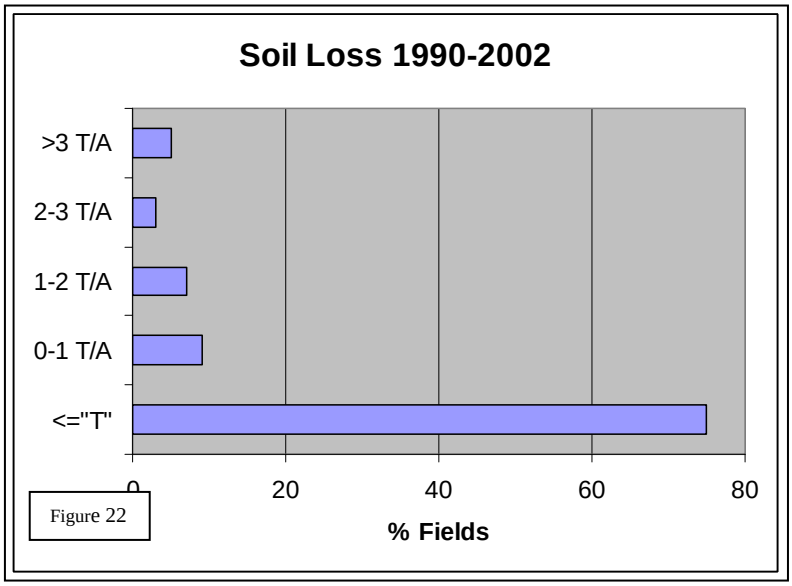


Figure 22

Due to topography changes in the central portions of the Wildcat Creek watershed, the actual percentage of fields eroding below "T" in the Mud Creek Headwaters watershed is most likely somewhat higher.

Discussions with USDA Natural Resources Conservation Service and Indiana Department of Natural Resources local field representatives, indicate that the most prevalent row crop farming method is conventionally tilled corn followed by reduced tilled soybeans. Using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*", the approximately 9,768 acres of row crops farmed in this method in the watershed can be expected to lose approximately 0.46 tons of sediment per year per acre, or contribute approximately **4,500 tons of sediment** every year to receiving waterways.

2.3.1.3 Existing Conservation: According to information from the local Natural Resource Conservation Service and Farm Service Agency offices, conservation practices in the watershed consist predominantly of Conservation Reserve Program (CRP) filter strips along ditches and waterways. Approximately 13 miles of CRP filter strips currently exist along the banks of approximately 13 miles of perennial and intermittent streams (26 miles of banks). Existing land-use data from the Tipton County Assessor's Office indicate that approximately 4 miles of banks in the watershed are adjacent to lands in which filter strip installation is not possible, these include land uses such as: home-sites, woods, commercial, town, roads, farm buildings, etc. According to these estimates, approximately

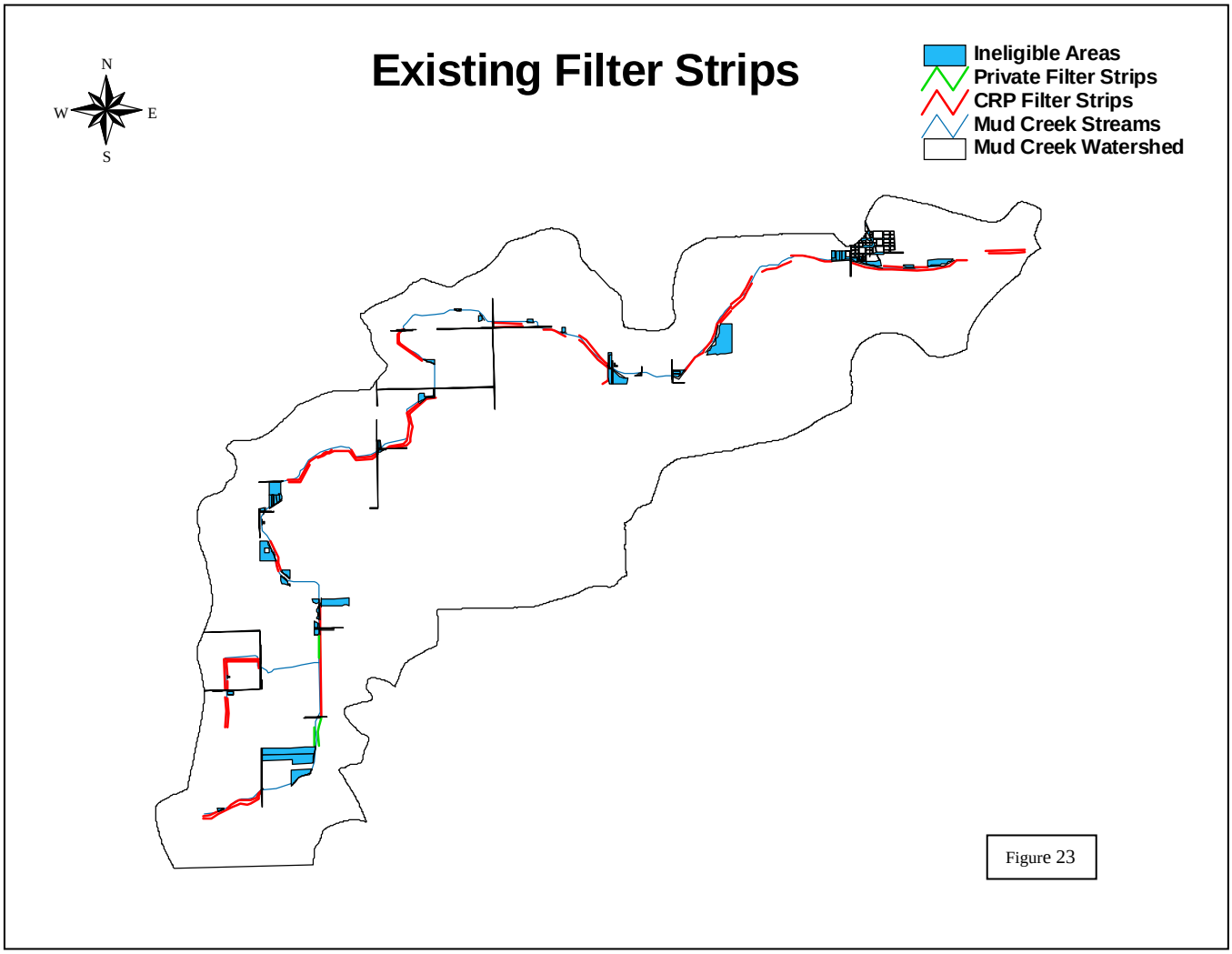


Figure 23

59% of the banks in the watershed are currently enrolled in Conservation Reserve Program filter strips. Local NRCS staff estimate that the most common width of filter strips in the watershed is approximately 30 feet. *Figure 23* above depicts the breakdown of existing CRP practices, and their distribution, as mapped in the watershed.

2.3.1.4 Site sampling: Throughout the watershed, many farmers and landowners have established filter strips or buffers along streams and ditches privately, or without participation in existing CRP or other conservation programs. To assess the extent of these private filter strips, an inventory was conducted by the project coordinator and representatives from the Steering Committee at all road crossings of streams and ditches in the watershed. According to this inventory, approximately 0.6 miles of private filter strips are located in the watershed. The inventory also indicated that stream-bank erosion was present at 19 of the 52 banks inventoried. Full results of the inventory are available in Appendices (Mud Creek Assessment.mdb). The location of data collection sites is displayed in *Figure 24*.

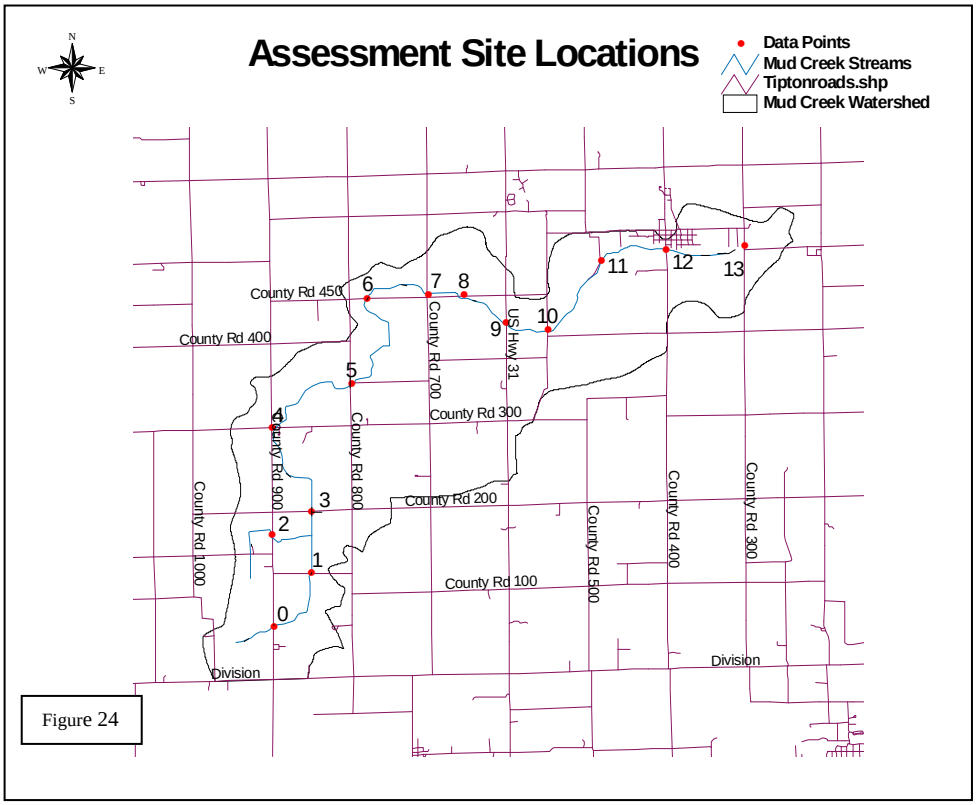


Figure 24

2.3.1.5 Impervious Surface: According to information from the Tipton County Assessors office, the following table depicts the amount of potentially "impervious surface" present in the watershed. Large areas of impervious surface can contribute to water quality problems, including: heavy metals, nutrients, oil & grease, salts, and increased flow rates in receiving waters.

2.3.1.6

Home Sites	Towns	Industrial/Commercial	Roads	Total % of Watershed Area
208 acres	51 acres	2 acres	222 acres	4%

Figure 25

Additionally, sources from the Indiana Department of Natural Resources, Division of Soil Conservation, indicate that there have been few, if any, requests for Indiana Urban Erosion Control (Rule 5) development permits in the watershed area within the last five years.

2.3.1.6 Fertilizer Run-off: The following table, based on matrices in the Purdue Extension publication- *Guide for Watershed Partnerships*, estimate available nutrients in the watershed based on fertilizer sales and livestock manure. It is important to note that this information does not include nutrients available from other sources, such as septic system discharge, Combined Sewer Overflow events, and residential fertilizer sales.

Nutrients From Fertilizer

Fraction of County in Watershed	x Total Nutrients (tons)*		x 2,000 lbs/ton	Nutrients in Watershed (lbs)	
6%	Nitrogen	P_2O_5		Nitrogen	P_2O_5
.06	3000	3220	X 2,000	360,000	386,400

Figure 26

* Source- Office of Indiana State Chemist. *Indiana Fertilizer Tonnage Reports*: January 1- December 31, 2001

2.3.1.7 Pesticide Run-off: Pesticides are applied by farmers to limit crop loss from insect predation and weed competition. According to estimates from the Purdue University Extension publication- *A Guide for Watershed Partnerships*, approximately 1% of the pesticides applied end up in our waterways. Using the following matrix taken from the *Guide*, pesticide loading for the Mud Creek Headwaters Watershed were estimated as presented in *Figure 27* below.

Crop Type	Crop Acres in Watershed**	X	Pesticide Type	Fraction of acres treated in the state (2000 figures)*	X	Average Rate of application (lbs per acre) (2000 figures)*	=	Estimated amount of pesticide applied (lbs)
Corn	4,280	X	Atrazine	.80	X	1.41	=	4,827
			Metolachlor	.41		1.5		2,632
			Acetochlor	.26		2.01		2,236
			Primisulfuron	.8		.02		68.48
			Cyanazine	--		--		
			Insecticides:					
			Tefluthrin	.13		.10		55.64
			Chlorpyrifos	.08		1.04		356
Soybeans	4,269	X	Glycophosphate	.71		.97		2,940
			Chlorimuronethyl	.19		.01		8.1
			2,4,D	.14		.46		275
			Imazethapyr	.09		.04		15.3
			Paraquat	--		--		
Total Pesticide Applied in Watershed (lbs)								**13,413.5**
Approximate Amount of Herbicides Transported to Waterways								**134 lbs**

Figure 27

*Source- 2000-2001 Indiana Agricultural Statistics
**Source- 2000-2001 Indiana Agricultural Statistics (# acres crop type in County x 6% area in watershed x 94% watershed area in crops)

2.3.2 Causes: The predominant sources of run-off and sedimentation in the watershed appear to be from row crop agricultural fields, simply because this type of land usage dominates the geographic area. Run-off from urban and residential sources is minimal, due to their small percentage of land use in the watershed (approx. 4%).

2.3.3 Sources: Although the topography is relatively flat and erosion potential is low, the widespread use of conventional tillage systems (particularly used for corn production) appears to be the most significant source of mobilized sediment and attached pollutants.

2.3.4 Priority Areas: The use of filter strips along waterways is an effective method of minimizing the effects of run-off from conventionally tilled fields. Priority areas for addressing run-off and sedimentation are any areas adjacent to waterways that do not currently have filter strips (approximately 8.4 miles of eligible banks). Additionally, any agricultural fields using conventional tillage systems for crop production will be considered priority areas.

2.4 **Animal Waste**: Planning group participants determined, through brainstorming and consensus exercises, that storage, handling, and disposal of animal waste is the third priority quality issue facing the Mud Creek Headwaters watershed. Nutrients and pathogens are the primary pollutants of concern.

2.4.1 Assessment: The Steering Committee met on February 20, 2003, to discuss methods to assess and characterize the extent of the water quality problem resulting from the storage, handling, and disposal of animal waste. Since no new water quality data is to be collected under the scope of this project, assessment methods target the collection of data from existing sources. The goal of the assessment procedure is to collect evidence that will identify causes and sources of pollution resulting from animal waste, and to identify priority areas in which to concentrate remediation efforts.

2.4.1.1 Livestock Operations Inventory: Indiana's confined feeding rule (327 IAC 16), applies to livestock producing operations with more than 300 cattle, 600 swine or sheep, or 30,000 fowl. According to records from the Indiana Department of Environmental Management, which administers the confined feeding regulations, there are four operations in the watershed which fall under the regulatory requirements. Using aerial photography and records

from the Farm Service Agency, local NRCS and IDNR staff estimate that there is only one other livestock operation in the watershed which is not subject to the confined feeding rule. Hog production is the most common form of livestock operations in the watershed. (See Section 1.2.6.1 for discussion of county-wide livestock trends) Data from these sources estimate the following breakdown of livestock present in the watershed:

Beef Cattle	Dairy Cattle	Swine	Fowl	Sheep
450	0	12,600	0	0

Figure 28

Based on the above estimates, the amounts of nutrients produced by livestock in the watershed were calculated using the matrices in the Purdue University Extension publication- *Guide for Watershed Partnerships:*

Livestock	# Head*	x Avg. Manure Produced	= Amount Manure Produced	Fraction Nutrients in lb. Manure		Lbs. N in Manure	Lbs. P in Manure
				Nitrogen	Phosphorus		
Beef Cattle	450	75 lb/day	33,750	.008	.0065	270	220
Dairy Cattle		115 lb/day		.0045	.002		
Hogs	12,600	11.7 lb/day	147,420	.0045	.004	663	590

Figure 29

Local NRCS staff indicate that storage of hog manure occurs most commonly under livestock buildings and is most often combined with lagoon systems. Application of manure is predominantly "knifed" or injected into agricultural fields, with some spraying through irrigation systems. Manure from cattle is typically scraped off concrete pads and spread onto fields with "honey-wagons". IDNR staff indicate that although the actual numbers of livestock present in the watershed are relatively low, significant amounts of manure are applied to fields in the watershed from livestock production sources residing outside the watershed area.

2.4.1.2 Livestock Access to Waterways: To assess the extent of livestock with direct access to streams and waterways, an inventory was conducted by the project coordinator and representatives from the Steering Committee at all road crossings of streams and ditches in the watershed. According to this inventory, only one area was identified where cattle had direct access to the stream. (Full results of the inventory are available in Appendix #3)

2.4.2 Causes: Typically, the causes of nutrient and pathogenic pollution to waterways resulting from livestock operations are associated with the storage, handing, and application of manure. Manure can leak or spill from storage pits, lagoons, tanks, etc. , improper application of manure can contaminate surface or ground water, and manure over-application can adversely impact soil productivity.

2.4.3 Sources: In the Mud Creek Headwaters watershed, the vast majority of livestock operations fall under the regulatory authority of IDEM's Confined Animal Feeding rule (327 IAC16). This regulatory program requires operators of livestock facilities to address issues such as: storage sufficiency, storage facility design criteria, acreage available for application, separation and setback requirements, a manure management plan detailing soil testing and application rates and areas, and adequate tracking and record-keeping. This would indicate that the majority of manure sources in the watershed are sufficiently addressed to minimize run-off the waterbodies. However, local farmers indicate that since manure is trucked in from outside sources, suitable application areas are often difficult to obtain.

2.4.4 Priority Areas: Local farmers indicate that fields in close proximity to livestock operations inevitably receive the heaviest loads of manure, due to the greater time and expense associated with long distance hauling. These fields are considered the highest priority areas in which to direct remediation efforts. Additionally, the one location in which livestock access to waterways was identified in the inventory is also considered high priority.

2.5 Pollutant Loads:

2.5.1 Agricultural Lands: NRCS staff indicate that the most prevalent row crop farming method is conventionally tilled corn followed by reduced tilled soybeans. Using the *Revised Universal Soil Loss Equation* (RUSLE), the approximately 9,768 acres of row crops farmed in this method in the watershed can be expected to lose approximately 0.46 tons of sediment per year per acre, or contribute approximately **4,500 tons of sediment** every

year to receiving waterways. If farming methods were changed to no-till corn followed by no-till soybeans, the annual soil loss rate would be reduced to a mere 0.12 tons per year, and result in approximately 3,325 tons of soil saved every year, a reduction of erosion by 72%. Additionally, by using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*", approximately 2,100 pounds of phosphorus and approximately 4,200 pounds of nitrogen would be prevented from entering waterways.

According to the information examined in Sections 2.3.1.4 and 2.4.1.4, available nutrients in the watershed from agricultural sources are as follows:

	Nitrogen (lbs)	**Phosphorus (lbs)**
From Fertilizer	360,000	386,400
From Manure	933	810
TOTAL	**360,933**	**387,250**

Figure 30

2.5.2 Urban/Residential Lands: Using the IDEM *"Urban Runoff BMP Pollutant Load Reduction Worksheet"*, the following tables estimate potential pollutant loading , and potential for pollutant load reduction if "Vegetated Filter Strips" were employed as a "Best Management Practice" (BMP) in the contributing areas. Contributing areas were based on land-use information provided by the Tipton County Assessor's Office.

Land-Use	**Sewered**	**Un-Sewered**
Commercial		2 acres
Industrial		
Institutional		
Transportation		222 acres
Multi-Family		
Residential		208 acres
Agriculture		8831 acres
Vacant		
Open Space		783 acres

Parameter	**Pre-BMP Loading (lbs/yr)**	**Post BMP Loading (lbs/yr)**	**Load Reduction (lbs/yr)**
BOD	36,014	17,827	18,187
COD	390,517	234,310	156,207
TSS	1,697,720	458,384	1,239,336
Lead	398	219	179
Copper	119	U	U
Zinc	1,156	462	693
TDS	1,820,382	U	U
TN	23,771	14,263	9,508
TKN	11,184	U	U
DP	782	U	U
TP	2,025	1,109	916
Cadmium	5	U	U

Figure 31

Section 3 GOALS & SOULTIONS

3.1 **Failing Septic Systems**

3.1.1 Discussion & Rational: At the Work Team meeting held on April 4, 2003, the planning group attempted, through a consensus exercise, to define a goal, develop a list of alternatives/solutions, and develop action items to address this topic based on the information made available though the assessment process. The group agreed that enough

information was collected (see Section 2.2) to determine that there is a significant threat to water quality from failed septic systems in the watershed. However, the group felt that more specific information is needed before definitive remediation actions can be employed. Particularly, the group believes that existing information on *E. coli* levels in the watershed streams is not sufficient to adequately characterize the extent or the sources of the contamination. The group believes that more intensive *E. coli* sampling is needed to establish water quality trends and to pin-point areas in need of remediation. Since data collection of this sort was not included in the scope of this project, the group focused planning efforts on strategies to gather more information.

3.1.2 Alternatives: The following alternatives were discussed by the Work Team:

- Intensive *E. coli* sampling/monitoring project to establish trends and pin-point areas in most need of remediation.
- Voluntary compliance- free diagnosis of potential problems for homeowners via dye test combined with cost share for system upgrade or repair.
- Inventory of all homes in the watershed located within 500 feet of a receiving stream. These homes have greatest potential for presence of "straight pipe" discharges.
- Demonstration of alternative technology systems in the watershed. Evaluate the effectiveness of non-traditional septic systems to facilitate wide-spread use in situations where traditional septic systems are limited.

3.1.3 GOAL: "Comprehensively define extent and sources of pollution resulting from failed septic systems prior to developing and implementing a remediation strategy."

3.1.3 Recommendations & Action Items:

Recommendation #1: Conduct and intensive *E. coli* monitoring project in surface waters of the watershed to identify reaches of streams most subject to bacterial pollution, account for seasonal and stream flow variations, and to establish a water quality baseline for future remediation efforts. Utilize existing SWCD voluntary monitoring program resources as a springboard (See Section 2.2.1.5).

Action Item: Establish a series of sampling locations at strategic points along streams which will provide for a reach-by-reach analysis of *E. coli* concentrations. *Target Date:* 1/1/05. *Technical Assistance:* Tipton County Soil & Water Conservation District, Tipton County Health Department, Tipton County Surveyor's Office. *Estimated Cost:* $500.

Action Item: Develop a sampling schedule and list of water quality sampling parameters, including: *E. coli*, water temperature, flow, pH, Dissolved Oxygen, etc. Develop a Quality Assurance/Quality Control Plan for collection and analysis of data. *Target Date:* 1/1/05. *Technical Assistance:* Tipton County Soil & Water Conservation District, Tipton County Health Department, Tipton County Surveyor's Office, Indiana Department of Environmental Management. *Estimated Cost:* $2,000.

Action Item: Apply for funding to conduct *E. coli* monitoring project. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department. *Target Date:* 10/1/05. *Potential Funding Sources*: Tipton County Foundation, Section 205(j) (IDEM), Environmental Fund for Indiana, Section 319 Grant (IDEM), IPALCO Golden Eagle Grants, corporate sponsorships, Lake & River Enhancement (IDNR), Water Quality Special Research Grants (CSREES). *Estimated Cost*: $20,000 per year of sampling.

Action Item: Conduct Monitoring Project. Develop database to chart and record water quality parameters by site. *Target Date:* 10/1/08. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department, private consultants. *Estimated Cost*: $20,000 per year of sampling.

Action Item: Analyze results of monitoring project. Develop remediation recommendations based on findings. *Target Date:* 10/1/08. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department, Indiana Department of Environmental Management, private consultants. *Estimated Cost*: $20,000 per year of sampling.

Recommendation #2: Conduct an inventory of all homes located within 500 feet of a receiving stream in the watershed.

Action Item: Develop inventory protocols, including: use of maps and aerial photographic data, use of County Assessor data, field collection data, use of GPS/GIS mapping, location of drainage tiles, record-keeping and data management, etc. *Target Date:* 1/1/05. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department, Tipton County Assessors Office, Tipton County Commissioners, private consultants. *Estimated Cost*: $4,000.

Action Item: Hire staff/contractor and/or assign local personnel to conduct inventory. *Target Date:* 12/1/05. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department, Tipton County Assessors Office, Tipton County Commissioners, private consultants. *Potential Funding Sources*: Tipton County Foundation, Section 205(j) (IDEM), Environmental Fund for Indiana, Section 319 Grant (IDEM), IPALCO Golden Eagle Grants, corporate sponsorships, Lake & River Enhancement (IDNR), Water Quality Special Research Grants (CSREES), Tipton County Commissioners. *Estimated Cost*: $18,000

Action Item: Analyze data and prepare a report of homes at "high risk" for pollution of surface waters resulting from improperly treated septic system waste. *Target Date:* 1/1/06. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Tipton County Health Department, Tipton County Assessors Office, private consultants. *Estimated Cost*: $5,000.

Recommendation #3: Develop an incentive based demonstration of new or non-traditional technology for septic systems that focuses on systems with problem soils or high water tables. Evaluate for wide-spread use in problem areas.

Action Item: Locate and target two home-sites in the watershed with systems that have failed due to problem soils and/or insufficient drainage of high water tables. *Target Date*: 1/1/05. *Technical Assistance*: Tipton County Health Department, Tipton County Soil & Water Conservation District. *Estimated Cost*: $5,000

Action Item: Determine the best available on-site technology suitable for correcting the failed system. Potential technology includes: re-circulating sand filters, mound systems, drip-irrigation systems, perimeter sub-surface drainage, constructed wetland systems, etc. *Target Date*: 1/1/06. *Technical Assistance*: Tipton County Health Department, Tipton County Soil & Water Conservation District. *Estimated Cost:* $5,000.

Action Item: Acquire a grant or low interest loan funding to subsidize the replacement of the failed systems with the most suitable technology. *Potential Funding Sources*: Indiana State Revolving Fund Loan Program (IDEM), Section 319 Grant (IDEM), Tipton County Foundation Grant, Section 104(b)(3) Grant (IDEM), Water Quality Cooperative Agreements (USEPA). *Target Date*: 1/1/07 *Estimated Cost*: $2,000

Action Item: Hire engineers to design the replacement systems and contractors to install the new on-site technology. Secure any required state or local permits (eg. NPDES, Section 404/401, Groundwater discharge permit, local septic permit, etc.) *Target Date*: 1/1/08. *Estimated Cost*: $40,000.

Action Item: Conduct post installation inspection and monitoring of the systems to determine effectiveness of the new technology. Utilize dye test and *E. coli*/nutrient monitoring. *Technical Assistance:* Tipton County Health Department, Tipton County Soil & Water Conservation District, private consultants. Target Date: 1/1/09. *Estimated Cost:* $5,000.

Action Item: Conduct outreach program in the watershed and county to publicize the results. *Technical Assistance*: Tipton County Health Department, Tipton County Soil & Water Conservation District, Tipton County Commissioners, Purdue Cooperative Extension Service, Rural Community Assistance Program. *Target Date*: 1/1/10. *Estimated Cost*: $7,000.

Recommendation #4: Develop a "Voluntary Compliance" program that offers free septic system diagnosis and cost share toward system repair, upgrade or replacement.

Action Item: Develop a program that offers free septic system diagnosis to residents in the watershed by using dye testing or similar methods. Target areas and homes identified through the efforts of Recommendations #1 and #2. *Technical Assistance*: Tipton County Health Department. *Target Date:* 1/1/04. *Estimated Cost*: $2,000

Action Item: Acquire a grant or low interest loan funding to subsidize the repair, upgrade, or replacement of failed systems. Target areas and homes identified through the efforts of Recommendations #1 and #2. When appropriate, utilize non-traditional systems evaluated through the efforts of Recommendation #3. Create a low interest loan program that ties the loan to the property in the form of a lien. Secure any required state or local permits prior to conducting repair activities. *Potential Funding Sources*: Indiana State Revolving Fund Loan Program (IDEM), Section 319 Grant (IDEM), Tipton County Foundation Grant, Section 104(b)(3) Grant (IDEM), Water Quality Cooperative Agreements (USEPA), Rural Community Assistance Program, Tipton County Commissioners, Tipton County Council. *Target Date*: 1/1/07 *Estimated Cost*: $200,000

3.2 Run-Off and Sedimentation

3.2.1 Discussion & Rational: At the Work Team meeting held on April 4, 2003, the planning group attempted, through a consensus exercise, to define a goal, develop a list of alternatives/solutions, and develop action items to address this topic based on the information made available though the assessment process. Discussion centered on practicable ways in which sedimentation of waterways could be reduced from agricultural lands. Although the information presented in Section 2.5.1 indicates that the most effective method for reducing sediment loads to receiving streams is to adopt wide-spread use of "no-till" tillage systems, the group believes that due to significant economic risks for farmers, adoption of no-till practices on the majority of watershed agricultural land is unlikely. However, the group decided to encourage the adoption of no-till by facilitating local discussion and conducting educational activities.

The group decided that the most plausible means to reduce sedimentation in the watershed is to facilitate the installation of grassed filter strips adjacent to streams and ditches. The group felt that existing conservation cost share programs provide an adequate incentive for landowners to remove these lands from agricultural production and establish grassed filter strips. However, the group believes that the addition of additional locally based incentive programs may be necessary to facilitate wide-spread use. Information in Section 2.3.1.3 indicates that currently, approximately 59% of banks currently have some level of filter strip protection. The group also believes that the installation of filter strips will help to improve water quality by providing setback distances for pesticide, manure, and fertilizer applications, as well as reducing erosion of stream-banks.

3.2.2 Alternatives: The following alternatives were discussed by the Work Team:

- Install filter strips along 100% of available banks.
- Develop an intense publicity/marketing program to encourage adoption of filter strips.
- Develop a locally based cost share incentive program in addition to existing CRP program.
- Encourage greater use of no-till tillage systems, particularly no-till corn.

3.2.3 GOAL #1: "Reduce sedimentation of waterways from agricultural sources by installing grassed filter strips adjacent to streams and ditches along 100% of eligible banks."

GOAL #2: "Reduce sediment and nutrient loads to waterways by encouraging greater use of no-till corn."

3.2.4 Recommendations & Action Items:

Recommendation #1: Establish the Mud Creek Headwaters Watershed as a local priority area for NRCS EQIP funding.

Action Item: Submit the following statement to local NRCS personnel for inclusion on EQIP local ranking criteria for Water Quality resource concern: "Are the acres for contract located within the Mud Creek Headwaters 14 digit HUC area, for which a Watershed Management Plan has been developed?" **Completed- 1/2003.**

Recommendation #2: Install filter strips along 100% of eligible banks (approximately 8.4 miles of banks).

Using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*", load reductions for sediment, nitrogen and phosphorus resulting from the installation of filter strips per Recommendation #1 are estimated as follows:

8.4 miles of banks installed = 4.2 miles of streams/ 13 total stream miles = 32% of watershed area (10,435 acres) = 3,339 contributing acres.

Sediment Load Reduction (ton/year)	18
Phosphorus Load Reduction (lb/year)	85
Nitrogen Load Reduction (lb/yr)	158

Figure 32

Action Item: Develop a cost share assistance program to subsidize filter strip establishment. Utilize existing programs such as CRP, EQUIP, Encourage the development of a local match program, using ditch assessment funds or local grants, to further subsidize landowner portion. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service. *Target Date:* 1/1/06 *Estimated Cost*: $2,000

Action Item: Develop a marketing program to publicize cost share assistance program and benefits of filter strips. Target landowners with no existing buffers. Marketing materials include:

- Informational bulletins and targeted mailings.
- Billboard advertising.
- Press releases and feature articles; case studies.
- Display for use at city & county events.
- Organized luncheons or breakfasts.
- Phone calls and/or personal visits to candidates.

Technical Assistance: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service, private contractors. *Target Date:* 6/1/06. *Potential Funding Sources*: Tipton County Foundation, Environmental Fund for Indiana, Section 319 Grant (IDEM), IPALCO Golden Eagle Grants, corporate sponsorships, Lake & River Enhancement (IDNR). *Estimated Cost*: $15,000.

Action Item: Establish approximately 8.4 miles of filter strips or buffers in eligible areas along streams and ditches. *Technical Assistance*: Tipton County Surveyor, Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, private contractors. *Target Date:* 1/1/08. *Potential Funding Sources*: Tipton County Foundation, Environmental Fund for Indiana, Section 319 Grant (IDEM), IPALCO Golden Eagle Grants, CRP (NRCS), EQUIP (NRCS), local ditch assessments revenues, corporate sponsorships, Lake & River Enhancement (IDNR). *Estimated Cost*: $60,000.

Recommendation #3: Encourage the adoption of "no-till" tillage systems for the production of corn.

Action Item: Develop a list of all producers in the watershed currently using no-till systems for corn production. Facilitate dialogue between these individuals and other potential no-till users via the creation of a "No-till Corn Work Group". Conduct periodic meetings of the work group to share successes, experiences, discuss problems, and promote greater use of no-till corn. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service, Conservation Tillage Information Center (CTIC). *Target Date:* 1/1/05. *Estimated Cost*: $2,000.

Action Item: Develop one or more no-till corn demonstration fields. Host periodic field days at the demonstration fields to illustrate production oriented topics associated with no-till corn production, such as: yields, production costs & time, soil properties, pesticide and nutrient inputs,

etc. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service, Conservation Tillage Information Center (CTIC). *Target Date:* 1/1/05. *Estimated Cost*: $2,000.

Action Item: Publish regular no-till corn related articles resulting from activities in Recommendations #1 and #2, in local media; including SWCD newsletters, local newspapers, and Purdue Extension publications. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service, Conservation Tillage Information Center (CTIC). *Target Date:* 1/1/05. *Estimated Cost*: $1,000

Action Item: Establish a list of well respected producers successfully using no-till corn systems that are available to custom plant for neighbors that are willing to experiment with no-till corn. This will minimize equipment costs and reduce risk for new participants. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service, Conservation Tillage Information Center (CTIC). *Target Date:* 1/1/05. *Estimated Cost*: $1,000

3.3 Animal Waste

3.3.1 Discussion & Rational: At the Work Team meeting held on April 4, 2003, the planning group attempted, through a consensus exercise, to define a goal, develop a list of alternatives/solutions, and develop action items to address this topic based on the information made available though the assessment process. Group discussion focused on the declining numbers of livestock operations in the watershed and in the county; due mostly to declining commodity prices and competition from large-scale production facilities. This trend is also discussed in Sections 1.2.6.1 and 2.4.1.1. Group members commented that most current livestock operations fall under the IDEM Confined Animal Feeding program, and that manure storage and disposal is conducted in a manner that minimizes water pollution. The group felt that the most important issue related to livestock production is livestock with direct access to waterways, and the resulting bank erosion, sedimentation, nutrient and pathogenic water quality problems. Although assessment efforts identified only one such operation in the watershed, the group felt compelled to concentrate efforts toward the remediation of this operation. The group also recognized the increasingly difficult and expensive task of locating and transporting animal waste to suitable fields for application. The group suggested the exploration of on-site waste treatment and disposal systems to eliminate off-site application.

3.3.2 Alternatives: The following alternatives were discussed by the Work Team:

- Fencing
- Alternative water sources
- Alternative waste storage/disposal systems
-

3.3.3 GOAL #1 "Reduce sediment, nutrient, and pathogenic contamination of waterways by the exclusion of all livestock from streams and ditches."

GOAL #2 "Reduce the potential for nutrient overloading of fields and potential for manure run-off to waterways by exploring the potential for on-site animal waste treatment and disposal."

3.3.4 Recommendations & Action Items:

Recommendation #1: Establish the Mud Creek Headwaters Watershed as a local priority area for NRCS EQIP funding.

Action Item: Submit the following statement to local NRCS personnel for inclusion on EQIP local ranking criteria for Water Quality resource concern: "Are the acres for contract located within the Mud Creek Headwaters 14 digit HUC area, for which a Watershed Management Plan has been developed?" **Completed- 1/2003.**

Recommendation #2: Exclude all livestock from streams and ditches.

Action Item: Contact landowner/operator of facility with cattle accessing Mud Creek and encourage exclusion of livestock by installing fencing and developing alternative water sources. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service. *Target Date:* 1/1/05. *Estimated Cost*: $0

Action Item: Utilize existing incentive programs to facilitate the exclusion of livestock to Mud Creek. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service. *Target Date:* 1/1/05. *Potential Funding Sources*: Conservation Reserve Program (NRCS), EQUIP (NRCS), Lake & River Enhancement (IDNR). *Estimated Cost*: $8,000.

Recommendation #3: Facilitate the development of alternative on-site manure storage/treatment/disposal facilities.

Action Item: Locate and contact a livestock producer willing to consider an alternative manure management system for demonstration purposes. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Purdue Cooperative Extension Service. *Target Date:* 6/1/05. *Estimated Cost*: $500

Action Item: Determine the best available on-site technology suitable for storing, treating, and disposing on animal waste on-site. Potential technology includes: constructed wetland systems, drip-irrigation systems, re-circulating filters, etc. *Target Date*: 1/1/06. *Technical Assistance*: Tipton County Soil & Water Conservation District, Indiana Department of Natural Resources-Division of Soil Conservation, USDA-Natural Resources Conservation Service, Indiana Department of Environmental Management, private consultants. *Estimated Cost:* $5,000.

Action Item: Acquire a grant or low interest loan funding to subsidize the installation of an alternative animal waste treatment system. *Potential Funding Sources*: Indiana State Revolving Fund Loan Program (IDEM), Section 319 Grant (IDEM), Tipton County Foundation Grant, Section 104(b)(3) Grant (IDEM), Water Quality Cooperative Agreements (USEPA), EQUIP (USDA/NRCS). *Target Date*: 1/1/07 *Estimated Cost*: $2,000

Action Item: Hire engineers to design the replacement systems and contractors to install the new on-site technology. Secure any required state or local permits (eg. NPDES, Section 404/401, Groundwater discharge permit, local permits, etc.) *Target Date*: 1/1/08. *Estimated Cost*: $150,000.

Action Item: Conduct post installation inspection and monitoring of the system to determine effectiveness of the new technology. *Technical Assistance:* Tipton County Health Department, Tipton County Soil & Water Conservation District, USDA/NRCS, IDNR, IDEM, private consultants. Target Date: 1/1/09. *Estimated Cost:* $5,000.

Action Item: Conduct outreach program in the watershed and county to publicize the results. *Technical Assistance*: Tipton County Health Department, Tipton County Soil & Water Conservation District, Tipton County Commissioners, Purdue Cooperative Extension Service, Rural Community Assistance Program. *Target Date*: 1/1/10. *Estimated Cost*: $7,000.

Section 4. MEASURING PROGRESS

4.1 Failing Septic Systems: Progress toward Plan completion and meeting the Group's goal for failing septic systems will be measured against the following milestones, in order of importance:

1. Development of a comprehensive *E. coli* monitoring project per Recommendation #1 in Section 3.1.3. *E. coli* levels established as a result of this project will be used as the primary benchmark indicator on which to base future remediation efforts.
2. Completion of a home-site inventory per Recommendation #2 in Section 3.1.3. Results of the inventory will provide baseline data of the home-sites in the watershed with the greatest potential to affect water quality via failed septic systems. The establishment of this data will be used as an indicator on which future remediation

efforts will be based, particularly, the numbers of these priority home-sites that participate in septic system evaluation and repair, per Recommendation #4 in Section 3.1.3.

3. Installation of an alternative septic system demonstration project, per Recommendation #3 in Section 3.1.3. Monitoring of the effectiveness of this new technology will be conducted as part of the demonstration project. Pre-treatment and post-treatment *E. coli* levels and nutrient levels will be evaluated. Success of the alternative technology will be evaluated against these parameters. Success of the demonstration project will also be measured by the numbers of people targeted and reached through the demonstration project's education and marketing component.
4. Development and implementation of the "Voluntary Compliance" program per Recommendation #4 in Section 3.1.3. Success of this program will be measured against the numbers of priority home-sites, as identified as a result of Recommendation #2 in Section 3.1.3, evaluated and repaired. Additionally, *E. coli* levels in surface waters downstream of repaired systems will be monitored using the procedures established by Recommendation #1 in Section 3.1.3, and compared against the benchmark levels. Project success will be accomplished when follow-up *E. coli* monitoring results in surface waters are below the Maximum Contaminant Level of 235 cfu/100 ml, or current water quality standard.
5. Operation & Maintenance: All data collected and/or practices installed per the above Recommendations, will be evaluated and maintained by the Tipton County Soil & Water Conservation District, or, by the appropriate responsible entity, as dictated by the specifics of the particular project.

4.2 Run-Off & Sedimentation: Progress toward Plan completion and meeting the Group's goal for addressing run-off and sedimentation in the watershed will be measured against the following milestones, in order of importance:

1. Establishment of the Mud Creek Headwaters as a local priority area for NRCS EQIP funding**. Completed 1/2003.**
2. Installation of grassed filter strips along approximately 8.4 miles of banks in the watershed, per Recommendation #2 in Section 3.2.4. Load reductions for sediment, nitrogen, and phosphorus from each installed filter strip will be calculated by using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*". Total load reductions for the 8.4 miles of filter strips area estimated as follows:

Sediment Load Reduction (ton/year)	18
Phosphorus Load Reduction (lb/year)	85
Nitrogen Load Reduction (lb/yr)	158

Figure 33

Success of the filter strip program will also be measured by the numbers of people targeted and reached through the program's education and marketing component.

3. Success criteria for encouraging the adoption of "no-till" corn, per Recommendation #3 in Section 3.2.4 include: development of the "No-Till Corn Work Group" and numbers of participants, development of "no-till" corn demonstration fields and number of participants at associated field days (load reductions for sediment, nitrogen, and phosphorus from each installed demonstration field will be calculated by using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*"), and numbers of educational publications published in local media.
4. Operation & Maintenance: All data collected and/or practices installed per the above Recommendations, will be evaluated and maintained by the Tipton County Soil & Water Conservation District, or, by the appropriate responsible entity, as dictated by the specifics of the particular project.

4.3 Animal Waste: Progress toward Plan completion and meeting the Group's goal for addressing animal waste in the watershed will be measured against the following milestones, in order of importance:

1. Establishment of the Mud Creek Headwaters as a local priority area for NRCS EQIP funding**. Completed 1/2003.**
2. Exclusion of livestock from Mud Creek from site identified in the watershed inventory (see Appendix #3 for results). Load reductions for Chemical Oxygen Demand and Phosphorus will be calculated by using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*") following installation of appropriate exclusion BMP's.
3. Installation of an alternative on-site manure facility per Recommendation #3 in Section 3.3.4. Load reductions for Chemical Oxygen Demand and Phosphorus will be calculated by using the IDEM tool "*Estimating Load Reductions for Agricultural and Urban BMP's*") following installation of appropriate exclusion BMP's. Effectiveness of the technology will be evaluated by monitoring pre-treatment and post-treatment effluent characteristics. Success of the demonstration project will also be measured by the numbers of people targeted and reached through the program's education and marketing component.

4. Operation & Maintenance: All data collected and/or practices installed per the above Recommendations, will be evaluated and maintained by the Tipton County Soil & Water Conservation District, or, by the appropriate responsible entity, as dictated by the specifics of the particular project.

Section 5. FUNDING SOURCES

The table below depicts potential funding sources and contact information for recommended projects.

SOURCE	CONTACT INFO.
Section 319	IDEM. (317) 232-0019 www.ai.org/idem/owm
Section 205(j)	IDEM. (317) 232-0019 www.ai.org/idem/owm
Tipton County Foundation	
IPALCO Golden Eagle Grants	(317) 736-8994 www.ipalco.com/aboutipalco/news/03-30-99.html
Section 104(b)(3)	IDEM. (317) 232-0019 www.ai.org/idem/owm
Environmental Quality Incentives Program (EQIP)	NRCS. (317) 290-3200 www.in.nrcs.usda.gov
Conservation Reserve Program (CRP)	NRCS. (317) 290-3200 www.in.nrcs.usda.gov
Lake & River Enhancement (LARE)	(317) 233-3870 www.state.in.us/dnr/soilcons
State Revolving Fund (SRF)	IDEM. (317) 232-0019 www.ai.org/idem/owm
Water Quality Special Research Grants	Cooperative State Research Education & Extension Service (CSREES). USDA. (202) 401-5971
Chemical Emergency Preparedness & Prevention Technical Assistance Grants	USEPA- (202) 260-0030 www.epa.gov/ceppo
Pesticide Environmental Stewardship Grants	USEPA. (703) 308-7035 www.pesp.org
Watershed Protection & Flood Prevention Program	USDA, NRCS (202) 720-3534 www.ftw.nrcs.usda.gov/programs.html
Watershed Assistance Grants	USEPA (202) 260-4538 www.epa.gov/owow/wag.html
Water Quality Cooperative Agreements	USEPA (202) 260-9545 www.epa.gov/owm/wm042000.htm

Figure 34

Section 6. ADMINISTRATIVE

6.1 **Plan Evolution/Progress Reports**- The Tipton County Soil & Water Conservation District will be the primary record-keeper and responsible entity for the watershed management plan. The document will be reviewed biennially by the SWCD to determine if established goals are being met according to the specified schedule and to make any adjustments or updates based on new information. The results of the biennial evaluation will be made available to stakeholders in the watershed via SWCD Board meetings, newsletters, direct mailings, and/or articles in local press.

6.2 **Contact Information-** If you have any questions regarding the intent or content of this plan, please contact:

Randy Jones, Project Coordinator
317/933-4169
rcjones@franklinisp.net

or Tipton County Soil & Water Conservation District
765/ 675-2316

6.3 **Distribution List-** Hard copies and electronic versions, as well as the GIS information, of this watershed management plan will be available at:

Tipton County Soil & Water Conservation District
243 Ash Street, Suite B.
Tipton, IN 46072.
765/ 675-2316

Hard copies will be provided to the following:

Tipton County Commissioners
Tipton County Health Department
Tipton County Surveyor's Office
Tipton Economic Development Council

6.4 **Calendar of Events:**

This watershed management plan was developed according to events summarized in the table below:

DATE	EVENT	OUTCOME
7/01	Developed topographic & aerial watershed maps.	Used for prioritization and informational purposes.
7/31/01	Watershed Prioritization Committee Meeting	Selected 4 14-digit watersheds for plan development.
8/23/01	"Kick-Off" event at Cargill luncheon	Introduced project to local citizens. Developed informational flyer.
10/3/01	Science Club presentation	Conducted workshop at local high school to explain project.
8/02	Supplemental SWCD Newsletter	Distributed informational newsletter/meeting invitation announcing project to approx. 500 watershed residents.
8/02	Press releases	Sent press releases to local media announcing watershed meeting and explaining project.
8/02	Identified key watershed group participants	Invited to participate through personal contacts from SWCD supervisors and target mailings.
9/10/02	Public meeting	Held first meeting to introduce project to public, provide watershed resource overview, group ground rules, and process.
10/02	Developed GIS based mapping and data collection system.	Includes spatial coverages for watershed resources.
11/02	Researched existing water quality & resource data.	Gathered & summarized data from existing local, state, & federal sources.
12/5/02	Steering Committee Meeting	Presented plan for watershed development to, solicited input for plan goals, timeline, actions, etc..
12/02	SWCD Newsletter, Press Releases	Distributed articles on project status and announced public meeting.
1/14/03	Public Meeting	Conducted meeting to identify and prioritize local concerns via Nominal Group Technique procedures and discuss assessment procedure.
2/20/03	Steering Committee Meeting	Developed procedures for watershed assessment.
3/03	Identified potential assessment collection sites.	Located sites with SWCD staff for assessment data collection.
3/03	County Health Dept. meetings	Met with local personnel to collect resource data.
3/03	Watershed Inventory	Conducted watershed inventory w/ Steering Committee members.
3/03	Began drafting Watershed Management Plan	
3/03	Press Releases, target mailings	Distributed articles on project status and announced public meeting.
4/7/03	Public Meeting	Presented results of assessment and identified goals, solutions, and tasks through consensus process.
4/03	Continued updating/revising Management Plan	
5/03	Submit Draft Watershed Management Plan to SWCD for comments	
5/03	Submit Draft Watershed Management Plan to	

	IDEM for comments	
5/03	Revise plan based on comments.	
5/16/03	Steering Committee Meeting	Review/revise Goals & recommendations, develop Vision & Mission statements.
5/19/03	Revise WMP based on Steering Committee comments.	
5/27/03	Submit draft plan to SWCD and IDEM for comment.	
6/27/03	Receive comments from IDEM.	Edit plan to reflect comments.
7/1/2003	Prepare final plan.	

Figure 35

6.5 **Table of Acronyms**

ACRONYM	DEFINITION
BMP	Best Management Practice
CES	Cooperative Extension Service
CRP	Conservation Reserve Program
EQIP	Environmental Quality Incentives Program
HUC	Hydrologic Unit Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
LARE	Lake and River Enhancement
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
SWCD	Soil & Water Conservation District
USEPA	United State Environmental Protection Agency
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Service
WMP	Watershed Management Plan

Figure 36

6.6 **Appendices:**

1. 14 digit HUC Prioritization Process Results
2. Issues Prioritization- Nominal Group Technique Results
3. Survey Results
4. Site Assessment Results
5. GIS Portable File

Appendix #1

Watershed Prioritization Meeting
Summary

When: July 31, 2001

Where: Tipton County Foundation Center

Participants:

George Tebbe-	SWCD Supervisor
Kurt Fettig-	SWCD Supervisor
Judy Baird-	SWCD Staff
Gail Peas-	IDNR
Luther Cline-	Tipton County Surveyor
Nolan Pyke-	Tipton County Health Department
Keith Shoettmer-	Citizen at Large
Mark Raver-	First National Bank

Facilitator: Randy Jones

Purpose:

Choose four 14-digit watersheds in Tipton County in which to conduct comprehensive watershed management planning.

Criteria:

Two watersheds must lie in the Wildcat Creek 8-digit watershed, and two watersheds must lie in the Upper White River 8-digit watershed.

Method:

Systematically discuss the 29 14-digit watersheds that are fully or partly contained within Tipton County and include or exclude based on resource issues identified by the participants. The method relied heavily on knowledge of local issues and resources by the participants. The list of resource issues or criteria was not prior conceived or limited to allow maximum flexibility and creativity by the participants.

Results:

1. Cicero Creek- Bacon Prairie Creek/Buscher Ditch *(Upper White River)*
   HUC#: 05120201080060
2. Cicero Creek- Buck Creek/Campbell Ditch *(Upper White River)*
   HUC#: 05120201080040
3. Turkey Creek- Askren/Round Prairie Ditch *(Wildcat Creek)*
   HUC#: 05120107010060
4. Mud Creek Headwaters *(Wildcat Creek)*
   HUC#: 05120107010030

14-Digit Name	Included	Reason
Bear Creek- West Fork Bear Creek	No	Small size, small portion within county
Cicero Creek- Bacon Prairie Cr/Buscher Dt	**YES**	Size, canning factory, heterogeneous topography, Town of Hobbs
Cicero Creek- Buck Creek-Campbell Dt	**YES**	Industrial park, housing developments, Buck Creek fish kills, poultry, size
Cicero Cr- Dixon Cr- Crum Dt	No	Few livestock operations, homogenous topography
Cicero Cr- Tobin Dt	No	Small size, small portion within county
Cicero Cr- Weasel Dt	No	Small size, small portion within county
Cox Dt- Chrity/Kingin Dt	No	No towns, few livestock
Duck Cr- Lamberson Dt	No	Small size, small portion within county
Duck Cr- Little Duck Cr	No	Small size, small portion within county
Duck Cr- Polywog Cr	No	More diverse issues in Bacon Prairie Creek, TOUGH DECISION
Duck Cr- Todd Dt	No	Small size, small portion within county
Kilmore Cr- Shanty Cr	No	Small size, small portion within county
Kilmore Cr- Stump Dt	No	Small size, small portion within county
Kokomo Cr- Headwaters	No	Larger portion of watershed out of county, **Good potential for Wildcat Group**
Kokomo Cr- Lower	No	Small size, small portion within county
Little Cicero Cr- Bennett Dt-Taylor Cr	No	Small size, small portion within county
Little Cicero Cr- Teter Br	No	Small size, small portion within county
Little Wildcat Cr- East & West Forks	No	No towns, few livestock
Little Wildcat Cr- Lower	No	Small size, small portion within county
Middle Fork Dt	No	Small size, small portion within county
Mud Cr- Headwater	**YES**	Recent drainage reconstruction, Sharpsville, livestock, HEADWATER
Mud Cr- North Cr	No	No towns
Prairie Cr- Rearce/McKinzie Dt	No	Small size, small portion within county
Sugar Cr- Mallot Dt	No	Not in Wildcat or Upper White river
Swamp Cr	No	Small size, small portion within county
Turkey Cr- Askren/Round Prairie Dt	**YES**	Windfall, livestock, recent drainage maintenance in upper, wooded corridor in lower reach, streambank erosion.
Turkey Cr- Headwaters	No	No towns, few livestock
Wildcat Cr- Honey Cr	No	Small size, small portion within county
Wildcat Cr- Mud Cr-Irwin Cr	No	No towns, most of main stem out of county

NOTE: Bolded watersheds had good merits and passed the initial cut. Discussion focused mainly on subtle differences between these nine watersheds.

Wildcat Watershed Planning Meeting
1/15/02
Meeting Summary

Meeting Publicity:

1. Mailed invitations to Steering Committee members, past participants and persons identified as "key" stakeholders.
2. Sent press release to Tipton & Kokomo papers announcing meeting and explaining project purpose & strategy. Included map of target watersheds.
3. Drafted announcement for inclusion in SWCD newsletter.

Attendance:

Matt Jarvis, NRCS	Roger Gunning
Amy Henniger, IDEM	Chris Kelley
Judy Baird	Nolan Pyke, Tipton Co. Health Dept.
John Hussey	George Tebbe
Bill Findley	Tim Salsberry
Howard Heath	Jim Stinson, Kokomo Tribune

Agenda:

1. Project Purpose & Strategy
2. Focus Watershed Areas
3. "Impaired Waters"
4. Identify Priorities
5. Watershed Inventory
6. Next Steps

Methods:

Information presented at the last public meeting was briefly reviewed. Answers to last meeting's survey questions were distributed. Participants were asked to review the answers, particularly focusing on the question "**What do you feel are the most critical threats to water quality in your area?"**.

The whole group was asked to brainstorm any additional ideas they had concerning the question, to offer clarification of stated issues, or to combine like ideas. These statements were recorded on a flip chart. Once this was completed, the participants were given 4 sticky notes, worth one point apiece, and asked to rank the recorded issues in terms of priority. The results are listed below:

1.	Failing Septic Systems	19 points
2.	Run-off	8 points
3.	Sediment	4 points
4.	Animal Waste	1 point

Survey Results:

Question #1: **"Why is water quality important to you?"**

- "Safe drinking water."
- "Drinking water, fish/wildlife habitat, recreation."
- "Safety, need for survival."
- "Water is a limited resource."
- "Health of family, quality of life."
- "Safe drinking water, Keep IDEM & govt. bodies out of Tipton County as much as possible." (ha! ha!)
- "We all like to have clean drinking water."
- "I want to leave the environment in as good condition as possible."
- "We all use it at some point, in some way. Our business is dealing with water (ditch maintenance). We must balance human needs with wildlife needs. Try to keep pollutants from being a permanent fixture in a particular system."
- "Water is part of the total environment."

Question #2: **"What do you feel are the most critical threats to water quality in your area?"**

- "Septic systems."
- "Sediment, Pesticides/herbicides (esp. residential use), failing septic systems."
- "Concentrated housing with own (individual) septic systems. Any operation located near a point source. Livestock operations not managed properly or not following regulations."
- "Urban growth- failure of septic systems due to soil type."
- "Residential over application of fertilizers. Old septic systems."
- "Surface run-off from chemicals & waste. Human waste into streams/ditches from older homes w/o septic systems. Wildlife waste. Low or lack of high water in ditches."
- "Septic tanks."
- "Sewage. Livestock run-off. Fertilizers. Chemicals."
- "Soil erosion, stagnation, human waste, run-off in heavy rains."
- "Run-off directly into flowing streams & ditches from fields, streets, & roads."

Question #3: **"What do you think we can do locally to improve or protect water quality?"**

- "Streambank filter strips."
- "Buffer streams. Address failing septic systems (replacement & maintenance). Public education."

- "Reduce housing, specify acreage per home. Clean-up septic systems improperly installed or out of date. Livestock operations- make sure they are following their management plans; make improvements where needed."
- "Getting sub-division located on municipal sewage plant."
- "More filter strips along open ditches."
- "Correct & appropriate ag. herbicide applications. Cap & close open wells. Community awareness & education."
- "Check tile ditches to see if pollution is coming from them."
- "We used filter strips along open ditches. We are using more contact chemicals."
- "Use approved erosion control methods. Keep streams free of obstructions. Try to get people to bring waste systems into compliance."
- "Finish dredging & straightening Turkey Creek at the last ½ mile where it has never been dredged."