

Nonpoint Source Control Plan for the Hillsboro Priority Watershed Project



This plan was prepared under the provisions of the Wisconsin Nonpoint Source Pollution Abatement Program by the Wisconsin Department of Natural Resources, the Department of Agriculture, Trade and Consumer Protection, and the Vernon County Land Conservation Department.

Watershed Plan Organization Information

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1996

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Nonpoint Source Control Plan for the Hillsboro Priority Watershed Project

The Wisconsin Nonpoint Source Water Pollution Abatement Program

August 1995

This Plan Was Cooperatively Prepared By:

The Wisconsin Department of Natural Resources and
The Department of Agriculture, Trade, and Consumer Protection
In cooperation with
The Vernon County Land Conservation Department

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RESOLUTION
Approving the Hillsboro Priority
Watershed Plan

WHEREAS, the Hillsboro Priority watershed plan has been prepared which assesses the existing water quality and watershed conditions, identifies the management practices and action necessary to improve or protect the water quality of the watershed, outlines the tasks required and the agency responsible for each, and establishes the time frame and cost estimates for the project, and


WHEREAS, inventory and planning phases of the project have been completed under the direction of the Vernon County Land Conservation Committee in cooperation with the Wisconsin Department of Natural Resources and the Department of Agriculture, Trade and Consumer Protection, and

WHEREAS, a draft plan has been available for review and comments were accepted at a public hearing held August 22, 1995, and

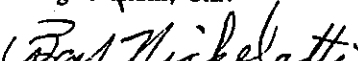
WHEREAS, the implementation of this plan will provide both technical assistance and cost share monies to eligible landowners within the priority watershed for the installation of conservation practices designed to reduce the sources of nonpoint pollution and protect or improve the quality of water in the West Branch and the South Branch of the Baraboo River watersheds, now there fore be it

RESOLVED the Vernon County Board of Supervisors approves the plan "A Nonpoint Source Control Plan for the Hillsboro Priority Watershed Project".

Dated: August 24, 1995
Land Conservation Committee:


George Nertum, Chr.


Robert Kelbel


Ray Nickelatti


Alvin Christianson


Robert Skaaland


Norman Yttri

CERTIFICATION

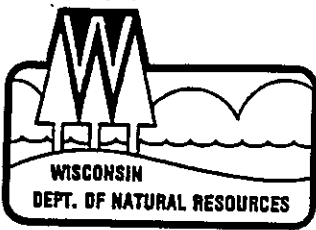
State of Wisconsin ()
County of Vernon ()

Office of Vernon County Clerk

I, Roger W. Novy, County Clerk of Vernon County, Wisconsin, DO HEREBY CERTIFY that the above and foregoing is a true and correct copy of a resolution approving the Hillsboro Priority Watershed Program which was duly adopted by the Vernon County Board on August 24, 1995, and that such resolution is in full force and effect.


Roger W. Novy
Vernon County Clerk





State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

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George E. Meyer
Secretary

October 4, 1995

Mr. Gerald Sandry, County Board Chairman
DeSoto, WI 54624

Dear Mr. Sandry:

I am pleased to approve the Hillsboro Priority Watershed Plan prepared through the Wisconsin Nonpoint Source Pollution Abatement Program. This plan meets the intent and conditions of S. 144.25, Wisconsin Statutes, and Chapter NR120, Wisconsin Administrative Code. This plan has been reviewed by the Department of Agriculture, Trade and Consumer Protection and was unanimously approved by the State Land and Water Conservation Board on October 3, 1995. I am also approving this plan as an amendment to the Lower Wisconsin Basin Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Vernon County Land Conservation Department Staff that participated in preparing this plan. The implementation of the Hillsboro Priority Project will greatly enhance the regional water quality and set a standard for future lakes selected as part of the Wisconsin Nonpoint Source Pollution Abatement Program.

Sincerely,

George
George E. Meyer
Secretary

An excellent project

cc: Alan Tracy, DATCP
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CHAPTER ONE

Introduction, Purpose, and Legal Status

Wisconsin Nonpoint Source Water Pollution Abatement Program

The Wisconsin State Legislature created the Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS) in 1978. The goal of the NPS Program is to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing rural and urban nonpoint source pollutants. The thirty-five square mile Hillsboro Watershed, located entirely within Vernon County, was designated a "priority watershed" in 1993. The primary objective of this project is to reduce nonpoint source pollution loads to Field Veterans Memorial Lake to enhance and protect the water quality of the West Branch Baraboo River, the South Branch Baraboo River, Beaver Creek and Field Veterans Memorial Lake (Hillsboro Lake) in Hillsboro.

Nonpoint sources of pollution include eroding agricultural lands, streambanks, gullies, field application of manure, fertilizers and pesticides and runoff from livestock wastes. Pollutants from nonpoint sources are carried to the surface water or groundwater through the action of rainfall runoff, snowmelt, and infiltration.

The following is an overview of the NPS Program:

- The DNR and DATCP administer the program which focuses on critical hydrologic units called priority watersheds. The program is implemented through priority watershed projects for which a plan is prepared.
- Local units of government implement the watershed project. Water quality improvement is achieved primarily through voluntary implementation of nonpoint source controls (Best Management Practices or BMPs) and adoption of ordinances. The Wisconsin Legislature has passed into law provisions where critical sites (significant water quality degradation sites) will be designated and enforcement in the event landowners choose not to voluntarily participate in the program. Landowners, land renters, counties, cities, villages, towns, metropolitan sewage districts, sanitary districts, lake districts, and regional planning commissions are eligible to participate.
- Technical assistance is provided to aid in the design of BMPs. State level cost-share assistance is available to help offset the cost of installing these practices.
- Informational and educational activities are employed to encourage participation.
- The DNR and DATCP review the progress of the counties and other implementing units of government, and provide assistance throughout the eight-year project. The DNR monitors improvements in water quality resulting from control of nonpoint sources of pollution in the watershed.

Priority Watershed Planning and Implementation Phases

Planning Phase

The planning phase of the project began in 1991 and included the following information-gathering and evaluation steps:

1. Determine the conditions and uses of groundwater, Field Veterans Memorial Lake and its tributary streams.
2. Inventory types of land uses and severity of nonpoint sources impacting streams, lakes and groundwater.
3. Evaluate the types and severity of other factors which may be affecting water quality. Examples include discharges from municipal wastewater treatment plants and natural or endemic stream conditions. This will be accomplished through the ongoing integrated resource management planning efforts in the Lower Wisconsin River Basin.
4. Determine levels of nonpoint source pollution control and measures necessary to improve and/or protect water quality.
5. Prepare and gain approval for a priority watershed plan documenting the above evaluations, implementation procedures and costs.

Implementation Phase

The implementation phase begins following review of the priority watershed plan by the Citizens Advisory Committee, the project team, a public hearing and approval by the DNR, the DATCP, and the Board of Supervisors for Vernon County. This phase is characterized below:

- The DNR enters into local assistance agreements with local units of government with implementation responsibilities identified in the plan. These agreements provide funds necessary to maintain the resources and staff required for plan implementation.
- In the rural portions of the watershed, the Vernon County LCD contact eligible landowners to determine their interest in voluntarily installing BMPs identified in the plan.
- For rural practices, the landowner and the county sign cost-share agreements outlining the practices, costs, cost-share amounts and a schedule for installation of BMPs. All practices are scheduled for installation up to five years from the date the agreement is signed. The DNR and local units of government sign similar agreements for urban practices.

Legal Status of the Nonpoint Source Control Plan

The Hillsboro Priority Watershed Plan was prepared under the authority of the Wisconsin Nonpoint Source Water Pollution Abatement Program described in Section 144.25 of the Wisconsin Statutes and Chapter NR 120 of the Wisconsin Administrative Code. It was prepared under the cooperative efforts of the DNR, DATCP, the Vernon County LCD, and the Hillsboro Priority Watershed Citizens Advisory Committee.

This plan is the basis for the DNR to enter into cost-share and local assistance grants and is used as a guide to implement measures to achieve desired water quality conditions. In the event that a discrepancy occurs between this plan and the statutes or the administrative rules, or if the statutes or rules change during implementation, the statutes and rules will supersede the plan.

Plan Organization

The remainder of this plan is divided into nine chapters. The contents of each chapter are described below:

Chapter Two. "Watershed Characteristics" is an overview of the cultural and natural resource features pertinent to planning and implementation efforts for the priority watershed project.

Chapter Three. "Water Resource Conditions, Nonpoint Sources and Water Resource Objectives" characterizes the existing and potential biological and recreational uses of surface waters. The results of the nonpoint source inventories and evaluations and water resource objectives are discussed.

Chapter Four. "Nonpoint Source Pollution Control Strategy" identifies the level of rural nonpoint source control needed to meet the water resource objectives and identifies the decision criteria and the nonpoint sources eligible for funding under the priority watershed project.

Chapter Five. "Detailed Program for Implementation" describes the means in which the local units of government administer the project, and estimates a local assistance and management practice cost-share budget.

Chapter Six. "Information and Education Program" describes techniques and activities for increasing awareness and understanding of water resources in the watershed, principles of nonpoint source pollution, best management practices, and the priority watershed project in general.

Chapter Seven. "Integrated Resource Management Program" presents the strategy for involving DNR resource management programs (fisheries management, wildlife, etc.) in the nonpoint source pollution abatement efforts in the Hillsboro Priority Watershed.

Chapter Eight. "Project Evaluation" discusses the means for assessing the amount of nonpoint source control gained through installation of best management practices.

Chapter Nine. "Water Quality Monitoring and Evaluation" presents strategy and a schedule for monitoring streams and lakes to determine the water quality impacts of implementing nonpoint source controls.

CHAPTER TWO

General Watershed Characteristics

Location and Community Information

Cultural Features

The Hillsboro Priority Watershed is a thirty-five square-mile drainage basin located approximately 35 miles east of Viroqua, and 50 miles southeast of LaCrosse in southwest Wisconsin (Map 2-1).

The West Branch Baraboo River and the South Branch Baraboo River drain into Field Veteran's Memorial Lake in Hillsboro. The Hillsboro Priority Watershed is part of the Lower Wisconsin River Basin. (Map 2-2).

Civil Divisions

The Hillsboro Priority Watershed lies entirely within Vernon County. Approximately the western one-half of the city of Hillsboro lies within the watershed. Otherwise there are no incorporated areas in the watershed. There is no public land within the watershed other than the city park which lies along the north shore of Field Veterans Memorial Lake.

Population Size and Distribution

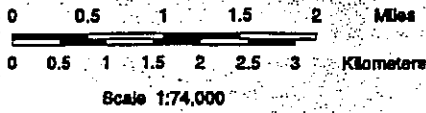
The Hillsboro Priority Watershed population is estimated to be about 1,300 persons, 700 in the rural part of the watershed and about 600 within the city of Hillsboro. The City of Hillsboro has a population of 1,263 according to the 1990 census. Population growth rates in the watershed are stable. Regional trends suggest that the watershed's population will continue to stabilize.

Land Uses

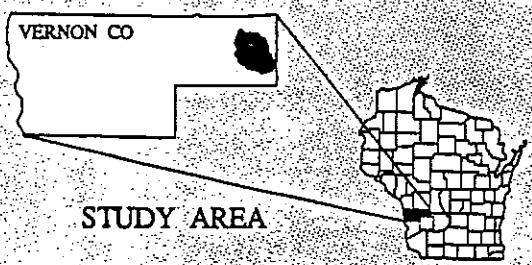
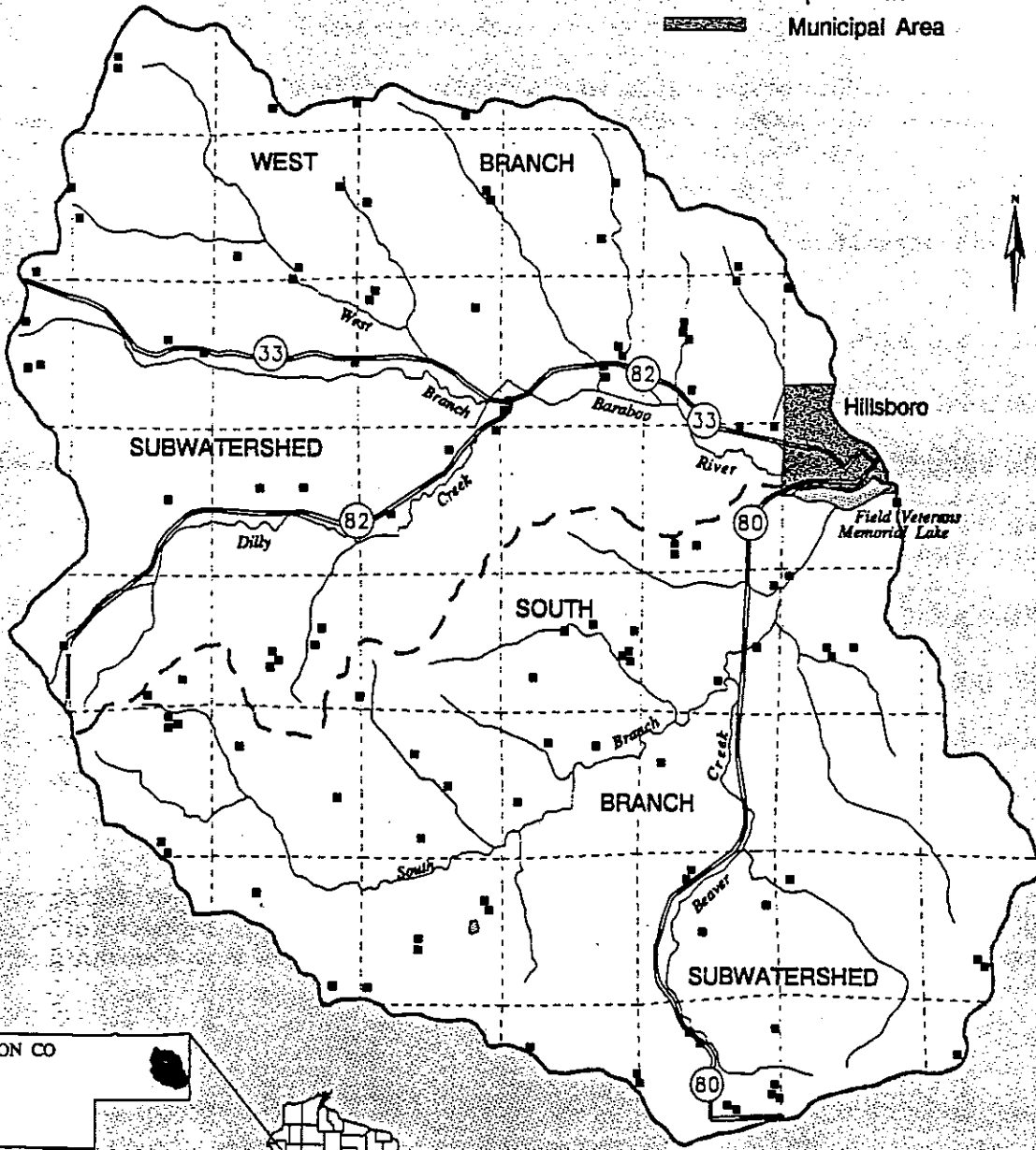
Rural land uses predominate in the watershed. Agriculture is the most important land use, comprising 78 percent. Dairy farming is the primary enterprise, with the average farm size being about 160 acres. Woodlands cover 20 percent of the land area. Developed land uses occupy less than 2 percent of the watershed (Table 2-1).

Hillsboro Priority Watershed Project

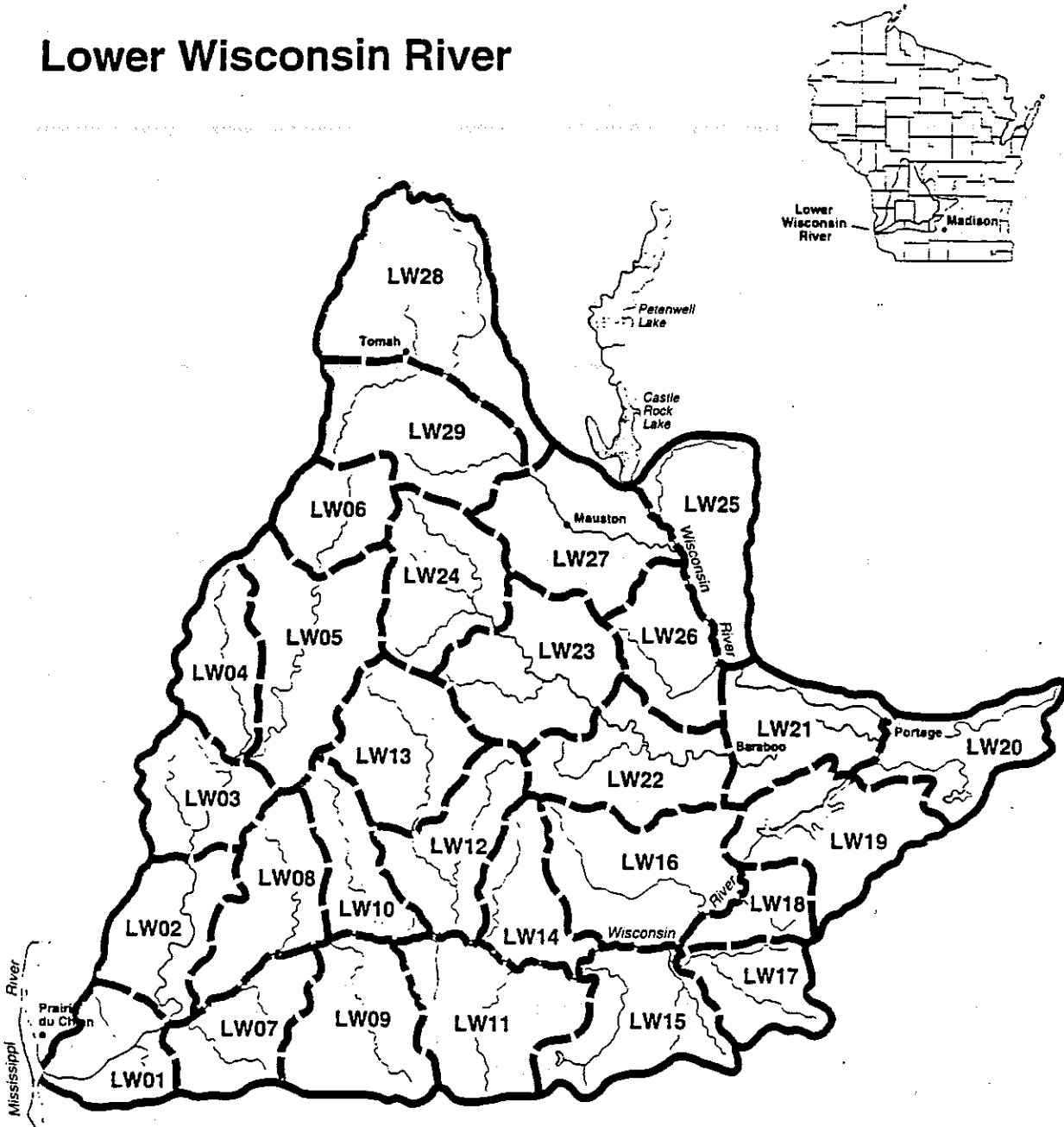
LEGEND



- Barnyards
- Project Boundary
- - - Subwatershed Boundary
- State or Federal Highway
- - - Township/Range/Section Lines
- Streams
- ▭ Open Water
- ▨ Municipal Area



Lower Wisconsin River



- | | | |
|------------------------------------|----------------------------------|--|
| LW01 Millville Creek | LW11 Otter and Morrey Creeks | LW21 Lower Baraboo River |
| LW02 Lower Kickapoo River | LW12 Willow Creek | LW22 Narrows Creek and Baraboo River |
| LW03 Reads and Tainter Creeks | LW13 Upper Pine River | LW23 Crossman Creek and Little Baraboo River |
| LW04 West Fork Kickapoo River | LW14 Bear Creek | LW24 Seymour Creek and Upper Baraboo River |
| LW05 Middle Kickapoo River | LW15 Mill and Blue Mounds Creeks | LW25 Duck Creek |
| LW06 Upper Kickapoo River | LW16 Honey Creek | LW26 Dell Creek |
| LW07 Green River and Crooked Creek | LW17 Black Earth Creek | LW27 Lower Lemonweir River |
| LW08 Knapp Creek | LW18 Roxbury Creek | LW28 Beaver Creek/Juneau |
| LW09 Blue River | LW19 Lake Wisconsin | LW29 Little Lemonweir River |
| LW10 Mill and Indian Creeks | LW20 Duck Creek and Rocky Run | |

Table 2-1. Summary of Land Uses within the Hillsboro Priority Watershed

Land Uses	Acres	Percent
Agricultural	17,577	78 %
pasture	4,791	22 %
cropland	9,367	41 %
grazed woodland	3,059	13 %
farmstead	360	2 %
Grassland	326	1.5 %
Developed	204	1 %
Woodland	4,513	20 %
Wetland*	Not inventoried in WIN	Not inventoried in WIN

* Estimates are of actual wetland acres, not cropped wet fields.

Source: Vernon County LCD

Natural Resource Features

Climate and Precipitation

The frequency, duration and amount of precipitation influences surface and groundwater quality and quantity, soil moisture content, runoff characteristics, and the physical condition of waterways. The Hillsboro Priority Watershed lies in the temperate continental zone which is characterized by winters which are long and relatively cold and snowy and summers which are mostly warm with periods of hot humid conditions. Mean annual precipitation for the region is about 32 inches of rain and melted snow; the majority falls in the form of thunderstorms during the growing season (May-September). Most runoff occurs in February, March and April when the land surface is frozen and soil moisture is highest.

Topography

The Hillsboro Priority Watershed is located within the unglaciated, or driftless area of Wisconsin. The watershed is characterized by narrow ridges and wide spring-fed valleys. Local relief ranges from 200-400 feet. The valley slopes are predominantly woodland because they are typically too steep to farm.

Geology and Soils

Rocks and minerals have greatly influenced the Hillsboro Priority Watershed. Dolomitic limestone and sandstone are the two basic bedrock types. The oldest underlying rock formation is the Cambrian sandstone. Above the Cambrian is Prairie du Chien Dolomite, which underlies the ridges in the watershed. Outcroppings of Prairie du Chien Dolomite are quite common in the watershed.

Most of the soils are residual, that is, developed from weathering of underlying bedrock. Other soils are alluvial (stream deposited) or loess deposits (wind deposited). The predominant soils are silty loams in the uplands, and sandy loams in the valleys.

Surface Water Resources

Land drainage patterns in the Hillsboro Priority Watershed are delineated as two major subwatersheds shown in Map 2-1. The subwatersheds are the South Branch Baraboo River and the West Branch Baraboo River. See Table 2-2 for the general conditions of major water resources in the Hillsboro Priority Watershed.

Streams

South Branch Baraboo, West Branch Baraboo and Beaver Creek are the major perennial streams in the watershed. While all three of these streams support a cold water class III trout fishery, they are not reaching their highest potential use because of nonpoint source pollutants. Eroding croplands, gullies and streambanks and improperly managed livestock operations are the major sources of nonpoint pollution in the watershed.

Wetlands

Wetlands are valuable natural resources. They provide wildlife habitat, fish spawning and rearing areas, recreation, storage of runoff and flood flows and removal of pollutants. Floodplain wetlands support furbearers and water fowl populations and may provide seasonal habitat for sportfish.

A wetland inventory was completed to identify existing, modified, and converted wetlands for the purpose of protection from further degradation or potential restoration. The focus of the inventory was on wetlands that are currently degraded through drainage, grazing, cropping, or other activities causing water storage loss, build up of sediments, and drainage to vegetation. Data was collected on 115 wetland sites encompassing 1,274 acres from NRCS maps, air photos, and DNR wetland maps were used for the inventory (Appendix A). Wetland restoration guidelines are outlined in Chapter Four.

Table 2-2. General Surface Water Conditions within the Hillsboro Watershed.

Water Body	Biological Use		Problems Related to Nonpoint Source Pollution
	Current	Potential	
RIVERS AND STREAMS			
South Branch Baraboo River	Class III trout stream	Class II trout stream	sediment, nitrates, flooding, lack of in-stream habitat
West Branch Baraboo River	Class III trout stream	Class II trout stream	sediment, nitrates, flooding, lack of in-stream habitat
Beaver Creek	Class III trout stream	Class II Trout Stream	sediment, nitrates, flooding, lack of in-stream habitat

Groundwater Resources

Groundwater is the sole source of drinking water within the Hillsboro Priority Watershed. Groundwater is stored and moves underground in pore spaces and cracks in soil and rock layers. Soil and rock layers which hold groundwater are called aquifers. In an aquifer, all of the pore spaces and cracks are filled or saturated with groundwater. A municipal or private well is simply a pipe through which groundwater is pumped from an aquifer to the land surface.

Since 1936, the State of Wisconsin has required well drillers to document well construction and rock and soil layers encountered during well installation. Driller construction reports for wells located in the Hillsboro Priority Watershed indicate that private wells draw groundwater from three aquifers: 1) the Pleistocene sand and gravel aquifer; 2) the Cambrian age sandstone and dolomite aquifer; and 3) the Crystalline bedrock aquifer.

1)Sand and Gravel Aquifer: The sand and gravel aquifer is found only in limited areas within the watershed. This aquifer is composed of alluvial materials that contain water at depths of less than 50 feet. Water yield to wells in this aquifer is generally low (less than 100 gpm).

2)Cambrian Sandstone and Dolomite Aquifer: The sandstone aquifer is the most important source of groundwater in the watershed. This bedrock sandstone layer occurs at depths of 60 to 1000 feet, and is composed of several geologic formations including the Cambrian sandstone and Prairie du Chien dolomite. The Cambrian sandstone is the most important water yielding formation and occurs throughout the Hillsboro Priority Watershed. The Prairie du Chien formation is dense dolomitic rock that has low permeability and is discontinuous in the watershed.

The sandstone aquifer is more than 50 feet thick in the region and provides reliable supplies of water suitable for municipal, industrial and agricultural uses. On ridge tops in the Driftless Area, this bedrock layer is commonly within five feet of the surface, and in places is exposed at the surface.

The sandstone aquifer in this region of the state is unconfined and is hydraulically connected to the aquifer above. Recharge to the sandstone aquifer passes through the unconsolidated sand and gravel aquifer where present, or through surface soils, rendering this aquifer susceptible to contamination from surface land uses.

3)**Crystalline Bedrock Aquifer:** The crystalline bedrock aquifer is located beneath the sandstone aquifer in formations more than 600 million years old. This aquifer is not an important source of water in the watershed. Most of the deposits are very dense, extremely deep, crystalline rock which normally yield small amounts of water.

Groundwater Quality

Private well samples were not collected and analyzed for nitrate + nitrite during the inventory phase of the Hillsboro Priority Watershed Project. However, private wells were analyzed for the neighboring Middle Kickapoo River Priority Watershed Project. Of the 162 private wells that were analyzed within the Middle Kickapoo Watershed, 12 well-water samples (7 percent), showed concentrations of more than 10 milligrams per liter (mg/L), which is above the groundwater Enforcement Standard (ES). Ninety-three samples (58 percent) had nitrate levels within the Preventive Action limit (PAL) of 2 mg/L. The remaining 55 samples (35 percent), were under the PAL. Results so far do not indicate a pattern of groundwater contamination that can be linked to specific sources of nitrate.

Sample analytical results from the Middle Kickapoo Watershed are summarized in Table 2-4. Samples analyzed for nitrate + nitrite showed concentrations ranging from not detected to 29 milligrams per liter (mg/L). The groundwater enforcement standard (ES) for nitrate is 10 mg/l. Nitrate + nitrite concentrations above 2 mg/L exceed the states preventive action limit (PAL).

If staff time and budget allows, testing of private wells for nitrate + nitrite concentrations will be conducted in the Hillsboro Priority Watershed Project Area.

<p>Enforcement Standard (ES) Health Advisory Level: The concentration of a contaminant at which the enforcing agency, either the Department of Industry, Labor & Human Relations, the DATCP, or DNR, must take action.</p>
<p>Preventative Action Limit (PAL): A lower concentration of a contaminant than the Enforcement Standard, the PAL is a warning that human activities are affecting groundwater quality.</p>

Table 2-3. Well Sampling Results: Middle Kickapoo River Watershed

NITRATE LEVELS						
Watershed	Number of Nitrate Samples		Number of Nitrate Samples		Number of Nitrate Samples	
	less than 2.0 mg/l	%	between 2.0 and 10.0 mg/l	%	greater than 10.0 mg/l	%
Middle Kickapoo	57	35%	93	58%	12	7%

Archaeological Sites: Coordination with State and Federal Historic Preservation Laws

Projects using state and federal funding, assistance, licenses and permits are required by law to consider the effects of their actions on archaeological and historical sites, and historical structures. The watershed project is a joint cooperative effort between federal, state, and county agencies as well as the private landowners who volunteer to participate in the program. As a result, the federal Historic Preservation Act of 1966, as amended, and the state historic preservation statute, s. 44.40, Wis. Stats., have been blended to produce a cultural resource management program which is both compatible to preserving cultural sites and implementing the watershed project.

Any existing archaeological sites within the Hillsboro Priority Watershed will need special consideration when structural best management practices are being considered. Settling basins, manure storage structures, and streambank or shoreline shaping and riprapping are likely practices that may impact archaeological sites. As discussed above, state and federal laws require preservation of archaeological resources within the framework of the NPS Program.

The Hillsboro Priority Watershed Project will address these concerns with the following procedures:

- (1) Vernon County will obtain inventory maps from the regional Wisconsin State Historical Society office, and will plot sites on topographic maps. Counties will also obtain a supply of landowner questionnaires from the historical society which will be used to identify additional non-inventoried sites.
- (2) Landowners' questionnaires will then be sent to the State Historical Society for determination of archaeological significance. In addition, landowners will have their lands evaluated by county staff for the need to conduct an archaeological survey (essentially compare property with known archaeological site locations). The historical society will determine the need for additional, extensive surveys. The counties and the DNR District NPS Program coordinator will also be involved in this determination.
- (3) If the inventory or questionnaire does reveal an archaeological site and the proposed best management practice may impact the site, an archaeological survey conducted by a qualified archaeologist will need to be completed. The survey will assess the potential of the practice to significantly impact the site. Alternative BMPs may need to be considered both before and after the results of the survey.

A cost-share agreement is signed before the survey is conducted. In certain instances a survey may reveal a significant archaeological site which precludes the installation of a particular BMP at that specific site. Cost-share agreements will contain language which nullifies or partially nullifies the cost-share agreement based on the final results of the archaeological survey.

Endangered and Threatened Resources

Information on threatened and endangered resources was obtained from the Bureau of Endangered Resources of the Department of Natural Resources. Endangered resources include rare species and natural communities.

It should be noted that comprehensive endangered resource surveys have not been completed for the entire Hillsboro Priority Watershed. The lack of additional occurrence records does not preclude the possibility that other endangered resources are present in the watershed.

In addition, the Bureau's endangered resource files are continuously updated from ongoing field work. There may be other records of rare species and natural communities which are in the process of being added to the database and so are not in the lists below.

Rare Species

Rare species are tracked by Wisconsin's Natural Heritage Inventory of the Bureau of Endangered Resources. Species tracked by the inventory include those that are listed by the U.S. Fish and Wildlife Service or by the state of Wisconsin.

Wisconsin Endangered Species: Any species whose continued existence as a viable component of this state's wild animals or wild plants is determined by the Department of Natural Resources to be in jeopardy on the basis of scientific evidence. (Our files do not contain records of any Wisconsin Endangered species in this watershed).

Wisconsin Threatened Species: Any species which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered. (Our files do not contain records of any Wisconsin Endangered species in this watershed).

Emydoidea blandingii, Blandings Turtle

The Blandings turtle is presently under review by the US Fish and Wildlife Service for federal listing and threatened in Wisconsin. This species is found in sedge meadows, southern wet and southern wet-mesic forest, wetland wet-mesic prairie, prairie potholes, and large ponds, slow-moving rivers and shallow lakes. The breeding season occurs from April through September.

Wisconsin Special Concern Species: Any species about which some problem of abundance or distribution is suspected in Wisconsin, but not yet proven. The purpose of this category is to focus attention on certain species before they become endangered or threatened. (Our files do not contain records of any Wisconsin Endangered species in this watershed).

Natural Areas

Natural areas are sites that contain high quality examples of natural communities. No natural areas have been identified in the Hillsboro Priority Watershed.

If specific locational or other information is needed about these species or natural communities, contact the Bureau of Endangered Resources, Department of Natural Resources. Please note that the specific location of endangered resources is sensitive information. Exact locations should not be released or reproduced in any publicly disseminated documents.

CHAPTER THREE

Water Quality Conditions, Objectives, and Nonpoint Sources

Introduction

Nonpoint sources are responsible for the degraded conditions of the streams in this watershed. Excessive amounts of sediment, nutrients, and bacteria degrade the water quality causing unbalanced fish communities with depressed populations and limited diversity. In this watershed the two most serious pollutants are manure and sediment. These are discussed below.

Major Nonpoint Source Pollutants

Manure

Manure contains several components that adversely affect water quality and aquatic life. Manure entering a stream breaks down, resulting in depletion of the oxygen in the water which fish and other aquatic life require to survive. Also, manure contains nitrogen which can form ammonia in the streams and lakes. In high concentrations the ammonia is toxic to fish and other aquatic life. Ammonia toxicity is temperature and pH dependent. The nutrients in manure (including nitrogen and phosphorus) also promote nuisance algae and weed growth in the streams and lakes. Finally, the bacteria found in livestock manure is harmful to livestock drinking the water, and to humans using the water for recreation. The major sources of manure in this watershed are runoff from barnyards and runoff from improperly field-spread manure.

Slopes and narrow valleys present special manure management problems. Many barnyards and manure-spreading sites are located in close proximity to streams or on slopes. In either case, organic loading to streams is often significant.

Sediment

Sediment adversely impacts the water resources in many ways. It degrades habitat for fish and aquatic insects which support fish and other forms of aquatic life. High sediment concentrations abrade fish gills making the fish more susceptible to disease, fills in pools and degrades fish spawning habitat. Suspended sediment also causes the water to be warmer in the summer, and warm water cannot hold as much oxygen as cold water. The sources of sediment in this watershed are upland erosion from croplands, streambank erosion, gully erosion and shoreline erosion. Heavy or long term sediment deposits are less problematic in upland streams of the watershed. This is due to the fact that the gradients and higher velocities tend to scour streams of sediment and therefore do not result in long-term habitat destruction caused by channelization or heavy sediment deposits. Instead, streambank erosion is the most common form of habitat destruction.

Nitrates

Groundwater with nitrate levels greater than 10 milligrams per liter (mg/l) exceed state groundwater standards. At this level it is recommended that infants and women of child-bearing age not consume the water because the nitrate interferes with the ability of the blood to carry oxygen. High levels of nitrates may also indicate other contaminants in the drinking water. High nitrate concentrations in the drinking water are also linked to spontaneous abortions in livestock. The most likely sources of nitrates in the groundwater in this watershed are nitrogen fertilizers and manure applied to croplands. See groundwater discussion in Chapter Two.

Water Quality Conditions and Recreational Uses

Streams

South Branch Baraboo, West Branch Baraboo and Beaver Creek, a tributary of South Branch Baraboo, are the three named streams in the Hillsboro Priority Watershed. These three streams are approximately 13.5 miles in length, while several small spring-fed tributaries total about 12.5 miles of additional stream.

Both branches of the Baraboo River are considered Class III trout waters, meaning they will not support natural reproduction. Water quality in the lower reaches of the Baraboo branches is much worse than in its upper tributaries, including Beaver Creek. The lower reaches often have high suspended solids and nutrient concentrations following peak runoff events. Water temperatures near 65°F or colder are needed for trout to thrive. Water temperatures in the lower reaches often exceed 65°F.

Water quality in the tributaries, Beaver Creek and upper reaches of the Baraboo branches is generally good. Stream temperatures and dissolved oxygen levels are generally suitable for trout. The limiting factors for these tributaries are siltation and lack of deep pools for habitat.

Flooding is a frequent occurrence in the Hillsboro Priority Watershed. Many of the streams show evidence of high flood crests and excessive bank erosion, particularly in pastures and woodlots where grazing is heavy. The frequent flooding is due primarily to a combination of steep topography and the loss of topsoil to erosion. The subsoil does not have the ability to absorb rainfall.

Lakes

Lakes are not a common feature of the driftless area, making Field Veteran's Memorial Lake a unique feature for the Hillsboro community. There are a few man-made farm dams used for controlling runoff, and for providing water for cattle or wildlife. Field Veteran's Memorial Lake has a surface area of about 43 acres. It was built in the late 1800's to run the local mill. In 1963 there was a disastrous flood which damaged the dam. The dam was rebuilt and the lake was dredged in 1966 and again in 1994. Shoreline protection (rock riprap) was installed in 1994 to prevent shoreline erosion along the north bank.

Water quality in the lake is generally poor to fair. The main water quality problem for the lake is sedimentation. It is anticipated that installation of sediment traps, and installation of Best Management Practices in the upland areas of the watershed will slow the depositional process and improve water quality in Field Veteran's Memorial Lake.

Water Quality Objectives

The DNR staff with assistance from the Vernon County staff and the DATCP developed water quality objectives. Objectives were identified for each subwatershed and are listed in the following subwatershed descriptions. Details of objective development can be found in the Hillsboro Priority Watershed Water Resources (Schreiber, 1994).

Following are the general objectives for streams and the reservoir:

Protection: Protection refers to maintaining the present biological and recreational uses supported by a stream or the reservoir. For example, if a stream supports a healthy coldwater fishery and is used for full-body contact recreational activities, the objective seeks to maintain those uses.

Enhancement: Enhancement refers to a change in the overall condition of a stream or lake within its given biological and recreational use category. For example, if a stream supports a warmwater fishery whose diversity could be enhanced, the objective focuses on changing those water quality conditions which keep it from achieving its full biological potential.

Restoration: Restoration refers to upgrading the existing capability of the resource to support a higher category of biological use. An example would be a stream which historically supported healthy populations of warmwater game fish, but no longer does. This objective seeks to improve conditions allowing viable populations of forage and warmwater game fish species to become reestablished.

The water quality conditions needed to support the objectives for streams and lakes are the basis for determining the type and level of nonpoint source control to be implemented under the priority watershed project.

Following are abbreviations for designated biological uses in the subwatershed discussions:

COLD = Coldwater Communities include surface waters capable of supporting a community of coldwater fish and other aquatic life or serving as a spawning area for coldwater fish species.
WWSF = Warmwater Sport Fish Communities include surface waters capable of supporting a community of warmwater sport fish and/or serving as a spawning area for warmwater sport fish.
WWFF = Warmwater Forage Fish Communities include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
LFF = Limited Forage Fish Communities

Discussions also include the "class" of trout streams based on the publication "Wisconsin Trout Streams" [DNR Publ. 6-3600(80)] and Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11.

Class I trout streams are high quality, and populations are sustained by natural reproduction.

Class II trout streams have some natural reproduction but may need stocking to maintain a desirable fishery.

Class III trout streams have no natural reproduction and require annual stocking of legal-size fish to provide sport fishing.

Table 3-1. Water Resource Conditions and Objectives: Hillsboro Priority Watershed

Sub-watershed	Stream Name	Length (Miles)	Biological Use Current Use/Miles	Potential Use/Miles	Limiting Factors	Observed or Potential Sources	Water Resource Goals
South Branch Baraboo (SB)	South Branch Baraboo River	5.6	Cold/Class III	Cold/ Class II	SED, HM	CL, BY, SB, PSB, CG	Improve to Class II fishery. Reduce sedimentation from intermittent tributaries. Maintain buffer zone. Stabilize streambanks. Improve habitat.
South Branch Baraboo (SB)	Beaver Creek	3.0	Cold/Class III	Cold/ Class II	HAB, SED	CL, SB, PSB, BY, CG	Improve to Class II fishery. Improve habitat. Reduce sedimentation and organic loading. Stabilize streambanks.
West Branch Baraboo (WB)	West Branch Baraboo River	5.5	Cold/Class III	Cold/ Class II	SED, HAB	CG, SE, CL, BY, PSB,	Improve to Class II fishery. Improve arthropod community balance. Improve habitat. Stabilize stream banks. Reduce sedimentation and organic loading.

LEGEND:

* Biological Use, Existing - this column indicates the existing biological use supported by the stream as defined in NR 102 (04)(3) under fish and aquatic life uses.
COLD - coldwater communities

Biological Use, Potential: This column indicates the biological use a stream or stream segment could meet if it was well managed and pollution sources controlled. In many cases the potential use is the same as the existing use. In other streams potential use may be higher than the existing use. Abbreviations are the same as those used in the existing use columns. The sources of information are indicated by footnotes on each table. The classifications for trout streams came from "Wisconsin Trout Streams" (DNR Publ. 6-3600(80)).

** Limiting Factors
HAB - Habitat (lack of cover, sedimentation scouring etc.)
SED - Sedimentation (filling in of pools)
HM - Hydrologic modification

***Observed or Potential Sources
CL - Cropland erosion
SB - Streambank erosion
PSB - Streambank pasturing
BY - Barnyard or exercise lot runoff
CG - Cattle Grazing

Subwatershed Discussions

South Branch Baraboo River (SB)

South Branch Baraboo River is a medium gradient (23 feet/mile) trout stream. The river drains approximately eighteen square miles of predominantly farmland and woodland in Union, Greenwood and Hillsboro townships and lies within the Driftless Area of southwestern Wisconsin. The South Branch Baraboo has a main tributary called Beaver Creek, a three mile stream which flows north into the South Branch.

Water Quality Conditions

South Branch Baraboo River supports a COLD water Class III trout fishery. South Branch Baraboo River has been degraded from the effects of flooding, streambank erosion, sedimentation of pools and riffles, lack of instream habitat, elevated stream temperatures and upland erosion. Manure runoff from animal lots and heavily pastured areas contribute organic loadings and high bacteria levels to the stream.

Feedlots and manure management practices in key locations are sources of organic enrichment and high bacteria levels in the stream. The combination of factors including sedimentation, organic loading and loss of cover have contributed to low recruitment and survival of brown trout. Currently, the stream is not meeting criteria for a Class II trout fishery and displays marginal characteristics of a Class III stream. [Excerpted from Hillsboro Water Resources Appraisal Report, Schreiber, 1994]

Nonpoint Source Pollutants

- The South Branch Baraboo subwatershed contains 59 animal lots which contribute 141,609 pounds of C.O.D. (chemical oxygen demand) annually. This represents 43 percent of the C.O.D. for the entire watershed.
- The upland sediment delivery in the South Branch subwatershed is 1,511 tons annually, or 43% of the subwatershed load. Cropland is the major source in this subwatershed.
- Eroding and Cattle Trampled Streambanks deliver 12% (426 tons) of the sediment delivered to the South Branch subwatershed.
- Gullies deliver 45% (1,576 tons) of the sediment delivered to the South Branch subwatershed.

Water Resource Objectives -- South Branch Baraboo Subwatershed (SB)

Improve to Class II fishery by reducing sedimentation and improving fish habitat in all subwatershed streams.

Significantly reduce sedimentation rates in Field Veterans Memorial Lake.

Significantly reduce peak streamflow and increase baseflow in the subwatershed streams.

West Branch Baraboo River (WB)

West Branch Baraboo River is a high gradient (69 feet/mile) class III trout stream. The river drains approximately 17 square miles of predominantly farmland and woodland in Hillsboro, Union, Forest and Greenwood Townships in Vernon County. The subwatershed lies within the Driftless Area of southwestern Wisconsin. Two main tributaries to the West Branch are unnamed streams which flow easterly, one along State Hwy. 33 and the other along Hwy. 82.

Water Quality Conditions

West Branch Baraboo River supports a COLD water Class III trout fishery. Water resource problems include flooding, sedimentation of riffles and pools, streambank erosion, lack of instream habitat, and elevated stream temperatures in the lower reaches near the lake. Manure runoff from animal lots and heavily pastured areas contribute organic loadings and high bacteria levels to the stream. Land use in the stream corridor is mostly pasture or low wet meadow with scattered stretches of bottomland forest. The stream has been stocked with trout in the past by DNR and by local sports clubs.

Feedlots and manure management practices in key location are sources of organic enrichment and high bacteria levels in the stream. The combination of factors including sedimentation, organic loading and loss of cover have contributed to low recruitment and survival of brown trout. Currently, the stream is not meeting criteria for a Class II trout fishery and displays marginal characteristics of a Class III stream. [Excerpted from Hillsboro Water Resources Appraisal Report, Schreiber, 1994]

Nonpoint Source Pollutants

- The West Branch Baraboo subwatershed contains 54 animal lots which contribute 184,915 pounds of C.O.D. annually. This represents 57 percent of the C.O.D. for the entire watershed.
- The upland sediment delivery in the West Branch subwatershed is 923 tons annually, or 27% of the subwatershed load. Cropland is the major source in this subwatershed.
- Eroding and Cattle Trampled Streambanks deliver 28% (948 tons) of the sediment delivered to the West Branch subwatershed.
- Eroding gullies deliver 45% (1,549 tons) of the sediment delivered to the West Branch subwatershed.

Water Resource Objectives – West Branch Baraboo River Subwatershed (WB)

Improve to Class II fishery by reducing sedimentation and improving fish habitat in all subwatershed streams.

Significantly reduce peak streamflow and increase baseflow in the subwatershed streams.

Results of Nonpoint Source Inventories

Barnyard Runoff

Runoff carrying a variety of pollutants from barnyards and other livestock feeding, loafing, and pasturing areas is a significant source of pollutants in the streams of the Hillsboro Priority Watershed. Livestock operations comprised of 113 animal lots are a source of 326,524 pounds of C.O.D. per year (Table 3-2). Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to creeks and wetlands.

Table 3-2. Barnyard Inventory Results: Hillsboro Priority Watershed

Subwatershed	Number of Barnyards	Total COD* (Pounds)	Watershed COD Load
South Branch Baraboo	59	141,609	43%
West Branch Baraboo	54	184,915	57%

* Based on Annual COD Loads
Sources: Vernon County LCD, DNR and DATCP

Upland Sediment

Intensive agricultural practices have caused considerable amounts of eroded soil to reach wetlands, streams and Field Veterans Memorial Lake in Hillsboro.

Upland sediment sources were evaluated through subarea sampling and extrapolation for the entire watershed (35 square miles). The results of this inventory are summarized in Table 3-3. An estimated 2,434 tons of soil per year are delivered to wetlands or streams in the watershed from uplands. Croplands are the source of approximately 90 percent of the sediment delivered to surface waters from uplands.

Table 3-3. Upland Sediment Loading by Land Use: Hillsboro Priority Watershed

Subwatershed		Cropland	Developed	Grassland	Pasture	Woodland	Wetland	Total
South Branch Baraboo	Acres	4,881	232	260	3,681	2,352	<1%	11,406
	Sediment							2,834
West Branch Baraboo	Acres	4,486	332	66	4,169	2,161	<1%	11,214
	Sediment							2,143
TOTAL	Acres	9,367	564	326	7,850	4,513	<1%	22,620
	Sediment							4,977

Trampled or Eroded Streambanks

Streambank erosion and trampling contributes about 20 percent of the total sediment to surface waters in the Hillsboro Priority Watershed. Approximately 17 miles of streams were evaluated. Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 7 miles of streambank. An estimated 1,374 tons of sediment are eroding and cattle trampled streambanks into streams annually. See Table 3-4 for streambank inventory results.

Table 3-4. Streambank Inventory Results: Hillsboro Priority Watershed

Subwatershed	Inventoried Length (ft)	Eroded Sites (ft)	Trampled Sites (ft)	Slumped Sites (ft)	Cattle Access (ft)	Total Sediment Lost (Tons/Yr.)	Bank Degraded From E,T,S	Total Bank Erosion %
South Branch Baraboo	38,700	9,730	2,980	635	10,730	426.0	33%	31%
West Branch Baraboo	51,465	14,182	6,019	4,576	15,509	948.0	47%	69%

Source: Vernon County LCD

Winter-Spread Manure

In the Hillsboro Priority Watershed, winter-spread manure will be addressed before the installation of any manure runoff system or manure storage facility that has state or federal financial assistance.

Approximately 25 of the 113 livestock operations in this watershed are eligible for barnyard systems. If the landowner chooses to build any of these facilities, manure spreading management and nutrient management will be incorporated into the total conservation plan for the landowner using the NRCS Standard 590.

Other Pollution Sources

Failing Septic Systems

Septic systems consist of a septic tank and a soil absorption field. Septic systems fail due to soil type, location of system, poor design or maintenance. In the Hillsboro Priority Watershed, there have been four failures in the past ten years. This is a relatively high rate of system failures.

Pollutants from septic system discharges are nitrates, bacteria, viruses and hazardous materials from household products.

Vernon County has been using the Wisconsin Fund since 1984. The Wisconsin Fund is a Private Sewage System Replacement Grant Program offering financial assistance designed to help eligible homeowners and small business operators offset the costs of replacing a failing septic system. The program is

administered by the Vernon County Zoning and Sanitary Department. The grant program applies to principle residences and small businesses built prior to July 1, 1978, and is subject to income and size restrictions. Seasonal homes are not eligible for participation in this program. Interested individuals should contact their county zoning department for more information.

Solid Waste Disposal Sites

There are no active or abandoned landfill sites in the Hillsboro Priority Watershed.

Leaking Underground Storage Tank (LUST) Sites: The Wisconsin Remedial Response Site Evaluation Report (PUBL-SW-144-91) lists the sites identified through the LUST program. There are no sites listed within the watershed.

Other Contaminated Sites

The Wisconsin Remedial Response Site Evaluation Report also has the Inventory of Sites or Facilities Which May Cause or Threaten to Cause Environmental Pollution and the Spills Program List which includes sites or facilities identified under the Hazardous Substance Spill Law.

Pollutant Reduction Goals

Pollutant load reductions are developed according to activities needed to achieve the water quality objectives. The following is a summary of reductions to be targeted for the entire watershed.

Sediment Goal: Reduce overall sediment delivered by 50 percent to meet this goal, the following is needed:

- All watershed participants will be required to follow a conservation cropping plan to "T" or below. This will have a significant impact on watershed sedimentation.
- Fifty percent reduction in streambank sediment delivered to all streams and a 75 percent reduction in length of trampled streambank on all watershed streams. Landowners who wish to voluntarily participate in the project may be required to address their trampled streambanks, depending on the severity of the problem.
- Fifty percent reduction in sedimentation from eroding gullies. Participants may be required to control 50% of sedimentation from gullies on their land.

COD Goal: Reduce overall COD load by 50 percent to meet this goal, the following is needed:

- Fifty percent reduction in organic pollutants from barnyards in all subwatersheds.
- Fifty percent reduction in organic pollutants from winter-spread manure on "unsuitable" acres in all subwatersheds.

In addition, this plan calls for a restoration of 10 percent of degraded or prior converted wetlands.

CHAPTER FOUR

Management Actions

Introduction

The development of management actions is based on the planning activities accomplished during the initial phase of the project. The land and water inventories of nonpoint pollution problems described in Chapter 3 are analyzed in association with previously determined water resource objectives and pollutant reduction amounts required to achieve the objectives. The management actions will determine how many units of best management practices will be targeted for reduction. Landowner eligibility for cost-sharing will depend on whether their non-point pollution levels fall within the targeted range of pollution quantities.

For eligible landowners, all sources of pollution categorized as essential and required (critical sites) must be controlled. The control of critical sites is essential to achieving the water quality objectives. Those landowners with Critical Site designation who have not volunteered to participate in the project after the initial 3-year sign-up period may be issued an order to correct the designated nonpoint source of water pollution. Eligible sites are also significant nonpoint sources and will help the project meet its water quality goals. Eligible sites may be considered "necessary" by Land Conservation Department (LCD) staff as a condition for participating in the project. LCD staff may determine that the site is a significant pollution source which cannot be ignored. Ineligible sites are sites which are insignificant pollution sources and are not eligible for cost-sharing.

Specific Management Actions

Cropland Erosion and Other Rural Sediment Sources

Uplands - The water resource appraisal indicated a need for a "high" level of control of sediment. The upland sediment inventory estimated that 2,435 tons enter surface waters annually in the project area. Analysis of USLE data when compared to sediment delivery indicates reducing erosion on upland fields will also reduce the sediment delivered to streams. Table 4-1 shows the eligibility criteria for management required on eroding uplands. A "high" level of control is a 50% reduction of upland sediment.

Table 4-2 below shows Cropland critical sites, which includes 7 fields eroding over "T" and delivering sediment at a rate greater than 1.7 tons per acre per year. Owners of these fields will be required to meet "T", and reduce the sediment rate to less than 1.7 tons per acre per year. Control of these 7 fields to "T" will result in a 18.4% reduction in sediment delivered to waters. The owners of these 7 fields will receive notification at the beginning of the project, and will have 3 years to sign up for the project.

Eligible crop fields are all other crop fields in the watershed. All participants in the project will be required to follow a conservation cropping plan whereby they will meet "T" on all crop fields. Where significant erosion occurs from fields that are considered essential to achieving the resource objective,

landowners may be required to control those fields to "T" as a condition for receiving cost-share assistance. These fields are eligible based on the theory that the installation of conservation practices such as contour strips and reduced tillage not only reduce soil erosion and sedimentation, but also reduce peak flood rates and increase infiltration into the groundwater.

Table 4-1. Cropland Eligibility Criteria for Sediment Control: Hillsboro Priority Watershed

Management Category	Rate of USLE Sediment Delivery (tons/ac/year)	Inventoried Reductions (tons/ac./yr.)	Target	No. of Fields	Tons of Sediment Controlled	Percent of Overall Reduction
Critical Sites	Over "T" and ≥ 1.7	> or = "T"	"T"	7	460	18.4%
Eligible Sites*	All Other Crop Fields	N/A	"T" or Below	959	N/A	N/A

* Some eligible sites may be determined by the LCD staff to be "essential" and required as a condition for participating in the project.

Table 4-2. Critical Site Cropland Fields Targeted for Sediment Control: Hillsboro Priority Watershed

Operator ID #	Field #	USLE Rate	Sediment Delivery Rate
26141V	1F	35 Tons/Ac./Yr.	2.62 Tons/Ac./Yr.
26141V	1A	26 Tons/Ac./Yr.	1.99 Tons/Ac./Yr.
26141V	1C	26 Tons/Ac./Yr.	1.99 Tons/Ac./Yr.
25141E	2	28 Tons/Ac./Yr.	1.95 Tons/Ac./Yr.
26141V	3A	26 Tons/Ac./Yr.	1.83 Tons/Ac./Yr.
26141V	7B	26 Tons/Ac./Yr.	1.77 Tons/Ac./Yr.
26141V	2	23 Tons/Ac./Yr.	1.72 Tons/Ac./Yr.

Streambanks and Lakeshores

Seventy-five percent of eroded streambanks in the watershed are pastured. The management strategy must plan for some type of livestock management that will reduce the amount of habitat loss and destruction associated with livestock access to streambanks. In addition to the mass load reductions required for streambank erosion control, participants must also address trampled areas where significant degradation to the streambank has occurred.

Participating landowners with cattle holding areas along streambanks will be required to either fence cattle from the area, or adhere to a pasture management plan. The LCD will determine pasture stocking rates and length of grazing periods using NRCS Technical Guide Standard 510, Pasture and Hayland Management.

Streambank degradation is divided into two main categories: (1) Eroded streambanks and lakeshores and (2) Cattle trampled banks. Eroding streambanks and lakeshores deliver 1,415 tons of sediment to surface water annually, and the 8,999 feet of cattle trampled streambanks deliver 180 tons of sediment. A "high" level of control is indicated for this source. The goal is to reduce streambank trampling by 75% and to reduce sedimentation from eroding streambanks and lakeshores by 50%.

Eroded Streambanks and Lakeshores: There are approximately 236 sites eroding less than 5 tons per year which are not eligible for cost-sharing. Eroded streambank and lakeshore sites are generally caused by the natural forces of water, and not necessarily by land use management. It is recognized and highly probable that upstream land use has a more significant impact on an eroding site than land use at the site itself. Most often, these sites are of "no fault" to the landowner. For that reason this project will not have "critical sites" in this category of streambank degradation.

Streambank and lakeshore erosion remain a significant source of sediment which needs to be addressed. The goal is to reduce sedimentation from these sources by 50%. Eligible sites are the 70 streambank sites eroding at a rate over 5 tons per year. Landowners who voluntarily wish to participate in the project may be required to address their eroding streambanks if the Vernon County LCD makes a determination that control is essential to achieving the water quality objective. *All eroding lakeshores eroding over 5 tons per year are Eligible sites if control of that site is deemed cost effective by the Vernon County LCD.* If control costs more than \$30 per ton of soil saved over a 10 year practice life, it is not considered cost-effective.

Cattle Trampled Streambanks: Critical sites include the top 5 sediment producing cattle trampled streambank sites 250 feet in length or longer. Control of these 5 sites is essential in order to begin meeting water quality goals. Combined, the 5 critical sites account for 24% of the total length of cattle trampled streambanks. A second group, Eligible Sites, consists of 117 sites which account for 76% of the trampled streambank length in the watershed. Landowners who voluntarily wish to participate in the project may be required to address their trampled bank with a management action of the Vernon County LCD determines the site to be essential for achieving the resource objective. LCD staff will make that determination based on the pollution severity of the site and other factors.

Reducing the mass load of sediment can be accomplished by applying a variety of BMP's that are more fully explained in Chapter 5. It is estimated that pasture management practices can control 20% of the mass load and the remaining erosion will need structural applications. All landowners entering a cost-share agreement must address streambank habitat destruction outlined under the management strategy for livestock access. Table 4-3 below defines the eligibility categories for Eroded streambanks, table 4.4 defines the eligibility categories for cattle trampled streambanks and Table 4.5 lists the critical site cattle trampled streambanks.

Table 4-3. Eroded Streambank Eligibility Criteria: Hillsboro Priority Watershed

Management Category	Sediment Delivery (tons/year)	Target Reduction	No. of Sites	Reduction in Tons	Percent Reduction
Eligible*	> or = 5 tons/year	1 ton/yr.	70	825	69%
Not-Eligible	< 5 tons/year	N/A.	236	N/A	N/A

Table 4-4. Trampled Streambank Eligibility Criteria: Hillsboro Priority Watershed

Management Category	Trampled Length (feet)	Target Reduction	No. of Sites	Reduction in Length	Percent Reduction
Critical	> = 250 ft.	0 feet	5	2,195 feet	24%
Eligible	> 0 and < 250	0 feet	117	6,804 feet	76%

Table 4-5. Critical Site Trampled Streambanks: Hillsboro Priority Watershed

Operator ID #	Site #	Site Length	Sediment Load
27141E	1	700 ft.	14 tons
3131C	1	525 ft.	10.5 tons
34141D	26	450 ft.	9 tons
20141B	2	260 ft.	5.2 tons
20141B	12	260 ft.	5.2 tons

Gully Erosion

Sediment from gullies is a major contributor of sediment to surface water in this watershed. Inventoried amounts (representative sample inventory) are 1,587 tons per year. All landowners participating in the project, whether through voluntary participation or critical site designation for other sources, must control 50% of the sediment load from gullies on their land. Control of the remaining 50% is eligible for cost-sharing but is not required. Refer to table 4-6 below for eligibility criteria. Emphasis will be on installing practices such as small grade stabilization structures (dams) which not only stop gully erosion, but also help to decrease peak flood flow and increase infiltration.

A primary objective of the project is to decrease peak flow and increase infiltration, along with reducing the mass sediment load to the streams and lake. Control of gully erosion must be cost effective. Generally, cost per ton of soil saved over a 10 year practice life should not exceed \$30. For example, a gully which is eroding at a rate of 10 tons per year, will erode 100 tons over 10 years. The cost of controlling that gully should not exceed \$3,000 or it is not considered cost effective.

Table 4-6. Gully Erosion Eligibility Criteria: Hillsboro Priority Watershed

Management Category	Description	Target Reduction Level
Eligible & Essential Sites	Actively Eroding Gullies	50% of Sediment Load
Eligible Sites	Actively Eroding Gullies	50% of Sediment Load
Not Eligible Sites*	Inactive Gullies	N/A

* Not Eligible, or inactive gullies, are not eligible for cost-sharing unless a practice can be applied which works to decrease peak flood rates and/or increase infiltration.

Barnyard Runoff

Chemical Oxygen Demand (COD) is a measurement of all oxidizable matter which measures the lbs. of oxygen demanded by organisms for decomposition. The objective for barnyard runoff control is to reduce COD loading to streams by a total of 50%. Based upon past experience, it was determined that a total of 75% of this reduction could be obtained solely through voluntary participation. Barnyard sites contributing a COD load greater than 9,900 lbs. on an annual basis will be designated as a critical site (See Tables 4-7 and 4-8 below) for control. Those landowners with an animal lot designated as a critical site for control are eligible for a complete barnyard system, but will only be required to divert upland clean water and roof runoff away from the lot. Installation of these low-cost practices alone will provide significant pollutant load reductions in the Hillsboro Priority Watershed.

Barnyard sites which contribute between 3,100 lbs. and 9,900 lbs. of COD annually, will be considered as eligible for cost-sharing, yet essential for participation in the Hillsboro Watershed if the COD reduction objective is to be met. Landowners wishing to participate in the watershed project who have an animal lot that falls within this category may need to address their barnyard as a component of the agreement, based solely on the discretion of the Vernon County LCD. The landowner would need only divert the clean upland water and roof runoff away from the animal lot. Landowners with barnyards that still exceed a COD loading of 1,600 lbs. after installation of these low cost controls are eligible for additional controls.

Barnyard sites which are contributing between 800 and 3,100 lbs. of COD annually will only be eligible for clean water diversions and roof runoff control. Barnyards contributing less than 800 lbs. of COD are not eligible for cost-sharing unless a 50% reduction in COD can be achieved with clean water diversions and/or roof runoff control.

Table 4-7. Barnyard Runoff Eligibility Criteria: Hillsboro Priority Watershed

Management Category	COD (lbs. per year)	No. of Yards	Lbs. COD Controlled	Percent Reduction
Critical Sites	> or = 9,900 lbs.	3	41,691	12.5%**
Eligible	800 lbs. to 9,899 lbs.	86	158,444	47.4%
Not Eligible	< 800 lbs.	24	N/A	N/A

** Only includes control reductions using clean water diversions and roof runoff control.

Table 4-8. Critical Site Barnyards: Hillsboro Priority Watershed

Operator ID Number	Yard Number	C.O.D. Load
25141A	1	29,998
20141A	1	11,311
24141H	1	9,908

Nutrient Management and Manure Storage

All significant livestock producers and dairy operators in the watershed will be eligible for assistance with development of a nutrient management plan for their farm. During the implementation phase of this watershed plan, nutrient and pest management plan development will be cost shared at 50% for up to three years. The plan development and implementation would include working with private consultants to follow a nutrient management plan which entails crediting manure applications and plow down alfalfa for their fertilizer value. Commercial fertilizer applications are then adjusted to meet crop needs. These plans will conform to NRCS Technical Guide Standard 590 (not including WI Tech. Note 1.4) for nutrient management and Standard 595 when pest management plans are developed.

Under the NRCS guidelines, Nutrient Management (590) must be included as a component of a Waste Management System which includes handling and/or the storage of waste. Livestock operations installing only clean water diversion practices such as Roof Runoff Management (558), Livestock Exclusion (472), Clean Water Diversion (362) may be exempt from the nutrient management plan requirement.

A manure storage facility or one of the options listed below will be necessary if the nutrient management plan demonstrates there is a deficiency of available land for proper winter manure spreading. This deficiency is likely to cause a detrimental surface water quality impact. Landowners showing this land deficiency will be eligible for cost sharing based on the least cost system that will reduce the surface water quality impact and be consistent with the 590 Standard.

Options include, but are not limited to: the construction of a short term manure storage facility (capacity of no less than 90 days manure production and in accordance with NRCS Standard 313); the construction of a long term manure storage facility (capacity of no less than 180 days and no more than 270 days manure production and in accordance with NRCS Standards 313 or 425); a properly sited unconfined manure stack; the reduction in the number of animals; the rental of additional lands; or giving the volume of manure, which cannot be spread safely without causing a surface water quality impact, to a neighboring farm which can use the additional manure in accordance with a nutrient management plan.

Easements

Stewardship easements have not been identified in this project. NR 120 nonpoint easements are available for the Hillsboro Priority Watershed streams.

NR 120 easements can be considered when certain best management practices are planned. Shoreline buffers, critical area stabilization and wetland restoration are practices that can be used along with NR 120 easements. The County LCD must indicate to the DNR how an easement will be used in conjunction with the best management practice. NR 120 easements will usually be riparian lands or wetlands. Easements cannot be purchased with program funds to facilitate or create limited grazing, rotational grazing, streambank fencing or structural measures like rock riprap. Riparian areas that have high sediment delivery, but low soil loss rates would be an example of a situation where an easement may be used.

Wetland Restoration

Under certain conditions, easements for wetland restoration can be used. Criteria for eligibility have been developed to facilitate wetland restoration. Wetland restoration can be a cost-shared practice with or without an easement. Eligibility for wetland restoration includes any areas identified by the County LCD

which were previous wetlands. The purchase on an easement for these sites must be approved by the nonpoint source and land management section of the DNR Bureau of Water Resources. Wetland restoration is an eligible practice when the following land use conditions are present:

1. Cultivated organic soils with tile or open channel drainage systems discharging to a permanent flowing stream.
2. Pastured wetlands riparian to permanent flowing streams.
3. Prior converted wetlands that have a hydrologic link to "critical" or "eligible" sites. All crop fields must be controlled to "T".

The review of each easement will include a cost-effectiveness analysis and an evaluation of the water quality problems associated with the water resource.

Ordinances

An assessment for the need to control construction site erosion has indicated only slight evidence of construction activity at this time. The following urban sources of suspended solids have been estimated:

Residential	10.7 tons
Industrial	1.9 tons
Commercial	4.3 tons
Institutional (Hosp., School)	8.6 tons
Park, Cemetery, Open Space	0.1 tons
Total	25.6 tons

Although construction is minimal at this time the need for a construction site erosion control ordinance may be reassessed if construction should increase significantly. If construction site erosion threatens the water resource, the appropriate local governments will be required to adopt an ordinance that meets DNR approval. Because of the presence of storm sewers and discharge of stormwater directly into Field Veterans Memorial Lake, the potential exists for sedimentation by uncontrolled construction, especially in the city of Hillsboro. An animal waste ordinance is currently being developed by Vernon County for county-wide implementation. An animal waste ordinance is required to be developed and implemented in the Hillsboro Priority Watershed Project.

Urban Nonpoint Sources

The urban land use analysis found just over 25 tons of sediment being delivered to the Field Veterans Memorial Lake impoundment from urban land uses. Another source of sediment inventoried along the lakeshore found 221 tons of delivery associated with shoreline erosion. Phosphorous loads from urban land uses were estimated at 108 lbs./ac./yr. A program of Information and Education along with some basic housekeeping type activities can be used to reduce phosphorous loads to the lake. Control of sediment from urban area can also be reduced by increasing the level of street cleaning in the drainage area. Leaf collection programs can help reduce phosphorous and sediment. Cost-sharing for these activities is available and must be approved by the DNR nonpoint source and land management section.

Under the current management strategy, landowners wishing to control streambank and lakeshore erosion will be eligible for cost-share assistance. Landowners with lakeshore erosion at rates > 5 tons per year are eligible for cost-sharing, provided the control is cost effective. If control costs more than \$30 per ton of soil saved over a 10 year practice life, it is not considered cost-effective.

CHAPTER FIVE

Local Government's Implementation Program

Introduction

This chapter identifies the means for implementing the rural management actions for nonpoint source pollution control described in the previous chapter. The following chapter details the information and education strategy to be implemented. See Chapter 3 for information regarding other pollution sources. The success of this priority watershed project depends on the aggressive implementation of these nonpoint source pollution control strategies.

More specifically this chapter identifies:

- The agencies and units of government responsible for carrying out the identified tasks;
- The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter 4;
- The cost-share budget;
- The cost containment policies;
- The cost-share agreement reimbursement procedures including administrative procedures for carrying out the project;
- Staffing needs including total hours per year and number of staff to be hired;
- Schedules for implementing the project;
- The involvement of other programs;
- The project budget including the expense for cost-sharing; and staffing for technical assistance, administration, and the information and education program;

Project Participants: Roles and Responsibilities

Landowners and Land Operators: Owners and operators of public and private lands are important participants in the priority watershed program. They will adopt BMPs which reduce nonpoint sources of water pollution and protect and enhance fish, wildlife and other resources. Landowners and land operators in the Hillsboro Priority Watershed eligible for cost-share assistance through the priority watershed program include: 1) individuals; 2) Vernon County; 3) other governmental units described in NR 120.02(19); 4) corporations; and 5) the State of Wisconsin.

Vernon County is the primary unit of government responsible for implementing this plan in rural areas.

The Vernon County Land Conservation Committee (LCC) will act for the County Board and will be responsible contractually and financially to the State of Wisconsin for management of the project in areas

with rural land uses. The County LCC will coordinate the activities of all other agencies involved with the rural portion of the project.

The specific responsibilities for the county are defined in the Wisconsin Administrative Rules, statute NR 120.04, and are summarized below:

- 1 Identify in writing a person to represent the county during implementation of the project.
- 2 Contact all owners or operators of lands identified as significant nonpoint sources within one year of signing the nonpoint source grant agreement. The county's strategy for contacting landowners is included in this chapter.
- 3 Develop farm conservation plans consistent with the needs of the project.
- 4 Enter into nonpoint source cost-share agreements with eligible landowners and enforce the terms and conditions of cost-share agreements as defined in s NR 120.13, Wisconsin Administrative Code.
 - a. For lands the county owns or operates, to enter into cost-share agreements with DNR to correct identified nonpoint sources and fulfill their obligations as a cost-share recipient.
 - b. Design best management practices and verify proper practice installation.
 - c. Reimburse cost share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules and established in this plan.
 - d. Prepare and submit annual work plans for activities necessary to implement the project. The Vernon County LCD shall submit a workload analysis and grant application to the Department of Agriculture, Trade and Consumer Protection (DATCP) as required in s Ag. 166.50.
 - e. Prepare and submit to the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP) the annual resource management report required under s NR 120.21(7) to monitor project implementation by tracking changes in the nonpoint source inventory, and quantifying pollutant load reductions which result from installing BMPs.
 - f. Participate in the annual watershed project review meeting.
 - g. Conduct the information and education activities identified in this plan for which they are responsible.

Department of Natural Resources. The role of the Department of Natural Resources (DNR) is identified in s 144.24, Stats. and s NR 120, Wis. Adm. Code. (NR 120) The Department has been statutorily assigned the overall administrative responsibility for the Wisconsin Nonpoint Source Pollution Abatement Program. The Department's role is summarized below.

Project Administration. Project administration includes working with the counties to ensure that work commitments required during the 10-year project implementation phase can be met. The DNR will participate in the annual work planning process with the county. The Department reviews cost-share agreements signed by the county and the participating landowners for installing BMPs. The DNR provides guidance when questions arise concerning the conformance of proposed activities with the statutes, administrative rules, and the watershed plan.

Financial Support. Financial support for implementation of the priority watershed project is provided to each county in two ways: a local assistance grant agreement, and a nonpoint source grant agreement. These agreements are described later in this chapter.

The DNR may also enter into cost-share agreements directly with local or state units of government for the control of pollution sources on land the governments own or operate.

Project Evaluation. The DNR has responsibility for priority watershed project monitoring and evaluation activities. These efforts determine if changes in water quality occur as best management practices and other pollution controls are installed or implemented. The water quality evaluation and monitoring strategy for the Hillsboro Watershed is included in Chapter 8. The DNR documents the results of monitoring and evaluation activities in interim and final priority watershed project reports.

Technical Assistance. The DNR provides technical assistance to the county on the design and application of best management practices. This assistance is primarily for urban areas.

Other Responsibilities. These include:

1. The appropriate District Nonpoint Source Coordinator to arrange for DNR staff to assist county staff with site reviews to determine the impacts of nonpoint sources on wetlands and/or groundwater quality.
2. Assisting county staff to integrate wildlife and fish management concerns into selection and design of BMPs.

Department of Agriculture, Trade and Consumer Protection. The role of the Department of Agriculture, Trade and Consumer Protection (DATCP) is identified in s 144.25, stats., ch. 92 stats., and NR 120. In summary, the DATCP will:

- (1) Manage a training program for the staff involved with project implementation.
- (2) Cooperate with the University of Wisconsin - Extension to act as a clearinghouse for information related to agricultural best management practices, sustainable agriculture, and nutrient and pest management.
- (3) Assist the counties to carry out the information and education activities or tasks described in this plan.

- (4) Assist county staff to identify watershed participants subject to federal or state conservation compliance programs.
- (5) Assist counties, if requested, to develop a manure storage ordinance.
- (6) Assist county staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.
- (7) Participate in the annual project review meetings.
- (8) If the need arises, assist in developing technical standards for agricultural BMPs, and provide technical assistance to county staff concerning application of these practices.
- (9) Assist county staff to evaluate the site specific practicality of implementing rural best management practices.
- (10) Provide technical and engineering assistance to counties for agricultural BMPs.

Other Agencies

Natural Resources Conservation Service (NRCS). This agency works through the local LCC to provide technical assistance for planning and installing conservation practices. The local NRCS personnel will work with the county staff to provide assistance with technical work when requested by the Land Conservation Committee and if NRCS staff time is available. Personnel from the Area NRCS office will provide staff training and engineering assistance for best management practices. Efforts will be made by DATCP to assist NRCS to coordinate the Hillsboro Priority Watershed Project with the conservation compliance and other conservation provisions of the 1985 and subsequent Federal Farm Bills.

University of Wisconsin Extension (UWEX). County and Area Extension agents will provide support in developing and conducting a public information and education program aimed at increasing voluntary participation in the project. This will include assistance to carry out the information and education activities identified in this plan.

Farm Service Agency (FSA, formerly ASCS). FSA administers most of the federal programs aimed at the stabilization of the prices paid producers for agricultural products and administers federal funds for rural soil and water and other resource conservation activities. The Agricultural Conservation Program (ACP) which is administered by FSA will, to the extent possible, be coordinated with the Hillsboro Priority Watershed Project. In addition other conservation incentives such as the Conservation Reserve Program (CRP) will be used whenever possible to control critical nonpoint sources of pollution.

Agricultural Best Management Practices (BMPs)

BMPs Eligible For Cost-Sharing And Their Rates: Best management practices are those practices identified in NR 120 which are determined in this watershed plan to be the most effective controls of the nonpoint sources of pollution. The practices eligible for cost-sharing and the cost share rates for each BMP are listed in Tables 5-1 and 5-2 below.

Design and installation of all BMPs must meet the conditions listed in NR 120. Generally these practices use specific standard specifications included in the NRCS Field Office Technical Guide. In some cases additional specifications may apply. The applicable specifications for each BMP can be found in NR 120.14. The Department may approve alternative best management practices and design criteria based on the provisions of NR 120.15 where necessary to meet the water resource objectives. Regarding alternative agricultural BMPs, this approval is developed in consultation with DATCP.

If the installation of BMPs destroys significant wildlife habitat, NR 120 requires that habitat will be recreated to replace the habitat lost. The DNR District Private Lands Wildlife Specialist or a designee will assist the LCD in determining the significance of wildlife habitat and the methods used to recreate the habitat. Every effort shall be made during the planning, design, and installation of BMPs to prevent or minimize the loss of existing wildlife habitat.

Table 5-1. Practices Using a Flat Rate for State Cost-Share Funding

Best Management Practice	Flat Rate
Contour Farming	\$ 6.00/acre (1)
Contour Stripcropping	\$ 12.00/acre (1)
Cropland Protection Cover	\$ 25.00/acre (2)
Reduced Tillage	\$ 45.00/acre (3)
Reduced Tillage	\$ 15.00/acre (4)

- (1) Wildlife habitat restoration components of this practice are cost-shared at 70%.
- (2) \$25 per acre for up to 3 years for cropland protection cover.
- (3) \$45 per acre over 3 years for reduced tillage on continuous row croplands.
- (4) \$15 per acre for one year only for reduced tillage on crop rotations involving hay.

Table 5-2. State Cost-Share Rates for Best Management Practices¹

BEST MANAGEMENT PRACTICE	STATE COST SHARE RATE
Field Diversions and Terraces	70%
Grassed Waterways	70%
Intensive Grazing Management (Rotational Grazing)	50% ¹
Critical Area Stabilization	70% ²
Shoreline Buffers	70% ²
Wetland Restoration	70% ²
Shoreline and Streambank Stabilization	70% ²
Grade Stabilization Structures	70%
Agricultural Sediment Basins	70%
Barnyard Runoff Management	70%
Animal Lot Relocation	70%
Roofs for Barnyard Runoff Mgmt. & Manure Storage	70%
Manure Storage Facilities	70% ³
Animal Waste System Storage Abandonment	70%
Milking Center Waste Control	70%
Cattle Mounds	70%
Lake Sediment Treatment	70%
Livestock Exclusion from Woodlots	50%
Structural Urban Best Management Practices	70% ⁴
Nutrient and Pesticide Management	50% ⁵
1 The maximum cost-share rate per watering system is \$2,000.	
2 Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter 4 for an explanation of where easements may apply.	
3 Cost share for manure storage is 70% of the first \$20,000 and 50% of the remaining cost up to a maximum cost-share of \$35,000.	
4 The maximum cost-share rate for land acquisition, storm sewer rerouting, and removal of structures necessary to install structural urban best management practices is 50%.	
5 Spill control basins have a state cost share rate of 70%.	

Following is a brief description of some of the most commonly used BMPs included in Table 5-1 and 5-2. A more detailed description of these practices can be found in NR 120.14.

- **Contour Farming** - The farming of sloped land so that all operations from seed bed preparation to harvest are done on the contour.
- **Contour Stripcropping** - Growing crops in a systematic arrangement of strips or bands, on the contour, in alternate strips of close grown crops, such as grasses or legumes, and row crops. All operations from seed bed preparation to harvest are done on the contour.
- **Reduced Tillage** - A system which leaves substantial amounts of crop residue on the soil surface after crops are planted. The minimum amount of ground cover after planting shall be at least 30%. It is utilized in two situations; one for continuous (at least 3 consecutive years) row crops, the other for short crop rotations (no more than 2 years corn and small grains and hay) or for the establishment of forages and small grains.
- **Critical Area Stabilization** - The planting of suitable vegetation on critical nonpoint source sites and other treatment necessary to stabilize a specific location.
- **Grassed Waterways** - A natural or constructed channel shaped, graded and established with suitable cover as needed to prevent erosion by runoff waters.
- **Grade Stabilization Structure** - A structure used to reduce the grade in a channel to protect the channel from erosion or to prevent the formation or advance of gullies.
- **Livestock Exclusion from Woodlots** - The exclusion of livestock from woodlots to protect the woodlots from grazing by fencing or other means.
- **Shoreline and Streambank Stabilization** - The stabilization and protection of stream and lake banks against erosion and the protection of fish habitat and water quality from livestock access. This practice includes streambank rip-rap, streambank shaping and seeding, stream crossings, livestock watering, fencing and fish habitat structures. This practice may also include plans and practices to manage or exclude livestock.
- **Terraces** - A system of ridges and channels with suitable spacing and constructed on the contour with a suitable grade to prevent erosion in the channel.
- **Intensive Grazing Management (Rotational Grazing)**: A grazing management scheme that divides the pasture into multiple cells (usually 5 to 30) that receive a short but intensive grazing period followed by a recovery period of approximately 28 days. Rotational grazing increases pasture production while enhancing a dense, stable vegetative cover.
- **Barnyard Runoff Management** - Structural measures such as filter systems and/or diversions and rain gutters to redirect surface runoff around the barnyard, and collect, convey or temporarily store runoff from the barnyard.
- **Field Diversions** - The purpose of this practice is primarily to divert water from areas it is in excess or is doing damage to where it can be transported safely.

- **Manure Storage Facility** - A structure for the storage of manure for a period of time that is needed to reduce the impact of manure as a nonpoint source of pollution. Livestock operations where this practice applies are those where manure is winter-spread on fields that have a high potential for runoff to lakes, streams and groundwater. The facility is needed to store and properly spread manure according to a management plan.
- **Agricultural Sediment Basins** - A structure designed to reduce the transport of sediment eroded from critical agricultural fields and other pollutants to surface waters and wetlands.
- **Shoreline Buffers** - A permanently vegetated area immediately adjacent to lakes, streams, channels and wetlands designed and constructed to manage critical nonpoint sources or to filter pollutants from nonpoint sources.
- **Animal Lot Relocation** - Relocation of an animal lot from a critical site such as a floodway to a suitable site to minimize the amount of pollutants from the lot to surface or groundwater.
- **Nutrient Management** - The management and crediting of nutrients for the application of manure and commercial fertilizers, and crediting for nutrients from legumes. Management includes the rate, method and timing of the application of all sources of nutrients to minimize the amount of nutrients entering surface or groundwater. This practice includes manure nutrient testing, routine soil testing, and residual nitrogen soil testing.
- **Pesticide Management and Spill Control Basin** - The management of the handling, disposal and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater. This practice includes integrated pest management scouting and planning and spill control basins with liquid-tight floors for pesticide handling areas.
- **Animal Waste System Storage Abandonment** - Proper abandonment of leaking and improperly sited manure storage systems will aid in protection of water resources from contamination by animal waste. The practice includes proper removal and disposal of wastes, liner materials, and saturated soil as well as shaping, filling, and seeding of the area.
- **Roofs for Barnyard Runoff Management & Manure Storage Facilities** - Roofs for barnyard runoff management and manure storage facilities consist of a roof and supporting structure constructed specifically to prevent rain and snow from contacting manure. This practice may be used where space for grassed filter strips and other components is limited. These roofed structures may not be enclosed.
- **Easements** - Although not considered to be Best Management Practices, easements are useful legal tools and their applicability is defined in Chapter 4, Management Actions. Details for such arrangements will be worked out between DNR and the counties during implementation phase.
- **Structural Urban Best Management Practices** - Structural urban best management practices are source area measures, transport system and end-of-pipe measures designed to control storm water runoff rates, volumes and discharge quantity. These practices will reduce the amount of pollutants carried in runoff and flows destructive to stream or lake habitat. Examples of practices include infiltration trenches, porous pavement, oil water separators, sediment chambers, sand filtration units, grassed swales, infiltration basins and detention/retention basins.

- **Milking Center Waste Control** - A milking center waste control system is a piece of equipment, practice or combination of practices installed in a milking center for the purpose of reducing the quantity or pollution of potential of the wastes.
- **Cattle Mounds** - Cattle mounds are earthen mounds used in conjunction with feeding and dry lot operations and are intended to provide a dry and stable surface area for cattle.
- **Lake Sediment Treatment** - Lake sediment treatment is a chemical, physical or biological treatment of polluted lake sediments.
- **Wetland Restoration** - The construction of berms or destruction of the function of tile lines or drainage ditches to create conditions suitable for wetland vegetation.

Best Management Practices Not Cost-Shared

BMPs not cost-shared, but which shall be included on the cost share agreement if necessary to control the nonpoint sources, are listed in NR 120.17. Several examples are included below.

- That portion of a practice to be funded through other programs.
- Practices previously installed and necessary to support cost-shared practices.
- Changes in crop rotations and other activities normally and routinely used in growing crops or which have installation costs that can be passed on to potential consumers.
- Changes in location of unconfined manure stacks involving no capital cost.
- Manure spreading management.
- Other activities the DNR and the Counties determine are necessary to achieve the objectives of the watershed project.

Activities and Sources of Pollution Not Eligible for Cost-Share Assistance

Priority watershed cost-share funds cannot be used to control sources of pollution and land management activities specifically listed in NR 120.10(2). The following is a partial list of ineligible activities most often inquired about for cost-sharing in rural areas.

- Operation and maintenance of cost-shared BMPs,
- Actions which have drainage of land or clearing of land as the primary objective,
- Practices already installed, with the exception of repairs to the practices which were rendered ineffective due to circumstances beyond the control of the landowner,
- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wis. Stats. (including livestock operations with more than 1,000 animal units, or livestock operations issued a notice of discharge under ch. NR 243),
- Septic system controls or maintenance,
- Dredging activities,
- Silvicultural activities,
- Bulk storage of fertilizers and pesticides,
- Activities and structures intended primarily for flood control,

- Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed, with the exception of those that occur beyond the control of the landowner,
- Other practices or activities determined by DNR not to meet the objectives of the program.

Cost-Share Budget

Costs of Installing Best Management Practices. The quantity and type of management practices that are required to meet the water quality objectives of this project are listed in Table 5-3. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100% and 75%. Also included are the units of measurement and cost per unit for the various BMPs.

The capital cost of installing the Best Management Practices is approximately \$2,010,000 assuming 100% participation. State funds necessary to cost-share this level of control would be about \$1,385,750. The local share provided by landowners and other cost-share recipients would be about \$615,250. At a 75% level of participation, the state funds needed to cover capital installation would be about \$1,039,313.

Easement Costs. Chapter 4 identifies where nonpoint source program funds can be used to purchase easements. The estimated cost of purchasing easements on eligible lands in Vernon County is shown in Table 5-3.

At 100% participation, the estimated purchase price of easements on eligible lands would be \$75,000. At 75% participation, the cost would be \$56,250. The easement costs would be paid for entirely by the state. However, it is very difficult to determine landowner response to easements as a management tool. Easements are a relatively new tool in the Priority Watershed Program. Therefore, it is very difficult to estimate cost.

Table 5-3. Cost-Share Budget Needs for Rural Management Practices in Vernon County

Best Management Practices	Number	Cost/Unit	Total Cost (1)	100% Participation		75% Participation	
				State	Local	State	Local
				Share	Share	Share	Share
Upland NPS Control							
Change in Crop Rotation	1,000 ac	NA (2)	0	0	0	0	0
Contour Cropping	500 ac	\$6	3,000	3,000	(3)	2,250	(3)
Contour Strip Cropping	2,000 ac	\$12	24,000	24,000	(3)	18,000	(3)
Reduced Tillage (4)	1,000 ac	\$45	45,000	45,000	(3)	33,750	(3)
Reduced Tillage (5)	500 ac	\$15	7,500	7,500	(3)	5,625	(3)
Critical Area Stabilization	10 ac	\$5,000	50,000	35,000	15,000	26,250	11,250
Grass Waterways	40 ac	\$2,800	112,000	78,400	33,600	58,800	25,200
Field Diversions and Terraces	4,000 ft	\$4	16,000	11,200	4,800	8,400	3,600
Grade Stabilization	50 ea	\$5,000	250,000	175,000	75,000	131,250	56,250

Best Management Practices	Number	Cost/Unit	Total Cost (1)	100% Participation		75% Participation	
				State	Local	State	Local
				Share	Share	Share	Share
Agricultural Sediment Basin	2 ea	\$10,000	20,000	14,000	6,000	10,500	4,500
Intensive Grazing	10 ea	\$4,000	40,000	20,000	20,000	15,000	15,000
Shoreline Buffers	10 ac	\$200	2,000	1,400	600	1,050	450
Wetland Restoration	5 ea	\$3,000	15,000	10,500	4,500	7,875	3,375
Livestock Exclusion, Woods	2,000 rods	\$18	36,000	18,000	18,000	13,500	3,500
Spill Control Basins	1 ea	\$15,000	15,000	10,500	4,500	7,875	3,375
Animal Waste Management							
Complete System	20 ea	\$25,000	500,000	350,000	150,000	262,500	112,500
Roof Gutters	60 ea	\$1,200	72,000	50,400	21,600	37,800	16,200
Clean Water Diversion	60 ea	\$1,500	90,000	63,000	27,000	47,250	20,250
Milkhouse Waste	20 ea	\$4,000	80,000	56,000	24,000	42,000	18,000
Cattle Mounds	0 ea	\$3,000	0	0	0	0	0
Nutrient Management	3,000 ac	\$6.00	18,000	9,000	9,000	6,750	6,750
Nut. & Pest Management	750 ac	\$10.00	7,500	3,750	3,750	2,812	1,406
Manure Stor. Facility (6)	10 ea	\$30,000	\$300,000	\$190,000	\$110,000	\$141,374	\$82,218
Streambank Erosion Control							
Shape and Seeding	4,000 ft	\$12	48,000	33,600	14,400	25,200	10,800
Fencing	500 rods	\$20	10,000	7,000	3,000	5,250	2,250
Rip-Rap/ Lunkers	10,000 ft	\$20	200,000	140,000	60,000	105,000	45,000
Crossing/Watering Ramp	20 ea	\$1,500	30,000	21,000	9,000	15,750	6,750
Remote Watering Systems	5 ea	\$2,000	10,000	7,000	3,000	5,250	2,250
Subtotal:			\$2,010,000	\$1,384,250	\$616,750	\$1,038,187	\$461,156
Easements	50 ac	\$1,500	75,000	75,000	0	56,250	0
TOTALS			\$2,085,000	\$1,459,250	\$616,750	\$1,094,473	\$461,156

- (1) Total Cost to control identified critical pollution sources.
- (2) N/A means that cost share funds are not available for this practice.
- (3) Local share consists of labor and any additional equipment costs, also see flat rates.
- (4) Reduced tillage on greater than three years continuous row crops.
- (5) Reduced tillage, including no-till, on rotations including hay.
- (6) Maximum cost-share is 70% of the first \$20,000, and 50% of the remaining up to a total maximum cost-share of \$35,000.

Cost Containment

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined by the bidding, range of costs, and average cost methods the amount paid the grantee may be increased with the approval of the County Land Conservation Committee. Appropriate documentation regarding the need for changes will be submitted to DNR.

Bids, Average Costs, and Flat Rates: The cost containment procedures to be used by Vernon County are described in their average cost list, and flat rate list. These have been approved by the DATCP and DNR. Copies of the lists can be obtained from the county LCD. If these procedures or lists change, they are subject to approval by DATCP and DNR.

Average costs have been determined through experience in the County. The average cost list will be reviewed periodically and appropriate changes made. If changes are made, the list will be forwarded to the DNR and the DATCP for final approval before the changes are used for calculating cost share agreements and payments. BMPs using flat rates are shown in Table 5-2. The rates shown are the state's share of the practice installation costs.

Cost-Share Agreement Reimbursement Procedures

Nonpoint Source Grant Agreement and Administration

General Information: The Nonpoint Source Grant Agreement is the means for transmitting funds from the DNR (through the Nonpoint Source Program) to Vernon County for use in funding the state's share of cost share agreements. Cost share agreements are the means to transmit funds from the county to the landowners.

A portion of the Nonpoint Source Grant is forwarded to Vernon County to allow the county to set up an "up front" account. Funds from this account are used by the county to pay landowners after practices are installed through the project. As this account is drawn down, the county will request reimbursements from DNR to replenish the account. The county will submit reimbursement requests on a quarterly basis or sooner if needed. This reimbursement schedule will insure that the "up front" account balance is maintained at an adequate level. The Nonpoint Source (NPS) Grant Agreement may be amended annually to provide additional funding if needed. The funds obligated under cost share agreements must never exceed the total funds in the NPS Grant Agreement.

Fiscal Management Procedures, Reporting Requirements: Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Hillsboro Priority Watershed Project. The records of all watershed transactions must be retained for 3 years after the date of final project settlement. A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26.

Cost Share Agreement and Administration

Purpose and Responsibilities: Consistent with s 144.25, Stats. and NR 120, Wis. Adm. Code, cost-share funding is available to landowners for a percent of the costs of installing BMPs to meet the project objectives. Landowners have five years after formal approval of the watershed plan to enter into cost-

share agreements (CSA). Practices included on cost-share agreements must be installed within the schedule agreed to on the cost-share agreement. Unless otherwise approved, the schedule of installing BMPs will be within 5 years of signing of the cost-share agreement. Practices must be maintained for a minimum of ten years from the date of installing the final practice included in the cost-share agreement.

The cost-share agreement is a legal contract between the landowner and the county. The agreement includes the name and other information about the landowner and grant recipient, conditions of the agreement, the practices involved and their location, the quantities and units of measurement involved, the estimated total cost, the cost share rate and amount, the timetable for installation, and number of years the practice must be maintained. The agreements also identify and provide information on practices not cost-shared through the nonpoint program but that are essential to controlling pollution sources (such as crop rotations). These items will be completely listed in the conservation plan and the conservation plan is tied to the CSA via addendum 2 of the CSA. Once it is signed by both parties, they are legally bound to carry out the provisions in it.

If land ownership changes, the cost-share agreement remains with the property and the new owner is legally bound to carry out the provisions. NR 120.13(9) and (10) has more information on changes of land ownership and the recording of cost-share agreements.

Local, state, or federal permits may be needed prior to installation of some BMPs. The areas most likely to need permits are zoned wetlands and the shoreline areas of lakes and streams. These permits are needed whether the activity is a part of the watershed project or not. Landowners should consult with the County Planning and Zoning Department or the Land Conservation Department offices to determine if any permits are required. The landowner is responsible for acquiring the needed permits prior to installation of practices.

The cost-share agreement binds the county to provide the technical assistance needed for the planning, design, and verification of the practices on the agreement, and to provide the cost-share portion of the practice costs.

Counties are responsible for enforcing compliance of cost-share agreements to which they are a party. Where DNR serves as a party to an agreement with a unit of government, the DNR will take responsibility for monitoring compliance. The responsible party will insure that BMPs installed through the program are maintained in accordance with the operation and maintenance plan for the practice for the appropriate length of time. Vernon County will check for compliance with practice maintenance provisions once every three years after the last practice has been installed. The county must check maintenance at its own expense after the Nonpoint Source Agreement has lapsed, unless state funding for this activity becomes available at any time during the implementation or monitoring phase of this project.

Landowner Contact Strategy

The following procedure will be used to make landowner contacts.

- During the first three months of the implementation period, all landowners or operators with eligible nonpoint sources will receive from the county a mailing explaining the project and how they can become involved.
- After the initial landowner mailings, county staff will make personal contacts with all landowners that have been identified as having critical nonpoint sources of pollution. Landowners with

designated critical sites will be contacted by the Vernon County LCD within the first year of project implementation.

- The county will continue to make contacts with eligible landowners and operators until they have made a definite decision regarding participation in the program.
- The Vernon County LCD will contact all eligible landowners who have not signed cost-share agreements by personal letter six months prior to the end of the cost-share sign-up period.

Procedure for Developing a Cost Share Agreement: Eligibility for cost-sharing is verified following a site visit, using the criteria described in Chapter 4.

The development of farm conservation plans will be the primary method used to develop cost-share agreements. These plans are specific to a particular landowner and are a comprehensive approach to the abatement of the nonpoint sources of pollution, and the conservation of soil and other resources. The farm plan takes into consideration the sustainability of the agricultural resources and the management decisions of the owner or operator.

The cost share agreement specifies the items listed in the farm conservation plan that are necessary to reduce the nonpoint sources of pollution. The conservation plan and cost share agreement will document existing management which must be maintained to protect water quality.

The following procedure will be used by the county for developing and administering agreements. Below are the steps from the initial landowner contact through the completion of BMP maintenance.

- Landowner and county staff meet to discuss the watershed project, NPS control practice needs, and coordination with conservation compliance provisions if applicable.
- Landowner agrees to participate with the watershed project.
- A farm conservation plan is prepared by the county.
- The landowner agrees with the plan, a Cost Share Agreement is prepared and both documents are signed by the landowner and the county. A copy of the Cost Share Agreement (CSA) is sent to the DNR Western District Nonpoint Source Coordinator and a copy given to the landowner. The CSA will be recorded by the county with the County Register of Deeds.
- Practices are designed by the county, or their designee, and a copy of the design is provided to the landowner.
- Landowner obtains the necessary bids or other information required in the cost containment policy.
- Amendments to the CSA are made if necessary.
- The county staff oversee practice installation.
- The county verifies the installation.

- The landowner submits paid bills and proof of payment (canceled checks or receipts marked paid) to the county.
- Land Conservation Committees or their designated representative and if required, county boards, approve cost-share payments to landowners.
- Checks are issued by the county to the respective landowners and project ledgers are updated.
- The county records the check amount, number, and date.
- DNR reimburses the county for expended cost-share funds.

Identifying Wildlife and Fishery Needs: The Vernon County staff will consult with DNR's Western District wildlife management and fisheries management staff to optimize the wildlife and fish management benefits of nonpoint source control BMPs. Specifically, the county staff will contact DNR staff if in the county's opinion: Fence rows, rock piles, wetlands, or other wildlife habitat components will be adversely affected by installation of agricultural BMPs.

The DNR staff will assist county staff at the County's request by:

- Identifying streambank protection practices that benefit fish and wildlife.
- Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.
- Reviewing placement of agricultural sediment basins to assure that negative impacts on stream fish and aquatic life do not occur and recommending wildlife habitat components.
- Providing technical assistance when the installation of BMPs will require the removal of obstructions or other wildlife habitat by proposing measures to minimize impact on wildlife habitat.
- Assisting to resolve questions concerning effects of agricultural nonpoint source BMPs on wetlands.

Submittal to the Department of Natural Resources: Cost-share agreements do not need prior approval from DNR, except in the following instances:

- where cost-share funds are to be used for practices on land owned or controlled by the county.
- for agreements or amendments where the cost-share amount for all practices for a landowner exceeds \$100,000 in state funds.
- for grade stabilization structures and agricultural sediment basins with embankment heights between 15 and 25 feet and impoundment capacities of 15 to 50 acre feet.

- for streambanks to be controlled using riprap or other materials with banks over 6 feet high, according to NR 120.14. If applications are similar to each other in content, they will be reviewed to determine if future applications need be subject to this approval procedure.
- for animal lot relocation.
- for roofs over barnyards or manure storage facilities.

Local Assistance Grant Agreement Administration

General Information: The Local Assistance Grant Agreement (LAGA) is a grant from the DNR to Vernon County for staff and support costs. Consistent with NR 120, the counties will use funds from the LAGA for staff to implement the project and conduct information and education activities. Other items such as travel, training, and certain office supplies are also supported by the LAGA. Further clarification of eligible costs supported by this grant is given in NR 120.21(4) and (6).

Grant Agreement Application Procedures: An annual review of the Local Assistance Grant Agreement is conducted through the development of an annual workload analysis by the county. This workload analysis estimates the work needed to be accomplished each year. The workload analysis is provided to DATCP and DNR for review and clarification.

Fiscal Management Procedures, Reporting Requirements: Vernon County is required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Hillsboro Priority Watershed Project. The records of all watershed transactions must be retained for 3 years after the date of final project settlement.

A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26. NR 120 requires quarterly reports to DATCP from the county in accordance with s Ag. 166.40(4) accounting for staff time, expenditures, and accomplishments regarding activities funded through the watershed project. Reimbursement requests may be included with the submittal of the quarterly project reports.

Budget and Staffing Needs

This section estimates the funding and staffing required to provide technical assistance for the rural portion of this project.

Staff Needs: Table 5-4 lists the total estimated staff needed to implement the project. Figures are provided for both the 50% and 75% levels of participation. A total of about 29,400 staff hours are required to implement this plan at a 75% landowner participation rate. This includes 10,400 staff hours to carry out the information and education program.

Table 5-4. Estimated County LCD Staff Needs for Project Implementation of the Hillsboro Watershed Project.

Activity	Project Years When Work Will Be Done	VERNON COUNTY	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project and Financial Management	1-10	2,000	2,000
Information and Education Program	1-5	10,400	10,400
Pre-Contact Office Inventory; Landowner Contacts and Progress Tracking	1-5	1,500	1,000
Conservation Planning and Cost-Share Agreement Development	1-5	1,500	1,000
Plan Revisions and Monitoring	1-10	1,200	800
Practice Design and Installation	1-10		
Upland Sediment Control		4,800	3,200
Animal Waste Management		4,900	3,267
Streambank Erosion Control		2,000	1,333
Easements		300	200
Training	1-10	800	800
Total LCD Workload:		29,400	24,000
Estimated Staff Required for Years 1-5:		2.1 per year	1.8 per year
Hours		4,280 per year	3,640 per year
Estimated Staff Required for Years 6-10:		1 per year	0.8 per year
Hours		2,080 per year	1,600 per year
Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Vernon County Land Conservation Department			

Currently, two full-time staff positions are being funded through the State Nonpoint Source Pollution Abatement Program for the Hillsboro Priority Watershed. The county and agencies will determine the need for additional staff based on the annual Workload Analysis. The county will assess the number and type of staff required for the final five years of the project based on the actual landowner participation following the three year cost-share sign-up period.

Staffing Costs: The estimated cost for staff at the 75% participation rate (see Table 5-5) is approximately \$529,200. These costs will be paid by the state through the Local Assistance Grant Agreement.

Table 5-5. Total Project Costs at 75% Landowner Participation Rate: Hillsboro Priority Watershed

Item	Costs (State Share)	
		Table 5-3
Cost-Share Funds: Practices	\$1,039,313	75% participation, state share
Cost-Share Funds: Easements	\$56,250	75% participation, state share
Local Assistance Staff Support*	\$529,200	total LCD workload x \$18.00
Information & Education	\$15,000	From I & E chapt., does not include staff
Other Direct Staff Support (travel, supplies, etc.)	\$59,020	from county's calculations
Engineering Assistance	\$5,000	from county's calculations
Total	\$1,703,783	

* Salary + Fringes (\$37,400 per year average)

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Vernon County Land Conservation Department

Table 5-6. Grant Disbursement Schedule at 75% Landowner Participation: Hillsboro Priority Watershed

Item	Project Year						Total
	1	2	3	4	5	6-10	
Cost-Share Funds: Practices	\$207,863	\$207,863	\$207,863	\$207,862	\$207,862	\$0	\$1,039,313
Cost-Share Funds: Easements	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250	0	\$56,250
Local Assistance Staff Support	\$70,000	\$72,800	\$75,712	\$78,740	\$81,890	\$150,058	\$529,200
Information & Education	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	0	\$15,000
Other Direct: (travel, supplies, etc.)	\$9,080	\$9,080	\$9,080	\$9,080	\$9,080	\$13,620	\$59,020
Engineering Assistance	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$0	\$5,000
TOTAL	\$302,193	\$304,993	\$307,905	\$310,932	\$314,082	\$163,678	\$1,703,783

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection and the Vernon County Land Conservation Department

Schedules

Grant Disbursement and Project Management Schedule

Implementation may begin upon approval of this watershed plan by the Vernon County Board; Wisconsin Department of Agriculture, Trade and Consumer Protection; Wisconsin Land and Water Conservation Board; the Wisconsin Department of Natural Resources; and a grant has been awarded. The watershed project implementation period lasts ten years. It includes an initial five year period for contacting eligible landowners and signing cost-share agreements. Practices on any cost-share agreement must be installed within a five years of signing the CSA.

Under extenuating circumstances, the initial period for entering into cost-share agreements can be extended by DNR for a limited period of time if it will result in a significant increase in nonpoint source control. Limited extensions for the installation period for practices on individual cost-share agreements must also be approved by DNR and DATCP.

The disbursement of the grants (Local Assistance and Nonpoint Source) to Vernon County will be based on an annual workload analysis and grant application process. The estimated grant disbursement schedule based on 75% participation by eligible landowners can be found in Table 5-6.

Total Project Cost: The total state funding required to meet the rural nonpoint source pollution control needs at a 75% level of landowner participation is presented Table 5-5. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state is \$1,703,783 and the estimated cost to landowners and others is \$461,438.

This cost estimate is based on projections developed by the agency planners and Land Conservation staff. Historically, the actual expenditures for projects are less than the estimated costs. The factors affecting expenditures for this watershed project include: the time it takes to plan the project; the length of time the project is under implementation; the amount of cost sharing that is actually expended; the number of staff working on the project; the amount of support costs; and the time local assistance is necessary.

Involvement of Other Programs

Coordination With State and Federal Programs

The Hillsboro Priority Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP, and the Federal Food Security Act (FSA) administered by the Natural Resources Conservation Service (NRCS). DATCP will assist the LCD and the NRCS offices to identify landowners within the watershed that are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FSA on December 31, 1989. FPP conservation plans by were completed December 31, 1991. There are 18 FPP plans and 13 FSA plans within the watershed project.

Implementation and amendment of these conservation plans will be necessary during the implementation phase of the watershed project. Watershed project staff will inform FPP and NRCS staff of changes in plans resulting from management decisions and the installation of needed BMPs for nonpoint source pollution abatement. This comprehensive approach to farm planning will facilitate consideration of the various goals and objectives for all the programs in which the landowner participates.

Eroding uplands in the eligible management category 1 may need control, in addition to that required for meeting soil loss targets, in order to meet soil erosion program goals established through other state and federal programs. Where this occurs, technical and financial assistance from the Nonpoint Source Program can be used to support practice design and installation on these critical lands. This assistance applies only where the additional control needed to meet soil erosion goals can be achieved using low cost practices.

CHAPTER SIX

Information and Education Program

Introduction

The following is a listing of information and education goals and objectives for the Hillsboro Watershed Project - an outline of what is to be accomplished through the Project's Information and Education Program. Also included is a listing of potential activities that can be used to accomplish these goals and objectives.

Specific Information and Education Program activities will be planned annually by the Watershed Project Team and Citizen Advisory Committee. Annual planning of activities will allow the Information and Education Program to be able to:

- Meet changing program needs.
- Respond to new information and education opportunities.
- Fit current levels of available funding and staff.

Educational Goals and Objectives

Goal 1: Reduce the amount of soil entering surface waters.

Objectives:

- a. Increase use of conservation tillage practices by crop producers.
- b. Increase use of contour field strips by crop producers.
- c. Increase use of improved pasture management practices by livestock grazers.
- d. Increase use of woodland soil conservation practices by woodland managers.
- e. Increase use of erosion control practices by road construction and maintenance crews.
- f. Increase use of erosion control practices by building contractors.
- g. Increase use of stream erosion control practices by owners and managers of stream corridors.
- h. Increase use of gully control practices by land owners and managers.
- i. Increase level of urban sediment control by the city and private homeowners.

Goal 2: Reduce the amount of phosphorous entering surface waters.

Objectives:

- a. Increase use of barnyard runoff control practices by livestock producers.
- b. Improve utilization of field applied manure and commercial fertilizer by crop producers.
- c. Improve management of lawn fertilizers and yard wastes by the city and private homeowners.

Goal 3: Improve fish and wildlife habitat.

Objectives:

- a. Increase use of streambank erosion control practices by stream corridor owners and managers.
- b. Increase use of stream protective livestock management practices by livestock grazers.
- c. Increase use of in-stream fish habitat structures by stream corridor owners and managers.
- d. Increase the creation, restoration and enhancement of shallow wetlands by landowners.
- e. Encourage restoration of fish and wildlife habitat by landowners and volunteers.

Goal 4: Protect groundwater from potential sources of contamination.

Objectives:

- a. Increase proper closing of abandoned wells by urban and rural landowners.
- b. Increase use of nitrogen management practices by crop producers and custom fertilizer applicators.
- c. Encourage careful management of farmstead activities and materials by rural landowners.

Goal 5: Increase upland infiltration of rainfall and snowmelt.

Objectives:

- a. Increase the creation, restoration and enhancement of shallow wetlands by landowners.
- b. Increase use of woodland soil conservation practices by woodland managers.
- c. Increase use of small dams in upland areas by rural landowners.
- d. Increase use of improved pasture management practices by livestock grazers.
- e. Increase use of cropland erosion control practices by crop producers.

Goal 6: Increase profitability of cropland, livestock and woodland enterprises.

Objectives:

- a. Increase farm profitability by maximizing use of on-farm sources of crop nutrients.
- b. Increase farm profitability by increasing use of reduced tillage.
- c. Increase woodlot profitability by improving the value of forest products.
- d. Increase farm profitability through improved herd health and reduced feed costs.
- e. Increase farm profitability by keeping farm operations eligible for USDA farm programs.

Goal 7: Achieve broad-based support and ownership of the project by watershed residents.

Objectives:

- a. Assure effective involvement of Citizen Advisory Committee members.
- b. Assure all watershed residents are aware of the project's purpose, goals and operation.
- c. Assure that governmental officials, community leaders and the media have full understanding of the project's purpose, goals and operation.

Activities

- One on one project staff / landowner contacts.
- One on one meetings: Units of government, key industries, religious leaders, media.
- Field days: Nutrient Management plots, demonstration projects.
- Placemats: Firemen Community Center, local cafes, Dairy Breakfast, school events.
- Traveling display: Library, athletic events, Dairy Breakfast, Cesky Den Festival, Hills Dilly Days, Labor Day Celebration, banks, etc.
- Demonstration Projects: Stream protection, barnyard management, upland erosion control.
- Network with existing groups: Grazing, Dairy, Outdoor sports, business.
- Distribution of existing publications: UW-Extension, DNR, Dept. of Ag., USDA.
- Youth/student activities and projects.
- Press: Hillsboro Sentry Enterprise, Country Today, Agri-View, Wisconsin State Farmer.
- Newsletters: Project, ASCS, Cenex, Electric Co-Op, Amish, school.
- Radio: WCON, WRCO, WRDB, WRJC, WIZM-Z93.
- TV: LaCrosse and Madison networks.
- Citizen Advisory Committee involvement: Regular meetings, reviews, tours.
- Presentation to groups: Civic clubs, Super 60's, Business Breakfast Club, Rolling Hills Sportsman, Scouts.
- Neighborhood meetings.
- Signs: Boundary and participant.
- Promotional items: T-shirts, hats, pens, rain gauges.
- Watershed logo.

CHAPTER SEVEN

Integrated Resource Management Program

Introduction

The purpose of this chapter is to define the principles and guidelines for assuring that the watershed project is coordinated with other resource management programs, organizations, and activities. Each of these activities is described below.

Fisheries

Watershed best management practices (BMPs), such as streambank protection, shoreline buffer strips, and easements, should be implemented in such a way that will enhance fishery management goals. Specifically, all streambank protection BMPs should be installed in such a way that fisheries habitat is enhanced. Large diameter-sized rock should be used below the water line. Rock riprap should be installed and sized so that the placement and size of rock will positively benefit trout habitat. The fishery manager should be consulted for input in the design of each streambank protection BMP. It is anticipated that fish habitat lunger structures will be widely used in conjunction with many of the streambank protection projects.

Wetland Restoration

Significant amounts of restorable wetland areas exist in this watershed. The general guidelines for wetland restoration, easement acquisition, and shoreline buffers to protect existing wetlands should be followed. Wetlands that are important wildlife habitats will be identified by the U.S. Fish and Wildlife Service in consultation with the Department of Natural Resources (DNR). Shoreline buffer easements may be acquired adjacent to these wetlands to better protect them from sedimentation and other nonpoint source pollution.

These wetlands (existing and restorable) were identified in the wetlands inventory conducted by the Vernon County Land Conservation Department (LCD). In addition to the normal priority watershed funding, additional cost-sharing may be available to provide for a 100 percent payment for installation of the BMP. This additional funding may be available through the DNR district private lands manager, and/or the U.S. Fish and Wildlife Service. Eligibility for this additional funding would be determined by the DNR's private lands manager or the district nonpoint source coordinator.

The Fish and Wildlife service is interested in working with private landowners, conservation agencies and other units of government to restore drained and altered wetlands through their "Partners for Wildlife" program. The FWS "Partners for Wildlife" program can contribute both technical and financial support for wetland restoration efforts in the Hillsboro Watershed.

Forestry Management

Objective #1: Protecting grazed woodlots from further access by livestock.

- The priority watershed project has included the use of woodlot fencing as a cost-sharable practice.
- The Vernon County LCD will make referrals to the DNR forester whenever landowner contacts reveal needs for woodlot protection from livestock access.
- The DNR forester will make a personal contact with the landowner after referral from the County LCD.
- Information and education activities will be used to encourage landowners to protect woodlands from livestock damage.

Objective #2: Enter eligible woodlands into forest management programs such as the Managed Forest Law and the American Tree Farm System.

- At the time of landowner contact, the Vernon County LCD staff will refer landowners to the county forester for a follow-up contact.
- The potential of woodlands to be eligible for forestry programs will need to be determined initially by the Vernon County LCD.
- Information and education activities will be used to make landowners aware of the Managed Forest Law and the American Tree Farm System.

Objective #3: Plant trees on non-productive fields, pasture, and CRP acreage.

- The use of trees for establishing critical area control is encouraged and is provided for in NR 120.14(11). For conditions which do not meet project eligibility criteria (tree planting on non-eroded areas) a specific information and education effort is planned.
- County LCD staff will make referrals to the DNR foresters wherever conditions favorable to tree planting occur.

Objective #4: Advocate proper planning, construction and maintenance of logging and skidding trails to prevent soil and water erosion.

- Soil erosion in logging areas has been identified as a water quality problem and presents a need for water quality protection. The best management practices used to control this type of problem are either included in chapter 5 or will be pursued through the alternative design procedures in NR 120.15.
- County LCD staff will use eligibility criteria for cost-sharing existing erosion problems in logging operation areas within the project. The criteria is explained in chapter 4 under management actions.

Objective #5: Support information and education efforts about forest regeneration and proper harvesting techniques.

Objective #6: Foster participation in the Agricultural Conservation Program (ACP) forestry practices administered by ASCS.

Wildlife Management

Objective #1: Protect remaining of deciduous bottomland hardwoods from forest fragmentation.

- For those areas defined as wetlands, easements may be available through the priority watershed program. The County LCD staff will evaluate the potential of protecting these areas by easement acquisition, or even by cost-sharing for wetland restoration if eligible.

Objective #2: Enroll all eligible farmed wetlands into the Wetlands Reserve Program of the farm bill.

Objective #3: Promote the use of no-till and conservation tillage systems to provide additional wildlife food and cover on agricultural lands.

- The use of tillage systems are cost-sharable activities and are included in chapter 5 as available best management practices.

Objective #4: Promote roadside mowing according to a plan which is beneficial to wildlife.

Objective #5: Restore the wetland basis not eligible for the Wetland Reserve Program.

- The implementation activity identified for this objective is providing wetland restoration as a cost-sharable best management practice. Guidelines for wetland restoration are included in chapter 4.
- Easement acquisitions will assist in meeting this objective.

Objective #6: Promote the Purple Loosestrife program.

- The control of this plant is an objective of the wildlife management program. The plant is a problem because of its propensity to displace more desirable vegetation especially in wetland environments. The plant's value as a wildlife cover or food is minimal and it is considered a nuisance invader. The implementation approach for this objective could be a specific information and education activity.

Objective #7: Encourage upland nesting cover establishment.

- For some land management practices, planting of desirable species that benefit nesting cover will be used.
- Assistance in identifying desirable species for planting will be provided by DNR wildlife managers.
- The use of beneficial plant species will be encouraged by the County LCD staff.
- Cost-sharing for wildlife plantings will be available through the critical area stabilization management practice.

Objective #8: Promote tree harvest operations which are conducive to oak, aspen and alder regeneration.

- In cases where County LCD staff recognize opportunities for timber management, they will make referrals to the DNR wildlife manager.
- The DNR wildlife manager will provide training information to allow LCD staff to recognize these timber management opportunities.

Objective #9: Ensure wildlife habitat re-creation where habitat is lost due to construction of Best Management Practices.

- Wildlife protection is required by administrative rule for a number of best management practices that will be installed in the project. Wildlife habitat shall be recreated to replace wildlife habitat lost through removal due to the construction of the following best management practices.

Riparian Zones

Where possible, riparian zones along creeks should be protected with fencing to protect them from livestock grazing and trampling. These can be acquired through easements so that they receive lasting protection. These areas are important wildlife habitats, particularly for wood ducks.

Stewardship

The streambank protection program under stewardship is an important additional means of protecting water quality. Under this program, the DNR could obtain an easement on both sides of the stream (generally 66 feet wide on each side). If needed, the DNR will financially support the fencing of the stream to protect it from livestock access.

No streams within the Hillsboro Priority Watershed were eligible at the time in which this nonpoint source pollution abatement plan was written.

Endangered Resources

Endangered, threatened, and special concern species and natural areas are listed in Chapter II of the plan. To the best extent possible, every effort should be made to protect these species. If specific to rational or other information is needed, contact the DNR Bureau of Endangered Resources.

Cultural Resources

Procedures for coordination with state and federal historic preservation laws are outlined in Chapter Two. The known archaeological sites within the Hillsboro Priority Watershed will need special consideration when structural best management practices are being considered. Settling basins, manure storage

structures, and streambank or shoreline shaping and riprapping are likely practices that may impact archaeological sites.

Coordination with State and Federal Programs

The Hillsboro Priority Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP, and the Federal Food Security Act (FSA) administered by the Natural Resources Conservation Service (NRCS).

Coordination with Trout Unlimited and Pheasants Forever

The conservation organizations, Pheasants Forever and Trout Unlimited have agreed to cooperate with landowners in installing best management practices such as streambank protection, wetland restoration, and shoreline buffers.

CHAPTER EIGHT

Project Evaluation

Introduction

This chapter briefly summarizes the plan for monitoring the progress and evaluating the effectiveness of the Hillsboro Priority Watershed Project. The evaluation strategy includes these components:

- Administrative review
- Pollution reduction evaluation

Information on these components will be collected by the Vernon County LCD and reported on a regular basis to the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP). Additional information on the numbers and types of practices on cost-share agreements; funds encumbered on cost-share agreements, and funds expended will be provided by the DNR's Bureau of Community Assistance.

Annual Administrative Review

The first component, the administrative review, will focus on the progress of County in implementing the project. The project will be evaluated with respect to accomplishments, financial expenditures, and staff time spent on project activities.

Accomplishment Reporting: The Computer Assisted Management and Planning System, called CAMPS, is a computer data management system that has been developed by the U.S. Soil Conservation Service (SCS). The SCS, the DNR and the DATCP use CAMPS to meet the accomplishment reporting requirements of all three agencies. The Vernon County LCD will use CAMPS to collect data for administrative accomplishments, and will provide the information to the DNR and the DATCP for program evaluation.

The Vernon County LCD will provide the following data to the DNR and the DATCP on a quarterly basis:

- Number of personal contacts made with landowners.
- Completed information and education activities.
- Number of farm conservation plans prepared for the project.
- Number of cost-share agreements signed.
- Number of farm conservation plan and cost-share agreement status reviews completed.
- Number of farms and acres of cropland checked for proper maintenance of BMPs.

In addition to quarterly reports, Vernon County LCD representatives will meet with the DNR and the DATCP staff annually to review progress and plan for the subsequent year.

Financial Expenditures: Vernon County will provide the following financial data to the DNR and the DATCP on a quarterly basis:

- Number of landowner cost-share agreements signed.
- Amount of money encumbered in cost-share agreements.
- Number of landowner reimbursement payments made for the installation of best management practices (BMPs), and the amount of money paid.
- Staff travel expenditures.
- Information and education expenditures.
- Expenditures for equipment, materials, and supplies.
- Expenditures for professional services and staff support costs.
- Total project expenditures for the LCD staff.
- Amount of money paid for installation of BMPs, and money encumbered in cost-share agreements.

Vernon County will also provide both agencies with the following financial data on an annual basis:

- Staff training expenditures.
- Interest money earned and expended.
- Total county LCD budget and expenditures on the project.

Time Spent On Project Activities: Vernon County will provide time summaries to both departments for the following activities on a quarterly basis:

- Project and fiscal management.
- Clerical assistance.
- Pre-design and conservation planning activities.
- Technical assistance: practice design, installation, cost-share agreement status review and monitoring.
- Educational activities.
- Training activities, and Leave time..

Nonpoint Source Pollutant Load Reduction

The purpose of the second evaluation component, pollutant load reduction, is to calculate reductions in the amount of key pollutants as a result of installing BMPs. Key sources were identified for estimating changes in pollutant loads that reach surface, in the Hillsboro Watershed; upland sediment, and runoff from barnyards and fields spread with manure, and streambank/shoreline erosion. Pollutant load reductions are developed according to activities needed to achieve the water quality objectives.

As described in Chapter Three, this plan calls for the following pollutant reductions in all subwatersheds:

Sediment Goal: To reduce overall sediment delivered to surface water by 50%, the following is needed:

- * A fifty percent reduction in sediment reaching streams from agricultural uplands by bringing all fields down to the Tolerable soil loss level ("T").
- * A fifty percent reduction in streambank sediment delivered to all streams and a 50 percent overall repair of streambank habitat in watershed streams.
- * A fifty percent sediment reduction from actively eroding gullies.

C.O.D. Goal: To reduce the overall C.O.D. load by 50%, the following is needed:

- * A fifty percent reduction in organic pollutants from barnyards in all subwatersheds.
- * A fifty percent reduction in organic pollutants from winter-spread manure on "unsuitable" acres in all subwatersheds.

Hydrology Restoration Goal: To improve aquatic habitat and stabilize stream flow, the following is needed:

- * Restore a minimum of 10 percent of degraded or prior converted wetlands.

Streambanks

Vernon County (LCD) staff will calculate changes in streambank sediment in terms of tons of sediment and length of eroding sites. A tally will be kept of landowners contacted, the amount of streambank sediment being generated at the time of contact, and changes in erosion levels estimated after installing BMPs.

Upland Sediment Sources

Vernon County will use the WIN HUSLE (Wisconsin Nonpoint Source) model to estimate sediment reductions due to changes in cropping practices. The counties will use FOCS to provide data for the WINHUSLE model on a quarterly basis, as described above.

Barnyard Runoff

Vernon County will use the BARNY (Modified ARS) model to estimate phosphorus reductions due to the installation of barnyard control practices. The county will report the information to the DNR through FOCS.

CHAPTER NINE

Water Resource Evaluation Monitoring

Introduction

The goal of the priority watershed evaluation monitoring program is to evaluate the progress of the nonpoint source control program toward improving the quality of water resources.

Monitoring objectives are to:

1. Evaluate whether water quality "objectives" resulting from implementation of best management practices at specific sites have been attained.
2. Evaluate whether pollutant load reduction goals have been met and the effectiveness of those goals in improving water quality at specific sites.
3. Evaluate the BMP implementation process, and the effectiveness of BMP's in reducing the pollutants at specific sites.
4. Evaluate the application of priority watershed plans to the management of water resources, and the attainment of water quality standards and beneficial uses.

Program Organization

1. Evaluation monitoring activities in priority watersheds will be planned and conducted according to monitoring program guidance in the Bureau of Water Resources, Surface Water Monitoring Strategy.

Evaluation monitoring can be conducted at selected sites in basins on the 5-year basin assessment schedule. Or they, can be conducted at selected sites as special projects, depending on other monitoring priorities.

2. Evaluation monitoring may be conducted on selected waterbodies in priority watersheds that meet specific site selection criteria. These sites would be part of a statewide strategy designed to meet the program evaluation monitoring goal and objectives.
3. Evaluation monitoring need not be conducted in each priority watershed.

Site Selection Criteria

The following criteria are suggested for site selection in agricultural watersheds to be intensively evaluated as part of basin assessments, or as special projects:

In addition, this plan calls for a restoration of 10 percent of degraded or prior converted wetlands.

1. Where BMPs are planned but yet to be implemented in priority watersheds;
2. Where serious water quality, habitat or both problems exist, and a direct cause/effect relationship between problems and nonpoint sources are obvious;
3. Where a high probability exists that appropriate BMPs will be installed in the site's watershed. If possible, final monitoring site selection should come after cost-share agreements have been signed. Extra effort should be made to achieve full participation by all land owners;
4. Where sites are not meeting attainable uses and have a high potential to improve following management of nonpoint sources;
5. Where reference sites with similar characteristics, including attainable uses, are available in the same or adjacent watersheds. A reference site can be either an impacted site that will not be managed, or preferably, a site without water quality problems and meeting attainable uses. The important consideration is that reference site conditions are not expected to change except due to climatic conditions; and
6. Where sites have adequate access for sampling personnel and equipment.

Size

1. Sites should be located on permanent streams large enough to support well developed fish communities. Streams should be 5 to 30 feet wide with base flows of 1 to 20 cfs; and
2. Watersheds should be manageable with areas of 5 to 50 square miles.

Water Quality

1. Suspected or known water quality problems should be caused by manageable nonpoint sources should not be present or not significant; and
2. Point sources should not be present or not significant; and
3. Potential sources of problems that cannot or are unlikely to be managed should not be present.

Habitat

1. Habitat problems should be caused by poor land use practices immediately adjacent to or near sites, and in-stream habitat should have a high potential to improve following implementation of BMPs; and
2. Sites should not be selected that have been ditched within 10 to 15 years.

Site Selection Process

Potential evaluation monitoring sites can be located while conducting basin assessments, or conducting appraisal monitoring in newly selected priority watersheds. Selecting potential sites during the appraisal monitoring process is recommended.

Reconnaissance surveys can be conducted to locate sites that meet evaluation monitoring criteria in on-going priority watershed projects. When potential sites are located by reconnaissance, data should be obtained to determine if site selection criteria are met. And, county staffs should be contacted to determine the potential for land owner participation.

Sites selected for evaluation should meet most of the selection criteria, including the presence of appropriate reference sites.

Evaluation Monitoring Approaches

Priority watershed evaluation monitoring projects can be conducted as part of basin assessments on a 5-year schedule, or as special projects subject to Bureau approval of annual monitoring plans. Intensive evaluation monitoring will continue to be conducted at "master monitoring" sites by the Bureau of Research, United States Geological Service and Water Resources Management staff. Basin assessments, special projects and monitoring project work planning are discussed in the Bureau's Monitoring Strategy.

The following evaluation monitoring options are provided as guidance for developing monitoring plans. Any option, or a combination of options, may be used for evaluating priority watershed projects.

Basin Assessment Approach

- (1) Select specific sites in priority watersheds that meet site selection criteria, including at least one reference site per treatment site. Intensively monitor these sites during the basin assessment year to establish pre-implementation surface water conditions. Evaluation monitoring projects should be designed to fit individual site characteristics, but should generally include collection of water chemistry, habitat, fish community and macroinvertebrate data.

These same sites should be monitored again in 5 years (post-implementation) when the basin is scheduled to be reassessed. These data would be compared to pre-implementation data to evaluate site specific improvements resulting from implementation of BMPs. Monitoring on a 5-year schedule would continue if appropriate.

- (2) Repeat appraisal type monitoring at selected sites in priority watersheds on the 5-year basin assessment schedule.

The general water resource conditions in all priority watersheds will be assessed by conducting appraisal monitoring for developing priority watershed management plans. Appraisal monitoring provides a general water resource quality and problems assessment that, when repeated during future basin assessments, can be used to evaluate surface water quality improvements, especially where they are significant.

When conducted on the 5-year basin assessment schedule, pre-implementation appraisal monitoring data may be compared to watershed wide assessment (using appraisal monitoring techniques) data, to provide a general, but adequate priority watershed project evaluation.

This approach would provide an evaluation of more surface waters in a priority watershed, and an evaluation of the overall results of a priority watershed project.

Special Project Approach

This approach is essentially the same as the basin assessment intensive monitoring approach (option 1), except that sites may be monitored more frequently, and would be planned as special projects. Guidance for special project planning is provided in the Bureau's Monitoring Strategy.

Evaluation Monitoring within the Hillsboro Priority Watershed

Evaluation monitoring will be conducted during the eight year implementation phase and will continue for an additional two years. Thus evaluation monitoring activities will not be completed until [year].

Western District staff recommends a 5-year basin assessment approach. If time and staff are available and if it is approved in the district surface water monitoring plan, a special project monitoring approach will also be considered at selected sites which meet the site selection criteria.

Basin Assessment Approach

Western District staff will conduct or repeat appraisal type monitoring at the same sites that were monitored in 1994 as part of the Appraisal Monitoring Plan/Report (Schreiber, 1994). Monitoring will follow the five year basin assessment schedule and will include the same types of monitoring outlined in the Hillsboro Water Resources Appraisal Report (Schreiber, 1994). This monitoring approach should detect habitat and surface water quality improvements, especially where they are significant. Monitoring will occur only in subwatersheds where significant Best Management Practice Installation has occurred.

Special Projects Approach

Southern District staff proposes more intensive/frequent monitoring at selected sites. Again this is optional and its implementation is based on available staff and approval in the districts surface water monitoring plan.

The special projects approach to evaluation monitoring in Hillsboro Watershed will focus on streambank stabilization and/or habitat improvement demonstration projects. Fish shocking, habitat assessment and perhaps macroinvertebrate monitoring will be performed before and after demonstration projects including riprapping, lunger structures and streambank fencing. Special demonstration sites will be selected along short stream segments. WDNR Fisheries Research staff and USGS staff will be evaluating Hillsboro Priority Watershed for a potential NPS Master Monitoring Site in May, 1993.

APPENDIX A

Watershed Planning Methods

Introduction

This chapter describes the steps and procedures used to prepare this plan and those needed to evaluate water quality and aquatic habitat

The Department of Natural Resources (DNR) is responsible for: designating the biological and recreational uses that surface waters can support under proper management; prescribing the water quality required to sustain these designated uses; and indicating the methods to implement, achieve and maintain those conditions.

The DNR's Western District Water Resources Management staff conducted investigations of the existing quality and natural resource conditions for Hillsboro Watershed in 1992. Their purpose was to evaluate water quality problems and establish a basis for setting water resources management objectives. Detailed assessment results are documented in the water resource appraisal report.

Data Collection

The following is a summary of the five elements comprising the water quality and aquatic habitat investigation:

Subwatershed Delineation and Stream Segmentation: Prior to collecting field data, the watershed was divided into [#] hydrologic subwatersheds. This was accomplished using [year] 1"=400' scale aerial photographs and 1"=2,000' (7.5 minute) U.S. Geological Survey quadrangle maps. These maps were also used to divide the perennial and intermittent stream network into segments. Stream segments were used to separate portions of waterways where either natural conditions or human-induced changes resulted in pronounced differences in stream character and/or water quality.

Stream Habitat Evaluation: Information characterizing stream habitat—including flow rate and depth, substrate quality, channel configuration, stability, and water temperature—were collected using techniques that the DNR developed. The data were evaluated using DNR's Stream Classification Guidelines (Ball, 1982).

Water Quality Assessment: Surface water quality was assessed through review of historical water chemistry data and an evaluation of bottom dwelling animals (macroinvertebrates) using the Hilsenhoff Biotic Index (Hilsenhoff, 1982). Extensive bacteria (fecal coliform) surveys were conducted to assess the suitability of surface waters for recreational use. Private well samples were collected and analyzed for nitrate + nitrite and triazine herbicides. Analytical data were used to assess the quality of groundwater in the watershed.

Fisheries Resource Assessment: Fish communities were assessed qualitatively using a combination of historical data (Fago, 1984) and information collected during this investigation. Resident fish populations in the streams, lakes, and impoundments were sampled using seines and electric shocking equipment.

Navigability and Recreational Use Determinations: The extent and degree to which streams are navigable was determined based on evidence of canoeing or boating, field data including evidence of stream alteration or use, and information that landowners or other local experts provided. Recreational uses were determined through field observations, file data and information from local users.

Data Interpretation

The data described above were used to determine the existing and potential biological and recreational uses for surface waters. The existing uses reflect present biological and recreational conditions. Potential uses reflect biological and recreational conditions that could be achieved under prescribed types and levels of management. Even though existing and potential uses of a surface water are the same, management programs can result in significant changes in the quality of the aquatic environment. Use classifications and supporting water quality standards used in evaluating water resource conditions are discussed below.

Biological Stream Use Classification

Biological stream use classes describe the fish species or other aquatic organisms which a stream system supports. Designation is based on the ability of a stream to provide suitable habitat and water quality conditions for fish and other aquatic life. The following biological stream use classification system was used statewide and was applied to surface waters in the Spring Creek Watershed.

COLD=	Cold Water Communities include surface waters capable of supporting a community of cold water fish and other aquatic life or serving as a spawning area for cold water fish species.
WWSF=	Warm Water Sport Fish Communities include surface waters capable of supporting a community of warm water sport fish and/or serving as a spawning area for warm water sport fish.
WWFF=	Warm Water Forage Fish Communities include surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
LFF=	Limited Forage Fish Communities

Discussions also include the "class" of trout streams based on the publication "Wisconsin Trout Streams" [DNR Publ. 6-3600(80)] and Outstanding/Exceptional Resource Waters, Wisconsin Administrative Code NR 102.20 and NR 102.11.

Class I trout streams are high quality, and populations are sustained by natural reproduction.

Class II trout streams have some natural reproduction but may need stocking to maintain a desirable fishery.

Class III trout streams have no natural reproduction and require annual stocking of legal-size fish to provide sport fishing.

Recreational Stream Use Classification

Recreational stream use classifications are described by a level of human body contact determined to be safe and reasonable. The system applies to all surface waters including those categorized as intermediate or marginal under the above referenced biological use classification system. Three designations are used under the recreational stream classification system. These designations are full body contact, partial body contact, and noncontact.

Full Body Contact: These waters are used for human recreation where immersion of the head is expected and occurs often. Recreation activities classified as full body contact include swimming, waterskiing, sailboarding and other similar activities.

Partial Body Contact: These waters are used for human recreation where immersion of the head is not frequent and contact is most often incidental or accidental. Recreational activities classified as partial body contact include boating, canoeing, fishing and wading.

Noncontact: These waters should not be used for human recreation. This category is used infrequently when extenuating circumstances such as high concentrations of in-place pollutants, an uncontrollable pollution source, or other conditions dictate that contact with the water would be an unnecessary health risk.

Water Quality Standards and Criteria

Surface water quality standards and criteria are expressions of the conditions considered necessary to support biological and recreational uses. Water quality standards for recreational and biological uses are contained in Chapters NR 102, NR 104, and NR 105 Wisconsin Administrative Code.

In addition to these standards, other criteria were used to assess the suitability of surface waters for recreational and biological uses. Data characterizing stream size and accessibility were used to help determine the suitability and types of recreation a stream is capable of supporting. Information on current recreational use of surface waters (provided by users at public access points and discussions with local officials) was also used to assess suitability of surface waters for recreation.

Additional information used to assess the suitability of surface waters for biological uses includes recommended maximum nutrient levels, suspended solids concentrations and the extent to which streambeds are clogged with sediment.

Groundwater quality standards for substances of public health concern and public welfare concern are contained in Chapter NR 140 Wisconsin Administrative Code. The enforcement standards (ES) and preventative action limits (PAL) are defined on page 40 in Chapter Two. If well samples results exceeded the nitrate + nitrite ES, owners were sent a notice warning them that infants under six months and pregnant women should not drink the well water. At nitrate + nitrite levels greater than 40 mg/L, owners are eligible to apply for well compensation funds from the Bureau of Water Supply.

If well sample results using the triazine screen exceeded 1 $\mu\text{g/L}$, wells were resampled and analyzed specifically for atrazine and its metabolites. This was free of charge and on voluntary basis by the Bureau of Water Supply who assisted well owners in obtaining a clean water supply.

Assessing Pollution Sources

The purpose of the pollution source assessment is to identify the rural and urban sources and quantities of pollutants impacting surface waters. Rural and urban pollutant sources assessed for this watershed are discussed below.

Rural Nonpoint Sources

Excessive quantities of sediment, nutrients, oxygen demanding substances, pesticides and bacteria are pollutants carried in runoff draining agricultural areas. These pollutants degrade surface water quality thereby restricting recreational and biological uses. The principal rural nonpoint sources evaluated in preparing this plan include:

- Barnyards and livestock area runoff.
- Eroding uplands delivering sediment to surface waters.
- Eroding, slumping, or trampled streambanks.
- Areas contributing runoff of winter-spread livestock manure.
- Gullies.

The Rock County LCD staff conducted inventories during year 1992. Inventory procedures are documented below. The DNR in cooperation with the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) and the LCD staff completed the data analyses. Inventory and evaluation procedures are summarized below.

Barnyard and Livestock Area Runoff: The [LCD(s)] staff mapped the locations of 5 barnyards in the watershed on 1985 1"=400' scale aerial photographs. A field survey of each barnyard was conducted to collect information needed to determine its pollution potential.

The barnyard data was used in the "BARNY" Model (Baun, 1992), a modification of the animal lot runoff model, which the U.S. Department of Agriculture, Agricultural Research Service developed (Young, 1982). Information about the mass loading of total phosphorus annually was generated to evaluate the relative pollution potential of each barnyard. The livestock operations were ranked according to their potential to impact surface and/or groundwater quality.

Upland Erosion and Sediment Delivery: The LCD staff conducted the inventory on about 6 square miles, or 100 percent of the watershed, using existing data and field investigations. Cropland, pastures, grasslands, woodlands and other open (non-urban) land uses were investigated. Existing data sources included site specific farm conservation plans, [#] 1"=400' scale aerial photographs, and U.S. Geological Survey 1"=2,000' scale quadrangle maps. The information obtained for each parcel included size, soil type and erodibility, slope percent and length, land cover, crop rotation, present management, overland flow distance and destination, channel type and receiving water.

Upland erosion and sediment delivery was determined using the Wisconsin Nonpoint Source (WIN HUSLE) Model (Baun & Snowden, 1992). The WIN HUSLE model calculates the average annual quantity of eroded soil reaching surface waters from each farm field. The determination is made based on a "typical" year of precipitation. Estimated sediment delivery was used to assess the relative pollution potential of each farm field in the watershed.

Streambank Erosion: The LCD staff and the DNR conducted field surveys on about 3 miles of perennial and intermittent streams located in rural areas.] The method used is a modification of the streambank erosion analysis included in Phase II of the Land Inventory Monitoring process used by the U.S. Department of Agriculture, Soil Conservation Service. At locations where erosion was occurring, the following information was recorded:

- Length of trampled or eroding bank.
- Vertical height.
- Estimated annual rate of recession.
- Adjacent land uses.
- Potential management measures.

The amount of sediment lost annually was calculated for each erosion site. In addition, areas adjacent to streams impacted by livestock, but which were not necessarily eroding at a high rate, were also noted.

Runoff from Areas Winter-spread with Livestock Waste: This analysis was done to estimate the pollution potential associated with winter-spreading livestock waste in the watershed. The information collected for the barnyard and upland erosion surveys was used in this evaluation.

This analysis was completed using a three-step process. First, the number of acres that each livestock operation needed to landspread manure was calculated for a six-month period approximating when manure cannot be incorporated into the ground because of frozen or saturated conditions. The amount of manure that each operation generated was based on the number and type of livestock. The area required for spreading was based on an application rate of [#] tons per acre per year.

Second, the land available to each livestock operation for winter-spreading was characterized according to its environmental sensitivity. Lands having slopes equal to or greater than six percent or located within the floodplain were considered to have a high potential to deliver landspread manure to lakes and streams during periods of spring thaw.

Third, the number of sensitive acres winter-spread with manure was estimated for each livestock operation based on the number of acres needed for winter-spreading and the proportion of lands available to the livestock operation determined to be environmentally sensitive. This number was used to indicate the relative pollution potential of each livestock operation due to runoff of winter-spread manure.

Streambank Erosion: Rural streambank erosion survey techniques were applied to portions of urban streams where streambank erosion was suspected to be a problem. Sites were selected based on information from the DNR water resources staff and local municipal staff.

Other Pollution Sources

Additional sources of surface water pollution beyond those discussed in this plan are degrading water quality in the watershed. These pollution sources have the potential of overshadowing improvements in water quality that might otherwise occur as a result of the priority watershed program.

The DNR conducted an inventory and evaluation of these other pollution sources. Inventory results and recommendations for alleviating the water quality impacts of these other pollution sources are documented in Chapter Four of this plan.

Establishing Water Resource Objectives

Recreational and biological water resource objectives were established for each of the streams and lakes in the watershed. These objectives identify how the project is anticipated to change the quality of the aquatic environment for recreational and biological uses. Factors considered in establishing water resource objectives include: existing water quality and aquatic habitat; factors or pollutants that may be preventing the surface water from reaching its full potential of supporting biological and recreational uses; and the practicality of reducing pollutants.

Establishing Pollution Reduction Goals

Nonpoint pollution reduction goals are estimates of the level of nonpoint source control needed to meet the water quality and recreational use objectives identified in this plan. Pollution reduction goals and water resource objectives are established together since they are integrally related.

Developing a Nonpoint Source Management Strategy

The final step in the planning process is the development of a strategy for achieving the nonpoint source pollution reduction goals identified in the plan. Several items are addressed in developing the management strategy including:

- Critical nonpoint pollution sources.
- Effective management practices and guidelines for use of state cost-share funds for practice installation.
- Responsibilities, estimated workloads and work schedules for local implementing agencies, and guidelines for use of state funds to support local implementation activities.
- Estimated cost of installing practices and supporting staff at the local level.
- Information and education needs.
- Project evaluation needs.

Identification of critical nonpoint sources eligible for cost share and technical assistance under the Nonpoint Source Water Pollution Abatement (NPS) Program were determined by:

- Evaluating pollutant loading for each nonpoint source in each subwatershed.
- Determining the relative importance of controlling each source (barnyards, urban runoff, cropland erosion, etc.) to achieving the water resource objectives.
- Developing criteria to determine which sources need to be controlled.
- Applying the criteria to determine eligibility for participation in the priority watershed project.

This evaluation was carried out on a subwatershed and watershed basis for the rural nonpoint sources. The result is a site specific ranking of nonpoint sources and a determination of assistance to be made available through the nonpoint source program for the control of NPS pollution, financial and technical.

The DNR convened an advisory committee to assist in preparing this watershed plan.

APPENDIX B

List of Acronyms

ACP	Agricultural Conservation Program
ASCS	Agricultural Stabilization and Conservation Service
BARNY	Barnyard Nutrient Analysis Model
BIM-GEO	DNR Bureau of Information Management-Geographical Unit
BMP	Best Management Practice
BOD	Biological Oxygen Demand
CAC	Citizens Advisory Committee
CFSA	Consolidated Farm Services Agency (NRCS, ASCS)
COD	Chemical Oxygen Demand
CRP	Cropland Reserve Program
CSA	Cost Share Agreement
DATCP	Department of Agriculture, Trade, and Consumer Protection
DIHLR	Department of Industry, Labor, and Human Relations
DNR	Department of Natural Resources
ECP	Erosion Control Program
EPA	United States Environmental Protection Agency
FFA	Future Farmers of America
FPP	Wisconsin Farmland Protection Program
FSA	Food Security Act
GIS	Geographic Information System
GW	Groundwater
HEL	Highly Erodible Land
I&E	Information and Education
LCC	Land Conservation Committee
LCD	Land Conservation Department
LUST	Leaking Underground Storage Tanks
LWCB	Land and Water Conservation Board
NPM	Nutrient and Pesticide Management
NRCS	Natural Resource Conservation Service
SHS	Wisconsin State Historical Society
SIP	Stewardship Incentive Program [Forestry]
SOS	Signs of Success monitoring program
SWCD	Soil and Water Conservation Department
USDA	United States Department of Agriculture
USGS	United States Geological and Natural History Survey
UWEX	University of Wisconsin-Extension
WGNHS	Wisconsin Geological and Natural History Survey
WIN-HUSLE	sediment transfer model based on the Universal Soil Loss Equation
WPDES	Wisconsin Pollutant Discharge Elimination System [Permit System]
WUWN	Wisconsin Unique Well Number assigned to well sample sites

APPENDIX C

Glossary

ACUTE TOXICITY:

Any poisonous effect produced by a single short-term exposure to a chemical that results in a rapid onset of severe symptoms.

ADVANCED WASTEWATER TREATMENT:

The highest level of wastewater treatment for municipal treatment systems. It requires removal of all but 10 parts per million of suspended solids and biological oxygen and/or 50 percent of the total nitrogen. Advanced wastewater treatment is also known as "tertiary treatment."

AGRICULTURAL CONSERVATION PROGRAM (ACP):

A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:

A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Therefore, algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:

A form of nitrogen (NH_3) found in human and manures. Ammonia can be toxic to aquatic life.

ANAEROBIC:

Without oxygen.

ANOXIC:

Absence of oxygen

AREA OF CONCERN:

Areas of the Great Lakes identified by the International Joint Commission (IJC) as having serious water pollution problems.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):

A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

ANTIDEGRADATION:

A policy stating that water quality will not be lowered below background levels unless justified by economic and social development considerations. Wisconsin's antidegradation policy is currently being revised to make it more specific and meet EPA guidelines.

AVAILABILITY:

The degree to which toxic substances or other pollutants are present in sediments or elsewhere in the ecosystem and are available to affect or be taken up by organisms. Some pollutants may be "bound up" or unavailable because they are attached to clay particles or are buried by sediment. Oxygen content, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, but others are important in organic waste stabilization.

BARNY:

The Wisconsin Barnyard runoff model, a computer model used to assess the water quality impacts of barnyards or feedlots. It was developed by DNR with assistance from NRCS and DATCP.

BASIN PLAN:

See "Areawide Water Quality Management Plan".

BENTHIC ORGANISMS (BENTHOS):

Organisms living in or on the bottom of a lake or stream.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOACCUMULATION:

The uptake and retention of substances by an organism from its surrounding medium and food. As chemicals move through the food chain, they tend to increase in concentration in organisms at the upper end of the food chain such as predator fish, or in people or birds that eat these fish.

BIOASSAY STUDY:

A test for pollutant toxicity. Tanks of fish or other organisms are exposed to varying doses of treatment plant effluent. Lethal doses of pollutants in the effluent are then determined.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD₅ is the biochemical oxygen demand measured in a five day test. The greater the degree of pollution, the higher the BOD₅.

BIODEGRADABLE:

Waste that can be broken down by bacteria into basic elements. Most organic wastes such as food remains and paper are biodegradable.

BIOTA:

All living organisms that exist in an area.

BUFFER STRIPS:

Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

BULKHEAD LINES:

Legally established lines that indicate how far into a stream or lake an adjacent property owner has the right to fill. Many of these lines were established many years ago and allow substantial filling of the bed of the river and bay. Other environmental laws may limit filling to some degree.

CARCINOGENIC:

A chemical capable of causing cancer.

CATEGORICAL LIMITS:

All point source discharges are required to provide a basic level of treatment. For municipal wastewater treatment plants this is secondary treatment (30 mg/l effluent limits for SS and BOD). For industry the level depends on the type of industry and the level of production. More stringent effluent limits are required, if necessary, to meet water quality standards.

CHLORINATION:

The application of chlorine to wastewater to disinfect it and kill bacteria and other organisms.

CHLORORGANIC COMPOUNDS (CHLORORGANICS):

A class of chemicals that contain chlorine, carbon and hydrocarbon. This generally refers to pesticides and herbicides that can be toxic. Examples include PCB's and pesticides such as DDT and dieldrin.

CHRONIC TOXICITY:

The effects of long-term exposure of organisms to concentrations of a toxic chemical that are not lethal, but is injurious or debilitating in one or more ways. An example of the effect of chronic toxicity is reduced reproductive success.

CLEAN WATER ACT:

See "Public Law 92-500."

COMBINED SEWERS:

A wastewater collection system that carries both sanitary sewage and stormwater runoff. During dry weather, combined sewers carry only wastewater to the treatment plant. During heavy rainfall, the sewer becomes swollen with stormwater. Because the treatment plant cannot process the excess flow, untreated sewage is discharged to the plant's receiving waters, i.e., combined sewer outflow.

CONFINED DISPOSAL FACILITY (CDF):

A structure built to contain and dispose of dredged material.

CONGENERS:

Chemical compounds that have the same molecular composition, but have different molecular structures and formula. For example, the congeners of PCB have chlorine located at different spots on the molecule. These differences can cause differences in the properties and toxicity of the congeners.

CONSERVATION TILLAGE:

Planting row crops while only slightly disturbing the soil. In this way a protective layer of plant residue stays on the surface. Erosion rates decrease.

CONSUMPTION ADVISORY:

A health warning issued by DNR and WDHSS that recommends people limit the fish they eat from some rivers and lakes based on the levels of toxic contaminants found in the fish.

CONTAMINANT:

Some material that has been added to water that is not normally present. This is different from a pollutant, which suggests there is too much of the material present.

CONVENTIONAL POLLUTANT:

Refers to suspended solids, fecal coliforms, biochemical oxygen demand, and pH, as opposed to toxic pollutants

COST-EFFECTIVE:

A level of treatment or management with the greatest incremental benefit for the money spent.

CRITERIA:

See water quality standard criteria.

DIEL:

Referring to a 24-hour period, usually involving a day and a night.

DIOXIN (2,3,7,8-tetrachlorodibenso-p-dioxin):

A chlorinated organic chemical which is highly toxic.

DISINFECTION:

A chemical or physical process that kills organism that cause disease. Chlorine is often used to disinfect wastewater.

DISSOLVED OXYGEN (DO):

Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen often result from inadequate wastewater treatment. The DNR considers 5 ppm DO necessary for fish and aquatic life.

DISTRICTS:

DNR field offices. There are six DNR administrative districts in the state (see inside back cover for map).

DREDGING:

Removal of sediment from the bottom of water bodies.

ECOSYSTEM:

The interacting system of biological community and its nonliving surrounding.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) that are disposed on land, in water or in air. As used in the RAP, effluent generally means wastewater discharges.

EFFLUENT LIMITS:

The DNR issues WPDES permits establishing the maximum amount of pollutant to be discharged to a receiving stream. Limits depend on the pollutant and the water quality standards that apply for the receiving waters.

EMISSION:

A direct (smokestack particles) or indirect (busy shopping center parking lot) release of any contaminant into the air.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):

The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

ENVIRONMENTAL REPAIR FUND:

A fund established by the Wisconsin Legislature to deal with abandoned landfills.

EPIDEMIOLOGY:

The study of diseases as they affect populations rather than individuals, including the distribution and incidence of a disease mortality and morbidity rates, and the relationship of climate, age, sex, race and other factors. EPA uses such data to establish national air quality standards.

EROSION:

The wearing away of the land surface by wind or water.

EUTROPHIC:

Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:

The process of nutrient enrichment of a lake leading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FACILITY PLAN:

A preliminary planning and engineering document that identifies alternative solutions to a community's wastewater treatment problems.

FECAL COLIFORM:

A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FILAMENTOUS ALGAE:

Algae that forms filaments or mats attached to sediment, weeds, rocks, etc.

FISHABLE AND SWIMMABLE:

Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

FOOD CHAIN:

A sequence of organisms where each uses the next as a food source.

GREEN STRIPS:

See buffer strip.

GROUNDWATER:

Undergroundwater-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water that flows in response to gravity and pressure. Often used as the source of water for communities and industries.

HABITAT:

The place or type of site where a plant or animal naturally lives and grows.

HEAVY METALS:

Metals present in municipal and industrial wastes that pose long-term environmental hazards if not properly disposed. Heavy metals can contaminate ground and surface waters, fish and other food stuffs. The metals of most concern are: arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and zinc (see also separate listings of these metals for their health effects).

HERBICIDE:

A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

INFLUENT:

Influent for an industry would be the river water that the plant intakes for use in its processing. Influent to a municipal treatment plant is untreated wastewater.

IN-PLACE POLLUTION:

As used in the RAP, refers to pollution from contaminated sediments. These sediments are polluted from past discharges from municipal and industrial sources.

ISOROPYLBIPHENYL:

A chemical compound used as a substitute for PCB.

LANDFILL:

A conventional sanitary landfill is "a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading solid wastes in thin layers, materials at the end of each operating day". Hazardous wastes frequently require various types of pretreatment before they are disposed of, i.e., neutralization chemical fixation encapsulation. Neutralizing and disposing of wastes should be considered a last resort. Repurifying and reusing waste materials or recycling them for another use may be less costly.

LEACHATE:

The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate drinking water supplies.

LOAD:

The total amount of materials or pollutants reaching a given local.

MACROPHYTE:

A rooted aquatic plant.

MASS:

The amount of material a substance contains causing it to have weight in a gravitational field.

MASS BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources, and the processes by which the chemical moves through the ecosystem.

MESOTROPHIC:

Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrophic.")

MILLIGRAMS PER LITER (mg/l):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent of "parts per million".

MITIGATION:

The effort to lessen the damages caused, by modifying a project, providing alternatives, compensating for losses or replacing lost values.

MIXING ZONE:

The portion of a stream or lake where effluent is allowed to mix with the receiving water. The size of the area depends on the volume and flow of the discharge and receiving water. For streams the mixing zone it is one-third of the lowest flow that occurs once every 10 years for a seven day period.

NONPOINT SOURCE POLLUTION (NSP):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer, drain, or pipe where effluent from a wastewater treatment plant is discharged.

PATHOGEN:

Any infective agent capable of producing disease. It may be a virus, bacterium, protozoan, etc.

PELAGIC:

Referring to open water portion of a lake.

PERIPHYTON:

Microscopic plants growing on rocks and other substrate.

PESTICIDE:

Any chemical agent used to control specific organisms, such as insecticides, herbicides, fungicides, etc.

PH:

A measure of acidity or alkalinity, measured on a scale of 0 to 14 with 7 being neutral and 0 being most acid, and 14 being most alkaline.

PHENOLS:

Organic compounds that are byproducts of petroleum refining, textile, dye, and resin manufacture. High concentrations can cause taste and odor problems in fish. Higher concentration can be toxic to fish and aquatic life.

PHOSPHORUS:

A nutrient that, when reaching lakes in excess amounts, can lead to overfertilized conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:

Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION:

The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

POLYCHLORINATED BIPHENYLS (PCBs):

A group of 209 compounds, PCBs have been manufactured since 1929 for such common uses as electrical insulation and heating/cooling equipment, because they resist wear and chemical breakdown. Although banned in 1979 because of their toxicity, they have been detected on air, land and water. Recent surveys found PCBs in every section of the country, even those remote from PCB manufacturers.

POLYCHLORINATED ORGANIC COMPOUNDS:

A group of toxic chemicals which contain several chlorine atoms.

PRETREATMENT:

A partial wastewater treatment required from some industries. Pretreatment removes some types of industrial pollutants before the wastewater is discharged to a municipal wastewater treatment plant.

PRIORITY POLLUTANT:

A list of toxic chemicals identified by the federal government because of their potential impact in the environment and human health. Major dischargers are required to monitor all or some of these chemicals when their WPDES permits are reissued.

PRIORITY WATERSHED:

A drainage area about 100,000 acres in size selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PRODUCTIVITY:

A measure of the amount of living matter which is supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC LAW 92-500 (CLEAN WATER ACT):

The federal law that sets national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all dischargers of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup, billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

PUBLIC PARTICIPATION:

The active involvement of interested and affected citizens in governmental decision-making.

PUBLICLY OWNED TREATMENT WORKS (POTW):

A wastewater treatment plant owned by a city, village or other unit of government.

RECYCLING:

The process that transforms waste materials into new products.

REMEDIAL ACTION PLAN:

A plan designed to restore beneficial uses to a Great Lakes Area of Concern.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS):

An investigation of problems and assessment of management options conducted as part of a superfund project.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA):

This federal law amends the Solid Waste Disposal Act of 1965 and expands on the Resource Recovery Act of 1970 to provide a program that regulates hazardous wastes, to eliminate open dumping and to promote solid waste management programs.

RETRO-FIT:

The placement of an urban structural practice in an existing urban area, which may involve rerouting existing storm sewers and/or relocating existing buildings or other structures.

RIPARIAN:

Belonging or relating to the bank of a lake, river or stream.

RIPRAP:

Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RULE:

Refers to Wisconsin administrative rules. See Wisconsin Administrative Code.

RUNOFF:

Water from rain, snowmelt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SECONDARY IMPACTS:

The indirect effects that an action can have on the health of the ecosystem or the economy.

SECONDARY TREATMENT:

Two-stage wastewater treatment that allows the coarse particles to settle out, as in primary treatment, followed by biological breakdowns of the remaining impurities. Secondary treatment commonly removes 90% of the impurities. Sometimes "secondary treatment" refers simply to the biological part of the treatment process.

SEDIMENT:

Soil particles suspended in and carried by water as a result of erosion.

SEICHES:

Changes in water levels due to the tipping of water in an elongated lake basin whereby water is raised in one end of the basin and lowered in the other.

SEPTIC SYSTEM:

Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank. Liquid percolates through the drain field.

SLUDGE:

A byproduct of wastewater treatment; waste solids suspended in water.

SOLID WASTE:

Unwanted or discharged material with insufficient liquid to be free flowing.

STANDARDS:

See water quality standards.

STORM SEWERS:

A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUPERFUND:

A federal program that provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

SYNERGISM:

The total effect is greater than the sum of the individual effects. For example, the characteristic property of a mixture of toxicants that exhibits a greater-than-additive cumulative toxic effect.

TERTIARY TREATMENT:

See advanced wastewater treatment.

TOP-DOWN MANAGEMENT:

A management theory that uses biomanipulation, specifically the stocking of predator species of fish to improve water quality.

TOTAL MAXIMUM DAILY LOADS:

The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TOXIC:

An adjective that describes a substance which is poisonous, or can kill or injure a person or plants and animals upon direct contact or long-term exposure. (Also, see toxic substance.)

TOXIC SUBSTANCE:

A chemical or mixture of chemicals which, through sufficient exposure, or ingestion, inhalation or assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will, on the basis of available information cause death, disease, behavioral or immunologic abnormalities, cancer, genetic mutations, or development of physiological malfunctions, including malfunctions in reproduction or physical deformations, in organisms or their offspring.

TOXICANT:

See toxic substance.

TOXICITY:

The degree of danger posed by a toxic substance to animal or plant life. Also see acute toxicity, chronic toxicity and additivity.

TOXICITY REDUCTION EVALUATION:

A requirement for a discharger that the causes of toxicity in an effluent be determined and measures taken to eliminate the toxicity. The measures may be treatment, product substitution, chemical use reduction or other actions that will achieve the desired result.

TREATMENT PLANT:

See wastewater treatment plant.

TROPHIC STATUS:

The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY:

Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNIFORM DWELLING CODE:

A statewide building code for communities larger than 2500 residents specifying requirements for electrical, heating, ventilation, fire, structural, plumbing, construction site erosion, and other construction related practices.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):

A special outreach, education branch of the state university system.

VARIANCE:

Government permission for a delay or exception in the application of a given law, ordinance or regulation. Also, see water quality standard variance.

VOLATILE:

Any substance that evaporates at a low temperature.

WASTELOAD ALLOCATION:

Division of the amount of waste a stream can assimilate among the various dischargers to the stream. This limits the amount (in pounds) of chemical or biological constituent discharged from a wastewater treatment plant to a water body.

WASTEWATER:

Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTE:

Unwanted materials left over from manufacturing processes, refuse from places of human habitation or animal habitation.

WASTEWATER TREATMENT PLANT:

A facility for purifying wastewater. Modern wastewater treatment plants are capable of removing 95% of organic pollutants.

WATER QUALITY AGREEMENT:

The Great Lakes Water Quality agreement was initially signed by Canada and the United States in 1972 and was subsequently revised in 1978 and 1987. It provides guidance for the management of water quality, specifically phosphorus and toxics, in the Great Lakes.

WATER QUALITY LIMITED SEGMENT:

A section of river where water quality standards will not be met if only categorical effluent standards are met.

WATER QUALITY CRITERIA:

A measure of the physical, chemical or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS:

The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE:

When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming, a variance may be granted.

WATERSHED:

The land area that drains into a lake or river.

WETLANDS:

Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WINHUSLE:

A computer model for evaluating sediment delivery to surface waters from agricultural lands. It was developed by DNR with assistance from NRCS.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN FUND:

A state program that helps pay the cost of reducing water pollution. Funding for the program comes from general revenues and bonds and is based on a percentage of the state's taxable property value. The Wisconsin Fund includes these programs:

Point Source Water Pollution Abatement Grant Program - Provides grants for 60% of the cost of constructing wastewater treatment facilities. Most of this program's money goes for treatment plant construction, but three percent of this fund is available for repair or replacement of private, on-site sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program - Funds to share the cost of reducing water pollution. Nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program - Communities planning for solid waste disposal sites are eligible for grant money. \$500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

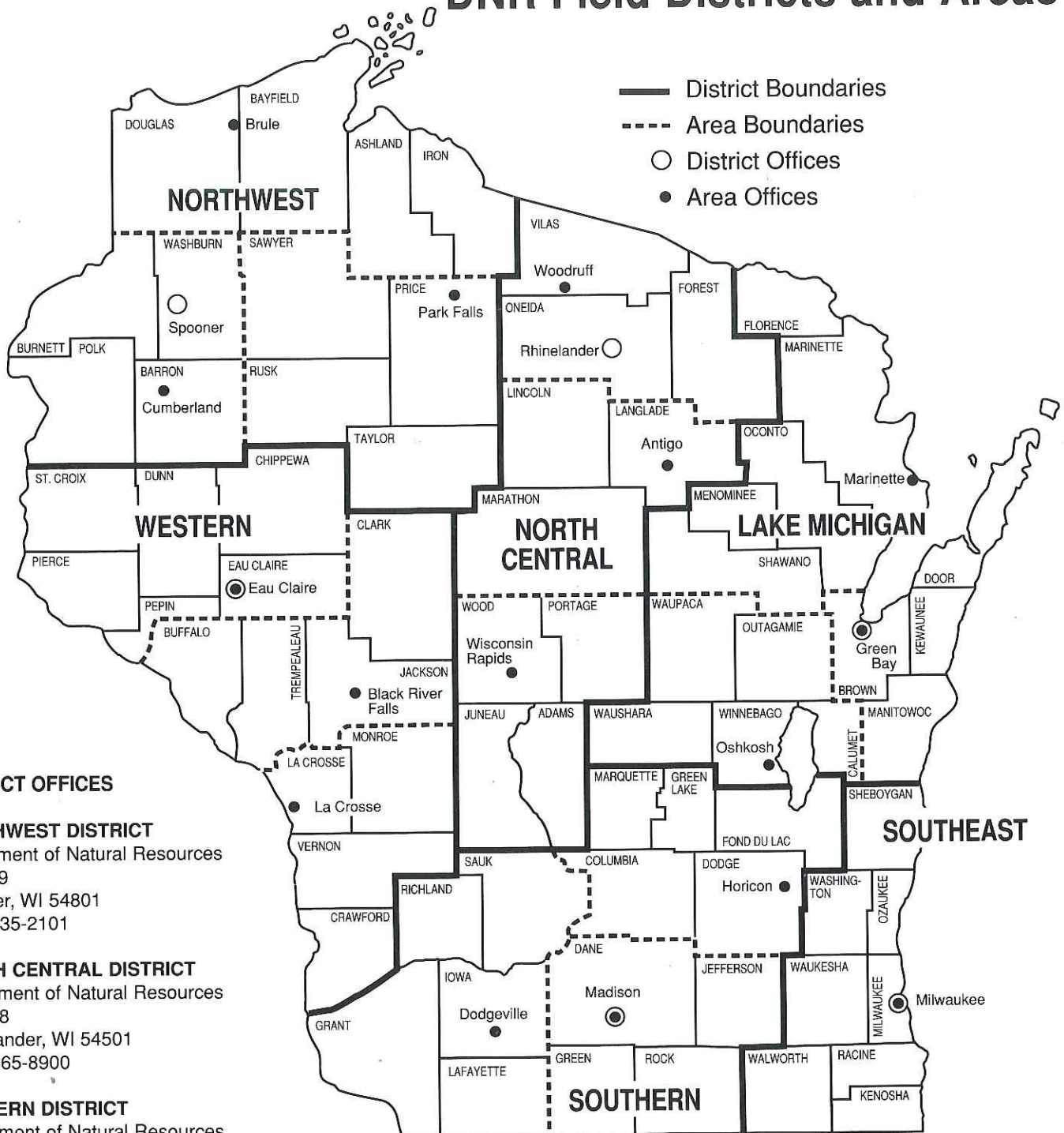
A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

APPENDIX D

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DNR Field Districts and Areas



DISTRICT OFFICES

NORTHWEST DISTRICT

Department of Natural Resources
 Box 309
 Spooner, WI 54801
 (715) 635-2101

NORTH CENTRAL DISTRICT

Department of Natural Resources
 Box 818
 Rhinelander, WI 54501
 (715) 365-8900

WESTERN DISTRICT

Department of Natural Resources
 Box 4001
 Eau Claire, WI 54702
 (715) 839-3700

LAKE MICHIGAN DISTRICT

Department of Natural Resources
 1125 N. Military Avenue, Box 10448
 Green Bay, WI 54307
 (414) 492-5800

SOUTHEAST DISTRICT

Department of Natural Resources
 2300 N. Dr. Martin Luther King, Jr. Drive
 Box 12436
 Milwaukee, WI 53212
 (414) 263-8500

SOUTHERN DISTRICT

Department of Natural Resources
 3911 Fish Hatchery Road
 Fitchburg, WI 53711
 (608) 275-3266

REV 3/96

An outline map of the state of Wisconsin, including its major islands and water bodies. The map is centered on the page and serves as a background for the text.

Our Mission:

To protect and enhance our Natural Resources—
our air, land and water;
our wildlife, fish and forests.

To provide a clean environment
and a full range of outdoor opportunities.

To insure the right of all Wisconsin citizens
to use and enjoy these resources in
their work and leisure.

And in cooperation with all our citizens
to consider the future
and those who will follow us.

