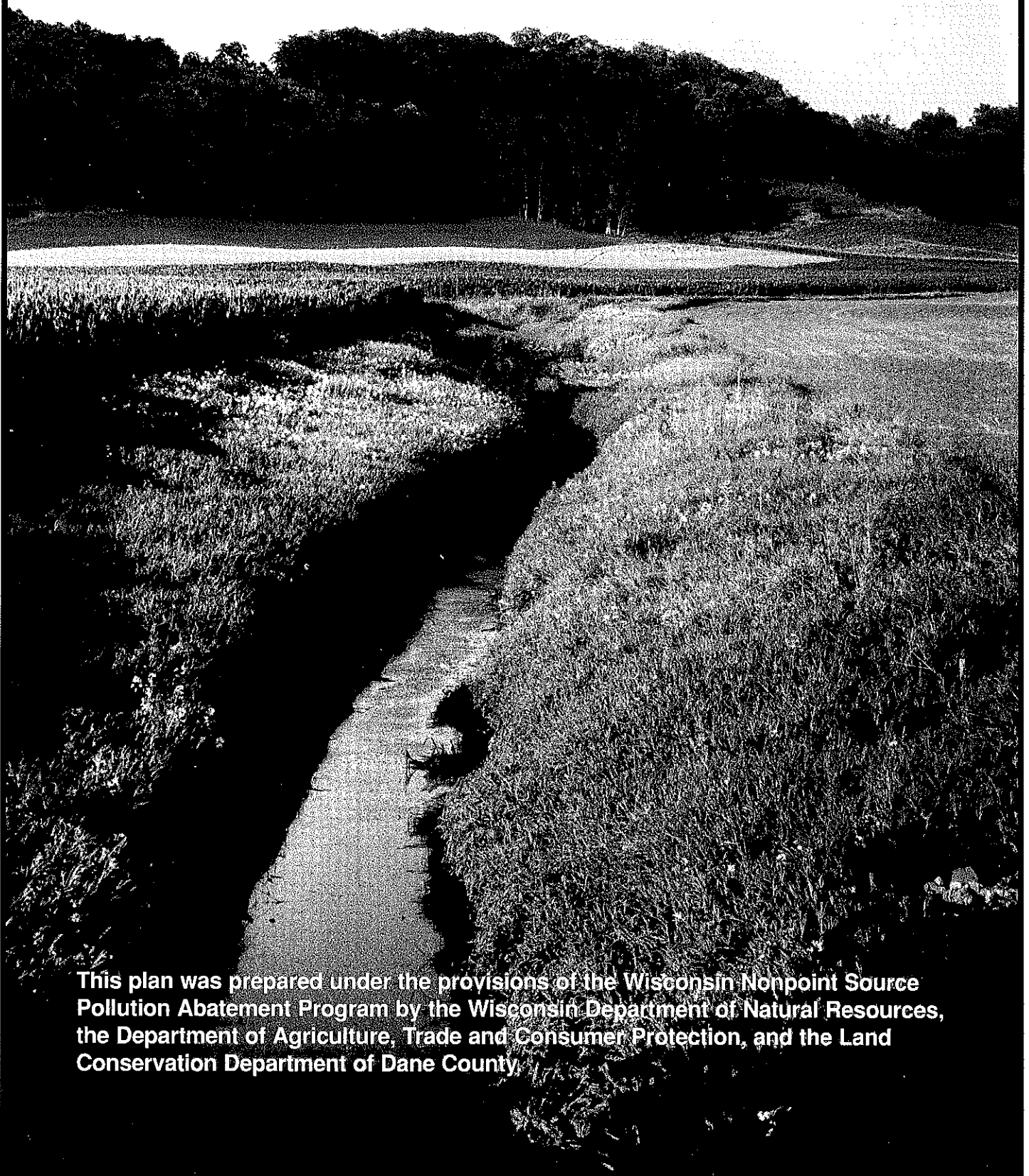


Nonpoint Source Control Plan for the Dunlap Creek Priority Watershed Project



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 Land Conservation Department of Dane County.

Watershed Plan Organization Information

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Nonpoint Source Control Plan for the Dunlap Creek Priority Watershed Project

The Wisconsin Nonpoint Source Water Pollution Abatement Program

January, 1994

This Plan Was Cooperatively Prepared By:

The Department of Natural Resources
The Department of Agriculture, Trade and Consumer Protection
The Dane County Land Conservation Department

Publication WR-334-94

For copies of this document please contact:

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The Department of Natural Resources acknowledges the Environmental Protection Agency's Region V Office for their involvement in the partial funding of this activity through Section 319 of the Water Quality Act.

Watershed Plan Credits

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Acknowledgements

In addition to the people listed on the inside of this front cover of this plan, the author and principal contributors would like to acknowledge the contributions of the following people:

Keith Foye, DATCP

Jim Baumann, DNR Nonpoint Source & Land Management Section

Red Larson, Soil Conservation Service

Ken Baun, DNR Nonpoint Source & Land Management Section

Joe Marter, Soil Conservation Service, Area Engineer

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Glenn Kinderman, Soil Conservation Service, District Conservationist

Dave Marshall, DNR, Madison Area, Biologist

Mike Sorge, DNR, Southern District

Doris Rusch, Wildlife Manager, DNR Southern District

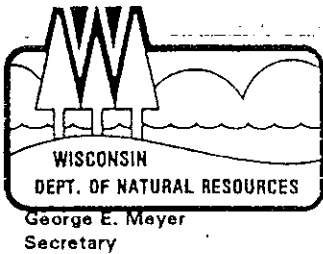
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Dunlap Creek Advisory Committee



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

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Box 7921
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June 28, 1993

Richard Phelps, County Executive
Dane County City-County Building
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

Dear Mr. Phelps:

I am pleased to approve the Dunlap Creek Priority Watershed Plan prepared through the Wisconsin Nonpoint Source Water Pollution Abatement Program. This plan meets the intent and conditions of s. 144.25, Wisconsin Statutes, and Chapter NR 120, Wisconsin Administrative Code. This plan has also been approved by the Department of Agriculture, Trade and Consumer Protection. I am also approving this plan as an amendment to the Lower Wisconsin Areawide Water Quality Management Plan.

I would like to express the Department's appreciation to the Dane County staff that participated in preparing this plan, particularly Kevin Connors and Susan Sklenar. We look forward to assisting Dane County in the implementation of the Dunlap Creek Priority Watershed Plan.

Sincerely,

A handwritten signature in cursive script that reads 'George'.

George E. Meyer
Secretary

cc: Mike Blaska, County Board Chair, City-County Building
Richard Skindrud, LCC Chair, City-County Building
Karen Van Vlack, Lakes and Watershed Coordinator, City-County Building
Kevin Connors - Dane Co. LCD, 57 Fairgrounds Drive
Andy Morton - SD
Keith Foye - DATCP
Becky Wallace - WR/2
Cindy Hoffland - CA/8
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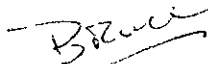
State of Wisconsin
Department of Agriculture, Trade and Consumer Protection

Alan T. Tracy, Secretary

801 West Badger Road • PO Box 8911
Madison, WI 53708-8911

June 21, 1993

Mr. Bruce Baker, Director
Bureau of Water Resources Management
Wisconsin Department of Natural Resources
Box 7921
Madison, WI 53707



Dear Mr. Baker:

The Department of Agriculture, Trade and Consumer Protection has reviewed and hereby approves the "Nonpoint Source Control Plan For The Dunlap Creek Priority Watershed Project".

We look forward to assisting DNR and the Dane County Land Conservation Committee in implementing the project.

Please contact Sue Porter (273-6205) if we can be of any further assistance in moving the project to implementation.

Sincerely,



Dave Jelinski, Director
Land and Water Resources Bureau
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
(608) 273-6411

cc: Becky Wallace
Kevin Connors, Dane County Land Conservation Dept.

ADOPTION OF THE DUNLAP CREEK WATERSHED PLAN

The Dane County Board of Supervisors by Res. 222, 1990-91 accepted designation of the Dunlap Creek Watershed as a Wisconsin Nonpoint Source Water Pollution Abatement Project. The Watershed plan is now adopted for review and approval by the Dane County Board, Wisconsin Department of Natural Resources, and Wisconsin Department of Agriculture, Trade, & Consumer Protection. Cost-sharing and technical assistance funds for the Wisconsin Fund Project are available for reimbursement for implementation of Best Management Practices as identified in the watershed plan. Cost-share funds will be allocated by form cost-share agreements with individual landowners. Since there will be many of these cost-share agreements, it will greatly simplify matters if the requirements of Dane County Code of Ordinance 25.06 is waived and these agreements can be approved by the Land Conservation Committee without further action by other county committees or the County Board.

NOW, THEREFORE, BE IT RESOLVED that the Dane County Board of Supervisors approve the watershed plan; that cost-share agreements with individual landowners be authorized directly by the Land Conservation Committee.

Adopted by the Dane County Board of Supervisors
June 17, 1993

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SUMMARY

Introduction

The Dunlap Creek Priority Watershed Project plan assesses the nonpoint sources of pollution in the Dunlap Creek Watershed and guides the implementation of nonpoint source control measures. These control measures are needed to meet specific water resource objectives for Dunlap Creek. The primary objective of the project is to reduce nonpoint source pollution to the creek, and to enhance and protect the water quality of streams in the Dunlap Creek Watershed.

Nonpoint sources of pollution most commonly found in this watershed include: polluted runoff and sediment from gullies, cropland and streambanks, and polluted runoff from barnyards. The purpose of this project is to reduce the amount of pollutants originating from nonpoint sources that reach surface water and groundwater within the Dunlap Creek Priority Watershed Project area.

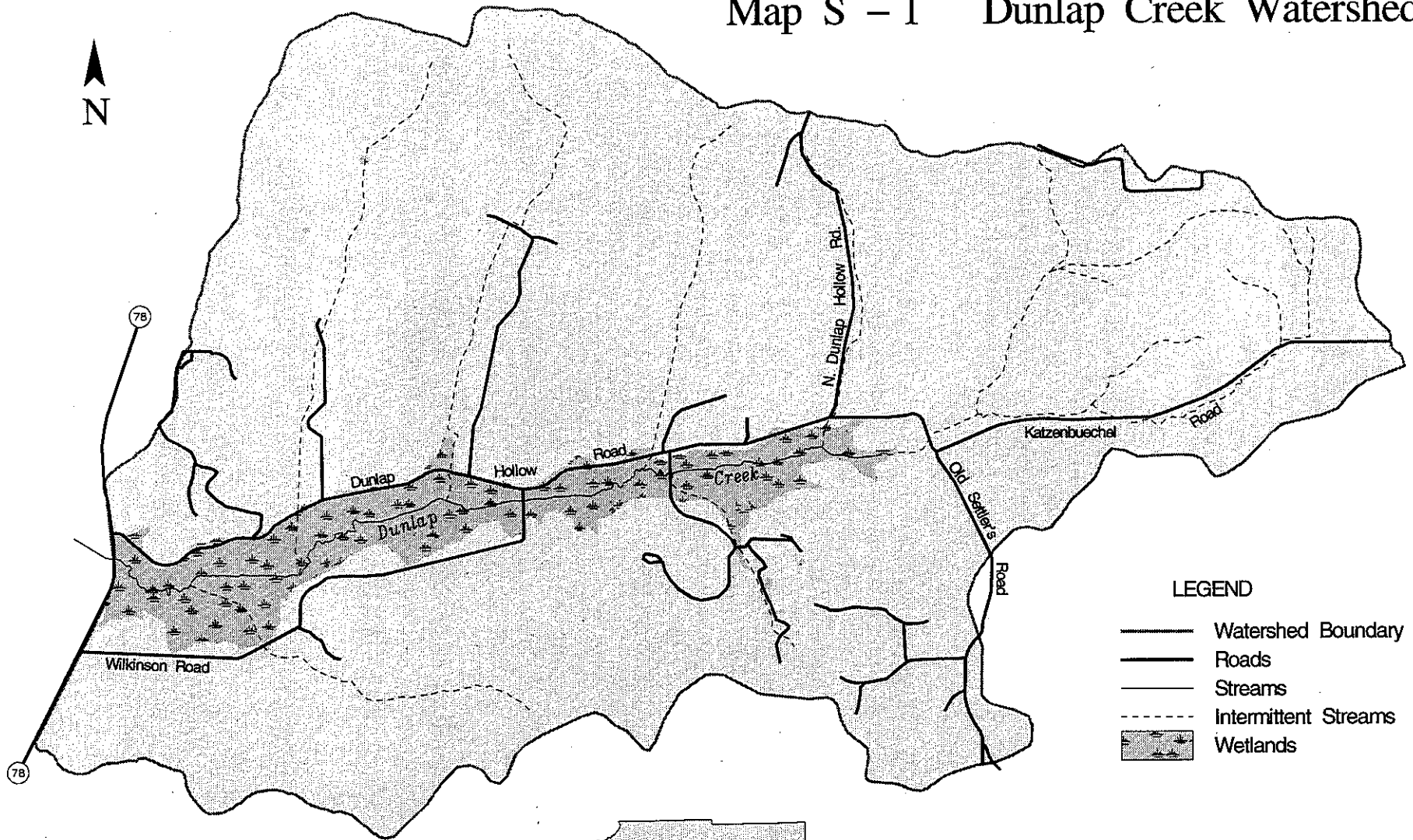
This plan was prepared by the Department of Natural Resources (DNR), the Department of Agriculture, Trade and Consumer Protection (DATCP), and the Dane County Land Conservation Department (LCD). The DNR selected the Dunlap Creek Watershed as a priority watershed project through the Wisconsin Nonpoint Source Water Pollution Abatement Program in 1990. It joined approximately 50 similar watershed projects statewide in which nonpoint source control measures are being planned and implemented. The State Legislature created the Nonpoint Source Water Pollution Abatement Program in 1978. The program provides financial and technical assistance to landowners and local governments to reduce nonpoint source pollution.

The project is administered at the state level by the DNR and DATCP. The Dane County LCD will administer the project locally with assistance from the University of Wisconsin-Extension and the Soil Conservation Service (U.S. Department of Agriculture).






General Watershed Characteristics

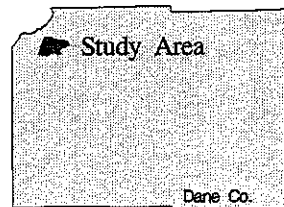
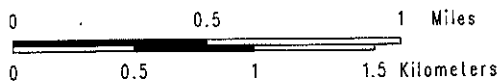
The Dunlap Creek Watershed drains seven square miles of land in Dane County in southern Wisconsin. The watershed is part of the lower Wisconsin Sub-Basin. The Dunlap Creek Watershed drains to the Wisconsin River. See map S-1.

Map S - 1 Dunlap Creek Watershed



LEGEND

-  Watershed Boundary
-  Roads
-  Streams
-  Intermittent Streams
-  Wetlands



Land use in the watershed, as shown in Table S-1, is mainly agricultural, and is currently dominated by livestock operations. The watershed population is small with approximately 75 landowners. Most of the watershed population lives on farmsteads or rural residential property, and there are no incorporated areas in the watershed.

Table S-1. Land Use in the Dunlap Creek Watershed

Land Use	Percent of Watershed
Agricultural	
pasture	19
cropland	45
Grassland	11
Woodlots	22
Developed/Residential	3

Source: DNR, Dane County LCD

Water Quality

Dunlap Creek supports a cold water sport fishery. Portions of the creek are Class II for trout waters. The streams of the watershed are not reaching their highest potential use due to pollution from point and nonpoint sources. Eroding croplands and streambanks and improperly managed livestock operations are the major source of nonpoint pollution in the watershed.

An inventory of groundwater quality was done in conjunction with the animal lot inventories. Results show that 19.6 percent of collected well samples had nitrate levels over the enforcement standard (health advisory level) of 10 milligrams per liter (mg/l), and 37.2 percent had nitrate levels between 2 mg/l, the preventative action limit, and 10 mg/l.

Well sampling for triazine showed that none of the samples collected had triazine levels over 3.0 mg/l, which is the enforcement standard for triazine. Triazine is a man-made compound that, when present in groundwater, indicates groundwater contamination. Ten of the samples (19.6%) had triazine levels between 0.3 and 3.0 mg/l. The preventative action limit for triazine is 0.3 mg/l.

Sources of Water Pollution

The Dane County LCD collected data on all agricultural lands, barnyards, manure storage sites, and streambanks in the watershed. These data were used to estimate the pollutant potentials of these nonpoint sources. The amount of phosphorus carried in runoff from each barnyard to a receiving stream was calculated. The amount of sediment reaching streams from eroding agricultural lands and streambanks was also determined. In the Dunlap Creek Watershed, about 36 percent of the sediment annually deposited in streams comes from agricultural upland erosion. Seventeen percent of the sediment reaching streams originates from streambank erosion. Approximately 47 percent of the total sediment originates from gully erosion.

The results of the investigations of nonpoint sources are summarized below:

Barnyard Runoff Inventory Results:

- Seven barnyards were assessed.
- These barnyards were found to contribute 738 pounds of phosphorus to surface waters, annually.

Streambank Erosion Inventory Results:

- Five stream miles (26,400 feet) were inventoried
- 181 tons of sediment reach streams from eroding sites (17 percent of total sediment)
- There are .6 miles (3,420 feet) of eroding sites (13 percent of streambanks inventoried).

Upland Sediment Inventory Results:

- 5701 acres were inventoried.
- 373 tons of sediment are delivered to streams (36 percent of total sediment).
- 81 percent of upland sediment is delivered from cropland.
- 1 percent of upland sediment is delivered from grazed woodlots and woodlots.
- 10 percent of upland sediment is delivered from pastures.

Gully Inventory Results:

- Most of the gullies were inventoried.
- About 6 gullies are large (over 5 feet deep)
- About 200 gullies are small (under 5 feet deep)
- 486 tons of sediment are delivered to streams, 47 percent of total sediment.

Wetland Inventory Results:

- There are no prior converted wetlands.
- There are several acres of wetland adjacent to the stream, but most are undisturbed.

Pollutant Reduction Levels

To improve water quality in the Dunlap Creek, this plan calls for:

- A 30 percent reduction in the sediment reaching streams from agricultural uplands.
- A 42 percent reduction in streambank sediment delivered to the creek and a 94 percent overall repair of streambank habitat.
- A 36 percent reduction in organic pollutants from barnyards.
- A 60 percent reduction in gully sediment delivered to the creek.

Management Actions

Management actions are described in terms of best management practices (BMPs) that are needed to control nonpoint sources to the pollutant levels described above. Cost-share funds for installing pollutant control measures will be targeted at operations contributing the most pollutants. Cost-share funds will be available through the Wisconsin Nonpoint Source Water Pollution Abatement Program for certain BMPs. As shown in Table S-2, cost-share rates range from 50 to 70 percent.

The Dane County LCD will contact all landowners who are eligible to receive cost-share funds during the project's implementation. All Category I sources of nonpoint pollutants must be controlled if a landowner wishes to participate in any aspect of the program. Category I represents the level of pollution control needed to achieve water quality goals in the watershed. Nonpoint sources in Category II contribute less of the pollutant load than those in Category I. They are included in cost sharing eligibility to further insure that water quality goals are met. Controlling sources in this category is not mandatory for a landowner to be funded for controlling other sources.

The Dane County LCD will assist landowners in applying BMPs. Practices range from alterations in farm management (such as changes in manure-spreading and crop rotations) to engineered structures (such as diversions and sediment basins) and are tailored to specific landowner situations. Participation in the program is voluntary.

The following is a brief description of critical nonpoint pollutant sources, project eligibility criteria, and BMP design targets for the project. The BMPs identified by the Dane County LCD emphasize both improving farm management and controlling pollutants. Table S-2 shows the eligible practices and cost-share rates.

Table S-2. Best Management Practices Eligible for Cost Sharing Through the Dunlap Creek Priority Watershed Project

Best Management Practices	State Cost-Share Rate
Contour Farming	50% (flat rate: \$6/acre)
Strip Cropping	50% (flat rate: \$10/acre)
Field Diversions and Terraces	70%
Grassed Waterways	70%
Reduced Tillage (No Till)	\$20/acre
Critical Area Stabilization	70% ^{1,2}
Grade Stabilization Structures	70% ²
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization	70% ²
Shoreline Buffers	70% ^{1,2}
Barnyard Runoff Management	70%
Animal Lot Relocation	70% ²
Manure Storage Facilities	70% ³
Livestock Exclusion From Woodlots	50%
Wetland Restoration*	70%
Nutrient and Pesticide Management	50%

1. Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See "Management Actions" in this summary for areas where easements may apply.
2. Maximum cost-share amount is \$20,000 including no more than \$15,000 for manure transfer equipment.
3. With a matching local share, the state share cost sharing level may be increased up to 80 percent.

Agricultural Lands

All agricultural lands contributing sediment to streams at a rate greater than "T" will be classified as Category I for cost sharing and must be brought down to a rate of "T" or lower. This involves an estimated 461 critical acres of cropland, and 29 percent of the upland sediment in the watershed. Category II will include all lands contributing sediment to streams at a rate greater than "T" and over 0.2 tons per acre per year. This involves 42 percent of the upland sediment in the watershed.

Animal Lots

The manure from barnyards carried in runoff needs to be controlled at about six of the seven livestock operations. All barnyards contributing more than 150 pounds of phosphorus will be classified as Category II for cost sharing and need to be reduced to 50 pounds annually or less. Those barnyards contributing between 80 and 150 pounds of phosphorus will be classified as Category IIa, eligible only for less expensive BMPs such as clean water diversions.

There are no Category I for barnyards in this watershed because sediment overwhelmingly limits water quality more than nutrients. Rather than risk losing sediment control because a landowner was unwilling to control nutrients, barnyard runoff control is optional. This is reasonable since gullies are such a large sediment problem, and because there are only seven barnyards in the entire watershed.

Manure Spreading

Participants in the Dunlap Creek project installing any barnyard system are required to implement and adhere to a Soil Conservation Service (SCS) "590 Nutrient Management" plan. The Dane County LCD will assist farm operators in preparing a management plan for proper manure spreading. A manure management plan identifies the proper spreading periods, application rates, and acceptable fields for manure spreading. Some manure management plans may identify the need for manure storage facilities to prevent winter manure spreading on unsuitable lands.

Streambanks

Project participants identified with sites having a lateral recession of at least 0.1 ton per linear foot per year will be Category I. Sites with less than 0.1 ton per linear foot per year recession, but more than 15 tons per landowner per year, will be Category II. Overall, approximately 76 tons of sediment from streambanks are eligible for control in the Dunlap Creek Watershed.

There will be an emphasis on controlling bank erosion and improving fish and wildlife habitat to enhance water quality and recreational opportunities.

Gullies

Project participants meeting all of the following site conditions will be Category I: 1) gully depths of at least 3 vertical feet, 2) bare soils and evidence of active erosion, 3) direct connection with streams via channelized flow during runoff events, and 4) reasonable access to necessary machinery will be Category I. Controlling these sites will control at least 60 percent (292 tons) of the sediment eroding from gullies. Category II participants are sites with less than 3 vertical feet and items 2, 3 and 4 listed in Category I.

Funds Needed for Cost Sharing, Staffing, and Educational Activities

The DNR will award grants to Dane County for cost sharing, staff support and educational activities. Table S-3 includes estimates of the financial assistance needed to implement needed nonpoint source controls in the Dunlap Creek Watershed, assuming a 75 percent participation rate of eligible landowners.

Table S-3. Cost Estimates for the Dunlap Creek Priority Watershed Project¹

Eligible Activity	Total Cost	State Share
Cost Sharing	\$730,035	\$519,514
Easements	168,750	168,750
Dane County Staffing	184,415	184,415
Educational Activities	2,500	2,500
Totals	1,067,700	\$899,079 ²

1. Estimates based on 75% participation.
2. Engineering assistance and other direct costs contribute an additional \$23,900

Project Implementation

Project implementation is scheduled to begin in 1993. The first three years of implementation is the period for participants to sign cost-share agreements. There is a five-year period for practice installation. While an eligible landowner or operator has three years to determine whether to participate in the program, installation of BMPs can usually begin as soon as a landowner signs a cost-share agreement with the Dane County LCD.

Information and Education

An information and education program will be conducted throughout the project period with the Dane County LCD having overall responsibility for the program. University of Wisconsin-Extension staff in the county will provide assistance. This program will be most intensive during the first three years of the project as landowners and local governments sign up for state cost sharing for pollution control. The program includes:

- A campaign to inform the residents about nonpoint source pollution and activities the residents can do to reduce this type of pollution.
- More intense educational activities, such as meetings, workshops, tours, and demonstration projects for landowners and local government officials who may adopt new pollution control techniques.
- Water quality newsletters that will inform farmers, local government officials, community groups, and concerned citizens about watershed activities, implementation processes, and pollution control methods.
- Educational activities and service projects to inform residents about water resource issues.

Further Information

If you want more information about the Dunlap Creek Priority Watershed Project, or a copy of the watershed plan, contact one of the following:

Andy Morton, Coordinator
DNR
Southern District Headquarters
Madison, WI
(608)275-3311

OR

Patrick Sutter
Dane County LCD
(608)266-4270

Project Evaluation and Monitoring

The evaluation strategy for the project involves collecting, analyzing, and reporting information to track progress in three areas:

1. **Administrative:** This category includes the progress in providing technical and financial assistance to eligible landowners, and carrying out education activities

identified in the plan. The Dane County LCD will track the progress in this area and report to the DNR and DATCP quarterly.

2. **Pollutant Reduction Levels:** The Dane County LCD will calculate the reductions in nonpoint source pollutant loadings resulting from changes in land use practices and report to the DNR and DATCP at an annual review meeting.
3. **Water Resources:** The DNR will monitor changes in water quality, habitat, and water resource characteristics during the project and at the end of the project period.

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 in 1978. The goal of the program is to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing pollutants from urban and rural nonpoint sources. The seven square-mile Dunlap Creek Watershed, located in Dane County, was designated a "priority watershed" in 1990.

Nonpoint sources of pollution include: gullies, eroding agricultural lands, streambanks, roadsides, existing and developing urban areas, 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 seepage.

The following is an overview of this program:

- The DNR and DATCP administer the program. It focuses on critical hydrologic units called priority watersheds. The program is implemented through priority watershed projects.
- A priority watershed project is guided by a plan prepared cooperatively by the DNR, DATCP and local units of government, with input from a local citizen's advisory committee. Project staff evaluate the conditions of surface water and groundwater, and inventory the types of land use and nonpoint sources of pollution throughout the watershed. The priority watershed plan assesses nonpoint and other sources of water pollution and identifies best management practices needed to control pollutants to meet specific water resource objectives. The plan guides implementation of these practices in an effort to improve water quality.
- Upon approval by state and local authorities, the plan is implemented by local units of government. Water quality improvement is achieved through voluntary implementation of nonpoint source controls (best management practices) and the adoption of ordinances. Landowners, land renters, counties, cities, villages, towns, sanitary districts, lake districts, and regional planning commissions are eligible to participate.

- Technical assistance is provided to aid in the design of best management practices. State level cost-share assistance is available to help offset the cost of installing these practices. Eligible landowners and local units of government are contacted by the County Land Conservation Departments to determine their interest in voluntarily installing the best management practices identified in the plan. Cost-share agreements are signed listing the practices, costs, cost-share amounts and a schedule for installing management practices.
- Information and education activities are developed 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 in the watershed.

Legal Status of the Nonpoint source Control Plan

The Dunlap Creek 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 DNR, DATCP, the Dane County Land Conservation Department, local units of government and the Dunlap Creek 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 discusses: the watershed assessment, a detailed program for implementation, and project evaluation. The contents of these areas are described below:

The Watershed Assessment

Chapter 2, "General Watershed Characteristics," is an overview of the cultural and natural resource features pertinent to planning and implementation efforts for the priority watershed project.

Chapter 3, "Water Quality Conditions, Objectives and Nonpoint Pollution Sources," presents field inventory results and identifies the water quality or water resource problems and improvements that can be obtained through implementation of a nonpoint source control project. This chapter discusses the level of pollutant control needed to achieve the water resource objectives, and describes the nonpoint sources and other sources of pollution.

Chapter 4, "Management Actions," identifies the level of rural nonpoint source pollution control needed to meet the water quality objectives. Eligibility criteria for funding to control nonpoint sources under the priority watershed project are also presented.

Detailed Program for Implementation

Chapter 5, "County Implementation Program," describes how local units of government administer the project, and estimates a local assistance and management practice cost-share budget.

Chapter 6, "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 7, "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 Dunlap Creek Watershed.

Project Evaluation

Chapter 8, "Progress Assessments," discusses the means for assessing the amount of nonpoint source control gained through installation of best management practices in the watershed.

Chapter 9, "Evaluation Monitoring," presents a strategy and schedule for monitoring to determine the water quality impacts of implementing nonpoint source controls in the Dunlap Creek Watershed.

CHAPTER TWO

General Watershed Characteristics

Location

The Dunlap Creek Priority Watershed is located in south central Wisconsin in north western Dane County (map 2-1). The watershed project includes only the 7.5 square miles draining to Dunlap Creek east of state highway 78. The watershed is bounded to the south by the Black Earth creek watershed.

Public Water Sources

Groundwater is the source of all potable water in the watershed. The entire population relies upon individual, privately-owned water systems. There are no municipal wastewater treatment facilities in the Dunlap Creek Watershed. Residents treat their waste with private septic systems.

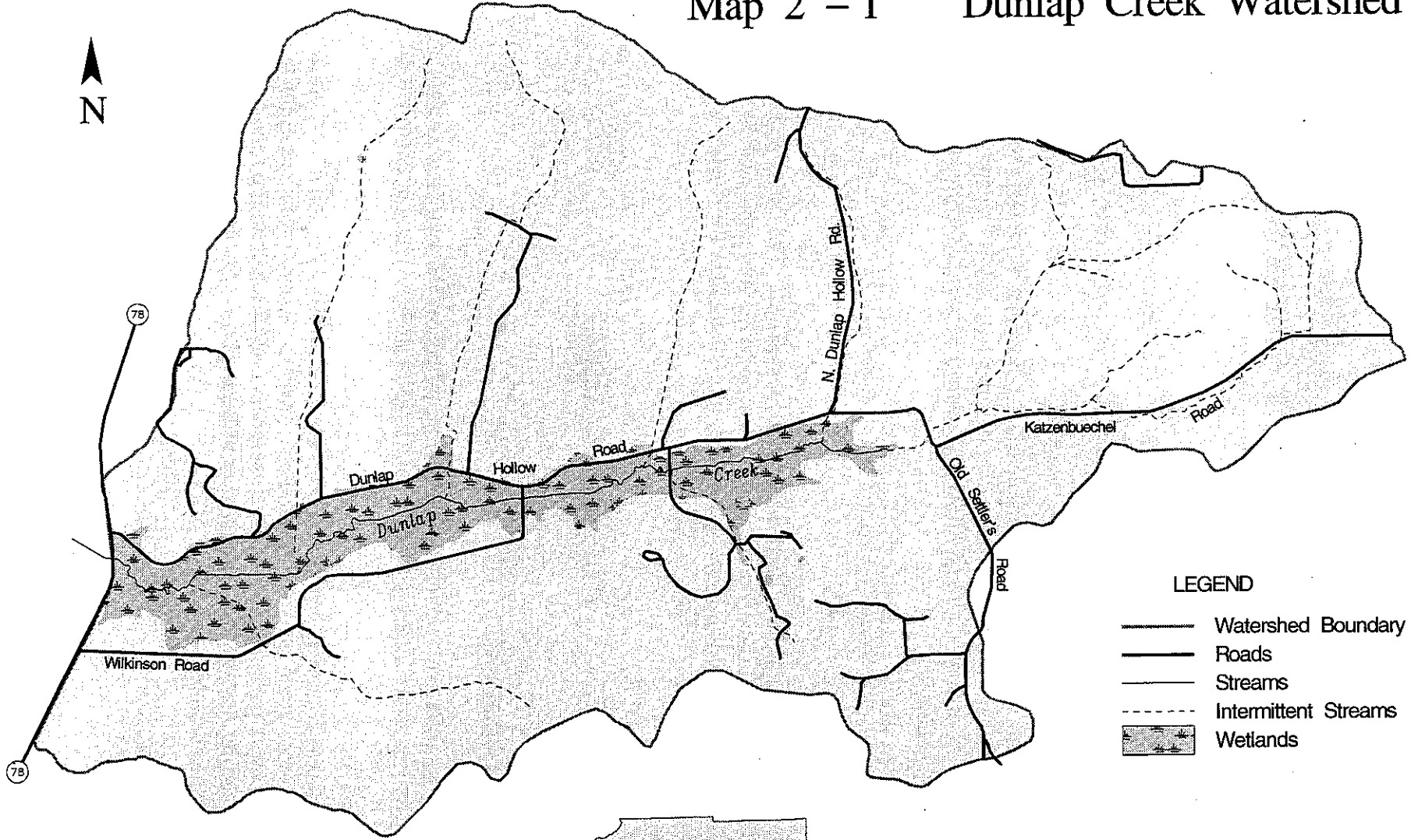
Physical Setting

Climate and Precipitation





The frequency, duration and amount of precipitation influences the quality of surface and groundwater, soil moisture content, runoff characteristics and the physical condition of waterways.

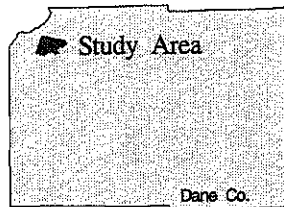
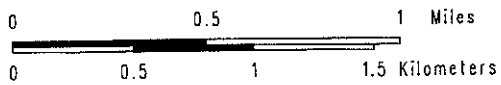
The Dunlap Priority Watershed lies in the temperate continental zone which is characterized by cold, snowy winters and hot, humid summers. Average annual precipitation for the watershed is about 31 inches. Most of this precipitation (55%) falls in the form of thunderstorms during the growing season (May to September). About 37 inches of snow falls during a typical winter.

Map 2 - 1 Dunlap Creek Watershed



LEGEND

-  Watershed Boundary
-  Roads
-  Streams
-  Intermittent Streams
-  Wetlands



Topography, Soils & Geology

The Dunlap Creek watershed is located primarily in the driftless area, a portion of the state that was not covered by glaciers during the latest ice age. The watershed is well dissected sandstone bedrock plateau characterized by narrow ridge tops and high, steep valley side slopes. Slope and stream deposits consisting of sands and gravel have been deposited along Dunlap Creek. West of the watershed is the broad, marsh-covered Wisconsin River Basin into which Dunlap Creek eventually drains. The eastern edge of the watershed is defined by the Johnstown end moraine, a topographic high created when the most recent glacier stopped advancing, depositing a thick ridge of unsorted sediments. Underlying the Johnstown moraine is Ordovician age Prairie du Chien dolomite. The dolomite has been eroded west of the moraine where the underlying Cambrian sandstone is exposed.

Silts consist of the Dodge, St. Charles, McHenry deep silt loams in the eastern part of the watershed and the Elkmound, Stony and Rocky land, Dunbarton shallow sandy loams and sandy glacial till which make up the Johnstown moraine. Elkmound, Stony and Rocky land, Dunbarton soils are shallow, well and excessively drained sandy and silty loams derived from sandstone and limestone bedrock.

The soils in this watershed have moderate to very severe limitations for farming, generally becoming more severe as you move from east to west. Erosion, soil tilth and fertility are the main concerns in management.

Surface Water Resources

Streams

There are spring-fed perennial and several intermittent streams within the watershed. Dunlap Creek maintains continuous flow throughout the year. A portion of Dunlap Creek is classified as Class II trout waters with all species of trout and large mouth bass the dominant species. These fisheries are not reaching their fullest potential because of sedimentation entering the streams. Eroding gullies, eroding field roads and improperly managed livestock operations cause the pollution. Intermittent streams flow only when there is runoff. Their small size makes them particularly susceptible to nonpoint source pollution. Their dynamic nature does allow rapid improvement, however, if pollution sources are reduced.

The base flow of the perennial streams is dominated by spring discharge, yet during rain events or spring runoff, enormous increases in flow occur. As the stream system receives sediment loads from uplands, downstream segments have generally lost the riffle-pool sequence and will become shallower, wider and warmer and more likely to overflow their banks if sediment sources aren't restricted.

Lakes

Lakes are not present in the landscape. There are only a few private ponds are in the Dunlap Creek Watershed.

Wetlands

Wetlands are valuable natural resource features. Their values include wildlife habitat, fish spawning and rearing, recreation, attenuation of runoff and flood flows and the removal of pollutants.

The wetland in the watershed has been used as pasture in the past. The watershed program will try to protect the existing wetland, and will assist landowners who wish to restore wetland areas.

Groundwater Resources

Regional Aquifers

Groundwater is the main source of drinking water in the Dunlap Creek Priority Watershed. It is stored 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 the pore spaces and cracks are filled or saturated with groundwater. A well is 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. Information from geologic logs, driller construction reports and Wisconsin Geological and Natural History Survey (WGNHS) reports for Dane County are summarized below. The principle aquifer within the watershed is the Cambrian Sandstone aquifer. Wells range in depth from 71 to 400 feet deep.

Direction of Groundwater Flow

The regional groundwater flow is northwest toward the Wisconsin River. Locally, groundwater flow paths are likely relatively short and flow toward the nearest tributary of Dunlap Creek. Figure 2-1 is a generalized cross-section of the watershed showing regional flow within the watershed.

Generalized Cross Section of the Dunlap Creek Watershed

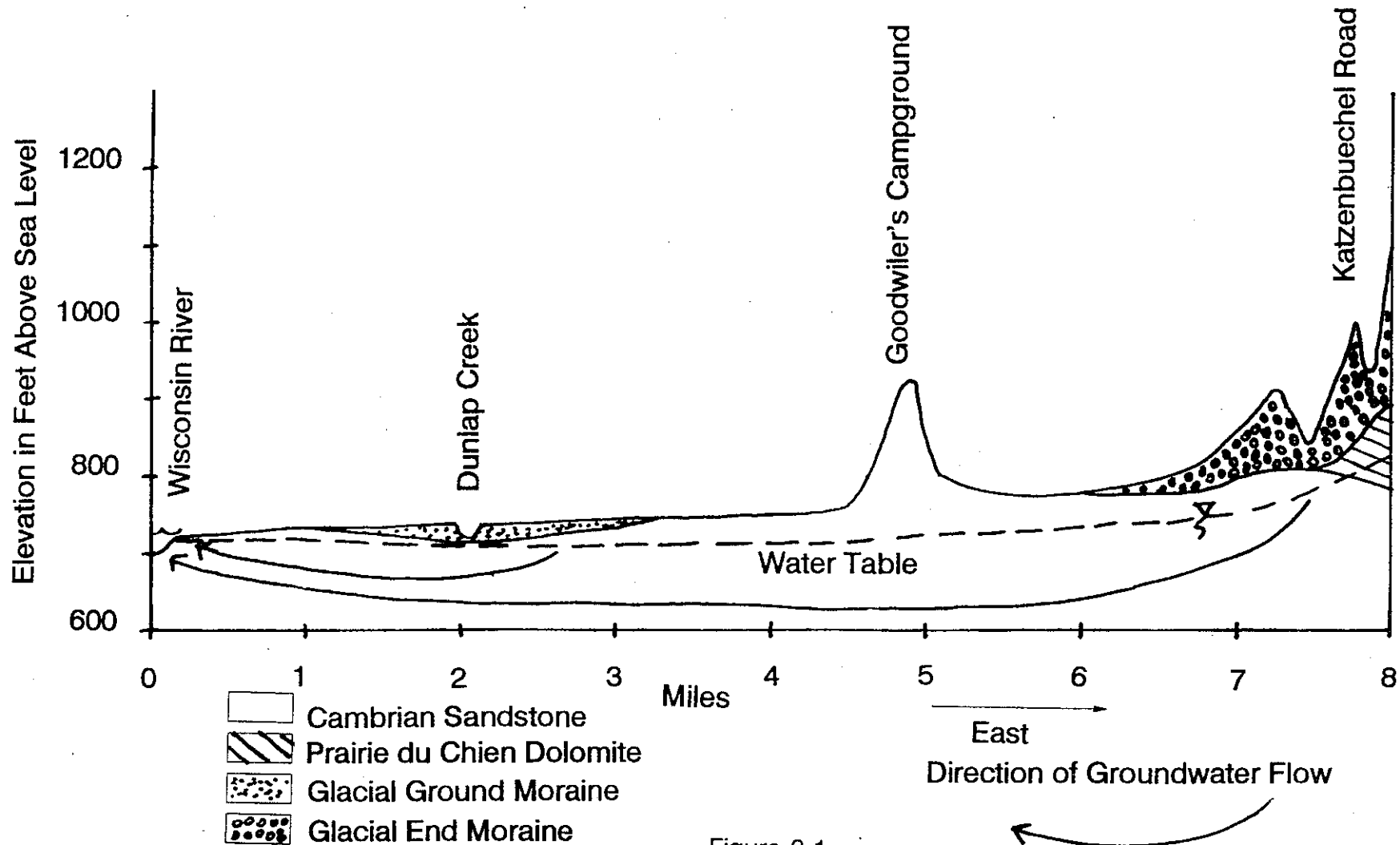


Figure 2-1

Groundwater Quality

Groundwater in the Dunlap Creek Watershed is generally considered good. As part of the Dunlap Creek Watershed Quality Appraisal, 51 private well samples were collected and analyzed for nitrate+nitrite and atrazine. Atrazine was the most widely used herbicide in Wisconsin and is a possible human carcinogen. Nitrate contaminated groundwater is the cause of methemoglobinemia or blue baby syndrome in infants and can cause abortions in cattle at levels as low as 20 parts per million. Sources of nitrate to groundwater can include manure, fertilizer (farm and lawn) septic systems and stormwater runoff from streets. Samples analyzed for nitrate+nitrite showed concentrations ranging from not detected to 47.7 parts per million. One part per million is comparable to one drop in a 10 gallon fish tank. The groundwater quality enforcement standard (ES) for nitrate is 10 ppm defined in chapter NR 140, Wis. Adm. Code.

The State of Wisconsin has two groundwater quality standards which are based on the potential health effects of selected contaminants. The higher standard, called the enforcement standard (ES), defines a violation of Chapter NR 140 Wis. Adm. Code. When an ES is attained or exceeded, a regulatory agency must prohibit the continuation of the activity that produced the substance, unless it is demonstrated to the agency that an alternative response action will achieve compliance with the ES. Nonpoint sources of nitrate and other nutrient contamination are generally not regulated by state agencies. DATCP regulates nonpoint sources of pesticide contamination due to misuse and poor handling practices.

The second standard, called the preventative action limit (PAL), is a lower level standard which is a "warning" for regulator agencies. Exceeding the PAL creates the possibility that some regulatory response may be necessary. The PAL is either 10%, 20% or 50% of the ES based on health related characteristics of the hazardous substance. Nitrate+nitrite concentrations above 2 ppm exceed the states preventative action limit (PAL). Ten (19.6%) sample analytical results exceeded the ES and nineteen (37.2%) exceeded the PAL. Results so far do not indicate a pattern of groundwater contamination that can be linked to specific sources of nitrate.

Concentrations of atrazine in the Dunlap Creek Watershed ranged from not detected to 0.5 parts per billion (ppb). One part per billion is comparable to one drop in 10,000 gallons (a small swimming pool). The groundwater ES for atrazine plus metabolites is 3.0 ppb. The PAL is 0.3 ppb as defined by chapter NR 140, Wis. Adm. Code. No well samples had atrazine concentrations greater than the groundwater ES. Ten well samples had atrazine concentrations which exceed the atrazine PAL. As with the nitrate contamination, no specific sources are indicated by the results.

Endangered Resources

Information on endangered resources was obtained from the Bureau of Endangered Resources (BER) of the DNR. Endangered resources include rare species and natural communities.

This section of the plan provides an awareness of the specific species to protect when installing best management practices.

Please note that comprehensive endangered resource surveys were not completed for the entire Dunlap Creek Priority Watershed. The lack of additional occurrence records does not preclude the possibility that other endangered resources are present in the watershed.

Also, BER'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 are not in the lists below. Updates or revisions of this watershed plan should be reviewed by the BER to include new records.

Rare Species

Wisconsin's Natural Heritage Inventory of the Bureau of Endangered Resources track rare species. Species tracked by the Inventory include those 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 DNR to be in jeopardy on the basis of scientific evidence. Wisconsin endangered species within the watershed are:

Agalanis Skinneriana (pale false foxglove)
Ophisaurus attenuatus (western slender glass lizard)
Polygala incarnata (pink milkwort)
Terrapene ornata (ornate box turtle)

Wisconsin Threatened Species

Any species which appears likely to become endangered within the foreseeable future, on the basis of scientific evidence. Wisconsin threatened species within the watershed are:

Asclepias lanuginosa (wooly milkweed)
Cacalia tuberosa (prairie indian plantain)
Cirsium hillii (prairie thistle)
Cypripedium candidum (white lady's-slipper)
Platanthera flava var herviola (tubercled orchid)
Polytaenia nuttallii (prairie parsley)
Vireo bellii (bell's vireo)

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. Wisconsin special concern species in this watershed are:

Aphredoderus sayanus (pirate perch)
Myosotis laxa (small forget-me-not)
Napaea dioica (glade mallow)
Nothocalais cuspidata (prairie dandelion)
Polygala cruciata (cross milkwort)
Scleria triglomerata (tall nut-rush)
Solidago sciaphila (cliff goldenrod)

Natural Areas

Natural areas are sites that contain high quality examples of natural communities. State Natural Areas (SNA's) are officially designated by the DNR Natural Areas Program as deserving protection. The DNR, other state and local agencies, or conservation organizations own these areas, and are managed to protect the natural resources.

The following State Natural Areas and natural areas were identified in the Dunlap Creek Priority Watershed. The natural communities found at each area are also listed.

State Natural Areas:

(There are no State Natural Areas in this watershed.)

Natural Areas:

Dunlap Hollow Fen (calcareous fen, southern sedge meadow, and hard springs and spring runs)

If specific locations or other information is needed about these species or natural communities, contact the Bureau of Endangered 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.

This plan comments on some of the endangered resources that may be present in the watershed. It is anticipated that the management practices will not have an adverse effect on any species listed in this plan. The pirate perch, a State Special Concern fish, occurs in Dunlap Creek. Spawning occurs during May. Therefore, we suggest that any riparian best management practices, such as riprap projects, be conducted in summer, fall, or winter months.

CHAPTER THREE

Water Quality Conditions, Water Resource Objectives, and Nonpoint Sources

Introduction

The first part of this chapter presents a general description of how nonpoint source pollutants impact water quality. The remainder of the chapter discusses: 1) establishing water resource objectives, 2) the results of the nonpoint source inventories, 3) individual subwatersheds: general characteristics, condition of water resources, nonpoint pollutant sources and water resource objectives, 4) the amount of pollutant control necessary to achieve the desired water resource conditions, and 5) other potential pollutant sources.

General Watershed Description

The watershed is almost entirely rural with the land use consisting primarily of woodland, cropland and pasture. See Table 3-1 for a summary of upland sediment loading by land use. There are approximately 75 landowners in the watershed, several of whom commute to jobs in Madison or Sauk City. There are roughly 25 livestock operations. Woodlots account for more than half of the land use, and many are on steep slopes.

Historical land use probably caused present soil erosion problems. Originally the steep hills of the watershed are thought to have been wooded, with the valley being wetland. In the late 1800s Dunlap Creek was dredged, and the natural springs became a "creek." Today the banks are significantly higher, supporting tree growth, while another 20 feet from the creek much of the watershed is wetland. On the hillsides, the trees were cut, prairies grew, and livestock were pastured. Much of the topsoil eroded, pasturing ceased, trees grew again, and gullies in the steep woods became a problem.

Today portions of Dunlap Creek are classified as Class II trout waters, and were stocked recently. Sediment appears to be the factor most limiting to aquatic organisms. For more details, see Table 3-6 for a physical, chemical, and biological data summary of Dunlap Creek

Table 3-1. Dunlap Creek Summary of Upland Sediment Loading by Land Use

	Crop	%	Woods	%	Pasture	%	Grass	%	Residential	%	All
sediment load	626	81%	8	1%	74	10%	7	1%	54	7%	769
total acres	2,579	45%	1,26	22%	1,059	19%	642	11%	161	3%	5,701

Water Pollution Basics

Nonpoint sources are responsible for the degraded conditions of the streams in the Dunlap Creek watershed. Excessive amounts of sediment, nutrients, and bacteria degrade the water quality, causing an unbalanced fish community with depressed populations and limited diversity. In this watershed the two most serious pollutant sources are sediment and manure. Sediment affects oxygen content and contributes phosphorus. Sediment also limits habitat for insects and fish, and appears to be the most detrimental pollutant in the watershed for this reason. Manure contributes nitrogen and phosphorus.

Sediment

Sediment adversely impacts the surface water resources in many ways. It degrades habitat for aquatic insects which support fish and other forms of aquatic life. High sediment concentrations abrade fish gills making the fish more susceptible to disease. Suspended sediment also causes the water to be warmer in the summer, and warm water cannot hold as much oxygen as cold water. The major sources of sediment in this watershed are gully erosion, upland erosion from croplands, and streambank erosion. Heavy or long-term sediment deposits are a problem in this stream.

Sediment deposition in streams is often not a problem in watersheds with unglaciated topography like Dunlap Creek. Steep gradients and high velocities scour streams of sediment and therefore don't result in long-term habitat destruction caused by channelization or heavy sediment deposits. Streambank erosion is the most common form of habitat destruction. However, in this watershed there are extremely large gullies that contribute significant amounts of sediment to the streams. Table 3-1 is a summary of sediment delivered to surface water based on land use, however, the model on which it is based does not take into account gullies. Gullies are the major contributor of sediment in this watershed.

Manure

Manure contains several components that adversely affect water quality and aquatic life. Manure entering a stream breaks down, depleting the oxygen in the water which fish 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. The

nutrients in manure (including nitrogen and phosphorus) also promote nuisance algae and weed growth in 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 surface water runoff from barnyards and runoff from improperly field-spread manure.

Steep slopes and narrow valleys present special manure management problems. Some barnyards and manure spreading sites are located close to streams or on steep slopes.

Nitrates

Groundwater with nitrate levels greater than 10.0 mg/l exceed state groundwater standards. At this level it is recommended that infants 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 source of nitrates in the groundwater in this watershed is nitrogen fertilizers and manure applied to croplands. See groundwater resources discussion in Chapter 2. Septic systems also contribute nitrates to groundwater.

Establishing Water Resource Objectives

The DNR staff developed the water quality objectives with assistance from Dane County staff and DATCP. Details of objective development can be found in the *Dunlap Creek Water Resources Appraisal Report* (1992). For a summary, see Table 3-2.

The water resource objectives for Dunlap Creek are:

- reduce sediment runoff and deposition
- repair degraded gullies
- promote nutrient management
- improve the trout fishery
- improve the macro-invertebrate community
- improve streambank stability and habitat
- improve the overall water quality

Pollutant Reduction Goals

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

Overall Sediment: Reduce 45% of sediment delivered to streams.

- Upland Sediment Erosion: Reduce 30% of sediment delivered to streams.
- Streambank Erosion: Reduce 40% of sediment delivered to streams.
- Gully Erosion: Reduce 60% of sediment delivered to streams.

Phosphorus: Reduction goal of 36%.

- Barnyard Runoff: Reduce by 36%.
- Winter Spreading of Manure: No specific goal established.

Habitat Restoration: Restore 75% of bank habitat.

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 source of pollutants to the waters of the Dunlap Creek Watershed. Livestock operations comprised of only seven animal lots are a source of 738 average annual pounds of phosphorus (see Table 3-3). Most of the oxygen-demanding pollutants and nutrients associated with these operations drain via concentrated flow to creeks and wetlands.

Upland Sediment

Intensive agricultural practices have caused considerable amounts of eroded soil to reach streams, ponds, and wetlands in the Dunlap Creek Watershed. Upland erosion is a source of the sediments that are carried downstream.

Table 3-2. Dunlap Watershed Resource Recommendations

Resource	Objectives	Impairments	NPS Control	Monitoring
Dunlap Creek	Reduction of sediment runoff and deposition	Poor trout recruitment	High - Habitat improvement, gully repair	Utilize data loggers to continually monitor dissolved oxygen and temperature during representative mid-summer periods, every three years.
		Habitat degradation		
		Low benthic diversity		
		Turbidity		
	Repairing of degraded gullies	Habitat degradation	High - Gully repair	Monitor in-stream sediment. See Appendix B
		Turbidity		
	Promote nutrient management	Areas of high amounts of animal waste runoff	Medium - Animal waste control	Assess macroinvertebrate populations
	Improve trout fishery	High amounts of streambank degradation	Medium - Animal waste control Control livestock Medium access	Assess population and size structure of trout and forage fishery
Improve macroinvertebrate community	Increased sedimentation due to degraded gullies and overgrazing of pastures	High - Sedimentation reduction	Assess macroinvertebrate populations by the use of HBI/FBI every three years, at established stations.	
Improve streambank stability and habitat	Habitat degradation	High - Streambank stabilization	Habitat monitoring	
Improvement of overall water quality	Low benthic diversity	High - Sedimentation reduction	Habitat and sediment monitoring	

Table 3-3. Barnyard Inventory Results: Dunlap Creek Watershed

Watershed	Total Number of Barnyards	Total Phosphorus (lbs)
Dunlap Creek	7	738

Based on BARNY Model for annual rainfall
Sources: Dane County Land Conservation Department, DNR, and DATCP

Upland sediment sources were evaluated for the entire watershed (7.5 square miles). The results of this inventory are summarized in Table 3-4. An estimated 373 tons of soil erode annually from croplands, farmsteads, pastures, woodlots, grassland, and other "open areas." About 10% of this amount (37 tons/year) is delivered directly to wetlands or streams in the watershed. Uplands are the source of approximately 36% of the sediment delivered to surface waters.

Conservation Reserve Program (CRP)

The USDA-Conservation Reserve Program (CRP) is having a significant impact on reducing sediment loading to Dunlap Creek. In Dunlap Creek, 388 acres of cropland were taken out of production by CRP. While cropped, these acres eroded at an average rate of 14 tons/acre/year. This represents losing 5,432 tons of soil from cropland annually, although it was not modeled to see how much of this sediment actually reaches the stream.

Since CRP contracts may not provide long term sediment reduction, the reduction in sediment from CRP is not permanent. CRP contracts expire after ten years, with the last one will running out in 2002. It is not known how many of the acres in the watershed now protected by CRP will go back into production, and will contribute significantly to sediment loading. If this happens, additional best management practices will be required to reduce the sediment loading. One way to prevent post-CRP sediment loading would be to extend the time frame for signing nonpoint source cost-share agreements if CRP land is involved, or coordinate with other existing and/or new state and federal conservation programs.

Sediment From Gullies

Gullies contribute far more sediment to Dunlap Creek than any other source in the watershed. Extensive inventories were done on the gullies, including use of aerial photos, land use maps, site visits, and consultation with several Soil Conservation Service engineers. The largest gully is at least 12 feet deep, 30 feet wide, and several thousand feet long. This gully flows directly into the headwater spring of Dunlap Creek. Some estimates indicate that this gully alone contributes nearly half of the sediment that reaches the creek. The inventories also revealed approximately 200 small gullies, and up to six larger gullies.

Because of the complexity of gully erosion, it was not possible to get a precise estimate of soil delivered to streams by gullies. Therefore, this plan uses conservative estimates that are quite certain gullies contribute at least 486 tons of soil to Dunlap Creek. This represents at least 47% of all sediment delivered. There is a good possibility that the actual amount of sediment delivered by gullies is much higher than these estimates.

Streambank Erosion

Streambank erosion contributes 17% of the total sediment to surface waters in the Dunlap Creek watershed (see Table 3-4). Sediment delivery has seriously affected recreational activities such as fishing. Even though the creek is narrow in some places (roughly 3 feet wide), at other places it widens to at least 10 feet and has a silty substrate of at least 3 feet of muck. Beaver dams exacerbate this problem in areas. The entire length of stream, approximately 2.5 miles, was evaluated (26400 streambank feet). Significant erosion has occurred and/or aquatic habitat and water quality were degraded along approximately 12,420 feet (47%) of streambank. Thirteen percent of this (3420 feet) was degraded by livestock access. An estimated 181 tons of sediment are eroding into streams annually. See Table 3-5 for streambank inventory results.

Table 3-4. Mass Balance of Sediment

Gullies	Uplands	Streambanks	Total
486 tons/yr	373 tons/yr	181 tons/yr	1,040 tons/yr
47%	36%	17%	100%

Table 3-5. Streambank and Habitat Degradation

Total Stream Length (feet)*	Length Degraded (feet)*	Sediment Loss (Tons/yr)	Banks with Livestock (feet)	Length Degraded by Agriculture (feet)	Percent Degraded by Agriculture
26,400	18,420	181	592	3,420	13%

*Both banks (actual stream length in watershed approximately 2.5 miles)

Nutrient Management/Winter Spreading of Manure

The most significant water quality problems associated with the spreading of livestock manure occur when wastes are spread on "critical" areas such as steeply sloped frozen ground, land in floodplains, or areas with shallow depth to groundwater. Because there are seven barnyards in the watershed, each will be looked at individually during implementation.

Surface Water Quality Appraisal Summary

Dunlap Creek is a spring-fed tributary to the Wisconsin River which originates in a terminal moraine. It flows through northwestern Dane County. The creek flows 9.5 miles before emptying into the Wisconsin River. The stream east of Highway 78 is classified as Class II trout waters, and is the only portion of the stream in the Priority Watershed Program. The fishery appears to be comparable in terms of growth rate, food base, and other conditions to similar Class II trout fisheries in southwestern Wisconsin, making Dunlap Creek a valuable resource.

Parts of the trout waters display good in-stream habitat. Other improvements are necessary including protection of the major springs and surrounding wetlands. The substrate in many parts consist of sand and gravel embedded with silt. The greatest land use impacts on the stream include upland and gully erosion, bank erosion, sedimentation, channel straightening, and ponding of springs, which reduce habitat and increase water temperatures. See Table 3-6 for a summary of physical, chemical and biological data.

Since 4.9 miles of stream are classified as "trout waters," it will be important to maintain them. Most critical are protecting and maintaining stable banks, "spring areas," and reducing sedimentation and other nonpoint source problems that plague this portion of stream. The restoration of deteriorated gullies is another issue that needs to be addressed.

Abbreviations for designated biological uses in the discussions to follow:

COLD = Cold Water Communities; includes 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; includes 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; includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

Table 3-6: Dunlap Creek Priority Watershed Physical, Chemical, and Biological Data Summary

Stream	Sites	Length (Miles)	Gradient (ft./Mile)	Base Flow (cfs)	Habitat (score)	Current Stream Class	HBI Date (Value)	Sampling Date	Temperature (°C)	Dissolved Oxygen mg/l	pH
Dunlap Creek	Overall	9.5	15.0	5.8		WWSF Cold/Class II					7.7-7.9
	Downstream STH 78	4.6	4.6	2.1		WWSF					7.7
	Upstream STH 78	4.9	25.4	6.2		Cold/Class II					7.9
	STH 78				139 (good)	CWSF/Class II	05/30/91 (5.238) 11/21/91 (5.220)	05/30/91 11/21/91	20.5 10.4°C	6.0 11.9 mg/l	
	Wilkinson				143 (good)	CWSF/Class II	05/30/91 (4.340) 11/21/91 (4.191)	05/30/91 11/21/91	10.2°C	12.0 mg/l	
	Old Settlers Road				232 (poor)	Intermittent Stream		05/30/91			

COLD = Cold Water Communities

WWSF = Warm Water Sport fish Communities

SWSF = Cold Water Sport fish Communities

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

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

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

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

Dunlap Creek

Description

Dunlap Creek lies in northwestern Dane County, occupying seven square miles. Land use is 57% woodland, 24% cropland, 12% grassland, and 5% pasture (see Table 3-1: Land Use in Dunlap Creek). It drains an area of 4,796 acres.

Water Resource Conditions

Dunlap Creek is a spring fed stream flowing west to the Wisconsin River. The section of the creek in the watershed (east of Highway 78) has a relatively steep gradient of 25.2 feet per mile. The bottom substrate here is composed of 15-20% gravel or rubble and 80-85% sand, silt, or clay. The pool-riffle ratio for this portion of stream is 1.4 to 1. Base discharge calculated at section 2 T8N R6E was 6.6 cubic feet per second. It should be noted that three large springs, with a base flow of over 300 gallons per minute, help in maintain the water temperature throughout the entire year.

The upper half of this stream has good instream cover and is classified as a Class II trout fishery. Some habitat improvement has been made, but improvement and protection of the major spring areas would benefit the trout population. Data collected in 1992 assessing the macroinvertebrate community tends to indicate very good to good water quality. The results of Hilsenhoff Biotic Index (HBI) and Family Biotic Index (FBI) are shown in Table 3-6. The family of Hydropsychidae Caddisflies tended to be the most abundant macroinvertebrate in the samples taken at specific sampling sites. Although the riffle area is the prescribed site for HBI sampling to assess water quality, it does not represent the general habitat conditions in the entire stream.

**Table 3-7. Fish Species present in Dunlap Creek,
Summer, 1992**

brook stickleback	brown trout
green sunfish	central mudminnow
largemouth bass	northern pike
Johnny darter	creek chub
mottled sculpin	white sucker
crayfish spp.	pirate perch

Backpack shocking done by DNR Bureau of Research

In general, the habitat at Dunlap Creek is "poor", scoring 24 out of a possible 100 using the Fish Habitat Index (an index currently being developed by the DNR Bureau of Research). The poor rating was due mainly to the predominance of fine sediments (sand and silt) in the stream bed and the lack of cover/shelter for fish resulting from predominantly shallow (<1 foot) water depths. The relatively stable flows and the consistent dominance of cold and coolwater fishes, show that the stream is fed predominantly by groundwater. Lack of cover for fish and lack of rocky substrate appear to be the primary factors limiting fish habitat.

Substrate is severely impacted by sedimentation. Infilling of interstitial space and imbedding of benthic habitat has reduced the Dunlap Creek stream bottom in stretches to essentially ecological deserts. Shifting sands make it difficult for flora or fauna to attach to the stream bottom, or may bury organisms that are attached. Stream morphology is a limiting factor for stream inhabitants, due to the lack of meandering, cut banks, and diversity in stream depth.

Primary productivity is limited as shifting bottom substrate prevents the establishment of flora and associated fauna which graze on periphytic growth. Insect grazers which are an important component of a balanced insect community are habitat limited. Filter-feeders such as net spinning caddis larvae (*Hydropsychidae spp.*), are lacking in Dunlap Creek due to poor substrate and particulate scour. However, where rubble occurs as substrate, these insects are abundant. Inputs of allochthonous material (grasses, leaves, twigs, etc.) are limited and buried by sediments, reducing important nutrient sources to "cutting" aquatic insects. These species are also very important in the food chain.

Nonpoint Pollutant Sources

- **Animal Lots.** Seven animal lots add 738 pounds of oxygen depleting phosphorus (based on annual rainfall events) to Dunlap Creek surface water resources each year.
- **Upland Sediment Delivery.** The upland sediment delivery is 373 tons annually, with 77% of upland sediment coming from cropland.

- **Streambank Erosion:** Streambank erosion contributes 181 tons of sediment annually, with 13% of the stream length degraded and trampled by livestock.
- **Gullies:** Gullies contribute by far the most sediment to the stream, adding at least 486 tons (47% of all sediment) per year. Table 3-8 summarizes the Pollutant Reduction Goals.

Water Resources Objectives:

- Improve trout fishery.
- Improve macroinvertebrate community.
- Improve streambank stability and habitat.
- Improve overall water quality.

These goals will be accomplished by:

- Reducing sediment runoff and deposition.
- Repairing degraded gullies.
- Promoting nutrient management.

Other Pollution Sources

Municipal and Industrial Point Sources of Water Pollution

There are no known point sources in the Dunlap Creek Watershed.

Table 3-8. Pollutant Reduction Goals

Pollutant Load Reductions	Attained by Management Strategies	
	Total Tons Inventoried	Tons Control (Category I)
I. Sediment (46%)	1,040	481
A. Upland (30%)	373	113
B. Streambank (42%)	181	76
C. Gullies (60%)	486	292
II. Phosphorus (36%)	738	(Category II) 266
	Total Trampled Feet Inventoried	Total Feet Control (Category I)
III. Habitat Repair (94%)	3,420	3,220
IV. Wetlands	n.a.	n.a.

1. Uplands are controlled to "T". Controlling to a "sediment cutoff" would have changed the overall sediment delivery by only 2%.
2. Gully estimates are conservative. They probably contribute more tons than listed. We can probably control a greater percent than listed.

CHAPTER FOUR

Management Actions: Control Needs and Eligibility for Cost Share Funding

Introduction

This chapter identifies the nonpoint source controls to be implemented under the Dunlap Creek Priority Watershed Project to meet the water quality objectives identified in Chapter 3. The first part of this chapter addresses rural nonpoint source control needs. It defines management categories for each nonpoint source. These categories account for the severity of the source, the need for its control, and the practicality of control. The management categories are then used to define which sources are eligible for financial and technical assistance under the priority watershed project.

This land use in this watershed is entirely rural. However, human-induced factors beyond the scope of the priority watershed project, such as a town road cut through a hillside, and natural factors like some gullies, may affect water resources in this watershed. Management actions related to fisheries management, wildlife management, and recreation are discussed in Chapter 7 of this plan.

Chapter 4 describes the management actions developed to meet the pollution reduction goals established during the water resource appraisal process. Also described below are the criteria which will determine the eligibility of each pollutant source for cost-share funding through the Nonpoint Source Program.

Management Categories

A management category is a statement of the relative need to control a specific source in order to meet water resources objectives. Management categories then determine eligibility of specific sources for financial and technical assistance under the priority watershed project. When the management categories are established, the underlying decisions are based on the biological and recreational potential of streams being considered and the current or suspected future impacts of nonpoint sources on those biological and recreational uses.

To improve water quality, and to increase the number of streams reaching their potential uses, each major nonpoint source pollution site (gullies, barnyards, manure-spreading, upland

fields, streambank erosion or habitat degradation sites) is addressed. Management category eligibility are expressed in terms of:

- Tons of sediment delivered to surface waters from gullies, eroding uplands and streambanks
- Feet of streambank trampled by cattle
- Pounds of phosphorus delivered to surface water annually from barnyard runoff
- The number of unsuitable acres winter-spread with manure

A definition of each management category is given below. Following this are the criteria used to define the management categories for each pollutant source.

County staff must confirm the criteria used to define these management categories at the time of a site visit. A source may be put into a different management category depending on the conditions found during the site visit. The management category for a source may be revised up to the point when the landowner signs the cost-share agreement. Sources meeting the Management Category I criteria (as defined in this chapter), which the landowner creates after the signing of a cost-share agreement, must be controlled at the landowner's expense.

Management Category I

Nonpoint sources included in this category contribute a significant amount of the pollutants impacting surface waters. Reducing their pollutant load is essential to achieve the water quality objectives in the watershed project. These sites are considered critical to meet the water quality objectives.

Nonpoint sources in Category I are eligible for funding and/or technical assistance under the priority watershed project. As a condition of funding, all sources in Management Category I must be controlled if a landowner wishes to participate in any aspect of the watershed project.

Management Category II

Nonpoint sources in this category collectively contribute less of the pollutant load than those in Management Category I. These nonpoint sources are identified and included in cost-sharing eligibility to further insure that water quality objectives for pollutant controls are met. Nonpoint sources in this category are eligible for funding and/or technical assistance under the priority watershed project. Controlling sources in this category are not mandatory for a landowner to receive funding to control other sources.

Management Category III

Nonpoint sources of pollution in this category do not contribute a significant amount of the pollutants impacting surface waters and are not eligible for funding and/or technical assistance under the priority watershed project. Other departmental programs (e.g. wildlife and fisheries management) can, if warranted, assist county project staff to control these sources as implementation of the integrated resource management plan for this watershed. Other federal programs may also be applicable to these lands.

As explained in the previous chapter, conclusions from the *Dunlap Creek Water Resources Appraisal Report* (January, 1992) show that controlling sediment is the primary focus of this project.

Criteria for Eligibility and Management Category Designation

Croplands and Other Upland Sediment Sources

There are three primary sources of sediment: gullies, uplands, and streambanks. The results of this analysis, an approximate "mass balance," show 47% of the sediment coming from gullies, 36% from uplands and 17% from streambanks. See Table 3-4.

Upland Erosion

Upland erosion represents 36% (373 tons) of the total sediment load to streams in the watershed. A 30% reduction in sediment from eroding fields was targeted for agricultural lands. Because such a relatively small percent of the sediment is delivered by uplands, controlling a large percent of the uplands would have little impact on reducing overall sediment. Therefore, most sediment reduction will be met by controlling sediment from gullies, and setting up the upland eligibility criteria based on what is feasible to implement.

This brings all lands that contribute sediment to streams at a rate greater than "T", the tolerable soil loss, down to "T." To be in Category I, landowner's fields must be above "T." Category I will control an estimated 461 "critical" acres of cropland and 29% of the total sediment load (111 tons) of the watershed. See Table 4-1.

Category II controls an additional 20 tons of sediment to reduce upland sediment by 42%.

Cropland Eligible for Assistance to Comply With Other State or Federal Programs

Eligible croplands targeted through the priority watershed project may need practices in addition to those prescribed through the priority watershed project to meet other resource management objectives. In such cases, practices needed to further reduce erosion to levels

Table 4-1. Pollutant Reduction Goals

Pollutant Load Reductions	Attained by Management Strategies	
	Total Tons Inventoried	Tons Control (Category I)
I. Sediment (46%)	1,040	481
A. Upland (30%) ¹	373	113
B. Streambank (42%)	181	76
C. Gullies (60%)	486	292
	Total Pounds Inventoried	Pounds Control (Category I)
II. Phosphorus (36%)	738	266
A. Barnyards (36%)	738	266
	Total Trampled Feet Inventoried	Total Feet Control (Category I)
III. Habitat Repair (94%)	3,420	3,220
IV. Wetlands ²	n.a.	n.a.

1. Based on the WINHUSLE model, 373 tons of sediment are being delivered into the stream system from upland fields. Of that, 216 tons of sediment are deposited in the stream channel within the watershed, and 157 tons flow out of the watershed.

Controlling all Category I fields is estimated to reduce the sediment load delivered to the stream from 373 to 260 tons (30 percent), reduce the sediment deposition within the stream system from 216 to 159 tons (26 percent), and reduce the sediment load out of the watershed from 157 to 111 tons (29 percent).

2. n.a. Wetlands were not inventoried in depth. There are no "prior converted" wetlands in the watershed. There are several acres of wetland adjacent to the stream, and most are undisturbed.

Table 4-2. Criteria and Management Categories for Eroding Agricultural Uplands in the Dunlap Creek Watershed

Management Category	Soil Loss (tns/ac/yr)
I	over "T"
II	under "T" & over sediment delivery 0.20 t/a/yr

necessary to comply with requirements of the State Farmland Preservation or Federal Food Security Act programs may be eligible for funding under the priority watershed project. In general, funding for these additional practices will be eligible as long as the costs for these practices are low to moderate. Examples of such practices include contour strip cropping or reduced tillage. High cost measures to provide additional sheet and rill erosion control on these lands will not be eligible for funding under the priority watershed project. Examples of such practices include field diversions or terraces. The county project management staff will make eligibility determinations for practices needed to achieve this additional level of soil loss control.

Gully Erosion

Gullies are the primary source of sediment in this watershed. They contribute at least 47% of the sediment, at least 292 tons annually. These estimates are conservative, probably many more tons and a greater percentage of the sediment in Dunlap Creek come from gullies. Following an extensive inventory, there appear to be at least four to six larger gullies and approximately 200 smaller gullies in the watershed. Controlling those gullies in Category I should translate to at least a 60% reduction in sediment. See Table 4-3 for eligibility criteria. Category II sites will control an unknown amount of sediment. See Chapter 9 for a description of the extensive sediment monitoring to document the success of gully control.

County staff will take into account technical feasibility and cost effectiveness when determining which gullies are in Management Category I.

Table 4-3. Gully Erosion Eligibility Criteria in the Dunlap Creek Watershed

Management Category	Eligibility Criteria (tons sediment/site/year)
I	Sites with: 1) gully depths of at least 3 vertical feet; 2) bare soils and evidence of active erosion; 3) direct connection with streams via channelized flow during runoff events; and 4) reasonable access to necessary machinery.
II	Sites with less than 3 vertical feet and <u>all</u> other criteria listed in Category I.

Sources: Dane County Land Conservation Department, DNR, DATCP

Animal Lot Runoff

According to the *Dunlap Creek Water Resources Appraisal Report* (January 1992), phosphorus is a problem in Dunlap Creek, but sediment is the limiting factor to aquatic organisms and water quality. Sediment is overwhelmingly more problematic to Dunlap Creek than phosphorus. A phosphorus reduction goal of 36% is required to achieve the water quality objectives in the Dunlap Creek project. This goal will be met by Category II participants. See Table 4-4.

Table 4-4. Animal Lot Runoff Eligibility Criteria in the Dunlap Creek Watershed

Management Category	Phosphorus Load Per Barnyard	Number of Barnyards	Phosphorus Reduction
I	no Category I	0	0%
II	greater than or equal to 150 pounds annually	2	36%
Ila	greater than or equal to 80 and less than 150 pounds annually	4	39%

Based on the BARNY model and annual rainfall data.

Source: Dane County Land Conservation Department, DNR, DATCP

Having no Category I for barnyards is justified because of the overriding need to control sediment. In order to achieve the high sediment reduction goals, the eligibility criteria for sediment-related BMPs are very broad; many landowners are eligible and required (large Category I). For cases where a landowner has a sediment problem as well as a nutrient runoff problem, it is more important to reduce the sediment. Therefore, in cases where the landowner is willing to correct the sediment problem, but not the nutrient problem, the landowner will not be required to correct the nutrient problem. Hence, there is no Category I for barnyards, but there is a large Category II (most barnyards are eligible.)

Management Category I

There are no Category I barnyards.

Management Category II

Management Category II will consist of any barnyard that contributes at least 150 pounds of phosphorus annually. All Category II barnyards will be designed to control runoff to 50 pounds of phosphorus or less annually. Control of phosphorus in this category will be achieved through installing any combination of these practices: clean water diversions, barnyard gutter systems, settling basin, filter wall, and filter strips. There are two barnyards in this category. Controlling them would reduce phosphorus by 36%.

Management Category Ila

Management Category Ila will consist of any barnyard that contributes between 80 and 150 pounds of phosphorus annually. All Category Ila barnyards will be designed to control runoff to 50 pounds of phosphorus or less annually. Control of phosphorus in this category will be achieved through installing clean water diversions and barnyard gutter systems only.

Controlling the four barnyards in this category would reduce phosphorus by 39%.
Controlling all Category II and IIa barnyards would reduce phosphorus by 75%.

Management Category III

Category III barnyards contributing less than 80 pounds of phosphorus annually. These barnyards will not be eligible for animal lot runoff practices or nutrient management cost sharing. There is only one barnyard in this category.

Nutrient Management and Animal Waste Storage

Project participants that install any barnyard system are required to use the Soil Conservation Service (SCS) Standard 590-Nutrient Management criteria to define suitable acres for spreading manure during winter months. If through the development of a 590 Nutrient Management Plan, it is determined that more manure is produced than what can be safely spread on suitable land in the winter months (within 20% of required acreage), short term storage will be required.

Eligibility for nutrient management cost-share assistance is limited to landowners installing barnyard systems.

Pesticide Management

Pesticide management is important to protect water quality. Management practices eligible for cost sharing include managing 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. The Dane County LCD will determine eligibility based on the site's surface or groundwater contamination potential.

Winter Manure Spreading Runoff

In the Dunlap Creek Watershed, winter spread manure will be examined before installing any manure runoff system or manure storage facility that has state or federal financial assistance. 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 SCS Standard 590.

Streambanks

Streambanks are divided into "eroded" and "trampled" banks. In Dunlap Creek, 13% of the banks are degraded. In most cases more than 10% bank degradation is considered significant.

Streambank Erosion

Streambanks contribute 17% (181 tons) of the overall sediment delivered to streams in the watershed. Category I participants will have severe erosion sites identified with a sediment delivery rate of at least 0.1 tons per linear foot per year. County staff will evaluate site accessibility/feasibility on Category I sites. Controlling all Category I streambanks will reduce streambank erosion by 42%. This is slightly less than the 50% goal, but will be compensated for by the anticipated large reduction of sediment from livestock access. See Table 4-5.

Category II participants are also eligible for streambank erosion control practices. These practices will incorporate appropriate fish habitat enhancement structures. Eligible streambanks contribute more than 15 tons per landowner per year.

Table 4-5. Streambank Eligibility Criteria for the Dunlap Creek Watershed

Management Category	Criteria
STREAMBANK EROSION	
I	Sediment delivery greater than or equal to 0.1 tons per linear foot
II	Sediment delivery greater than 15 tons per landowner
III	All others
STREAMBANK HABITAT	
I	Trampled sites over 1,000 feet/landowner.
II	All others.

Sources: Dane County Land Conservation Department, DNR, DATCP

Livestock Access

Category I streambanks include trampled sites with over 1000 feet owned by one landowner. Controlling Category I streambanks will reduce 94% of streambank erosion. Access restrictions will be outlined in a grazing management plan developed by county staff. This management plan will provide for the maintenance of a vegetated buffer along the banks of streams, lakes, and drainage ways with livestock. The objectives of the practice are to buffer nutrient runoff, protect fish and wildlife habitat, reduce bank erosion and in-stream turbidity, and preserve stream channel structure. Plans will be based on SCS Standard 510 and UW-Extension guidelines. Structural practices such as fencing, stream crossings, watering access, watering facilities, spring development, and streambank and shoreland protection may be included in the practice. Although not considered a best management

practice, easements are available as useful legal tools, and their applicability is defined later in this chapter. Participating landowners with Category I sites will develop these grazing management plans as part of the cost-share agreement.

The purpose of the grazing management plan is to protect and stabilize areas immediately adjacent to streams. County staff will use their discretion concerning cost effectiveness and feasibility when applying best management practices to protect and stabilize agriculturally impacted streambanks.

Wetland Restoration

There will be no Category I sites for wetland restoration. There are no prior converted wetlands in the watershed. There are several acres of wetland adjacent to the stream, but most are undisturbed. There will be an attempt to restore a few pastured wetlands through BMPs and easements.

Wetland restoration is an eligible best management practice to control nonpoint sources of pollution. Secondary benefits of wetland restoration may enhance fish and wildlife habitat.

Wetland restoration includes: plugging or breaking up existing tile drainage systems, plugging open channel drainage systems, other methods of restoring the pre-development water levels of an altered wetland, or fencing out livestock.

Wetland restoration is an eligible practice when applied to any of the following:

- Cultivated hydric soils with tile or open channel drainage systems discharging to a stream or tributary.

Wetland restoration will reduce the amount of nutrients and pesticides draining from the altered wetland to a water resource. Establishing permanent vegetation and disabling the drainage system will control this pollutant source.

- Pastured wetlands riparian to streams, or tributaries.

Eliminating livestock grazing within wetlands will reduce the organic and sediment loading to the wetland and adjacent water resource, and reduce the direct damage to the wetland from the livestock. Livestock exclusion by fencing will control the pollutants and restore the wetland.

- Prior converted wetlands down slope or up slope from fields identified as Management Category I upland sediment sources through the WINHUSLE model.

Restoration of wetlands in these situations will do one of two things: 1) create a wetland filter which reduces the pollutants from an up slope field(s) to a water resource; or 2) reduce the volume and/or velocity of water flowing from an up-

slope wetland to a down-slope critical field. Two eligibility conditions must be met to use wetland restoration in this situation:

- 1) All upland fields draining to the wetland must be controlled to a soil loss rate that is less than or equal to the soils "T" value.
- 2) One or more of these same fields must still have a sediment loss rate (after the application any erosion control measures) greater than the "average sediment delivery rate."

Easements

Nonpoint source program funds may be used to purchase land easements to support specified best management practices. These practices, all of which involve establishing permanent vegetative cover, include:

- Shoreline Buffers
- Critical Area Stabilization
- Wetland Restoration

Although easements are not considered a best management practice, they can help achieve desired levels of nonpoint source pollution control in specific conditions. Easements are used to support best management practices, enhance landowner cooperation and more accurately compensate landowners for loss or altered use of property. The benefits of using easements in conjunction with a management practice are: 1) riparian easements can provide fish and wildlife habitat along with the pollutant reduction function; 2) easements are generally perpetual, so the protection is longer term than a management practice by itself; and 3) an easement may allow for limited public access (depending on the situation). However, the primary justification of an easement must be for water quality improvement.

Within the Dunlap Creek, priority watershed easements should be considered in the following situations:

- To exclude livestock from grazed wetlands or along eroding streambanks within the watershed.
- When eliminating row cropping and the establishing permanent vegetative cover will stabilize a critical area.
- To support eligible wetland restorations.

- When a barnyard or animal feedlot is located within the flood plain and: a) a permanent easement is the least-cost alternative to provide adequate pollution reduction or b) a permanent easement provides a greater level of pollution reduction than on-site engineering options at a price that is cost effective when compared to the level of pollution reduction and the price of available engineering options.

Note that, in addition to the criteria described above, participating landowners must control all "Management Category I" sources (through a cost-share agreement) to be eligible for an easement through the watershed project. Also, land currently in the Conservation Reserve Program (CRP) may be considered for an easement.

Ordinances

Wisconsin Statutes require each county to have a manure storage ordinance to be eligible for grants from the nonpoint source program.

Manure Storage Ordinance

Dane County has enacted a DATCP approved manure storage ordinance which implements requirements outlined in Section 92.16 Wis. Statutes. The ordinance is administered by Dane County.

Construction Site Erosion Ordinance

The County Board of Supervisors of Dane County finds that soil erosion from construction activities may be 10 to 100 times greater than erosion from agricultural activities on lands of equal size, slope and soil type. Construction activities and subsequent development can disturb natural cover and land surfaces resulting in a change in runoff patterns that may have a detrimental effect on water quality and downstream uses. Further, effective sediment and stormwater management depends upon proper planning, design and timely installation of conservation practices as well as continued maintenance of the practice.

Construction Site Erosion Control

Dane County currently has two ordinances that deal with construction sites. The first one, adopted in 1976, authorized by Chapter 75 of the Dane County Code of Ordinances, requires erosion control plan for plats (a boundary or description of a small piece of property, such as residential lots). The second ordinance was established by amending Chapter 14 of the Dane County Code of ordinances establishing an erosion control system. This amendment, adopted in 1987, requires an Erosion Control Plan for certain zoned districts. LCD staff review all erosion control plans and compare them to the Technical Guide adopted by Dane County.

CHAPTER FIVE

County Implementation Program

Introduction

This chapter identifies the means for implementing the management actions for nonpoint source control described in Chapter 4, and describes the county's nonpoint source implementation strategy for rural areas. 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 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 that reduce nonpoint sources of water pollution and protect and enhance fish, wildlife and other resources. Landowners and land operators in the Dunlap Creek Watershed eligible for cost-share assistance through the priority watershed program include: 1) individuals, 2) Dane County, 3) other governmental units described in NR 120.02(19), 4) corporations, and 5) the State of Wisconsin.

County Government

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

The Dane County Land Conservation Committee (LCC) will act for the County Board, and will be responsible contractually and financially to the State of Wisconsin for project management 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, s. NR 120.04, and are summarized below:

- Identify in writing a person to represent the county during implementation of the project.
- Contact all owners or operators of lands identified as significant nonpoint sources (Category I) within one year of signing the nonpoint source grant agreement. The county's strategy for contacting landowners is included in this chapter.
- Develop farm conservation plans consistent with the needs of the project.
- 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.
- 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.
- Design best management practices and verify proper practice installation.

- Reimburse cost-share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules established in this plan.
- Prepare and submit annual work plans for activities necessary to implement the project. The Dane County LCD shall submit a workload analysis and grant application to DATCP as required in s. Ag. 166.50.
- Prepare and submit to the DNR and 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.
- Participate in the annual watershed project review meeting.
- Conduct the information and education activities identified in this plan for which they are responsible.

Department of Natural Resources

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

Project Administration

Project administration includes working with the counties to ensure that work commitments required during the 8-year project implementation phase can be met. The DNR will participate in the annual work planning process with the county.

The DNR 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 to control pollution sources on land these 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. Chapter 9 includes the water quality evaluation and monitoring strategy for the Dunlap Creek Watershed. 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 for design and application of best management practices. This assistance is primarily for urban areas.

Other Responsibilities:

- 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.
- 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 DATCP is identified in s. 144.25, stats., ch. 92 stats., and NR 120. In summary, the DATCP will:

- Manage a training program for the staff involved with project implementation.
- 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 pesticide management.
- Assist the counties to carry out the information and education activities or tasks described in this plan.
- Assist county staff to identify watershed participants subject to federal or state conservation compliance programs.
- Assist counties, if requested, to develop a manure storage ordinance.
- Assist county staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.

- Participate in the annual project review meetings.
- If the need arises, assist in developing technical standards for agricultural BMPs, and provide technical assistance to county staff concerning application of these practices.
- Assist county staff to evaluate the site-specific practicality of implementing rural best management practices.

Other Agencies

The Dunlap Creek Watershed Project will receive assistance from the agencies listed below.

Soil Conservation Service (SCS)

This agency works through the local LCC to provide technical assistance for planning and installing conservation practices. The local SCS personnel will work with the county staff to provide assistance with technical work when requested by the Land Conservation Committee and if SCS staff time is available. Personnel from the Area SCS office will provide staff training and engineering assistance for best management practices. Efforts will be made by DATCP to assist SCS to coordinate the Dunlap Creek 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.

Agricultural Stabilization and Conservation Service (ASCS)

ASCS administers most of the federal programs aimed at the stabilization of the prices paid to 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 ASCS will, to the extent possible, be coordinated with the Dunlap Creek 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 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 under the Dunlap Creek Watershed Project and the cost-share rates for each BMP are listed in Tables 5-1 and 5-2.

Design and installation of all BMPs must meet the conditions listed in NR 120. Generally these practices use specific standard specifications included in the SCS 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 DNR may approve alternative best management practices and alternative design criteria based on the provisions of NR 120.15, where necessary, to meet the water resource objectives.

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

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

Contour and Field Stripcropping — Growing crops on the contour, in alternate strips of close grown crops, such as grasses or legumes, and tilled row crops.

Reduced Tillage — A system which leaves a roughened surface or substantial amounts of crop residue in or on the soil surface after crops are planted. The system consists of no more than one primary tillage pass in the fall or spring and no more than two passes with light or secondary tillage equipment prior to planting. It is utilized in two situations; one for continuous row crops or long corn rotations, the other for short crop rotations 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 riprap, streambank sloping and seeding, stream crossings, watering ramps, streambank fencing and fish habitat structures. This practice may include pasture pumps for watering livestock.

Terraces — A system of ridges and channels with suitable spacing, constructed on the contour with a suitable grade to prevent erosion in the channel.

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.

Barnyard Runoff Management — Structural measures such as filter systems and/or diversions and raingutters to redirect surface runoff around the barnyard, and collect, convey or temporarily store runoff from the barnyard.

Manure Storage Facility — A structure to store manure the time 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 with a high potential for runoff to lakes, streams and groundwater. The facility needs to store manure for proper spreading 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 — Relocating 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.

Wetland Restoration — The constructing berms or destroying tile lines or drainage ditches to create conditions suitable for wetland vegetation.

Nutrient Management — The managing and crediting nutrients for 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 testing.

Pesticide Management — 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.

Easements — Although not considered to be best management practices, easements are useful legal tools and their applicability is defined in Chapter 4. Details for such arrangements will be worked out between DNR and the counties during implementation phase.

Under some circumstances, practices may be recommended that are not included on the BMP list. Administrative Rule NR 120.15 provides for alternative practices where necessary to meet the water resource objectives identified in the watershed plan. The DNR shall identify in the nonpoint grant agreement, the design criteria and standards and specifications where appropriate, cost-share conditions, and cost-share rates for each alternative BMP.

Table 5-1. State Cost-Share Percent Rates for Best Management Practices

Best Management Practice	State Cost Share Rate
Contour farming	50% ¹
Contour and field stripcropping	50% ¹
Reduced tillage	50%
Shoreline and streambank stabilization	70% ²
Livestock exclusion from woodlots	50%
Field diversions and terraces	70%
Grassed waterways	70%
Critical Area Stabilization	70% ^{2,3}
Grade Stabilization Structures	70% ²
Agricultural Sediment Basins	70%
Shoreline Buffers	70% ^{2,3}
Wetland Restoration	70% ^{2,3}
Nutrient & Pesticide management	50% ⁴
Barnyard Runoff Management	70%
Animal Lot Relocation	70% ²
Manure Storage Facilities	70% ⁵

- 1 Wildlife habitat recreation has a state cost-share rate of 70%.
- 2 If an additional 10% is funded by Dane County or other group, DNR will add 10%, making the cost-share rate 90%.
- 3 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.
- 4 Spill control basins have a state cost share rate of 70%.
- 5 Maximum cost-share amount is \$20,000 including no more than \$5,000 for manure transfer equipment. (Legislation is proposed to change these amounts. If the legislation is adopted the cost share amount will correspond with the new statutory language). Table 5-2 lists maximum state cost-share flat rates. The watershed project should use either a percentage cost share rate or a flat cost-share rate for each practice.

Table 5-2. Practices Using a Flat Rate for State Cost-Share Funding

Best Management Practice	Flat Rate
Contour Farming	\$ 6.00/ac ¹
Contour Strip Cropping	\$ 12.00/ac ¹
Reduced tillage more than three years of continuous row crops	\$ 45.00/ac ²
Reduced tillage crop rotations using hay	\$ 15.00/ac ¹

1 Wildlife habitat restoration components of this practice are cost-shared at 70%.

2 Reduced tillage systems for continuous row cropping over three years (excluding no-till).

3 Reduced tillage systems for short crop rotations, and establishment of forages and small grains (includes no-till). One year only.

BMPs 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. Here are several examples:

- The part of a practice funded through other programs.
- Practices previously installed and necessary to support cost-shared practices will be referenced by "must follow current conservation plan."
- 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 County determines 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 with land drainage or clearing as the primary objective
- Practices already installed, with the exception of repairs to practices 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, except 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 BMPs

Table 5-3 lists the quantity and management practices required to meet this project's water quality objectives. The capital cost of installing the BMPs are listed in this table assume landowner participation rates of 100% and 75%. Also included are the units of measurement and cost-share amount per unit for the various BMPs.

The capital cost of installing BMPs in Dane County is approximately \$0.9 million, assuming 100% participation.

- State funds necessary to cost-share this level of control would be about \$0.7 million.
- The local share provided by landowners and other cost-share recipients would be about \$0.2 million.

At a 75% level of participation, state funds needed to cover capital installation would be about \$0.5 million.

Easement Costs

Chapter 4 identifies where nonpoint source program funds can be used to purchase easements. Table 5-3 shows the estimated cost of purchasing easements on eligible lands. At 100% participation, the estimated purchase price of easements on eligible lands would be \$0.23 million. At 75% participation, the cost would be \$0.17 million. 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.

Cost Containment

Cost Containment Provisions

The Dane County Land Conservation Committee chose to use an *average cost* procedure as its primary method to contain costs of best management practices. Average costs are determined for units of materials or labor. The average costs used in the project's first year are based on 1992 costs from the Dane County/Black Earth Creek Watershed Project. The average costs will be reviewed and updated at least annually. The Dane County Land Conservation Committee intends to use the following policy to govern cost-share payments:

Cost-share payments will be based on the actual costs not to exceed the estimated cost-share amount for the identified practice based on the calculated average costs without prior approval of the Land Conservation Committee.

For situations where an average cost procedure is inappropriate, Dane County will use either a bidding or maximum cost procedure. Examples of practices where bidding may be the most appropriate approach are streambank riprapping and manure storage facilities. Dane County Land Conservation Department staff are responsible for determining when a bidding or maximum cost procedure is most appropriate.

Cost-Share Agreement Reimbursement Procedures

Nonpoint Source Grant Agreement and Administration

General Information

The Nonpoint Source Grant Agreement provides a way of transmitting funds from the DNR (through the Nonpoint Source Program) to Dane 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.

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

Management Needs, BMPs	Number	Cost/Unit	Total Cost (1)	100% Participation		75% Participation	
				State Share	Local Share	State Share	Local Share
Upland NPS Control							
Contour Cropping	20 ac	6.00	120	120	2	90	2
Contour Strip Cropping	80 ac	12.00	960	960	2	720	2
Reduced Tillage (3)	275 ac	45.00	12,375	12,375	2	9,281	2
Reduced Tillage (4)	525 ac	15.00	7,875	7,875	53,580	5,906	40,185
Critical Area Stabilization	38 ac	4,700.00	178,600	125,020	4,620	93,765	3,465
Grass Waterways	6 ac	2,800.00	15,400	10,780	1,800	8,085	1,350
Field Diversions & Terraces	2,000 ft	3.00	6,000	4,200	49,500	3,150	37,125
Grade Stabilization	55 ea	3,000.00	165,000	115,500	99,120	86,625	74,340
Agricultural Sediment Basin	28 ea	11,800.00	330,400	231,280	12,125	173,460	9,094
Nutrient and Pest Mgmt. (5)	970 ac	25.00	24,250	12,125	450	9,094	338
Shoreline Buffers (6)	10 ac	150.00	1,500	1,050	4,500	788	3,375
Wetland Restoration	5 ea	3,000.00	15,000	10,500		7,875	
Livestock Exclusion from Woodlots	50 rods	14.00	700	700		525	
Animal Waste Management							
Barnyard Runoff Control							
Complete System	2 ea	\$20,000.00	40,000	28,000	12,000	21,000	9,000
Simple System/Diversions	4 ea	\$8,000.00	32,000	22,400	9,600	16,800	7,200
Manure Storage Facility (7)	4 ea	\$15,000.00	60,000	42,000	18,000	31,500	13,500
Streambank Erosion Control							
Shape and Seeding	500 ft	\$6.00	3,000	2,100	900	1,575	675
Streambank Fencing	1,500 rods	\$20.00	30,000	30,000	6,000	22,500	4,500
Rural Riprap	800 ft	\$25.00	20,000	14,000		10,500	
Livestock/Machinery					7,500	13,125	5,625
Crossing/Watering Ramp	10 ea	\$2,500.00	25,000	17,500	1,800	3,150	1,350
Remote Watering Systems	3 ea	\$2,000.00	6,000	4,200			
Subtotal:			\$974,180	\$692,685	\$281,495	\$519,514	\$211,121
Easements	150 ac	\$1,500.00	225,000	225,000	0	168,750	0
Wetlands, Critical Area, Streambank							
TOTALS			\$1,199,180	\$917,685	\$281,495	\$688,264	\$211,121

1 Total cost to control identified critical pollution sources
 2 Local share consists of labor and any additional equipment costs, also see flat rates
 3 Reduced tillage on continuous row crops, greater than 3 years
 4 Reduced tillage, including no-till, on rotations including hay
 5 Nutrient and pest management practices will be cost-shared in a flat rate per practice. \$25.00/ac is the total cost-share rate over 3 years.
 6 Shoreline Buffer practice needs will be determined during implementation
 7 Cost-share for short term storage only
 Sources: DNR; DATCP; and the Dane County Land Conservation Department

A portion of the Nonpoint Source Grant is forwarded to Dane 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 under the project. As this account is drawn down, the county will request reimbursements from the DNR to replenish the account. The county will submit reimbursement requests quarterly or sooner if needed. This reimbursement schedule will insure that the "up front" account balance is maintained at an adequate level. The NPS Grant Agreement will be amended annually to provide funding needed for cost sharing for the year. The funds obligated under cost-share agreements must never exceed the total funds in the NPS Grant Agreement.

Fiscal Management Procedures, Reporting Requirements

Dane County is required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Dunlap Creek 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 three years after formal approval of the watershed plan to enter into cost-share agreements. Practices included in cost-share agreements must be installed within the schedule agreed to in the cost-share agreement. Unless otherwise approved by the DNR, 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 and the timetable for installation. The agreements also identify and provide information on practices not cost-shared through the nonpoint program but are essential to control 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 landownership 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 landownership and the recording of cost-share agreements with the Register of Deeds.

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.

Dane County is responsible for enforcing compliance of cost-share agreements to which it is 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. Dane County will check for compliance with practice maintenance provisions once every three years after the last practice is 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.

1. 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.
2. After the initial landowner mailings, county staff will make personal contacts with all landowners identified as having critical nonpoint sources of pollution (Management Category I). These contacts will occur within the cost-share sign-up period.
3. The county will continue to make contacts with eligible (Management Category I and II) landowners and operators until they have made a definite decision regarding participation in the program.
4. The county will contact all eligible landowners (as defined in 3 above) not signing cost-share agreements six months before the end of the cost-share sign-up period.

Procedure for Developing a Cost Share Agreement

Cost-sharing eligibility is verified following a site visit, using criteria described in Chapter 4.

Farm conservation plan development 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 abate nonpoint sources of pollution, and conserve soil and other resources. The farm plan considers the sustainability of agricultural resources and the management decisions of the owner or operator.

The cost-share agreement refers to items in the farm conservation plan that are necessary to reduce 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 to develop and administer agreements. Here are the steps from the initial landowner contact to the completion of BMP maintenance.

1. Landowner and county staff meet to discuss the watershed project, NPS control practice needs, and coordination with conservation compliance provisions if applicable.
2. Landowner agrees to participate with the watershed project.
3. The county prepares a farm conservation plan.
4. The landowner agrees with the plan, a Cost Share Agreement is prepared and the landowner and the county sign both documents. A copy of the Cost-Share Agreement (CSA) is sent to the DNR Southern 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. Only the first page of the original CSA needs to be recorded with the Register of Deeds. Dane County LCD keeps a copy of the first page and the rest of the original CSA.
5. The county or their designee designs the practices and a copy of the design is provided to the landowner.
6. The landowner obtains the necessary bids or other information required in the cost containment policy.
7. Amendments to the CSA are made if necessary.
8. The county staff oversee practice installation.
9. The county verifies the installation.
10. The landowner submits paid bills and proof of payment (canceled checks or receipts marked paid) to the county.

11. Land Conservation Committees or their designated representative and, if required, county boards approve cost-share payments to landowners.
12. The county issues checks to the respective landowners and project ledgers are updated.
13. The county records the check amount, number, and date.
14. DNR reimburses the county for expended cost-share funds.

Identifying Wildlife and Fishery Needs

The Dane County staff will consult with DNR's Southern 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 installing 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 installing BMPs 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 DNR

Cost-share agreements do not need prior approval from the DNR, except in these instances:

- where cost-share funds are used for practices on county owned or controlled land.
- for agreements or amendments where the cost-share amount for all practices for a landowner exceeds \$50,000 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 Dane County for their staffing and support costs of carrying out this watershed plan. Consistent with NR 120, the county will use funds from the LAGA for additional 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 120.14(4) and (6).

Grant Agreement Application Procedures

An annual review of the Local Assistance Grant Agreement is conducted during 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. Along with the workload analysis, a grant application form is sent. Funds needed to complete the agreed upon annual workload are amended to the local assistance grant agreement.

Fiscal Management Procedures, Reporting Requirements

Dane County is required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Dunlap Creek 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. Quarterly reports are sent to the DNR by the county 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. Time reports are sent to DATCP quarterly.

Staffing Needs

Budget and Staffing Needs:

This section estimates the funding and staffing required to provide technical assistance for the rural portion of this project. These estimates are based on needs identified for Dane County.

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 9,290 staff hours are required to implement this plan at a 75% landowner participation rate. This includes 960 staff hours to carry out the information and education program.

The Land Conservation Department in Dane County will employ .8 project staff during the first year of the project. Dane County will assess the number and type of staff required for the remainder of the project based on the experience gained during the first year of implementation.

Staffing Costs

The estimated cost for staff at the 75% participation rate (see Table 5-5) is approximately \$.18 million. All of these costs, with the exception of some direct cost items, will be paid for by the state.

Schedule of Implementation

Grant Disbursement and Project Management Schedule

Implementation may begin after approval of this watershed plan and acceptance of Nonpoint Source Grant by the Dane County Board, Wisconsin DATCP, and the DNR. The priority watershed project implementation period lasts eight years. It includes an initial three year period for contacting eligible landowners and signing cost-share agreements. Practices on any cost-share agreement must be installed within a five years from the date of the last signature on a cost-share agreement, or in accordance with NR 120.

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

Grant disbursement (Local Assistance and Nonpoint Source) to Dane 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 in Table 5-6. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state would be \$.9 million.

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 time and how much cost sharing is expended; the number of staff needed and other support costs; and the time local assistance is necessary.

Table 5-4. Estimates County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	DANE COUNTY	
		75% Landowner Participation (Staff Hours)	50% Landowner Participation (Staff Hours)
Project & Financial Mgmt.	1-8	1,200	1,200
Information & Education Program	1-8	960	960
Pre-Contract Office Inventory; Landowner Contracts & Progress Tracking	1-3	300	250
Conservation Planning & Cost Share Agreement Development	1-3	700	475
Plan Revisions and Monitoring	1-8	320	213
Practice Design & Installation	1-8	3,900	2,600
Upland Sediment Control		560	375
Animal Waste Management		500	350
Streambank Erosion Control			
Training	1-8	850	850
Total LCD Workload:		9,290	7,273
Estimated Staff Required for Years 1-3: hours		0.8 per yr 1,584 per yr	0.6 per yr 1,228 per yr
Estimated Staff Required for Years 4-8: hours		0.6 per yr 1,150 per yr	0.4 per yr 908 per yr

Sources: DNR; DATCP and Land Conservation Department of Dane County

Table 5-5. Total Project Costs at 75% Landowner Participation Rate

Item	Costs (State Share)	
Cost Share Funds: Practices	\$519,514	Table 5-3 75% participation, state share
Cost Share Funds: Easements	\$168,750	Table 5-3 75% participation, state share
Local Assistance Staff Support	\$184,415	Table 5-4 total LCD workload x \$17.56/hr
Information/Education Direct	\$2,500	from I & E chapter does not include staff
Other Direct (travel, supplies, etc.)	\$6,400	from county's calculations
Engineering Assistance	\$17,500	from county's calculations
TOTAL	\$899,079	

Sources: DNR; DATCP; and the Dane County Land Conservation Department

Table 5-6. Grant Disbursement Schedule at 75% Landowner Participation

Item	Project Year				TOTAL
	1	2	3	4-8	
Cost-Share Funds: Practices	\$159,004	\$159,004	\$201,566	\$0	\$519,514
Cost-Share Funds: Easements	\$50,625	\$50,625	\$67,500	\$0	\$168,750
Local Assistance Staff Support	\$27,815	\$27,815	\$27,815	\$100,970	\$184,415
Information/Education: Direct	\$513	\$513	\$513	\$961	\$2,500
Other Direct: (travel, supplies, etc.)	\$1,024	\$1,024	\$1,024	\$3,328	\$6,400
Engineering Assistance	\$2,800	\$2,800	\$2,800	\$9,100	\$17,500
TOTAL	\$241,781	\$241,781	\$301,157	\$114,360	\$899,079

Involvement of Other Programs

Coordination With State and Federal Conservation Compliance Programs

The Dunlap Creek 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 Soil Conservation Service. DATCP will assist Dane County and the SCS office to identify landowners within the watershed who are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FSA on December 31, 1989. Dane County completed FPP conservation plans by July 1, 1990.

There will be a need to implement the conservation plans and, in the future, amend these plans during the implementation phase of the watershed project. Watershed project supported staff will revise the conservation plans developed for FPP. They will also inform SCS of changes in FSA 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.

Some eroding uplands in Management Categories I and II may need control, in addition to those required for meeting sediment delivery targets, 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.

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 for participation in the program. As a result, the federal Historic Preservation Act of 1966, as amended, and the state historic preservation statute, s. 44.40 Wisc. Stats. were blended to produce a cultural resource management program which is both compatible to preserving cultural sites and implementing the watershed project.

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 Wisconsin Priority Watershed Program. The Dunlap Creek Priority Watershed Project addresses these concerns with the following procedures:

1. The County will use State Historical Society Inventory maps with the location of known archaeological sites.
2. Landowners interested in project participation may have their lands evaluated by county staff and the State Historical Society to determine the need to conduct an archaeological survey. A landowner questionnaire may also be used to identify additional noninventoried sites. The completed questionnaire will be sent to the State Historical Society to determine archaeological significance.
3. If the inventory or questionnaire reveal an archaeological site and the proposed BMP 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 BMP to significantly impact the site. Alternative BMPs may need to be considered both before and after the results of the survey.
4. 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 that nullifies or partially nullifies the cost-share agreement based on the final results of the archaeological survey.

CHAPTER SIX

Information and Education

This information and education (I&E) plan describes the methods and procedures that will be implemented to inform and educate the public about the Dunlap Creek watershed and the Dunlap Creek Priority Watershed project. It will also serve as a guide during implementation and evaluation of the plan. The proposed activities are based on availability of funds and review of annual work plans. The activities may be revised through the annual work plan procedure.

The information and education aspect of this watershed will focus on individual contact between landowners and Land Conservation staff. The small area (seven square miles) and small number of landowners (approximately 75) makes this an effective means of encouraging landowners to participate and install BMPs in the watershed. County staff have already made several contacts with land owners.

One of the concerns which information and education can address in this watershed is the lack of a sense of community between the diverse life styles of the local landowners. In a successful watershed program individuals need to think beyond their land borders. This is a necessary part of the decision making process when improving local environmental conditions. It becomes even more important when the people involved see each other as individuals to work with and accomplish common goals. To begin developing this greater sense of community we will host an annual meeting/picnic to allow residents to meet each other in a positive venue and to talk about watershed problems and their solutions.

Another feature of this watershed is its proximity to the highly successful Black Earth Creek Priority Watershed project. The northern boundary of Black Earth Creek Watershed is the southern boundary of Dunlap Creek Watershed. Dunlap Creek landowners will be included in the mailings to Black Earth Creek landowners, and will be invited to all informational and educational activities. Any newsletters, demonstration tours, or field days happening in Black Earth Creek will also be promoted in Dunlap Creek. However, since Black Earth Creek is completing its sign-up period, several newsletters/fact sheets will be necessary to inform Dunlap Creek residents about watershed activities that Black Earth Creek residents are already familiar with.

A budget estimate of \$2,500 will cover the Dunlap Creek-specific I&E strategies as well as covering any extra costs encumbered by Black Earth Creek (BEC) Watershed project from serving the Dunlap Creek landowners. Most of this budget will be spent in the first three years of implementation. (Dane County LCD is the responsible party for each I&E activity.)

Specific activities that will occur include:

- **Implementation Kickoff Picnic** -- held soon after approval of watershed plan to inform landowners of the next step in the project
- **Citizens Advisory Committee meetings** -- public informational meetings held approximately 3 times/yr for the first year (if necessary), once/yr for the rest of the project.
- **Mailings** of fact sheets, CAC minutes, upcoming events, etc. -- three mailings/yr for first three years, then one mailing/yr for the rest of the project
- **Brochures**, handouts, written material available from DNR, LCD and UWEX
- **Field days and watershed tours** -- for just Dunlap Creek, and as part of BEC watershed project
- Possible grade stabilization **demonstration**
- **Continued individual landowner contacts**
- **Sediment monitoring** -- to show improvements within watershed
- Possible **logo** and other promotional items (hats)

See Table 5-6 for a grant dispersement schedule.

CHAPTER SEVEN

Integrated Resource Management Program

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

Fisheries

Watershed BMPs such as streambank protection, shoreline buffer strips, and easements should be implemented in a way to enhance fishery management goals. The fishery manager should be consulted for input on the design of streambank protection. Conservation organizations may be able to cooperate with landowners in funding BMPs. When greater enhancement to the fisheries may be realized, it is possible to go above the least cost when installing BMPs.

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 DNR private lands manager. Shoreline buffer easements may be acquired adjacent to these wetlands to better protect them from sedimentation and other nonpoint source pollution.

Soil Conservation Service wetlands inventory identified these wetlands (existing and restorable). Dane County Land Conservation Department staff will use the SCS wetland inventory to help locate wetlands. In addition to the normal priority watershed funding, additional cost sharing may be available to provide for a 100% payment to install this BMP. This additional funding may be available through the District Private Lands Manager and/or the U.S. Fish and Wildlife Service. Eligibility for this additional funding would be determined by the private lands manager or DNR District Nonpoint Source Coordinator.

Riparian Zones

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

Stewardship

The streambank protection program under the Stewardship Program is an important additional means of protecting water quality. Under this program, an easement on both sides of the stream (generally 66 feet wide on each side) could be obtained by the DNR. If needed, the DNR will fence the stream to protect it from livestock access.

Currently no portion of Dunlap Creek is eligible for stewardship. It is recommended that Dunlap Creek be added to the list of streams eligible for stewardship acquisition.

CHAPTER EIGHT

Project Evaluation

Introduction

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

1. administrative review
2. pollution reduction evaluation
3. evaluation monitoring (see Chapter 9)

The Dance County LCD will collect information on the first two components and report on a regular basis to the DNR and DATCP. The DNR takes care of the third component. The DNR's Bureau of Community Assistance will provide additional information on the numbers and types of practices on cost-share agreements, funds encumbered on cost share agreements, and funds expended.

The LCD, DATCP, and DNR will cooperatively prepare a final report. It will summarize the administrative activities, pollutant load reductions, and water quality information, and make conclusions on the success of the project.

Administrative Review

The first component, the administrative review, will focus on the progress of Dane County in implementing the project. The project will be evaluated with respect to 1) accomplishments, 2) financial expenditures, and 3) staff time spent on project activities.

Accomplishment Reporting

The Dane County LCD will collect data on administrative accomplishments using a computer system, and will provide this to the DNR and DATCP for program evaluation.

The Dane County LCD will provide the following data to the DNR and DATCP quarterly:

- number of personal contacts made with landowners
- completed I&E 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, Dane County representatives will meet with DNR and DATCP staff annually to review progress and plan for the subsequent year.

Financial Expenditures

Dane County will provide the following financial data to the DNR and DATCP quarterly:

- number of landowner cost-share agreements signed
- amount of money encumbered in cost-share agreements
- number of landowner reimbursement payments made to install 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 LCD staff
- amount of money paid for installation of BMPs, and money encumbered in cost-share agreements

Dane County will also provide both agencies with the following financial data annually:

- staff training expenditures
- interest money earned and expended
- total county LCD budget and expenditures on the project

Time Spent On Project Activities

Dane County will provide quarterly time summaries to both departments for these activities:

- 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 and training activities
- leave time

Pollutant Load Reduction

Key Nonpoint Sources for Evaluating Pollutant Load Reductions

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. Three key sources were identified for estimating changes in pollutant loads that reach creeks in the Dunlap Creek Watershed: a) streambank erosion, b) upland sediment, and c) runoff from barnyards and fields spread with manure.

As Chapter 3 describes, this plan calls for these pollutant reductions for the entire watershed:

- reduce watershed-wide sediment entering creeks from agricultural uplands, streambanks, and gullies by 45%.
- 75% overall repair of bank habitat
- reduce the "top" 36% of manure and organic matter entering creeks from barnyards

Streambanks

Dane 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 during contact, and changes in erosion levels estimated after installing BMPs.

Upland Sediment Sources

Dane County will use the WIN (Wisconsin Nonpoint Source) model to estimate sediment reductions due to changes in cropping practices. Data for the WIN model will be provided quarterly by the counties through a computer model, as described above.

Barnyard Runoff

Dane County will use the BARNY (Modified ARS) model to estimate phosphorus reductions from installing barnyard control practices. The county will report the information to the DNR through a computer model.

CHAPTER NINE

Water Resources Evaluation Monitoring

Goals and Objectives

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. Evaluation monitoring objectives are:

- Evaluate the attainment of water quality "objectives" that result from implementation of best management practices at specific sites.
- Evaluate the attainment of pollutant load reduction goals, and the effectiveness of those goals in improving water quality at specific sites.
- Evaluate the implementation of BMPs needed, and their effectiveness in reducing problems contributing to non-attainment of water quality objectives at specific sites.
- Evaluate the priority watershed plans applicability for managing water resources, and attaining water quality standards and beneficial uses.

Program Organization

- Evaluation monitoring activities in priority watersheds will be planned and conducted according to monitoring program guidance in the Bureau's 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.
- 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 evaluation monitoring goals and objectives.
- 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.

location

- Where BMPs are planned but not yet implemented in priority watersheds
- Where serious water quality, habitat or both problems exist, and a direct cause/effect relationship between problems and nonpoint sources are obvious
- 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 are signed. Extra effort should be made to achieve full participation by all landowners
- Where sites are not meeting attainable uses and have a high potential to improve by managing nonpoint sources
- 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 from climatic conditions
- Where sites have adequate access for sampling personnel and equipment

size

- 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
- Watersheds should be manageable with areas of 5 to 50 sq. miles.

Water Quality

- Suspected or known water quality problems should be caused by manageable nonpoint sources, such as barnyards or feedlots
- Point sources should not be present or not significant
- Potential problem sources that cannot or are unlikely to be managed should not be present

Habitat

- 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
- 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 landowner 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, USGS and WRM 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 could 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 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 evaluate 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.

The Bureau recommends a 5-year basin assessment monitoring approach, as discussed in option 2. With the exception that an intensive special project monitoring approach may be recommended at unique sites where problems are severe, the resource has a high value, participation levels are high, and a measurable response is anticipated.

As part of the evaluation monitoring strategy for the Dunlap Creek Priority Watershed Project, sediment will be closely monitored. The proposed sediment monitoring strategy is included as an appendix. The proposal states that approximately five sites in Dunlap Creek, will measure sediment by using transects. Dane County staff will take measurements. DNR Southern District staff will be available to analyze the data at the end of the project.

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APPENDIX A: Assessment Methods for Water Quality and Nonpoint Source Conditions in Dunlap Creek

Introduction

Part of the Dunlap Creek Priority Watershed Project's planning process was to determine the current water quality and water use conditions of the ground and surface water resources in the project area. Then an assessment was made of the potential changes in water quality and water use that might be expected as a result controlling nonpoint source pollutants.

The assessment was made based on many sources of information including chemical and biological water quality data from the DNR files, and input from the county Land Conservation Department (LCD) staff, the DNR fish managers, and the DNR water quality specialists. Two of the tools used in this assessment are discussed in more detail below.

Biotic Index

The type of insects found living on rocks and in other habitats in a stream reflects the water conditions of that stream. Certain species of insects will tolerate only unpolluted waters while others are able to survive various degrees of water pollution. The term pollution in this discussion refers to organic material in the water. Organic pollutants can affect water quality in two ways. First, organic material adds nutrients to the water which may result in nuisance growth of algae or weeds. Second, bacterial breakdown of the organic material can deplete water of its dissolved oxygen, which is required for fish survival.

The Hilsenhoff Biotic Index or HBI (Hilsenhoff, 1982), developed in Wisconsin, indicates the degree of organic pollution in a stream by the types of insects living in the stream. Organic pollution tolerance values are assigned to various species of insects. The scale of the values is zero to 10, with zero being the least tolerant (that is, insects least tolerant to organic pollution in the stream). The number and types of insects found at a stream site are used to calculate an HBI value between zero and five for the stream. Qualitative descriptions of water quality for the index values are given in Table A-1.

Table A-1. Qualitative Descriptions for the Biotic Index

HBI Range	Water Quality	Degree of Organic Pollution
0.00 - 3.50	Excellent	No organic pollution
3.51 - 4.50	Very Good	Possible slight organic pollution
4.51 - 5.50	Good	Some organic pollution
5.51 - 6.50	Fair	Significant organic pollution
6.51 - 8.50	Poor	Very significant organic pollution
8.51 - 10.00	Very Poor	Severe organic pollution

Source: Hilsenhoff 1987

Stream Fishery Habitat Assessment

In order to determine the present and potential future fishery uses of the streams, a procedure developed by Joe Ball of the DNR was used. This procedure is described in Stream Classification Guidelines for Wisconsin (Ball, 1982). The system uses an inventory of the stream's physical fish habitat conditions (such as stream flow, bed type, amount of riffles and pools, and streambank conditions) along with other parameters (water quality, water temperature, pH [degree of acidity or alkalinity], and current stream biotic conditions) to classify the present fishery use of the stream.

This information is then modified to simulate the conditions that may be present as a result of a successful nonpoint source control project in the watershed. This second step indicates what may be expected after successful nonpoint source control.

Table A-2 shows the general conditions that need to be present in order for a stream to support various fishery types.

Groundwater Sampling

Nitrate is one of the oldest contaminants known to exist in Wisconsin groundwater. Nitrate is water soluble and moves easily through soil. It does not naturally occur in soil minerals or groundwater so any elevated levels are a result of human activities. Sources of nitrate in groundwater include fertilizers, animal waste, septic systems, and land disposal of nitrogen-containing waste in amounts that exceed the ability of plants to use it quickly.

Stream _____ Reach Location _____ Reach Score/Rating _____

County _____ Date _____ Evaluator _____ Classification _____

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. 10	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. 14	Heavy erosion evident. Probable erosion from any run off. 16
Watershed Nonpoint Source	No evidence of significant source. Little potential for future problem. 8	Some potential sources (roads, urban area, farm fields). 10	Moderate sources (small wetlands, tile fields, urban area, intense agriculture). 14	Obvious sources (major wetland drainage, high use urban or industrial area, feed lots, impoundment). 16
Bank Erosion, Failure	No evidence of significant erosion or bank failure. Little potential for future problem. 4	Infrequent, small areas, mostly healed over. Some potential in extreme floods. 8	Moderate frequency and size. Some "raw" spots. Erosion potential during high flow. 16	Many eroded areas. "Raw" areas frequent along straight sections and bends. 20
Bank Vegetative Protection	90% plant density. Diverse trees, shrubs, grass. Plants healthy with apparently good root system. 6	70-90% density. Fewer plant species. A few barren or thin areas. Vegetation appears generally healthy. 9	50-70% density. Dominated by grass, sparse trees and shrubs. Plant types and conditions suggest poorer soil binding. 15	<50% density. Many raw areas. Thin grass, few if any trees and shrubs. 18
Lower Bank Channel Capacity	Ample for present peak flow plus some increase. Peak flow contained. W/D ratio <7. 8	Adequate. Overbank flows rare. W/D ratio 8-15. 10	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. 14	Inadequate, overbank flow common. W/D ratio >25. 16
Lower Bank Deposition	Little or no enlargement of channel or point bars. 6	Some new increase in bar formation, mostly from coarse gravel. 9	Moderate deposition of new gravel and coarse sand on old and some new bars. 15	Heavy deposits of fine material, increased bar development. 18
Bottom Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition. 4	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. 8	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. 16	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. 20
Bottom Substrate/ Available Cover	Greater than 50% rubble, gravel or other stable habitat. 2	30-50% rubble, gravel or other stable habitat. Adequate habitat. 7	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 17	Less than 10% rubble gravel or other stable habitat. Lack of habitat is obvious. 22
Avg. Depth Riffles and Runs	Cold >1' 0 Warm >1.5' 0	6" to 1' 6 10" to 1.5' 6	3" to 6" 18 6" to 10" 18	<3" 24 <6" 24
Avg. Depth of Pools	Cold >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' 18 3' to 4' 18	<2' 24 <3' 24
Flow, at Rep. Low Flow	Cold >2 cfs 0 Warm >5 cfs 0	1-2 cfs 6 2-5 cfs 6	.5-1 cfs 18 1-2 cfs 18	<.5 cfs 24 <1 cfs 24
Pool/Riffle, Run/Bend Ratio (distance between riffles ÷ stream width)	5-7. Variety of habitat. Deep riffles and pools. 4	7-15. Adequate depth in pools and riffles. Bends provide habitat. 8	15-25. Occasional riffle or bend. Bottom contours provide some habitat. 16	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 20
Aesthetics	Wilderness characteristics, outstanding natural beauty. Usually wooded or un-pastured corridor. 8	High natural beauty. Trees, historic site. Some development may be visible. 10	Common setting, not offensive. Developed but uncluttered area. 14	Stream does not enhance aesthetics. Condition of stream is offensive. 16

Column Totals: _____

Column Scores E _____ +G _____ +F _____ +P _____ = _____ = Score

<70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor

Table A-2. Physical and Chemical Guidelines for Aquatic Life Use

Parameter A	Use Class and Criteria			
	B	C	D	E
Flow (cfs)(1)	>.5	>3	>.2	>.0
Water Quality Dissolved Oxygen (mg/l) (2)(3)	>4	>3	>3	>1
Temperature (Deg.F)(3)	<75	<86	<86	<90
pH (3) 5-9.5	5-10.5	5-10.5	4-11	4-11
Toxics (4) acute	<acute	<acute	acute	>acute
Habitat Rating (1)	<144	<144	<144	>200

- (1) Wisconsin DNR
- (2) U.S. EPA (1977)
- (3) Alabaster and Lloyd (1980)
- (4) U.S. EPA (1980)

"<" means "less than"
">" means "greater than"

Use Classes

- A: Cold Water Sport fishery
- B: Warm Water Sport fishery
- C: Valuable Tolerant Forage Fishery

- D: Rough Fish
- E: No Fishery

Source: DNR Technical Bulletin (Unpublished) (Ball, 1982).

Summary

The biotic index and the stream habitat assessment are both important tools for helping establish water quality and water use objectives in the watershed project. Although no water quality assessment tool can predict the changes in water quality and water use with 100 percent accuracy, these tools can be useful in appraising the current and potential future conditions of the water resources in the watershed project area.

Pollutant Source Assessment Methods

Introduction

Another part of the watershed planning process was collecting information on the various nonpoint sources of pollutants in the watershed. Data was collected under the supervision of the Dane County Land Conservation Department with funding support from the DNR. The LCD hired staff to gather the actual field data. The LCD reviewed and approved the quality of this data. Then the LCD sent the data to the DNR for analysis. The inventory methods used for each nonpoint pollutant source are described below.

Upland Sediment Inventory Methods

Upland erosion is of concern because it can be a major contributor of sediment to the water resources of a watershed. Sediment in streams and lakes adversely affects the water resources in many ways. Suspended sediment makes it difficult for fish to feed, and it abrades fish gills, making the fish more susceptible to disease. Suspended sediment also causes the water to be warmer in the summer, and warm water cannot hold as much oxygen as cold water. Sediment that settles out of the stream fills pools in streams and destroys fish habitat. Soil from cropland entering the water also contains nutrients and pesticides, which increases the algae and weed growth in lakes and harms the aquatic life of a water body.

An upland sediment source for this project is defined as the sheet and rill erosion from land areas. This erosion is commonly measured by sediment delivery in tons per acre per year. This sediment results from the overland flow of water on fields. It does not include the gully and streambank erosion, both of which also contribute sediment to the surface waters.

The evaluation for this project quantified upland erosion and estimated the amount of eroded sediment that reaches surface waters. Cropland, pastures, grasslands, woodlands and other open non-urban land uses were investigated. Individual parcels were identified on aerial photographs. Parcel boundaries were based on the slope, cropping pattern or predominant vegetation type, property boundaries, and drainage characteristics.

The inventory was conducted on the entire 7 square mile watershed, using existing data and field investigations. Existing data sources included site specific farm conservation plans, aerial photographs, U.S. Geological Survey 1"=2,000' scale quadrangle maps, and the county's soil survey. The information obtained for each parcel included size, soil type and its ability to erode, 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 Model, also called WINHUSLE (Baun, 1992). This analytical tool was developed by the Wisconsin Nonpoint Source Water Pollution Abatement Program to assess the pollution potential from eroding uplands. The WINHUSLE model calculates the average annual quantity of eroded soil that reaches surface waters by determining the soil loss and routing the runoff originating on each parcel under a "typical" year of precipitation. The parcels are ranked according to their potential to contribute sediment to surface waters.

Streambank Erosion Survey

Streambank erosion is bank failure along channels caused by the cutting action of water on the banks. This erosion is important because of its direct impact on fish habitat in terms of bank shade and cover, in addition to the impact of the sediment filling up the stream's pools. Streambank erosion is a natural process but is often accelerated by cultural activities such as grazing cattle.

The inventory method used to evaluate streambank erosion was a modification of Phase II of the Land Inventory Monitoring process (SCS). The main channels of all streams, were assessed with this method. For each erosion site, the method estimates the volume and the tons of sediment lost on a yearly average. This was done by measuring the length, height, and recession rate of each erosion site. Recession rates were determined based upon the physical characteristics of the eroded site. The volume of sediment was then multiplied by the density of the sediment to obtain the tons of soil loss from the site. Along with this data, location, landowner identification, and cattle access was collected for each site. Field personnel collected this information by walking the streams. Each erosion site was located on ASCS eight-inch-to-the-mile air photos.

Barnyard Runoff Inventory Methods

Livestock operations are the major type of agriculture in the Dunlap Creek Watershed. All barnyards were inventoried to determine the impact of barnyard runoff on water quality. Barnyard runoff carries manure to the streams and ponds of the watershed.

Manure contains several components that adversely affect water quality and aquatic life. Manure contains nitrogen in the form of ammonia. In high concentrations ammonia can be toxic to fish and other aquatic life. When manure enters a water system, the breakdown of the organic matter depletes oxygen which fish and other organisms require to survive. Also, the nutrients in manure (including nitrogen and phosphorus) will promote nuisance algae and weed growth in the streams and ponds. Finally, bacteria found in livestock manure is harmful to other livestock drinking the water, and humans using the water for recreation.

The United States Department of Agriculture - Agriculture Research Service developed a computer model to estimate the amount of pollutants coming from a barnyard as a result of a rainstorm (Young, et al. 1982). This model was modified by the Wisconsin DNR's Nonpoint Source and Land Management Section. The model has been used to indicate which barnyards within a watershed have the greatest potential to affect water quality from rainfall runoff that washes through a barnyard. The model does not assess any needs for manure storage or the impact from manure runoff from spread fields. It only assesses the barnyard runoff pollutant quantities.

The information needed to run this model was collected on all of the barnyards in the Dunlap Creek Watershed. The data this model requires includes: the types and numbers of livestock, the size of the yard, the physical characteristics of the area which contributes surface runoff waters to the yard, and the physical characteristics of the area through which the runoff waters leaving the barnyard flow before becoming channelized. A rainfall amount is assigned to the model. An average annual rainfall event was selected.

With this information, the model calculates the pounds of phosphorus and the pounds of Chemical Oxygen Demand (COD) for each barnyard as a result of the selected rainfall event. Chemical Oxygen Demand is a measure of the amount of organic material in the barnyard runoff.

Manure Spreading Runoff

The disposal of livestock wastes on land is a concern for water quality when manure is spread on frozen land with steep slopes or on land in a floodplain. Under these conditions, the spread manure runs off with melting snow or winter rain and enters the streams and lakes of the watershed. The impacts from this runoff are the same as those mentioned in the barnyard runoff discussion.

A complete inventory of winter spread manure was not done for this project. See Chapter 4 for description of eligibility criteria.

Point Sources of Pollution

There are no known point sources of pollution in the Dunlap Creek watershed.

Gully Inventory Methods

Staff from the LCD and Soil Conservation Service (SCS) did extensive field surveys of the gullies in Dunlap Creek. Data was also collected from soils maps, aerial photos, farm plans, and talking with individual landowners.

APPENDIX B: Proposed Sediment Evaluation and Monitoring in Dunlap Creek

Dunlap Creek Watershed has severe sediment erosion problems, sediment appears to be the limiting factor for fish, and gullies are a major problem for several landowners. A large (24 foot) grade stabilization structure was proposed and is anticipated to control 30 to 50% of the sediment entering the stream. To assess the effectiveness of this BMP, the following monitoring strategy is proposed.

1. Five sites will be monitored, one each above and below the bridges at Wood Sand Hill Road and Wilkinson Road, and one above the bridge at Route 78.
2. The sites will be somewhere between 100 and 200 feet from each bridge, marked with a stake on shore (with landowner's permission), and near obvious landmarks (tree, fence, boulder, etc.).
3. At each site a numbered stick (ski pole, etc.) will be used to measure sediment depth.
4. At each site three to five measurements will be taken, in the middle and sides of the stream. The stream width will also be measured.
5. At each site at least four transects (3-5 depth measurements plus stream width) will be measured over a 100 yard length of the stream.
6. The monitoring will be done at least once per year, in August or September.
7. County staff will record major weather trends (drought, huge storms, etc.) in an attempt to account for variability. More monitoring may be done, before and/or after large rain events, and depending on the weather. Recording water levels from the bottom of bridges may tell whether there is less water or more sediment in the stream.
8. The DNR (central office) will conduct a detailed habitat assessment using the John Lyons technique. This will be done at least once in 1993 and once 1-2 years after the grade stabilization structure is installed.
9. The sediment retained by the grade stabilization structure will be measured and an approximate volume calculated.

10. County staff will be responsible for collecting data. In the first year DNR will assist the county.
11. The site locations, procedure, and data will be written up and recorded by the county, with a copy sent to the DNR project manager.
12. This strategy will be considered a "special project" in the evaluation chapter of the watershed plan.

APPENDIX C: GLOSSARY

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 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. Thus algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:

A form of nitrogen (NH₃) found in human and animal wastes. Ammonia can be toxic to aquatic life.

ANAEROBIC:

Without oxygen.

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.

AVAILABILITY:

The degree to which toxic substances or other pollutants that are present in sediments or elsewhere in the ecosystem 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. The amount of oxygen, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, and some are important in the stabilization of organic wastes.

BARNY:

The Wisconsin Barnyard Runoff Model, a computer model used to assess the water quality impacts of barnyards on feedlots. The DNR developed this model with assistance from SCS and DATCP.

BASIN PLAN:

See "Areawide Water Quality Management Plan".

BENTHIC ORGANISMS (BENTHOS):

The 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.

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 which 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.

CAMPS:

Computer Assisted Management and Planning System, a computer data management system that was developed by the U.S. Soil Conservation Service (SCS). In 1994-1995 CAMPS will be updated to FOCS, Field Office Computer System.

CLEAN WATER ACT:

See "Public Law 92-500."

CONSERVATION TILLAGE:

Planting row crops while disturbing the soil only slightly. In this way a protective layer of plant residue stays in the surface; erosion is decreased.

CONSUMPTION ADVISORY:

A health warning issued by DNR and WDHSS that recommends that 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, as a pollutant suggests that 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.

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 are often due to inadequate wastewater treatment. The DNR considers 5 ppm DO necessary for fish and aquatic life.

ECOSYSTEM:

The interacting system of biological community and its nonliving surrounding.

EFFLUENT:

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

EFFLUENT LIMITS:

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

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.

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.

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.

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.

GREEN STRIPS:

See buffer strip.

GROUNDWATER:

Underground water-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water and 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.

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.

LCD:

County Land Conservation Department

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 BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutants 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 to "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 in which 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 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.

NPS:

See nonpoint source pollution.

OLIGOTROPHIC:

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

PESTICIDE:

Any chemical agent used for control of 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.

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.

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 set 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 discharges 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.

RAP:

See Remedial Action Plan.

RECYCLING:

The process by which waste materials are transformed into new products.

REMEDIAL ACTION PLAN:

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

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.

SCS:

U.S. Soil Conservation Service

SECONDARY IMPACTS:

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

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 which provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):

Small particles of solid pollutants suspended in water.

TOXICITY:

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

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.

UDC:

Uniform Dwelling Code, a building code consisting of statewide regulations for electrical, heating, ventilation, fire, structural, plumbing, construction site erosion and other related practices, generally used by communities of at least 2,500 inhabitants.

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.

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 percent of organic pollutants.

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:

Those 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 land. The DNR developed this model with assistance from SCS.

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 percent 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):

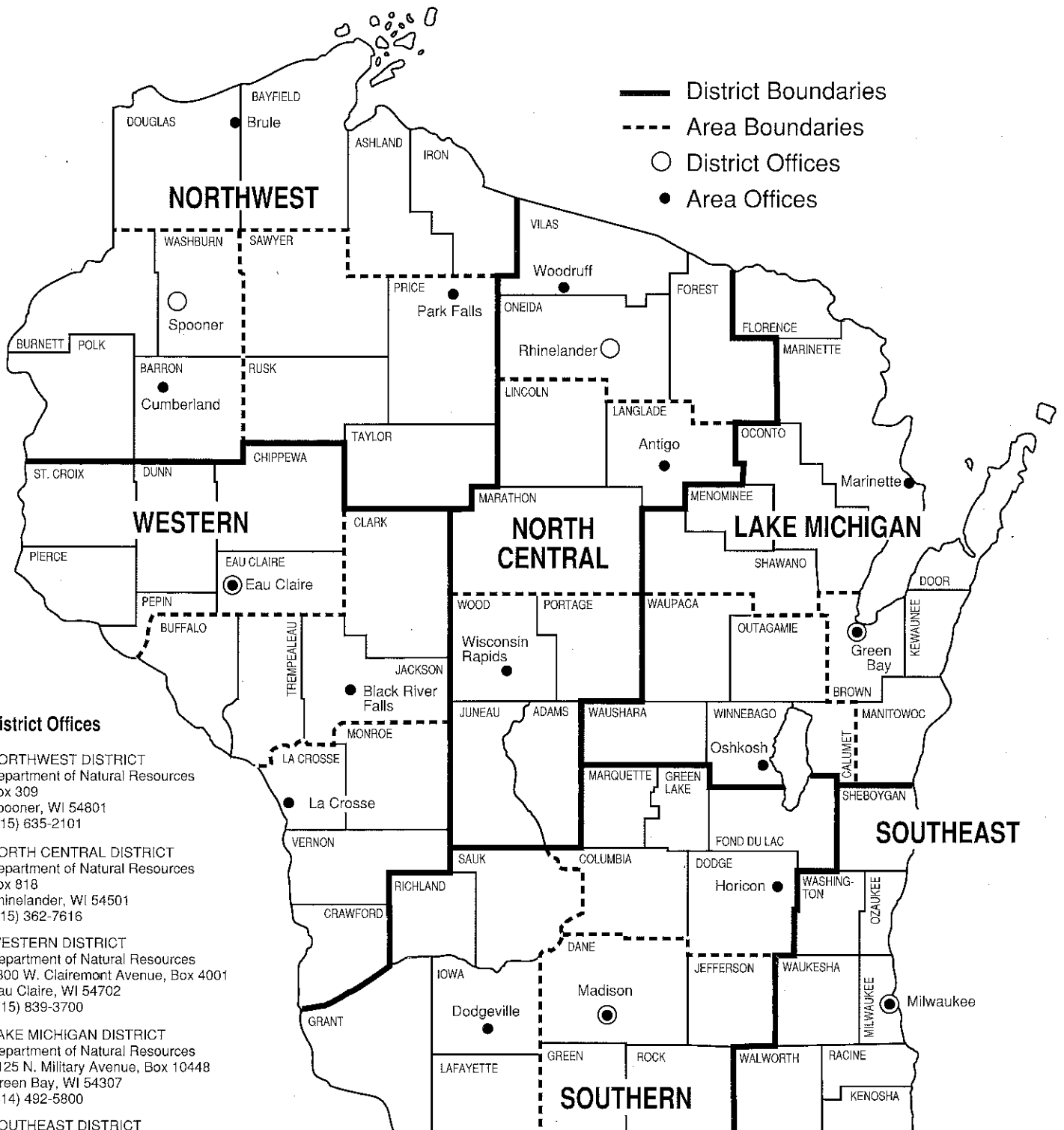
A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

Priority Watershed Projects in Wisconsin 1993

<u>Year Selected- Map Number</u>	<u>Large-scale Priority Watershed Project</u>	<u>County(ies)</u>	<u>Year Selected- Map Number</u>	<u>Small-scale Priority Watershed Project</u>	<u>County(ies)</u>
79-1	Galena River*	Grant, Lafayette	90-1	Arrowhead River & Daggels Creek	Winnebago, Outagamie, Waupaca
79-2	Elk Creek*	Trempealeau	90-2	Kinnickinnic River	Milwaukee
79-3	Hay River*	Barron, Dunn	90-3	Beaverdam River	Dodge, Columbia, Green Lake
79-4	Lower Manitowoc River*	Manitowoc, Brown	90-4	Lower Big Eau Pleine River	Marathon
79-5	Root River*	Racine, Milwaukee, Waukesha	90-5	Upper Yellow River	Wood, Marathon, Clark
80-1	Onion River*	Sheboygan, Ozaukee	90-6	Duncan Creek	Chippewa, Eau Claire
80-2	Sixmile-Pheasant Branch Creek*	Dane	91-1	Upper Trempealeau River	Jackson, Trempealeau
80-3	Big Green Lake*	Green Lake, Fond du Lac	91-2	Neenah Creek	Adams, Marquette, Columbia
80-4	Upper Willow River*	Polk, St. Crox	92-1	Balsam Branch	Polk
81-1	Upper West Branch Pecatonica River*	Iowa, Lafayette	92-2	Red River - Little Sturgeon Bay	Door, Brown, Kewaunee
81-2	Lower Black River*	La Crosse, Trempealeau	93-1	South Fork Hay River	Dunn, Polk, Barron, St. Croix
82-1	Kewaunee River*	Kewaunee, Brown	93-2	Branch River	Manitowoc, Brown
82-2	Turtle Creek	Walworth, Rock	93-3	Soft Maple/Hay Creek	Rusk
83-1	Oconomowoc River	Waukesha, Washington, Jefferson	93-4	Tomorrow/Waupaca River	Portage, Waupaca, Wausara
83-2	Little River	Oconto, Marinette			
83-3	Crossman Creek/Little Baraboo River	Sauk, Juneau, Richland	Year Selected- Map Number	Small-scale Priority Watershed Project	County(ies)
83-4	Lower Eau Claire River	Eau Claire	SS-1	Bass Lake*	Marinette
84-1	Beaver Creek	Trempealeau, Jackson	SS-90-1	Dunlap Creek	Dane
84-2	Upper Big Eau Pleine River	Marathon, Taylor, Clark	SS-90-2	Lowes Creek	Eau Claire
84-3	Sevenmile-Silver Creeks	Manitowoc, Sheboygan	SS-90-3	Port Edwards - Groundwater Prototype	Wood
84-4	Upper Door Peninsula	Door	SS-91-1	Whittlesey Creek	Bayfield
84-5	East & West Branch Milwaukee River	Fond du Lac, Washington, Sheboygan, Dodge, Ozaukee	SS-91-2	Spring Creek	Rock
84-6	North Branch Milwaukee River	Sheboygan, Washington, Ozaukee, Fond du Lac	Year Selected- Map Number	Priority Lake Project	County(ies)
84-7	Milwaukee River South	Ozaukee, Milwaukee	PL-90-1	Minocqua Lake	Oneida
84-8	Cedar Creek	Washington, Ozaukee	PL-90-2	Lake Tomah	Monroe
84-9	Menomonee River	Milwaukee, Waukesha, Ozaukee, Washington	PL-91-1	Little Muskego, Big Muskego, Wind Lakes	Waukesha, Racine Milwaukee
85-1	Black Earth Creek	Dane	PL-92-1	Lake Noquebay	Marinette
85-2	Sheboygan River	Sheboygan, Fond du Lac, Manitowoc, Calumet	PL-92-2	Lake Ripley	Jefferson
85-3	Waumandee Creek	Buffalo	PL-93-1	Camp/Center Lakes	Kenosha
86-1	East River	Brown, Calumet	PL-93-2	Lake Mendota	Dane, Columbia
86-2	Yahara River - Lake Monona	Dane	PL-93-3	Hillsboro Lake	Vernon
86-3	Lower Grant River	Grant			
89-1	Yellow River	Barron			
89-2	Lake Winnebago East	Calumet, Fond du Lac			
89-3	Upper Fox River (Ill.)	Waukesha			
89-4	Narrows Creek - Baraboo River	Sauk			
89-5	Middle Trempealeau River	Trempealeau, Buffalo			
89-6	Middle Kickapoo River	Vernon, Monroe, Richland			
89-7	Lower East Branch Pecatonica River	Green, Lafayette			

* Project completed

DNR Field Districts and Areas



An outline map of the state of Wisconsin, including the Door County peninsula and the Apostle Islands in Lake Superior. The map is centered on the page.

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.

