Lower Black River Priority Watershed Project

Final Report

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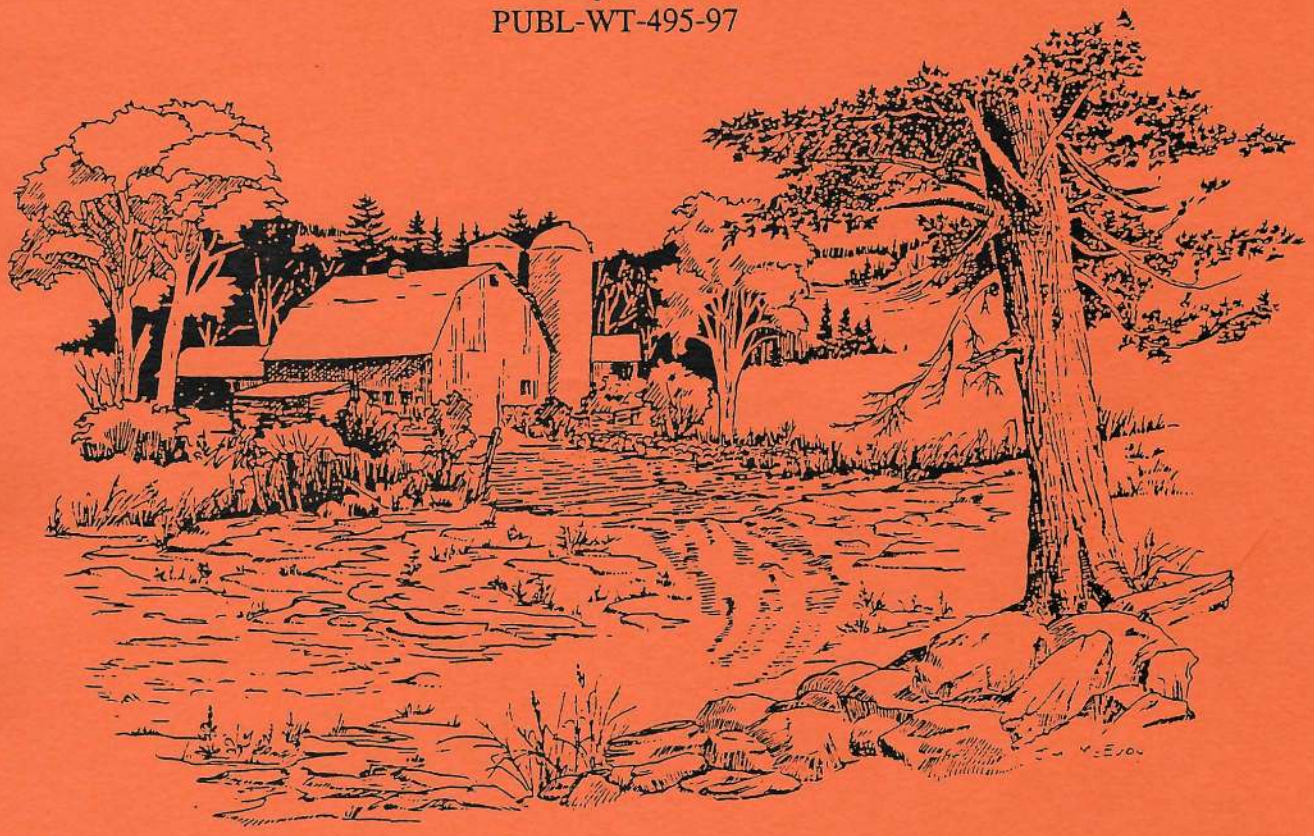

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Table of Contents

List of Tables

List of Maps

List of Figures

List of Appendices

Executive Summary

Introduction

The Lower Black River watershed in LaCrosse and Trempeleau Counties was selected as a priority watershed in 1981 under the Wisconsin Nonpoint Source Water Pollution Abatement (NPS) Program administered by the Wisconsin Department of Natural Resources (DNR). The project, which began in 1983, was administered and implemented locally by the LaCrosse County Land Conservation Department and the Trempeleau County Land Conservation Department. Best managment practices (BMPs) were installed in the watershed from 1985 to 1993. The watershed is located in northwest La Crosse County and southern Trempeleau County and includes 167 square miles of land draining to the Black River and its tributaries from the confluence with Fleming Creek downstream to the Mississippi River and the tributaries to Lake Onalaska (Map 1).

Water resource objectives identified in the 1983 plan focused on improving the fish habitat on Halfway Creek, Jostad Creek, Creamery Creek and the Black River by reducing sediment and organic loading and improving streambank cover. The project also sought to acheive incremental reductions in the sediment load to the Mississippi River and Lake Onalaska by reducing the sediment load coming from Fleming Creek, Grant Creek, Halfway Creek, Sand Lake Creek and the Black River. The reduction in sediment load to Lake Onalaska was expected to contribute to the preservation of its warmwater fishery and its recreational value.

Land Management

Increased Chemical Oxygen Demand (COD) from barnyard runoff, which reduces the amount of dissolved oxygen available to fish and aquatic invertebrates, was identified as a major concern in the plan. Eroding cropland on steep slopes was estimated to contribute 77% of the sediment load delivered to the streams in the watershed and eventually Lake Onalaska, with eroding streambanks and eroded soil from grazed woodlands and pastures on steep slopes contributing about equally to the remainder of the sediment load. The plan identified the most critical areas contributing the largest percent of nonpoint pollutants in determining the Priorty Management Area (PMA) on which the project would focus. Because of its steep topography the coulee region in the eastern two thirds of the watershed was designated as the priority management area. Landowners in this area were identified as eligible for cost-share assistance for installing Best Management Practices (BMPs) aimed at reducing nonpoint pollution (Map 2).

Of the 540 eligible land parcels, 75, or 14%, were covered by a cost share agreement with the landowner. When viewed in terms of the percent of targeted BMPs that were installed the project was more successful, with participation in targeted BMPs generally ranging between 40% and 70%. The project acheived notable successes in acheiving higher participation in several BMPs aimed at reducing soil erosion. While 30 acres were targeted in the plan as critical areas to be stabilized, almost twice that number, 57 acres, were stabilized. In addition, 72% of the needed grade stabilization structures were installed, and 67% of the needed grassed waterways were installed. In terms of streambank protection, about half of the targeted cattle crossing and streambank stabilization BMPs were installed. The lowest percentages of targeted BMP installation were 31% for contour stripping, 24% and 25% for fencing to keep livestock from trampling streambanks and wood lots, respectively.

Water Resources

DNR collected pre- and post-implementation data on water chemistry (from a USGS gauge station on the Black River), aquatic macroinvertebrates (using the Hilsenhoff Biotic Index) and stream habitat (using the Stream Classification Guidelines for Wisconsin). Post-implementation studies to determine the effectiveness of BMP installation concentrated on smaller streams in the eastern coulee region. Improvements in stream habitat were noted at one section of Halfway Creek and Upper Fleming Creek, but most of the evaluated streams showed little or no improvement. Evaluators noted that bank erosion was dramatically reduced and habitat scores improved in stream sections where cattle fencing was installed, but water quality gains from these improvements were offset by continuing streambank erosion, sedimentation and organic loading from upstream sections where cattle access to the stream is not controlled.

Results from aquatic macroinvertebrate sampling in upper and lower Fleming Creek and Halfway Creek did not show a significant difference between scores before and after the project. However, all these streams had very good water quality according to the Hilsenhoff Biotic Index both before and after the project. Water chemistry data from the USGS gauge station did not show significant differences in water quality before, during or after the watershed project.

Overall, improvements in water quality and stream habitat have been difficult to assess due to the limited participation of landowners installing BMPs. It may also be too soon to to be able to measure the effects of BMP installation on water quality and stream habitat

Financial Management

The Lower Black River Priority Watershed Project was one of the few projects where the cost-share funds set aside at the beginning of the project, 1.5 million, was nearly expended at the end of the project, or 1.3 million. Dollars spent through cost-sharing is not a good

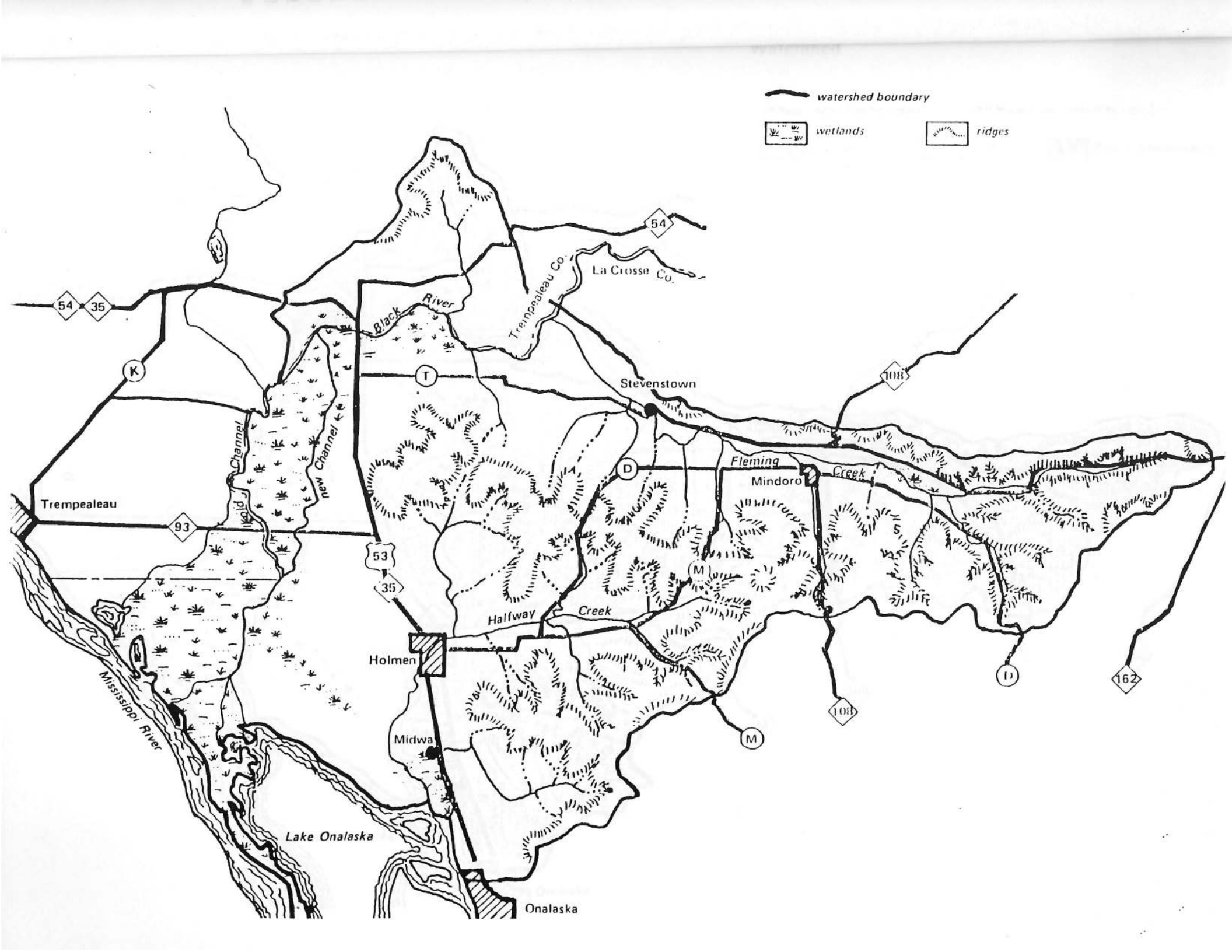
measure of success, however, this indicates that landowner cooperation was good and that almost all the projects that were agreed upon to be installed, were installed.

Landowner/local share contributions for this priority watershed project totalled $540,000. Compared to the $1,708,000 total state expenditures, 32% of the funds involved in this voluntary program had their source at the local level. The remaining 76% of the funds were split into two types of grants. A total of $398,000. in Local Assistance Grants (LAGs) was used by both LaCrosse and Trempeleau counties to support project planning and program administrative costs at the local level. The remaining $1,310,000 contributed by the state was in the form of Nonpoint Source Grants (NPS). These are the funds used for cost sharing installation of best management practices (BMPs). Conservation practices that landowners installed were cost-shared at the 70 to 80% rate, depending on the practice.

Conclusion

The Lower Black River Priority Watershed can be considered a success for several reasons. The majority of the landowners who participated in this project represented mostly full-time farming operations. Comparisons of practice installation rates show that more practices were installed per agreement than in any other watershed. The question regarding the extent of improvements made in water quality has been better addressed in newer watershed projects where more prior water quality data is collected. There is lack of sufficient monitoring data to confirm that overall water quality has improved, however, common sense dictates that installation of a typical barnyard best management practice would greatly reduce nitrate and phosphorus loadings to a stream. The installation of the barnyard systems provided the greatest probable benefit to improving water quality. Once a few systems were installed, they tended to sell themselves within and outside the watershed project area. Cost-sharing on the 57 barnyard systems installed represented the biggest portion of state funds spent on the project. Of the 1.4 million dollars spent in cost-sharing, $678,000. was applied toward the barnyard systems.

The Lower Black River Priority Watershed Project was well supported by the counties and the Department of Natural Resources. Adequate funding was available to suppport needed staff, equipment and supplies. Following the eight and one-half years duration of this project, an evaluation of project management was done. The exchange of information was positive in that suggestions and criticisms of what worked and what didn't work can be used to improve future project planning and implementation. Measuring past successes and failures is a way to improve the continually evolving Nonpoint Source Program. At the close of the Lower Black River project, it was discovered that one of the key elements for insuring success of future projects is to expand and emphasize the Information and Education (I & E) aspect of watershed management.


watershed boundary
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Lake Onalaska
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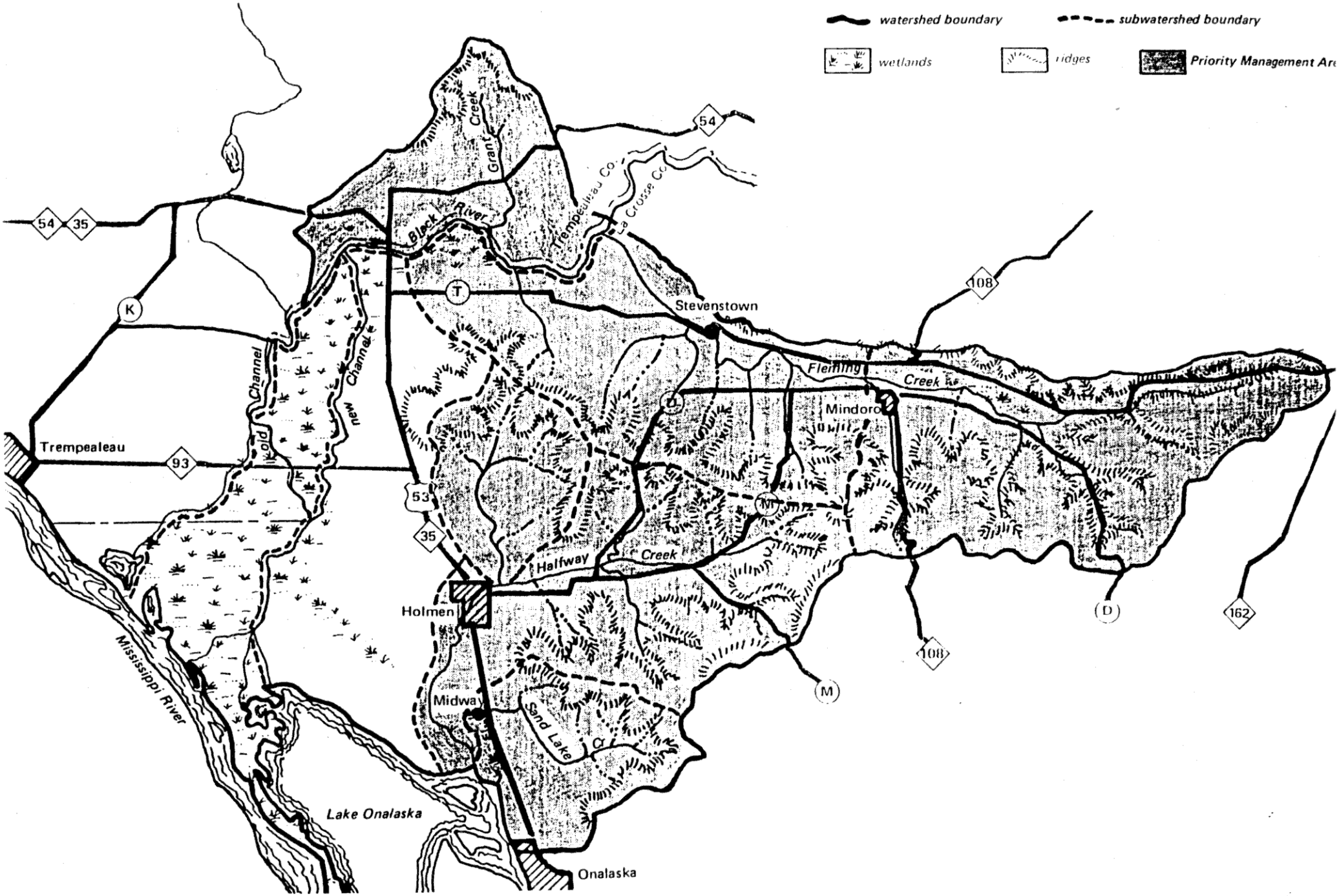
162

Map 2 : Priority Management Area for the Black River Watershed



Introduction

This report is required under the Evaluation Plan of the Soil and Water Resource Management and Nonpoint Source Program. The report evaluates the degree to which both water resource and land management project objectives were accomplished. It also analyzes local project management, documents financial trends, and serves as a mechanism for targeting areas for improvements in the NPS Program. A glossary is provided in Appendix A to define programmatic terms.

In 1978, the Wisconsin Legislature created the Wisconsin Nonpoint Source Water Pollution Abatement Program (NPS). The primary goal of the NPS Program is to improve and protect the water quality of streams, lakes, wetlands, and groundwater by reducing pollutants from urban and rural nonpoint sources. Pollutants from nonpoint sources can be carried to surface water or groundwater through rainfall runoff or seepage, and snowmelt. The Program seeks water quality improvement by providing technical and financial assistance to those individuals or entities who voluntarily implement nonpoint source controls, usually referred to as Best Management Practices (BMPs), and to those municipalities who adopt local ordinances controlling nonpoint pollution.

In 1981 the Lower Black River Watershed in LaCrosse and Trempealeau Counties was designated a priority watershed by the Department of Natural Resources under the NPS program. The watershed plan was developed by the DNR and LaCrosse and Trempealeau County Land Conservation Departments (LCDs). The project began in 1981 and ended in 1993, with the Implementation Phase from 1983 to the end of the project.

During the project, the Lower Black River Priority Watershed sought to:

* Improve existing trout fishery in Halfway Creek, Jostad Creek and Creamery Creek;

* Protect the smallmouth bass habitat in the stretch of the Black River upstream of STH 53; and

* Contribute to the preservation of the existing warmwater fishery and recreational value of Lake Onalaska while reducing sediment loads from Fleming Creek, Grant Creek, Black River, Halfway Creek and Sand Lake Creek.

Two counties, LaCrosse and Trempealeau, have been responsible for administering and implementing the program at the local level. Specific guidelines and practices necessary to achieve the project's goals were set out in the Lower Black River Priority Watershed Plan and are discussed in more detail as follows.

The purposes of this final report are to:

1. Report and evaluate the progress of LaCrosse and Trempealeau Counties in project implementation and management.

2. Evaluate and provide documentation on whether water quality objectives have been attained in the project.

3. Evaluate and provide documentation on whether pollutant load reduction goals have been met and whether they have improved water quality in the project.

4. Evaluate the BMP implementation process, and the effectiveness of BMPs in reducing the pollutants in the project.

5. Provide recommendations which target key areas needing improvement in the NPS program, and reinforce positive aspects of the program.

6. Inform and educate landowners, operators, and other citizens in and near the watershed.

Watershed Description

The Lower Black River Watershed is located in northwest LaCrosse and southern Trempealeau counties. The watershed extends from the Black River at the confluence with Fleming Creek downstream to the Mississippi River and to Lake Onalaska. The watershed encompasses 167 square miles and nearly 107,000 acres and is located in the driftless, unglaciated southwestern part of Wisconsin.

The LaCrosse County portion of the watershed is about 137 square miles (about 82% of the watershed area). Incorporated areas in the LaCrosse County portion of the watershed include the Village of Holmen and a portion of the City of Onalaska. Holmen is the only incorporated area entirely within the watershed. The Cities of LaCrosse and most of Onalaska are immediately south of the watershed. The remaining 30 square miles (18%) of the watershed is in Trempealeau County.

In 1983 land use was predominantly rural; 41% of the land was used for agriculture and 44% was woodland, with wetlands, farms and urban areas comprising the remaining 15%. The major agricultural use throughout the watershed was dairy farming, with some cash cropping, primarily corn and soybeans, in the prairie areas. Some scattered beef operations existed. The 1980 population was just over 10,000.

The eastern two-thirds of the watershed, which contains most of its smaller streams, is characterized by steep coulee terrain of sandstone ridges and narrow stream valleys. Soils are well drained and very susceptible to water erosion, especially on steeper slopes and where gullies have cut into the sandy subsoils. Dairying is the primary agriculture in this area. Most farming occurs on steep valley slopes with the farms often located directly adjacent to

the streams. Fields are generally small and irregularly shaped. The western one-third is nearly level prairie areas of the Black River delta and Mississippi River Valley benches. Farm fields here are larger, more regularly shaped and better for cash cropping than the uplands. The Black River floodplain is too wet for agriculture and is primarily wetland wildlife habitat.

Water Resources Assessment

The water resources inventory in the plan described the condition of the watershed's streams and lakes. There are 18 named streams, approximately 13 miles of which were classified as trout streams on Jostad, Creamery and Halfway Creeks. The stretch of the Black River upstream of STH 53 supported a smallmouth bass fishery. The Black River also supported northern pike, walleye, largemouth bass, bluegills, channel catfish and black crappies. Other streams in the watershed primarily supported a forage fishery. Streams supporting trout and smallmouth bass fisheries are shown in Map 3. Map 4 shows the subwatersheds.

Fleming Creek and Halfway Creek are the major streams in the Lower Black River Watershed. Because of the steep coulee topography there are a number of tributaries to each of the major streams. Many of these tributaries are flashy and have intermittant flows within parts of their reaches or during drier months.

DNR Fish Managers felt there was moderate potential to improve the fishery on Fleming Creek upstream of Mindoro to support trout and also improve the water quality in Creamery Creek to upgrade it from a Class III trout stream to a naturally reproducing trout stream. Portions of Halfway Creek and the length of Jostad Creek were judged to have good potential for fishery improvement.

There are numerous small lakes and extensive wetlands in the Mississippi River floodplain and the floodplain along the lower Black River. The major lake in the watershed is Lake Onalaska which is a shallow 5,400 acre impoundment at the confluence of the Black River and the Mississippi River formed by Lock and Dam # 7 on the Mississippi. Halfway Creek and Sand Lake Creek also contribute small volumes of water during periods of high flow, but runoff from these streams during intense storms was very high in suspended sediment (Claflin, 1970). Halfway Creek was identified as a major nutrient source for Lake Onalaska (Dawson, 1982).

Lake Onalaska supported a warmwater fishery totalling over 40 species (including commercial harvesting of carp), but also received high nutrient and sediment loads from almost the entire watershed. As a result, Lake Onalaska was losing open water area, algae blooms were occurring, densities of aquatic plants were increasing and excess sediment and nutrient loading to the lake was increasing the potential to lose a well balanced largemouth bass and bluegill fishery. There was an estimated loss of 31% of the lake volume in the last 40 years due to sedimentation.

Nonpoint Source Assessment

Land uses surveyed in the Lower Black River watershed included cropland, woodland, pastures, barnyards, streambanks and urban areas.

The watershed plan identified excess sediment as the major cause of water quality problems in the Lower Black River watershed and in Lake Onalaska. The GREAT I Study of the Upper Mississippi River Basin identified the Lower Black River watershed as having a severe erosion hazard and the potential to significantly contribute to the sediment problems in the Mississippi River.

The primary source of sediment was excess cropland erosion which contributed approximately 77% of the total sediment load delivered to the streams from the watershed. A large percent of the cropland erosion comes from a small percent of the cropland acres which had high rates of tons per acre per year of soil loss. Erosion on woodlands, pastures and streambanks each contribute about equally to the remaining 23% of the sediment load to streams from the watershed. Again, a small percent of the acres on steep slopes where cattle were grazed on both woodlands and grasslands, caused a very large percent of the woodland and pasture sediment load. Most of the streambank erosion occurred along relatively short stretches of the streambanks where erosion rates were high. Cattle access to streams which can aggravate streambank erosion and reduce fish habitat, was common throughout the watershed. 101 barnyards in the watershed were considered high potential sources of organic material and suspended sediments to the streams.

Specific water quality problems and the nature of the nonpoint source pollutants made it difficult to define specific objectives that were reasonable and economically feasible yet would produce quantifiable improvements in water quality. Aesthetic improvements were also important but difficult to quantify. The following objectives were identified in the plan:

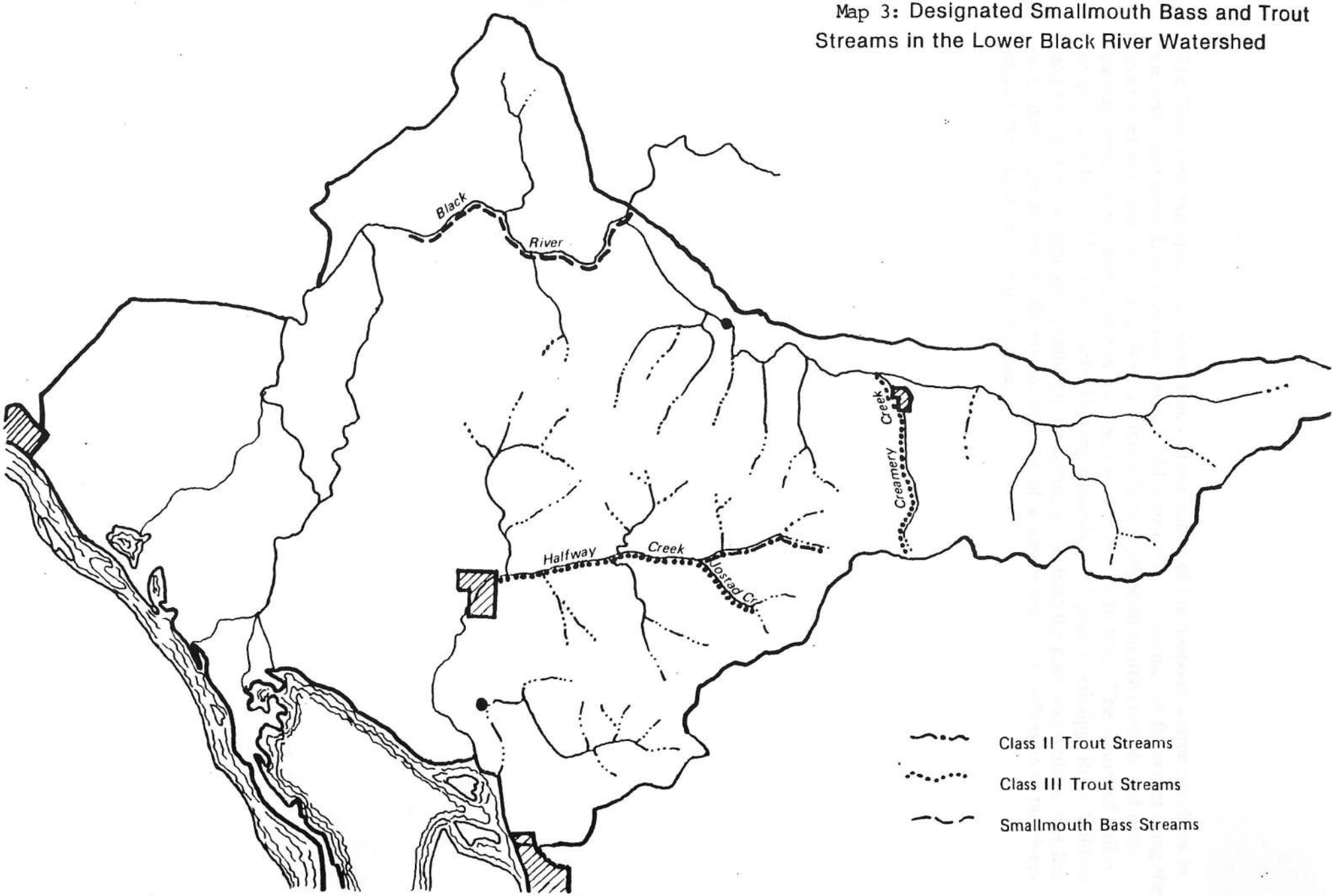
1. Improve existing trout fishery in Halfway Creek, Jostad Creek and Creamery Creek by reducing sediment and organic loads and improving fish habitat and streambank cover.

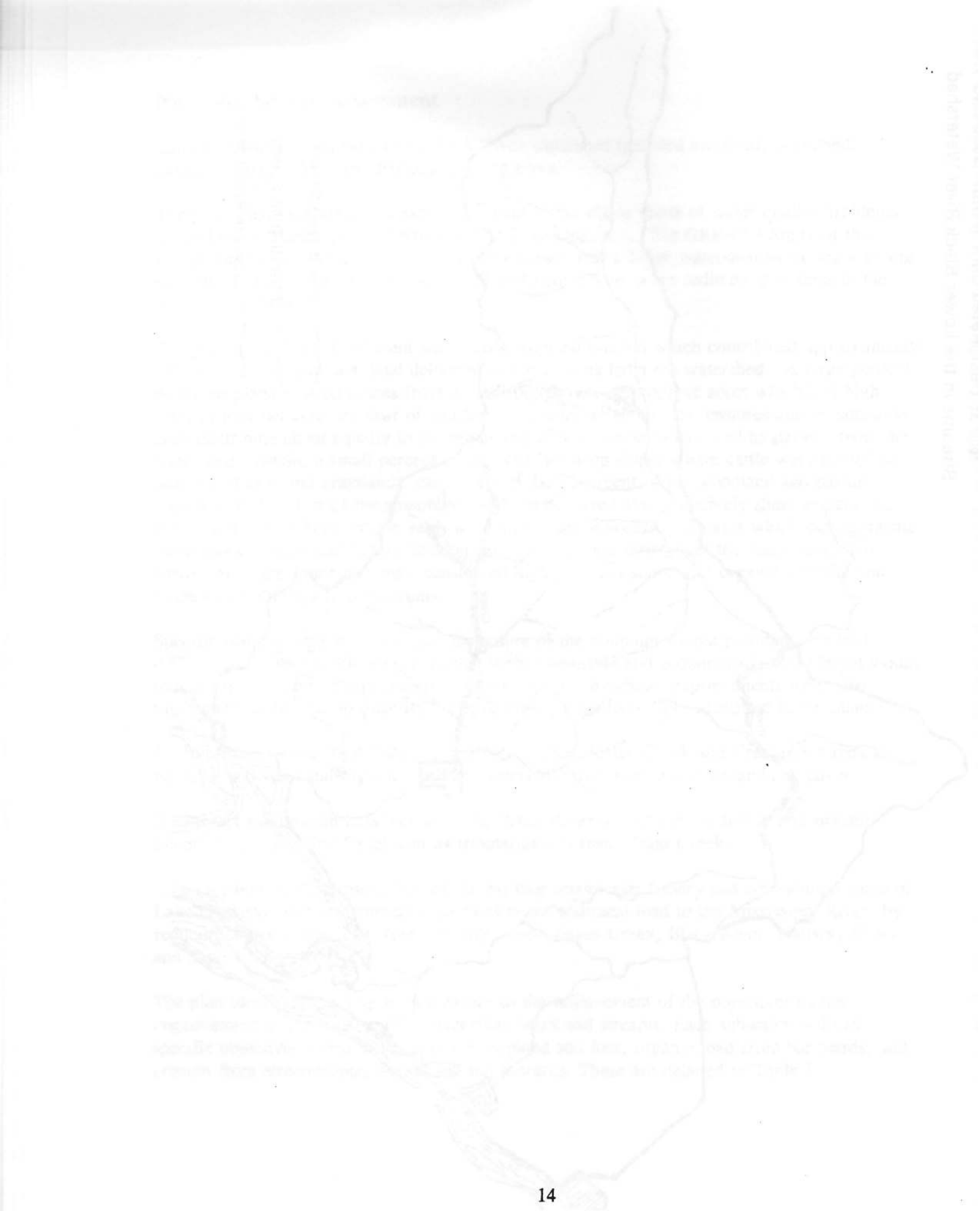
2. Protect smallmouth bass habitat of the Black River by reducing sediment and organic material from Fleming Creek and its tributaries and from Grant Creek.

3. Contribute to the preservation of the existing warmwater fishery and recreational value of Lake Onalaska with incremental reductions in the sediment load to the Mississippi River, by reducing the sediment load from Fleming Creek, Grant Creek, Black River, Halfway Creek and Sand Lake Creek.

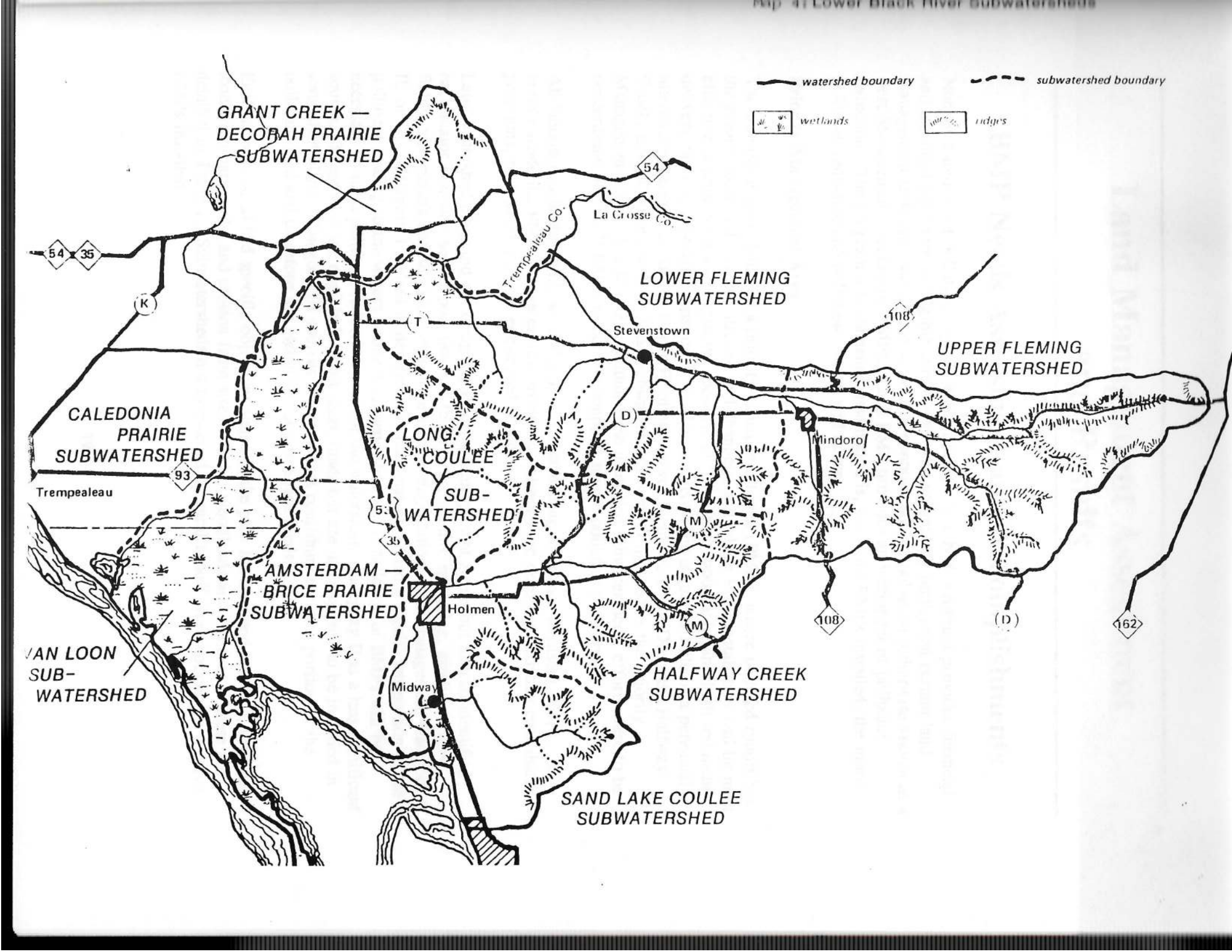
The plan identified the long term measure of the achievement of the objectives as the improvement in the fishery of the watershed lakes and streams. Each subwatershed had specific objectives stated in the plan for cropland soil loss, organic load from barnyards, and erosion from streambanks, woodlands and pastures. These are detailed in Table 1.

Map 3: Designated Smallmouth Bass and Trout Streams in the Lower Black River Watershed





The DNR Fish Managers were optimistic that correction of the nonpoint source problems in the watershed could lead to as much as a 5-fold increase in the number of fishermen using the trout streams in the watershed. With a combination of nonpoint source controls and trout habitat improvement the increase in use could be as much as 10-fold. The continued ability of the Black River, Van Loon Public Hunting Grounds and Upper Mississippi River Wildlife and Fish Refuge to support recreational use levels, at the time the plan was written, was felt to be dependent on abating the nonpoint source of sediment and other pollutants to the rivers before the effects became irreversible


watershed boundary
subwatershed boundary
wetlands
ridges
GRANT CREEK — DECORAH PRAIRIE SUBWATERSHED
La Crosse Co.
Trempealeau Co.
LOWER FLEMING SUBWATERSHED
Stevenstown
UPPER FLEMING SUBWATERSHED
CALEDONIA PRAIRIE SUBWATERSHED
LONG COULEE SUB-WATERSHED
Trempealeau
Mindoro
AMSTERDAM — BRICE PRAIRIE SUBWATERSHED
Holmen
Midway
VAN LOON SUB-WATERSHED
HALFWAY CREEK SUBWATERSHED
SAND LAKE COULEE SUBWATERSHED
54
35
K
T
D
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M
108
162

Land Management Assessment and Results

BMP Needs Assessment and Accomplishments

Nonpoint sources of pollution degrade water quality. The NPS Program provides financial and technical assistance to eligible landowners who voluntarily implement certain land management techniques developed to control nonpoint source pollution (otherwise known as a Best Management Practice or BMP). Each BMP provides an increment of pollutant reduction. The program's fundamental assumption is, the more BMPs installed, the more pollution reduction and pollution control will occur.

Priority Management Area

The watershed plan identified a priority management area (PMA) where polluted runoff has the greatest potential to reach streams and channels, and where BMP installation will be most effective at improving water quality. Because of their steep topography and high sediment delivery rates, and because most of the land area falls within a quarter mile of a perennial or intermittent stream, all of the Upper Fleming, Lower Fleming, Grant-Decorah, Halfway Creek, Long Coulee and Sand Lake subwatersheds were designated as the Priority Management Area. (See Map 2). Within these identified subwatersheds, efforts were to be concentrated to install BMPs to correct nonpoint source pollution problems.

All landowners in the PMA were eligible for cost sharing assistance to install BMPs. In areas outside the PMA, where critical erosion problems were occuring, existing cost share programs, such as ACP, were considered adequate.

Later watershed plans did not designate Priority Management Areas but instead identified each major nonpoint source pollution site (barnyards, manure spreading, eroding upland fields, streambank and shoreline erosion or habitat degradation) as a Management Category I, II, or III. Category I is used to designate sources that generated a significant portion of the pollutant loading to the waters within a subwatershed and installation of BMPs will be necessary to meet pollutant reduction goals of the watershed. Category II is a less significant source. These sites are eligible for cost-share funds but are not required to be included in watershed plans. Category III sources are those that contribute a minor portion of the pollutant load and therefore are ineligible for cost-share funds.

Each subwatershed had specific objectives stated in the plan for cropland soil loss, organic load from barnyards, and erosion from streambanks, woodlands and pastures. These are detailed in Table 1. Subwatersheds not threatened by rural runoff were not chosen to have BMPs installed.

Table 1. Summary of the Nonpoint Sources Targeted for Control in the Lower Black River Watershed Inventory

Subwatersheds	Reduce Cropland Soil Loss to 5 tons/ac/yr or less	Barnyards	Reduce Erosion on		
			Stream bank (moderate & severe)	Pasture on Steep slopes	Grazed Wood lands on steep slopes
Upper Fleming	2980 ac	22 highest ranked	10,540 ft.	790 ac	2700 ac on steep slopes
Lower Fleming Creek	2370 ac	23 highest ranked	8620 ft	900 ac	1860 ac on steep slopes
Grant-Decorah Prairie	1440 ac	13 highest ranked	2000 ft		
Halfway Creek-coordinate w/trout stamp & habitat work	2200 ac	30 ranked high & medium	15,670 ft	140 ac	
Sand Lake	250 ac		9800 ft	1020 ac	270 ac steep areas
Long Coulee*	740 ac	13 ranked high & medium	4600 ft.	130 ac	

*Plus: Encourage the city of Onalaska to develop a construction erosion and runoff control ordinance which will include single home sites.

The LaCrosse County Land Conservation Department was successful in contacting all eligible landowners. Of the approximately 540 eligible landowners contacted, 75, or 14%, signed a cost-share agreement. County personnel stated that most of the landowners who refused to participate in the program cited lack of control over practice implementation. Other factors causing the low participation rate included a lack of priority setting in the project, the economic downturn in the early 1980s, confusion over the different local agency's jurisdiction and directives, and lack of standards for compliance for pollutant reduction.

A small portion of Trempeleau County was included within the project boundary. Of the 50 eligible landowners contacted, 34, or 68% signed cost-share agreements. This is a higher participation rate, but over a smaller portion of the watershed. The combined overall participation rate from both counties was 18%.

The project had several successes in meeting the objectives for BMP installation. Of the 30 acres of critical area stabilization needed, 59 acres were completed: almost 200%. Of the 156 acres of waterways needed, 99 acres or 63% were installed. Of the 105 barnyard runoff systems needed, approximately 57, or 54% were installed.

The project met with more difficulty in meeting the objectives for installing other BMPs. Of the 7680 feet of riprap needed, 3670 feet or 40% were installed including streambank shaping and seeding. Of the 3500 acres needing strip cropping, 1075 acres or 31% were strip cropped. Of the 171,600 feet of streambank protection/fencing needed, 40,931 feet, or 24%, of fencing were installed. For livestock exclusion from woodlots, of the 6554 acres (80 rods/60 acres) planned, only 35,887 linear feet were installed. This is an accomplishment of 25%. Final closeout records revealed that many landowners either didn't install planned fencing at all or installed less than was originally planned.

Table 2. BMP Installation Chart

Practice	1985	1986	1987	1988	1989	1990	1991	1992	1993	Total	Planned Amount	% Complete
Upland Erosion Control / Sediment Delivery Reduction												
Contour Strips (AC)	209	172	161	286	67	159	21	--	--	1075	3500	31%
Field Diversions (ft)	3770	2790	3799	2155	600	2250	700	1615	710	18,389	38,500	48%
Grassed Waterway (AC)	9	13	16	25	8	9	5	11	9	105	156	67%
Critical Area Stabilization (AC)	7	3	10	8	3	4	11	9	2	57	30	190%
Grade Stabilization Structures (units)	9	6	9	9	8	9	5	4	--	59	82	72%
Fencing to Exclude Livestock from Woodlands (rods)	176	104	--	387	469	523	325	12	179	2175	8,739	25%
Streambank Protection												
Fencing (ft)	--	--	7590	8892	743	2351	1968	10923	8465	40,932	171,600	24%
Cattle crossings	5	3	--	8	1	2	3	1	--	23	39	59%
Riprap, Shaping and Seeding (ft)	525	145	--	435	--	477	1254	54	780	3,670	7,680	48%
Animal Waste Management												
Barnyard Runoff Control System	4	9	15	7	4	7	6	1	4	57	105	54%
Manure Storage Facility	--	--	1	2	--	--	1	1	3	8	11	73%

Summary

While the 18% overall participation rate sounds very low, this project was undertaken with little or no advance "marketing" data analysis to determine the level of local landowners' interest in such a voluntary program. La Crosse County was very successful at assuring installation of practices on cost share agreements. Only two landowners did not fulfill their contracts due to sale of property or financial difficulties. Many program-level improvements concerning procedures for state review of cost share agreements and other topics were implemented due to recommendations from the county project manager.

Water Resource Evaluation and Results

Water Evaluation Monitoring Strategy

In order to determine whether water resources objectives were being achieved, water evaluation monitoring was conducted on different sites throughout the Lower Black River Priority Watershed. DNR environmental monitoring staff evaluated the water quality and the effects of nonpoint source pollution management efforts. Evaluations consisted of pre-implementation monitoring to estimate baseline water quality data, and post-implementation monitoring to document changes in water quality resulting from changes in land management. The DNR's bioassessment report contains discussions of the sampling methodologies used and the site specific results. This report summarizes the results and conclusions; readers interested in greater detail are advised to directly consult the bioassessment report.

Pre-implementation monitoring efforts were widely scattered throughout the watershed. Monitoring included water chemistry, fisheries and macroinvertebrate surveys and habitat assessment. Post-implementation monitoring consisted of habitat evaluation, macro-invertebrate analysis and water chemistry sampling on selected streams. Although the original plan called for monitoring of all sites for which baseline evaluations had been done, post-implementation monitoring was focussed on streams where BMP installation was concentrated. The primary goal of post-implementation monitoring was to determine if selected BMPs were achieving their goal in improving the biological integrity of selected streams.

Water Evaluation Methodologies and Results

Water Chemistry Analysis

The United States Geological Survey (USGS) has collected water samples on the Black River with a gauge station near Galesville in La Crosse County since December 1931. Water samples collected with an automatic sample device from 1981 to 1993 were used to determine if water quality had improved over the duration of implementing BMPs. Samples were analyzed by the Wisconsin State Lab of Hygiene (SLOH). Parameters studied to evaluate objective goals were turbidity, dissolved oxygen, total phosphorus, total kjeldahl nitrogen, dissolved ammonia, fecal coliform bacteria, suspended sediment and dissolved solids.

Geometric means of water quality data from the USGS gauge station were calculated from 1981 to 1993. Because of the location of the gauge station, this data would only represent runoff from Upper Black River, Upper and Lower Fleming Watersheds and Grant Creek-Decorah Prairie Subwatersheds. No significant differences in water quality were noted before, during or after implementation of BMPs.

Fish Surveys

DNR collected fish community data by electroshocking the entire Black River from 1975 to 1979 (Fago, 1983). Approximately 44 locations were sampled on the Lower Black River watershed. A diverse population of fish species was observed. Post-implementation analysis has not been done to date.

Macroinvertebrate Analysis

The WDNR has periodically conducted macroinvertebrate community analysis on the tributaries throughout the Lower Black River Watershed. Macroinvertebrates are good indicators of water quality over several months. Macroinvertebrate communities will generally respond to periodic water quality problems that are not always detected during water quality sampling.

The WDNR collected aquatic macroinvertebrate samples in Spring 1986 and 1992. Samples were collected using the "kick method" (Hilsenhoff, 1987) and a D-frame net. Samples were sent to the University of Wisconsin-Stevens Point to identify the species of organisms present. Results were applied to Hilsenhoff's Biotic Index (HBI). Aquatic macroinvertebrate communities indicated no significant changes between pre and post-implementation biotic index values. The macroinvertebrate HBI may not be a good indicator of improving conditions in this watershed because water quality is generally good as reflected by the HBI values.

Habitat Analysis

Pre-implementation habitat assessment (Ball, 1982) was done during the Fall of 1985 on Hardies Creek and during the Fall 1986 on several tributaries of Grant Creek-Decorah Prairie, Upper and Lower Fleming, Long Coulee, Halfway Creek and Sand Lake Coulee subwatersheds.

Post implementation analysis was done during the Fall of 1992 on Hardies Creek and the Fall of 1994 on selected streams in the watershed where pre-implementation analysis was done and where BMP implementation was concentrated. This included streams in Grant Creek-Decorah Prairie, Upper and Lower Fleming, Long Coulee and Halfway Creek subwatersheds.

Results

Stream habitat assessments can further evaluate the streams ability to support a healthy biological community. Pre-implementation habitat analysis was conducted on Upper and Lower Fleming Creek, Hardies Creek, Long Coulee Creek and Halfway Creek Subwatersheds. With the exception of one sight on Upper Fleming Creek which rated poor, all of the sites rated fair using the Stream Classification Guidelines for Wisconsin (Ball, 1982).

Post-implementation analysis indicates a small amount of improvements in the watershed, although some sites scored lower, indicating ongoing problems (See Table 3).

Trivial changes in habitat ratings and scores are more than likely due to the subjective observations by the individual doing the analysis. This is possible because different persons conducted pre and post implementation analysis. However, obvious improvements in stream habitat were noted in several cases where BMPs were installed on smaller tributaries.

Where cattle fencing was installed on Upper Fleming Creek, Halfway Creek and Long Coulee Creek, habitat scores did improve. Upper Fleming Creek improved its rating from poor to fair. Bank erosion sedimentation, and organic loadings were dramatically reduced. The same can be said for Halfway Creek below County Highway D where habitat rating improved from fair to good. Lunker structures were also installed at this site and the stream is currently classified as a Class II trout stream. However, immediately upstream of CTH D, cattle still have access to the stream. Streambank erosion, sedimentation and organic loadings are an obvious problem and are impairing BMP improvements downstream. Sedimentation and infilling of pools are the most noticeable problem.

Table 3. Habitat Scores and Ratings for Selected Stream Stretches in the Lower Black River Watershed

	1986		1994	
Stream	**Score**	**Rating**	**Score**	**Rating**
Grant Creek	118	Fair	144	Fair
Bell Coulee Creek	126	Fair	128	Fair
Upper Fleming Creek	208	Poor	171	Fair
Wet Coulee Creek	124	Fair	168	Fair
Lower Fleming Creek	148	Fair	148	Fair
Lower Fleming Creek	163	Fair	154	Fair
Lower Fleming Creek	116	Fair	120	Fair
Halfway Creek	159	Fair	166	Fair
Halfway Creek	166	Fair	110	Good
Long Coulee Creek	179	Fair	166	Fair
Long Coulee Creek	152	Fair	180	Fair
Hardies Creek	158	Fair	138	Fair
Hardies Creek	158	Fair	141	Fair

Water chemistry data from the USGS gauge station showed no significant improvement. Generally streams in the watershed did not show significant improvement, but habitat evaluations did show noticeable improvements on the smaller streams where BMPs were installed in high concentration. This is supported by aquatic macroinvertebrate and habitat scores improving only in these small stream sections. Post implementation fish shocking may show improvements in certain areas and should be done in the future.

Summary

It is clearly documented that BMPs can reduce nonpont source pollution. On the smaller streams where practices were installed in high concentration, stream improvements were noticeable. Macroinvertebrate and habitat scores improved in these small stream sections to further support these incremental stream improvements.

Overall priority watershed improvements were not noted due to the following limiting factors: low participation, limited chemical and biological data, and location of the USGS gauge station.

Financial Evaluation

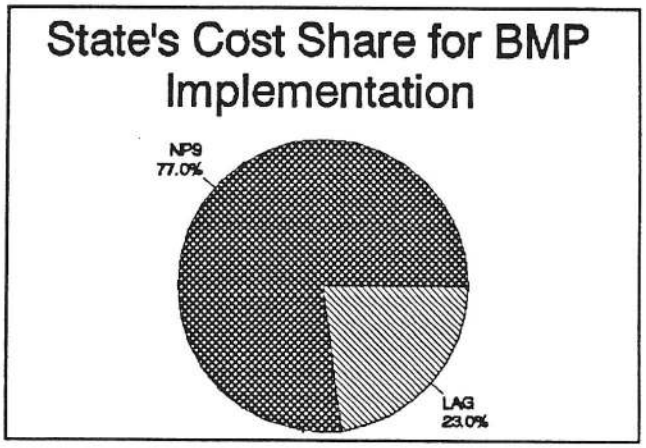
This section addresses the financial aspects of the Lower Black River Priority Watershed Project. The evaluation includes the timing and amount of nonpoint source and local assistance grants to La Crosse and Trempealeau Counties and examines the degree to which funds obligated through cost share agreements to landowners were expended.

Two types of financial grants are awarded to watershed projects, Nonpoint Source (NPS) and Local Assistant Grants (LAG). Nonpoint grants fund the actual practices built or undertaken (e.g., barnyards, minimum tillage) by the owner/operator of the farm. The local assistance grants fund local staff, their supplies, travel, training, and professional service contracts with private providers (engineers, crop consultants, co-ops, etc.). Cost-share agreements are the contracts between the owner/operator and the local government to install the practices to control nonpoint pollution. The glossary provided in Appendix A defines some of the grant-related terms used in this section.

Estimates were made in the watershed plan to approximately budget for a number of practices that might reasonably be expected to be needed to control the nonpoint pollution. The estimates in the plan were for budgeting purposes, i.e. to set aside enough money for an entire project grant period (8-10 years), not necessarily for comparison with actual installations.

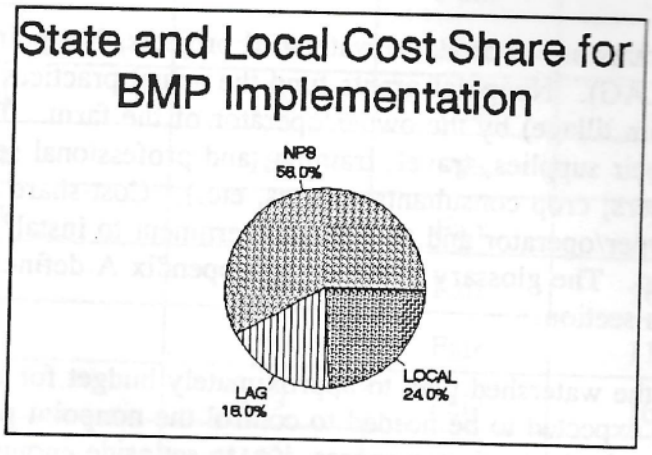
The total amount of funds awarded through grants from the DNR to LaCrosse and Trempealeau counties for the Lower Black River Priority Watershed Project was $1,708,000.00. Figure 1 shows the relative proportions of the State's cost share for the BMPs that were implemented in this watershed. The greatest expenditures were for barnyard runoff management structures, streambank protection, grassed waterways and terraces respectively. The remaining 12 BMPs made up less than 25 percent of the total expenditures for BMPs implemented

Figure 1. State's Cost Share for BMP Implementation



Landowners in LaCrosse and Trempealeau counties also contributed to cost share amounts. Local contributions in the amount of $540,000.00 were also applied toward the cost of the installation of practices. Figure 2 shows the percentages of funds spent by the State and local governmental units on administrative and implementation phases of this project.

Figure 2. State and Local Cost Share for BMP Implementation



Summary and Conclusions

It is clearly documented that BMPs are successful in reducing nonpoint source pollution. A higher participation of installing BMPs would have improved the reduction of these sources and the success of this project. The few sites where improvements were noted show that implementing cost effective BMPs does work.

This project supports the idea that voluntary measures can effectively control nonpoint pollution. At this time, the water quality results are not immediately evident due to the fact that response of streams to installation and adoption of BMPs is also affected by many other factors. Given the time scale of the physical processes involved in stream morphology and natural variations, it may not be reasonable to expect dramatic improvements in biotic indicators of water quality.

The Lower Black River Priority Watershed Project can be considered a success for several reasons. The project increased awareness of nonpoint pollution problems, enabling landowners to identify existing problems and to know that assistance in remediating these problems is available. The project was successful in maintaining water quality as opposed to the degradation that would have continued to occur had pre-existing practices and conditions remained unchanged. The biggest positive result of this project was reinforcement of the fact that increasing information and education efforts is necessary to set the stage for a change in landowner attitudes and practices that will yield long term results in reducing and eliminating nonpoint pollution.

Appendix A
Glossary

COST SHARE AGREEMENT (CSA):
The contract between the local governmental unit (county, city, village, lake district) and the program participant (landowner or operator). The CSA lists the Best Management Practices, cost estimates, installation schedule, operation & maintenance requirements, and the obligations of both parties signing the agreement.

BEST MANAGEMENT PRACTICE (BMP):
As defined in s.144.25, Stats., means a practice, technique or measure identified in areawide water quality management plans which is determined to be the most effective, practicable means of preventing or reducing pollutants generated from nonpoint sources to a level compatible with water quality objectives, which does not have an adverse impact on fish and wildlife habitat. BMPs are described in s. NR 120, Wis. Admin. Code.

ENCUMBRANCE:
The funds included in a Nonpoint Source or Local Assistance Grant.

EXPENDITURE:
The funds actually paid to cost share recipients after installation of BMPs. Also, the funds actually paid to local units of government through a Local Assistance Grant.

FISCAL YEAR (FY):
The state fiscal year beginning on July 1 and ending June 30.

LOCAL ASSISTANCE GRANT:
NPS Program funds to support local costs of project planning and implementation including: Local staff salaries, supplies, travel and training, information and education efforts, professional services contracts.

NONPOINT SOURCE GRANT:
NPS Program funds used for cost sharing of Best Management Practices. The state shares the cost of installing best management practices from 70 to 100%, with the landowner/operator and sometimes the local government unit.

NONPOINT SOURCE:
A land management activity (land use) which contributes to sediment runoff, seepage or percolation which adversely affects or threatens the quality of waters of this state and which is not a point source under s. 147.015 (12), Stats.

PRIORITY WATERSHED:
A large-scale or small-scale watershed which the department has identified through the continuing planning process under s.147.25, Stats., as one of those watersheds where the need for nonpoint source water pollution abatement is most critical.

PRIORITY WATERSHED PLAN:
A detailed portion of the areawide water quality management plan prepared for priority watersheds as described in s. NR 120, Wis. Admin. Code.

UNEXPENDED BALANCE:
Funds in cost share estimates on cost share agreements, but not yet paid to cost share recipient.

Appendix B
Bibliography

Claflin, Thomas O. 1970. Lake Onalaska feasibility study. The River Studies Center, University of Wisconsin - La Crosse.

Dawson, V.K., G.A. Jackson and C.E. Korschgen. 1982. Water chemistry at selected sites on Pools 7 and 8 of the Upper Mississippi, Vol. 4 and Techincal Appendix G. U.S. Army Corps of Engineers, Great River Environmental Action Team. St. Paul, MN.

Fago, D. 1983. Distribution and Relative Abundance of Fishes in Wisconsin: Black, Trempealeau, and Buffalo River Basins. Wisconsin Department of Natural Resources Technical Bulletin No. 40. 120 pp.

Hilsenhoff, W.L. 1987. Using a Biotic Index to Evaluate Water Quality in Streams. Wisconsin DNR Technical Bulletin. No. 132. 23 pp.

Ball, J. 1982. Stream Classification Guidelines for Wisconsin. Wisconsin Department of Natural Resources Technical Bulletin.

Masterson, Jon 1994. Lower Black River Priority Watershed Project Bioassessment Final Report. Wisconsin Department of Natural Resources. Madison, WI.

Appendix C
Local Project Management Survey
LaCrosse County

An Evaluation of Local Project Management

I. PARTICIPATION

A. 1) What percentage of eligible landowners were contacted by county staff? **100% of those not on a "hobby farm".**
How was eligibility defined? **Everybody not on a hobby farm.**
Do you have an suggestions for improving how eligibility is defined? **Should be eligible if a water quality problem is identified and a solution for controlling the problem is available with specifications.**

2) What is your definition of one contact? **Person to person, not by telephone.**

3) What methods of contact wer used (phone contacts, written correspondence, face to face, media, etc...)? What was the primary method? **Letters sent to explain program, followed by DNR drive by to i.d. barnyards, slopes, feedlots distance to creeks, then personal (face to face).**

4) On average, how many times was contact attempted by each method? **Everyone was attempted to be contacted at the farm at least once, usually twice.**

5) In what order of priority were landowners contacted? What were the problems encountered, if any? **Higher priority landowners, based on phosphorus load ranking, were contacted first and more often.**

6) What suggestions do you have for improving success of landowner contact? **None.**

B. 1) What percentage of those landowners contacted signed up? **Out of 540 eligible properties, 75 contracts were signed, or 14%.**

2) Of those who were contacted, what percentage installed practices under this program? **Out of 75 Cost Share Agreements, 73 installed all practices, 2 dropped out for financial reasons.**

3) What percentage of those landowners contacted installed practices under other programs or without cost-sharing? **Unknown.**

4) Briefly describe what worked and what didn't. If known, state the reasons given for non-participation. **Landowners have no standard to follow for behaviors to improve water quality. IF standards, like USLE, are available, landowners are more likely to follow them. It is possible to set a standard for phosphorus; lateral movement of streambank for erosion.**

C. Table [ ] shows the percentage of best management practices on cost share agreements that were installed, by practice.

Briefly give your rationale for:

1) The percentage of animal waste practices installed. **All those contracted, except for 2 landowners who went bankrupt.**

2) The percentage of streambank practices installed.

3) The percentage of upland erosion practices installed.

Describe what worked and what didn't regarding practices installed. **Had more practices installed per farm due to "whole farm" plans. More landowners signed when County could state absolutely that funds would be available.**

D. 1) What were the types of Information and Education activities? **Quarterly newsletter sent out during the sign-up period (first 3± years).**

2) In your opinion, did available I & E methods and materials provide adequate information to encourage landowners to sign up? **Yes.**

3) Are there any I & E strategies, materials or activities you would try on new projects not used in this project? Explain. **All high priority projects designated in basin plans should get demonstration grant money before selection. Have all priority watersheds priority landowners eligible for $$.**

4) Was there a Community Action Committee? How often did they meet? Describe their major function and activities. **Yes, 3-4 times, there was little emphasis on CACs.**

E. 1) Describe what worked and what didn't in regards to the ability of the project staff to work effectively with landowners. **Good experienced technical staff, not new people.** With state staff? **Too much turnover in DNR coordinators with less technical knowledge. There were long delays in receiving Cost Share Agreement approvals from DNR.**

F. 1) What was the most influential factor affecting participation rates? **Legal ramifications of contracts had a mostly positive influence.**

2) What other factors had a positive influence on participation? **The money was guaranteed. There was less trouble than ASCS because fewer approvals and committee actions were required.**

3) What percentage of landowners who had both information and knowledge of the program and adequate financial resources, still didn't sign up? **No idea, did not do 100% inventory.**

4) What is your opinion on the use of regulation in the future? **There is a need to define physical and chemical standards for compliance, which hold for all landowners in high priority watersheds, not just for the 70% designated or targeted landowners. Perception already exists that the priority watershed program is not voluntary and therefore is somewhat regulatory because after an inventory, anyone could be designated a "critical site" and regulated. Regulations should be based on a standard which everyone is required to meet.**

II. INFORMATION AND MANAGEMENT

A. What types of data management and automation were used? Describe what worked well and what didn't. **No automation, this was an older project. Tracking sheets were used for contacts, but pollutant load reduction was not tracked.**

B. Describe what worked and what didn't in regards to combined workload analysis, grant applications, annual review forms and meetings. (Applicable to projects beginning in 1993 and after.) **Not applicable, there were only 1-2 annual meetings with DNR. Workload is driven by landowner complaints, not necessarily by annual plans.**

C. Describe what worked and what didn't in regards to accomplishment and reimbursement reporting (verification forms). **During first half of the project, "work prodects" were used for reimbursement not reimbursements based on hours or salaries. Reimbursement required lots of amendments.**

D. List recommendations for improvement of information management. **Eliminate all the reviews of Cost Share Agreements in Madison.**

III. PERSONNEL MANAGEMENT

A. In your opinion, was the project adequately staffed? **Yes, same project manager plus 2 technicians worked throughout the entire project life.**

B. Please record the number of people who left positions early for each year of the project, and describe reasons for the turnover. **None, because staff positions were made permanent, not project positions which end when the project ends.**

C. What worked well and what could be improved upon? **Having permanent staff, trained and knowledgable for the life of the project worked well. Constant turnover in DNR staff (untrained, unknowledgeable, no sense of watershed history or project progress) worked badly.**

D. Describe the strategy for information exchange between old and new position holders. **N/A - no turnover.**

E. Were staff resources adequate for existing workloads? **Mostly adequate.**

F. How did actual hiring compare to what the priority watershed plan advised? **N/A - not in plan.**

G. How supportive was the LCC and County Board in hiring staff and dealing with project changes? **Pretty supportive.**

H. Did the DNR District Coordinator adequately answer questions and/or train county staff to function properly in the watershed? **No, there was no coordinator in the District and there were too many different DNR Central Office coordinators during the life of the project, with too little experience. Some tended to "exaggerate" their competence/ competency.**

I. Is adequate training being given to local staff? If not, please suggest needs. **Project staff received better training from Soil Conservation Service and SITCOM.**

J. Is ther timely follow up to problems by the District Coordinator? **Project coordinator wasn't in the district. There was not timely follow up from Central Office most of the time.**

IV. FISCAL AND GRANT MANAGEMENT

A. How important was funding to accomplish the project goals? **Pretty important - no money means no (or fewer) practices. Some exceptions are: reduced tillage occurs voluntarily due to equipment changes, and less woodlot grazing has occurred where timber is worth more.**

B. What was the reimbursement schedule? **We were told it would only take 2 weeks to receive reimbursement, but it always took longer.** How long did it take counties to submit reimbursements? **Quarterly would be optimal for county submittals.**

C. How long of a time period expires from submitting reimbursements request to receiving payment? **Early in the project it took about 4 months -- too many people had to review them. Later on it took 3 months.** Describe any problems with timing, if any. If not, in your opinion, why? **Three to four months is unacceptable.**

D. Did adequate safeguards exist to insure money was spent as statutes and codes direct? **From county perspective, yes. DNR didn't trust that counties were professionals.**

E. Please offer any suggestions for improving fiscal management. **DNR should publish a procedural handbook for financial steps, including what DNR has to review. DNR policies should be in writing - including the deviations from the usual procedures.**

V. TECHNICAL ASSISTANCE

A. Describe how county staff worked with farmers to monitor installed practices to ensure that they are maintained. **Complaint based only and 25% monitoring for other farm programs. Because we had stable staff, each of the 2 technicians could work with "their landowner", write a plan, design the practices and oversee the installation. So each farmer was able to work with the same technician throughout the process. Now technicians are too specialized, no continuity with landowners.**

B. Describe county staff relations with the Soil Conservation Service (NRCS). **We had one temporary hire who didn't work out too well - we did no further hiring. The problem was inexperience - too much training was required. The SCS District Conservationist was involved early in the project. Contracting didn't work well.**

C. Describe what worked well and what didn't in regards to county staff relations with the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP). **DNR had too many project managers. There was little DATCP involvement.**

D. Please offer any recommendations for DNR improvement. **We need consistent program policy and continuity in DNR Project Managers. Delegate as much authority as possible to the counties. Counties should be able to use "saved " LAG funds in their NPS account for installing practices.**

VI. EQUIPMENT MANAGEMENT

A. Describe what worked and what didn't regarding the adequacy of equipment such as computers or vehicles. **We didn't have a computer and did not lease vehicles. The county should pay for its own vehicles and equipment because they are used for other reasons and kept after the project ends.**

VII. FUTURE INSPECTION ACTIVITIES TO FULFILL NR120.04(6) AND GRANT CONDITIONS REFERRED TO IN PART 5 #13.

A. Describe the BMP maintenance inspection strategies that will be used after the closeout of the project. **No set schedule, but almost all landowners are in other programs. Compliance monitoring with Farmland Preservation is coincidental.**

B. Describe the payback criteria and procedures used. **N/A because everything was installed. There was one case of a fraudulent bill which resulted in a fine and some jail time. There were 2 or 3 padded bills, but the LCC reviewed them and both withdrew their bills or changed the bill to the correct amount.**

C. Describe the reporting process to the DNR and DATCP. **None**

D. Describe any projects (such as habitat restoration, cattle fencing, etc..) that involved community groups, fishing or conservation clubs, WCC or any other groups. **One landowner used a conservation club for fish habitat work, but few people showed up to work. However the practice worked o.k.**

E. Have you noticed or had reports of water quality changes (appearance, odor, etc..) since installation of BMPs began? **No reports for watershed, but looking at site-by-site conditions are obviously improved. Setting watershed goals is not realistic. We should look at site improvements instead.**