SUBWATERSHED CHARACTERISTICS

The following is a subwatershed-specific discussion of land uses, water quality conditions, water resource objectives, nonpoint sources, and nonpoint source reduction goals. The locations of the subwatersheds and their potential biological and recreational uses are shown on Map 3. More detailed information concerning water resource conditions is contained in the Milwaukee River Integrated Resource Management Basin Plan, Volume III, North Branch Watershed.

Nichols Creek Subwatershed

Land Use: This area, located along the northern border of the North Branch Watershed, contains 4,407 acres constituting about five percent of the watershed. Virtually all (95%) of the area is in rural land uses. These include agricultural (2,942 or 67%), woodlands (673 acres or 15%), grassland (314 acres or 7%), and wetlands (279 acres or 6%). The Department owns approximately 400 acres and 2,500 linear feet bordering the stream in the headwaters area called the Nichols Creek State Wildlife Area.

Water Resource Conditions: The North Branch (known locally as Nichols Creek), two small intermittent tributaries, and the Cascade millpond are located in this subwatershed. Nichols Creek is the headwaters of the North Branch and drains through the village of Cascade. It is impounded in the village of Cascade into a small seven-acre area named the Cascade millpond.

All of the 4.4 miles of Nichols Creek in this subwatershed capable of supporting a trout fishery, are achieving their potential biological uses.

Habitat and other physical features along Nichols Creek are suitable for self-sustaining populations of brook and brown trout. Historical and more recent biological assessments indicate good water quality.

Nichols Creek is an extremely valuable resource attributable to its consistent flow, cold temperature, and good water quality and habitat. However, livestock wastes, cattle access, and sediment pose a threat to its ability to continue to support good populations of trout and the aquatic organisms they eat.

The Cascade millpond has fair-to-good water quality and seasonally supports trout. However, heavy growths of aquatic vegetation caused by upstream contributions of sediment and nutrients impair its aesthetic quality and recreational use. It is partially meeting its potential biological use.

The two intermittent tributaries were not surveyed, but they provide seasonal contributions to stream flow and habitat for resident fish populations in Nichols Creek.

Water Resource Objectives:

1. Protect the existing high quality of Nichols Creek and enhance its ability to sustain naturally reproducing populations of trout.

2. Enhance the water quality and aesthetic value of the Cascade millpond and improve its capacity to seasonally support trout.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Nichols Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a high level (70%).

2. Restrict livestock access to Nichols Creek to improve aquatic habitat.

3. Reduce the amount of sediment and associated turbidity (cloudiness) in Nichols Creek by reducing sediment delivery from eroding cropland by a moderate level (30%).

Table 9
Nonpoint Source Conditions in the Nichols Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	6	barnyards	27.3 (4.6/stream mile)	
Winter Spread	not determined	4	operators	Critical Acres[2] 47	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	2,679	acres	7,129 tons	317 tons
	internally drained	1,728	acres	2,877 tons	0 tons
	total	4,407	acres	10,006 tons	317 tons (53/stream mi)
Streambank Erosion	Nichols Creeks	410	feet	0.1 tons	0.1 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Six barnyards drain to Nichols Creek. The extent and severity of these sources is not as serious as in other parts of the North Branch Watershed. However, the sensitive nature of the stream dictates that a high level of control is needed.

Upland erosion contributes an estimated 317 tons of sediment annually, or more than 53 tons per stream mile, to Nichols Creek. Most of the sediment originates on lands upstream of County Trunk Highway V in the town of Lyndon, Sheboygan County. This is a moderate loading rate compared with other areas of the North Branch Watershed.

Areas winter spread with livestock manure are not extensive, but one livestock operation has a moderate amount of critical acres from which runoff may be a pollution problem. Streambank erosion is regular, occurring at one location just upstream from the Cascade millpond.

Cascade Swamp Subwatershed

Land Use: This area, located south of the Nichols Creek drainage area in the northeast corner of the North Branch Watershed, contains 3,845 acres constituting about four percent of the watershed. Nearly all of the village of Cascade is located here, but rural land uses predominate. Agricultural uses (2,184 acres or 57%), wetlands (762 acres or 20%), woodlands (410 acres or 11%), and grassland (256 acres or 6%) comprise 94 percent. Residential and commercial areas together total 233 acres (or 6%). A predominant feature is the Cascade Swamp.

Water Resource Conditions: Nichols Creek, which flows for approximately six miles through this subwatershed, is the principal stream. Water quality remains fairly good, with cool to warm temperatures and moderate dissolved oxygen levels. The dam at the Cascade millpond, warm water entering the stream from the Cascade Swamp, and an unnamed stream draining the Adell subwatershed generally limit the numbers and distribution of trout. The stream supports a diverse warmwater sport and forage fish community. The recreational use classification upstream of County Trunk Highway F is partial-body contact; downstream of County Trunk Highway F it is full-body contact.

Approximately 1.7 miles of the 4.6 miles of Nichols Creek in this subwatershed capable of supporting a warmwater fish community are only partially achieving their potential biological uses. Nonpoint sources from upstream and the drainage area result in sedimentation, warm water temperatures, high bacteria levels, and moderate aquatic plant growth.

Water Resource Objectives:

1. Enhance the water quality of Nichols Creek to allow support of a warmwater sport fishery and limited populations of trout.

2. Protect the water quality of the Lake Ellen outlet and intermittent streams flowing into Nichols Creek to reduce downstream pollutant levels and aquatic plant growth.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Nichols Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a high level (50%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Nichols Creek by reducing sediment delivery from eroding cropland by a moderate level (30%).

3. Reduce the amount of pollutants entering Nichols Creek carried in urban runoff.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and urban runoff.

Six barnyards are located in this subwatershed; four drain to Nichols Creek and two to internally drained wetlands. Phosphorus loading to streams (131.9 pounds) is among the highest of any subwatershed. Only four other subwatersheds have a higher loading rate for phosphorus draining to streams. The number of pounds of phosphorus per stream mile (17.1) is exceeded only in the Beechwood Lake subwatershed. Two of the four livestock operations are responsible for 88 percent of the load. This area also has the highest amount of barnyard-related phosphorus loading to

Table 10
Nonpoint Source Conditions in the Cascade Swamp Subwatershed

Contributing Sources

Type	Receiving Area	Number	Units	Pollutant Load Pounds of Phosphorus[1]
Barnyard Runoff	streams/lakes/wetlands	4	barnyards	131.9 (17.1/stream mile)
	pocket wetlands	2	barnyards	54.2
Winter Spread Manure	not determined	3	operators	Critical Acres[2] 52
Delivered[3]				Eroded Soil
Sediment				
Upland Erosion	streams/lakes 210 tons	1,584	acres	4,224 tons
	internally drained 0 tons	2,261	acres	3,261 tons
	total 210 tons	3,845	acres	7,485 tons
	(27/stream mi)			
Streambank Erosion		None		

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

internally drained wetlands. Clearly, this source of nonpoint pollution has some of the most important water quality impacts of any area in the North Branch Watershed.

Upland erosion contributes an estimated 210 tons of sediment annually, or more than 27 tons per stream mile.
Most of the sediment originates on lands downstream of the Cascade Swamp, southwest of County Trunk Highway F in the town of Lyndon, Sheboygan County. This is a moderate loading rate when compared with other areas of the North Branch Watershed.

There are not a significant number of critical acres winter spread with livestock manure. However, one livestock operation has a moderate amount of critical acres from which runoff may be a pollution problem. Urban runoff contributes a relatively small amount of sediment to Nichols Creek. However, the potential of urban runoff to contribute heavy metals, oil, road salt, and bacteria to downstream areas used for fishing and other recreation in the village of Cascade is a concern.

Point Sources: Point sources impacting the stream are a whey processing operation discharging to the unnamed stream draining the Adell subwatershed, and the village of Cascade municipal sewage treatment plant which discharges to Nichols Creek. The whey processing facility is meeting its permitted discharge limits for biochemical oxygen demand and suspended solids; however, it does contribute to downstream water quality problems. The sewage treatment plant, with an average daily flow of 160,000 gallons, is estimated to contribute 50 percent of the phosphorus load carried by the stream. Violations of the dissolved oxygen standards have occurred downstream of the plant discharge.

Lake Ellen Subwatershed

Land Use: This subwatershed, located southeast of the village of Cascade, is among the smallest in the North Branch Watershed. It contains 909 acres, constituting about one percent of the watershed. Rural land uses predominate, with agriculture (369 acres or 41%), woodlands (138 acres or 15%), wetlands (104 acres or 11%), and grassland (57 acres or 6%) comprising 73 percent. Urban lands (135 acres or 15%) are made up primarily of medium-density residential development along the eastern and southern shoreline of Lake Ellen.

Water Resource Conditions: The water resource features include Lake Ellen, one intermittent tributary, and a small pond located on this tributary. Lake Ellen, the second largest lake in the North Branch Watershed, is a 121-acre seepage lake with a maximum depth of 47 feet and a mean depth of 23 feet. Lake Ellen is a moderately fertile lake which stratifies in summer and winter. It is managed for bass, panfish, northern pike and walleye.

Lake Ellen is only partially achieving its potential biological use as a warmwater sport fishery. The calculated phosphorus loading is close to acceptable limits necessary to maintain present water quality. However, periodic algal blooms and localized heavy concentrations of aquatic plant growth occur.

A seasonally intermittent tributary flows through a pond and discharges to the north side of the lake. It contributes bacteria and nutrients to the lake and is only partially achieving its potential biological uses.

Water Resource Objectives:

1. Protect and enhance the water quality of Lake Ellen to allow it to support an improved warmwater sport fishery.

2. Improve the water quality of the stream flowing into Lake Ellen to reduce contributions of bacteria and nutrients.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Lake Ellen and the inlet stream by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (25%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Lake Ellen and the inlet stream by reducing sediment delivery from eroding cropland by a moderate level (30%).

3. Reduce the amount of pollutants entering Lake Ellen from urban runoff.

Nonpoint Sources: Nonpoint sources include runoff from two livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and urban runoff.

Runoff from livestock operations and associated areas winter spread with manure may be important nonpoint sources. The amount of sediment delivered to surface water is the lowest in the watershed. However, most is being deposited in Lake Ellen. Runoff from lakeshore development contributes nutrients and potentially other pollutants to the lake.

Table 11
Nonpoint Source Conditions in the Lake Ellen Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	2	barnyards	1.4[2]	
				Critical Acres[3]	
Winter Spread Manure	not determined	3	operators	12	
				Eroded Soil	Delivered[4] Sediment
Upland Erosion	streams/lakes	641	acres	566 tons	26 tons
	internally drained	268	acres	1,081 tons	0 tons
	total	909	acres	1,647 tons	26 tons
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Includes estimate of loading rate for only one barnyard.
[3]Critical acres have steep slopes or are seasonally flooded.
[4]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Chambers Creek Subwatershed

Land Use: This subwatershed located west of Lake Ellen contains 1,873 acres (or 2%) of the North Branch Watershed. Agricultural areas (1,351 acres or 72%), woodlands (345 acres or 18%), and grassland and wetlands (115 acres or 6%), are the predominant land uses. The area is characterized by undulating kettle moraine topography and a rather sudden drop in elevation from the headwaters to the point where Chambers Creek flows into the North Branch.

Water Resource Conditions: Chambers Creek originates in a wetland area and flows approximately 1.7 miles to the confluence with the North Branch. This small, cold, fast-flowing stream and its perennial tributaries have good water quality. Perennial springs and general habitat conditions are suitable for sustaining a naturally reproducing population of brook trout and a diverse forage fish community.

Chambers Creek is only partially achieving its potential biological use as a trout stream. Sediment deposition occurs in pools and meanders, particularly downstream of State Trunk Highway 28. The ability of Chambers Creek to continue to support populations of trout is threatened by runoff from barnyards, areas winter spread with livestock wastes, sediment from eroding cropland, and livestock pasturing along the streambanks.

Water Resource Objective:

1. Protect the existing high quality of Chambers Creek and enhance its ability to sustain naturally reproducing populations of trout.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce the amount of phosphorus and bacteria in Chambers Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (45%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Chambers Creek by reducing sediment delivery from eroding cropland by a moderate level (25%).

3. Restrict livestock access to Chambers Creek to improve aquatic habitat.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Five barnyards drain to Chambers Creek or its tributaries. Two sites contribute 88 percent of the phosphorus attributed to barnyards. While the overall quantity of phosphorus being contributed to the streams is not high, the loading rate per mile of stream (14.0 pounds) is exceeded in only four other subwatersheds.

Upland erosion contributes an estimated 194 tons of sediment annually to Chambers Creek. This is low when compared with many other areas in the North Branch Watershed. However, the loading rate per stream mile (65 tons) is higher in only two other subwatersheds. Nearly all of the delivered sediment originates north of County Trunk Highway SS in the town of Mitchell, Sheboygan County.

Table 12
Nonpoint Source Conditions in the Chambers Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	5	barnyards	42.0 (14.0/stream mile) 54.2	
				Critical Acres[2]	
Winter Spread Manure	not determined	3	operators	36	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	1,606	acres	4,204 tons	194 tons
	internally drained	267	acres	0 tons	0 tons
	total	1,873	acres	4,204 tons	194 tons (65/stream mi)
Streambank Erosion	Chambers Creek	3,200	feet	N/A	N/A[4]

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.
[4]Pastured area along streambank without significant erosion.

Source: Wisconsin Department of Natural Resources.

Streambank erosion along approximately 3,200 linear feet of bank is contributing a significant amount of sediment and adversely affects instream habitat. There are not a significant number of critical acres winter spread with livestock manure. However, one livestock operation has a moderate amount of critical acres from which runoff may be a pollution problem.

Adell Subwatershed

Land Use: This subwatershed, located south of the Cascade Swamp drainage area in the northeast portion of the North Branch Watershed, contains 4,492 acres (about 5% of the watershed). The village of Adell is located here, but rural land uses predominate. Agricultural uses (2,826 acres or 63%), wetlands (826 acres or 18%), woodlands (327 acres or 7%), and grassland (239 acres or 5%) comprise 93 percent of the subwatershed. Urban uses include residential, commercial, and industrial lands which together total 269 acres, or seven percent of the drainage area. A predominant feature is the northern portion of the Adell Swamp.

Water Resource Conditions: The unnamed perennial stream (Adell tributary) and two intermittent channels in this subwatershed have fair-to-poor water quality. Low dissolved oxygen concentrations and relatively high biological oxygen demand result primarily from an industrial discharge in the village of Adell. The perennial stream has been channelized, resulting in moderate depth and a slow flow rate. Moderate bacterial contamination occurs throughout the summer and during wet weather in the fall.

Approximately 4.6 miles of the 5.1 miles of the Adell tributary capable of supporting a warmwater forage fish community are not achieving their potential biological uses. Nonpoint sources impact the stream's water quality in the form of sedimentation and excessive nutrients downstream from County Trunk Highway W, to where it flows into the North Branch near County Trunk Highway F.

The stream currently supports forage fish and aquatic life tolerant of pollution. This is partially due to severely degraded habitat resulting from channelization and the discharge from a whey company. Continued improvement through upgrading the industrial treatment, combined with upland erosion control, should make this stream capable of supporting a warmwater sport fishery. Some subsequent instream habitat improvement to restore natural meanders would accelerate rehabilitation.

Water Resource Objectives:

1. Improve the degraded water quality of the unnamed stream flowing south from the village of Adell to enable support of a warmwater forage fish community.

2. Protect downstream water quality of the North Branch.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in the unnamed stream by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (50%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in the unnamed stream by reducing sediment delivery from eroding cropland by a moderate level (25%).

3. Reduce the amount of pollutants entering the streams receiving urban runoff from the village of Adell.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, and upland erosion.

Table 13
Nonpoint Source Conditions in the Adell Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	3	barnyards	131.9 (3.1/stream mile)	
	pocket wetlands	2	barnyards	7.9	
Winter Spread Manure	not determined	5	operators	Critical Acres[2] 54	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	2,665	acres	7,728 tons	393 tons
	internally drained	1,827	acres	4,594 tons	0 tons
	total	4,492	acres	12,322 tons	393 tons (57/stream mi)
Stream bank Erosion		None			
Urban Runoff[4]	unnamed streams	80	acres	---	9 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.
[4]Urban runoff also contributes 42 pounds of lead annually to surface water.

Source: Wisconsin Department of Natural Resources.

Five barnyards are located in this subwatershed; three drain to the unnamed streams and two drain to internally-drained wetlands. The amount of phosphorus entering the streams and the per stream mile loading rate are low when compared with many other areas in the North Branch Watershed.

Upland erosion contributes an estimated 393 tons of sediment annually, or more than 57 tons per stream mile, to the streams in this subwatershed. This quantity is exceeded in only five other subwatersheds, and the loading rate per mile of stream is among the highest in the North Branch Watershed. Most of the delivered sediment originates on uplands north of County Trunk Highway W in the town of Sherman, Sheboygan County.

There are not a significant number of critical acres winter spread with livestock manure. However, two livestock operations have a moderate amount of critical acres from which runoff may be a pollution problem. Urban runoff contributes a relatively small amount of sediment to the unnamed tributary. However, the potential of urban runoff to contribute heavy metals, oil, road salt, and bacteria to the unnamed perennial stream is a concern.

Melius Creek Subwatershed

Land Use: This subwatershed, located in the northwestern portion of the watershed, contains 2,940 acres (or 3%) of the watershed. Agricultural land uses (1,520 acres or 52%), woodlands (700 acres or 24%), grassland (356 acres or 12%), and wetlands and surface water (296 acres or 10%), predominate.

Water Resource Conditions: The headwaters of Melius Creek begin as springs, developed as a trout hatchery owned and operated by the state of Wisconsin. The three mile long stream passes through extensive wetlands and is bordered by deciduous trees, shrubs, and sedges. One perennial and two intermittent streams flow into it. Water quality in Melius Creek is suitable to support trout, although stocking is needed to sustain the population.

Nearly all--2.5 of three miles--of Melius Creek is only partially achieving its potential biological uses. Instream habitat necessary to support trout is degraded by accumulations of sediment. Ammonia levels in the discharge of the hatchery do not threaten aquatic life. Barnyard runoff and flushing of adjacent wetlands contribute to high levels of instream bacteria during high flows.

Water Resource Objectives:

1. Protect the existing quality of Melius Creek and its tributary streams to enable them to continue to support trout and coldwater forage fish.

2. Enhance aquatic habitat and water quality in Melius Creek to increase the potential for additional natural reproduction of trout.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Melius Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (40%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Melius Creek and its tributary streams by reducing sediment delivery from eroding cropland by a moderate level (25%).

Nonpoint Sources: Nonpoint sources include runoff from a livestock operation, runoff from areas winter spread with livestock manure, and upland erosion.

Seven barnyards drain to Melius Creek or its tributaries. The quantity of phosphorus being contributed to streams is not high and the loading rate per mile of stream is moderate. Most is originating at two of the barnyards.

Upland erosion contributes a relatively low amount (166 tons) of sediment annually to Melius Creek. The loading rate per stream mile is moderate. Most of the delivered sediment originates downstream of the large wetland complex bisected by County Trunk Highway SS in the town of Scott, Sheboygan County. There are not a significant number of critical acres winter spread with livestock manure. However, two livestock operations have a moderate amount of critical acres from which runoff may be a pollution problem.

Table 14
Nonpoint Source Conditions in the Melius Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	7	barnyards	36.1 (7.7/stream mile)	
				Critical Acres[2]	
Winter Spread Manure	not determined	3	operators	50	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	1,893	acres	3,695 tons	166 tons
	internally drained	1,047	acres	1,478 tons	0 tons
	total	2,940	acres	5,173 tons	166 tons (35/stream mi)
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

North Branch Subwatershed

Land Use: This subwatershed, located in the middle of the watershed, contains 8,051 acres constituting about eight percent of its area. It is the fourth largest subwatershed, and only two other subwatersheds have more miles of streams. Rural land uses predominate, with agriculture (5,369 acres or 67%), woodlands (1,265 acres or 16%), grassland (687 acres or 8%), and wetlands and surface water (569 acres or 8%), together comprising 99 percent of the area.

Water Resource Conditions: The size and depth of the North Branch has increased in the northern reaches of the subwatershed as a result of Chambers and Melius creeks and the perennial stream draining the Adell subwatershed flowing into it. The river ranges in depth from 0.5 to 3 feet and is from 5 to 20 feet wide. Pasturing in some areas has resulted in the river becoming exceedingly wide (up to 100 feet) and shallow along certain stretches.

Approximately 4.0 miles of the 13.4 miles of the North Branch capable of supporting a warmwater sport fishery, are only partially achieving their potential biological uses. Water quality is fairly good, with cool to warm temperatures and moderate dissolved oxygen levels. The river is impounded at one location (Gooseville millpond), resulting in slower flow and warmer water temperatures. Resident fish communities are a combination of cool (northern pike) and warmwater species (panfish). Nonpoint source pollution from upstream and the drainage area itself are reflected in sedimentation and moderate aquatic plant growth.

Water Resource Objectives:

1. Enhance the water quality of the North Branch to improve its ability to support a warmwater sport fishery and populations of cool water fish species including northern pike.

2. Enhance the water quality of the Gooseville millpond to reduce aquatic plant growth, provide suitable habitat for warmwater sport fish, and reduce downstream pollutant loads.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in the North Branch and the Gooseville millpond by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (30%).

2. Restrict livestock access to the North Branch to improve aquatic habitat.

3. Reduce the amount of sediment and associated turbidity (cloudiness) in the North Branch and the Gooseville millpond by reducing sediment delivery from eroding cropland by a low level (20%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Twenty-three barnyards are located here: 18 drain to the North Branch, one to an internally drained wetland, and four to internally drained uplands. Phosphorus loading to streams is the second highest of any subwatershed. Seven of the 18 sites draining to streams account for 78 percent of the phosphorus load.

Table 15
Nonpoint Source Conditions in the North Branch Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	7	barnyards	36.1 (7.7/stream mile)	
	pocket wetlands	1	barnyards	5.8	
	shallow soils[2]	2	barnyards	14.2	
	deep soils[3]	2	barnyards	15.2	
Winter Spread Manure	not determined	17	operators	Critical Acres[4] 288	
				Eroded Soil	Delivered[5] Sediment
Upland Erosion	streams/lakes	6,369	acres	15,436 tons	785 tons
	internally drained	1,682	acres	2,865 tons	0 tons
	total	8,051	acres	18,301 tons	785 tons (47/stream mi)
Streambank Erosion	North Branch	3,320	feet	4.5 tons	4.5 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Soils less than 60" deep over bedrock or water table.
[4]Soils more than 60" deep over bedrock or water table.
[5]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Upland erosion contributes an estimated 785 tons of sediment annually, or more than 47 tons per stream mile. Only one subwatershed has more total sediment delivered to streams. Approximately two thirds of the sediment originates on uplands north of County Trunk Highway D in the town of Sherman, Sheboygan County.

The amount of critical acres winter spread with livestock manure is also significant. The estimated 288 acres of critical land spread with livestock wastes constitute a significant potential source of nonpoint pollution. This is the highest number of critical acres in the North Branch Watershed. Streambank erosion occurs at 16 sites and affects more than 3,300 feet of bank.

Gooseville Creek Subwatershed

Land Use: This subwatershed, located about one mile southwest of the village of Adell in the northeastern portion of the watershed, contains 2,462 acres, or three percent of the North Branch Watershed. Agricultural land uses (1,856 acres or 75%), wetlands (370 acres or 15%), woodlands (110 acres or 4%), and grassland (103 acres or 4%), comprise 98 percent of the area.

Water Resource Conditions: Gooseville Creek is a small coldwater stream approximately 2.5 miles long, originating as two small streams fed by springs. A large spring in the headwaters contributes most of the stream flow in the upper one-half of its length. Its small size limits recreation to wading and other partial body contact activities.

Approximately 1.5 miles of the 2.5 miles of Gooseville Creek capable of supporting a coldwater fish community, are only partially achieving their potential biological uses. Gooseville Creek has good water quality and supports self-sustaining populations of trout and coldwater forage fish. Channelization of the northern tributary has degraded the aquatic habitat. The sluggish flow in downstream areas results in sediment accumulation and threatens reproduction of trout.

Water Resource Objective:

1. Protect the existing water quality of Gooseville Creek and enhance its ability to sustain naturally reproducing populations of trout.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Gooseville Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (30%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Gooseville Creek by reducing sediment delivery from eroding cropland by a moderate level (40%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, and upland erosion.

Three barnyards drain to Gooseville Creek. The overall quantity of phosphorus being contributed to the stream is not high, and the loading rate per mile of stream is moderate: most is originating at one site. Three other barnyards drain to pocket wetlands. However, the phosphorus loading rates are low.

Upland erosion contributes a moderate amount (180 tons) of sediment annually to Gooseville Creek. However, the loading rate per stream mile (82 tons), is exceeded in only one other subwatershed in the North Branch Watershed. Most sediment originates in the steeply sloped areas between East Bates Road and Lynn Road in the town of Sherman, Sheboygan County.

The number of critical acres winter spread with livestock manure is moderate. However, three livestock operations have a moderate amount of critical acres from which runoff may be a pollution problem.

Table 16
Nonpoint Source Conditions in the Gooseville Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	3	barnyards	27.3 (10.5/stream mile)	
	pocket wetlands	3	barnyards	8.3	
				Critical Acres[2]	
Winter Spread Manure	not determined	6	operators	99	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	665	acres	3,288 tons	180 tons
	internally drained	1,797	acres	5,241 tons	0 tons
	total	2,462	acres	8,529 tons	180 tons (82/stream mi)
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Batavia Creek Subwatershed

Land Use: This subwatershed is located in the middle of the North Branch Watershed, and contains 4,926 acres (about 5% of the area). The unincorporated community of Batavia is located here, but rural land uses predominate. Agricultural uses (3,568 acres or 72%), woodlands (464 acres or 9%), wetlands (385 acres or 8%), grassland (288 acres or 6%), together comprise 95 percent of the area. The remaining area (220 acres or 5%), is under urban use in and adjacent to Batavia.

Water Resource Conditions: Batavia Creek originates as a series of small streams. The headwaters have undergone extensive channelization down to State Trunk Highway 28, where the creek is impounded as Batavia millpond. Although seasonally intermittent, the northern headwater tributary contains the major portion of stream flow; the southern headwater tributary is an agricultural drainage ditch with seasonal flow.

All of Batavia Creek is only partially achieving its potential biological uses. The stream is capable of supporting a warmwater sport fish community. Siltation is a problem, with thick deposits of organic material overlaying the gravel and rubble substrate. Portions of the creek upstream of County Trunk Highway SS have high bacterial concentrations during periods of wet weather.

Water Resource Objectives:

1. Enhance the water quality of Batavia Creek to improve its ability to support a warmwater fish community.

2. Enhance the water quality of the North Branch by reducing pollutant loading contributed by Batavia Creek.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Batavia Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (40%).

2. Restrict livestock access to Batavia Creek to improve aquatic habitat.

3. Reduce the amount of sediment and associated turbidity (cloudiness) in Batavia Creek by reducing sediment delivery from eroding cropland by a moderate level (30%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, and upland and streambank erosion.

Phosphorus loading to Batavia Creek and its tributaries from ten livestock operations is high. The phosphorus load (150.5 pounds) is exceeded in only three other subwatersheds. This area has the highest phosphorus loading rate per mile of stream (21.1 pounds); six sites contribute 85 percent of the load.

Upland erosion contributes an estimated 289 tons of sediment annually, or 41 tons per stream mile, to Batavia Creek. The amount of sediment and the loading rate per mile of stream is moderate. A significant amount of the sediment originates on uplands in the eastern one-third of the area east of State Trunk Highway 28, town of Scott, Sheboygan County.

Table 17
Nonpoint Source Conditions in the Batavia Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	10	barnyards	150.5 (21.2/stream mile)	
				Critical Acres[2]	
Winter Spread Manure	not determined	8	operators	65	
				Eroded Soil	Delivered[3] Sediment
Upland Erosion	streams/lakes	3,130	acres	6,691 tons	289 tons
	internally drained	1,796	acres	3,559 tons	0 tons
	total	4,926	acres	10,250 tons	289 tons (41/stream mi)
Streambank Erosion	Batavia Creek	1,800	feet	1.5 tons	1.5 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Critical acres have steep slopes or are seasonally flooded.
[3]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

The amount of critical acres winter spread with livestock manure is low. However, one livestock operation has a moderate amount of critical acres from which runoff may be a pollution problem. Streambank erosion occurs at two sites immediately north of County Trunk Highway A, along 1,800 feet of bank.

Mink Creek Subwatershed

Land Use: This subwatershed, located in the northwest corner of the watershed, contains 6,482 acres constituting about seven percent of the North Branch Watershed. Rural land uses predominate, with agricultural uses (4,660 acres or 72%), woodlands (931 acres or 14%), wetlands (511 acres or 8%), and grassland (379 acres or 5%), comprising 99 percent of the area. A portion of the Kettle Moraine State Forest-Northern Unit is located in the northwest corner of the area.

Water Resource Conditions: Mink Creek is a cold headwater tributary of the North Branch. It flows for approximately 15 miles (within the Mink Creek and Beechwood Lake subwatersheds), making it one of the longest streams in the Milwaukee River Basin. The section of Mink Creek in this subwatershed is a relatively small stream with good water quality. It has been managed for trout, primarily by stocking, but seasonal warm temperatures limit reproduction. The stream is more suited to cold water forage fish and cool water sport fish, but has the potential to be a limited trout fishery.

The portion of Mink Creek in this subwatershed capable of supporting a coldwater fish community is only partially achieving its potential biological uses. Despite good overall water quality, the stream is subject to some of the highest sediment loading rates in the North Branch Watershed. Turbidity and accumulation of sediment have short- and long-term adverse water quality impacts. Bacteria contamination is a continuing problem, because the stream supports partial body contact forms of recreation.

Water Resource Objective:

1. Improve the water quality of Mink Creek to provide for support of a better coldwater trout fishery and a coolwater fish community.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce the amount of phosphorus and bacteria in Mink Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a high level (65%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Mink Creek by reducing sediment delivery from eroding cropland by a moderate level (30%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Phosphorus loading to Mink Creek from 11 livestock operations is moderate. Four sites contribute about 70 percent of the phosphorus. However, the phosphorus loading rate per stream mile (15.7 pounds)) is among the highest in the North Branch Watershed, with only three other subwatersheds with greater levels.

Upland erosion results in an estimated 687 tons of sediment washing into Mink Creek. This is among the highest in the watershed, with only two other subwatersheds with higher amounts of sediment delivered to streams and lakes. The loading rate per mile (143 tons) is the highest level in the North Branch Watershed, caused by intensive agricultural land uses, steep topography, and erodible soils. The greatest amount of eroded sediment delivered to Mink Creek originates on uplands between County Trunk Highways F and G, in the town of Scott, Sheboygan County.

Table 18
Nonpoint Source Conditions in the Mink Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	11	barnyards	75.4 (15.7/stream mile)	
	deep soils[2]	1	barnyard	10.0	
				Critical Acres[3]	
Winter Spread Manure	not determined	9	operators	113	
				Eroded Soil	Delivered[4] Sediment
Upland Erosion	streams/lakes	3,723	acres	12,833 tons	687 tons
	internally drained	2,759	acres	6,596 tons	0 tons
	total	6,482	acres	19,479 tons	687 tons (143/stream mi)
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils more than 60" deep over bedrock or water table.
[3]Critical acres have steep slopes or are seasonally flooded.
[4]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

The amount of critical acres winter spread with livestock manure is moderate, with three operations having a relatively high number of acres from which runoff may be a pollution problem. Streambank erosion is not extensive.

Beechwood Lake Subwatershed

Land Use: This subwatershed, located immediately south of the Mink Creek area, contains 7,565 acres, constituting about eight percent of the North Branch Watershed. Except for the small unincorporated community of Beechwood, the area is primarily rural. Agricultural land uses (5,389 acres or 71%), woodlands (846 acres or 11%), wetlands and surface water (604 acres or 8%), and grassland (494 acres or 6%), together comprise 96 percent of the area. The remainder is in residential and commercial uses in and around Beechwood.

Water Resource Conditions: Mink Creek and Beechwood Lake are the predominant water resources. Water quality in Mink Creek is influenced by upstream nonpoint sources described above for the Mink Creek subwatershed. As discussed above, Mink Creek has relatively good water quality and has been managed for trout with limited success.

An estimated 4.2 miles of the 8.4 miles of Mink Creek in this subwatershed capable of supporting trout are only partially achieving their potential biological uses. Sediment from sources upstream and within this subwatershed compound to degrade water quality.

An unnamed tributary stream flows into Mink Creek just upstream of State Trunk Highway 28. Its cold temperature and relatively good water quality supports coldwater forage fish. This stream may provide additional spawning areas for resident trout from Mink Creek.

Beechwood Lake is a highly fertile lake which has experienced winter fish kills. It supports a diverse fishery of northern pike, bass, and panfish. Excessive plant growth, algal blooms, and turbidity limit recreational use and prevent it from achieving its potential biological use as a warmwater sport fishery.

Water Resource Objectives:

1. Improve the water quality of Mink Creek to provide for support of a better coldwater trout fishery and a coolwater fish community.

2. Enhance the water quality of Beechwood Lake to improve the warmwater fishery and improve recreation opportunities.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Mink Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a high level (65%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Mink Creek by reducing sediment delivery from eroding cropland by a moderate level (30%).

3. Restrict livestock access to Mink Creek to improve aquatic habitat.

4. Reduce phosphorus and sediment contributions to Beechwood Lake from barnyard runoff, areas winter spread with livestock manure, and cropland erosion, by a moderate level (35%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion. Urban runoff from the unincorporated community of Beechwood is not a significant source of nonpoint pollution.

Thirty-one livestock operations are located here, more than any other subwatershed. Sixteen drain to streams, a number exceeded in only three other subwatersheds. The amount of phosphorus loading to

Table 19
Nonpoint Source Conditions in the Beechwood Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	16	barnyards	106.4 (7.7/stream mile)	
	pocket wetlands	4	barnyards	5.8	
	shallow soils[2]	3	barnyards	14.2	
	deep soils[3]	7	barnyards	15.2	
	other[4]	1	barnyard	27.3	
				Critical Acres[5]	
Winter Spread Manure	not determined	15	operators	203	
				Eroded Soil	Delivered[6] Sediment
Upland Erosion	streams/lakes	3,089	acres	10,112 tons	478 tons
	internally drained	3,756	acres	7,882 tons	0 tons
	total	7,565	acres	17,994 tons	478 tons (35/stream mi)
Streambank Erosion	Mink Creek	8,390	feet	9.7 tons	9.7 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils less than 60" deep over bedrock or water table.
[3]Soils more than 60" deep over bedrock or water table.
[4]Drains to manure storage lagoon.
[5]Critical acres have steep slopes or are seasonally flooded.
[6]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

streams is moderate and the loading rate per stream mile is relatively low. Five sites are contributing 75 percent of the phosphorus load. Three livestock operations with moderate phosphorus loads drain to areas with shallow soil overlying the water table. The potential for ground water contamination from these sites was not specifically evaluated, and will require site-specific investigations.

Upland erosion contributes an estimated 478 tons of sediment to Mink Creek. This is among the highest in the North Branch Watershed, with only four other subwatersheds with higher amounts of sediment delivered to streams and lakes. The loading rate per mile (35 tons) is moderate. The origin of most delivered sediment is north of County Trunk Highway A and west of Boltonville Road, in the town of Scott, Sheboygan County.

The amount of critical acres winter spread with livestock manure is significant, with only three other subwatersheds with more critical acres.

Five operations have a relatively high number of acres from which runoff may be a pollution problem. Streambank erosion is extensive, affecting about 8,400 feet of bank at 13 sites.

In summary, the number of combined livestock operations in the Mink Creek and Beechwood Lake subwatersheds means that Mink Creek receives drainage from more barnyards than any stream in the North Branch Watershed. Further, the combined amount of sediment annually contributed to Mink Creek from the Mink Creek and Beechwood Lake subwatersheds (1,165 tons) is the highest for any stream in the North Branch Watershed.

Silver Creek Subwatershed

Land Use: This subwatershed is the second largest and its 9,774 acres constitute about 10 percent of the North Branch Watershed. Rural land uses predominate, though a portion of the village of Random Lake and the unincorporated communities of Sherman Center and Silver Creek are located here. Agricultural land uses (6,641 acres or 68%), wetlands and surface water (1,597 acres or 16%), woodlands (690 acres or 7%), and grassland (469 acres or 5%), together comprise 96 percent of the area. Urban areas occupy 377 acres or four percent of the subwatershed.

Water Resource Conditions: Silver Creek originates in the Adell Swamp as an intermittent stream. The outlet of Random Lake and the village of Random Lake municipal sewage treatment plant contribute to its flow. The stream supports a warmwater sport fish community and partial body contact forms of recreation.

An estimated 7.1 of the 9.3 miles of Silver Creek capable of supporting a warmwater fish community are only partially achieving their potential biological uses. Siltation, poor quality instream habitat and bacterial contamination limit the biological potential of this stream. During summer, significant bacteria contamination occurs at State Trunk Highway 144 downstream of the sewage treatment plant. Further downstream contamination occurs as Silver Creek flows under County Trunk Highway I.

Water Resource Objectives:

1. Enhance the water quality of Silver Creek to improve its ability to support a warmwater sport fishery.

2. Enhance the water quality of the North Branch by reducing pollutant loading contributed by Silver Creek.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Silver Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a high level (50%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Silver Creek by reducing sediment delivery from eroding cropland by a moderate level (40%).

3. Restrict livestock access to Silver Creek to improve aquatic habitat.

4. Reduce the amount of pollutants entering Silver Creek with urban runoff.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, streambank erosion, and urban runoff.

Phosphorus loading to Silver Creek from 23 livestock operations is significant. The loading rate (160 pounds) is exceeded in only two other subwatersheds. Six sites contribute 60 percent of the phosphorus. The phosphorus loading per stream mile is low, due in part to the length of stream.

Upland erosion results in an estimated 597 tons of sediment washing into Silver Creek. Sediment loading is higher in only three other watersheds, though the loading rate per stream mile is

Table 20
Nonpoint Source Conditions in the Silver Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	23	barnyards	160.1 (11.0/stream mile)	
	deep soils[2]	1	barnyard	1.9	
				Critical Acres[3]	
Winter Spread Manure	not determined	20	operators	223	
				Eroded Soil	Delivered[4] Sediment
Upland Erosion	streams/lakes	4,975	acres	9,553 tons	597 tons
	internally drained	4,779	acres	12,763 tons	0 tons
	total	9,774	acres	22,316 tons	597 tons (41/stream mi)
Streambank Erosion	Silver Creek	17,350	feet	43.7 tons	43.7 tons
Urban Runoff[5]	Silver Creek	204	acres	---	39 tons

[1]Phosphorous loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils more than 60" deep over bedrock or water table.
[3]Critical acres have steep slopes or are seasonally flooded.
[4]Tons of eroded soil and delivered sediment are average annual values.
[5]Urban runoff also contributes 176 pounds of lead annually to Silver Creek.

Source: Wisconsin Department of Natural Resources.

moderate. Eroded sediment delivered to Silver Creek originates on uplands throughout the subwatershed with no particular area significantly worse than another.

Areas spread with manure are of particular concern, with more than 220 critical acres spread with livestock wastes. This number of critical acres is exceeded in only one other watershed. Streambank erosion is also a significant nonpoint source problem. More than three miles of unstable and eroding streambank are contributing about 40 tons of sediment annually to the creek. The erosion is occurring at ten locations.

Urban runoff contributes about 39 tons of sediment annually to Silver Creek. Most is attributed to those areas of the village of Random Lake which drain via storm sewers to the creek. The land uses contributing the sediment include residential, commercial, and industrial. Runoff also has the potential to contribute heavy metals, oil, road salt, and bacteria to Silver Creek.

Huiras Lake Subwatershed

Land Use: This subwatershed, located in the southeast corner of the watershed, contains 5,927 acres constituting about six percent of the North Branch Watershed. Agricultural land uses (3,287 acres or 55%), wetlands and surface water (1,456 acres or 25%), woodlands (484 acres or 8%), and grassland (450 acres or 8%), together comprise 96 percent of the area. The remaining acres (250 acres or 4%), are urban areas scattered around the subwatershed.

Water Resource Conditions: The primary water resources are an unnamed perennial stream and its intermittent tributaries, Huiras Lake, and Lake Twelve. The unnamed stream begins as an intermittent outlet of a small pond and flows through an extensive wetland complex before flowing into the North Branch. Huiras Lake is 26 acres in size with a maximum depth of seven feet. Lake Twelve has a surface area of 53 acres and a maximum depth of 19 feet. Both lakes have a limited amount of shoreline development and no public access.

Approximately 1.1 miles of the 4.1 mile long unnamed stream capable of supporting a warmwater fish community are only partially achieving their potential biological uses. Upstream portions which have little flow and shallow depths generally support a limited aquatic community tolerant of pollution. However, nearly all of this stream is meeting its biological potential.

Water quality in Lake Twelve is good and it supports a diverse warmwater fish community. Nutrient levels are at an acceptable level and nonpoint sources are not having a significant impact on water quality. The shallow depth of Huiras Lake and fish winterkills restrict the lake's ability to support self-sustaining sport fish populations. However, its abundant emergent vegetation make it an important waterfowl nesting area and fall migration stopover.

Water Resource Objectives:

1. Protect the water quality of the unnamed stream and its tributaries to improve their ability to support a warmwater fish community.

2. Protect the water quality of Lake Twelve and Huiras Lake to improve their ability to support warmwater fish communities and recreational uses.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in the unnamed streams, Lake Twelve, and Huiras Lake by reducing contributions from barnyards and critical areas winter spread with livestock waste by a low level (20%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in the unnamed streams, Lake Twelve, and Huiras Lake by reducing sediment delivery from eroding cropland by a low level (20%).

3. Restrict livestock access to the unnamed streams to improve aquatic habitat.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Table 21
Nonpoint Source Conditions in the Huiras Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of	
Phosphorus[1]					
Barnyard Runoff	streams/lakes/wetlands	12	barnyards	131.9 (16.0/stream mile)	
	pocket wetlands	1	barnyards	30.5	
	deep soils[2]	2	barnyards	0.0	
				Critical Acres[3]	
Winter Spread Manure	not determined	8	operators	88	
				Eroded Soil	Delivered[4] Sediment
Upland Erosion	streams/lakes	2,888	acres	3,550	171 tons
	internally drained	3,039	acres	3,413 tons	0 tons
	total	5,927	acres	6,963 tons	171 tons (24/stream mi)
Streambank Erosion	unnamed stream	2,000	fee	2.1 tons	2.1 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils more than 60" deep over bedrock or water table.
[3]Critical acres have steep slopes or are seasonally flooded.
[4]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Phosphorus loading to surface water from 12 livestock operations is significant. The phosphorus load (114 pounds) is one of the highest in the North Branch Watershed. This area also has the third highest phosphorus loading rate per mile of stream (16.0 pounds). Two sites contribute more than 80 percent of the load.

Upland erosion contributes an estimated 171 tons of sediment annually, or 24 tons per stream mile. The amount of sediment and the loading rate per mile of stream is moderate. The amount of critical acres winter spread with livestock manure is relatively high, primarily because of limitations that the large area of wetlands present to spreading livestock wastes. One livestock operation has a moderate amount of acres from which runoff may be a pollution problem.

Stony Creek Subwatershed

Land Use: Stony Creek is the largest subwatershed in the North Branch area, with its 11,535 acres making up about 12 percent of the watershed. Rural land uses predominate, though the unincorporated communities of St. Michael and Boltonville are located here. Agricultural land uses (6,494 acres or 56%), woodlands (2,634 acres or 23%), grassland (1,239 acres or 11%), and wetlands and surface water (865 acres or 7%), together comprise 97 percent of the area. Urban land uses occupy 303 acres or three percent. The proportion of woodlands and grasslands is higher than in any other subwatershed. This area exhibits some of the most extensive presettlement vegetation and land use conditions in the North Branch Watershed.

Water Resource Conditions: Stony Creek and Haack Lake are the primary water resources. Stony Creek originates in wetlands and receives flow from two small perennial and two intermittent streams. It has been channelized downstream of Forest Road and is impounded at Boltonville. Haack Lake is a small kettle lake surrounded by wooded wetlands. The Boltonville millpond is an 11-acre impoundment created by a low-head dam on Stony Creek maintained by the Boltonville Sportsmans Club.

Stony Creek supports both coldwater and warmwater aquatic communities. Historical and recent biological collections indicate relatively good water quality. However, an estimated 11.1 miles of the 13.6 mile long Stony Creek are only partially achieving their potential biological uses.

High water temperature and siltation appear to be the major limiting factors for trout productivity in Stony Creek. Instream pools have been affected by siltation, but retain some ability to hold trout. Downstream of Boltonville, the stream has moderate bacterial contamination. Siltation in slackwater areas and in pools and runs suggests that sediment transport from upland erosion and streambank erosion is significant.

Haack Lake has good water quality and supports a limited panfish population. Winter kills are frequent because of shallow depth. Boltonville millpond has a large amount of accumulated sediment, turbidity, and excessive aquatic weed growth. Department fish surveys in the early 1980's revealed abundant populations of bullhead, white sucker, and stunted bluegills. The pond was drawn down and dredged in 1986.

Water Resource Objectives:

1. Enhance and improve the water quality of Stony Creek to improve its ability to support a mixed coldwater and warmwater fish community.

2. Protect the water quality of Haack Lake and enhance the water quality of the Boltonville millpond to support warmwater fish communities.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in Stony Creek, Haack Lake, and the Boltonville millpond by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (25%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Silver Creek, Haack Lake, and the Boltonville millpond by reducing sediment delivery from eroding cropland by a moderate level (25%).

Table 22
Nonpoint Source Conditions in the Stony Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	23	barnyards	210.0 (11.5/stream mile)	
	shallow soils[2]	2	barnyards	39.2	
	deep soils[3]	11	barnyards	194.2	
	other[4]	1	barnyard	21.0	
				Critical Acres[5]	
Winter Spread Manure	not determined	21	operators	193	
				Eroded Soil	Delivered[6] Sediment
Upland Erosion	streams/lakes	6,508	acres	17,388 tons	877 tons
	internally drained	5,027	acres	7,134 tons	0 tons
	total	11,535	acres	24,522 tons	877 tons (48/stream mi)
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils less than 60" deep over bedrock or water table.
[3]Soils more than 60" deep over bedrock or water table.
[4]Drains to manure storage lagoon.
[5]Critical acres have steep slopes or are seasonally flooded.
[6]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, streambank erosion, and urban runoff.

This subwatershed has the most significant nonpoint source problem associated with livestock operations in the North Branch Watershed. It has the most barnyards (36) and the highest amount of phosphorus loading to surface water (210 pounds). Four sites draining to surface water contribute more than 80 percent of the load. In addition, the high amount of phosphorus discharging to internally drained areas posses a threat to groundwater quality. The amount of phosphorus per stream mile is moderate due in part to the extensive length of stream.

Despite the large amount of woodland and grassland, this area also has the highest amount of sediment delivered to surface waters. An estimated 877 tons of sediment is washing into Stony Creek and its tributaries annually. The loading rate per stream mile (48 tons) is moderate. Eroded sediment delivered to Silver Creek originates on uplands throughout the subwatershed, with no particular area significantly worse than another.

The areas spread with livestock manure is of particular concern. An estimated 193 critical acres are estimated to be spread with livestock wastes, a quantity exceeded in only three other watersheds. Five sites have a high or moderate number of critical acres.

Wallace Creek Subwatershed

Land Use: This subwatershed, located in the southwest corner of the watershed, contains 8,121 acres constituting about eight percent of the North Branch Watershed. Rural land uses predominate, with agricultural uses (4,196 acres or 52%), woodlands (1,872 acres or 23%), grassland (1,053 acres or 13%), and wetlands and surface water (457 acres or 6%), comprising 94 percent of the area. Urban land uses (539 acres or 6%) are located primarily in the unincorporated community of Orchard Grove.

Water Resource Conditions: The primary water resource is an unnamed perennial stream known locally as Wallace Creek. The headwaters of Wallace Creek are two small intermittent streams flowing from wetlands. As the stream flows north, a significant influx of coldwater enters it from a series of cold water springs developed and managed as private trout hatcheries.

The creek's cold water fish community includes populations of fish indicative of good water quality. Their presence in the groundwater discharge areas and natural springs highlight the importance of protecting these sources of coldwater within the stream system. Wallace Creek has the potential to support a coldwater sport fishery.

An estimated 7.5 miles of the 9.5 mile long Wallace Creek are not achieving their potential biological uses. Water quality problems include streambank degradation and siltation, particularly in the downstream portions. Bacterial contamination is widespread and occurs most often during wet weather periods.

Water Resource Objective:

1. Improve the water quality of Wallace Creek to provide for support of a widespread mix of warm, cool, and coldwater fish species.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce the amount of phosphorus and bacteria in Wallace Creek by reducing contributions from barnyards and critical areas winter spread with livestock waste by a low level (20%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Wallace Creek by reducing sediment delivery from eroding cropland by a moderate level (25%).

3. Restrict livestock access to Wallace Creek to improve aquatic habitat.

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, upland erosion, and streambank erosion.

Twenty-one livestock operations are located in this area. Seven sites drain to surface water and the combined phosphorus load is not significant. However, a large amount of phosphorus drains to internally drained areas from seven sites. Two of the seven may be a source of groundwater contamination. Upland erosion contributes an estimated 281 tons of sediment to Wallace Creek, or 15 tons per stream mile. The amount of sediment is relatively high but the loading rate per mile of stream is low. The area south and east of State Trunk Highway 144 is a significant source of sediment delivered to the stream.

Table 23
Nonpoint Source Conditions in the Wallace Creek Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	7	barnyards	8.3 (0.4/stream mile)	
	pocket wetlands	5	barnyards	37.1	
	shallow soils[2]	3	barnyards	0.0	
	deep soils[3]	6	barnyards	182.1	
Winter Spread Manure	not determined	18	operators	Critical Acres[4] 242	
				Eroded Soil	Delivered[5] Sediment
Upland Erosion	streams/lakes	4,715	acres	6,050 tons	281 tons
	internally drained	3,406	acres	3,439 tons	0 tons
	total	8,121	acres	9,489 tons	281 tons (15/stream mi)
Streambank Erosion	Wallace Creek	None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils less than 60" deep over bedrock or water table.
[3]Soils more than 60" deep over bedrock or water table.
[4]Critical acres have steep slopes or are seasonally flooded.
[5]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

The amount of critical acres winter spread with livestock manure (242 acres) is high, with only one other subwatershed with more area so affected. Streambank erosion is also a significant source of sediment loading in Wallace Creek. An estimated six tons of sediment are eroding from unstable banks in two locations.

The impact of urban runoff on water quality was not evaluated, but it is not likely to be significant, given the non-intensive land use pattern and scattered drainage patterns of the area.

Wallace Lake Subwatershed

Land Use: This is the second smallest drainage area in the watershed. Located in the southwest corner of the North Branch Watershed, its 336 acres include Wallace Lake and Lake Lenwood. The non-lake area includes a mixture of rural uses and residential development around the entire shoreline of Wallace Lake.

Water Resource Conditions: The water resources include Wallace Lake, Lake Lenwood, and a small stream connecting the lakes. Wallace Lake has a surface area of 50 acres and a maximum depth of 35 feet. Nearly all of the shoreline has been developed with year-round homes. Lenwood Lake has a surface area of 14 acres and a maximum of 35 feet. The outlet flows into Wallace Lake.

Wallace Lake supports a diverse warmwater sport fish community comprised of largemouth bass, panfish, and northern pike. Prior to installation of sanitary sewers in 1986, the lake received pollutants from malfunctioning onsite septic systems. Nutrient loading probably is not high enough to be at a critical level. However, summer algal blooms occasionally impact water-based recreation. No current water quality information is available for Lake Lenwood.

Water Resource Objective:

1. Enhance the water quality of Wallace Lake to provide for support of an improved warmwater sport fishery and improved recreational opportunities.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce the amount of sediment and associated turbidity (cloudiness) in Wallace Lake by reducing nutrient contributions and sediment delivery by a low level (15%).

Nonpoint Sources: Nonpoint sources include upland erosion and urban runoff.

Nonpoint source pollution is not a significant threat to water quality in Wallace Lake. A minimum amount of sediment is delivered to the lake from adjacent rural upland areas. Pollutants carried to the lake in runoff from residential development along the shoreline was not quantified. However, based on information from similar areas, runoff from this area can contribute nutrients, bacteria, and a variety of other materials which may eventually degrade lake water quality. Sanitary sewers were recently installed around the lake, thus eliminating past water quality problems associated with malfunctioning onsite sewage disposal systems.

Table 24
Nonpoint Source Conditions in the Wallace Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Units	Pollutant Load: Eroded Soil	Pollutant Load: Delivered[1] Sediment
Barnyard Runoff		None			
Winter Spread Manure		None			
Upland Erosion	streams/lakes	33	acres	40 tons	2 tons
	internally drained	304	acres	73 tons	0 tons
	total	337	acres	113 tons	2 tons
Streambank Erosion		None			

[1]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Spring Lake Subwatershed

Land Use: This is the smallest drainage area in the watershed, located in the southeast portion of the North Branch Watershed near the village of Random Lake. The 275 acres include a mixture of urban and rural land uses. Agricultural lands occupy about 82 acres, while woodland and wetland encompass 54 acres and 27 acres, respectively. The lakeshore is not heavily developed, with a few residences and a boat launch.

Water Resource Conditions: Spring Lake is the only water resource in this subwatershed. As the name implies, this 57 acre lake is spring-fed and has a maximum depth of 20 feet. The outlet discharges to Random Lake. The lake supports a warmwater sportfish community comprised of largemouth bass, northern pike, and panfish.

Spring Lake is achieving its potential biological uses. The estimated nutrient loading to the lake is far below the level necessary to cause water quality problems. Spring Lake has a well balanced aquatic plant population without the heavy concentrations which often impair recreational use.

Water Resource Objective:

1. Protect the water quality of Spring Lake so it can continue to support a warmwater sport fishery.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce nutrient contributions and sediment delivery by a low level (10%).

Nonpoint Sources: Nonpoint sources are not significant threats to water quality in Spring Lake. A minimum amount of sediment is delivered to the lake from adjacent rural upland areas. Runoff from one livestock operation will be investigated further during project implementation.

Table 25
Nonpoint Source Conditions in the Spring Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	deep soils[2]	2	barnyards	0.0[3]	
				Critical Acres[4]	
Winter Spread Manure		not determined			
				Eroded Soil	Delivered[5] Sediment
Upland Erosion	streams/lakes	135	acres	274 tons	11 tons
	internally drained	94	acres	106 tons	0 tons
	total	229	acres	380 tons	11 tons
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils more than 60" deep over bedrock or water table.
[3]Site-specific analysis completed for only one barnyard.
[4]Critical acres have steep slopes or are seasonally flooded.
[5]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

Random Lake Subwatershed

Land Use: This subwatershed is located in the southeast portion of the watershed and its 1,711 acres constitute about two percent of the North Branch Watershed. Unlike most other portions of the watershed, urban land uses in the village of Random Lake comprise a relatively large (281 acres or 16%) section of the area. Rural land uses include agricultural (849 acres or 50%), wetlands and open water (394 acres or 23%), and woodlands and grasslands (187 acres or 11%).

Water Resource Conditions: The primary water resources are Random Lake and the outlet of Spring Lake. Random Lake has a surface area of 209 acres and a maximum depth of 21 feet. The lake is shallowest in the northern portion, where aquatic plant growth is excessive. The lake supports a warmwater sport fishery which includes northern pike, walleye, bass, and panfish.

Random Lake is only partially achieving its potential biological uses as a warmwater sport fishery. Estimated phosphorus loading exceeds the level needed to maintain good water quality. During summer stratification, dissolved oxygen levels fall to levels which are unsuitable for desirable fish species. Recreational use conflicts arise when speed boating and waterskiing concentrate in the northern basin on weekends and holidays.

Water Resource Objective:

1. Enhance the water quality of Random Lake to allow it to support an improved warmwater sport fishery.

Nonpoint Source Controls Needed to Achieve the Objective:

1. Reduce the amount of pollutants entering Random Lake with urban runoff.

2. Reduce the amount of sediment and associated turbidity (cloudiness) in Random Lake by reducing phosphorus contributions by a moderate level (35%) and sediment delivery by a low level (10%).

Nonpoint Sources: Nonpoint sources include upland erosion and urban runoff. Runoff from one livestock operation will be investigated further during project implementation.

Urban runoff and sediment originating from agricultural areas are the most important nonpoint sources. As previously discussed, urban runoff transports a variety of pollutants to surface water including nutrients, bacteria, sediment, and toxic compounds. Construction erosion is the most important contributor of sediment to the lake under present conditions. However, a portion of the commercial area in the central portion of the village of Random Lake also is the source of a significant amount of the pollutant load for the lake.

Table 26
Nonpoint Source Conditions in the Random Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	deep soils[2]	1	barnyard	[3]	
				Critical Acres[4]	
Winter Spread Manure			not determined		
				Eroded Soil	Delivered Sediment[5]
Upland Erosion	streams/lakes	463	acres	830 tons	36 tons
	internally drained	1,134	acres	2,698 tons	0 tons
	total	1,597	acres	3,528 tons	36 tons
Streambank Erosion		None			
Urban Runoff[6]	Random Lake	281	acres	---	744 tons

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils more than 60" deep over bedrock or water table.
[3]Site-specific analysis not completed for this barnyard.
[4]Critical acres have steep slopes or are seasonally flooded.
[5]Tons of eroded soil and delivered sediment are average annual values.
[6]Construction erosion is the primary source of sediment. Urban runoff also contributes 11 pounds of lead annually to Random Lake.

Source: Wisconsin Department of Natural Resources.

Erler Lake Subwatershed

Land Use: This subwatershed, located in the south central portion of the watershed, contains 4,621 acres constituting about five percent of the North Branch Watershed. Rural land uses predominate, with agricultural uses (3,007 acres or 65%), woodlands (839 acres or 18%), grassland (542 acres or 12%), and wetlands and surface water (59 acres or 1%), comprising 96 percent of the area. Urban land uses comprise 174 acres or four percent of the subwatershed.

Water Resource Conditions: The primary water resources are 5.5 miles of the North Branch and Erler Lake. This portion of the North Branch is relatively wide and deep. Erler Lake is a spring-fed 35-acre kettle lake with a maximum depth of 38 feet. Water levels in Erler Lake are controlled by a four-foot head dam at the outlet.

The North Branch supports a diverse coolwater sport fishery consisting of large and smallmouth bass, panfish, and northern pike. Sedimentation is a particularly important problem in slackwater areas. Turbidity (cloudiness) is caused by sediment laden runoff and instream activity by rough fish which stir up bottom substrates. Bacterial contamination occurs in the entire length of the North Branch in this subwatershed. The 4.9 miles of the North Branch in this subwatershed are only partially achieving their potential biological uses.

Water Resource Objectives:

1. Enhance the water quality of the North Branch to improve its ability to support a warmwater sport fishery and populations of coolwater fish species, including northern pike.

2. Enhance the water quality of Erler Lake to allow it to support an improved warmwater sport fishery.

Nonpoint Source Controls Needed to Achieve the Objectives:

1. Reduce the amount of phosphorus and bacteria in the North Branch by reducing contributions from barnyards and critical areas winter spread with livestock waste by a moderate level (35%).

2. Reduce the amount of sediment and associated turbidity (cloudiness) in the North Branch by reducing sediment delivery from eroding cropland by a low level (10%).

3. Reduce the amount of sediment and associated turbidity (cloudiness) in Erler Lake by reducing phosphorus contributions by a moderate level (35%) and sediment delivery by a low level (10%).

Nonpoint Sources: Nonpoint sources include runoff from livestock operations, runoff from areas winter spread with livestock manure, and upland erosion.

Eight livestock operations are located in this area. Five sites drain to surface water and the combined phosphorus load is not significant.

Upland erosion contributes an estimated 243 tons of sediment to the North Branch, or 25 tons per stream mile. The amount of sediment and the loading rate per mile of stream is moderate. The area west of County Trunk Highway M is a significant source of sediment delivered to the stream.

Table 27
Nonpoint Source Conditions for the Erler Lake Subwatershed

Type	Receiving Area	Contributing Sources Number	Contributing Sources Units	Pollutant Load	
				Pounds of Phosphorus[1]	
Barnyard Runoff	streams/lakes/wetlands	5	barnyards	13.9 (1.4/stream mile)	
	pocket wetlands	1	barnyards	2.1	
	shallow soils[2]	2	barnyards	0.0	
				Critical Acres[3]	
Winter Spread Manure	not determined	5	operators	11	
				Eroded Soil	Delivered Sediment[4]
Upland Erosion	streams/lakes	3,234	acres	5,492 tons	243 tons
	internally drained	1,387	acres	1,043 tons	0 tons
	total	4,621	acres	6,535 tons	243 tons (27/stream mi)
Streambank Erosion		None			

[1]Phosphorus loads for barnyards are based on the 10 year, 24-hour rain event.
[2]Soils less than 60" deep over bedrock or water table.
[3]Critical acres have steep slopes or are seasonally flooded.
[4]Tons of eroded soil and delivered sediment are average annual values.

Source: Wisconsin Department of Natural Resources.

CHAPTER IV
NONPOINT SOURCE CONTROL NEEDS

INTRODUCTION

This chapter identifies the nonpoint source controls to be implemented under the North Branch Priority Watershed Project (North Branch Watershed). These controls are based primarily on water quality information, the results of the nonpoint source evaluations, and the identified levels of reduction for sediment and phosphorus needed to achieve the water quality objectives.

The first portion of this chapter establishes eligibility criteria and management categories for the rural nonpoint sources. The criteria and management categories determine which sources are eligible for financial and technical assistance under the priority watershed project. The second section identifies the need for and mechanisms to implement nonpoint urban nonpoint source controls.

As previously discussed, man-induced and natural factors beyond the scope of the priority watershed project affect water resources in this watershed. Management actions related to point source pollution control, fisheries management, wildlife management, and recreation are discussed in the previously described North Branch Milwaukee River Watershed Integrated Resource Management Plan.

NONPOINT SOURCE ELIGIBILITY CRITERIA

Eligibility criteria determine placement of pollution sources into one of three management categories. The management categories determine the eligibility of nonpoint sources for funding and/or technical assistance under the priority watershed project. The criteria are based on:

a. Potential biological and recreational stream and lake use classifications.

b. Impacts of nonpoint sources on those biological and recreational uses.

c. Subwatershed-specific pollution load reductions needed to achieve water quality conditions which support the potential biological and recreational uses.

d. Watershed-wide pollutant load reductions needed to achieve downstream water quality objectives in the Milwaukee River Basin.

Rural Nonpoint Sources

Rural nonpoint source eligibility criteria were developed for:

a. Sites where barnyard runoff drains to surface water, internally drained wetlands, and areas overlain with deep or shallow mineral soils.

b. Areas used for manure spreading.

c. Areas from which eroded soil is deposited in lakes and streams.

d. Areas where streambank erosion is adversely affecting water quality and/or aquatic habitat.

These criteria are expressed as the following:

1. Barnyard runoff--pounds of phosphorus under a 10 year, 24-hour storm.
2. Manure spreading--number of critical acres spread during winter.
3. Upland erosion--tons of sediment delivered to surface water annually.
4. Streambank erosion--tons of sediment delivered to surface water annually.

Generalized criteria are used for barnyards draining to internally-drained areas and cropland delivering sediment to riparian wetlands or internally-drained lands.

Urban Nonpoint Sources

Generalized eligibility criteria were developed for the following:

1. Construction erosion control
2. Runoff from existing development
3. Runoff from planned future development

NONPOINT SOURCE MANAGEMENT CATEGORIES

As stated above, criteria are used to classify nonpoint source into one of three management categories. Each is described below.

1. Management Category I: Nonpoint sources in this category are eligible for funding and/or technical assistance under the priority watershed project. The sources in this category contribute a significant amount of the pollutants impacting surface and/or groundwater quality. A reduction in their pollutant load is essential for achieving the priority watershed project water quality objectives.

   Control of all pollution sources in this category is required as part of any cost share agreement. For example, if a landowner has several pollution sources on his/her property (barnyard, streambank erosion, cropland erosion) which are in this category, then all of these sources need to be controlled to meet the conditions of the agreement.

2. Management Category II: Nonpoint sources in this category are also eligible for funding and/or technical assistance under the priority watershed project. Sources in this category together contribute less of the pollutant load than those included in Management Category I. However their control may be essential to achieve water quality objectives because of the need to offset sources in Management Category I, which are not controlled under the voluntary approach used under the priority watershed project.

   Inclusion of sources in this category on cost share agreements is optional, although the success of the priority watershed project may depend on their control. An example would be a landowner whose barnyard is in Management Category I but who also has areas of cropland erosion in Management Category II. The cost share agreement for control of the barnyard runoff need not stipulate control of the cropland erosion; however, county project staff implementing the project should encourage control of all Management Category II sources.

3. Management Category III: Nonpoint sources in this category are not eligible for funding and/or technical assistance under the priority watershed project. Sources in this category do not contribute a significant amount of the pollutants impacting surface and/or groundwater quality. A reduction in their pollutant load is not essential for achieving the priority watershed project water quality objectives.

   An example of a pollution source in this category would be cropland eroding at a very high rate which, because of its location, is not contributing a significant amount of sediment to a lake or stream.

   While not eligible for funding under the priority watershed project, other Departmental programs (Wildlife and Fisheries Management) will assist county project staff to control this problem. This may take the form of technical assistance, application of program funds to create wildlife habitat, or soliciting the help of a local conservation groups for funds or labor. Such efforts will occur as part of the previously described North Branch Milwaukee River Integrated Resource Management Plan. Additionally, coordination of federal (the Food Security Act) and state (the Farmland Preservation Program) efforts may also assist conservation efforts for these sources.

Change in Management Category

The priority watershed offers flexibility during implementation for reassigning pollution sources to a different management category. This may be necessary as a result of a change in the operation of a farm, for example, or other circumstances having occurred since completion of the inventories. Application of decision criteria necessary for changing management categories is described below.

ELIGIBILITY CRITERIA AND MANAGEMENT CATEGORIES FOR RURAL NONPOINT SOURCES

The criteria and management categories described below are for:

a. Barnyard runoff.
b. Areas used for manure spreading.
c. Areas where eroded soil is delivered to lakes and streams.
d. Areas where streambank erosion or access by livestock are adversely affecting water quality and/or aquatic habitat.

Barnyard Runoff

Barnyards are divided into four groups for management. These are:

1. Barnyards draining to surface water or riparian wetlands
2. Barnyards draining to internally-drained wetlands
3. Barnyards draining to internally-drained areas overlain with shallow mineral soils
4. Barnyards draining to internally drained areas overlain with deep mineral soils

Table 28
Criteria and Management Categories for Barnyards Draining to Surface Water and Riparian Wetlands in the North Branch Milwaukee River Watershed

Phosphorus Per Barnyard	Management Category	Phosphorus Reduction
12 pounds or more	I	65%
11.9 to 5 pounds	II	20%
4.9 to 0 pounds	III	0%

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboygan and Washington County Land Conservation Departments.

Barnyards Draining to Surface Water or Riparian Wetlands: Phosphorus reduction goals for each subwatershed were described in Chapter III. Additionally, a watershed-wide phosphorus reduction goal of about 85 percent for barnyards draining to surface water is needed to achieve downstream water quality improvement. The criteria presented below were developed to achieve these goals and the associated improvements in water quality needed to meet the potential biological and recreational stream and lake uses.

Application of these criteria to the 156 barnyards draining to surface waters and riparian wetlands for each subwatershed and the watershed as a whole is shown in Table 29. The result is that 64 barnyards, or 40 percent, are eligible for funding under the watershed project. Thirty sites are classified as Management Category I and 34 as Management Category II. Control of these sites would reduce the amount of phosphorus loading to surface water and riparian wetlands by about 1,119 pounds or about 85 percent.

Subwatersheds with the greatest number of eligible barnyards and the corresponding phosphorus load reductions are North Branch (10 sites, 146 pounds), Silver Creek (10 sites, 133 pounds), and Batavia Creek (9 sites, 148 pounds). Installation of nonpoint source control practices at these sites will achieve subwatershed specific and watershed-wide reduction goals.

Eligible barnyards are located in portions of three of the four counties in which the watershed is located. Sheboygan County, containing about 65% of the watershed, has the greatest number (53 sites or 85%), followed by Washington County (7 sites or 8%), and Ozaukee County (4 sites or 7%).

Table 29
Barnyards Draining to Surface Water or Riparian Wetlands Eligible for Funding in the North Branch Milwaukee River Watershed[1]

	Management Category				Total		
	I		II				Percent of Subwatershed Barnyard Phosphorus Load
Subwatershed	barnyards	lbs. P	barnyards	lbs. P	barnyards	lbs. P	
Nichols Creek	--	--	3	19.8	3	19.8	72
Cascade Swamp	3	130.2	--	--	3	130.2	99
Chambers Creek	1	29.2	1	7.8	2	37.0	88
Adell	1	20.3	--	--	1	20.3	96
Melius Creek	1	15.8	1	10.0	2	25.8	84
North Branch	5	105.6	5	40.9	10	146.5	90
Gooseville Creek	1	14.5	--	--	1	14.5	63
Batavia Creek	6	127.1	3	20.9	9	148.0	98
Mink Creek	1	19.5	5	43.8	6	63.3	71
Beechwood Lake	4	69.6	2	16.0	6	85.6	80
Silver Creek	2	53.6	8	79.2	10	132.8	83
Huiras Lake	2	94.1	2	11.1	4	105.2	92
Stony Creek	3	164.7	3	16.0	6	180.7	86
Erler Lake	--	--	1	9.0	1	9.0	65
TOTAL	30	844.2	34	274.5	64	1118.7	87

[1]Barnyards in the Wallace Creek Subwatershed have phosphorus loads below the decision criteria and are not eligible for funding. There are no barnyards in the Wallace Lake Subwatershed. A total of three barnyards in the Lake Ellen, Spring Lake, and Random Lake subwatersheds will be evaluated during implementation.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Fond du Lac, Ozaukee, Sheboygan, and Washington County Land Conservation Departments.

Table 30
County Locations for Barnyards Draining to Surface Water or Riparian Wetlands
Eligible for Funding in the North Branch Milwaukee River Watershed

	Management Category		
	I	II	
County	No. of Barnyards	No. of Barnyards	Total
Sheboygan	24	29	53
Washington	4	3	7
Ozaukee	2	2	4
Total	30	34	64

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

Barnyards Draining to Internally Drained Wetlands: A site-specific management approach is being used for control of barnyard runoff draining to internally-drained wetlands. The 20 barnyards contribute a combined total of 170 pounds of phosphorus to wetlands. The impacts vary with the size and ecological diversity of the area. An additional consideration is whether the wetland serves as a groundwater recharge area, in which case pollutant loading from a barnyard has the potential to be a source of groundwater contamination.

Table 31
Barnyards Draining to Internally Drained Wetlands in the North Branch
Milwaukee River Watershed For Which a Management Category Will Be Determined

Subwatershed	County	No. of Barnyards
Cascade Swamp	Sheboygan	2
Beechwood Lake	Sheboygan	1
Adell	Sheboygan	1
Gooseville Creek	Sheboygan	1
North Branch	Sheboygan	1
Stony Creek	Washington	2
Wallace Creek	Washington	5
Huiras	Ozaukee	1
Total		14[1]

[1]These barnyards have a phosphorus load of more than five pounds.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee. Sheboyagan and Washington County Land Conservation Departments.

No specific eligibility criteria were developed for barnyards draining to these areas. Field investigations for the 13 barnyards with a phosphorus load of five pounds or more will be conducted jointly by the county project management staff and water resource management investigators from the Department's Southeast District Office.

The field investigators will quantify the impact of the barnyard runoff on the water quality, wildlife habitat, and ecological integrity of each wetland during the first three months of the implementation period. A site with a phosphorus loading rate of five pounds or more having an adverse impact on the wetland will be designated as Management Category I or II, and will be eligible for funding. Eligibility will be determined jointly by the county project managers, the DATCP, and the Department. Sites with a phosphorus loading rate of five pounds or more with minimal impacts, and those with a loading rate less than five pounds will be assigned to Management Category III, and will not be eligible for funding.

Barnyards Draining to Internally Drained Areas Overlain with Shallow Mineral Soils: A site-specific management approach is being used for control of barnyard runoff originating at the nine sites with a combined phosphorus load of 53 pounds, draining to internally-drained areas with shallow soils (60 inches or less) overlying bedrock or groundwater. The primary concern with these barnyards is their potential to be a source of groundwater contamination.

No specific criteria were developed to establish the eligibility of these barnyards for funding under the priority watershed project. Six barnyards with a potential to be a source of groundwater contamination will be evaluated jointly by the county project management staff, the DATCP, and the Department.

Department and county file data and/or a site visit will be used for the investigation. Information to be used includes, but is not limited to, the following: a mechanical analysis of the soil; site-specific determination of depth to bedrock or groundwater; herd size; barnyard management; location of the barnyard with respect to groundwater recharge areas; and groundwater quality information. Table 32 lists preliminary site characteristics to be used in determining the threat to groundwater from these sites.

The Department, the DATCP, and the county project management will make a joint determination of a management category for each barnyard. Lesser cost alternatives to reduce the groundwater contamination potential will be eligible for cost-sharing under the priority watershed project. However, if site conditions require use of high cost practices to solve the problem, further site-specific investigations including groundwater monitoring will be conducted prior to making a final determination of cost share eligibility.

Barnyards Draining to Internally Drained Areas Overlain with Deep Mineral Soils: Thirty-four barnyards drain to internally drained areas overlain with deep (more than 60 inches) mineral soils. Generally, these sites have limited potential for surface or groundwater contamination. Consequently, they are assigned to Management Category III, and are <u>not eligible</u> for funding and/or technical assistance under the priority watershed project.

However, several of these barnyards have exceedingly high phosphorus loads. The county project management staff may revaluate these sites. If upon further investigation, it is determined that a threat to surface and/or groundwater exists, the county staff and the Department may jointly decide to change the management category to make the site eligible for assistance.

Table 32.
Preliminary Site Characteristics Used To Indicate
Low Groundwater Contamination Potential
From Concentrated Animal Waste Sources[1].

Characteristic	Animal Lot	Temp. Manure Stack	Solid Manure Storage Structure	Runoff from Lot, Stack or Structure
Feet to groundwater or bedrock	>3	>5	>3-5[2]	>22.
Percent soil passing #200 sieve	>50% for at least 1 foot, or >25% for at least 3 feet	>50% for at least 3 feet, or >25% for at least 5 feet	>3 feet having >50%, or >5 feet having >25%	>50% for at least 1 foot, or >25% for at least 2 feet[3].
Animal herd size	Animal herd size should be considered as a factor, although criteria need to be developed.			
Management	The frequency of lot scraping should also be considered as it will affect the availability of total nitrogen and the form of nitrogen found under the barnyard.			
Location	Sources located in groundwater discharge areas are generally less of a concern for water supply wells than sources located in groundwater discharge areas.			

1. The separation distance and soil mechanical analysis criteria were considered together in determining site vulnerability.
2. As determined in the first 100 feet of vegetated buffer for overland flow or 300 feet of vegetated buffer for channel flow.
3. If runoff ponds for extended periods in an unvegetated area, a groundwater hazard may exist even if the separation distances and soil characteristics are met.

Table 33
Barnyards Draining to Internally Drained Areas with Shallow Soils
in the North Branch Milwaukee River Watershed for Which a
Management Category will be Determined

Subwatershed	County	No. of Barnyards	Total Pounds of Phosphorus
North Branch	Sheboygan	2	14.2
Beechwood Lake	Sheboygan	2	42.7
Stony Creek	Washington	2	11.5
Wallace Creek	Washington	3	1.5
Erler Lake	Washington	1	2.1
Total		10	72.0

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

Table 34
Criteria and Management Categories for Critical Acres Winter Spread With Livestock Manure in the North Branch Milwaukee River Watershed

Acres	Critical Acres Per Barnyard	Management Category	Percent of Critical
	15.0 acres or more	I	60%
	14.9 to 7.0 acres	II	25%
	6.9 to 0 acres	III	15%

Source: Wisconsin Department of Natural Resources and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

Runoff From Areas Winter Spread With Livestock Manure

A reduction in the quantity of phosphorus originating from "critical areas" winter spread with livestock manure is needed to achieve subwatershed-specific and watershed-wide water quality objectives. Achievement of phosphorus reduction goals for the priority watershed project depends on reducing it by an amount roughly equivalent to the amount attributed to barnyard runoff.

As previously discussed, critical acres are lands with steep slopes or acres located in flood prone areas. Runoff from such areas has a high potential to contribute phosphorus and other pollutants to surface water. Decision criteria presented below are designed to reduce phosphorus from this source by about 85 percent in the watershed. This is the same overall percent reduction used for determining eligibility for barnyards draining to surface water.

Application of these criteria to the 1,900 critical acres in the watershed is shown in Table 35. The result is that 1,171 critical acres are classified as Management Category I and 425 acres are Management Category II. Management Category I includes those livestock operators included in the top 60 percent of the critical acres and areas where manure is spread in or near sensitive wetlands, or where a threat of groundwater contamination exists. Management Category II includes those livestock operators which together own the next 25 percent of the critical acres spread during winter.

The management categories for critical acres are used initially to establish a priority list for contacting landowners. Those in Management Category I are contacted first, followed by individuals in Management Category II. A site visit determines the number of livestock: the presence, type, and adequacy of manure storage facilities, and manure spreading practices. This information is used to estimate the number of critical acres on which manure is winter spread.

Cropland Areas Delivering Sediment to Surface Water

Eligibility criteria were established for the 80 square miles of eroding upland areas delivering sediment to surface waters. These criteria, the number of parcels and associated acreage eligible for funding under the priority watershed project, and the total amount of sediment anticipated to be controlled are shown in Table 36.

An estimated 656 fields or parcels, encompassing 6,860 acres, are eligible for funding (Management Category I) to install erosion control practices. Installation of management practices will reduce the amount of sediment delivered to surface water by varying amounts in each subwatershed, and by about 2,000 tons or 34 percent in the watershed as a whole.

Table 35
County Locations for Critical Acres Winter Spread with Manure Eligible for Funding in the North Branch Milwaukee River Watershed

	Management Category					
	I		II			Total
County	No. Operators	Critical Acres	No. Operators	Critical Acres	No. Operators	Critical Acres
Sheboygan	32	778	29	285	61	1,063
Washington	6	229	15	150	21	379
Ozaukee	4	119	3	33	7	152
Fond du Lac	2	45	1	7	3	52
Total	44	1,171	48	475	92	1,646

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

Subwatersheds with the greatest number of eligible acres are Silver Creek (1,142 acres), Batavia Creek (705 acres), and Wallace Creek (639 acres). Together these subwatersheds contain about 36 percent of the eligible acres. Silver Creek (289 tons), Stony Creek (265 tons), Mink Creek (236 tons), and the North Branch (181 tons), subwatersheds account for 48 percent of the delivered sediment to be controlled.

Importantly, sediment reduction goals on some of these areas may be difficult to achieve and/or prohibitively expensive. Most often this includes lands with a low soil loss (below T, or tolerable soil loss limits), with a delivery rate above the target reduction level. In such cases, if the county Land Conservation Departments conclude that control on a parcel in Management Category I is not practical, then the parcel may be reclassified to Management Category II. Documentation of these changes will be reported to the Department for project tracking and evaluation purposes.

Cropland Delivering Sediment to Riparian and Internally Drained Wetlands

As noted above, cropland eligible for funding includes areas delivering sediment to streams or lakes above the target reduction levels. However, a significant portion of the eroding croplands deliver sediment to wetlands adjacent to streams or lakes (riparian) or internally drained wetlands. Wetlands trap most or all of this sediment, thereby reducing the impact that it or other associated pollutants may have on streams or lakes. In the process, the wetland may itself suffer environmental damage. If it is severe enough, the wetland may lose its ability to continue to trap the eroding sediment.

Site-specific evaluations will be conducted, as needed, by the Department water resources management personnel and the county project management staff. Eligibility for cost-sharing or technical assistance will be determined by the Department, DATCP, and the county Land Conservation Department staffs.

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

Cropland eligible for assistance through the priority watershed project may also need practices beyond those required to achieve the sediment delivery reduction goals. In such cases, practices needed to reduce erosion to levels necessary to comply with requirements of the State Farmland Preservation or Federal Food and Security Act Programs may be eligible for funding under the priority watershed project. These determinations will be made jointly by the DATCP, the Department, and the county project management staff on a site-specific basis. Generally, funding will be available for cropland needing low to moderate cost erosion control practices. High cost measures to control erosion on these areas will not be eligible for funding under the priority watershed project.

Streambank Degradation

Criteria were developed to categorize the eligibility for funding of the 52 sites where these conditions exist. Eligibility is based on the need to reduce sedimentation and direct deposition of livestock wastes into streams. The decision criteria and management categories are presented in Table 37.

Application of these criteria resulted in the identification of 36 sites classified as Management Category I and 16 sites in Management Category II. Sites in Management Category I include areas with erosion rates at or above the criteria, or where livestock access is having a significant impact on water quality and/or aquatic habitat. Subwatersheds with the most significant amount of streambank erosion and eroded sediment are Silver Creek (10 sites, 44 tons), North Branch (16 sites, 19 tons), and Beechwood Lake (13 sites, 7 tons).

Table 36
Criteria and Cropland Eligible for Funding in the
North Branch Milwaukee River Watershed

Subwatershed Sediment Reduction Subwatershed	Sediment Criteria (T/AC/YR)	No. of Parcels	Total Acres	Sediment Controlled (tons)	Goal(%)
Nichols Creek	0.20	37	553	121	30
Cascade Swamp	0.41	9	94	75	30
Lake Ellen	0.17	5	40	7	30
Chambers Creek	0.17	53	498	72	25
Adell	0.32	34	435	114	25
Melius Creek	0.18	26	315	59	25
North Branch	0.45	37	371	181	20
Gooseville Creek	0.33	13	163	90	40
Batavia Creek	0.14	41	705	114	30
Mink Creek	0.50	30	347	236	30
Beechwood Lake	0.28	39	385	175	30
Silver Creek	0.17	82	1142	289	40
Huiras Lake	0.18	36	257	50	20
Stony Creek	0.60	47	324	265	25
Wallace Creek	0.13	89	639	93	25
Wallace Lake	0.07	1	11	13	15
Spring Lake	0.25	1	5	1	10
Random Lake	0.17	3	53	5	10
Erler Lake	0.15	73	524	68	10
TOTAL	--	656	6861	2033	--

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Fond du Lac, Ozaukee, Sheboygan, and Washington County Land Conservation Departments.

Table 37
Criteria and Management Categories for Streambank Erosion Sites
in the North Branch Milwaukee River Watershed

Decision Criteria Eroded Sediment Per Site	Management Category[1]	Sediment Reduction
1 ton or more	I[2]	site-specific
0.01 to 0.99 ton	II	site-specific
no tons	III	--

[1]Management categories will be assigned to additional eroding sites and/or where livestock have access to streams during implementation.

[2]This includes areas without significant erosion but at which livestock access is having a significant impact on water quality or aquatic habitat.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Department.

Table 38
Streambank Erosion Sites Eligible for Funding in the North Branch Milwaukee River Watershed

	Management Category				Total		Subwatershed Sediment Reduction
	I		II				
Subwatershed	# Sites	Tons Sediment	# Sites	Tons Sediment	# Sites	Tons Sediment	Goal (%)
Nichols Creek	2	--	3	0.1	5	0.1	30
Chambers Creek	1	--	--	--	1	--	25
North Branch	5	17.2	10	1.8	16	19.0	20
	1	--[1]					
Batavia Creek	1	1.5	--	--	2	1.5	30
	1	--[1]					
Mink Creek	1	2.1	--	--	1	2.1	30
Beechwood Lake	4	5.6	3	1.2	13	6.8	30
	6	--[1]					
Silver Creek	6	43.7	--	--	10	43.7	40
	4	--[1]					
Green Lake	1	6.0	--	--	2	6.0	25
	1	--[1]					
Hiras Lake	2	4.0	--	--	2	4.0	20
TOTAL	36	80.1	16	3.1	52	83.2	--

[1]These sites are areas where livestock have access to streams. Sediment contributed to the stream is not significant, however, impacts to aquatic habitat and water quality may result in their being eligible for assistance under the priority watershed project.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

The majority of the eligible streambank sites are located in Sheboygan County (44 sites) with the remainder in Washington County (six sites) and Ozaukee County (two sites). Additional sites discovered during implementation will be evaluated and assigned a management category to be assigned by the county Land Conservation Department staff, the DATCP, and the Department.

Removal of dams and similar instream structures in the Milwaukee River Basin is being evaluated under the previously described Milwaukee River Basin Integrated Resource Management Plan planning effort. The Department participated in stabilization of streambanks and exposed lakebed as part of a dam removal project in the city of West Bend under the East-West Branch Priority Watershed Project. The need for similar efforts in the North Branch Watershed, should they occur, will be evaluated. Where warranted, stabilization of the lakebed and streambanks may be eligible for technical and financial assistance.

Table 39
County Locations for Streambank Erosion Sites Eligible for Funding
in the North Branch Milwaukee River Watershed

	Management Category		
County	I No. of Sites	II No. of Sites	Total
Sheboygan	28	16	44
Washington	6	--	--
Ozaukee	2	--	2
Total	36	16	52

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and the Fond du Lac, Ozaukee, Sheboyagan and Washington County Land Conservation Departments.

ELIGIBILITY CRITERIA AND MANAGEMENT CATEGORIES FOR URBAN NONPOINT SOURCES

The Department evaluated the relative contributions of urban nonpoint sources and the associated impacts on water quality for the villages of Adell, Cascade, and Random Lake. In addition, the potential for runoff from lakeshore development surrounding Lake Ellen and Wallace Lake to affect water quality and the achievement of potential biological and recreation uses was investigated.

The results indicate that in general, urban nonpoint sources are not affecting water quality to an extent which jeopardizes achievement of potential biological and recreational use objectives. However, selected urban nonpoint sources in portions of the North Branch Watershed should be addressed under the priority watershed project because of their potential to cause longer term water quality problems.

Specific eligibility criteria and management categories were not developed for urban nonpoint sources. Rather, a strategy comprised of four elements was developed to focus efforts for reducing the impacts of urban nonpoint sources in the North Branch Watershed. The four elements presented below are:

1. Construction site erosion.
2. Runoff from existing development.
3. Runoff from planned future development.
4. Information and Education Program.

Construction Site Erosion

Construction site erosion can have some of the most dramatic adverse water quality impacts attributable to urban nonpoint sources. Adoption and enforcement of construction erosion control ordinances are effective tools to reduce the extent and severity of this problem. The following discussion pertains to actions which may be taken under the priority watershed project to control construction site erosion.

Village of Random Lake: The need for ordinances in the North Branch Watershed was highlighted in the village of Random Lake during 1988. Runoff from a developing industrial park located about one-quarter from Random Lake carried sediment and other pollutants to roadside ditches draining to the lake.

At the village's request, the Department and the UW-Extension assisted in the development of a construction erosion control ordinance for the village. Its provisions followed the Model Ordinance for the Control of Construction Site Erosion, which was developed by the Department and the League of Wisconsin Municipalities in 1987. The ordinance was adopted by the village in January 1989.

Upon request, the Department will review the ordinance and provide the village with guidance on the means for enforcement. Additional staff for enforcement of the ordinance by the village are eligible for funding under the priority watershed project for a period of two years.

Villages of Adell and Cascade: The extent of future urban development and the associated potential for construction site erosion in these communities is uncertain. However, both villages are encouraged to adopt and enforce a construction site erosion control ordinance to help ensure that water quality impacts attributable to development are reduced.

Upon request, the Department and/or the UW-Extension will assist the communities in developing construction site erosion control ordinances. Development of ordinances and additional staff necessary for enforcement are eligible for funding under the priority watershed project.

Unincorporated Areas: On the whole, the greatest extent of new urban development in the North Branch Watershed will likely occur in unincorporated areas. Accordingly, local units of government with jurisdiction in unincorporated areas are encouraged to adopt and enforce construction site erosion control ordinances.

Upon request, the Department and/or the UW-Extension would assist the appropriate local unit of government (counties and/or townships) to develop erosion control ordinances. Development of ordinances and additional staff necessary for enforcement are eligible for funding under the priority watershed project.

Runoff From Existing Development

The Department's analysis of the impacts of runoff from existing urban development indicated that, in general, it is not having a widespread water quality impact. However, runoff from certain areas in each of the three villages and lake shore developments surrounding Lake Ellen and Wallace Lake can have localized adverse impacts.

Upon request, the Department will provided limited assistance to the communities to identify "critical" areas from which urban nonpoint source runoff is having a recognizable impact on water quality. Practices used to reduce pollutant loads from existing urban development include, but are not limited to the following: wet basins, infiltration trenches, street sweeping, pet waste control ordinances, and Information and Education Programs. These practices are eligible for funding under the priority watershed project.

Runoff From Future Urban Development

The limited amount of urban development anticipated to occur in the North Branch Watershed will not likely prevent achievement of watershed-wide biological and recreational use objectives. However, there is a potential that localized impacts of larger concentrations of new urban development could degrade water quality. Stormwater management ordinances and structural measures which incorporate provisions for nonpoint source control are effective ways to reduce the impact of new development on water quality. Stormwater management plans are effective tools to determine the best ways to address these issues.

Upon request, the Department and/or the UW-Extension will provide limited assistance to the villages in developing stormwater management ordinances. Development of ordinances and additional staff necessary for enforcement are eligible for funding under the priority watershed project. In addition, the Department will cost share expenses related to the completion of a stormwater management plan.

Urban Information and Education Program

Information and Education Program efforts in the three villages and other urbanized areas in the watershed will inform homeowners on nonpoint sources originating on their own property. The Information and Education Program for the North Branch Watershed is presented in Chapter VI. Expenses for urban Information and Education Program efforts in which the villages or other local units of government participate are eligible for funding under the priority watershed project.

PART TWO
DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER V - DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER VI - INFORMATION AND EDUCATION PROGRAM

CHAPTER V
DETAILED PROGRAM FOR IMPLEMENTATION

INTRODUCTION

The purpose of this chapter is to describe how the North Branch Priority Watershed Project will be implemented. The rural and urban nonpoint source controls needed to improve water quality were presented in Chapter IV, "Nonpoint Source Control Needs." This chapter contains information and guidelines for local units of government that will implement the project, and state and federal agencies that will provide technical, financial, and administrative support.

Specifically, this chapter includes information and guidelines concerning:

a. Priority watershed project participants and their responsibilities.

b. Availability and administration of state cost share assistance funds for installation of rural and urban nonpoint source control practices.

c. Availability and administration of state cost share assistance funds for the support of the local units of government implementing the priority watershed project.

d. An estimated budget for nonpoint source control practices and support of local staff.

PRIORITY WATERSHED PROJECT PARTICIPANTS AND THEIR ROLES

Landowners and Land Operators

Owners and operators of public or private lands are key participants. They will install, through the voluntary approach used under the priority watershed project, land management practices which reduce nonpoint sources impacting water quality. Eligible participants include individuals, counties, cities, villages, towns, sanitary districts, inland lake protection districts, corporations, and state agencies.

Eligible rural landowners will work with their county Land Conservation Department to develop farm conservation plans, enter into cost share agreements, and install practices. Cost share recipients installing nonpoint source control practices agree to maintain existing management practices which protect water quality, and to maintain all cost shared practices.

In urban areas, an Information and Education Program will inform municipal officials and residents about sources of nonpoint pollution and the impacts they have on water quality. The villages of

Adell, Cascade, and Random Lake will work with developers, builders, and the appropriate municipal authorities in compliance with local construction erosion control ordinances and stormwater management plans for new development. Practices to control construction site erosion and manage runoff from new developments are not eligible for cost-sharing through this watershed project.

Local Units of Government

Primary responsibility for implementing the North Branch Priority Watershed Project lies with the Land Conservation Departments in Fond du Lac, Ozaukee, Sheboygan, and Washington counties. To a lesser extent, municipal officials in the villages of Adell, Cascade, and Random Lake will also have responsibility for carrying out certain elements of the project.

Counties (Fond du Lac, Ozaukee, Sheboygan, Washington County Land Conservation Departments): Counties, working through their respective Land Conservation Departments, have the following implementation responsibilities:

1. Contacting eligible landowners.

2. Developing land conservation plans.

3. Entering into cost share agreements with landowners.

4. Designing nonpoint source control practices and verifying practice installation.

5. Reimbursing landowners, or other recipients of cost share assistance, for the capital costs of installing Best Management Practices at the cost share rate specified in Chapter NR 120, Wisconsin Administrative Code.

6. Monitoring project implementation by tracking changes in the nonpoint source inventory, quantifying pollutant load reductions which result from installing nonpoint source control practices, and evaluating progress in completing the county work tasks on schedule.

7. Working with the Department, counties, and towns in the watershed to identify construction erosion control program needs for unincorporated areas. Where appropriate, county staff will administer and enforce construction erosion control ordinances in unincorporated areas.

8. Cooperating with the UW-Extension in conducting the Information and Education Program described in Chapter VI.

Villages of Adell, Cascade, and Random Lake: The villages have the following project implementation responsibilities:

1. Cooperating with the UW-Extension in the conduct of the Urban Information Program described in Chapter VI.

2. Contacting owners or operators of urban areas where nonpoint source control practices are needed to reduce the impact of stormwater runoff on water quality in a stream or lake.
3. Entering into cost share agreements with landowners.

4. Entering into contracts with private consulting firms and/or governmental agencies to determine the best means for installing urban nonpoint source control practices.

5. Modifying or adopting and administering construction erosion control ordinances consistent with the guidelines in this plan.

6. Developing and implementing stormwater management plans or ordinances as needed to protect water resources from the impacts of increasing development, consistent with the guidelines in this plan.

Department of Natural Resources

The Wisconsin Department of Natural Resources (Department) is the state agency responsible for providing financial support for project implementation. In addition, the Department is required to administer the project and evaluate water quality improvements resulting from installing nonpoint source control practices. The Department, in cooperation with the DATCP, the U.S. Department of Agriculture, and the Soil Conservation Service, also provides technical assistance to local units of government implementing the project. Each of these functions is summarized below.

Financial Support: Financial support for implementation of the priority watershed project is provided in two ways. First, the Department enters into local assistance grant agreements with local units of government having implementation responsibilities. These agreements cover expenses to support staff and related expenses, and for professional service contracts needed to implement the nonpoint source controls called for in the priority watershed plan. The local assistance grant may also be used to support staff and cover other expenses associated with implementation of the Information and Education Program presented in Chapter VI.

Second, funds are provided to the local units of government with implementation responsibility to pay for nonpoint source control practices. A nonpoint source grant agreement is signed by the Department and the local units of government, which establishes an account to be used as the state's share of the costs for practices. These funds are used by the local units of government implementing the project to reimburse landowners for the costs of practice installation. The Department may also enter into cost-sharing agreements directly with local or state units of government for control of pollution sources on lands the governments own or operate.

Project Administration: Project administration involves working with local units of government to ensure that work commitments required during the eight-year project implementation phase can be met. The Department participates in annual work planning with local units of government receiving local assistance grants, and as necessary coordinates revisions in the funding agreements.

The Department reviews cost share agreements signed by the local implementing units of government and the participating landowners for installing nonpoint source control practices. When necessary, guidance is provided when questions arise concerning the conformance of proposed activities with this watershed plan. In some situations, prior review and approval by the Department of nonpoint source control practices, cost share agreements, or local assistance activities is required as a condition of funding. These requirements are contained in Chapter NR 120, Wisconsin Administrative Code.

Project Evaluation: The Department has responsibility for monitoring and evaluating priority watershed projects. These responsibilities are discussed in detail in Chapter VII, "Project Evaluation and Monitoring."

Technical Assistance: The Department provides technical assistance to local units of government to aid in nonpoint source control practice design and installation. Such assistance insures that practices eligible for cost share assistance will be used, and that the best possible benefit for improving water quality will occur.

Special Activities: The Department has other responsibilities during project implementation which include:

a. Assisting Land Conservation Department staff with site reviews to determine the impacts of nonpoint sources on wetlands and/or groundwater quality.

b. Assisting county Land Conservation Department staff to integrate wildlife and fish management concerns into selection and design of nonpoint source control practices.

c. Working jointly with the DATCP to provide counties with technical guidance on the application of nonpoint source control practices contained in Appendix C of this plan.

d. Assisting county Land Conservation Department staff and the villages of Adell, Cascade, and Random Lake to identify the need for and/or modifications in construction erosion control and stormwater management ordinances.

e. Assisting communities to identify additional actions needed to implement recommendations for reducing urban nonpoint sources associated with existing and developing areas.

Department of Agriculture, Trade, and Consumer Protection

The Department of Agriculture, Trade, and Consumer Protection (DATCP) has an important role in the implementation of the North Branch Priority Watershed Project. Participation focuses on providing technical assistance regarding rural nonpoint source control practices, and assisting with project administration and information and education efforts. More specifically, the DATCP will:

a. Manage a training program for the county Land Conservation Department staff involved with project implementation.

b. Cooperate with the UW-Extension to act as a clearinghouse for information related to agricultural Best Management Practices, sustainable agriculture, and nutrient and pest management.

c. Carry out information and education activities or tasks described in Chapter VI, "Information and Education Program."

d. Assist Land Conservation Department staff to identify watershed project participants subject to federal or state conservation compliance programs.

e. Assist, if requested, Land Conservation Department staff to develop manure storage ordinances.

f. Assist Land Conservation Department staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.

g. Participate in the annual project review meetings.

h. Participate in developing technical standards for agricultural Best Management Practices, and provide technical assistance to county Land Conservation Department staff concerning application of these practices.

i. Assist Land Conservation Department staff to evaluate the site-specific practicality of implementing rural nonpoint source control practices.

Cooperating Agencies

The primary cooperating agencies that will assist in implementing the priority watershed project are the Soil Conservation Service (SCS) and the Universtiy of Wisconsin Extension Service (UW-Extension). The SCS provides technical assistance to Land Conservation Department staff for design and installation of nonpoint source control practices. This agency receives state funds for practice design and provides engineering approval for nonpoint source control measures when required.

The UW-Extension is responsible for coordinating the Information and Education Program identified in Chapter VI of this plan, and will play a major role in carrying out many of the information and education activities in rural and urban areas.

PRIORITY WATERSHED PROJECT IMPLEMENTATION SCHEDULE

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-year period.

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

ELIGIBLE NONPOINT SOURCES AND CONTROL PRACTICES

Nonpoint sources eligible for cost share assistance under the North Branch Priority Watershed Project were presented in Chapter IV, and are summarized by county in Table 40. As previously discussed, control of these sources is essential to achieve stream and lake water quality objectives.

Eligible nonpoint source control practices, or Best Management Practices (BMPs) are practices, techniques, or measures determined to be the most effective, practicable means of controlling urban and rural nonpoint sources of pollution. Eligible BMPs identified for this plan include those contained in Chapter NR 120, Wisconsin Administrative Code. The practices and their cost share rates are listed in Table 41.

Table 41 includes modifications to three eligible BMPs and three "alternative" BMPs. Information concerning these practices is contained in Appendix C.

Table 40
Estimated Best Management Practice Needs for Controlling Rural Nonpoint Sources in the North Branch Milwaukee River Watershed

		Practice Needs				
Best Management Practice	Units	Sheboygan	Washington	Ozaukee	Fond du Lac	Watershed Need
UPLAND EROSION CONTROLS[1]						
Contour Cropping	acres	1,816	756	78	N/A	2,650
Contour Strip Cropping	acres	407	53	7	N/A	467
Reduced Tillage	acres	1,633	220	31	N/A	1,884
Critical Area Stabilization	acres	42	30	10	N/A	82
Change in Rotation	acres	4,805	1,625	200	N/A	6,630
Grass Waterways	acres	87	32	10	N/A	129
Terraces	feet	10,600	5,000	N/A	N/A	15,600
Field Diversions	feet	2,400	10,000	2,500	N/A	14,900
Grade Stabilization	number	10	4	9	N/A	23
Agriculture Sediment Basins	number	5	6	3	N/A	14
ANIMAL WASTE CONTROLS[2]						
Barnyard Runoff Management	number	53-61	7-20	4-5	0	64-86
Manure Management	acres	1,063	379	152	52	1,646
(Long Term Storage)	(number)	24	5	7	3	39
(Short Term Storage)	(number)	13	9	N/A	N/A	22
(Waste Utilization Plans)	(number)	24	7	N/A	N/A	31
STREAMBANK EROSION CONTROLS[3]						
(Shape & Seed)	feet	2,080	7,000	2,000	N/A	11,080
(Fencing)	feet	36,400	13,000	2,000	N/A	51,400
(Rip-Rap)	feet	2,300	N/A	N/A	N/A	2,300
(Crossings)	number	5	2	4	N/A	11

[1]Vegetative filter strips are included under Critical Area Stabilization.

[2]Roofs over barnyards and manure management facilities and barnyard relocation are included under Barnyard Runoff Management. Waste utilization planning needs include plans for landowners having barnyard runoff control systems, long term storage, short term storage, or merely a waste utilization plan not associated with any of these structural practices.

[3]Includes vegetative filter strips, livestock watering pumps, and fish habitat structures.

Table 41
Eligible Best Management Practices and Cost Share Rates
for the North Branch Milwaukee River Watershed

Best Management Practice[1]	State Cost Share Rate
Contour Cropping	50% or $6/ac.
Contour Strip Cropping	50% or $12/ac.
Field Strip Cropping	50% or $10/ac.
Field Diversions	70%
Terraces	70%
Grassed Waterways	70%
Reduced Tillage	50% or $45/ac.[1] 50% or $15/ac.[2]
Critical Area Stabilization[3]	*70%
Grade Stabilization Structures	*70%
Agricultural Sediment Basins[4]	70%
Streambank Protection[3]	*70%[5]
Barnyard Runoff Management	70%
Animal Lot Relocation[4]	70%[6]
Long Term Manure Storage Facilities	70% up to $10,000
Short Term Manure Storage Facilities	70% up to $6,000
Roofs for Barnyard/Manure Storage Facilities	*70%
Livestock Exclusion From Woodlots	50%
Structural Urban Practices[7]	70%
Street Sweeping[4]	50%

[1]Applies to areas used for continuous row crop production.

[2]Applies to areas planted following crop rotations.

[3]Special modifications have been made for some pollution sources in the North Branch Watershed. See Appendix C for modifications.

[4]This practice is not contained in Chapter NR 120, Wisconsin Administrative Code. See Appendix C for more information.

[5]The maximum cost share amount for streambank stabilization practices will not include the cost for fish habitat structures.

[6]The maximum cost share amount of relocation of buildings, structures, and lots shall be 70 percent of the replacement cost up to their appraised value. Salvage or resale value realized during the maintenance period of the cost share agreement shall be deducted from the appraised value.

[7]Applies to practices for existing urban areas. Construction erosion control and stormwater management practices for new development are not eligible.

*State cost share may be increased up to 80 percent with matching county funds.

Source: Wisconsin Department of Natural Resources.

NONPOINT SOURCES AND CONTROL PRACTICES NOT ELIGIBLE FOR COST SHARE ASSISTANCE

Priority watershed cost share funds cannot be used to control nonpoint sources and land management activities specifically excluded by Chapter NR 120, Wisconsin Administrative Code. These include:

1. Nonpoint source control practices installed prior to project implementation.

2. Activities covered under the Wisconsin Pollutant Discharge Elimination System Permit Program, or otherwise authorized under Chapter 147 of the Wisconsin Statutes.

3. Activities and nonpoint sources including: on septic system controls; dredging of lakes, streams or wetlands; silvicultural activities; wetland drainage; and practices routinely used in the growing of crops or feeding livestock.

4. In urban areas, construction erosion control practices, practices designed to control runoff, or nonpoint sources originating from areas undergoing development.

COST SHARE AGREEMENT ADMINISTRATION

Purpose and Responsibilities

Cost share agreements are legally binding contracts between the grant recipient and local units of government implementing the priority watershed project, or in some cases the Department. Generally, each agreement specifies the quantity and location of each Best Management Practice the grant recipient agrees to install, the estimated total cost and cost share amount for each practice, and a schedule for installing the practices.

The grant recipient agrees to install all practices on the agreement within a five-year period, maintain all practices on the agreement for a specified period of time, and to refrain from changes in land management that will either lessen the effectiveness of the practices or otherwise degrade water quality.

The cost share agreement binds the granting authority to provide the technical assistance needed for planning, design, and certification of the practices on the agreement, and to provide the cost share portion of the practice costs. These cost-sharing and technical assistance obligations are supported by the Department through a nonpoint source grant with the implementing agency, and through local assistance agreements which pay for local project staff.

Local units of government implementing the project are responsible for enforcing compliance of contracts to which they are party. Where the Department serves as a party to an agreement with a unit of government, the Department will take responsibility for monitoring compliance.

Cost Share Agreement Participants

The following summarize roles of the participants in establishment of cost share agreements for the North Branch Priority Watershed Project:

1. A landowner, land operator, or unit of government (other than a county or state agency) can receive cost share assistance for eligible nonpoint source control practices installed in unincorporated areas of Fond du Lac, Ozaukee, Sheboygan, or Washington counties by entering into an agreement with the respective county Land Conservation Committee.

2. The counties of Fond Du Lac, Ozaukee, Sheboygan, and Washington; the villages of Adell, Cascade, and Random Lake; and state agencies can receive cost share assistance for eligible nonpoint source control practices installed in unincorporated areas by entering into an agreement directly with the Department.

3. A landowner or operator can receive cost share assistance for eligible nonpoint source control practices installed in incorporated areas of the villages of Adell, Cascade, or Random Lake by entering into an agreement with the respective village.

Developing Cost Share Agreements

Cost share agreements are signed during the first three years of the eight year project implementation period. The process is summarized below.

Rural Areas: Landowners or operators with eligible nonpoint sources are contacted by county Land Conservation Department staffs during the first three years of project implementation. Eligibility is confirmed following a site visit, using the criteria for management categories described in Chapter IV. Barnyards draining to internally drained wetlands or areas covered with shallow soils are reviewed jointly by the Department, the DATCP, and the Land Conservation Department staff to determine the nonpoint source management categories.

Farm conservation plans serve as the primary tools for developing cost share agreements between the landowner and the county. The cost share agreement must include Best Management Practices needed to control all sources in Management Category I. The agreement may, at the landowner's option, include practices to control sources in Management Category II. Inclusion of controls for sources in Management Category II will be strongly encouraged by the Land Conservation Department staff.

The agreement specifies, either on the agreement itself or by reference to the farm conservation plan, the existing types and level of management which must be maintained to protect water quality. Sources in Management Category III may be listed on the agreement as non-cost shared items.

The Land Conservation Department district staff will consult with the Department's Southeast District Wildlife Management and Fish Management staff to optimize the wildlife and fish management benefits of nonpoint source control practices. Specifically, the county staff should contact the Department staff if:

a. Streambank protection practices, agricultural sediment basins, or critical area stabilization practices are being considered.

b. Fence rows, rock piles, wetlands, or other wildlife habitat components will be affected by installation of agricultural nonpoint source control practices.

The Department will assist county staff by:

a. Identifying streambank protection practices that benefit fish and wildlife.

b. Identifying wildlife habitat components that could be incorporated into vegetative filter strips placed along streams or in upland areas.

c. Reviewing placement of proposed agricultural sediment basins to assure that negative impacts on stream fish and aquatic life do not occur, and provide comments on incorporating wildlife habitat components into the design.

d. Providing technical assistance on removal of obstructions, and proposing measures that minimize the wildlife habitat impacts.

e. Consulting to resolve questions concerning the effects of agricultural nonpoint source control practices on wetlands.

Urban Areas: Developing cost share agreements for urban nonpoint source control practices parallels the practices found in rural areas. The Department will assist the villages in identifying existing areas where the control of nonpoint sources will help achieve water quality objectives. Practices to control urban nonpoint sources may be cost shared through agreements between the individual landowners and the village, or between the village and the Department, providing the municipality assumes the role of the land operator for purposes of practice installation and maintenance. In either case, it is the villages' responsibility to contact eligible landowners.

Ideally, developing a cost share agreement for retrofitting existing development with nonpoint source control practices would be the last of a three-step process, involving the development or modification of a Construction Ercsion Control Program, and the development of a Stormwater Management Plan.

Where needed, the Department's Fisheries and Wildlife Management staff will be available to provide comment on the selection and design of practices in urban areas. This assistance will be coordinated through the Milwaukee River Program Coordinator in Milwaukee.

Approval of Cost Share Agreements

Cost share agreements, developed in conformance with this plan, are approved by the land owner or operator and the local implementing unit of government. The Department is required to review and approve cost share agreements under the following circumstances:

1. The Department enters into a cost share agreement with a county, state agency, or the village of Adell, Cascade, or Random Lake.

2. Cost share agreements exceeding $50,000 in state funds.

3. Cost share agreements for large-grade stabilization structures, practices for streambanks exceeding six feet in height, agricultural sedimentation basins, and practices requiring animal lot relocation.

4. Cost share agreements for urban practices such as detention ponds.

Fiscal Management Procedures for Cost Share Agreements

This section identifies the responsibilities and procedures for handling state funds used to cost share nonpoint source control practices. Fiscal management requirements for local units of government are specified in Chapter NR 120, Wisconsin Administrative Code, and are summarized below.

Funding Agreements: The Nonpoint Source Grant Agreement is the means for transmitting funds from the Department (through the Nonpoint Source Control Program) to management agencies for use in supporting cost share agreements with landowners. Cost share agreements are the means used to transmit funds from the local management agency to the individual landowner. Where the Department signs a cost share agreement with a county or village to support practices on land owned or operated by the local agency, the Nonpoint Source Grant Agreement is used as a cost share agreement. Restrictions on the use of Nonpoint Source Control Program funds are as follows:

1. Nonpoint Source Control Program funds may only be used to support cost share agreements signed within the eligible period specified on the Nonpoint Source Grant Agreement.

2. Practices initiated prior to the signing of a cost share agreement are not eligible for support by the priority watershed project.

3. Only those practices specified in the Nonpoint Source Grant Agreement will be eligible for support by the priority watershed project.

Responsibilities and Procedures: Fond du Lac, Ozaukee, Sheboygan, and Washington counties will each have a Nonpoint Source Grant Agreement with the Department, and each will handle cost share agreements with their own landowners. These counties are fiscally responsible for the use of cost share funds provided to recipients. These counties are also responsible for preparing and maintaining their own fiscal management files, as specified in Chapter NR 120, Wisconsin Administrative Code. The villages of Adell, Cascade, and Random Lake may also sign a Nonpoint Source Grant Agreement.

Fiscal management procedures used to administer cost share funds are:

Step 1. Land Conservation Committees from Fond du Lac, Ozaukee, Sheboygan, and Washington counties develop cost share agreements with eligible landowners, and when necessary obtain the Department's review and approval.

Step 2. Land Conservation Department staff design Best Management Practices. Where necessary, the appropriate bidding process is used.

Step 3. Land Conservation Department staff oversee practice installation.

Step 4. Landowners submit itemized bills to Land Conservation Committees.

Step 5. Land Conservation Department staff verify that the practice meets applicable standards and that cost-containment requirements have been met.

Step 6. Land Conservation Committees, and if required, county boards, approve cost share payments to landowners. Each Land Conservation Committee is responsible for obtaining proof that the local share of the practice cost has been paid.

Step 7. Checks are issued by the Land Conservation Committees to the respective landowners installing the practices and project ledgers are updated. In Sheboygan County, payments will be made using a two-party check that lists as payees the grant recipient and the contractor.

A similar process will be used in the villages of Adell, Cascade, and Random Lake for cost share agreements administered by the villages.

Cost Containment Provisions

Rural Best Management Practices: The Fond du Lac, Ozaukee, Sheboygan, and Washington County Land Conservation Committees will use a combination of bidding and average cost techniques to contain the cost of Best Management Practices for unincorporated areas in the North Branch Watershed. The following summarizes other cost containment provisions:

1. Nonpoint source control practices having a total estimated cost of $5,000 or more must be bid through the county bidding procedure.

2. Nonpoint source control practices having a total estimated cost of less than $5,000 may be bid by the landowner or grant recipient at his own discretion. Contractors are required to obtain bids from subcontractors for those items the contractor will not complete.

3. If the bidding process is not used, the cost share payment will be based on the average cost method. Each county will develop an average cost per unit for materials and labor to determine the average cost for practices and practice components.

4. This list of average costs will be reviewed annually and updated as needed. Average cost figures will be kept on file by the counties until the final project audit has been completed.

5. Cost share payments will be based on actual installation costs. They may not exceed the estimated cost share amounts based on the bidding and average cost methods without approval of the appropriate Land Conservation Committee. Appropriate documentation regarding the need for changes will be submitted to the Department.

Urban Best Management Practices: Wisconsin Statutes generally require bids as a cost containment procedure for public works improvements. Chapter NR 120, Wisconsin Administrative Code, specifies conditions under which the villages can use the force account method for professional services or construction activities supporting priority watershed project funds.

LOCAL ASSISTANCE GRANT ADMINISTRATION

Local assistance funds are provided by the Department to local units of government and state agencies, or their agents, to support staff hired or contracted to conduct activities necessary to implement the watershed project. Funds are also provided to cover direct costs associated with these implementation activities. Although these funds will not cover 100 percent of the cost to a local management agency, the funds are intended to support a substantial portion of the cost.

Eligible Rural Implementation Activities

Activities eligible for support with local assistance funds are specified in Chapter NR 120, Wisconsin Administrative Code. Responsibilities of the counties for implementation were listed earlier in this chapter under the heading "Priority Watershed Project Participants and Their Roles."

Eligible Urban Implementation Activities

Activities eligible for support with local assistance funds are specified in Chapter NR 120, Wisconsin Administrative Code. Responsibilities of the villages for implementation were listed earlier in this chapter under the heading "Priority Watershed Project Participants and Their Roles."

The priority watershed project will also provide support for the following activities aimed at construction erosion control:

1. Technical assistance in evaluating existing construction erosion control ordinances to determine if modifications are needed.

2. Distribution of available technical materials, including the previously described model ordinance and practice standards handbook.

3. Training workshops for local government staff, elected officials, developers, and consulting engineers.

4. Additional local staff for a specified start-up period (up to two years) to assist a county, village, or town in the development and implementation of a construction erosion control and/or stormwater management ordinance.

The priority watershed project will also provide support for the following activities aimed at controlling nonpoint sources from new urban development:

1. Technical assistance in developing water quality-related objectives for detailed stormwater studies.

2. Cost share expenses for the water quality and aquatic habitat components of a detailed stormwater management plan for future development.

3. Distribution of available technical materials to those responsible for developing and implementing the stormwater plan.

4. Training sessions for those involved in developing, administering, and implementing the stormwater management plan.

5. Additional local staff for a specified start-up period to assist a municipality in implementing the stormwater plan. This could include assistance needed to develop and administer a stormwater control ordinance that includes provisions for protecting water quality and habitat.

The priority watershed project will also provide support for the following activities, aimed at controlling nonpoint sources from established urban development needing control to help achieve project water quality objectives:

1. Technical assistance in developing water quality-related objectives for detailed stormwater studies in existing urban development.

2. Cost share expenses for the water quality and aquatic habitat components of a detailed stormwater management plan for existing urban development.

3. Distribution of available technical materials to those responsible for developing and implementing structural urban nonpoint source control practices in existing urban areas.

4. Training sessions for those involved in developing, administering, and implementing the above practices.

5. Additional local staff needed to design and install the above practices.

6. Information and education activities which reduce water quality impacts of runoff through improved urban "housekeeping practices."

Local Assistance Grant Agreement Participants

The Department will sign separate Local Assistance Grant Agreements with the counties of Fond du Lac, Ozaukee, Sheboygan, and Washington to conduct basic rural implementation and construction erosion control activities. The Department will also sign separate agreements with the villages of Adell, Cascade, and Random Lake to support: construction erosion control activities, stormwater management planning for new development, activities needed to retrofit eligible existing urban development, and information and education activities. The Department has an agreement with the UW-Extension to assist the villages in planning and conducting information and education activities.

Developing Local Assistance Grant Agreements

Local Assistance Grant Agreements will be developed jointly by the Department and each grant recipient upon approval of this watershed plan. Thereafter each grantee will prepare and submit,

under guidance from the Department and the DATCP, an annual or periodic work plan that includes activities needed to be completed to successfully implement the priority watershed project.

The work plans will be based on the staffing and budget needs identified in this plan, and on additional needs that arise during implementation. Following approval of the work plan, the Department will amend each Local Assistance Grant as needed, and submit the revised grant to the recipient for signature.

Fiscal Management Procedures for Local Assistance Grants

Fiscal management procedures and record-keeping requirements are specified in Chapter NR 120, Wisconsin Administrative Code.

BUDGET AND STAFFING NEEDS

Rural Nonpoint Source Control Costs

Cost estimates for controlling rural nonpoint sources in the North Branch Watershed are shown in Table 42. The total cost of installing the nonpoint source control practices in the watershed to achieve the water quality objectives is approximately $3.3 million dollars. State funds necessary to cost share this level of control would be about $2.1 million dollars, or 64 percent of the total. The local share provided by landowners and other cost share recipients would be about $1.1 million dollars, or about 36 percent of the total.

Individual County Budget Needs: The total watershed budget is divided up according to individual county needs as a basis for developing Nonpoint Source Grant Agreements. The budget projections are presented in Tables 43 through 46, and are summarized below.

Rural Nonpoint Source Control Staff Needs

The technical assistance workloads that develop for county Land Conservation Department staffs over the eight-year implementation period will vary, depending on the level of landowner cooperation. The total estimated technical assistance workload, by county, for the rural portion of the North Branch Watershed is shown in Table 47. Staff needs will be identified through annual work plan submittals.

An estimated 23,000 and 39,000 hours, based on participation levels of 50 percent and 100 percent respectively, will be needed to implement the project. This is equivalent to a full-time staff equivalent of between 13 and 22 staff years of effort. This will cost between $333,000 and $563,000 in salary and fringe benefits for local staff during the project implementation period.

Urban Nonpoint Source Control Costs

Urban nonpoint source control costs will involve preparation of construction erosion control and stormwater management ordinances, preparation of stormwater management plans, construction of nonpoint source control practices for existing urban development, and participation in the

Information and Education Program. These efforts will be concentrated in the villages of Adell, Cascade, and Random Lake.

The estimated combined costs for preparation of ordinances in the three communities is $10,000. Stormwater management plans for the three communities are estimated to cost a total of between $18,000 and $25,000. Alternative evaluation levels for construction of nonpoint source control practices indicated that the costs were $12,000 to $60,000 for the village of Cascade, $15,000 to $90,000 for the village of Adell, and $80,000 to $172,000 for the village of Random Lake. More detailed plans will be needed during implementation to determine practice installation needs and costs.

Urban Nonpoint Source Control Staff Needs

The technical assistance workloads that develop for the three villages over the eight year implementation period will vary depending on the level of involvement. An estimated 200 hours of village staff time would be required for development of the above ordinances in the three communities. Estimated hours of staff time for installation of nonpoint source control practices in existing urban development and for enforcement of the ordinances was not determined. Local staff hours needed for participation in the Information and Education Program activities is presented in Chapter VI.

Table 42
Cost Share Budget Needs for Rural Management Practices in the North Branch Milwaukee River Watershed

Best Management Practice	Total Cost[1]	Cost share Needs: Full Participation (100% of Eligible Landowners) State Share	Full Participation Local Share	Partial Participation (75% of Eligible Landowners) State Share	Partial Participation Local Share
Contour Cropping	$ 15,900	$ 15,900	--[2]	$ 11,925	--[2]
Contour Strip Cropping	5,604	5,604	--[2]	4,203	--[2]
Reduced Tillage	28,260	28,260	--[2]	21,195	--[2]
Critical Area Stabilization	8,200	5,740	2,460	4,305	1,845
Change in Rotation	0	0	0	0	0
Grass Waterways	322,500	225,750	96,750	169,313	72,563
Terraces	54,600	38,220	16,380	28,665	12,285
Field Diversion	52,150	36,505	15,645	27,379	11,734
Grade Stabilization	69,000	48,300	20,700	36,225	15,525
Agriculture Sediment Basins	420,000	294,000	126,000	220,500	94,500
Barnyard Runoff Controls	1,140,000	798,000	342,000	$598,500	$256,500
Long Term Manure Storage	780,000	390,000	390,000	292,500	292,500
Short Term Manure Storage	220,000	132,000	88,000	99,000	66,000
Streambank Shape & Seed	44,320	31,024	13,296	$23,268	$9,972
Streambank Fencing	51,400	35,980	15,420	$26,985	$11,565
Streambank Rip-Rap	46,000	32,200	$13,800	$24,150	$10,350
Stream Crossings	16,500	11,550	$4,950	$8,663	$3,713
All Practices	$3,274,434	$2,129,033	$1,145,401	$1,596,775	$859,051

[1]Total cost to control critical pollution sources.

[2]Local share consists of labor and any additional equipment costs.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Land Conservation Departments of Sheboygan, Washington, Ozaukee and Fond du Lac counties.

Table 43
Cost Share Budget Needs for Rural Management Practices in
Sheboygan County in the North Branch Milwaukee River Watershed

		Cost share Needs			
		Full Participation (100% of Eligible Landowners)		Partial Participation (75% of Eligible Landowners)	
Best Management Practice	Total Cost[1]	State Share	Local Share	State Share	Local Share
Contour Cropping	$ 10,896	$ 10,896	--[2]	$ 8,172	--[2]
Contour Strip Cropping	4,884	4,884	--[2]	3,663	--[2]
Reduced Tillage	24,495	24,495	--[2]	18,371	--[2]
Critical Area Stabilization	4,200	2,940	1,260	2,205	945
Change in Rotation	0	0	0	0	0
Grass Waterways	217,500	152,250	65,250	114,188	48,938
Terraces	37,100	25,970	11,130	19,478	8,348
Field Diversion	8,400	5,880	2,520	4,410	1,890
Grade Stabilization	30,000	21,000	9,000	15,750	6,750
Agriculture Sediment Basins	150,000	105,000	45,000	78,750	33,750
Barnyard Runoff Controls	855,000	598,500	256,500	$448,875	$192,375
Long Term Manure Storage	480,000	240,000	240,000	180,000	180,000
Short Term Manure Storage	130,000	78,000	52,000	58,500	39,000
Streambank Shape & Seed	8,320	5,824	2,496	4,368	1,872
Streambank Fencing	36,400	25,480	10,920	19,110	8,190
Streambank Rip-Rap	46,000	32,200	13,800	24,150	10,350
Stream Crossings	7,500	5,250	2,250	3,938	1,688
All Practices	$2,050,695	$1,338,569	$712,126	$1,003,927	$534,095

[1]Total cost to control critical pollution sources.

[2]Local share consists of labor and any additional equipment costs.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Land Conservation Departments of Sheboygan, Washington, Ozaukee and Fond du Lac counties.

Table 44
Cost Share Budget Needs for Rural Management Practices in
Washington County in the North Branch Milwaukee River Watershed

		Cost share Needs			
		Full Participation (100% of Eligible Landowners)		Partial Participation (75% of Eligible Landowners)	
Best Management Practice	Total Cost[1]	State Share	Local Share	State Share	Local Share
Contour Cropping	$ 4,536	$ 4,536	--[2]	$ 3,402	--[2]
Contour Strip Cropping	636	636	--[2]	477	--[2]
Reduced Tillage	3,300	3,300	--[2]	2,475	--[2]
Critical Area Stabilization	3,000	2,100	900	1,575	675
Change in Rotation	0	0	0	0	0
Grass Waterways	80,000	56,000	24,000	42,000	18,000
Terraces	17,500	12,250	5,250	9,188	3,938
Field Diversion	35,000	24,500	10,500	18,375	7,875
Grade Stabilization	12,000	8,400	3,600	6,300	2,700
Agriculture Sediment Basins	180,000	126,000	54,000	94,500	40,500
Barnyard Runoff Controls	210,000	147,000	63,000	110,250	47,250
Long Term Manure Storage	100,000	50,000	50,000	37,500	37,500
Short Term Manure Storage	90,000	54,000	36,000	40,500	27,000
Streambank Shape & Seed	28,000	19,600	8,400	14,700	6,300
Streambank Fencing	13,000	9,100	3,900	6,825	2,925
Streambank Rip-Rap	0	0	0	0	0
Stream Crossings	3,000	2,100	900	1,575	675
All Practices	$779,972	$519,522	$260,450	$389,642	$195,338

[1]Total cost to control critical pollution sources.

[2]Local share consists of labor and any additional equipment costs.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Land Conservation Departments of Sheboygan, Washington, Ozaukee and Fond du Lac counties.

Table 45
Cost Share Budget Needs for Rural Management Practices in
Ozaukee County in the North Branch Milwaukee River Watershed

		Cost Share Needs			
		Full Participation (100% of Eligible Landowners)		Partial Participation (75% of Eligible Landowners)	
Best Management Practice	Total Cost[1]	State Share	Local Share	State Share	Local Share
Contour Cropping	468	$ 468	--[2]	351	--[2]
Contour Strip Cropping	84	84	--[2]	63	--[2]
Reduced Tillage	465	465	--[2]	349	--[2]
Critical Area Stabilization	1,000	700	300	525	225
Change in Rotation	0	0	0	0	0
Grass Waterways	25,000	17,500	7,500	13,125	5,625
Terraces	0	0	0	0	0
Field Diversion	8,750	6,125	2,625	4,594	1,969
Grade Stabilization	27,000	18,900	8,100	14,175	6,075
Agriculture Sediment Basins	90,000	63,000	27,000	47,250	20,250
Barnyard Runoff Controls	75,000	52,500	22,500	39,375	16,875
Long Term Manure Storage	140,000	70,000	70,000	52,500	52,500
Short Term Manure Storage	0	0	0	0	0
Streambank Shape & Seed	8,000	5,600	2,400	4,200	1,800
Streambank Fencing	2,000	1,400	600	1,050	450
Streambank Rip-Rap	0	0	0	0	0
Stream Crossings	6,000	4,200	1,800	3,150	1,350
All Practices	$383,767	$240,942	$142,825	$180,707	$107,119

[1]Total cost to control critical pollution sources.

[2]Local share consists of labor and any additional equipment costs.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Land Conservation Departments of Sheboygan, Washington, Ozaukee and Fond du Lac counties.

Table 46
Cost Share Budget Needs for Rural Management Practices in
Fond du Lac County in the North Branch Milwaukee River Watershed

		Cost Share Needs			
		Full Participation (100% of Eligible Landowners)		Partial Participation (75% of Eligible Landowners)	
Best Management Practice	Total Cost[1]	State Share	Local Share	State Share	Local Share
Contour Cropping	$ 0	$ 0	--[2]	0	--[2]
Contour Strip Cropping	0	0	--[2]	0	--[2]
Reduced Tillage	0	0	--[2]	0	--[2]
Critical Area Stabilization	0	0	0	0	0
Change in Rotation	0	0	0	0	0
Grass Waterways	0	0	0	0	0
Terraces	0	0	0	0	0
Field Diversion	0	0	0	0	0
Grade Stabilization	0	0	0	0	0
Agriculture Sediment Basins	0	0	0	0	0
Barnyard Runoff Controls	0	0	0	0	0
Long Term Manure Storage	60,000	30,000	30,000	22,500	22,500
Short Term Manure Storage	0	0	0	0	0
Streambank Shape & Seed	0	0	0	0	0
Streambank Fencing	0	0	0	0	0
Streambank Rip-Rap	0	0	0	0	0
Stream Crossings	0	0	0	0	0
All Practices	$60,000	$30,000	$30,000	$22,500	$22,500

[1]Total cost to control critical pollution sources.

[2]Local share consists of labor and any additional equipment costs.

Source: Wisconsin Department of Natural Resources, Wisconsin Department of Agriculture, Trade, and Consumer Protection, and the Land Conservation Departments of Sheboygan, Washington, Ozaukee and Fond du Lac counties.

Table 47
Estimated Technical Assistance Needs For Rural Implementation
In The Milwaukee River North Branch Watershed

Activity	Project Years When Work Will Be Done	Sheboygan County		Washington County		Ozaukee County		Fond du Lac County		TOTAL	
		100% Part. (Hrs.)	75% Part. (Hrs.)	100% Part. (Hrs.)	75% Part. (Hrs.)	100% Part. (Hrs.)	75% Part. (Hrs.)	100% Part. (Hrs.)	75% Part. (Hrs.)	100% Part. (Hrs.)	75% Part. (Hrs.)
Project and Financial Mgt.	Years 1-8	1600	12	1400	1050	1160	870	160	120	4320	3240
Information/Education	Years 1-8	--	--	--	--	--	--	--	--	--	--
Pre-Contact Office Inventory, Landowner Contacts, and Tracking Sheets	Years 1-3	1816	1362	808	606	200	150	24	18	2848	2136
Conservation Planning, Cost Share Agreement Development	Years 1-3	4540	3405	2020	1515	500	375	60	45	7120	5340
Practice Design & Installation											
Upland Erosion Control	Years 1-8	4500	3375	2140	1605	1080	810	10	7.5	7730	5798
Barnyard Runoff Control	Years 1-8	5700	4275	1400	1050	500	375	0	0	7600	5700
Manure Spreading Control	Years 1-8	3200	2400	1190	893	560	420	240	180	5190	3893
Streambank Erosion Control	Years 1-8	2490	1868	1400	1050	400	300	0	0	4290	3218
Training	Years 1-8	300	300	300	300	200	200	200	200	1000	1000
Total LCD Workload:		24,146	18,185	10,658	8,069	4,600	3,500	694	570	40,098	30,324
Estimated Staff Required Per Year for Years 1-3:		3151	2373	1462	1107	531	405	86	70	5230	3955
Estimated Staff Required Per Year for Years 4-8:		2939	2215	1255	952	602	458	88	72	4884	3697

CHAPTER VI
INFORMATION AND EDUCATION PROGRAM

PURPOSE AND PERSPECTIVES

The primary purpose of this Information and Education Program for the North Branch Watershed is to enhance implementation of watershed plan objectives. Incorporated in its preparation were both rural and urban basinwide educational strategies. These, in turn, were based upon survey data from: rural and urban landowners and users, public meeting results, committee and ad hoc group review, staff suggestions, and other participatory processes.

In order to help ensure judicious use of funds for maximum impact, the educational program planning was viewed from a number of different perspectives. These included:

1. Key audience capable of registering the greatest impacts on the resource base.

2. Key messages from the watershed project needing to be relayed.

3. Potential uses and outcomes of specific activities.

4. Levels of effort from different sources meshing for collective impact in improving water quality.

5. Critical timelines which might necessitate shifts in strategy.

6. Educational approaches prospectively to be employed.

The resulting educational plan for the North Branch Watershed includes recommendations for both general and specifically targeted activities. It recognizes that carefully and specifically targeted audience groups hold the key to actions that can result in fairly immediate, substantial, and known improvements to water resource features. At the same time, the educational plan acknowledges that educational activities designed for general or broad audiences are important. They can help influence both short-term and long-term management decisions. In part, this is a recognition that numerous "encounters" with information are often required to motivate positive action. The general activities also address certain public "right-to-know" and "building project momentum" objectives. Even so, however, the targeting of audiences and refinement of messages will occur to the greatest degree possible to benefit from cost-efficiencies and better potentials for program impact.

Key Audience Groups

Ideally, the watershed project would be able to uniformly reach all key audiences effectively throughout the entire implementation period. The realities of limited staff and resources, however, will likely require reprioritizing and shifts between areas as important stages of the project unfold. The key audience groups, as identified in the rural and urban educational strategies, and as contained in the North Branch Watershed Educational Plan, include:

1. Agricultural Organizations
2. Civic and Service Groups
3. Conservation and Environmental Groups
4. Elected and Appointed Officials
5. General Public
6. Lake Residents/Organizations
7. Local Media Representatives
8. Rural Landowners and Operators
9. Urban Homeowners/Residents

Some of the above are uniquely rural or urban; others show considerable overlap. Their respective priority is shown by the extent to which activities in the accompanying plan table apply. For the project "sign-up period," these audiences will be addressed according to the following desired outcomes, tentatively given in decreasing order of priority:

1. Watershed project participation, largely through establishment of a cost-sharing agreement, either by units or government or rural landowners.

2. Community action through regulation of nonpoint source pollution (ordinances) or proper management (public works programs).

3. Other state and federal conservation programs utilized to achieve water quality objectives in a way complementary to the Nonpoint Source Control Program.

4. Widespread individual action on a voluntary basis, with no cost-sharing agreement, including urban homeowners/residents using good "housekeeping" practices.

5. Support of the watershed project through convictions regarding Milwaukee River Program goals.

6. Increased awareness that the project exists and of what is being accomplished.

More than one of these outcomes could apply in any given instance, and there would likely be some interchangeability both within the respective groups and over time.

Types of Activities

There are different types of information and education activities included in the educational plan, as distinguished below by the outcome(s) sought:

1. Activities that motivate individuals and/or groups to action through participation in the watershed project.

2. Activities that provide instruction on how to take appropriate action.

3. Activities that develop an understanding of how the priority watershed project works (describing steps involved in planning, timelines, etc.).

4. Activities that share project progress, to reinforce awareness and perhaps motivate by peer pressure.

5. Activities that promote complementary programs which may address project objectives, but in a different fashion.

These may be regarded as activity outcomes or objectives which serve to complement the broad educational goals established for the Milwaukee River Priority Watershed Project (See Appendix D).

Levels of Activities

Educational planning for the North Branch Watershed was complicated by the broader framework of the Milwaukee River Basin, within which it lies. The plan presented in this chapter addresses activities intended specifically for the North Branch Watershed. A separate Basinwide Information and Education Plan addresses activities recommended for completion at the area or state level. The following levels of activities are thus distinguished for educational planning and implementation purposes:

Watershed-Specific -- Activities specifically designed and intended for use in the North Branch Watershed. Other watershed projects may have comparable educational activities recommended which can "draw from" those undertaken here, but some restructuring or adaptation would be needed.

Basinwide -- Activities, including educational materials, that have a potential for immediate use in the North Branch Watershed, and which would make the project more effective. These activities, however, are undertaken for a broader, multi-watershed purpose under the Milwaukee River Priority Watershed Project.

Statewide--Activities, particularly educational materials and training programs, undertaken to meet a widespread educational need (beyond the Milwaukee River Basin), but which may prove useful for a successful North Branch Priority Watershed Project.

It should be noted that activities designed to reach smaller, targeted audiences with specific messages are best carried out in rural areas and smaller geographic units (individual watersheds, at largest). Activities designed to establish more general awareness among large groups representing a range of audience types are best carried out in a metropolitan media market at the basinwide level. The North Branch Watershed Educational Plan guides the former, but will also benefit from the latter.

Some activities, such as newsletters, are designed to communicate messages to several target audiences. Here, even though a specific subgroup may be the primary recipients of information provided in a given newsletter issue, there is recognized benefit in having other groups know what is occurring and why. Over time, project efforts will thus be seen as proportionately balanced, for example, between urban and rural areas.

EDUCATIONAL PROJECT WORKLOAD AND LEAD COUNTY CONCEPT

During the sign-up period under the watershed project, there is a clear need to establish cost-sharing contracts with as many eligible individuals and communities as possible (ordinance development and housekeeping practices can be pursued after this period ends, as well as during it). In order to accomplish this, county staff must be available to make the necessary contacts and then commit to the necessary follow-through. These one-on-one contacts illustrate a most fundamental type of education. However, they are considered a part of the technical implementation process, and are budgeted for elsewhere. Key educational materials, nevertheless, which will make this process more effective are covered here or in the Basinwide Information and Education Plan.

The educational plan table reflects a collective decision on the part of the counties to informally practice a "lead county concept" in sequentially implementing the five priority watershed plans under the Milwaukee River Priority Watershed Project. Having Sheboygan County serve as "leader" for the multi-county educational activities in the North Branch Watershed should result in greater efficiencies.[4] This is because Ozaukee and, especially, Fond du Lac County contains a very small portion of the watershed. Examples of activities affected by this "deferral" to lead an educational county would be tours, newsletter articles, news releases, and public meetings. Because Washington County has a large portion of the watershed population and substantial involvement in the adjacent East-West Branch Watershed, it will be looked to as a lead contributor for certain urban educational activities and radio program coverage.

PROGRAM EVOLUTION AND EDUCATIONAL PLAN UPDATES

The North Branch Watershed Educational Plan was prepared as a part of an ongoing process while an Urban Information and Education Strategy and a Basinwide Information and Education Plan were still under preparation. In drawing from important elements of these two documents to "fit" within a proper framework and establish a pattern of consistency, the North Branch Educational Plan had to move forward on a base of "best assumptions to date."

Thus, educational plan updates will occur. They have tentatively been scheduled on an annual basis; it is likely that the first such update will rank among the most important. The first year of project implementation with its new insights will have been completed, as well as other watershed plans and the two major documents referenced above. These basinwide "umbrella" documents in particular contain much support information and policy positions that could not be included in this chapter. If changes in the Milwaukee River Basin Educational Program direction were to occur, for example, it could affect North Branch Watershed educational programming. No dramatic changes are foreseen at this time, however; and every attempt has been made to ensure that the North

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[4]For the other Milwaukee River watersheds, the roles would be reversed: Fond du Lac and Washington counties would assume an educational lead for the East-West Branch; Ozaukee County would assume the lead for at least the agricultural portion of the South Branch; and Washington County (perhaps assisted by Ozaukee County) could assume leadership for Cedar Creek. In all cases, landowners would still be referred to, and work with, their respective county LCD. It is simply the county portions of the basinwide educational workload that would be divided for efficiency; and primary identity for certain activities would thus reside in the counties that are most logical.

Branch Educational Plan, including descriptive accounts of activities, "meshes" well with the basinwide effort. This approach will also help govern decision-making in the other adjoining watershed projects.

It is likely that the first years of educational activity within the North Branch Watershed will be among the most ambitious. The groundwork for a successful and extensive program needs to be laid. However, the relative absence of activities listed beyond the initial years should not be construed as a plan to do less educationally. Rather, any apparent disparity in activities for succeeding years reflects a presently unclear picture of needed commitments--for both staff and funding. It is also likely, therefore, that the educational plan table will be "filled-in" as the annual updating process progresses.

PART THREE
EVALUATION PLAN

CHAPTER VII - PROJECT EVALUATION AND MONITORING

CHAPTER VII
PROJECT EVALUATION AND MONITORING

Project Evaluation: The Department has responsibility for monitoring and evaluating priority watershed projects. These efforts monitor expected changes in water quality occurring as nonpoint source control practices are installed, and as construction erosion control ordinances and stormwater management plans are developed and implemented. The water quality evaluation and monitoring strategy for the North Branch Priority Watershed Project is discussed later in this chapter. The Department documents the results of monitoring and evaluation activities in both interim and final priority watershed project reports.

PROJECT EVALUATION AND MONITORING

The success of the priority watershed progress is determined by:

a. Monitoring local implementation efforts.
b. Evaluating changes in land management.
c. Monitoring changes in water quality.

Evaluating Local Implementation

Information for this element will be used jointly by local project managers, state support staff from the Department, and staff from other supporting agencies to identify adjustments needed in project implementation.

The information and technical assistance workload for each unit of government is identified in this plan. Annual work plans will be prepared by local units of government and the UW-Extension, and approved by the Department as a requirement for receiving continued financial assistance under the priority watershed project.

Semi-annually, each unit of government identified in this plan as having a significant role in the control of rural or urban nonpoint sources will summarize its progress towards meeting the annual work objectives. These reports will be submitted to the Department and the DATCP, and used as a basis for discussing project progress and possible changes that may be needed.

Annually, the Department will coordinate project evaluation meetings with local units of government, and will prepare an annual project summary report.

Evaluating Changes in Land Management

This information will be used to track progress being made towards pollutant reduction goals, and will serve in part as an indicator of project success.

Rural Nonpoint Sources: The following indicators will be used to evaluate the change in pollutant loading from rural nonpoint sources:

1. Reductions in sediment delivered to surface water from upland erosion.
2. Reductions in sediment delivered to surface water from streambank erosion.
3. Improvement in degraded streambanks.
4. Reductions in the estimated phosphorus loading from barnyards.
5. Reduction in the number of critical acres winter spread with manure.
6. Other indicators as needed.

For each of these source categories, three calculations will be made. These include the reduction in mass loading, the percent reduction in mass loading from the source category, and the percent of the target reduction goal met for the source category. The first calculation will be made for each stream segment and subwatershed. The other calculations will be made only by subwatershed. Separate calculations will be developed based on practices included in cost share agreements and practices actually installed.

Urban Nonpoint Sources: The following indicators will be used to evaluate the change in pollutant loading from existing urban areas and from planned future urban areas:

1. Reductions in lead and suspended solids-loading resulting from practices retrofitted on existing areas.

2. Changes in mass-loading of lead and suspended solids, and the change in stream hydrology from implementation of more detailed stormwater management plans or ordinances for future development.

3. Adoption or modification and enforcement of construction erosion control ordinances. Separate calculations will be developed based on practices included in cost share agreements or in stormwater management plans, and practices installed.

Counties will maintain and update their own inventory data base as needed to perform the required calculations. Inventory updates will include changes resulting from revised baseline data, as well as changes resulting from practice installation.

Annually, each county will summarize and submit the required reports to the Department and the DATCP. In addition, each county will attach a landowner tracking sheet to each cost share agreement it sends to the Department. The tracking sheet will include summary information concerning original inventory conditions and management category determinations, and changes in inventory conditions and management category determinations where applicable.

For urban nonpoint sources, the Department will assist the community in developing the required information.Information submitted to the Department will be incorporated by it into the annual project summary report.

Evaluating Changes in Water Quality

The purpose of water quality and aquatic habitat evaluations is to determine if the water resource objectives set forth in this watershed plan are being attained. The evaluation, together with measures of change in pollutant loading, will serve as an indicator of project success.

Monitoring Methods: Water quality evaluations for streams and rivers will be based on changes in chemical and bacteriological parameters and changes in several resource components, including stream habitat, macroinvertebrate populations, fish communities and aquatic plant communities. Water quality evaluations for lakes will be based on trophic status, as indicated by nutrient status, chlorophyll concentrations, and water clarity.

Site Selection Criteria: Evaluation monitoring sites will be selected in areas where the chance for water quality improvement is greatest, based on the severity of existing pollution sources and the potential of the stream for improvement. The monitoring effort is structured to provide intensive monitoring at a limited number of sites.

Site selection criteria include the severity of nonpoint sources to be controlled, the expected response in the water resource, and site accessibility. Control sites have also been selected to provide a measure of natural variation between years or seasons aside from those expected due to pollutant reduction. Table 48 lists potential evaluation monitoring sites. Some flexibility will be required to adjust the evaluation monitoring plan so that monitoring stations are not located in areas where there is minimal landowner cooperation.

Potential Evaluation Monitoring Sites:

Lakes- Three lakes are potential evaluation sites.

Spring Lake water quality will be monitored as a baseline lake because its pollutant load presently is acceptable. Its drainage area is small and stable, and water quality is presently good.

Lake Ellen water quality will be monitored, as it is expected to show improvement with control of a relatively few nonpoint sources.

Monitoring of water quality in Random Lake will assist in evaluating the impacts of increased industrial development and stormwater diversion on the water quality of Random Lake.

Streams- Three stream sites are proposed for evaluation monitoring;

Monitoring of the North Branch of the Milwaukee River above Gooseville will be used to evaluate water quality and habitat improvements resulting from the cumulative controls in smaller tributary subwatersheds.

Monitoring of water quality in Nichols Creek will be conducted because it is relatively unimpacted by severe nonpoint sources, and because it has a reliable source of constant quality water. Monitoring of this stream will provide baseline data to which other stream data can be compared.

Bacterial problems in Batavia Creek related to barnyards have been identified as the most severe in the North Branch Watershed. Monitoring of bacteria levels will provide a measure of anticipated reductions in bacterial contamination and associated barnyard nutrients as well.

Table 48
Sites Selected for Evaluation Monitoring
in the North Branch Milwaukee River Watershed

Water Feature	Subwatershed	Adjacent Nonpoint Source Affecting Site[1]	Evaluation Method[2]
LAKES			
Spring Lake	Spring Lake	control	NUT, BI0
Lake Ellen	Lake Ellen	UE, BY	NUT, BI0
Random Lake	Random Lake	UNPS	NUT, BI0
STREAMS			
North Branch	North Branch	UE, BY, PA, BE	HAB, NUT, BI0
Nichols Creek	Nichols Creek	control	HAB, BI0
Batavia Creek	Batavia Creek	UE, BY PA, BE	HAB, BACT

[1]UE = Upland Erosion, BY = Barnyard, Imp = Impoundment, UNPS = Urban Nonpoint Sources, PA = Pasture, BE = Bank Erosion

[2]HAB = Habitat Investigations, NUT = Chemical Monitoring, BI- = Biological Investigations, Bact = Bacteriological Investigations

Source: Wisconsin Department of Natural Resources.

The schedule for pre-project monitoring is as follows:

Nichols Creek: Fall 1989; Spring, Summer 1990.

North Branch Milwaukee River: Fall 1989; Spring, Summer 1990.

Batavia Creek: Fall 1989; Spring, Summer 1990.

Lakes (Spring, Ellen, Random): 1989, 1991, 1993, 1995 (once in the spring, once in the winter, and three times during the growing season.)

Post-project monitoring will be conducted at sites where pre-project monitoring has been conducted, so that changes in water quality, habitat, or biota can be determined.

The Department is responsible for evaluation monitoring, data analysis, and interpretation. The Department is also responsible for documenting in evaluation monitoring reports the results of pre- and post-project evaluation monitoring. These reports will be used to prepare annual project summary reports, and to prepare the final project report.

APPENDIX A
STATE OF WISCONSIN WATER QUALITY STANDARDS FOR STREAMS AND LAKES IN THE WATERSHED

Stream Classification	Warm Water	Temperature	6.0-9.0[3]	Dissolved	(counts/100 ml)	Umonized	Maximum	Other
		Water Quality Parameter						
Stream Classification		Maximum Temperature (°F)	pH Range (s.u.)	Minimum Dissolved Oxygen (mg/l)	Maximum Fecal Coliform (counts/100 ml)	Maximum Umonized Ammonia (mg N/l)	Maximum Total Ammonia (mg/N/l)	Other
Full fish and Aquatic Aquatic Life	Trout Balanced	[1,2]	6.0-9.0[3]	6.0[4]	--	0.02	--	[5,6,9]
	Warm Water Aquatic Community	89[1]	6.0-9.0[3]	5.0	--	0.04	--	[9]
Intermediate	Unbalanced Aquatic Aquatic Community	--	6.09-9.0	3.0	--	--	3-6[7]	[5,9]
Marginal	Effluent Channel, Wetlant, Diffuse Surface Water	--	6.0-9.0	1.0	--	--	--	[5,9]
Recreational Use	Full Body Contact	--	--	--	200-400[8]	--	--	[9]

[1]There shall be no temperature changes that may adversely affect aquatic life. Natural daily and seasonal temperature fluctuations shall be maintained.
[2]There shall be no significant artificial increases in temperature where natural trout or stocked salmon reproduction is to be protected.
[3]The pH shall be within the range of 6.0 to 9.0 standard units, with no change greater than 0.5 unit outside the estimated natural seasonal maximum and minimum.
[4]Dissolved oxygen shall be not lowered less than 7.0 mg/l during the trout spawning.
[5]Unauthorized concentrations of substances are not permitted that alone or in combination with other materials present are toxic to fish and other aquatic life. The determination of the toxicity of a substance shall be based upon the available scientific data base. References to be used in determining the toxicity of a substance shall include, but not be limited to Quality Criteria for Water, EPA0440/9-76-003, U.S. Environmental Protection Agency, Washington, D.C., 1976, and Quality Criteria 1972, EPA-R3-73-003, National Academy of Sciences, National Academy of Engineering, U.S. Government Printing Office, Washington, D.C., 1974. Questions concerning there permissible levels, or changes in the same, of a substance or combination of substances or undefined toxicity to fish and other biota, shall be resolved in accordance with the methods specified in Water Quality Criteria 1972 and Standard Methods for the Examination of Water and Wastewater, 14th Edition, American Public Health Association, New York, 1975, or other methods approved by the Department.
[6]Streams classified as trout waters shall not be altered from natural background by effluent that influence the stream environment to such an extent that trout populations are adversely affected.
[7]Total Ammonia, expressed as N, shall not exceed 3 mg/l during the warm months (May-October) and 6 mg/l during the cold months (November-April).
[8]Fecal coliform shall not exceed a monthly geometric mean of 200 counts/100 ml based on not less than five samples per month, nor a monthly geometric mean of 400 counts/100 ml in more than 10 percent of all samples during any month.

[9]Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state. Floating or submerged debris, oil, scum, or other materials shall not be present in such amounts as to interfere with public rights in waters of the state. Materials producing color, ordor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state. Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

APPENDIX B

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES FOR INFILTRATION DEVICES IN URBAN AREAS

Infiltration Device Type	Residential[4]	Institutional[5]		
		Rooftop	Parking Lot	
			0 - 5,000 sq. ft.	5,000 - 500,000 sq. ft.
Infiltration Basin[1]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration Trench[1]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[2]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Infiltration Practices	Redirect downspouts and slope driveways to lawn, for infiltration. No pretreatment.	Redirect downspouts to lawn for infiltration . No pretreatment.	Slope lots to grass buffer strip.	

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]Multi- and single-family dwellings.
[5]Churches, schools, and hospitals.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

	Commercial[4]					
Infiltration Device Type[3]	Rooftop Runoff		Parking Lot Runoff			Storage and Loading Acres Runoff[5]
	0-10,000 sq. ft.	> 10,000 sq. ft.	0-5,000 sq. ft.	5,000-500,000 sq. ft.	>500,000 sq. ft.	
Infiltration Basin[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts to lawn for infiltration. No pretreatment.		Slope lots to grass buffer strip.			

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. Grit chambers remove particles down to 100 u and wet sedimentation removes particles down to 40-100 u. All pretreatment devices should be equipped with oil and grease traps.
[4]Retail and service operations.
[5]The use of infiltration practices in storage areas must be reviewed on a case-by-case basis.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

	Industrial (Manufacturing)[4]			
Infiltration Device Type[3]	Rooftop Runoff		Separate Employee & Visitor Parking Lot Runoff	Storage and Loading Area Runoff[5]
	0-10,000 sq. ft.	> 10,000 sq. ft.		
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Grassed Swale[2]	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]For the purpose of this table, industrial (manufacturing) consists of production industries. An example would be an industry with smokestacks that have the potential for emitting particles that will settle on building rooftops and parking lots.
[5]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

Industrial (Non-Manufacturing)[4]

Infiltration Device Type[3]	Rooftop Runoff		Separate Employee & Visitor Parking Lot Runoff		Storage and Loading Area Runoff[5]
	0-10,000 sq. ft.	> 10,000 sq. ft.	5,000-500,000 sq. ft.	> 500,000 sq. ft.	
Infiltration Basin[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment required.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts and driveways to lawn for infiltration. No pretreatment.				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

APPENDIX C
ALTERNATIVE BEST MANAGEMENT PRACTICES, DESIGN CRITERIA, STANDARDS, AND SPECIFICATIONS FOR THE NORTH BRANCH MILWAUKEE RIVER WATERSHED

1. STREET SWEEPING

Description: Mechanical street sweeping to remove vegetative matter, debris, and particles from gutters.

Purpose: In some urban areas within the North Branch Watershed, intensified urban street sweeping can provide an important water quality benefit when combined with other practices in a comprehensive urban stormwater quality control program. Intensified sweeping, meant to adequately clean streets from late winter (prior to spring rains) through late fall, when pulverized leaf fragments are available for washoff to storm sewers.

Conditions: Cost sharing is authorized for the support of contract sweeping, or for the support of "additional municipal staff" needed to run equipment owned or rented by the municipality, in order to increase street sweeping in critical areas from minimum levels to accelerated levels.

Critical areas for each municipality are those defined in Chapters III and IV of this watershed plan. Minimum levels are defined as the municipality's existing level of street sweeping. Accelerated levels are defined as a frequency exceeding once every two weeks during the period of late winter through late fall, or as further refined in this watershed plan for the applicable municipality. This practice must be augmented by other urban stormwater control practices, as specified by this watershed plan or as otherwise approved by the Department.

Cost sharing is limited to a two-year period for each eligible street surface in a municipality. Eligible surfaces will not be covered by cost-sharing more than once. The intensified street sweeping program for each critical area must be maintained by the municipality for a period of ten years, following the end of the two-year cost share period for that critical surface.

2. AGRICULTURAL SEDIMENTATION BASINS

Description: This is a basin designed and constructed to reduce the transport to surface waters and wetlands of sediment eroded from critical agricultural fields.

Purpose: The purpose of this practice is to detain sediment-laden runoff from critical agricultural fields for sufficient time to allow the majority of the sediment to settle out.

Cost Share Conditions

1. Cost sharing is authorized for:

   a. Sediment basin including embankments; principal and emergency spillway structures, including anti-seep collars; dewatering outlet; outlet protection; vegetation and fencing.

   b. Sediment basins for structures with embankments of six to 25 feet in height or with impoundment capacities of 15 to 50 acre-feet only when approved in writing by the Department prior to construction.

   c. Sediment basins serving drainage areas of up to 150 acres.

2. Cost sharing is not authorized for:

   a. Basins having embankments exceeding 25 feet in height or with an impoundment capacity of more than 50 acre feet.

   b. Basins serving more than 150 acres.

   c. Basins located where failure may result in loss of life.

Planning Considerations

Sediment basins may come under the definition of dams and be subject to the provisions of Chapter NR 333, Wisconsin Administrative Code, Dam Design and Construction Standards. As of August 1988, Chapter NR 333 did not apply to dams having a structural height of 6 feet or less, or a storage capacity of 15 acre-feet or less. Also, Chapter NR 333 did not apply to dams having a structural height of more than 6 feet but less than 25 feet and a maximum storage capacity of less than 50 acre-feet of water.

Sediment basins meeting these design requirements are at best only 70 to 80 percent effective in trapping sediment. Smaller sediment particles such as clay-sized particles will not be effectively controlled. Consequently, these basins should not be used to treat runoff from tributary lands unless those lands have a reasonable degree of soil loss protection. The sediment basin is meant only to provide for additional water quality protection in situations where use of upland practices to control lands below "T" is not practical. Because soil particles already in transport are more difficult to control than soil particles at the erosion site, this practice should only be considered after on-site erosion control alternatives for meeting sediment delivery goals have been exhausted.

Design Standards and Specifications

1. The sediment basin shall be designed using Soil Conservation Service Standards 350 (Sediment Basin) and 378 (Pond). In addition, the following design specifications must be met:

   a. The basin shall include the following components.

      A runoff storage volume; a sediment storage and permanent pool volume; a principal spillway; a dewatering outlet for the runoff water storage volume; and an emergency spillway.

b. The minimum surface area of the runoff storage volume (A_s) shall be calculated as follows:

A_s (ft^2) = 625 x A_{dr}
where A_{dr} is the drainage area to the basin in acres.

c. The depth of the runoff storage volume from the top of the sediment storage and permanent pool volume to the crest of the principle spillway shall be at least 2 feet to prevent resuspension of sediments.

d. The sediment storage volume shall be based on a design period of 10 years.

e. The length to width ratio of the runoff storage volume shall be at least 2:1, and preferably 5:1. Baffles shall be used when necessary to prevent short-circuiting in basins. The shortest flow path shall be used to determine the width to length ratio.

f. The principal spillway shall include one or more outlets for dewatering the runoff storage volume. The size of the outlet(s) shall be calculated so that dewatering takes <u>at least</u> 3 days. The bottom hole or slot shall be at the elevation of the sediment storage and permanent pool. No hole shall be greater than 4 inches in diameter.

The following equation may be used:

$$A_o = \frac{A_s(2h)^{.5}}{20{,}428 * T * C_d}$$

where A = surface area of the outlet (ft^2)
A^o = surface area of basin (ft^2)
h_s = head of water above the outlet
T = dewatering time (hr)
C_d = coefficient of contraction for the outlet, about 0.6 for sharp edged orifices.

g. The sediment basin shall discharge to a stabilized drainageway protected from erosion. The principal spillway outlet pipe shall discharge at the bottom of the embankment.

h. The following maintenance provisions apply: 1) The embankment and emergency spillway shall be inspected regularly to insure that it is structurally sound and has not been damaged by erosion. Repairs shall be made promptly; 2) if the sediment reaches the elevation of the sediment storage and permanent pool elevation, the basin shall be cleaned out.

3. ANIMAL LOT RELOCATION

Description and Purpose: Relocation of an animal lot from a critical site such as a floodway to a suitable site to minimize the amount of pollutants from the lot to surface or groundwater.

Cost Share Conditions

1. Cost sharing shall be authorized for:

   a. Construction of fences and other items necessary to confine the livestock on the new site.

   b. Removal of fences and other obstructions, and the establishment of permanent vegetation on the existing site necessary to stabilize the site to be abandoned.

   c Reconstruction or replacement of buildings and other structures necessary for the relocation of the animal lot. The maximum cost share amount for relocation of buildings, structures, and lots shall be 70 percent of the replacement cost up to the appraised value of the buildings, structures, and lots to be replaced. Any salvage value or resale value realized during the maintenance period of the cost share agreement shall be deducted from the appraised value.

   d. Proper abandonment of wells abandoned as a result of yard relocation.

2. A plan for relocation shall be approved by the Department, in writing, prior to signing of the cost share agreement.

Design Standards & Specifications

1. Wells shall be properly abandoned in accordance with the requirements of Chapter NR 112, Wisconsin Administrative Code.

2. Soil Conservation Service field office guide standards and specifications as of December, 1988:

   a. 393 - filter strip
   b. 363 - diversion
   c. 558 - roof runoff management
   d. 342 - critical area planting
   e. 561 - heavy use area protection
   f. 382 - fencing
   g. 412 - grassed waterway
   h. 468 - lined waterway or outlet
   i. 484 - mulching
   j. 620 - underground outlet
   k. 350 - settling basin.

4. LIVESTOCK WATER PUMPS

Description: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) Best Management Practices contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: This component will allow the livestock operator to provide a watering area for livestock that does not require livestock access to the surface water from which the water is being drawn.

Cost Share Conditions: Watering areas created through installation of livestock water pumps must be stabilized against erosion and must provide for the diversion of overland runoff tributary to the site. A suitable vegetative buffer must be maintained between the watering area and the stream to prevent water pollution from accumulated manure. Where necessary, accumulated manure must be removed from the site as part of a manure management plan.

Design Standards: Water pumps must be installed, used, and maintained consistent with manufacturer's specifications.

5. FISH HABITAT STRUCTURE

Description: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) Best Management Practices contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: This component will allow the use of streambank stabilization practices that incorporate fish habitat structures. This will enhance integration of nonpoint source controls and fishery improvement.

Cost Share Conditions: The cost share rate is 70 percent for this component, subject to an increase to 80 percent under the provisions of Chapter NR 120.18(1) (c), Wisconsin Administrative Code. The maximum cost share amount for stream bank stabilization practices involving fish habitat structures shall be the cost share amount of the stream bank stabilization without using the fish structure as part of the practice.

Design Standards: Soil Conservation Service (SCS) Standard 395 will constitute the practice component. Part of this standard requires that installation be in accordance with designs approved by the Department fish manager and the SCS biologic.

6. VEGETATIVE FILTER STRIP

Description: This practice is based on the guide standard for cropland filter strips contained on pages 74-83 of the publication *Effects of Conservation Practices on Water Quantity and Quality* (USDA-Soil Conservation Service, October 1, 1988; 98 pages).

This practice is meant to refine SCS Standard 393 (Filter Strip). In turn, this refined standard will be considered as an additional practice component under the Critical Area Stabilization and the Shoreline Protection Best Management Practices contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: Vegetated buffers have been identified as a Best Management Practice for stabilizing stream banks, enhancing fish and wildlife habitat, and removing critical croplands from production. They may also provide "filtering" of sediment, nutrients, pesticides, and other pollutants from upslope croplands.

Cost Share Conditions: Cost sharing may be provided for:

a. Establishment of vegetative cover.

b. Construction of level spreading structures and associated grading necessary for the buffer to properly filtered pollutants.

c. Obstruction removal.

Planning Considerations: Filter strip effectiveness is dependent upon overland flow. Once soil particles are in transport it becomes increasingly difficult and expensive to achieve adequate control, particularly where flow becomes channelized prior to entering the designed filter strip area.

For this reason the use of vegetative filter strips as a primary control practice for controlling sediment delivery from larger tributary areas should only be considered after all options for on-site erosions control have been exhausted.

The Soil Conservation Service provides the following items to consider when designing or using vegetated buffer strips:

1. Vegetated buffer strips are effective for removing sediment and other suspended solids if flow is shallow and uniform.

2. Total phosphorus is not as effectively removed as sediment.

3. Buffers with concentrated or deeper channel-type flow are <u>much</u> less effective than buffers with shallow uniform flow.

4. Research in Virginia indicates vegetated buffers on cropland are only moderately effective for sediment and nutrient removal since the majority of the flow entering the buffer was judged to be concentrated. This problem is greater in hilly areas.

5. Effective cropland buffers have a limited expected life due to sediment buildup. For areas with significant soil loss, the expected life may be three to five years. Leveling and revegetating may be necessary to reestablish the buffer.

6. Vegetation must be vigorous, dense sod-forming, stiff upright type, capable of remaining upright in heavy flows and during dormancy. The vegetation should be tolerant of wet and dry conditions and capable of recovering from inundation with water and sediment.

The Milwaukee River wildlife management staff specialist should be contacted to discuss wildlife aspects of proposed filter strips. However, vegetative requirements must be based primarily on filtering effectiveness, and secondarily on value as wildlife habitat.

Design Criteria: The following tables identify the filtering of <u>overland flow</u> by vegetated buffers. These tables are derived from a procedure contained in an SCS recommended article, "Predicting Runoff Pollutant Reduction in Buffer Zones Adjacent to Land Treatment Sites" by Overcash, Bingman and Westerman (Transactions of the ASAE - 1981). Minimum filter strip widths shall not fall below minimums specified in SCS Standard 393.

Table A-1
Buffer Area to Source Area Ratio

Soil Type	% Reduction	Ration
loam	100%	0.7
silt loam or	75%	0.2
sandy clay loam	50%	0.1
silty clay loam	20%	>1.0
	10%	0.4

Table A-2
Flow Length of Buffer to Source Length

Ratio Original Field Reduced Field 35 feet (2 rods)
Overland Flow Length

Ratio	Original Field	Reduced Field	Buffer
0.1	400 feet	365 feet	35 feet (2 rods)
	300	275	25
	200	180	20
	100	90	10
0.2	400 feet	335	65 feet (4 rods)
	300	250	50 (3 rods)
	200	165	35 (2 rods)
	100	85	15 (1 rod)
0.4	400 feet	290 feet	110 feet
	300	215	85
	200	145	55
	100	70	30 (2 rods)
0.7	400 feet	240 feet	160 feet
	300	180	120
	200	120	80
	100	60	40

Assumptions: rainfall intensity of 0.5 inches/hour very good vegetated cover.

APPENDIX D
MILWAUKEE RIVER PROGRAM
BASINWIDE EDUCATIONAL GOALS

BASINWIDE GOAL PERTAINING TO EDUCATION

Educate key audiences regarding nonpoint source pollution and related resource management problems and solutions, thereby helping to facilitate public involvement, informed decision making, and plan implementation.

INFORMATION AND EDUCATION SUBCOMMITTEE-ADOPTED GOALS

The best available techniques, including research and survey results, will be utilized in educational strategy development, implementation, and evaluation. The Milwaukee River Priority Watershed Information and Education Program will strive to:

a. Improve the awareness and understanding of the watershed as a system, water quality problems, and the benefits available through integrated resource management, particularly nonpoint source pollution control.

b. Inform people about the potentials of, and instill a sense of responsibility or ethic for, the natural resources within the Milwaukee River Basin.

c. Achieve widespread participation in, and support for, the Priority Watershed and Integrated Resource Management Programs through the involvement of broadly-based and diverse groups.

d. Develop and maintain a clear understanding of the steps the Nonpoint Source Control Program will be taking among rural and urban landowners and users, watershed committees, community leaders, and other groups.

e. Optimize both the use of rural and urban nonpoint source pollution control measures through voluntary cooperation, and the integrated use of complementary resource management techniques.

f. Coordinate and cooperate with other federal, state, and local programs and promote all appropriate implementation strategies (including mandatory controls, where warranted) as mechanisms to achieve water quality improvements.

APPENDIX E
WATER QUALITY ASSESSMENT

This appendix describes what procedures are used to prepare the plan. These are:

1. Evaluating water quality and aquatic habitat
2. Assessing pollution sources
3. Establishing water quality objectives
4. Establishing pollution reduction goals
5. Developing a nonpoint source control strategy

EVALUATING WATER QUALITY AND AQUATIC HABITAT

The Department is responsible for:

a. Designating the biological and recreational uses necessary for maintaining and protecting waters of the state.

b. Prescribing the water quality required to sustain these designated uses.

c. Indicating the methods to implement, achieve and maintain those conditions.

Existing surface water quality and natural resource conditions for lakes and streams were investigated to determine water quality objectives.

The Department water resource management staff conducted the investigations during 1985 and 1986. Most perennial and intermittent streams and all of the major lakes were evaluated. A groundwater evaluation determined potential sources of and susceptibility to contamination. The following is a summary of the six parts of this investigation.

1. Subwatershed Delineation and Stream Segmentation

Prior to collecting field data, the watershed was divided into 19 smaller areas termed hydrologic subwatersheds. This was accomplished using 1985 1"=400' scale aerial photographs and 1"=2,000'(7.5 minute) U.S. Geological Survey quadrangle maps. These maps were also used to divide the perennial and intermittent stream network into segments. Stream segments were used to separate portions of waterways where either natural conditions or human induced changes resulted in pronounced differences in stream character and/or water quality.

2. Stream Habitat Evaluation

Information characterizing stream habitat including flow rate and depth, substrate quality, channel configuration, streambank stability, and water temperature, were collected using techniques developed by the Department. The data were evaluated using the Departmental Stream Classification Guidelines.[5]

3. Water quality Assessment

Water quality was assessed using a combination of historical water chemistry data and an evaluation of bottom dwelling animals (macroinvertebrates) using the Hilsenhoff Biotic Index.[6] Extensive surface water bacteria surveys assessed with suitability for recreational use. Results were interpreted using the 1986 revisions to Chapter NR 102, Wisconsin Administrative Code.

4. Fisheries Resource Assessment

Fish communities were assessed qualitatively using a combination of historical data and information collected during this investigation.[7] Resident fish populations in the streams, lakes, and impoundments were sampled using seines and electrical shocking equipment.

5. Navigability and Recreational Use Determinations

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

6. Groundwater Pollution Potential and Susceptibility to Contamination

The purpose of this element was to gain an understanding of the threats to continued use of groundwater for potable uses. The evaluation used existing land use data, soil characteristics, geologic information, nonpoint source inventories, and the previously discussed investigations of cultural features. It also relied on a recently completed statewide investigation of groundwater contamination susceptibility.

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[5]J. Ball, Stream Classification Guidelines for Wisconsin, WDNR, Madison, 1982.

[6]W. Hilsenoff, Using A Biotic Index To Evaluate Water Quality In Streams, Technical Bulletin Number 132, WDNR, Madison, 1982.

[7]D. Fago, Distribution and Relative Abundance of Fishes in Wisconsin, IV: Root, Milwaukee, Des Plains, and Fox River Basins, Technical Bulletin Number 147, WDNR, Madison, 1984.

SURFACE WATER BIOLOGICAL AND RECREATIONAL USE CLASSIFICATIONS

The above information was used to determine the existing and potential biological and recreational uses for surface waters. The existing uses reflect present biological and recreational conditions. Potential uses are determinations of the water quality conditions which could be achieved under prescribed types and levels of management.

In most cases, the potential use classifications do not differ from the present uses. Consequently, priority watershed project objectives for most of the surface water resources are either to protect or enhance the existing uses supported by the stream. The following is a discussion of the biological and recreational stream use classification systems.

Biological Stream Use Classification and Water Quality Standards

Biological stream use classes describe the fish species or other aquatic organisms supported by a stream system. Designation is based on the ability of a stream to provide suitable habitat and water quality conditions for those fish and other forms of life. The following biological stream use classification system is used statewide and was applied to surface waters in the North Branch Watershed:

Table A-3
Biological Stream Use Classification

USE CLASSIFICATION	DESCRIPTION
FULL FISH & AQUATIC LIFE CATEGORY (FAL)	
FAL A	Capable of supporting cold water sport fish (trout and other salmonid species) to the following extent:
(Class I)	Trout fishery sustained by natural reproduction
(Class II)	Trout fishery sustained by natural reproduction and periodic stocking
(Class III)	Trout fishery sustained entirely by stocking
FAL B	Capable of supporting or serving as a spawning area for warmwater sport fish (walleye, bluegill, smallmouth bass)
FAL C	Capable of supporting forage fish (shiners, minnows) and aquatic invertebrates (insects, clams, crayfish) intolerant of pollution, or forage fish tolerant of pollution.
VARIANCE CATEGORIES	
INTERMEDIATE D	Capable of supporting forage fish or rough fish (carp) tolerant or very tolerant of pollution and aquatic invertebrates tolerant of pollution.
MARGINAL E	Capable of supporting aquatic invertebrates which are very tolerant of pollution or no aquatic life. They may support amphibians, reptiles, waterfowl, and other wildlife.

FAL A Cold Water Sport Fish: These streams are capable of supporting a cold water sport fishery, or as serving as a spawning area for salmonid (trout, salmon) species. The presence of an occasional trout or salmon does not justify classifying it as supporting a cold water sport fishery.

FAL B Warmwater Sport Fish: These streams are capable of supporting a warmwater sport fishery or serving as a spawning area for warmwater sport fish (walleye, bluegill, smallmouth bass). Although warm water fish are occasionally found in many small streams, fish must commonly be found in a water body for it to be classified under this category.

FAL C Cold/Warmwater Forage Fish: These streams are capable of supporting an abundant, usually diverse, population of forage fish (shiners, minnows) and/or aquatic invertebrates (insects, clams, crayfish) which are intolerant of pollution. They are generally too small to support cold or warmwater sport fish, but have natural water quality and habitat necessary to support forage fish and/or aquatic invertebrates. Streams capable of supporting valuable populations of tolerant forage fish are also included in this category.

Intermediate D: These streams are capable of supporting small populations of forage fish tolerant of pollution, or fish and aquatic invertebrates tolerant of pollution. The aquatic community is usually limited by small physical stream size and reduced stream flow.

Marginal E: These streams are capable at best of supporting aquatic invertebrates or occasionally very tolerant fish species. These streams are usually small--intermittent streams and ditches--and the capacity to support aquatic life is extremely limited.

Water Quality Standards: Water quality necessary to support stream biological uses has been quantified by certain measurable standards. These standards are statements of the characteristics of surface waters which must be maintained to enable the stream to continually meet its designated use. Generally, the best water quality supports the highest level of aquatic life. The standards are set forth in Chapters NR 102 and NR 104, Wisconsin Administrative Code and presented in Appendix A.

Recreational Stream Use Classification and Water Quality Standards

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

Full Body Contact: These waters are used for human recreation where immersion of the head is expected and occurs often. Recreation activities classified as full body contact include swimming, waterskiing, sailboarding and other similar activities where frequent and significant contact with the water occurs. Water quality standards for full body contact use are applicable from May through September.

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

Noncontact: These waters should not be used for human recreation. This category is used infrequently when extenuating circumstances such as high concentrations of in-place pollutants, an uncontrollable pollution source, or other conditions dictate that contact with the water would be an unnecessary health risk. typically, surface waters included in this classification would ordinarily be considered to be capable of supporting partial body contact uses.

Water Quality Standards and Use Criteria: The types and levels of recreational uses a stream or lake can support is based on water quality standards for levels of bacteria, the inherent physical characteristics of the stream and the ability to support recreational use, and the observed or recorded ways it is presently used. Each is discussed below:

Bacterial Contamination - Surface water bacteriological surveys were conducted during inventory. Chapter NR 102 of the Wisconsin Administrative Code establishes guidelines for determining how bacterial contamination impacts recreational uses of surface water. In streams classified as full body contact, the level of fecal coliform bacteria (membrane filter fecal coliform count) cannot exceed 200 colonies per 100 milliliters of water for not less than five occasions per month, nor 400 colonies per 100 milliliters in more than 10 percent of the samples taken in any month.

Physical Characteristics - Physical stream characteristics were obtained during the above referenced biological stream use investigations. Data characterizing stream width, depth, flow, streambank height and stability, and accessibility were used to help determine the suitability and types of recreation a stream is capable of supporting.

Present Recreational Uses - The type of recreation occurring on watersheds, lakes, and streams was determined by direct observation, information provided by users at public access points, and discussions with local officials.

ASSESSING POLLUTION SOURCES

The pollution assessment identifies the rural and urban sources and quantities of pollutants impacting surface and groundwater. Rural and urban pollutant sources are discussed below.

Rural Nonpoint Sources

Excessive quantities of sediment, nutrients, oxygen demanding substances, pesticides, and bacteria are nonpoint sources of pollutants carried in runoff draining from agricultural and other rural areas included in the North Branch. These pollutants degrade surface and groundwater quality and thereby restrict recreational uses that may threaten the fitness of groundwater for safe human consumption. The principal nonpoint sources evaluated were:

a. Runoff from barnyards and livestock feeding, pasturing, and loafing sites.
b. Upland erosion and sediment delivery to streams, lakes, and wetlands.
c. Stream bank erosion.
d. Runoff from areas used for winter spreading livestock manure.

inventories were conducted during 1986 and 1987 by the Fond du Lac, Ozaukee, Sheboygan, and Washington County Land Conservation Department staffs. The procedures are documented in a manual developed by the Department for the Milwaukee River Basin.[8] Data analysis was completed by the Department in cooperation with the DATCP and the county Land Conservation Department staffs. The inventory and evaluation procedures are summarized below.

Barnyard and Livestock Area Runoff: The locations of the 220 livestock operations in the watershed were mapped on 1985 1" - 400' aerial photographs by the respective county Land Conservation Department staffs. Field surveys were used to collect information regarding the size and number of animal lots, size and location of areas draining to the lot, the number and types of animals, the amount of time spent in the lot, type and extent of buffer area receiving drainage, and runoff destination.

The data was evaluated using an analytical model which determines the pollution potential for each site. The model **(BARN)** is a modification of a mathematical formula developed by the U.S. Department of Agriculture, Agricultural Research Service.[9] It calculates runoff volume and the concentration and quantity of total phosphorus and chemical oxygen demand under a 24-hour rainfall event with a ten-year frequency of occurrence (rainstorm of about 4 inches). The livestock operations were ranked according to their potential to impact surface and/or groundwater quality.

Upland Erosion and Sediment Delivery: This evaluation quantified upland erosion and estimated the amount of eroded sediment reaching surface water. Cropland, pastures, grasslands, woodlands and other open (non-urban) land uses were investigated. Individual parcels were identified on 1985 1"-400' scale aerial photographs. Parcel boundaries were based on slope, cropping pattern or predominant vegetation type, property boundaries, and drainage characteristics.

The inventory was conducted on 141 square miles, or 95 percent of the watershed, using existing data and field investigations. Existing data sources included site-specific farm conservation plans, 1985 1"=400' scale aerial photographs, and U.S. Geological Survey 1"-2,000' scale quadrangle maps. The information obtained for each parcel included size, soil type and erodibility, slope percent and length, land cover, crop rotation, present management, overland flow distance and destination, channel type, and receiving water.

Upland erosion and sediment delivery was determined using the Wisconsin Nonpoint Source Model (WIN). This analytical tool was developed by the Wisconsin Nonpoint Source Control Program to assess the pollution potential from eroding uplands. The WIN model calculates the average annual quantity of eroded soil reaching surface water. It is determined by soil loss and runoff originating on each parcel under a "typical" year of precipitation. The parcels are ranked according to their potential to contribute sediment to streams, lakes, and wetlands.

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[8]R.A. Young, M.A. Otterby, and A. Roos, An Evaluation System To Rate Feedlot Potential, USDA-Agriculture Research Service, 1982.

[9]K. Baun and S. Snowden, The Wisconsin Nonpoint (WIN) Model: Version 1.0, Model Documentation, WDNR, Madison, 1987.

Streambank Erosion: Stream bank erosion is the undercutting and slumping of stream margins. It results from natural fluctuations in flow conditions and human influence, including urban development and uncontrolled livestock access to waterways. There is physical damage to streambanks resulting in fish habitat loss and there is deposition of eroded sediment directly into streams.

An assessment of the occurrence and severity of streambank erosion was completed for both the rural and urban areas in the North Branch Watershed. The survey method is a modification of the stream bank erosion analysis included in Phase II of the Land Inventory Monitoring (LIM) process used by the U.S. Department of Agriculture, Soil Conservation Service. Field surveys were conducted on 120 miles, or 85 percent, of the perennial and intermittent streams. At locations where erosion was occurring, the following site-specific information was recorded:

1. Length of trampled or eroding bank.
2. Vertical height.
3. Estimated annual rate of recession.
4. Adjacent land uses.
5. Potential management measures.

The amount of sediment lost annually was calculated by multiplying the length of the eroding segment times the height of the bank times the estimated annual recession rate. The information was compiled and ranked by stream for each subwatershed. Importantly, this inventory included areas adjacent to streams impacted by livestock, but which were not necessarily eroding at a high rate.

Runoff from Areas Winter Spread with Livestock Waste: The investigation was conducted to identify those areas unsuitable for winter spreading of livestock manure because of the potential impact on surface or groundwater quality. Information collected in the barnyard and livestock area and upland erosion surveys are used in this evaluation.

This analysis was completed using a two-step process. First, the area needed for landspreading at each livestock operation was determined for the approximate six-month period when the ground is frozen or saturated with water. The amount of manure generated by each operation was based on the number and type of livestock. The area required for spreading was based on an application rate of 25 tons per acre per year.

Second, the available area meeting specific physical criteria was determined and designed to minimize water quality impacts resulting from manure spreading. Criteria used to assess suitability for spreading included slope, proximity to a floodplain or floodway, and soil depth to bedrock or groundwater. Areas with either a slope of greater than six percent, or within a floodway or floodplain, or with a shallow depth to bedrock or groundwater (less than 12"), were considered to have a high potential to deliver landspread manure to lakes and streams during periods of spring thaw. The upland inventory was used to determine the amount of land available for each operation.

This analysis provided a means of comparing the amount of land required for spreading by each livestock operation for spreading with the amount of suitable area needed. If the amount of suitable land was greater than or equal to the area needed for spreading, it was assumed that landspreading was not a significant source of nonpoint pollution. But if the amount of suitable land was greater than or equal to the area needed for spreading, it was assumed that landspreading was not a significant source of nonpoint pollution. However, if the amount of suitable land was less than the area needed, then it was assumed that the potential existed for surface or groundwater pollution. Operations with an inadequate amount of suitable land were ranked to determine their the relative importance in the watershed.

Urban Nonpoint Source Inventory and Analysis

Existing and developing urban areas can be as significant a source of nonpoint pollutants as rural areas. A wide range of nonpoint sources of pollutants are generated by urban land uses and activities. They include some of the same materials associated with rural nonpoint sources, including sediment, nutrients, oxygen demanding organic materials, and bacteria. However, other pollutants, many of which are potentially toxic, are transmitted to surface waters and groundwater by urban runoff. These include metals (lead, zinc, chromium, copper, cadmium, and arsenic), pesticides, and a wide range of hazardous organic compounds.

Nationwide investigations confirm that urban runoff can have a significant adverse impact on receive waters. The result is that urban areas and activities can upset several important components of a stream including stream flow, habitat, water quality, bottom sediment quality, and stream biology. These impacts can be short-term or long-term. Short-term impacts include sediment deposition in surface waters from construction sites, or large increases in urban runoff resulting in erosion and scour of the streambank and streambed. Long-term exposure to these pollutants may result in high concentrations of toxic compounds in fish.

The principal pollution sources evaluated were runoff from existing urban areas and runoff from areas under construction. Information necessary to determine the impacts of urban nonpoint pollution was collected by the Department staff.

Existing Urban Areas: Stormwater pollutant concentrations, runoff volumes, and pollutant yields vary by land uses (residential, commercial, industrial) and development characteristics (intensity of the development, stormwater conveyance system). The inventory of established urban areas was designed to quantify the land use and development characteristics in the villages of Adell, Cascade, and Random Lake to determine the relative contribution of pollutants to surface and groundwater.

Field investigations and 1"-400' scale 1985 aerial photographs were used to quantify urban land uses. Drainage patterns and storm water conveyance systems were recorded. Site-specific information for each of the villages was used to evaluate pollutant loading of phosphorus, lead, and suspended sediment.

New Urban Development: New urban development is an important consideration in the urban nonpoint pollution analysis. Areas undergoing construction have the potential to erode at high rates (more than 50 tons per acre per year) and dramatically impact surface water quality and habitat. During and after construction, increased amounts of runoff are transported downstream because of the limited infiltration capacity of buildings, parking areas and roadways.

The Department staff used inventory data to calculate existing erosion and sediment delivery associated with construction activity. Planned urban development projections were used to estimate the potential for future construction site erosion, and to estimate the pollution potential for new urban areas should they be developed without construction erosion controls and stormwater management practices.

Other Pollution Sources

Additional sources of surface and groundwater pollution beyond those discussed are degrading water quality. Examples include sewage treatment plant discharges and runoff from agricultural lands where improperly applied fertilizers or pesticides are threatening water quality. These pollution sources have the potential to overshadow improvements in water quality that might otherwise occur as a result of the priority watershed program.

Most of these other pollution sources are regulated or controlled by a variety of other local, state, or federal programs. However, the Department conducted an inventory and evaluation of these other pollution sources under the integrated resource basinwide planning effort being carried out as part of the required update of areawide water quality management plans. The results and recommendations for alleviating the impacts on water quality are documented in the North Branch Integrated Resource Management Plan.

In addition the DATCP, the Department, and the UW-Extension are cooperatively working through a technical committee to define fertilizer and pesticide use guidelines to minimize threats to surface and groundwater quality. The results will be especially important for the North Branch Priority Watershed Project.

ESTABLISHING WATER QUALITY AND RECREATIONAL USE OBJECTIVES

Site-specific surface water quality objectives form the basis for determining the levels of pollution control the priority watershed project seeks to achieve. Groundwater objectives are less site-specific and generally are related to the maintenance of water quality at a level necessary to meet state standards.

Water quality objectives were developed by the Department staff (water resources management, fisheries management, wildlife management), with assistance from the Fond du Lac, Ozaukee, Sheboygan, and Washington county Land Conservation Department staffs. Factors considered included water quality and aquatic habitat, sources and types of pollutants, and the extent to which the pollution sources are controllable.

Surface water quality control of nonpoint sources is the single most effective means in the North Branch Watershed. However, pollution control and resource management efforts beyond the scope of the Nonpoint Source Control Program are needed to achieve the identified objectives. For example, some water resources will need habitat rehabilitation, fish stocking, and point source controls in conjunction with nonpoint source controls. These needs are documented in the North Branch Watershed Integrated Resource Management Plan.

ESTABLISHING POLLUTION REDUCTION GOALS

Pollution reduction goals are estimates of the general level of control needed to meet the water quality and recreational use objectives. The reduction goals target the control of sediment and phosphorus. Sediment and phosphorus were targeted because they were identified as having the most widespread and significant impact on water resources. Importantly, reducing the quantity of these substances reaching surface and groundwater will also decrease the amount of other substances, such as heavy metals, pesticides, and bacteria, which degrade water quality.

DEVELOPING A NONPOINT SOURCE CONTROL STRATEGY

The final step in the planning process is the development of a strategy to control nonpoint pollution sources. This is accomplished by considering the water resource objectives, pollution sources, reduction goals, and the tools available to the Department under the Nonpoint Source Control Program. The strategy was developed by the Department and the DATCP in cooperation with the Fond du Lac, Ozaukee, Sheboygan, and Washington County Land Conservation Department staffs.

The nonpoint source control strategy includes three constituents: nonpoint source pollution control needs, the means and schedule for implementing the controls, and an Information and Education Program. The means by which the nonpoint source control needs were determined are discussed below. Development of the implementation plan and the Information and Education Program are discussed in Chapter V, "Detailed Program for Implementation" and Chapter VI, "Information and Education Program."

The nonpoint source pollution control needs were determined by:

a. Evaluating the pollutant loading for each nonpoint source in each subwatershed.

b. Determining the relative importance of controlling each source (barnyards, urban runoff, cropland erosion, etc.) to achieving the water resource objectives.

c. Developing criteria to determine which sources need to be controlled.

d. Applying the criteria to determine eligibility for participation in the priority watershed project.

This strategy was carried out on a subwatershed and watershed basis for the rural and urban nonpoint sources to determine the eligibility and the means which they would be controlled. The result was a site-specific ranking of nonpoint sources and the assignment of management categories which determined eligibility for participation in the priority watershed project.

APPENDIX F
DESCRIPTION OF WATERSHED-SPECIFIED MATERIALS AND EVENTS

Newsletters

Newsletters will be used to convey information to targeted groups such as local government officials, landowners, civic and environmental groups, interested citizens, and other likely participants in the Milwaukee River Priority Watersheds Program (Milwaukee River Program). The objectives of the newsletters will be to:

a. Supply basic information on the Milwaukee River Program.

b. Provide updates on important elements of the Milwaukee River Program including dates of upcoming events.

c. Improve understanding of nonpoint source pollution problems and causes.

d. Increase appreciation of lakes, streams and related natural resources in the watershed.

e. Introduce landowners to recommended management practices.

f. Provide information on available assistance including cost-sharing.

g. Build a sense of momentum by providing information on participation and implemented practices.

Newsletters will be distributed to key audiences within the watershed and used as handouts at public meetings, tours, and exhibits.

Two watershed-specified newsletters are presently planned for each year of the watershed project. However, many issues in the Milwaukee River Program transcend watershed boundaries, and interest groups often have regional membership. Therefore, some newsletters may be most efficiently written and distributed at the basinwide, rather than watershed, level.

Thus, once the implementation process has begun, the watershed could be featured once a year in a basinwide newsletter; and perhaps five basinwide newsletters per year (corresponding to the five Milwaukee River Watersheds) could be produced during the latter part of the Milwaukee River Program. Newsletters featuring articles about watersheds with similar nonpoint source pollution problems would then be distributed to key audiences on the mailing lists for neighboring watersheds.

Watershed newsletters will include articles on urban as well as rural nonpoint source pollution problems and practices to provide a balanced picture of the Milwaukee River Program activities. Watershed newsletters featuring articles on municipal, commercial, and industrial problems and practices will be distributed to the usual rural audience, and to targeted urban audiences such as: local government officials, civic and environmental groups, business associations, and environmental contacts for industries.

The lead responsible party for watershed newsletters will be the Area UW-Extension Water Quality Education Coordinator, with State Specialist assistance. The Urban Water Quality Educator will be responsible for drafting or arranging for an expert to draft articles on urban issues. Other UW-Extension, Department, and Land Conservation Department staff will also be involved in newsletter preparation and distribution.

Watershed Folder and Fact Sheets

A watershed folder will be produced to communicate basic information about the Milwaukee River Basin and to serve as the "cover piece" for an educational packet that would be assembled to meet the needs of particularly rural landowners and operators, but also perhaps local officials. Thus, the folder would contain different sets of information and education materials, including fact sheets, depending upon the audience groups to which it would be given.

The folder will ultimately bear a basinwide rather than a watershed-specific identity; most of the fact sheets contained within it would likely have basinwide or statewide applicability, and be produced at those levels. An exception may be demonstration project fact sheets and writeups describing good management practices which are viewed as "informal demonstrations." These could be localized considerably to this watershed project. Likewise, the combination of materials inserted in the folder would tend to help "localize" it.

Area and county UW-Extension and county LCD staff would jointly prepare the watershed folder and demonstration fact sheets.

Watershed Slide Program(s)

An adaptable slide program will be developed for use at public meetings, community group programs, and volunteer training sessions. The program will have some modules which can be used throughout the basin, such as those explaining the Milwaukee River Program, nonpoint source pollution, and rural and urban practices for abating nonpoint source pollution. Other modules will be specific to the watershed, such as those explaining local nonpoint source pollution problems and causes, local examples of nonpoint source pollution abatement practices, landowner survey(s), inventory data, and plan recommendations.

County LCD and UW-Extension staff will provide slides and information for the watershed-specific portions of the slide program, adapt basinwide portions, and use the program for public meetings, community group programs, and volunteer training sessions. Many slides, especially graphic summaries of landowner surveys, inventory data, and plan recommendations, will be prepared by the Department or state or area UW-Extension staff. Area UW-Extension Water Quality staff will be responsible for coordinating the production of the slide program.

Local Exhibits

Exhibits on the Milwaukee River Program, on urban and rural nonpoint source pollution, on specific watershed plans, and on Best Management Practices will be used at county fairs and other special events in the watershed. The purpose or focus of these exhibits will change as the program progresses. Thus, interchangeable groups of exhibit components must be developed and made available to cover a variety of themes. The first exhibit used in a watershed will be designed to raise public awareness of the Milwaukee River Program, nonpoint sources of pollution, and typical solutions. The second exhibit will be designed to inform people about inventory and/or survey results and plan recommendations for their watershed. The third (and fourth, if appropriate) exhibit will inform people about specific Best Management Practices.

Arrangements for use of exhibits in local areas will be the responsibility of county UW-Extension and LCD staff, with assistance from area UW-Extension and district Department staff. Most materials for the exhibits will be developed by watershed advisory committee members and other volunteers whenever possible to augment staff resources.

Media Contacts

An active program to involve the media in covering watershed events will begin with a conference, with each local newspaper covering the watershed to acquaint editors and reporters with the Milwaukee River Program. The lead responsible person for this activity is the Public Information Officer for the Department's Southeast District. The Milwaukee River Program Coordinator and UW-Extension staff will also be involved.

News releases will be distributed to all local newspapers and radio stations (and regional newspapers and television stations where appropriate) to announce watershed events such as tours, public information meetings, plan completion, demonstration project installations, and grant awards. The lead responsible agency for the news releases will vary depending on which agency or private group is responsible for the particular event.

Newspaper feature articles and appearances on local radio talk shows and interview programs will be sought to provide more in-depth coverage of the program. County UW-Extension staff will be primarily responsible for covering water quality issues in their regular radio talk shows and newspaper columns. Background material for radio programs and newspaper columns will often be prepared at the basin or state level. County staff will also participate in the preparation of background materials on subject in their field of expertise. Special feature articles or interview shows may involve direct participation by state or district Department or UW-Extension staff.

Series of Newspaper Columns and Radio Public Service Announcements

A coordinated series of newspaper columns and radio public service announcements will be used to inform people about particularly urban Best Management Practices. The primary focus of the series will be homeowner practices such as yard care, household hazardous waste, stream corridor and lakeshore management, automobile maintenance, and pet waste disposal. General information on the Milwaukee River Program, nonpoint source pollution, and Best Management Practices for municipalities will also be included.

Development of the series of newspaper columns and radio public service announcements will be coordinated at the basinwide level, but publication or distribution will be made part of the watershed implementation program. County UW-Extension agents will adapt newspaper columns and radio public service announcements for local use, and will arrange for distribution to local newspapers and radio stations. Newspaper columns will also be distributed for publication in local civic and environmental group newsletters.

County UW-Extension agents may be involved in the development of newspaper columns or public service announcements related to their areas of expertise. Supportive educational materials such as fact sheets will be available, upon request, through county UW-Extension offices. Such fact sheets and other written materials will be prepared at the basinwide or statewide level.

Demonstration Site and Key Rural Practices Tours

A meeting and tour will be conducted for any existing demonstrations, and for all future demonstration sites. Priority landowners needing specific information and first-hand exposure to the demonstrated practices will be invited to the event(s). Transportation to and from the sites and organization around a social event such as a meal will be utilized as advisable and approved.

In addition, tours related to Best Management Practices will be pursued as appropriate for specific audiences, making use of both formal and informal "demonstrations." Presently, such a tour is planned for livestock operators, and others are envisioned as likely for future years.

County Land Conservation Departments and UW-Extension staff are identified as having the major responsibility for these tours.

Implementation Meeting/Tour

During the implementation phase in the watershed, a meeting and/or tour will be scheduled. The purpose of the meeting/tour will be to update local officials on program progress, to encourage more participation, and to inform the media and the public about implemented practices and water quality improvements. Rural and urban demonstration projects and other implemented practices will be featured in the meeting/tour. The meeting/tour should be scheduled before the end of the sign-up period for state cost-sharing. Implementation meetings and tours may be combined for adjacent watersheds where sign-up periods overlap.

The lead responsible party for arranging implementation meetings/tours will be the Milwaukee River Program Coordinator. Assistance will also be provided by other Department, LCD, and county and area UW-Extension staff.

Demonstration Projects

The need for demonstrations of nonpoint source pollution control practices will be evaluated in the watershed. Where appropriate, demonstrations will be designed to enhance related natural resources, such as fish and wildlife habitat, as well as improve water quality. Watershed demonstrations will be evaluated according to the following criteria:

1. Does the practice address an identified, major source of water pollution in the Milwaukee River Basin?

2. Is the practice needed in a variety of areas in the watershed (or other parts of the Milwaukee River Basin) to achieve water quality goals?

3. Is the practice unfamiliar and/or untested in the vicinity or in southeastern Wisconsin?

4. Does the practice require further research and refinement before widespread application? Would a demonstration aid this process?

5. Is the site proposed for the demonstration highly visible, easily accessible, or located where there would be credibility ascribed to the practice?

Staff of the Milwaukee River Program, with the advice of Watershed Advisory Committees and local governments, will identify and actively pursue implementation of needed demonstrations. An ad hoc group composed of the Milwaukee River Program Coordinator, area UW-Extension Water Quality staff, the state UW-EXtension Water Quality Education Coordinator, the Department Nonpoint Section Chief or designee, and local government staff--including county UW-Extension and LCD's--will be responsible for further identifying needed demonstrations, and for drafting the necessary detailed proposals which elaborate upon the new demonstrations suggested in this plan. Implementation of specific demonstrations will be pursued by appropriate Department, LCD, local government, and UW-Extension staff.

Part of the plan for each demonstration will be an information and education element including, at a minimum, signs, slides, fact sheets, and tours. Area UW-Extension Water Quality staff will play a major role in coordinating and/or conducting the information and education component of each demonstration project.

Signs

Signs with the Milwaukee River Program logo will be used at selected locations to increase public awareness of the Milwaukee River Program and possibly the extent of the Milwaukee River Basin and stream locations. Potential sites for signs identifying the Milwaukee River Basin, the five priority watersheds, and individual streams will be selected and prioritized by the Information and Education subcommittee. Signs will be produced by contract with a private firm. Primary responsibility for coordinating this sign project will be assigned to a staff member at the Department's Southeast District.

Signs identifying demonstration projects and other Milwaukee River Program cooperators will also be used. Wherever possible, more detailed signs explaining demonstration projects and other cost shared practices will be put up in prominent public locations such as parks, waysides, boat and fishing accesses, and river walkways.

Lake Organization Meetings and Programs

Meetings will be scheduled with every lake district or organization. Specially targeted Information and Education Programs, including model yards where appropriate, will be developed for these areas because lakeshore developments are a special problem in the Milwaukee River Basin. Most of the lakes in the basin are surrounded by dense residential development served by septic or holding tanks.

Information and Education Programs will focus on land use planning, stormwater management, yard care practices, erosion control, and septic or holding tank maintenance, because these practices are especially critical for maintaining water quality and property values for lake developments. Three different approaches have been identified for potential use in Information and Education Programs for lake organizations.

The first approach identified for use in these areas is a model yard contest or demonstration. The contest or demonstration and related training may be sponsored by the lake organization with assistance from county UW-Extension staff. The primary focus of model yard programs would be landscaping, storm water infiltration, lakeshore stabilization, erosion control, and septic and holding tank maintenance practices that will protect lake water quality.

A second approach which may be used with interested lake organizations is a lakeshore management demonstration. Under this program, volunteers would participate in demonstrations of stormwater management, erosion control, shoreline stabilization, landscaping, or wetland restoration practices that protect lake water quality and enhance fish and wildlife habitat.

A third approach which may be used is the UW-Extension drinking water education program. Under this program, lakeshore residents would be provided with bottles to collect representative drinking water samples. After analysis, a public meeting would be conducted to collectively explain results, sources and patterns of movement for problem pollutants and the effect of land uses upon water quality.

Lake districts may also choose to participate in the nonpoint source pollution control program as units of local government, making them potentially eligible for cost-sharing to implement approved practices. Like cities and villages, lake districts or organizations may also develop and implement Information and Education Programs for their residents with assistance from UW-Extension staff.

Responsibility for follow-up activities such as information on yard care practices and training for model yard contests will lie with county and area UW-Extension staff.

Town Meetings

During the planning phase of the watershed project, staff from the lead educational counties met with their respective town boards and/or planning commissions. This was done to accomplish one or more of the following: establish a courtesy contact; explain the deteriorated nature of the water resource base; indicate the steps which would be followed in the project; illustrate ways in which the project might affect the respective town and its residents; and provide a status update regarding the project.

During the implementation phase, meetings are planned for each of the watershed townships lying in the lead educational counties. Officials and residents from adjoining towns in different counties or different watersheds may be invited to participate as advisable. The primary purpose of these

meetings, tentatively scheduled for year one of the project, will be to respectively indicate that implementation is underway and encourage participation, and to later advise that this phase will end shortly, offering suggestions for future involvement.

These meetings will be the responsibility of the county UW-Extension and LCD staff. Area UW-Extension and Department staff assistance could be made available as needed for specific topics or the production of handout materials.

City and Village Meetings

As part of a process involved with more detailed local planning, the Milwaukee River Program staff will schedule a meeting with the governing body of each village. The purposes of the meeting will be to:

a. Present inventory results, urban residents survey results (if any) and general plan recommendations.

b. Get feedback from local officials regarding the plan as it affects their community.

c. Identify the next steps regarding specific actions to be taken, ultimately leading to approval of the plan for the community by the Village Board.

The lead responsible party for scheduling meetings with municipal staff and elected officials will be the Milwaukee River Program Coordinator. Other Department and county or area UW-Extension staff will provide assistance at these meetings. For the meetings, the Milwaukee River Program staff will prepare (or arrange for the preparation of) a written summary of inventory and survey results, and plan recommendations for each village and related audio-visual materials such as slides, overheads, maps, and graphs.

Local Government Information and Education Activities

The Milwaukee River Program Coordinator will contact each village once a year during implementation to assess progress, update the community on the Milwaukee River Program, and determine what types of information or other assistance they need. To facilitate this process, each village will be asked to designate a contact person for the Milwaukee River Program. Timing of the annual follow-up is important, due to the local government budget cycle. Contacts should be made during the spring or early summer so that plans for new programs and capital expenditures can be included in the normal local government budget process.

Appropriate county or area UW-Extension and Department staff will assist local governments in the development and implementation of Information and Education Programs for their residents, businesses, and industries. The Department and the UW-Extension staff will also provide information on urban Best Management Practices to village officials through telephone contacts, attending local government meetings, providing workshops, or other educational means.

County UW-Extension agents will have primary responsibility for urban information and education activities wherever they have appropriate skills and time. Area UW-Extension Water Quality staff will be responsible for urban information and education activities when needed by county UW-Extension staff.

Construction Erosion Control and Stormwater Management Workshops

One specific type of technical education and training assistance which will be offered to cities and villages in the Milwaukee River Basin will be construction erosion control and stormwater management workshops. The purpose of the workshops will be to assist municipal staff with the implementation of new or revised ordinances or plans for construction erosion control or stormwater management. The workshops will be designed to provide technical information on these practices to municipal staff, local developers, builders, contractors, and consultants. The most effective time to schedule them will be winter or early spring, before the busiest construction season.

The area Urban Water Quality Educator will be responsible for organizing these workshops. Materials for use in the workshops will be developed on a basin or state level.

Programs for Local Groups

Videotape and slide programs with supportive educational materials will be presented to or made available to civic and environmental organizations, agricultural groups, Chambers of Commerce, local business and industry associations, youth groups, schools, churches and other local organizations. To provide an organized approach for soliciting and meeting program requests from local groups, the Milwaukee River Program Coordinator will develop a speakers bureau. Members of the speakers bureau will include state and local government staff and members of the advisory committees. Likely members will be surveyed concerning topics, frequency, and type of groups they are willing to address.

The primary responsibility for maintaining the speakers bureau database will belong to the Milwaukee River Program Coordinator at the Department's Southeast District. The Urban Water Quality Educator will publicize the speakers bureau to solicit program requests from urban groups. Videotapes, slide programs, and supportive educational materials will be developed on a statewide or basinwide level by state or area staff or through contracts with private or public agencies. Area UW-Extension staff will play a lead role in developing or coordinating the development of needed materials. County UW-Extension agents involved in the Milwaukee River Program will participate in the speakers bureau and the development of information and education materials according to their areas of interest and available time.
Ultimately, it is hoped that the Milwaukee River Program staff can meet with leaders of these groups to provide information on the Milwaukee River Program, define how they would like to be involved in the program, train volunteers from their groups, and (where appropriate) assist them in the implementation of educational programs, demonstration projects, and other activities.

Major Proposals

Major proposals include those collections of educational activities that could likely be performed well only under the umbrella of a substantial educational effort complementing the other activities undertaken for the watershed project. As such, major proposals must be prepared to document need and establish a proposed work plan. Additionally, major proposals for a conservation tillage specialist and agrichemical management specialist would show the watershed project as but one benefactor of a larger, perhaps basinwide or areawide educational program. Even the outcome of an investigation with municipalities is likely to benefit from, or point to, the need for training programs and/or materials that are produced for a broader purpose.

Annual Educational Plan Update

The North Branch Watershed Educational Plan will be reviewed and updated annually. This is needed particularly so that educational materials and events, costs, and timing can be intelligently specified for the period beyond year one. The anticipated completion of a Basinwide Information and Education Plan and major proposals will mark important milestones in projecting future educational commitments needed for the project--as will the completion of the first year of implementation.

Area UW-Extension staff will provide the leadership role in this annual plan updating process, and will be assisted especially in the identification of needed directions by county UW-Extension and LCD staff. The Department staff may also play an important role in the needs identification process.

Table A-4
North Branch Watershed Educational Plan Activities

SHEBOYGAN COUNTY

Educational Material/Event	Responsibility	Hours	Timing
Printed Materials			
Watershed Newsletter articles	UWEX/LCD	40	2/Yr
Watershed Folder adaptation	LCD/UWEX	20	Yr 1
Purchase of existing bulletin materials (for folder inserts and handouts)	UWEX/LCD	10	Yr 1
Demonstration Project fact sheets	UWEX/LCD	20	Yr 1
Animal waste management			
Contour strip cropping			
Good practices fact sheets	UWEX/LCD	Based on plan numbers	
Audio Visual Materials			
Slide program: Watershed project orientation including urban components to build momentum	LCD/UWEX	8	Yr 1
Exhibits (usage)			
"Smaller settings" including banks, possibly farm co-ops.	UWEX	10	Yr 1
County Fair (with Sheboygan R. Wat. project)	LCD/UWEX	10	Yr 2
Media Releases/Participation[3]			
Newspaper column adaptation	UWEX	4	4/Yr
News releases--with important events only	UWEX/LCD	10	2/Yr
Tours			
Demonstration Site meeting and tour for animal waste operators	LCD/UWEX	25	Yr 1
Animal waste management tour	"	25	Yr 3
Cropland management tour	UWEX/LCD	25	Yr 2
Bus tour of key practices for local officials (with Sheboygan R. Wat.)	"	30	Yr 2/3
New Demonstrations4			
Conservation tillage	UWEX	35	Yr 2
Long-term alfalfa rotations (1-2 yr corn)/ alfalfa stand renovation	"	20	Yr 1
Model yards[5] - Possibly for Random, Ellen, and Wallace Lakes	"	"	Yr 3/4
Documentation of water quality benefits from practice(s)[6]	DNR/LCD	35	Yr 1
Meetings			
Towns--regarding implementation process[7]	UWEX/LCD	16	Yr 1
Municipal officials, including staff[8]	DNR/UWEX	12	Yr 1
Community group programs, upon request	UWEX	8	2/Yr
Agricultural groups (possibly with Wash. Co.)	UWEX	8	2/Yr

Signs

For demonstration projects	LCD	10	Yr 1
For cooperating landowners[9] (installing practices)	LCD		Ongoing
At key watershed locations[10]	UWEX	10	Yr immediately

1 Many activities will utilize area UW-Extension staff leadership or assistance.

2 The identification and purchase of existing bulletin materials (including fact sheets, brochures, newsletters, etc.) will prevent unnecessary duplication and make use of already published expertise. conservation tillage, "sustainable agriculture", and crop rotations are several subjects for which this approach is anticipated.

3 Washington County UW-Extension radio talk shows originating from West Bend will also be used to benefit the North Branch watershed, particularly its most populous southwestern portion. These will also pertain to the East-West Branch Watershed and thus are a "basinwide" education activity.

4 Hourly estimates for new demonstrations pertain to their investigation, formal proposal, and additional groundwork--not to the more time-consuming establishment, maintenance, and use.

5 Model yards, if warranted in lake areas, would be accomplished through cooperative involvement of Washington County UW-Extension.

6 A demonstration to document water quality benefits from installing practices could either be specifically established for this purpose, or accomplished in conjunction with another demonstration which lends itself well to the intended cause and effect objective.

7 Townships in Washington and Ozaukee counties would also be reached through their respective staff. This may occur in conjunction with educational efforts for the East-West Branch and/or Milwaukee River South Watershed(s).

8 A number of urban area meetings--notably developers', builders', and municipal officials' workshops on construction erosion control and stormwater management--will be held for the Sheboygan River Priority Watershed, with appropriate North Branch parties invited.

9 Visor hats for cooperating landowners is another type of "sign" undergoing approval for the watershed project. By providing these to individuals who understand the project and have made commitments, one-on-one education through local testimonials is anticipated.

10 Signs placed at key watershed locations such as bridge crossings and public access points would be part of a basinwide plan to raise awareness of the Milwaukee River Program.

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