TABLE 14. Cropland Soil Erosion in Black Earth Creek - Vermont to Halfway Prairie Subwatershed.

Erosion Rate	Tons/year	%
> 10 tons/acre/yr.	22,651	79
7-to-10 tons/acre/yr.	494	2
4-to-7 tons/acre/yr.	2,884	10
< 4 tons/acre/yr.	2,589	9
totals	28,618	100
Erosion Rate	**Acres**	**%**
> 10 tons/acre/yr.	612	25
7-to-10 tons/acre/yr.	48	2
4-to-7 tons/acre/yr.	426	17
< 4 tons/acre/yr.	1,381	56
totals	2,467	100

Locations of these animal lots are shown on Figure 14. Generally, the pollutant loads from animal lots in this subwatershed are lower than average for this watershed. One or two lots, however, may be located in the floodplain, and be significant sources of pollutants during floods.

Winter Spread Manure (oxygen demand and nutrients). Winter spread manure was not analyzed. However, based on the erodibility of the soils and the steepness of slopes, it is likely a number of the 14 livestock operations in this subwatershed are sources of manure to the stream from winter spread sites.

TABLE 15. Animal Lot Pollutant Loads for Black Earth Creek - Vermont to Halfway Prairie Subwatershed.

Phosphorus Load Range	Operations	Lbs. *	%
> 20 lbs. phosphorus **	0	0	0
15-to-20 lbs. phosphorus	0	0	0
10-to-15 lbs. phosphorus	1	12	27
5-to-10 lbs. phosphorus	3	17	37
< 5 lbs. phosphorus	10 ***	16	36
Total	14	46	100

* Pounds for a 10-year, 24-hour storm

** Phosphorus is used as an indicator of the amount of manure reaching streams. The amount of BOD or COD is proportional to the amount of phosphorus.

*** 1 or 2 of these operations may be in the floodplain

Nonpoint Source Control Needs to meet the Water Resources Objectives

To achieve the water resources objectives identified for Black Earth Creek, the nonpoint sources identified below must be controlled. Each type of source and its control need is briefly described and discussed.

1. Cropland Management Needs:

   Erosion control is needed on an estimated 660 acres of cropland.

The cropland analysis estimated most of the tons of erosion occurs on fields with very high or high erosion rates (greater than 10-to-15 tons/acre/year and 7-to-10 tons/acre/year). These very high/high erosion rates occur on about 660 acres.

2. Stream Bank Management Needs:

Stream bank erosion due to cattle access and stream meandering need to be controlled.

Eroding stream banks add to the degradation of the fish habitat in this segment of Black Earth Creek. Cattle access needs to be controlled. Stream bank erosion caused by stream cutting should be controlled. Since the stream is very wide and shallow, little can be gained by narrowing the stream. Practices such as fencing and shaping and seeding will improve habitat. Riprap may also be needed in certain locations. No other habitat improvements are anticipated.

3. Animal Lot Management Needs:

The amount of manure from animal lot runoff needs to be reduced on 4 of the 14 operations.

Based on the simulation of runoff controls, it is estimated that a 60% reduction can be achieved by reducing the amount of phosphorus on the 8 of 14 operations with estimated amounts of 5 or more pounds. If one or both of the 2 operations possibly in the floodplain are in fact in the floodplain, additional controls will be needed on the floodplain site or sites.

4. Manure Spreading Management Needs:

Manure spreading management plans need to be prepared for the 14 livestock operations to minimize the amount of manure entering the stream.

Although the amount of manure could not be quantified and significant sites could not be identified, the very high oxygen demand levels during trout hatch periods warrants control of this type of nonpoint source.

Fishery Management and Other Resource Needs

1. Habitat Improvement Needs:

Stream bank stabilization described above should improve the fish habitat. No special habitat improvement needs have been identified.

2. Land Acquisition Needs:

Specific lands adjoining Black Earth Creek within this subwatershed need to be acquired to protect the trout waters.

Land acquisition along Black Earth Creek in this subwatershed has been an ongoing activity for many years. A number of parcels have been identified for acquisition by fee simple purchase, rent or easement. These parcels rank fifth in priority for lands within Black Earth Creek watershed.

INDIAN LAKE SUBWATERSHED - IL

Subwatershed Description

The Indian Lake Subwatershed covers the northeast portion of the Black Earth Creek Watershed. The drainage basin includes an area of 2.9 square miles. The major water resource feature in the subwatershed is Indian Lake, a small, shallow hypereutrophic lake. The lake is 67 acres in size with a maximum depth of 7.5 feet and a mean depth of 4.6 feet. The lake is usually covered with ice from late November to late February or early March. Very little drainage comes out of the lake's outlet to Halfway Prairie Creek and no defined drainage channels enter the lake; it is an isolated water resource. Ten acres of wet meadow are found adjacent to the lake. Dane County operates Indian Lake County Park on the south and east shores of the lake. The lake is an important aesthetic factor in people's recreational experience of the hiking and ski trails at the park.

The land use in this subwatershed is entirely rural. Overall the land use is:

agriculture	50%
woodlands	37%
wetlands	6%
incorporated (urban)	0%
other	6%

Other includes roads and scattered residences.

Water Resources Conditions

Indian lake is hypereutrophic. Summer secchi disc readings average less than 0.5 m. Levels of chlorophyll-a usually run over 200 ug/L and often are as high as 400 g/L. Dissolved inorganic phosphorus averages greater than 0.05 mg/L while total phosphorus is greater than 0.3 mg/L. The total N:P ratio for Indian Lake is less than 11. During the summer months, severe blue-green algal blooms occur. During the rest of the year, blooms of other species of algae occur. Zooplankton are generally not abundant. Before 1982, macrophytes were sparse. After 1982, Potamogeton pectinatus and P. crispus became abundant in water greater than 1.5 meters during May and early June. Later in the summer, the macrophytes die back and algae takes over. Supersaturation of dissolved oxygen occurs in the

summer. Fish kills occasionally occur in the winter. The fishery in the lake is characterized by bullheads, green sunfish and fathead minnows. The panfish species are often stunted and large fluctuations in the population occur. Existing recreational uses include aesthetic enjoyment, birdwatching, boating and a warmwater fishery of marginal and fluctuating quality.

An interested local citizen is monitoring dissolved oxygen levels in the lake. This individual is working with Dane County Parks to rejuvenate a fishery in Indian lake. Department fisheries and water resources staff have recommended aeration and fish stocking as potential remediation tools. Dane County Parks has funds budgeted for the project.

Potential uses are very similar to existing uses. Changes in watershed management would not be likely to change nutrient levels in the lake. Periodic stocking of fish such as bluegill or largemouth bass may enhance fishing experience. However, for stocking to be successful, it must be timed to occur after the bullhead population has been reduced (through winterkill or removal) to avoid excessive predation of the small fish.

Water Resources Objectives

The water resources objective for Indian Lake accepts the hypereutrophic condition of the lake. This condition cannot be changed. The objective is to provide technical assistance to Dane County Parks for installing an aeration system and warm water sports fishery. Department staff will continue to provide support to the lake volunteer.

Pollutants from Nonpoint Sources

Eroding Croplands (sediment and nutrients). Most of the cropland in the Indian Lake subwatershed has been retired from cropland production for 10 years through the Conservation Reserve Program. Prior to the land retirement, most of the sediment reaching Indian Lake (if it was transported through the wetland) from this subwatershed is from eroding croplands. Based on cropland soil erosion estimates prior to land retirement, Table 16 shows that about 88% is from croplands with very high erosion rates (greater than about 10 tons/acre/year) and about 4% is from croplands with high erosion

rates (greater than about 7-to-10 tons/acre/year). Table 16 also shows that these very high/high erosion cropland fields comprise about 48% of the croplands. Overall, they comprise about 24% of the area of the subwatershed.

TABLE 16. Cropland Soil Erosion in Indian Lake Subwatershed.

Erosion Rate	Tons/year	%
> 10 tons/acre/yr.	15,624	88
7-to-10 tons/acre/yr.	759	4
4-to-7 tons/acre/yr.	509	3
< 4 tons/acre/yr.	810	5
totals	17,770	100
Erosion Rate	**Acres**	**%**
> 10 tons/acre/yr.	364	40
7-to-10 tons/acre/yr.	72	8
4-to-7 tons/acre/yr.	64	7
< 4 tons/acre/yr.	416	45
totals	916	100

Animal Lots (oxygen demand and nutrients). Manure from animal lots and winter spread fields is a source of nutrients to Indian Lake. Table 17 shows the number of animal lots and pollutant loads by range of phosphorus load.

Winter Spread Manure (oxygen demand and nutrients). Winter spread manure was not analyzed. However, based on the erodibility of the soils and the steepness of slopes, it is likely a number of the 3 livestock operations in this subwatershed are sources of manure to the stream from winter spread sites.

TABLE 17. Animal Lot Pollutant Loads for Indian Lake Subwatershed.

Phosphorus Load Range	Operations	Lbs.*	%
> 20 lbs. phosphorus **	0	0	0
15-to-20 lbs. phosphorus	0	0	0
10-to-15 lbs. phosphorus	2	25	84
5-to-10 lbs. phosphorus	0	0	0
< 5 lbs. phosphorus	1	5	16
Total	3	30	100

* Pounds for a 10-year, 24-hour storm

** Phosphorus is used as an indicator of the amount of manure reaching streams. The amount of BOD or COD is proportional to the amount of phosphorus.

Nonpoint Source Control Needs to meet the Water Resources Objectives

Since it is unlikely Indian Lake will improve, no water resources objectives were identified. Cropland management is being achieved through other programs. Therefore, no specific nonpoint source control needs are identified.

Fishery Management and Other Resource Needs

None identified.

HALFWAY PRAIRIE CREEK SUBWATERSHED - HC

Subwatershed Description

The Halfway Prairie Creek subwatershed is in the north central portion of the Black Earth Creek Watershed. The Indian Lake subwatershed is upstream of this subwatershed; the Village of Mazomanie is downstream. This subwatershed covers a 13.2 square mile area.

Land use in the subwatershed is virtually 100% rural. Overall, the land use is:

agriculture	62%
woodlands	28%
wetlands	2%
incorporated (urban)	0%
other	8%

Other includes roads and scattered residences and commercial buildings.

Water Resources Conditions

Halfway Prairie Creek (Master waterbody ID # 1248800) is 11 miles long and has not been formally classified.(12) Trout exist in this stream, but are usually not found. Most of the stream has been ditched and the stream often have very little buffer from cornfields. Water quality as indicated by Hilsenhoff Biotic Index varies from fair to very good, but is very poor upstream of Marxville.(17) Stream temperatures between Marxville and CTH F are good (13-15°C) but instream habitat is poor. This portion could probably support trout with habitat and nonpoint source control work.(7)

Water Resources Objectives

Halfway Prairie Creek may have the potential to support a trout fishery downstream from Marxville. Currently, it supports a forage fishery with seasonal trout visitors.

To accomplish this objective:

- the springs below Marxville which give the stream trout potential should be protected and
- sediment and oxygen demand loading from this subwatershed must be reduced by 50%.

Pollutants from Nonpoint Sources

Eroding Croplands (sediment and nutrients). Greater than 90% of the sediment reaching Halfway Prairie Creek from this subwatershed is from eroding croplands. Based on cropland soil erosion estimates, Table 18 shows that about 88% is from croplands with very high erosion rates (greater than about 10 tons/acre/year) and about 3% is from croplands with high erosion rates (greater than about 7-to-10 tons/acre/year). Table 18 also shows that these very high/high erosion cropland fields comprise about 41% of the croplands. Locations of these critical croplands are shown on Figure 15. Overall, they comprise about 25% of the area of the subwatershed.

Eroding and Trampled Stream Banks (sediment and direct habitat impairment).

Stream bank erosion occurs in scattered locations along Halfway Prairie Creek. Although not the major source, stream bank erosion adds to the sedimentation problems in Halfway Prairie Creek.

Animal Lots (oxygen demand and nutrients). Manure from animal lots and winter spread fields are the most probable source of oxygen demanding substances. Table 19 shows the number of animal lots and pollutant loads by range of phosphorus load. Locations of these animal lots are shown on Figure 15. In addition, 2 animal lots may be in the floodplain.

TABLE 18. Cropland Soil Erosion in Halfway Prairie Creek Subwatershed.

Erosion Rate	Tons/year	%
> 10 tons/acre/yr.	63,184	88
7-to-10 tons/acre/yr.	2,050	3
4-to-7 tons/acre/yr.	1,945	3
< 4 tons/acre/yr.	4,233	6
totals	71,412	100
Erosion Rate	**Acres**	**%**
> 10 tons/acre/yr.	1,937	37
7-to-10 tons/acre/yr.	221	4
4-to-7 tons/acre/yr.	337	6
< 4 tons/acre/yr.	2,467	56
totals	8,474	100

Winter Spread Manure (oxygen demand and nutrients). Winter spread manure was not analyzed. However, based on the erodibility of the soils and the steepness of slopes, it is likely a number of the 28 livestock operations in this subwatershed are sources of manure to the stream from winter spread sites.

TABLE 19. Animal Lot Pollutant Loads for Halfway Prairie Creek Subwatershed.

Phosphorus Load Range	Operations	Lbs.*	%
> 20 lbs. phosphorus **	1	25	15
15-to-20 lbs. phosphorus	1	20	12
10-to-15 lbs. phosphorus	2	25	15
5-to-10 lbs. phosphorus	8 ***	58	35
< 5 lbs. phosphorus	16 ***	37	22
Total	28	165	100

* Pounds for a 10-year, 24-hour storm

** Phosphorus is used as an indicator of the amount of manure reaching streams. The amount of BOD or COD is proportional to the amount of phosphorus.

*** Includes an animal lot in the floodplain.

Nonpoint Source Control Needs to meet the Water Resources Objectives

To achieve the water resources objectives identified for Halfway Prairie Creek, the nonpoint sources identified below must be controlled. Each type of source and its need is briefly described and discussed.

1. Cropland Management Needs:

   Erosion needs to be controlled on an estimated 2158 acres of cropland.

The cropland analysis estimated most of the tons of erosion occurs on fields with very high or high erosion rates (greater than 10-to-15 tons/acre/year and 7-to-10 tons/acre/year). These