CHILTON MILLPOND LAKE PLANNING GRANT:

CHILTON MILLPOND WATERSHED,

A PLAN FOR THE FUTURE

Project Number LPL-683-00

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INTRODUCTION

The Chilton Millpond, also known as Lake Chilton, is an impoundment on the South Branch of the Manitowoc River. It was created when a dam was constructed to generate power for a gristmill.

According to the Wisconsin Department of Natural Resources (DNR), the Millpond has a surface area of approximately 10 acres, a maximum depth of 7 feet, and a mean depth of 3 feet. The current depths are likely shallower due to sediment accumulations since the measurements were taken.

The Millpond is located within the City of Chilton and is surrounded by homes, businesses, and a city park. Lawns and green space are adjacent to most of the shoreline. A portion of the Chilton storm sewer system outlets directly into the Millpond.

The headwaters of the South Branch of the Manitowoc River are south of the Millpond, in Fond du Lac County. The land area that drains to this upstream portion of the South Branch of the Manitowoc River and directly to the Millpond is the Millpond watershed. The watershed includes about 28,901 acres in Calumet County. The Millpond watershed within Calumet County is also the boundary area of this Lake Planning Grant Project.

Land use in the watershed, outside of the City of Chilton, is predominantly agricultural. Cash cropping and dairying are the primary types of agriculture.

HISTORY AND BACKGROUND

Recreational Uses and Water Quality

Decades ago, the Chilton Millpond was used for all forms of recreation, including boating, swimming, and fishing. By the 1970's, these recreational uses had noticeably declined. The overall depth of the Millpond was reduced by five feet due to sedimentation. The water was brown due to suspended soil particles. Algae blooms and abundant growth of duckweed and other aquatic plants occurred during most summers. As a fishery, the Millpond supported mostly rough fish.

According to Steve Hogler, DNR Fisheries Biologist, there was an ongoing effort to create, manage, and maintain a warm water fishery in the Chilton Millpond for the past 40 years. Activities have included the formation of a lake district, lake and river studies, fishery surveys, fish stocking and habitat enhancement projects, chemical controls, dredging, and the installation of nonpoint pollution practices upstream.

These efforts have not produced the desired results of restoring the fishery or quality recreational uses of the Millpond. Sediment has reduced water depths again. Algae

blooms occur in most summers, duckweed grows in abundance, and aquatic plants choke the shallows. Rough fish are still the predominant fish species.

Lake District

The Chilton Millpond Lake District was formed in 1978. Part of the reason for its formation was to qualify for financial assistance to dredge the Millpond. A Calumet County Board resolution listed these additional reasons for its formation:

1. To define present and anticipated problems of the Millpond.
2. To identify the causes of the problems and implement measures to deal with them.
3. To undertake activities, such as protection of the fishery, maintenance of lake levels, control of weeds, and reduction of sediment.

The City of Chilton municipal boundaries were designated as the Lake District boundaries. Members of the City Council were appointed as its Board of Commissioners.

Since its formation, the District has been active in supporting and seeking funding for efforts to improve the condition of the Millpond. Its latest effort was to provide local match funding for this Lake Planning Grant Project.

Previous Lake Study

In 1993, a DNR Lake Planning Grant was awarded to the Lake District to collect water quality data on the Millpond. A major goal of the grant project was to use the data in deciding whether to continue efforts to establish a warm water fishery, or to defer those efforts to a later time. A secondary goal was to look for relationships between land use upstream of the Millpond and the water quality conditions in the Millpond. A private consulting firm, Aquatic Resources, completed the project.

Phosphorus levels were measured during March through September in 1993. High levels of phosphorus were found throughout this period. High levels of phosphorus can raise the fertility level of the water and cause excessive growth of algae and other aquatic plants. Levels found in the Millpond were high enough to produce massive algae blooms.

Further water testing indicated that very low levels of oxygen prevailed in the Millpond during the summer. Decomposing algae was the cause. As algae dies and decomposes, it uses up the oxygen in the water. Large amounts of decomposing algae were found in the water of the Millpond.

Measurement of light penetration depths revealed that very little sunlight reached the Millpond bottom. Penetration depths were limited to three feet in the summer by suspended soil particles and algae. The consultants concluded that the limited light prevented the growth of aquatic plants. These plants provide food and cover for fish and

their prey. The algae and soil particles also limited the vision of fish and made it difficult for them to find food. In addition, the suspended particles clogged their gills.

A profile map of sediment depths on the bottom of the Millpond was developed to assess sediment accumulations since a 1978 dredging. From the map, it was estimated that 65,625 cubic yards of sediment had accumulated in 15 years.

The consultants looked at the soils and land uses upstream from the Millpond for sources of nutrients and sediment. They noted that clay soils were prevalent throughout the upstream area. Soil erosion, from clean tilled fields, detached clay particles from the soil surface and runoff carried them into the South Branch of the Manitowoc River. Because the clay particles were very small, they remained in suspension and were carried by the River into the Millpond.

The consultants surmised that runoff from cropland and barnyards carried manure and fertilizers into the River. Manure and fertilizers contain high levels of phosphorus, nitrogen, and other nutrients. Concentrating downstream in the Millpond, these nutrients caused high fertility levels.

In their report the consultants noted that "It is the combination of soil types and cropping practices that contribute to the water quality problems of the Chilton Millpond. Land use management practices that limit exposed soil need to be used."

They also recommended that the South Branch Manitowoc River watershed be immediately considered for the Wisconsin Priority Watershed Nonpoint Pollution Source Program. The purpose of this Program was to provide cost sharing to landowners for conservation practices. As a result, the Calumet County Land & Water Conservation Department prepared an application for the DNR Program. However, the Program was terminated before submittal of the application.

Stream Classification

Tim Rasman, DNR Biologist, completed a stream classification project on the South Branch of the Manitowoc River in 1999. The classification was made in the Village of Johnsburg, upstream from the Millpond and in Fond du Lac County. Rasman determined that the biotic index of the River was 7.3, indicating fairly poor water quality with significant organic pollution. In his report, Rasman noted that the River is "very negatively impacted by agriculture and channeling". From additional observations made in Calumet County, he also noted that "the stream is ditched in many places with agricultural runoff having a major influence on the physical, biological, and chemical nature of the stream".

Fish Surveys and Stocking

Steve Hogler, DNR Fisheries Biologist, summarized the history of fish surveys on the Millpond in a 1999 letter to UW-Extension. In his summary, Hogler noted that a 1963

survey found that carp dominated the fishery and that the water was turbid. There was a history of winterkill prior to the survey. Subsequent surveys in 1980, 1983, 1989, and 1991 indicated that carp and bullhead were the dominant species and very few pan fish or game fish were present. Poor water quality and lack of habitat structure were listed as contributing causes. The last fish survey was conducted in 1993, as part of the previous Lake Planning Grant. The survey showed that the Millpond had an unbalanced fishery, with mostly rough fish present.

According to Hogler, DNR had stocked thousands of fish over the years. Northern pike, largemouth bass, bluegill, and yellow perch were stocked on numerous times in 1972 through 1974 and 1979 through 1988. Fish cribs were installed in 1986.

Hogler concluded that stocking program had limited success in establishing a warm water fishery in the Millpond. He surmised that "It is likely that low flow and poor water quality on the South Branch of the Manitowoc River has a major impact on the fishery of the Millpond. To improve the water quality of the lake and fishery, upstream sources of nutrients must be controlled. Other management options would be ineffective over the long-term in establishing a fishery."

Chemical Controls

Chemical control of aquatic plants was attempted in the 1960's and early 1970's. There were no long lasting positive results from these attempts.

Dredging

Dredging of the Millpond began in 1977 and was completed in 1978. Approximately 65,000 cubic yards of accumulated sediment were removed. The depth of the Millpond was restored by four to five feet. The intent of the dredging was to reduce aquatic plant growth. It was believed at the time that the removal of the sediment would also remove the soil and nutrients that the plants depended on. Restoration of depth would limit sunlight penetration that the plants needed and reduce their growth. A deeper millpond would improve oxygen levels and reduce shallow areas which froze solid in winter.

Consultants completing the 1993 Lake Planning Grant Study found that some of these objectives were reached, but with unintended results. They concluded that the dredging made the problem worse because the deeper depths allowed no sunlight penetration to the bottom. Plants could not grow in the deeper portions of the Millpond. Fish and their prey depended on the plants for oxygen, food, and cover.

Installation of Nonpoint Pollution Control Practices

Nonpoint pollution control practices are conservation practices used to reduce the amount of nutrients, soil, and pollutants that runoff the land and into surface waters. Reduced tillage, barnyard runoff control systems, animal waste storage facilities, and nutrient management are some of the practices used by agriculture. Many of these practices are

already in place in the Millpond watershed. A later section in this report provides an inventory of some of them.

SCOPE AND ACTIVITES OF THIS GRANT PROJECT

Grant Scope

From the previous studies and restoration attempts, it was evident that erosion and runoff from agricultural lands were degrading water quality in the Chilton Millpond. It was suspected that urban runoff from the City of Chilton was also a major factor. Conservation practices and land use management changes would need to be adopted to improve water quality. However, there was no inventory of what practices were needed, where they were needed, or a cost estimate for installing them.

In 2000, the Calumet County Land & Water Conservation Department (LWCD) and the Chilton Millpond Lake District applied for a Lake Planning Grant to complete such an inventory. The scope of the project proposal was to concentrate efforts on potential nonpoint pollution sources within a critical 1,000 foot zone adjacent to the South Branch of the Manitowoc River and its tributaries. The inventory was to be limited to Calumet County and to consist of the following elements:

- Narratives describing nonpoint pollution source concerns.
- Photos and maps documenting those concerns.
- Suggested best management practices (BMP's) to address the concerns.
- Cost estimates for installation of needed conservation practices.
- Amount of estimated pollution reduction (if determinable).

The completed inventory and data were to be compiled using a Geographical Information System (GIS). GIS is a computerized mapping system in which features on the land can be located and mapped on aerial photography. Using the computer program ARCVIEW, features can be mapped by type on separate layers. The layers and features can then be brought together in various combinations on one map for analysis and quantification.

Seasonal trends of water quality in the Millpond were to be measured by water sampling and testing at five separate times suggested by the DNR. A watershed management plan was to be developed to address the identified problems and needs.

A grant amount of $10,000 was requested. Calumet County LWCD and the Chilton Millpond Lake District were to provide $1,666.67 each in matching funds or in-kind services.

The proposal was accepted and the Grant was awarded in April 2000. Grant activities were to be completed by December 31, 2002 and the final report by June 30, 2003.

Grant Activities

A student intern was hired in the summer of 2000 to work on the grant project. LWCD staff provided assistance. Since the Calumet County GIS and ARCVIEW were not yet available, the initial inventory work was completed using paper maps and drawing markers. The intern completed the following activities:

1. Development of a base map for the inventory.
2. Identification of all landowners and residents within the Millpond watershed and 1000 foot critical zone and creation of mailing lists.
3. Introduction of the project by mail and media to watershed landowners and residents.
4. Initial identification of vegetative buffer needs along the River and its tributaries.
5. A survey of City of Chilton residents on lawn fertilizer application practices.
6. Distribution of brochures and pamphlets on water quality protection to City residents.
7. Location of livestock operations and manure storage facilities within the critical 1,000 foot zone.
8. A Survey of 15 farm operators within the critical zone on their use of conservation practices.
9. Onsite investigations of 15 livestock operations within the critical zone for potential manure runoff.
10. Identification of potential grassed waterway needs.
11. Hand drawn maps of identified conservation practice needs.

In 2002, GIS and ARCVIEW were available to complete the inventory and map work. A decision was made to update and expand the inventory to include the entire Millpond watershed. A new project map was created with the DNR GIS hydrology layer for surface waters.

Cropping and tillage practices within the Millpond watershed were surveyed in the spring of 2002. A roadside transect method was used. Land slope and soils information was also collected. The resulting data was used to estimate predominant crop types and tillage practices, soil erosion rates, and sediment yields within the watershed.

Water samples were taken from the Millpond on five separate dates in 2001 and 2002. Samples were sent to the State Hygiene Laboratory for water quality testing. Water clarity and temperature were measured when sampling.

As part of this report, all of the 2002 inventory results were correlated with and added to those completed in 2000. Conservation practice needs were quantified when sufficient data existed. Practice installation costs were estimated for practice needs that could be quantified. A literature review of past studies, letters, and publications related to the Millpond was conducted and summarized by LWCD staff as a final activity. A summary of the review is presented in the preliminary sections of this report.

All final project maps in this report were created with GIS and ARVIEW 8.3. The DNR hydrology layer was used to locate and identify all surface water features.

A master color map showing all existing conservation practices and practice needs identified in the grant project was developed. Although it was not published as part of this report, copies were delivered to the DNR Lake Grant Coordinator and Chilton Millpond Lake District. A copy of the map is available for viewing at the Calumet County Land & Water Conservation Department in the Calumet County Courthouse.

INVENTORY AND WATER QUALITY TESTING RESULTS

PROJECT MAPS

Smaller black and white maps were created for this report and are located in the Map Appendix at the end of it. See **Map 1** in the Map Appendix for a project boundary map with locations of surface water channels and the 1,000 foot critical zones. On **Map 1** and all other maps in this report, the DNR surface water categories were used in the inventory process. The South Branch of the Manitowoc River and main tributaries that that flow year round were labeled as streams on the maps. Drainage ditches, seasonally flowing tributaries, and large waterways were labeled ditches and drainageways. Any gaps between streams, ditches, and drainageways on the maps are wetland areas with no well-defined channels. The land area around these wetlands was not considered as part of the 1,000 foot critical zone in the inventory.

It should be noted that a seasonally flowing drainageway on the extreme western boundary of the watershed was not included on the maps nor was it considered for the 1,000 foot critical zone. This drainageway was not deemed to be a significant source of sediment and nutrients to the Millpond. It only flows seasonally and has no defined channel in many areas due to wetlands. It empties into a large wetland adjacent to the South Branch of the Manitowoc River in Fond du Lac County.

WATER QUALITY TESTING RESULTS

To provide a water quality baseline and show seasonal trends, water samples were drawn from the Millpond on five separate dates during a one year period. Samples were taken at a three foot depth in the summer (July 2001, August 2001, July 2002), winter with ice on (February 2002), and spring with ice off (April 2002). Samples were sent to the State Lab of Hygiene for analysis.

Samples from all dates were tested for total phosphorus and dissolved phosphorus. All but one sample were tested for chlorophyll A. The April 2002 sample was also tested for total calcium, total alkalinity, conductivity, pH, total iron, total magnesium, total recoverable manganese, nitrate + nitrite, total Kjeldahl nitrogen, total recoverable potassium, and total recoverable sodium.

At each sampling event, air and water temperature, and depth of light penetration were measured. Light penetration was measured through the use of a secchi disk lowered into the water.

See **Table 1** below for water testing results and sampling data.

Table 1

CHILTON MILLPOND WATER SAMPLING
AND TESTING DATA

SAMPLING DATE

TEST NAME,	7/18/01	8/16/01	2/18/02	4/10/02	7/1/02
CHLOROPHYLL (ug/l)	13	22		3	9.26
TOTAL PHOSPHORUS (mg/l)	0.277	0.32	0.149	0.07	0.405
DISSOLVED PHOSPHORUS mg/l)	0.166	0.098	0.081	0.026	0.269
TOTAL CALCIUM (mg/l)				58.9	
TOTAL ALKALINITY (mg/l)				222	
CONDUCTIVITY (umhos/cm)				607	
PH				8.1	
TOTAL IRON (mg/l)				0.1	
TOTAL MAGNESIUM (mg/l)				34.2	
TOTAL MANGANESE ICP (ug/l)				44	
AMMONIA NITROGEN (mg/l)				0.019	
NITRATE + NITRITE NITROGEN (mg/l)				1.71	
TOTAL KJELDAHL NITROGEN (mg/l)				1.03	
TOTAL POTASSIUM (mg/l)				4	
TOTAL SODIUM (mg/l)				13.7	
SECCHI DISK DEPTH (FEET)	3.3	2.5	4.9	6.3	2.8
WATER TEMPERATURE (CENTIGRADE)	22.8	18.3	7.3	2.3 ?	22.8

All water testing results in the preceding **Table 1** are reported in milligrams (one thousandth of a gram) per liter of water except for chlorophyll, manganese, conductivity, and pH. Chlorophyll and manganese are reported as micrograms (one millionth of a gram) per liter of water. Conductivity is reported as micro-mhos per centimeter and pH as pH units. Water clarity and temperature observations made on sampling dates are in feet and degrees Fahrenheit, respectively.

Chlorophyll is contained in all plants and is necessary to them for food production and growth. It also gives plants, including algae, their green color. The chlorophyll results are an indication of the amount of algae that is contained in the water. The Millpond test results ranged from 3 micrograms per liter in April 2002 (just after ice-out) to 22 micrograms per liter in August, 2001. Chlorophyll levels normally increase as water

temperatures and fertility levels increase. Results higher than 15 indicate that a water body is eutrophic.

These results indicate that the Millpond is eutrophic. Eutrophic water bodies are high in nutrients, frequently weedy, and subject to algae blooms. Shallow waterbodies, like the Millpond, are vulnerable to fish winterkills because the decomposing algae deplete most of the oxygen. Rough fish species predominate in such situations.

According to the DNR publication, "Understanding Lake Data", phosphorus is the most common key nutrient in Wisconsin waterbodies affecting the degree of algae and aquatic plant growth. High levels of this nutrient cause algae blooms and excessive plant growth. Phosphorus is found in human and animal waste and fertilizers. Sources of phosphorus are related to land use activities and include soil erosion, leaking effluent from septic systems, and surface runoff from lawns, cropland, and areas where livestock are concentrated.

Total phosphorus includes the phosphorus dissolved in the water and the phosphorus contained in plant and animal waste fragments suspended in the water. Results from the Millpond ranged from .07 to .405 milligrams per liter. According to the DNR water specialists, levels above .03 milligrams per liter promote nuisance algae blooms in shallow impoundments like the Millpond.

Dissolved phosphorus is the phosphorus dissolved in the water. It is immediately available for algae and plant use. Test results from the Millpond were .026 milligrams per liter in April 2002. According to the DNR, levels should be less than .01 milligrams per liter in the spring to prevent summer algae blooms.

Total calcium, total magnesium, manganese, and alkalinity are indicators of the hardness of water. They also reflect the geology of the area. Increasing alkalinity is often related to increased algae production. The alkalinity level of the Millpond was 222 milligrams per liter. Water with levels greater than 120 milligrams per liter is considered hard water. The levels of total calcium and magnesium in Millpond water, 58.9 milligrams per liter and 34.2 milligrams per liter respectively, indicate that the hardness is coming from calcium and magnesium. These levels are expected since surface and groundwater pass over and through bedrock and soils that are high in calcium and magnesium, as they flow toward the Millpond.

The pH level, a measure of acidity, is also determined by the alkalinity. Highly alkaline waterbodies usually have a pH above 7. The Millpond pH was 8.1, indicating high alkalinity.

Manganese is a heavy metal. Possible sources of manganese include industrial activities. The test results of 44 micrograms per liter are relatively low. The results were expected since there are few industrial activities upstream of the Millpond.

Total iron (Fe) is an indicator of the geology of the region and the rock and soils that the water has passed over or through. The low level of .01 milligrams per liter indicates that bedrock and soils in the upstream region are low in iron.

Nitrogen is another key element needed for plant growth. It is contained in all living matter, decomposing organic matter, animal and human wastes, and fertilizers. High nitrogen levels can cause algae blooms and excessive aquatic plant growth.

Nitrogen in water exists in more than one form, so different tests are needed for the different forms. Ammonia (NH3) is an inorganic (mineral) form and has a separate test. Nitrate (NO3) and nitrite (NO2) are also inorganic forms and often occur together, so are tested for together. Total Kjeldahl nitrogen is a combination of organic (living matter) nitrogen and inorganic ammonium (NH4). Nitrogen is converted from an organic form to the inorganic forms as the matter decomposes.

Inorganic nitrogen can be used directly by aquatic plants and animals. Levels of inorganic nitrogen over 0.3 milligrams per liter can support summer algae blooms. The test results of inorganic nitrate and nitrites in the Millpond was 1.71 milligrams per liter. These results significantly exceed the level for algae blooms.

Potassium is an element contained in all living matter. It is also a component of many fertilizers and is found in large quantities in animal waste. Natural levels in soil and water are usually low. Elevated levels indicate that land use activities are affecting the water body due to runoff. The test results for total potassium were relatively low at 4 milligrams per liter. These lower results do not correspond with the relatively high levels of phosphorus and nitrogen found in the testing.

Natural sodium levels in soil and water are also normally low. Elevated levels indicate that land use activities are affecting the water body. Sources of sodium include fertilizers, road salt, and animal and human waste that have run off the land. The 13.7 milligrams per liter found in the Millpond are somewhat elevated. Possible sources include manure and fertilizer runoff from cropland and road salt runoff from the streets in Chilton.

Secchi disk readings are an indicator of water clarity. Clarity is dependent on the amount of sediment and algae suspended in the water. It varies throughout the season as algae populations and sediment increase and decrease. Readings are taken by lowering a black and white disk into the water and noting the depth at which the disk disappears.

Disk readings in the Millpond varied from 2.5 in the summer of 2001 to 6.3 feet in the spring of 2002. Readings less than 7 feet are considered fair, less than 5 feet poor, and less than 3 feet very poor. The Millpond readings never exceeded the fair category. As noted earlier, water clarity is important so that bottom rooted aquatic plants receive sunlight to grow. It is also important for fish to find their food.

URBAN RUNOFF

Because the City of Chilton surrounds the Millpond, urban land use activities impact its water quality. Runoff from stormwater and snowmelt picks up pollutants from lawns, driveways, streets, and parking lots. These pollutants may include lawn fertilizers and herbicides, pet wastes, tire rubber, oil, antifreeze, and gasoline. Runoff can carry these substances directly into the Millpond or into the storm sewer system. The Chilton storm sewer system has at least 8 outlets that empty into the Millpond and just upstream of it.

Chilton Storm Sewer System

In order to determine the area of the City draining to and impacting the Millpond, a storm sewer map was acquired from the City of Chilton. Using this and other maps, the drainage boundaries were delineated. City parcel and address maps were used to develop a mailing list of city residents within these boundaries.

In 2002, the storm sewer maps within the City drainage boundaries were transferred to the County GIS. See **Map 2** in the Map Appendix for the storm sewer map and storm sewer outlets. Analysis of these maps indicated that 1.7 miles of city storm sewer outlet in 8 locations into the Millpond or just upstream of it.

Survey of Lawn Fertilizer Applications

Previous studies and water testing results have indicated that high phosphorus and nitrogen levels impact the Millpond water quality. Lawn fertilizers contain phosphorus and nitrogen. Runoff from lawns in the City of Chilton can carry the fertilizers into the Millpond. Unnecessary or excess fertilizer applications increase the chances that phosphorus and nitrogen will runoff. Soil testing prior to application can ensure that fertilizers are applied only when needed. Matching application rates with soil test results, plant needs, and the labeled nutrient content of fertilizers ensure that excess fertilizers are not applied.

A survey form was developed by the LWCD to learn more about fertilizer applications in the City of Chilton and the knowledge level of those residents making them. The survey was mailed to City of Chilton residents in June of 2000. Only residents living in the City drainage boundaries of the Millpond were mailed the survey. One hundred ninety four surveys were mailed. Ninety surveys were returned, indicating a 46 % response rate. The following questions were asked on the survey, with the responses and number of responses indicated underneath each question.

1. Do you apply commercial fertilizers to your lawn?

   Yes 50 No 40

2. Are they applied by a professional company, or do you do it yourself?

Professional company 16 Yourself 34

3. If known, what is the N-P-K rating of the fertilizer applied?

   All respondents
   Known N-P-K 18 Unknown N-P-K 32

   Professional company
   Known N-P-K 2 Unknown N-P-K 14

   Self-applied
   Known N-P-K 16 Unknown N-P-K 18

4. What time of the year is the fertilizer applied? Spring, summer, Fall

   Spring 30 Summer - 7 Fall – 28

   (Very few responses were given by those who hired a commercial applicator)

   Multiple applications response

   1 season 19 2 seasons 13 3 seasons 6

5. Have you had your soil sampled to find the proper application rate?

   Yes 7 No 42

Residents were also asked to fill in their name and address if they would like more information on lawn care fertilizers. Seventeen respondents listed their address for more information.

Fifty five percent of the survey respondents applied fertilizers on their lawns. Sixty eight percent of those who applied fertilizers to their lawns, self-applied them. The majority of those who self-applied fertilizers knew how to read the container label to determine the N-P-K (nitrogen-phosphorus-potassium) content. Whether the respondents knew what the label meant or how to determine proper nutrient application rates by fertilizer weight or volume was not addressed by the survey. Few of the respondents who had their fertilizers commercially applied, knew the nutrient content.

Most of the respondents who hired professional applicators did not indicate the season of application. Of those who self-applied, most of them applied fertilizers in the fall and/or spring. About one half of them made applications in more than one season. Only 14 % of all respondents tested their soils to determine fertilizer application rates.

The above results indicate that most of the respondents did not follow any fertilizer application management practices to reduce potential runoff of excess nutrients. Those who had fertilizer commercially applied either did not know when it was applied and its nutrient content, or they did not remember it. It is likely that lawn fertilizers add to the high phosphorus and nitrogen levels in the Millpond.

There is a need to educate city and rural residents on proper application methods including soil testing to determine fertilizer needs, the interpretation of labels and nutrient content of fertilizers to determine application rates, and best time of season for application to promote grass utilization of the added nutrients.

There is also a need to educate city residents on best management practices to reduce or eliminate the runoff of other potential contaminants into the Millpond. These contaminants include yard and pet wastes, household chemicals, soaps, and lawn herbicides.

AGRICULTURAL RUNOFF

Soil Erosion and Sediment From Cropland

Soil erosion from cropland is a major source of sediment to the Millpond. As indicated earlier in this report, suspended soil particles cloud the Millpond water and accumulate as sediment on the bottom of it. Soil erosion is accelerated when the soil surface is left bare. Raindrops striking the bare surface detach soil particles from the surface and runoff carries them downhill. If surface water is nearby, runoff carries the particles into it.

Land planted to annual crops, like corn and soybeans, is often tilled each year. Tillage buries crop residue, exposing the soil surface to erosion. Moldboard plowing, also called clean tillage, turns under most of the crop residue and leaves the soil surface bare. Minimum tillage and no till leave residue on the soil surface, protecting it from erosion. As residue levels increase, protection from erosion and runoff also increases.

In June 2002, the LWCD completed a roadside transect survey of cropland in Calumet County. The purpose of the survey was to determine cropping and tillage practices within the County and to estimate potential soil erosion rates. The survey was conducted by driving on a representative route through the County and stopping at designated points. Observations were made at each point on the type of crop (annual or hay), previous crop, type of tillage (clean, minimum, or no till), and the amount of crop residue (% cover) left on the surface. Slopes and soil types were determined for each point. The results of the survey were analyzed on a County and individual watershed basis. The Millpond watershed was included in the survey.

It should be noted that the survey data was collected and analyzed for the entire watershed area of the South Branch Manitowoc River in Calumet County, and not just the Millpond watershed. The Millpond watershed consists of only about 1/3 of the area

of the entire South Branch of the Manitowoc River watershed. However, tillage and cropping trends are likely similar in both of these areas.

The survey indicated that in 2002, approximately 66% of cropped fields in the entire watershed were planted to annual crops. The remaining fields were planted to hay or permanent vegetation. Fields in hay or permanent vegetation have continuous cover and slight potentials for erosion.

It also indicated that 58% of planted fields in the entire watershed were clean tilled. About 10 % of the fields had some residue left on the soil surface, but less than the amount required for optimal erosion control. Only 4 % of planted fields had sufficient amounts of residue for optimum erosion control.

Potential soil calculated at each point using the Universal Soil Loss Equation (USLE). From the data, it was determined that 31 % of all cropland in the entire watershed of the South Branch Manitowoc River had erosion rates in excess of tolerable soil loss levels (T levels). The County average was 21% of all cropland. This watershed, which includes the Millpond watershed, had the highest percentage of cropland with excessive soil erosion rates of all watersheds in the County.

From the soil erosion data, it was estimated that 230,041 tons of soil per year eroded from fields in the South Branch of the Manitowoc River watershed in a single year. This is 63% of the Calumet County total of 362,472 tons per year and 79,038 tons in excess of tolerable soil loss levels. The land area draining to the Millpond is approximately 1/3 of the Manitowoc River watershed area. If the erosion rates in the Millpond watershed are similar to those of the entire watershed, approximately 76,680 tons of soil per year erode from fields in the Millpond watershed. About 26,346 tons of this total is due to soil erosion in excess of tolerable soil loss levels.

Much of this eroded soil may settle out from the runoff, before it reaches the South Branch of the Manitowoc River and, eventually the Millpond. However a significant portion of it does as was substantiated by the amount of sediment that was dredged 1978. It is evident that soil erosion from cropland is a major source of sediment to the Millpond. It is also evident that erosion rates in this watershed are higher than in the rest of the County.

As alluded to earlier, leaving crop residue on the soil surface reduces erosion. More use of minimum tillage and no till when planting annual crops would contribute greatly to reducing soil loss rates. The cost of implementing minimum till and no till could be calculated if the number of cropland acres in the Millpond watershed were known. Future development of a land use layer and incorporation of an erosion modeling program in the County GIS would make this possible.

A very rough estimate of maximum cost can be made by assuming that 2/3 of the land in the Millpond watershed is in cropland. The County GIS indicates that there are about

28,901 acres of land area in Calumet County portion of the watershed. Two thirds of this area is 19,267 acres of cropland.

According to the tillage survey, 68 % of all cropped fields in the watershed were clean tilled or did not have enough residue for optimal erosion control. This equals about 13,102 acres of cropland in the watershed. The cost of changing from clean tillage to minimum till or no till varies, but may be estimated to be $27 per acre for one crop year. To bring about this change on all of the above acres would cost $353,754 for 1 crop year.

Because tillage costs vary, cost sharing is often provided to farmers at a set rate per acre for a number of years. More than 1 year of cost sharing is provided because it may take longer to successfully implement all of the needed changes. The maximum cost share rate set by the Wisconsin DNR in 2003 is $18.50 per acre for up to 4 years. Using this rate for a 4-year period on 13,102 acres would require $969,548.

Realistically, not all farmers would change their tillage systems and not all of the cropland would need the changes. If minimum till or no till was adopted on 50% of the above acres, about $485,000 would be needed for cost sharing.

Currently, there are no governmental funds available in these amounts to implement such changes. In addition, land owners and users must be willing to make such changes. A long-term educational program on the economic and resource benefits of reduced tillage and no till will be needed to convince many of them to change. Equipment demonstrations and field trial plots should be included as part of the program.

Another method to reduce overall erosion rates is to include hay in a cropping rotation and to grow fewer years of annual crops. With the recent trend in dairy farming to substitute corn silage for hay in animal feed and the decline in dairy farm numbers, it is unlikely that annual crops will be replaced with more hay.

Gully Erosion

Gully erosion can occur in the natural drainageways of the land, where surface runoff concentrates. If these drainageways are not left in grassy vegetation, they are prone to severe gully erosion. Shaping these channels to handle runoff volumes and establishing permanent grassy vegetation in them will usually control this erosion. This conservation practice is called a grassed waterway.

Aerial photography and field observations indicated that gully erosion is not a large problem in the Millpond watershed. Grassed waterways have been installed in most of the drainageways that needed them.

Livestock and Streambank Erosion

Unlimited access of livestock to streams and adjacent banks can cause severe erosion problems. Feeding on vegetation along the stream, livestock can reduce or destroy the

vegetative cover. Trampling by their hooves can leave soils bare and susceptible to erosion. An associated problem is the animal wastes that are deposited into or near the stream.

Fencing livestock out of these areas will prevent these problems. Only three areas of seasonal livestock access to surface waters draining to the Millpond were identified by the inventory. Neither area had severe erosion problems. An estimated 1,000 feet of fence would address these problem areas. At a cost of $2.50 per foot, the fencing would cost $2,500. The typical cost sharing rate is 70% and $1,750 would be needed to cost share fencing at three of these sites.

Vegetative Buffers Along Streams, Drainageways, and Ditches

In many cases, fields adjacent to streams, drainageways, and ditches are tilled and cropped as close as possible to the bank or water's edge. This is partially due to agricultural economics, which induces producers to use all land suitable for crops. Land out of production does not provide economic benefits to them.

Runoff from cropped fields adjacent to these surface waters can carry soil particles, animal waste, and fertilizers off of the fields and into the waters. Cropping up to the waters edge allows the runoff to flow unimpeded into the surface waters.

Vegetative buffers, also called filter strips, are permanent strips of grass, trees, or shrubs left between cropland and the surface water's edge. The buffers act as filters, reducing the amount of sediment and nutrients in the runoff. They slow the runoff down so that the sediments drop out before reaching the water. Much of the slowed runoff soaks into the ground and the plants take up the nutrients in the water.

Vegetative buffers are the last lines of defense against any sediments and nutrients contained in runoff. They are not a substitute for erosion and sediment delivery control measures or for the proper management of manure and fertilizer applications on fields adjacent to surface water. Buffers should be used in conjunction with those conservation practices.

The effectiveness of vegetative buffers in filtering sediment and nutrients depends on their width. As width of the buffer increases, so does its effectiveness. Most studies indicate that a minimum width of 30 feet is necessary. As land slope increases, this minimum width for effectiveness also increases.

Because previous studies indicated that soil particles and nutrients in runoff impact the Millpond, vegetative buffer needs were part of the rural inventory. Needs were first inventoried along the South Branch Manitowoc River and its main tributaries. These are the major cropland areas impacting the Millpond. Additional needs were inventoried along ditches and drainageways connected to the River system. These areas also impact the Millpond, but to a lesser degree.

The initial inventory of buffer needs was completed in 2000, using paper maps, drawing markers, and rulers. In 2002, GIS was used to update the inventory. The maps and area calculations in this report are based on the GIS inventory.

Buffer needs were mapped and calculated for a 30-foot zone adjacent to surface waters. This 30-foot zone coincides with the minimum width for buffer effectiveness. Any cropped area within this zone was mapped as a buffer need.

The vegetative buffer needs map for a 30-foot zone along the South Branch Manitowoc River and its main tributaries is **Map 3** in the Map Appendix. With GIS, it was determined that 30.5 acres of cropland would need to be planted to permanent vegetation to establish a 30-foot wide buffer in this zone.

Costs to establish vegetative buffers can vary widely due to site conditions and accessibility, the size of the area, the species to be planted, and the availability of tillage and planting machinery. A middle range cost estimate of $500 per acre for trees and shrubs and $200 per acre for grasses and clover will be used for cost estimates. These costs are often reimbursed in full to the landowner if he or she participates in a buffer incentive program.

Using these figures, it would cost approximately $15,250 to plant and establish a 30-foot wide vegetative buffer of trees and shrubs along both sides of the South Branch Manitowoc River and its main tributaries in Calumet County. A buffer of grasses and clover would cost $6,100 for establishment.

Including drainageways and ditches connected to the main River system would provide more filtering for sediments and nutrients. Refer to **Map 4** in the Map Appendix for the 30-foot buffer needs along drainageways and ditches. Using GIS to calculate these needs, an additional 42.2 acres of cropland would need to be planted to permanent vegetation. The middle range cost for planting and establishing trees and shrubs on this acreage is $21,100. Grasses and clover would cost $8,440.

In total, 72.7 acres of cropland would need to be planted to permanent vegetation to establish a continuous 30-foot buffer on both sides of all surface waters draining to the Millpond. The total cost of establishment for trees and shrubs would be $36,350. The cost for grasses and clovers would be $14,540.

A 30-foot wide buffer does not capture nor filter all of the sediment and nutrients from runoff, especially where adjacent cropland is sloping. Wider buffers are more effective. Recent studies and federal farm program rules indicate that a buffer width of 150 feet provides maximum effectiveness in capture and filtration.

To determine buffer needs for maximum effectiveness, GIS was used to map and calculate buffer needs in a 150-foot zone adjacent to the South Branch of the Manitowoc River and its main tributaries. Buffer needs in the 150-foot zone along ditches and drainageways were not considered in this mapping. Establishment of a 150-foot buffer

along ditches and drainageways was not considered practical because of the large areas of cropland that would be taken out of production.

Refer to **Map 5** in the Map Appendix for the locations of the 150-foot wide buffer needs. GIS calculations indicate that 465.2 acres of cropland would need to be planted to permanent vegetation to create this larger buffer width. The cost for planting and establishing trees and shrubs on this acreage would be $232,600. Grasses and clover would cost $93,040.

The planting and establishment of permanent vegetative buffers entails taking cropland out of production. Reimbursements for planting and establishment costs are often not enough to persuade landowners to establish them. With current farming economics, many landowners will not take cropland out of production without added incentives. Incentive programs that provide annual rental payments or that purchase easement rights are often necessary.

Federal and State incentive programs are currently available for establishment of buffers. The Conservation Reserve Enhancement Program (CREP) is available on a County-wide basis. The CREP pays incentives of $550 - $1,800 per acre for establishing buffers for a 15-year period. Incentives for establishing permanent buffers, using perpetual easements are $700 - $2,600 per acre.

Incentive payments are based on the average annual cropland rental rate associated with soil productivity in the buffer areas. Using the 2003 incentives for a predominant soil in Calumet County, a landowner would be paid $1,600 per acre for a 15-year buffer and $2,250 per acre for a permanent buffer. If this program were used to establish a 30-foot buffer wherever needed in the Millpond watershed, $116,320 would be needed for incentives for the 15-year period. Under the permanent easement option, $163,575 would be needed for the incentives.

As of 2003, Calumet County had been allocated enough federal and state funds to cover incentive payments and costs for establishing all of the 30-foot buffers needed in the Millpond watershed. But landowner participation has been limited in the watershed and the whole County. As with tillage changes, land owners and users will need to be convinced of the benefits of establishing buffers. An educational program will need to be developed on the benefits of buffers and the existence of incentive programs.

It should be noted that the maximum effectiveness of vegetative buffers in filtering sediment may not be reached in the Millpond watershed. Clay soils predominate in this watershed and clay particles are very small. Vegetative buffers do not always filter them out of the runoff.

Farmsteads with Livestock

All livestock operations are similar in many ways. Most have buildings where livestock are housed and fed. The building sites may include barnyard or feeding areas where the

livestock are kept or allowed outside. All livestock operations generate animal waste. Typically the waste must be collected, transported, and then spread on the land. Some operations have manure storage facilities. The facilities store the waste during winter and other times when it is difficult to spread on the land.

Animal waste, or manure, contains high levels of nutrients such as phosphorus and nitrogen. According to water test results, the Millpond also has high levels of these nutrients. Runoff can pick up manure from feeding, loafing, storage areas and cropland and carry it to nearby surface waters. Eventually the manure and the nutrients it contains may end up in the Millpond.

Locating farmsteads where livestock are kept is important in identifying possible sources of manure and nutrient runoff. This is especially true when the farmsteads are located near surface water features. In the initial application for this Lake Planning Grant, it was proposed that special emphasis be given to farmstead sites within a critical 1,000 feet zone adjacent to each side of surface water features.

An initial inventory of these sites was completed in 2000, using paper maps, field observations, and mailed surveys. Only the 1,000-foot zone adjacent to the South Branch Manitowoc River and its main tributaries was considered. With this method, 20 farmsteads with livestock were mapped and identified in the critical zone. Fifteen of these farmsteads were visited to gather information on potential manure runoff. Animal numbers at each farmstead ranged from 15 to 400 dairy and beef cattle.

In 2002, the County GIS and additional field observations were used to update the earlier inventory. Some changes were made in inventory methodology. More recent and detailed aerial photography was used. The inventory was expanded to include the 1,000 foot critical zone adjacent to drainageways and ditches connected to the main River and tributary system. Farmsteads with evidence of more than 5 livestock were mapped and identified. Farmsteads with livestock in the entire project area were also identified. See **Map 6** in the Mapping Appendix for the locations of all farmsteads with livestock.

In the updated inventory, 34 farmsteads with livestock were mapped and identified in the 1000 foot critical zone along the South Branch of the Manitowoc River and its tributaries. Sixteen more farmsteads were mapped and identified in the critical zone along drainageways and ditches connected to the River system. In total, 50 farmsteads with livestock were identified in these critical zones.

In areas outside of these critical zones, 48 more farmsteads with livestock were identified and mapped in the Millpond watershed. Two of these 48 farmsteads are located just south of the County line. They were included because they are associated with cropland within the County.

The exact number of livestock at each of the farmsteads was not determined in the final inventory. Livestock numbers at any one site may change frequently. Some of the farmsteads are used only for young stock or steers on a seasonal basis.

The identification of 96 farmsteads with livestock indicates that there is a considerable amount of manure that must be collected, stored, and spread in the Millpond watershed. With the large number of sites and their widespread locations, there is a large potential for manure runoff into surface waters. A more intensive inventory, including site visits, will need to be completed to assess this potential. The presence of barnyards or feedlots at the farmsteads increase the potential.

Runoff From Barnyards and Feedlots

Barnyards and feedlots are the areas adjacent to livestock housing, where livestock feed, exercise, and loaf. In many cases, the animals spend the majority of their time outside in these areas. As a result, manure accumulates in them. If located near surface water, rain water and the resulting runoff may carry the manure into the water. Water from the barn roof may add to the problem.

Runoff control systems reduce the amount of manure runoff from these areas. Individual components of these systems divert clean water from running over the areas, contain manure solids, and filter manure runoff.

Roof gutters, downspouts, and tile inlets divert water from the barn roof. Berms, surface inlets, and tile divert water from outside of the area. Concrete slabs with walls contain the manure solids within the barnyard or feedlot. Outlets in the walls allow liquids to slowly leave the area and flow over grass filter strips. The strips filter out remaining solids. As the water soaks into the filter strips, the grass plants take up the nutrients left in it.

Location of barnyards and feedlots within the critical zone do not necessarily mean that manure runoff is reaching the River system and the Millpond. Of the 15 barnyard and feedlots visited in 2001, only 6 of the sites had potential manure runoff to the River system. General observations from riding past the additional 35 farmsteads within the critical zone in 2002, indicated that most had barnyards and/or feedlots associated with them. Some of them may allow manure to runoff and enter surface channels, especially road ditches. The distance and connection of these channels to the River will need to be determined in order to judge the impact of manure runoff on the River.

Since a specific barnyard or feedlot may need some or all of the separate components of a runoff control system, a detailed site survey will be required for each of them. Staffing resources did not allow such an inventory to be completed in the timeframe of this planning grant.

On the 6 sites identified in 2001 for potential manure runoff, approximately $75,000 would be needed to install the needed components of runoff control systems. Cost sharing these costs at a 70% rate would require $52,500 in government funding.

Manure Storage Facilities.

Manure storage facilities are typically used to store manure, so that it does not have to be spread during the winter and summer. Manure spread on frozen ground in the winter cannot be incorporated and may run off into surface waters. Manure cannot be spread on most growing crops during the summer due to possible damage to the crop. It can be spread between cuttings of hay but not incorporated. Storage of the manure until spring planting and fall harvest allows incorporation and reduces manure runoff.

In 2002, the County GIS, staff knowledge, and field observations were used to inventory manure storage facilities in the Millpond watershed. See **Map 7** in the Map Appendix for locations of these storage facilities.

Of the 34 farmsteads with livestock in the critical 1,000-foot zone along the main River system, only 10 farmsteads were identified as having storage facilities associated with them. Of the 14 farmsteads located in 1,000 foot critical zone along drainage ways and ditches, only 4 of them were identified as having storage facilities. A total of 14 of the 50 farmsteads (28%) in the critical zones had manure storage facilities.

This may or may not be a problem. Farmstead owners without storage facilities usually spread their manure daily or stack it someplace during bad weather and wet field conditions. The potential for manure runoff depends on where and for how long that the manure is stacked and when and on which fields it is spread on. It also depends of the quantity of manure that must be dealt with. Some of the sites may not have sufficient animal numbers to justify the cost of storage facilities. Others may house animals seasonally.

Manure storage facilities are expensive. On average, earthen pits installed into the ground cost $20,000 to $40,000 each. Concrete lined pits and above ground storages cost $50,000 to over $100,000 each. Using the median figure of $30,000 apiece for earthen storages, it would cost $720,000 to install 24 facilities on all farmsteads with livestock in the critical zones along the main River system. Another $300,000 would be needed to install 10 facilities in the critical zone along drainageways and ditches. Governmental cost sharing for manure storage facilities is usually set at a 70% rate. A minimum of $714,000 of governmental funds would be needed to cost share the installation of 34 storages at all farmsteads in the critical zones of the project area.

Farmsteads with livestock outside the critical zone may spread their manure on fields within the critical zone. The inventory indicated that there are 50 of these farmsteads within the project area. Only 9 of these 50 farmsteads have manure storage facilities. Installation of 41 more earthen facilities could cost and additional $1,230,000. Cost sharing their installation at a 70% cost share rate would require $861,000 of governmental funds.

It is very likely that storage facilities will not be installed at all of these farmsteads. Some of the sites will have low runoff potentials. Owners of others will either not see the need for their installation or will not have the funds for their portion of construction costs.

Runoff From Cropland and Nutrient Management Planning

Fertilizers and manure are applied to cropland to provide nutrients for crop needs. Nutrient management is the management of these applications to minimize the amount of excess nutrients that runoff into surface waters or leach down into groundwater. Proper management of the timing, placement, and amounts of these applications ensure that most of the applied nutrients are used by the crops and do not runoff the land.

Proper nutrient management requires the annual development of a nutrient management plan. The plan details the timing, placement, and rates of applications of manure and fertilizers on a field by field basis. Information on soil fertility levels, past applications, crop nutrient needs, and nutrient levels of the manure and fertilizers is needed to develop the plan.

Water testing of the Millpond indicated high levels of phosphorus and nitrogen in the water. Manure and most fertilizers contain high levels of phosphorus and nitrogen. It is very likely that nutrient management on cropland in the watershed would reduce the amount of nutrients entering the Millpond from these sources.

The survey in 2000 indicated that none of 15 surveyed farmers with livestock in the critical zone along the River developed nutrient management plans that met State and Federal technical standards. The number of farmers developing nutrient management plans in the entire Millpond watershed is not known.

Developing plans for all cropland in the watershed would include 19,267 acres of nutirent management planning. The development of a nutrient management plan by a private consultant costs about $6.00 per acre per year. The cost for nutrient management planning on all of these acres would be $115,602 per year. Cost sharing for planning is usually provided at a 50 % rate for a maximum period of 4 years. To cost share nutrient management planning on all cropland acres would require $231,204 in governmental funds during a 4 year period.

Crop consultants and some government employees are trained and certified to develop nutrient management plans. However, with proper training, farmers can learn to develop their own plans. Future training programs for farmers could reduce the need for cost sharing and governmental funding. As with other practices, farmers will need to be convinced of the benefits of using nutrient management.

A PLAN OF ACTION

SUGGESTIONS FROM OTHERS

The initial inventory in this report was summarized and presented to the Calumet County Land & Water Conservation Committee and the Lake District Board of Commissioners. Members of these groups were asked for suggestions on how to raise public awareness on the water quality of the Millpond and the land uses impacting it. They were also asked for suggestions on how to increase the adoption of conservation practices to protect and improve Millpond water quality.

Members of the Calumet County Land & Water Conservation Department offered these suggestions:

- Presentations to schoolchildren on the problems and solutions.
- Speaking and poster contests on natural resources in local schools.
- Development of a comprehensive educational program on needed conservation practices.
- Programming on cable television local channel to stimulate public interest.
- Distribution of fact sheets and brochures with tax and utility bills to city residents.

Members of the Chilton Millpond Lake District Board of Commissioners made these suggestions:

- Use of local high school science teachers, FFA groups, and UW-Extension youth educator to raise awareness of youth on the issues, problems, and solutions.
- Creation of a display for the Chilton library.
- Inclusion of the problems and solutions in the agricultural class curriculum of area technical colleges.
- Use of city and county web sites to present information and education.
- Presentations at public informational meetings for urban and rural residents of the project area.
- Publication of a newsletter on the Chilton Millpond.
- Creation and distribution of brochures on needed conservation practices to city and town residents.
- Involvement of youth groups like Boy Scouts and 4H in activities such as storm drain stenciling.
- Programming on the local cable television channel.
- Distribution of brochures and fact sheets with city utility bills.
- Development and use of cost share programs for conservation practices.

Using many of these suggestions, the Calumet County Land and Water Conservation Department developed a comprehensive plan for future activities to address the water quality problems of the Chilton Millpond. The plan is outlined in the next section. This plan will take many years to implement and will require more financial and staffing

resources than are currently available. Partnerships will need to be formed with the Chilton Millpond Lake District, State and federal agencies, schools, town governments, and Millpond watershed residents to successfully implement this plan.

COMPREHENSIVE PLAN FOR THE FUTURE – A THREE-PART PROGRAM

UW-Extension research has indicated that a three-part course of action is often needed to solve resource problems like those of the Millpond and its watershed. The three parts of this course of action include incentives or cost sharing, education, and regulation.

Installing and implementing all needed urban and agricultural practices to improve and protect the water quality of the Chilton Millpond will be very costly. The lowest estimates for implementation and installation of agricultural practices in this study exceed $1.5 million dollars. The highest estimates exceed $3.5 million. Cost estimates were not made for all needed agricultural practices, nor were they made for any needed urban practices. The actual cost for implementing all needed practices is likely to be much higher than these estimates.

If cost sharing is to be provided to landowners to implement and install these practices, government or private funds must be available. Some programs already exist to provide such funding from State and Federal sources. However current funding levels for these programs do not approach the levels needed within the Chilton Millpond watershed. In addition, state and federal budget constraints could affect the future availability of these funds.

The availability of cost share funds does not automatically mean that the needed conservation practices will be installed and implemented in this watershed. Land owners and users impacting the Millpond must first become aware of the problems they are causing and potential solutions. Without this awareness, they will not utilize available cost sharing to put in the necessary practices. They must first believe that the practices are needed and that they, as well as the Millpond, will benefit from them. A targeted educational program is needed.

Some of the identified practices may be needed to meet new DNR rules for agriculture and future County ordinances. Enforcement of these rules and ordinances by local and state authorities could compel some land owners and users to install or implement the practices. However, state statutes now require that cost sharing be offered prior to enforcement in many of these situations.

Current and proposed activities and strategies for the three-part program are detailed in the next section. Education is listed first because of its importantance in the implementation strategy of this program, including enforcement and cost sharing.

Education

The Calumet County Land & Water Conservation Department is conducting a County-wide educational program that addresses many of the same conservation needs that were found in the Millpond watershed. The information gathered in this grant project will be used to develop a more targeted program, specific to the Millpond watershed. The targeted program will include the development of educational materials specific to the watershed and distributions and presentations of these materials within the watershed. Problems and solutions related to urban and agricultural land use will both be addressed. The suggestions from the Land and Water Conservation and Chilton Millpond Lake District Committee members, listed previously, will be incorporated into the program delivery.

The LWCD will lead this effort by:

- Developing a PowerPoint presentation on the findings of this report and the needed conservation practices for agricultural and urban environments.
- Giving the presentations to interested groups.
- Publicizing the identified resource problems and practice needs through the media and a dedicated issue of the Department newsletter.
- Assisting the Lake District and town governments in developing and distributing their own materials.
- Coordinating efforts to involve citizen and school groups in activities promoting the installation and implementation of needed practices.
- Encouraging schools to incorporate the problem, issues, and solutions contained in this report into their curriculum.
- Including portions of this report and related materials on the LWCD website.
- Using the inventory data and maps in this report to target educational activities and materials to land owners and users impacting the Millpond.
- Using mail lists developed as part of the grant to target mailing of educational materials.

The LWCD will not be able to implement the educational program without help. Local town governments within the project area and the Chilton Millpond Lake District will need to provide assistance in whatever ways they can, which may include:

- Sponsoring the publication of educational materials.
- Distribution of educational brochures and fact sheets through government related or Lake District mailings
- Providing facilities for meetings, displays, and presentations.
- Providing volunteers to assist with educational activities.

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Cost Sharing and Incentives

The Wisconsin Department of Agriculture, Trade, & Consumer Protection (DATCP) currently provides the Calumet County LWCD with an annual grant to be used for cost

sharing conservation practices. Agricultural land owners and users within the County may apply for these funds. These funds can only be used for installing structural practices, such as barnyard runoff control systems and manure storage facilities. They cannot be used for implementing management practices like conservation tillage and nutrient management planning. Since these funds are not targeted to any area within the County, residents within the Millpond watershed must compete with others for them.

The United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) provides cost sharing funding for structural and management practices through their Environmental Quality Incentives Program (EQIP). Annual allocations for Calumet County may exceed $100,000 in future years. Land owners and users compete on a County-wide basis for these funds through an environmental ranking system. Continuance of these funds is dependent on federal budgets and continuing national farm bill legislation.

USDA – Farm Services Agency (FSA) and NRCS, Wisconsin DATCP, and Calumet LWCD currently sponsor an incentive program for the installation and maintenance of vegetative buffers. The program is called the Conservation Reserve Enhancement Program (CREP). The program pays landowners an annual rental fee for establishing vegetative buffers along streams, ditches, wetlands, and lakes. In addition, upfront incentive payments and all of establishment and maintenance costs for the buffers are provided. Total payments range from $500 to $2,600 per acre, depending on the soil productivity of the buffer area and period of enrollment. The enrollment period can be 15 years or in perpetuity. Calumet County was initially allocated $600,000 through 2006 for the CREP. Previous enrollments and mandatory transfers to other counties may decrease the amount available to future applicants.

The Wisconsin Department of Natural Resources (DNR) currently has two competitive granting programs that potentially could be used to provide cost sharing for constructed conservation practices in the Millpond watershed. One of the programs is the Targeted Runoff Management Program (TRM). County or local governments can compete annually for these funds to install small scale projects within a limited area and involving one or a few landowners that are impacting surface or groundwater. Maximum funding is currently set at $150,000 per project and multiple projects are allowed in a County. All projects must be completed within a 2-year period. Competition for these funds is very stiff and State budget constraints may affect this program in the near future.

The other DNR program is the Lake Protection Grant Program. It can be used for multiple landowners in a large-scale targeted area, such as area of this Lake Planning Grant. Funds can be used for cost sharing constructed conservation practices. Program length is limited to a few years and maximum funding is $200,000.

The LWCD will act as the main entity in promoting and administering cost sharing programs for needed practices in the watershed. Major activities will include:

- Publicizing the availability of cost sharing funds in the Millpond watershed area.
- Targeting portions of currently available cost sharing funds to the Millpond watershed area.
- Applying for small scale TRM grants for cooperating land owners and users within the Millpond watershed.
- Promoting the CREP to landowners with buffer needs in the critical zones of the project area.
- Applying for a Lake Protection Grant, if and when staff resources are adequate to administer it and projected landowner participation rates are high enough to warrant it.

Regulation

Enforcement of standards and regulations can be used to promote adoption of needed practices when education and offers of cost sharing do not produce the desired results. Implementation and enforcement of the new DNR statewide performance standards for agriculture may bring about the adoption of many needed conservation practices within the project area.

These standards require that soil erosion on all cropland be controlled to tolerable soil loss levels. Control of soil erosion will result in much less sediment getting into the Millpond. It will also result in less runoff of manure and fertilizers from cropped fields and into the River and Millpond.

They also require that all fertilizer and manure applications to cropland be made according to a nutrient management plan by 2008. Using nutrient management planning on all cropland draining to the Millpond will drastically reduce the amount of nutrients being added from upstream waters.

Unlimited access of livestock to streams and adjacent areas is prohibited by the standard. Improvements to the Millpond from this requirement will be limited since only three such sites exist in the watershed.

Under the standards, barnyards and feedlots located within 300 feet of surface water are required to have runoff control systems. These systems will reduce the manure runoff to the Millpond. Their installation will ensure that there is no direct runoff from these areas and that clean water is diverted from running through them. Unconfined manure piles are also prohibited within the 300 feet of surface water.

A voluntary and educational approach will be used to initially implement these standards. The standards require that cost share funding be made available to affected landowners prior to enforcement in many cases. Adequate funding for cost sharing fund will need to be available for complete and successful implementation. Adequate staffing resources

will also need to be available to assist in their implementation. Enforcement mechanisms will need to be developed by the County or DNR to insure implementation of the standards.

LWCD activities related to rules and regulations will include:

- Developing and conducting an educational program on the new DNR Standards.
- Using the inventory contained in this report to determine compliance with standards within the Millpond watershed.
- Targeting of compliance reviews in the critical zone of the Millpond watershed.
- Updating of our current Calumet County Animal Waste Storage Ordinance to include provisions for nutrient management.

Other possible activities include:

- The incorporation of DNR standards into County ordinances.
- The development of new County ordinances to protect water quality.

Conclusions

The water quality problems of the Chilton Millpond will not be solved easily, cheaply, or in a short time frame. It will require a change in daily land use activities and behaviors of many rural and city residents of the watershed.

Watershed residents must become aware of the impacts of their land use on the South Branch of the Manitowoc River system and the Chilton Millpond. They also need to be willing to adopt the needed changes and bear the costs to reduce those impacts. The end result of clean water and a healthy environment is attainable. It will require government entities, the Lake District, and residents of the watershed working together to put the needed conservation practices into place in the Millpond watershed.

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And any others that have contributed to the completion of this grant project.

MAP APPENDIX

LIST OF MAPS