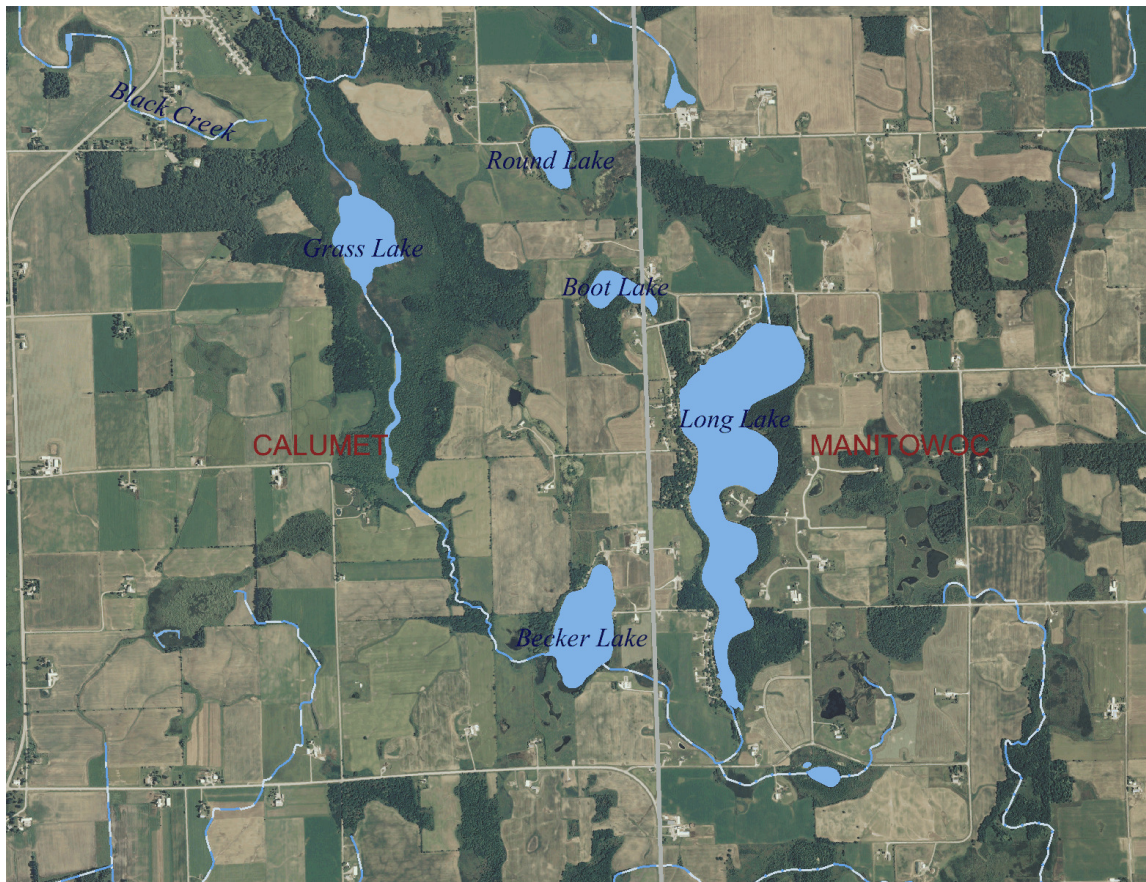


CALUMET COUNTY:
CALMAN LAKE PLANNING EDUCATION PROJECT
PHASE 1
FINAL REPORT



Prepared For Wisconsin Department of Natural Resources Land Planning Grant Program
by Eugene McLeod, Calumet County Resource Management Department

INTRODUCTION

Becker, Boot, Round, and Grass Lakes are located in the northeast quarter of Calumet County, near the borderline between Calumet and Manitowoc Counties. Long Lake is located just east of the borderline in Manitowoc County. The five lakes are similar in many ways. They are fairly small (11 – 127 acres), are in the same watershed, and are interconnected during high water periods. Fish can move between them, as well as pollutants and invasive species. All five lakes face similar problems, including:

- Cloudy water
- Over-richness in nutrients
- Low oxygen levels and resulting fish kills
- Algae blooms and excessive weed growth
- Loss of fish and aquatic life habitat

These problems are caused by past and current land use activities in the watershed area draining to the lakes. The removal of native shoreline vegetation, filling and draining of wetlands, and polluted runoff from cropland and residential areas have caused most of the problems. Re-establishment of shoreline vegetation and wetlands and the use of conservation practices and behavior changes to control polluted runoff are needed to reduce these problems.

Invasive species are replacing native aquatic plants in these lakes and along their shorelines. Other invasive animals and plants have been found nearby. A concerted effort must be taken by residents and users of the lakes to avoid introducing invasive species to them.

To better identify and address these problems, Calumet County applied for a Wisconsin Department of Natural Resources Lake Planning Grant in July of 2010. Manitowoc County was listed as a cooperating partner. The purpose of the small grant project was to educate watershed residents, farmers, local officials, and lake users on:

- Problems these lakes were facing
- Potential causes of the problems
- Conservation practices and behavior changes needed to reduce the problems

As part of the grant project, it was proposed that water samples be taken from each of the five lakes in fall and spring and that the samples be tested for major nutrients and other indicators of water quality. The grant was awarded to Calumet County in September of 2010 with an expiration date of December 2011. A grant project extension until December 2012 for additional water sampling and testing was requested and approved. Grant project activities began in November of 2010. Calumet County Resource Management Department (formerly Land and Water Conservation Department) and Manitowoc County Soil and Water Conservation Department staff and volunteers carried out most project activities. This report is a description of what happened and what was learned during the grant project.

LAKES IN THE PROJECT AREA



Becker Lake is about 35 acres in size and has a maximum depth of 53 feet. In high water periods, a stream flows in from Long Lake and out to Grass Lake. Fish include panfish, largemouth bass, northern pike, walleye, and carp.



Boot Lake is also about 11 acres in size, but is fairly shallow with a maximum depth of 16 feet. In high water periods, it is connected by wetlands to Long Lake. Fish include panfish, largemouth bass, and northern pike.



Grass Lake is a northern bog type lake that is very shallow and about 28 acres in size. During high water periods, it receives stream flow from Becker Lake and flows out to Spring Creek. It has limited fish populations and abundant wildlife. It is surrounded by private land.

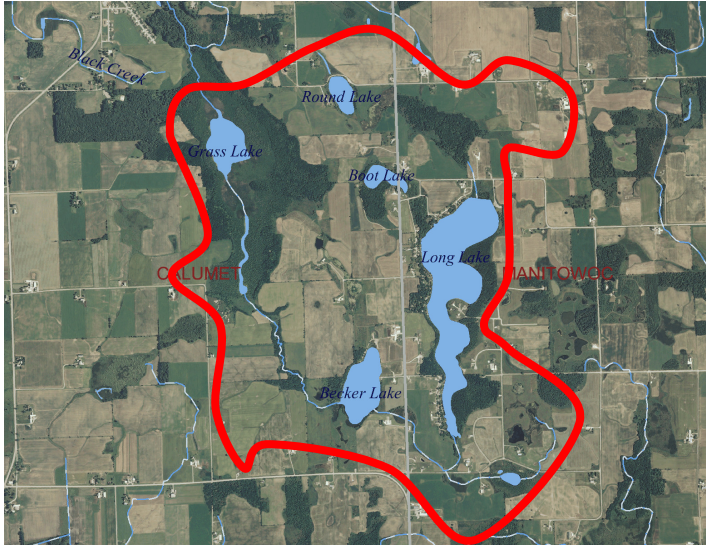


Round Lake is about 11 acres in size and has a maximum depth of 50 feet. During high water periods, it may be connected by wetlands to Long Lake. Fish include panfish, largemouth bass, and trout. It is the only lake of the five lakes where trout are stocked.



Long Lake is the largest of the 5 lakes and has the most developed shoreline. It is 127 acres in size with a maximum depth of 38 feet. In high water periods, it is connected to Boot Lake and possibly Round Lake by wetlands and has stream flow to Becker Lake. A dam regulates outflow. Fish include panfish, largemouth bass, northern pike, and a large carp population.

THE WATERSHED AND POLLUTED RUNOFF



The red line in the picture above is the approximate outer boundary of the *watershed* of these five lakes. The *watershed* is the area of land that drains to the lakes. The water in the lakes originates from precipitation, surface runoff, and/or groundwater from within this land area.

As rain and snowmelt run off the land within the *watershed*, the runoff can pick up eroded soil particles and other materials that are spread, stored, spilled, dumped, or applied to the land surface and carry them downhill to the lakes. The soil particles and nutrients in this polluted runoff cause many of the problems that we now see in the lakes. Here are some causes of polluted runoff to the lakes:

- Soil erosion from cropland and disturbed areas on construction sites
- Land applications of manure and fertilizers to cropland
- Land applications of fertilizers to lawns
- Pet wastes that are not picked up
- Surface discharges of septic wastes and household “grey water”

Land use practices and behaviors need to be changed within the watershed to reduce polluted runoff to the lakes. Reducing polluted runoff will improve water quality and habitat for aquatic life in them, increasing the quality of fishing and other recreational activities. Fish stocking and chemical treatments have been tried in the past and have not been successful. The necessary conservation practices must be put in place on farms and residences to keep soil, nutrients, and other pollutants where they belong and out of the lakes.

The problems that the lakes are facing are similar to those of other lakes in Wisconsin that are located in areas with agriculture and shoreline development. The sources of polluted runoff are similar and so are the conservation practices and behavior changes needed to reduce it.

Some conservation practices and behaviors that can be used to reduce polluted runoff include:

- Minimizing areas of soil disturbance on construction sites and capturing eroded soil on site
- Using reduced tillage on cropland and maintaining crop residues on the soil surface
- Applying manure and fertilizers on cropland according to soil tests and crop nutrient requirements
- Applying lawn and garden fertilizers according to soil tests and plant nutrient requirements
- Picking up and properly disposing of pet wastes
- Maintaining septic systems and not discharging gray water to land surface or lakes

Natural vegetation along shorelines can filter out pollutants in runoff, before they reach the lakes. Wetlands can also capture and filter polluted runoff. Planting crops or lawn right up to the shoreland and filling or draining of wetlands eliminates these filters. These natural filters can be restored by:

- Establishing strips of native vegetation at least 35 feet wide adjacent to the shoreline.
- Restoring wetlands along shorelines and upslope of the lakes

INVASIVE SPECIES



Invasive species are non-native species of plants, animals, fish, and other forms of life that have no known natural controls. They often out-compete native plants, animals, and

fish for sun, water, and nutrients. They can overtake or shade out the native species and create conditions that are unfriendly to them. So far only Eurasian Water Milfoil and Curly Leaf Pondweed have been found in these lakes. Reed canary grass can be found in wetlands along some of their shorelines. There are many more invasive species that have been found close-by that pose a threat to fish, aquatic life, and recreational activities.

In order to prevent these other harmful species from reaching the lakes, residents and lake users can take the following steps:

- Inspect boats, trailers, and equipment for aquatic plants and animals
- Remove all attached aquatic plants and animals
- Drain all water from boats, vehicles, and equipment
- Never move aquatic plants or live fish away from a waterbody

PROJECT INFORMATION GATHERING

Calumet County staff gathered recent and historical information on the lakes, primarily from the Wisconsin Department of Natural Resources (DNR) website and their Surface Water Integrated Monitoring System (SWIMS) database. Information included historical descriptions of the lakes and problems and laboratory testing results from lake water samples. The water testing results indicate that problems with excessive amounts of nutrients in four of these lakes go back over 3 decades. No data could be found for Grass Lake.

Testing results from samples taken in 1976 indicate that Round Lake had very high levels of total phosphorus. The levels at that time were five times the amount considered to be a very poor water quality index for phosphorus. Boot Lake samples had similar testing results in 1979. The results for all samples taken from Boot, Becker, and Round Lakes from 1976 to the present indicate poor or very poor water quality indexes for phosphorus. A majority of samples taken from Long Lake since 1988 to present indicate a poor water quality index. All of the historical testing results for the four lakes indicate total phosphorus levels in excess of the amount needed for nuisance algae blooms.

Historical descriptions also reveal that algae blooms and/or winter kills of fish occurred in at least three of the lakes during the past 40 years and that some of them were chemically treated to eradicate the undesirable fish populations. A 1971 description of Becker Lake indicates that it “suffers occasional partial winterkill affecting primarily the marginal fishery” and that “poor agricultural practices in adjacent watersheds contribute to increasing rates of eutrophication of this basin as is reflected in the intense algae blooms often present”. A 2002 description of Becker Lake states that the “fish community structure shows signs of occasional to frequent fish kills”. A Boot Lake description from 1971 states that it “is subject to frequent winterkill” and that “nutrient-rich runoff water from a predominantly agricultural watershed is largely responsible for heavy algae blooms commonly seen on this lake”. It also indicates that the lake was treated with a pesticide in 1965 to eliminate undesirable fish and then restocked. A 2002 description states that Boot Lake “winterkills every three to five years”. Round Lake was described in 1971 as “suffers from very rare partial winterkills” and “at times algae

blooms are present”. It was also noted that “in 1959 the lake was treated with chemicals to eradicate the very marginal warm water fishery” and then restocked. A 2002 description states that Round Lake “suffered its last fish kill in 1999”. A 1968 description of Long Lake stated that ‘major use problems include algae, carp, and stunted panfish”.

The historical water quality data and lake descriptions indicate that some or all of these lakes had problems with excessive nutrients, algae blooms, and fish kills for many years in the past. Current sampling and testing data and observations indicate that these problems still exist and in some ways may have become worse.

PUBLICIZING THE PROJECT

To gain public support for grant activities, Calumet County staff publicized the grant project in several ways. Newspaper articles announcing the grant project and inviting the public to the educational meetings were sent to all local papers in Calumet and Manitowoc Counties and published in many of them. Reporters and editors for the papers were invited to the meetings and wrote and published news articles on them. Staff members attended a number of conservation and hunting and fishing club meetings to apprise members of grant project activities and progress. An outdoor sports writer also published an article on the project in local papers

LAKES BROCHURE

As part of the project, a brochure about the five lakes was developed to educate the public about the lakes and stimulate their interest in improving them. The color, tri-fold brochure included a description of the five lake, some of the problems they are facing, and some basic conservation practices that may address some of their problems. The brochure was mailed out to everyone on the project mailing list and also passed out at the last educational meeting. It is anticipated that the brochure will be used and refined for future grant projects.

LAKE WATER SAMPLING AND TESTING

In the grant project proposal, the County indicated that water from the five lakes would be sampled and tested in the fall and following spring to provide a baseline for current water quality. A request was made at a conservation club alliance meeting for volunteers to conduct the sampling. Two volunteers, Robert Sengbusch and Russ Callaway, stepped up to do the sampling. Samples were taken from Becker, Long, and Round Lakes on November 19, 2010; April 17 and November 15, 2011; and March 18, 2012. Sample dates were chosen to be near fall and spring turnover of the water in the lakes. Samples were taken from Boot Lake on the latter three dates only. Samples were not taken from Grass Lake because it is surrounded by private land and wetlands and not readily accessible by watercraft. The samples were tested by the Water and Environmental Analysis Lab (WEAL) at the University of Wisconsin Stevens Point. Tests included conductivity, reactive phosphorus, total phosphorus, ammonium (N), nitrite and nitrate nitrogen (NO₂ + NO₃), total Kjeldahl nitrogen, and chloride. Testing results are listed in Table 1 on the next page.

High levels of nutrients in lake water, such as phosphorus and nitrogen, promote excessive aquatic plant growth and algae blooms. According to the UW-Extension publication, *Understanding Lake Data*, total phosphorus is a good indicator of a lake's nutrient level status because its levels remain relatively stable. Total phosphorus is a combination of dissolved (reactive) phosphorus and the phosphorus contained in solid fragments of plants and animals in the water. Total phosphorus test results for the 2010 – 2012 water samples indicate that all of the lakes have levels very much greater than 0.050 micrograms per liter, the level over which nuisance algae blooms may occur. Lake water with a level above 0.150 micrograms per liter is considered to have a very poor water quality index and all of the testing results, except for one from Long Lake, are above that level. Because of the high total phosphorus levels, all of the lakes would likely be considered hyper-eutrophic, or very nutrient-rich, and subject to frequent and severe nuisance algae blooms. Dissolved (reactive) phosphorus should be below 0.010 milligrams per liter to avoid algae blooms and testing results from Becker, Long, and Boot Lakes indicate they are above this level on all dates that they were sampled.

Table 1. Lake Water Sample Testing Results

LAKE	SAMPLE DATE	Conductivity	Reactive Phosphorus	Total Phosphorus	Ammonium (N)	Nitrate & Nitrate N	Total Kjeldahl N	Chloride
Becker	11/19/10	396	0.266	0.471	1.94	0.13	1.11	29.9
	4/17/11	391	0.209	0.401	1.94	0.32	4.07	29.0
	11/15/11	372	0.152	0.447	0.93	<0.1	4.34	28.8
	3/18/12	401	0.033	0.281	0.08	0.44	2.83	28.1
Boot	11/19/10	-	-	-	-	-	-	-
	4/17/11	423	0.140	0.381	1.79	0.18	4.32	36.9
	11/15/11	383	0.012	0.228	1.22	2.0	4.23	37.4
	3/18/12	378	0.017	0.191	0.24	1.11	2.88	31.8
Long	11/19/10	372	0.022	0.121	0.61	0.09	3.07	30.1
	4/17/11	380	0.056	0.208	1.06	0.21	3.17	29.1
	11/15/11	355	0.009	0.197	0.60	<0.1	3.90	29.5
	3/18/12	384	0.012	<0.006	0.09	0.30	2.61	29.2
Round	11/19/10	434	0.244	0.265	1.11	<0.02	2.88	29.4
	4/17/11	441	0.269	0.353	1.68	0.10	3.10	30.4
	11/15/11	415	0.296	0.347	1.42	<0.1	3.10	32.1
	3/18/12	440	0.206	0.246	1.16	0.25	2.74	29.7

All data expressed as milligrams per liter except conductivity is expressed as micromhos per centimeter

BECKER LAKE GRASSROOTS ASSOCIATION

In 2011, a group of concerned watershed residents, conservation and sports club members, and farmers began meeting and discussing what they as a group could do to improve Becker Lake. Robert Sengbusch, a resident and club member, served as the group's leader and as a contact and liaison for the group to county, state, and federal resource professionals.

The group held monthly meetings to plan activities to improve the lake. Some of the activities that they completed, in conjunction with the Brillion Conservation Club and its members, were:

- Formation of a informal lake association with 3 committees
- Fund raising for fish stocking and shoreland improvements
- Creation of fish habitat in Becker Lake with tree felling
- Periodic water sampling and water quality monitoring
- First contacts with farmers and residents around Becker Lake to promote conservation practice installation
- Arranging field visits and farmer meetings for county conservation staff to identify sources of polluted runoff and to recommend conservation practices to address them

This non-government, group of individuals was instrumental in gaining support and interest from residents and farmers around and near Becker Lake for the grant project and lake water quality improvement.

EDUCATIONAL MEETINGS AND IDEAS GENERATED

As part of the grant project, it was proposed that at least 3 educational meetings (forums) be held for landowners, farmers, and local officials to help them understand the problems affecting the five lakes and to gain input and support to address them. It was also hoped that the meetings would stimulate public interest in forming some sort of lake organization to begin development of a watershed-wide lakes management plan.

Before any meetings could take place, it had to be determined who would be invited to the meetings and how they would be contacted. It was determined that the following groups of people either had impacts on the lakes or would be concerned with the conditions of the lakes and interested in improving them:

- Shoreline and watershed residents
- Farmers within the watershed
- Town and municipal officials
- Conservation and outdoor sports club members
- Federal and state conservation agency staff
- Area lake association members
- Lake users.

A mailing list was developed using existing organizational mailing lists, government websites, conservation department records, county tax lists, and a watershed boundary

map. The watershed map had to be sketched by hand since the combined watershed boundary for the five lakes had never been determined. The final mailing list contained over 230 individuals and households.

The first educational meeting and forum was scheduled on the evening of April 26, 2011. The Village of Hilbert Community Center was chosen as the location because it was a large modern facility just outside of the watershed boundaries and could be used free of charge. Invitations were mailed out or emailed to everyone on mailing list and announcements were put in local newspapers.

Approximately 60 individuals showed up at the meeting, including residents and farmers from the watershed, conservation and lake association members, and government officials and staff. Four PowerPoint presentations related to the lakes and their problems were given. Presenters and presentations included:

- Eugene McLeod, County Conservationist from Calumet County, presented information on water quality and nutrients in the lakes and sources of polluted runoff to them.
- Steve Hogler, Fishery Biologist from Wisconsin DNR, reported on the status and health of the fishery in the lakes, winterkill problems, and impacts of polluted runoff on aquatic life.
- Diane Schauer, Aquatic Invasive Species Coordinator from Calumet County, described aquatic invasive species currently found in the lakes and their impacts and potential future threats from invasive species and what can be done to reduce the threats.
- Gene Weyer, President of Manitowoc County Lakes Association, gave examples of programs and partnerships for establishing sediment ponds near lakes to capture soil and nutrients from runoff.

The public was allowed to ask questions during and after the presentations. A general discussion took place after the presentation about what they thought were major problems affecting the lakes and potential ways to solve them. Large aerial photos of the lakes and their watersheds were put on the tables and individuals marked where they thought polluted runoff was coming from.

Jerry Halverson, County Conservationist from Manitowoc County suggested that the next step be small group meetings, one for each lake, held during the summer to further discuss the problems, sources, and solutions. The small groups would then bring back what they discussed and their ideas to the larger group at a second educational meeting in the fall. A sign up sheet was passed around and 19 individuals volunteered to meet in small groups.

It was later decided to hold all small group meetings at one time and in one place. The small group meetings were scheduled for the evening of September 14, 2011 at the Hilbert Community Center. Invitations were mailed to the 19 individuals on the sign-up list, along with a list of questions on problems, solutions, and next steps.

Six individuals, three of which were Calumet County and Manitowoc County staff members, showed up for the small group meetings. Non-staff attendees included a high school science teacher and resident of the watershed, a board member from a town within the watershed, and the leader of a grassroots lake association for Becker Lake and resident of the watershed. An informal discussion took place for about 2 hours. Some of the ideas that came forth during the discussion included:

- Involving local high school science class students to do regular sampling and testing of the water from the lakes
- Water from tiles draining agricultural lands may be impacting the lakes, especially that from the tile outlet just southeast of Becker Lake
- Historical dumping of whey into wetlands north of Long Lake may still be impacting the lakes
- Clearing of woods on a property near Long Lake may be impacting it.
- There are large spikes of phosphorus in the lakes after rains
- Setup instruments to capture shallow groundwater flow to the lakes and test the water for nutrient amounts
- It took a long time for the lakes to get in the conditions they are now in and it will take along time for them to recover
- Review previous lake studies and management plans for Long Lake
- Check for water testing data from intermittent streams connecting the lakes
- Do invertebrate surveys of the lakes

The order of events for the next educational meeting was also discussed and it was proposed to break up attendees in small groups as was intended for this meeting

The second educational meeting and forum took place on September 27, 2011. As with the first meeting, announcements were placed in local newspapers and invitations were mailed to everyone on the mailing list. A brochure on the lakes and their problems, written and published as part of the grant project, was included with the invitations. Also included in the mailing was the UW-Extension publication, *Brown Water, Green Weeds*, a fact sheet on runoff of soil and nutrients and its impacts on lakes and streams.

About 49 people showed up at this meeting and similar to the first meeting included residents and farmers from the watershed, conservation and lake association members, and government officials and staff. The meeting began with a recap of the first educational meeting and presentation of the ideas that came forth in the small group meeting on September 14. Attendees were then asked to divide into 2 groups – one group for the more developed Long Lake and one group for the other 4 lakes with little development on them. Both groups were then given the same list of questions on problems, solutions, and next steps as was given to attendees at the September 14 small

group meeting. They were asked to answer them individually and then discuss their answers as a group. Groups were allowed over 45 minutes to do this. The following concerns, ideas, and solutions came out of the group discussions:

- Long Lake group
 - Concerns about potential impacts to the lake if zoning changes around the lake from agricultural and conservation zoning to zoning that allows single family residences
 - Concerns that trees within 1,000 feet of Long Lake were being clear-cut and that shoreland zoning ordinances were not being enforced
 - Concerns that recommendations in past Long Lake management plans are not being implemented
 - Move forward with a plan to improve the lake that is cost effective
 - Need more education for residents and land users
 - Develop demonstration sites for necessary conservation practices

- Becker, Boot, Grass, and Round Lakes group
 - Do comprehensive lake water sampling and testing at various points in the lakes and streams connecting them to find the major sources of nutrients
 - Continue water testing to see if results get better as conservation practices are installed
 - Do more education on practices and behavior changes needed to address problems
 - Use effective education methods including videos of practices that landowners can borrow and watch
 - Have more face-to-face meetings with landowners and meetings like this one
 - Look at conservation practice cost versus benefit for each pollution source and prioritize
 - Promote conservation practices to control soil erosion including reduced tillage and more hay on cropland
 - Show/demonstrate practices that work and how to apply them
 - Redirect cropland drainage tile outlets away from the lakes
 - Start with more education of the group of people who volunteer to assist in lake management planning

After the discussion, Dena Mooney from Calumet County gave a short presentation on Phase 2 of the project - another Wisconsin Department of Natural Resources Lake Planning Grant that was awarded to Calumet County to form a volunteer lake monitoring group and start the process of developing a lake management plan for the five lakes and their combined watershed.

A third and separate public educational meeting was proposed for farmers, thinking they would be more apt to attend and have frank discussions if it was limited to them. However, it was decided not to hold a separate meeting since a number of farmers attended and participated in the two public education meetings.

WEBSITE

In the grant application, it was stated that Calumet County staff would develop a web page of information related to the lakes and the grant project. The web page was developed and incorporated into the *Surface Water Education* portion of the Calumet County Resource Management Department's web pages. The link to the web page is: http://www.co.calumet.wi.us/departments2.iml?dept_id=247 A summary of the grant project, this report, and how to establish rain gardens are currently on the webpage. The web page development is an ongoing process and more information about water quality and conservation practices will be added to it during the organizational and lake management planning phases of the project.

IDENTIFICATION OF POLLUTION SOURCES AND CONSERVATION PRACTICE INSTALLATION

It was not the intent of County staff to begin looking for the specific sources of nutrients and sediments impacting the lakes and identifying and the necessary conservation practices during this grant project. However, with the help from the grassroots lake group described earlier in this report, a group of farmers around Becker Lake invited them to check out their land. USDA – Natural Resources Conservation Service and County Land and Water Conservation staff walked the land around much of the Lake and met with two of the farmers. Sites with soil erosion and nutrient runoff problems were found and staff recommended various conservation practices to address them. One farmer agreed to put in necessary practices on his farm and cropland and another farmer agreed to think about it. On the Manitowoc County side, a farmer in the northwest watershed of Long Lake agreed to plant permanent strip of trees on a steep area of cropland draining to the lake. With the assistance of Manitowoc County and NRCS staff and members of the grassroots lake group, the tree planting began before this grant project ended.

IMPAIRED WATERS LIST AND STRATEGIC PLANNING

In 2011, the County Conservationist from Calumet County made a formal request to Wisconsin DNR to put Becker and Round Lakes on the state's impaired waters (303(d) list. The DNR acknowledged the request. At the time this report was written, the DNR was looking into starting the necessary water sampling and testing and water quality monitoring for Becker Lake for the designation.

In April, 2012, Calumet County adopted its new 5-year strategic plan for addressing land and water conservation resource concerns within the county. The *Calumet County Land & Water Resource Management Plan, 2012 – 2016* describes land and water resource conditions, identifies resource concerns, and outlines strategies to address the concerns. It lists ways residents and government will work together to improve these resources within the county. Improving surface water quality and reducing soil erosion are goals within the plan. The watershed area of Becker, Boot, Grass, and Round Lakes is listed as a critical area, in which actions and resources will be targeted to reach these goals.

NEXT STEPS

This grant project was successful in that it stimulated interest from lakeshore and watershed residents, farmers in the watershed, town and municipal officials, and conservation and outdoor sports club in the problems with the lakes and in improving them. The next steps towards improving these lakes will be to complete activities for a small scale DNR lake planning organizational grant. Hopefully a group of volunteers will be found to move forward in seeking assistance for and developing a lake management plan that includes all five lakes and their combined watershed. Once a lake management plan is developed, grant funds can be sought to put in the necessary conservation practices. The challenge will be to convince a majority of land owners and users to install the needed practices on their land.

In the meantime, Manitowoc and Calumet County staff, in cooperation with state and federal resource professionals, will continue to work with farmer and landowners within the watershed to educate them and to provide technical and financial assistance for installation of needed conservation practices.

