Sheboygan County

2013

Marsh Management Plan Update

Prepared by:

Sheboygan County Planning & Conservation Department &

Sheboygan County Recreational Facilities

Management Advisory Committee

Adopted: December, 2013

Broughton Sheboygan Marsh Strategic Management Plan 2013 Update

prepared under & authorized by

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lead agency

SHEBOYGAN COUNTY PLANNING & CONSERVATION DEPARTMENT

Aaron Brault, Director

Emily Vetting, Associate Planner

project team

SHEBOYGAN COUNTY RECREATIONAL FACILITIES MANAGEMENT ADVISORY COMMITTEE

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Thomas Epping, Sheboygan County Board District 15
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Dan Weidert, Wisconsin DNR
Jeremiah Dentz, Outdoor Skills & Education Center
Scott McMurray, Marsh Park Facilities Manager
Mike Holden, Northern Kettle Moraine Snowmobile Association
Fritz Goebel, Citizen
Lil Pipping, Citizen
Tim Chisolm, Citizen
Dave Derus, Citizen
Dave Smith, Citizen

There were also a number of interested citizens who spent a great deal of time on the plan update. They are: Sarah Dezwarte, Dale Katzma and Travis Motl. Ducks Unlimited should also be recognized for their efforts on the feasibility study of the Sheboygan Marsh dam.

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Acknowledgments

Preparation of the *Broughton Sheboygan Marsh Strategic Management Plan 2013 Update* was financially sponsored by Sheboygan County in its annual operating budget. The Sheboygan County Planning & Conservation Department was the lead agency in defining and developing the *2013 Plan Update* and in identifying its implementation strategies. The Sheboygan County Recreational Facilities Management Advisory Committee provided valuable insight and guidance throughout the entire plan update process. Their hard work and dedication is appreciated.

A special thanks should be made to those individuals who comprised of the original team that crafted the original *2001 Broughton Sheboygan Marsh Strategic Management Plan.* As with any planning document the goals and objectives and implementation strategies will change over time. However, as the original *2001 Plan* was so well written and thought out, the *2013 Update* went very smooth. In fact, other than a number of the goals, objectives and implementation items, much has not changed between the original and updated plan.

An additional thanks and appreciation should be made to all the individuals who attended the public input sessions and completed the online survey. There was a very good, commendable response from both forms of input.

Dan Weidert of the Wisconsin Department of Natural Resources provided valuable insight to the survey questions, provided important and relevant information at the public input sessions, and provided much of the updated WDNR information listed in the report.

The collaborative efforts of local, county, and state agency personnel, the Sheboygan County Recreational Facilities Advisory Committee (SCRFMAC) should be commended.

Aaron Brault, Sheboygan County's Planning & Conservation Director, was the *2013 Plan Update*'s principal author. It should be noted that much of the text from the *2001 Plan* was still relevant, especially the background text, and that the authors of the *2001 Plan* deserve much credit in the *2013 Plan Update* as well.

Broughton Sheboygan Marsh Strategic Management Plan 2013 Update

Mission & Vision

This plan will be a guide to the successful management of the Broughton Sheboygan Marsh's future. The plan will be based on science and proven management techniques guiding the stewardship of the treasured resource that is the Broughton Sheboygan Marsh.

Goals & Objectives

1. To preserve this ecologically, geologically, & archaeologically significant area of Wisconsin for present and future generations.
2. To provide recreational & educational opportunities that are clearly complementary & compatible with the natural environment of ***Sheboygan Marsh***.
3. To protect species, communities, & ecosystems and demonstrate sound resource management.
4. To retain a place to experience and embrace nature.
5. To develop those programs and facilities that will promote the natural and cultural resources of ***Sheboygan Marsh***, and enhance the use and enjoyment of this ***special place***.
6. To support opportunities to add lands that are deemed necessary to protect the waters, lands, and living resources at ***Sheboygan Marsh***.
7. To encourage consideration of conservation values in the management of ***privately-owned***, adjoining lands and waters.
8. To strengthen relationships with neighboring landowners, conservation organizations, and local municipalities.
9. To foster public participation and increase public understanding of how the management decisions regarding the ***Sheboygan Marsh*** are made and applied.
10. To manage today, for tomorrow, with the vision of Charles E. Broughton yesterday.

Executive Summary

The Broughton Sheboygan Marsh Park & Wildlife Area is the prominent feature in a 133 square mile watershed of the Sheboygan River. This pristine area contains about 14,000 acres of land and surface water, of which 7,414 acres are owned by Sheboygan County and an additional 752 acres are owned by the State of Wisconsin. The balance is under private ownership.

The Marsh exists due to the retreat of the last glacier that covered the region. Melt waters and successive flows were blocked by a prominent rock outcropping which served as a dam.
Over thousands of years, the original glacial lake formed behind the outcropping filled with decaying plant matter to form the present day Marsh. In fact, up to 100 feet of marl and peat fill the basin.

The Marsh is home to white tail deer, wild turkey, coyotes, fox, great blue herons, sandhill cranes, ruffed grouse, red-tail hawks, sora rails, yellow-headed blackbirds, rabbits, raccoons, muskrats, and mink. The Marsh is an important waterfowl nesting and staging area. Fish species include northern pike, bass, black bullhead, and panfish. In addition to these larger and widely known animals, the Marsh is a biological repository for countless other organisms, many of which may never be seen by the casual observer.

Most people would probably agree that preserving the Marsh is a good idea, but that was not the case from about 1870 to about 1930. During those years, there were several schemes to drain the Marsh and convert it to farmland. Enormous steam-powered dredges were used to dig ditches, and more than 20 miles of those drainage ditches can still be seen and traversed in the Marsh today.

Large parts of the Marsh were actually drained by these attempts, but the personal fortunes of investors were squandered as sales of the drained lands never materialized. Instead of the “Utopia” proponents had hoped for, draining the Marsh resulted in environmental devastation, and large areas of the Marsh became wastelands instead of wetlands.

Beginning in 1927, conservation-minded citizens began attempts to restore the Marsh. These efforts were led by Charles E. Broughton and the Sheboygan Chapter of the Izaak Walton League. Mr. Broughton started by donating 80 acres of the land to Sheboygan County. The County subsequently purchased 6,349 acres at a public foreclosure. In 1938, a dam was constructed by the Federal Works Progress Administration. The new dam quickly reflooded the area, and the Marsh once again flourished as it does to this day.

Just based on this short history one can see that there are many issues that surround the management of the Broughton Sheboygan Marsh. From water level management to acquisitions, the ultimate goal of this plan is to provide Sheboygan County with a sound, scientific guidance on how best to oversee the various matters which take place at Sheboygan County’s most significant ecological resource.

Compared to the 2001 plan, the most significant changes to this plan include the drive for more educational and recreational opportunities, the implementation strategies concerning bog management, forestry management and fishery management, as well as the recommendation that a drawdown occur every 5 years (or sooner if ecologic conditions warrant) without question.

As with any plan, this document is a guide and should be a living, working document that changes or is updated due to future circumstances that may take place not foreseen at the time of publishing. Only then, will its guidance be accurate and logical.

Figure 0

Location Map of Broughton Sheboygan Marsh Park & Wildlife Area

Sheboygan County, WI

Figure 0 - Marsh Location Map

Chapter 1 – Priority Issues, Concerns, & Topics

Introductory Comments

The priority issues, concerns, and topics set forth in this plan were identified and prioritized through information gathered at two public input sessions and through an online survey. Both these methods employed a structured public input process (See Appendix A).

Priority Issues, Concerns, & Topics

As with the original *2001 Plan,* a number of issues, concerns, and/or topics became a consistent theme throughout the discussions. From the input gathered for the *Plan Update,* those issues, concerns, and/or topics that were most prevalent were:

- *Continue to provide and expand the educational opportunities at the Marsh*
- *Research & implement better water level & associated cattail management at the Marsh*
- *Proper planning, keep the surrounding area from being developed*
- *Provide more recreational opportunities at the Marsh*
- *Manage the Marsh for what it is, a marsh*
- *Maintain a fishery*

Because of the diverse user-groups at the Marsh, there is no way that the decisions made from the guidance of this plan will ever please everyone. That is why, the implementation strategies regarding the above and other identified issues, concerns, and/or topics are based on scientific and professional knowledge, not hearsay or whims.

Each of the above mentioned issues, concerns, and/or topics is explored in further detail below.

Educational Opportunities

Since 1992, the Camp Y-Koda Outdoor Skills Center has held environmental educational opportunities at the Marsh for children and teens of all ages. Each year thousands of area school district children and teens embark upon the Marsh to learn about wetland ecology. Though not limited to the following, the participants partake in a canoe tour of the wetland learning about the natural history, and observing biodiversity and ecological interactions within the area. Discussions are generated around key concepts including: succession, ecosystems, community, food chains, wetland functions and more. Students participate in an activity showing how wetlands have been diminished over time. Students also use the scientific method to determine if the marsh is a healthy ecosystem based on macro invertebrate sampling and identification. Students also participate in activities that demonstrate the relationship of predator and prey, and competition.

Figure 1 - Kayaking at the Marsh

During the public input sessions when attendees were asked what they liked about the Marsh and what they felt could be improved at the Marsh in the future, educational opportunities was the top answer. One of the implementation strategies listed in Chapter 2 is to construct a new multi-purpose building at the Marsh, in part, to house an improved educational facility. Currently, the educational classes are housed in a donated semi-trailer. Though the donation of the trailer is greatly appreciated and has served its purpose well over the past 20 years, the time has come when something more permanent and flexible is needed. The Camp Y-Koda Outdoor Skills Center has become such a popular educational opportunity for the local school districts, space is at a premium and the program is nearly to the point where they have to turn away interested groups. The program too would also like to expand into more year-round offerings as demand has incited this conversation to come forth. The construction of a new multi-purpose building would definitely help the educational opportunities maintain and improve their success.

Educational opportunities as those afforded by Camp Y-Koda's programming provide lifelong lessons in proper and appropriate care for our environment. A legacy of knowledge regarding the Marsh's health is provided through the educational programming. Further enhancing these opportunities can only help protect the Marsh. Time and time again during the public input meetings and after reviewing the online survey we heard or saw quotes like the following detailing the strong support for maintaining and improving the educational opportunities.

> *"Develop any type of activity that would educate/introduce our youth to the great outdoors, in particular something that drives home the importance of hunting/fishing as a game management tool. Let's develop/offer activities that teach all ages that the Sheboygan Marsh is a great resource to be shared by all."*
>
> *Quote from online survey response.*

Water Level Management

Throughout modern history, water level management at the Marsh has been on the forefront of any discussion about the resource. The water level dialogue is quite broad as it affects many different aspects of the Marsh. For example, drawdowns have been scientifically shown to mimic ecologic effects of drought conditions prior to any attempt at human management. In essence, drawdowns are a necessary tool in providing for a diverse, healthy marsh ecosystem. However, drawdowns can be quite controversial in that they no doubt affect a number of different user-groups such as fishermen. The results of the public input sessions and online survey (See Appendix A) showed this dichotomy clearly. One of the top responses when asked what the future should hold at the Marsh was more frequent drawdowns and to

Figure 3 - Cattail Removal 2011

Figure 2 - Marsh Drawdown 2011

manage the Marsh as a marsh, not as a fishery. Conversely, one of the other top responses, though below the former, was that a fishery should be maintained at the Marsh. Drawdown cycles obviously do not promote an extensive fishery.

Another water level management issue that arose after the manmade dam was built in 1938 was controlling the floating cattail mats that back up behind dam. These mats are a result of the rapid fluctuation of the waterbody after heavy rain events as the mats are "ripped" away from their roots and eventually float downstream to behind the dam. In 1968, a bypass tube was installed around the northside of the dam to try and help control the water level fluctuations. This tube, however, proved too small and the cattail problem has persisted. Luckily, in 2012 Ducks Unlimited took an interest to the problem and agreed to partner with Sheboygan County and the WDNR to conduct a feasibility study as to how to better control water levels of the waterbody. They are considering a larger bypass tube, spillways, a new dam design, and/or a combination of different mechanisms to allow more water to pass during heavy rain events or thaws.

Overall, the primary reasons for water level management at the Marsh are to: 1) reduce problems with floating cattail mats, and 2) improve the ecological diversity thereby improving all wildlife habitat as a result.

What follows is mostly text from the *2001 Plan* that provides a detailed history of the water level issues and the water level strategies available. The thoughts in this area of the *2001 Plan* are no different than what they were in the *2013 Plan Update*.

Cattail Bog Removal Costs		
Year	Cost	Comments
1880s		Bertschy attempts drainage - (lowers ~7")
1910s		Land & Lime Co. drains marsh
1921-37		Drawn down - peat fires
1938		Dam built to restore water levels
1953		Alarm over loss of cattail bogs - high water
1968		Problems w/ floating cattails noted. Drawdown & installation of bypass.
1980		Problems w/ floating cattails noted
1981		Cattail blockages @ dam and river
1984		Cattails removal prior to partial drawdown
1985		bulrush removed, high water
1986		Flooding in September/fish kill
1987		Complete drawdown + fish eradication
1988		Drought ~13-inches below dam
1993	$ 2,409.00	Flooding
1994	$ 1,842.00	Easterly winds
1995	$ 351.00	Partial drawdown
1996-2000	$ 82,840.00	
2001	$ 39,191.00	Strategic Management Plan completed
2002	$ 666.00	Drawdown from May to Nov. 2.25" rain raised water 2.65' during drawdown.
2004	$ 1,211.00	17.29" rain 5/8 to 7/8. 20-year all-time record water level on 6/14 (~34" over).
2006	$ 509.00	Helicopter spraying of cattails in lake area, ditches, & river blockages.
2007	$ 1,177.00	
2008	$ 4,947.00	11.1" rain 6/4 to 6/17 raised levels by 30" (~34" over). Cattail spraying.
2009	$ 4,570.00	
2010	$ 67,300.00	16.6" rain 6/8 to 8/2. ~500 dump-truck loads of cattail bogs hauled away.
2011	$ 47,689.34	Drawdown from May to September.
2012	$ -	Summer drought, no cattail removals needed. Summer spraying from helicopter.
	$254,702.34	Total costs since 1993.

Table 1 - Historical Bog Removal Costs

> *"It is my understanding that more precise control of the water table cannot happen with the current dam and bypass tube. Serious consideration should be given to updating these structures."* *Quote from online survey response.*

Water Level History

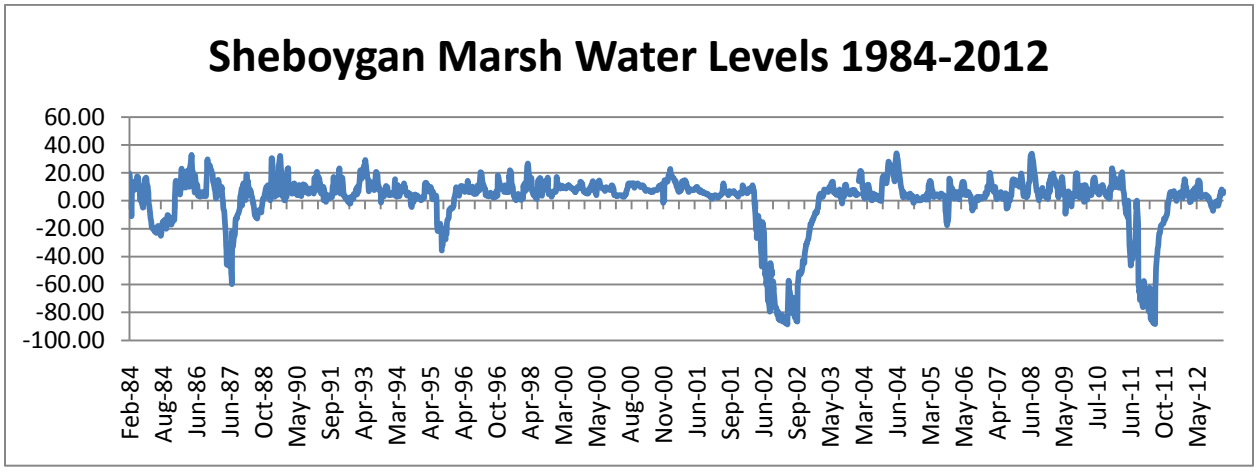


Figure 4 - Water Level History 1984-2012

The Sheboygan Marsh "flowage" is in fact a restored wetland; restoration was completed in 1938 with the installation of the dam. The water levels were restored, "according to the engineer in charge, to about what it was between the years of 1868 to 1921." This level was verified by a field investigation in 1999 & 2000 (Chapter 3). Water level does not mean depth, however. The depths in 1938 were much greater than the depths reported by Peterson and Sinz in 1905. "No data was given in the government surveys of 1837, but undoubtedly the Marsh was deeper in places in 1938 than it was in 1837" (Herman, 1941). This was probably the result of peat fires and normal oxidation of the soils during the period that the Marsh was drained between 1921 and 1937.

While the problems with floating cattail mats and the "opening up" of the Marsh was well-evidenced back in the 1940s and 1950s, media accounts documented those problems beginning in the late 1960s. In a more recent timeframe, flood events in 1995 and 1997 exasperated the floating cattail mats prior to the 2002 drawdown. In 2010 and 2011, record amounts of monies were spent to rid the cattail mats. High water levels, high wind events and the time lag between drawdowns appeared to be the primary culprits in these years. In some instances, over 3 acres of cattail mats backed up behind the dam. The following figures illustrate those backups.

Figure 5 - Cattail Backup Spring 2011 Prior to Drawdown

Figure 6 - Cattail Backup Fall 2010

Over the recorded history of the Marsh the water levels have been manipulated quite frequently in one way or another. The following table, Table 2, chronicles over a century of these manipulations.

Table 2 - Water Level History

Timeframe	Event
1870-1890	John Bertschy attempted drainage – but succeed in lowering the limestone ledge at the outlet only 6-8 inches (1).
1904-1905	Peterson & Sinz conducted an engineering study on how to drain the marsh (1). Description of the outer edge of the marsh indicated occurrence of tamarack and brush similar to what it is today. They wrote, "The Central portion is a prairie covered with tall marsh grass, which is a source of large fires each fall." They also wrote, "The limestone ledge is the main cause of the existence of the swamp…the cross section of the channel at this point being so very small as compared to that in the swamp, in time of flood flow it is entirely too small to carry all the water. In the spring of the year the eastern part of the swamp for two to three miles up is entirely covered."
1912-1921	Sheboygan Valley Land & Lime Company attempted to drain the marsh. More than 20 miles of ditches, varying in depth from 6' to 20' were dug. A channel was blasted through the limestone ledge on the eastern edge of the marsh. The project was fairly successful, but post-war farmland prices were low and availability high. The promoters eventually defaulted on their taxes.
1921-1927	Peat fires, oxidation, and compaction lowered the bottom of the marsh.
1928 & 1931	A local group of concerned citizens built a temporary dam.
1936	Site of the dam and adjoining 8 acres purchased by C.E. Broughton
1937-1938	W.P.A. built the present dam
1938	Dam completed in March. Water levels restored; according to engineer in charge, to about what it was between the years 1868 to 1921. Water levels were probably about the same but peat fires, oxidation, and compaction of the bottom sediments meant water depths were greater than found in 1921.

Timeframe	Event
1938, 1941, 1942, 1949, 1952	"The area of open water on the Sheboygan Marsh has been increasing in size since 1942. Previously, this particular area had a considerable stand of wild rice, hardstem and river bulrush, and some seed grass. When visited in 1949, the area of open water appeared to be at least 150 acres in size. It is believed that this increase in size of the open water area is due in a large measure to the high water level held at the dam (2)."
1953	Water level raised another 6 inches by the installation of a 6-inch I-beam as flashboards on top of the spillway.
1968	A bypass was installed around the dam with state, county, and sportsmens funds. "The purpose was to allow water-level management in the marsh to improve hunting and fishing and to reduce loss associated with marsh bogs." (Sheboygan Press, April 1967, March 1968).
1981-1983	Floating mats of cattails blocked flow at the dam, and in the river downstream of the dam.
1984	Sheboygan Marsh Master Plan & Management Agreement between state and county was completed. Removal of 6" I-beams from the top of the spillway. Partial summer drawdown (~18" below the spillway). Redredged the south ditch. Great response by annual wet-soil plants such as smartweed and bidens.
1985	Perennial plants appear such as softstem bulrush, arrowhead, bur-reed, water plantain and some new cattail growth. Good response by wildlife with black terns and yellow-headed blackbirds returning. Ducks and muskrats increasing in numbers.
1986	Heavy fall rains (record 13" in September) result in a fish kill and floating bulrush mats at the dam.
1987	Complete summer drawdown to conduct chemical fish eradication. Redredged area in front of the dam. Smartweeds and bidens respond well.
1988	A drought year with a natural partial drawdown of water levels to almost 13 inches below the spillway in August of that year. This allowed for expansion of cattails throughout the lake area.
1993	Problems with floating cattail mats after record-setting rainfall during the spring and summer. (Fond du Lac County declared a disaster area for federal flood damage funds). Approximately 250 acres of cattails float to the dam area.
1995	Partial drawdown with low precipitation – causing levels to go down to 3 feet below the spillway for approximately one week in July. Hot, dry summer with partial fish kill. Poor response by annual aquatic plants and very little cattail expansion.
1996	Some response by soft-stem bulrush, arrowhead, giant bur-reed and large quantities of duck weed.
1997	Unusual rainfall periods (i.e. >6" in 3 days in June).
1998 -2001	Continuing problems with floating cattail mats at the dam.
2002	Full drawdown takes place.
2008-2009	Bog removal efforts creep up.
2010-2011	Bog removal efforts are extraordinary. Over 700 truckloads of material have to be removed in 2010 and another 450 in 2011 prior to the full drawdown.
2011	Full summer drawdown. Good growth of bidens, bulrush, and other native species.
2012	Partial drawdown due to drought. No cattail mat removal needed.

Water Level Strategies

The following impact analysis is based on published literature, experience with water level management of similar flowages in the state, and on past experience with water level management on *Sheboygan Marsh*.

There are two written reports from two "outside" experts, after field visits on the Sheboygan Marsh: Art Techlow, DNR fishery biologist with extensive experience on the Winnebago Lakes system (1998); and Russ Terry, a Ducks Unlimited habitat biologist (1999). In 2011, as part of the plan update process, Mr. John C. Panuska, Ph.D., P.E, a Natural Resources Extension Specialist in the Biological Systems Engineering Department at the University of Wisconsin, presented to those on the planning team as well as interested citizens regarding drawdowns, drawdown effects, and possible alternatives. Similar to Mr. Techlow and Mr. Terry provided for the *2001 Plan,* Mr. Panuska also stated drawdowns are a beneficial tool towards wetland health.

Mr. Techlow stated, *"Floating cattail mats are symptomatic of flowages with high water levels, and with too long of intervals between drawdowns."* In comparing similar problems at nearby Eldorado Marsh and Rush Lake, he noted, *"The best managed marshes typically have more frequent drawdowns, 4- to 5-year intervals, and keep lower water levels."*

Mr. Terry reported, "*Floating cattail mats most commonly occur in impounded areas that are infrequently or never drawn down*." He felt the partial drawdowns every 5-7 years were too infrequent, and concluded, "*I recommend a water level management scheme where water is slowly drawn down every 2-4 years*."

Mr. Panuska stated too that drawdowns every 4-6 years, or if ecological indicators illustrate the need sooner, are important to thwart the undesired consequences of floating cattail mats at the Marsh.

In his book *Freshwater Marshes – Ecology and Management* world renowned expert M.W. Weller also discusses loss of emergent aquatics in marshes which is a subject directly related to drawdowns. One can see in the following figures the affects hydrology and vegetation have on wildlife populations.

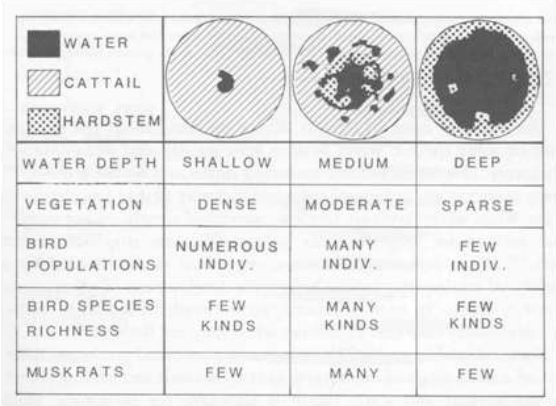


Figure 7 - Emergent Aquatics Illustration

As a marsh passes from dense vegetation to open water because of the action of high water and muskrat activity, considerable change takes place in the numbers of muskrats and birds, and a major change in bird-species richness. The same differences in numbers or species tend to occur in wetlands that, because of water depth, remain in these "stages" for long periods. (Weller, M.W. Freshwater Marshes – Ecology and Management. 1981)

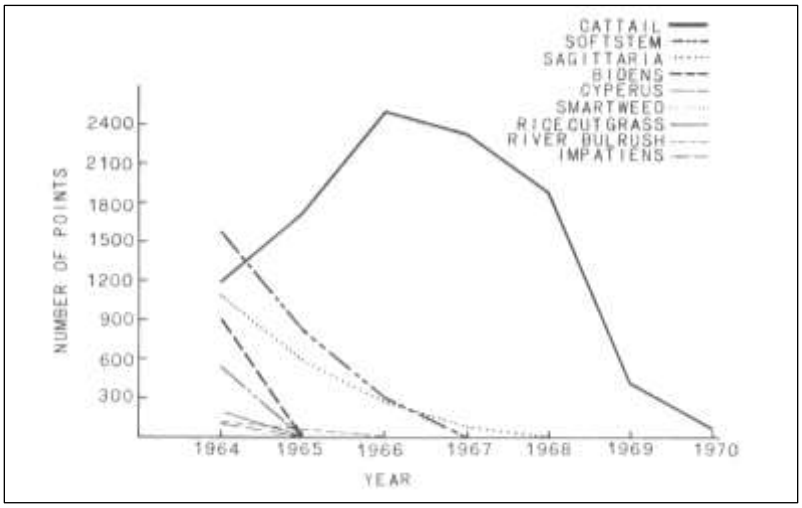


Figure 8 - Cattail Growth Consequences

Decline of wet-meadow and mud-flat species concurrent with growth in abundance of cattail. Following reflooding, wet-meadow species such as beggars-tick (Bidens) and smartweed were eliminated in one or two years. Marsh-edge species like arrowhead and softstem bulrush survived two to four years of flooding, whereas cattail increased for several years until it was eaten out by muskrats or floated up by high water. (Weller, M.W. Freshwater Marshes – Ecology and Management. 1981)

Considering the input received from the public and from what professional experts reported in both the *2001 Plan* and as part of the *2013 Plan Update* the following alternative impact analysis was completed. Each of the presented alternatives was analyzed by evaluating the likely impacts to: 1) aquatic vegetation, 2) wildlife, 3) fish, 4) navigation/boating, 5) other environmental impacts, and 6) upland vegetation. Six strategies were reviewed and evaluated:

1. Maintain "normal" water levels.
2. Maintain "normal" water levels, except for bypassing water during peak flows in spring & fall.
3. Lower the average water level by 0.5 to 1.0 feet.
4. Conduct winter drawdowns.
5. Conduct partial summer drawdowns.
6. Conduct full summer drawdowns.

Figure 9 - Water Management Impact Analysis

Water Level Strategy	Aquatic Vegetation		Wetland Wildlife		Fish		Boating & Navigation		Other Env. Impacts		Upland Vegetation		Total Score	Comments
	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term		
Normal Water Levels	-1	-1	-1	-1	1	-1	1	-1	-1	-1	0	0	-6	
Normal w/ Peak Attenuation	1	-1	-1	-1	1	-1	1	-1	-1	-1	0	0	-4	
Lower Levels by 0.5-1.0 Feet	1	-1	1	-1	1	1	-1	-1	-1	-1	-1	-1	-4	
Winter Drawdowns	1	-1	-1	-1	1	-1	-1	-1	-1	-1	0	0	-6	Hazardous for ATV & Snowmobile Users
Partial Summer Drawdown	1	1	1	0	-1	-1	-1	0	-1	1	0	0	0	
Complete Summer Drawdown	1	1	1	1	-1	0	-1	0	-1	1	0	0	2	Carp Control Possible, Dredging Possible

Analysis Indicators Considered Short-term & Long-term Effects
1 = Positive, -1 = Negative, 0 = No Impact

1. Maintain "normal" water levels.

Under this water level strategy, normal water level fluctuations would occur without any attempt to control water levels with the bypass structure. There would be larger water level fluctuations than occur now, especially in the spring and fall.

- Aquatic vegetation: The diversity and quantity of emergent plants would continue to decline as wave action, ice and carp dislodge cattail mats along the edge of the open "lake" area. Submergent plant diversity would likely decline as well, from increased suspension of silt and less sunlight penetration.
- Wildlife: Less cover and lower plant diversity would result in lower numbers and diversity of wildlife using the deep marsh area. Waterfowl numbers would decline during the breeding season (less cover for nesting and brood habitat) and migration (less cover and food), except for an increase in use by diving ducks during the latter part of migration. Muskrat and mink

numbers would decline, as well. There would also be a decline in shorebird and wading bird use, as well as in use by terns and songbirds.

- Fish: This alternative would have the least impact to fish communities in the Marsh. Populations would experience natural fluctuations in population size and length structure.
- Navigation/boating recreation: Opportunities for this activity would likely increase during spring, early summer, and fall. Dense growth of coontail and milfoil would likely restrict boating activities during mid-summer and early fall.
- Other environmental impacts: As plant diversity decreases and suspended sediments increase, the diversity and number of invertebrates, and planktonic species will decrease. The open water area of the marsh will continue to increase and emergent vegetation will decline; this will lead to increased wave action and suspension of sediments.

2. Maintain "normal" water levels, except for bypassing water during peak flows in spring and fall.

We would expect similar results as found with strategy 1. Northern pike may be negatively impacted by this alternative as flooded vegetation would be less available in most years during the egg laying and incubation period at ice out. Northern pike fry and fingerling may be stranded in isolated pockets of water.

3. Lower average water levels by 0.5 to 1.0 foot.

The mudflats that would be exposed would initially sprout a variety of annual and then perennial plants. But, within 3 to 4 years those areas would likely fill in with cattails. The area of open water would be reduced by about 25 percent and the remaining area would be shallower by 0.5 to 1.0 foot. Cattails may invade more of the remaining "lake" area, as the optimal depth for cattail growth is 1.5 to 2.5 feet. Water level fluctuations would continue to be a problem and floating cattail mats may be even more of a problem.

- Aquatic vegetation: Would increase the amount of emergent vegetation because of shallower water levels. Problems with floating cattail mats would likely continue, and may become worse. Submergent plants would decrease because of less area but would be dense in the remaining "open" water areas.
- Wildlife: Waterfowl and other water birds would likely increase initially but may decline over time, as the diversity of emergent vegetation declines. Use by migrating diving ducks would likely decline. Muskrat and mink populations would increase initially and then decline as emergent vegetation declines. General loss of wetland species with the loss of deep water marsh habitat.
- Fish: The lowered residence time of water in the Marsh may be beneficial to many fish species. The faster exchange of water should be especially beneficial in winter when stagnant areas of the Marsh experience depleted oxygen conditions. Fish would be more confined to flowing areas of the Marsh in natural and man-made channels.

- Navigation/boating recreation: The opportunities for this activity would decline, especially in the spring and fall. Opportunities on the river itself would remain about the same.
- Other environmental impacts: There would be an increase shrub and tree growth with lower water. Over time more area of shrub-carr, lowland timber, and wet meadow wetland types would develop.

4. Winter drawdowns.

Water levels would be drawn off after ice has formed, likely in early December. Another approach would be to keep water levels high until February, or early March, and then draw down in anticipation of spring runoff. Late winter drawdowns would have less severe impacts on wildlife and aquatic plants. Regardless of the method, the water levels would be kept as low as possible until after all the frost had left the ground and cattail mats.

- Aquatic vegetation: The large watershed, 133 square miles, limits the efficacy of this technique in reducing flooding and dislodging of cattails. This technique may reduce floating cattail problems but would impact survival of some aquatic plants because of freezing under the ice. Loss of muskrats may limit their impact on reducing the area of cattails. The diversity of submergent plants would be reduced, as well as quantity. Without periodic drawdowns during the growing season the variety and quantity of emergent plants would also decline.
- Wildlife: Muskrats, mink, otter, and beaver would likely be impacted to some unknown degree. Loss of muskrats through winter freeze-outs would be likely. If the variety of aquatic vegetation were reduced there would likely be a reduction in wetland birds, including waterfowl.
- Fish: The impacts of this alternative are similar to those in Alternative 3. The lowered residence time of water would reduce the areas impacted by low oxygen conditions. Fish would be more confined to flowing areas of the Marsh.
- Navigation/boating recreation: Minimal impacts to boating. Hazardous conditions would likely develop for snowmobilers and ATV users using frozen navigation routes for recreation during the winter.
- Other environmental impacts: Lower survival of invertebrates, mollusks, and herptiles, etc.

5. Partial summer drawdowns.

Partial summer drawdowns were conducted in 1984 and 1995, in an attempt to limit problems with floating cattail mats and improve wetland wildlife habitat while limiting impacts to the fishery. The 1984 drawdown was successful in stimulating germination and growth of aquatic vegetation. There was some new cattail growth around the fringes of the remaining cattail areas. The 1995 partial drawdown did not seem to be effective in stabilizing the large mass of floating cattails for more than that year (Table 1).

- Aquatic vegetation: Vegetation response to the 1984 partial drawdown was textbook: submergents were primarily coontail and about 40 acres of wild celery; the annual, first year, emergents were composed of dense stands of smartweed and bidens, with perennials showing up the next year—primarily softstem bulrush but also wild rice, arrowhead, burreed, and some cattail expansion—mostly along existing cattail beds. Cattail mats were stabilized until flooding in September of 1986 (Table 1); even with the parking lot flooded in fall of 1985, cattails were not a problem.
- Wildlife: There was a good response to improved habitat conditions with a big increase in migratory waterfowl use the first fall (> 3500 ducks staging), as well as breeding bird increases seen for ducks, black terns, wading birds, and yellow headed blackbirds. Although no formal surveys were done, many more muskrat houses were evident in 1985 and 1986.
- Fish: Fish populations have declined during past partial drawdowns. The declines were temporary in scope with recovery generally occurring within 4 years of the drawdown. Temperature and low oxygen stress were the most likely causes of summer kills of fish during past partial drawdowns.
- Navigation/boating recreation: Partial drawdowns would decrease opportunity and use by boaters from June through August, although some access would still be available for canoes.
- Other environmental impacts: Scientific literature on drawdowns indicate that allowing vegetated aquatic areas to remain, as in a partial drawdown, provides areas for invertebrates and mollusks to survive and repopulate the flowage at full pool. Partial drawdowns retain more habitat for waterfowl, muskrats, and other wetland species during the year of the drawdown than a complete drawdown would provide. Water clarity and quality improves the year of and for a year of two after partial drawdowns.

6. Complete summer drawdowns.

Complete summer drawdowns were conducted in 1968, to install the bypass tube, and again in 1987, to allow a fish eradication project. There were also complete summer drawdowns in 2002 and 2011. There are not good records for years following the 1968 drawdown, but initial response was very similar to the results from the partial drawdown in 1984. Apparently, there were not major problems with floating cattail mats because there are no records of having to remove cattails until around 1981 when newspaper accounts and file records indicate that cattail mats were blocking water flow at the dam and downstream in the river. Response to the 2002 drawdown was good in that cattails did not again become an issue until 2009. There were vast issues with floating mats in 2009, 2010 and then in early 2011 prior to the effects of that complete drawdown. Though the response to the 2011 drawdown cannot be fully gauged at the time of publication, no cattail mat removal was necessary in 2012.

- Aquatic vegetation: 2011 vegetation response was again as would be expected, with dense growth of smartweed and bidens showing up the first year; followed by perennials like bulrush, arrowhead, burreed, and wild rice. File references and photos indicate that cattails expanded

along the existing cattail beds but not into the "lake" area during the 1968 drawdown. The complete drawdown in 1987 was followed by a drought in 1988 that lowered water levels about 18 inches, equivalent to a partial drawdown; the result of back-to-back drawdowns was germination and then growth of cattails throughout the "lake" area of the marsh. The cattails were stressed by deeper water in the "lake" area (~ 3 feet) after 1988 but persisted and slowly expanded, especially the root complex, through 1992. There were no problems noted with floating cattail mats from 1987 through 1993, when major floods occurred throughout the midwest. Flood conditions existed in April, June, and July of 1993, ripping up cattail mats throughout the "lake" area, approximately 250 acres. Similar to the 1987-1988 drawdown period, the 2011 drawdown witnessed a drought in the following year leading to water levels dropping approximately 10 inches. There were no cattail removals necessary in 2012. WDNR staff estimates that the cattail growth in 2012 replaced what was lost in 2009, 2010, and 2011 during the heavy flow of cattail mats to the dam area.

- Wildlife: The response from wetland wildlife species were similar to those reported under partial drawdowns above for both the 1968 (D. G. Olson, 1969, Sheboygan Marsh Renewal, Wisconsin Conservation Bull. Vol. 34, No. 3) and 1987 drawdowns (DNR file references). Production of wetland dependent wildlife species is reduced during the years of complete drawdowns but improved habitat in subsequent years more than makes up for these losses.
- Fish: Full drawdowns have the greatest negative impact on fish communities in the Marsh. However, full drawdowns present the opportunity to temporarily control carp which are then confined to small areas of the Marsh where they may be eliminated with the application of the chemical rotenone. Recovery of the fishery occurs generally within four years of the full drawdowns.
- Navigation/boating recreation: Obviously boating access is very limited during the time that the water levels are down (June through August), with only limited canoe access on the river channel itself.
- Other environmental impacts: Although no surveys were done on impacts to mollusks, invertebrates, and herptiles, it can be assumed that a full drawdown does impact abundance during the year of the drawdown; Increased vegetation and nutrient release from the drawdowns likely increase these production of these organisms in subsequent years. Increased vegetation and compaction of sediments during the drawdowns improves water clarity, and probably water quality in the marsh and river. As seen in Figures 7 & 8 the most commonly accepted scenario for optimal wildlife habitat on a deep water marsh is to provide approximately 50% dispersion of emergent vegetation with open water (termed a hemi-marsh). This scenario provides the best condition for many individuals and greatest variety of wildlife. The accepted method to produce hemi-marsh conditions is through drawdowns of water levels.

Land Use Planning

Professionals involved in the *2013 Plan Update* process as those individuals from the general public who participated by attending a public input session or completing the online survey felt that appropriate

planning and zoning measures were important to protect the unique natural area Sheboygan County is blessed with. In fact, when attendees at the public input sessions were asked they currently like about the Marsh, the number two answer after educational opportunities was lack of development in and around the area. When asked what they felt was important to them regarding the future of the Marsh, the fourth and fifth top answers were land use planning related. Considering these answers and that even in the *Wisconsin State Comprehensive Outdoor Recreation Plan 2011-2016* planning related objectives are one of the seven main goals, it is no doubt that development pressure is perhaps arguably one of the most challenging problems facing outdoor recreation in the state and county.

It is no surprise that the towns surrounding the Marsh have been progressive in their planning efforts. These entities have realized the value of the Marsh and have planned accordingly. The Towns of Russell, Greenbush, and Rhine, within which the entirety of the Marsh is located, have all adopted Smart Growth plans and all of the entities are zoned.

As illustrated in Figure 10, the Towns have essentially zoned all of the undeveloped lands at the Sheboygan Marsh as either Lowland Conservancy (C-1) or Upland Conservancy (C-2). This stewardship is also reflected in each of the their Smart Growth land use plans where much, if not all, of the land surrounding the current publicly owned Marsh land is planned as "Natural Area" or equivalent.

Sheboygan County, through its zoning authority, has also restricted many land uses surrounding the Marsh through Chapter 70 of the County Shoreland-Floodplain Ordinance. This ordinance was enacted in 1970 and has gone through several revisions since that time with the latest update occurring in 2012. See Figure 11.

Further explanation is warranted regarding the two planning issues that scored highly for future considerations. Better nutrient and runoff management scored quite high as a future consideration. Nutrients such as nitrogen, a common ingredient in fertilizer, enter the Marsh ecosystem through poor runoff management practices. The County and WDNR have both recognized this issue as significant problem to our water resources as these additional nutrients spawn excessive vegetative growth and promote algal blooms. Both entities have programs to help combat this issue, however, there has never been a targeted effort to work with the surrounding landowners of the Marsh. Chapter 2 lists this planning effort as an implementation objective.

The other high scoring planning item mentioned was redeveloping or developing wetland areas upstream of the Marsh. Having these areas exist would help filter nutrients prior those waters entering the Marsh, they would provide additional flood storage to help alleviate the rapid fluctuations currently seen at the Marsh, and they would ultimately provide additional habitat. As the public lands of the Marsh nearly run to the Sheboygan County line, Sheboygan County, WDNR, and Fond du Lac County will have to work collaboratively to make this planning effort a reality. As with the aforementioned planning item, this item too is listed in Chapter 2 as an implementation objective.

Though not directly stated as a high priority, additional land acquisitions surrounding the Marsh will help aid in the above two planning factors that were directly stated. According to the adopted *Sheboygan*

County Comprehensive Outdoor Recreation Open Space Plan a number of parcels adjacent to the Marsh are considered high priority acquisition areas (see Figure 12). These areas are considered high priority because they lie in watersheds that are degraded and are in need rehabilitation and protection and/or they have natural features that need to be protected. Some of the areas identified are also part of the WDNR's Land Legacy Program. The goal of that program is to identify the places believed to be most important to meet the state's conservation and recreation needs over the next 50 years.

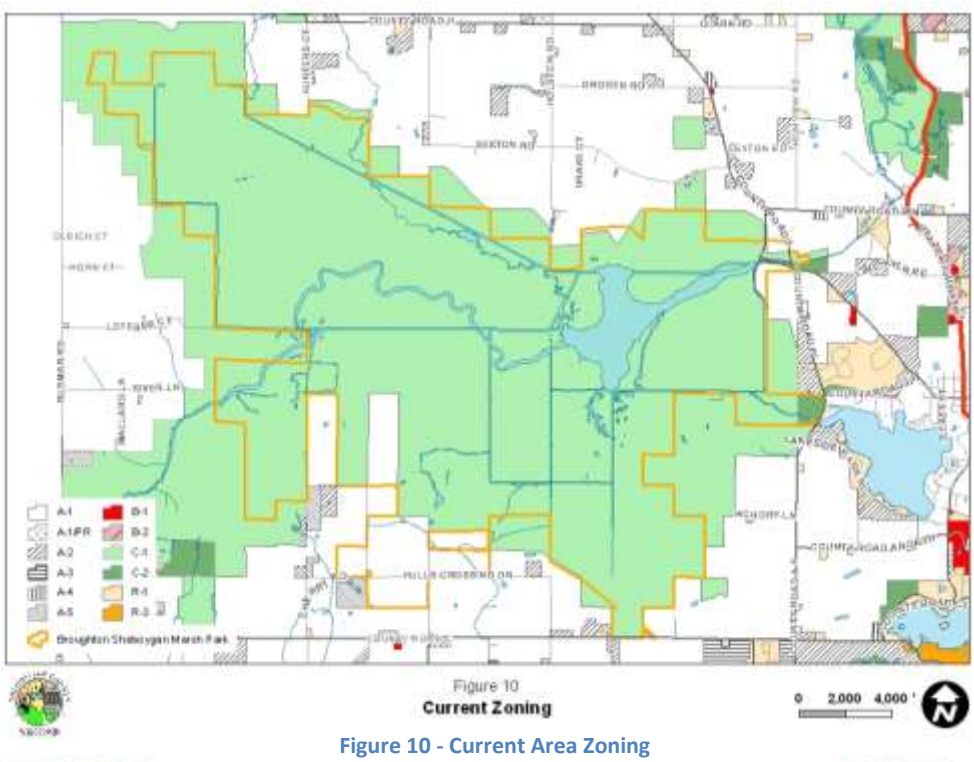


Figure 10 - Current Area Zoning

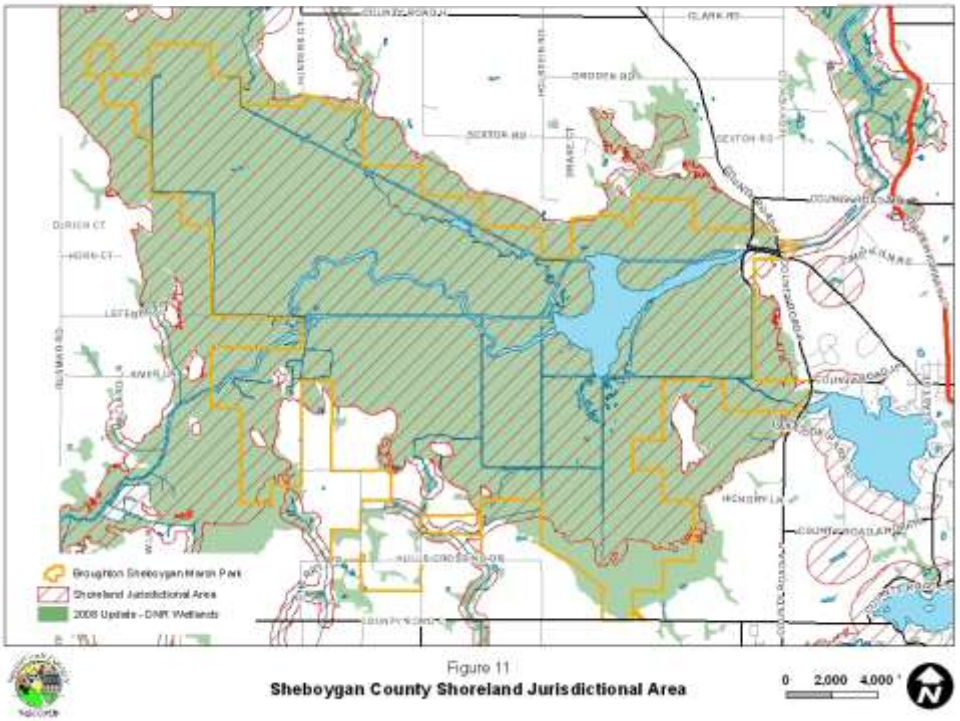


Figure 11 - County Shoreland Jurisdictional Areas

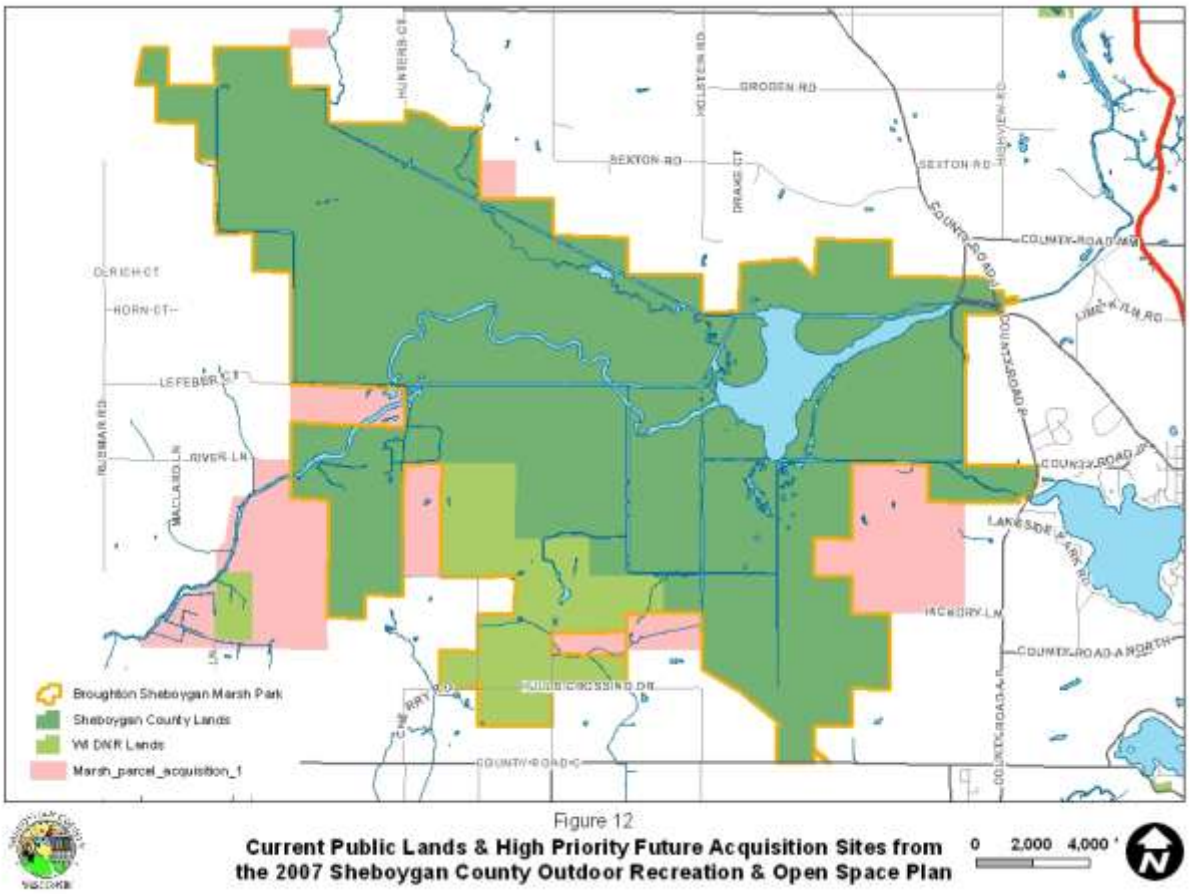


Figure 12 - Current Public Lands & Potential Priority Acquisiton Areas

It is the policy of the WDNR and the County to purchase land only from willing sellers through friendly negotiations. The goal for both entities is to purchase land fee simple, but both may consider purchasing rights as conservation easements as well.

Recreational Opportunities

In the *2001 Plan* recreational opportunities were also identified as a priority issue. However, the information gathered for the *2013 Plan Update* differs somewhat in that one of the primary recreational components mentioned during the public input sessions and the online survey was the support to develop a trail network at the Marsh. When asked the question if the Marsh Master Plan should include the development of hiking/biking trails a 60% majority of respondents stated they would like to see that network developed. However, it should be noted that in the comment section of the

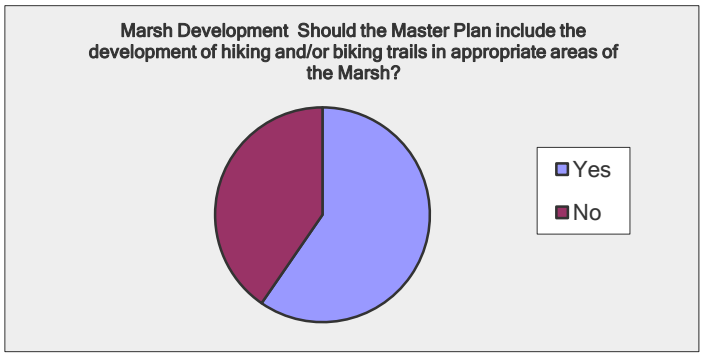


Figure 13 - Online Survey Response

survey that if a trail network were to be developed it should be nonmotorized in nature and should be hiking only, no bicycling. Considering the information gathered at the public input sessions as well, the prevailing sentiment is that if a hiking trail network is developed it should only be in the South Ditch area. This response ranked third out of the twelve themes when attendees were asked what they currently liked about the Marsh. When asked what they currently do not like about the Marsh the fifth ranked response was "Lack of Recreational Trail Opportunities" out of fifteen prevalent themes. In initial discussions about the development of a new educational multi-purpose building, it is thought that if a trail network is developed it could happen at the same time as the building development and be educational in nature.

If hiking trails are developed it might add to the stress already in place at the Marsh in regards to competing user-groups vying for the same, limited space. Fishing, hunting, trapping, boating/canoeing, snowmobiling, ATV riding, nordic skiing, camping, picnicking, nature study, and pleasure driving/wildlife viewing are among the recreational activities already enjoyed at the Sheboygan Marsh. Minimizing future conflicts between competing activities is key to increasing satisfaction for all participants. That is evident nationwide, statewide and countywide, and it is crucial at Marsh.

The *2001 Plan* noted that ATV use on non-designated areas was significant concern at the time and that aggressive enforcement was beginning to take place to curb that trend. At the time of development of *2013 Plan Update* it appears the corrective action that took place in the early 2000's succeeded. ATV users seem to be using designated areas and are no longer wreaking havoc on sensitive vegetation and wildlife in non-designated areas. The Marsh is still a "State Managed" area per the formal management agreement between the WDNR and Sheboygan County. This agreement prohibits motorized vehicles on public lands of the Sheboygan Marsh Wildlife Area except in expressly designated areas.

Though both the WDNR and County are managing more land and resources with less staff, each entity should continue enforcing the rules dictating the Marsh to protect the sensitive nature of the resource.

Wildlife & Ecological Management

As with the competing recreational uses at the Marsh, there is also competing philosophies on what the Marsh should be managed for in regards to wildlife and ecology, and no matter what philosophy one considers, it all relates back to water level management. The three competing ideals mentioned most are to manage the Marsh as a marsh first and foremost, manage the Marsh as a fishery, or manage the Marsh for waterfowl. Similar to the information gathered in the *2001 Plan,* the ideal that gains the most support is managing the Marsh as a marsh first and consider ancillary benefits of a fishery and

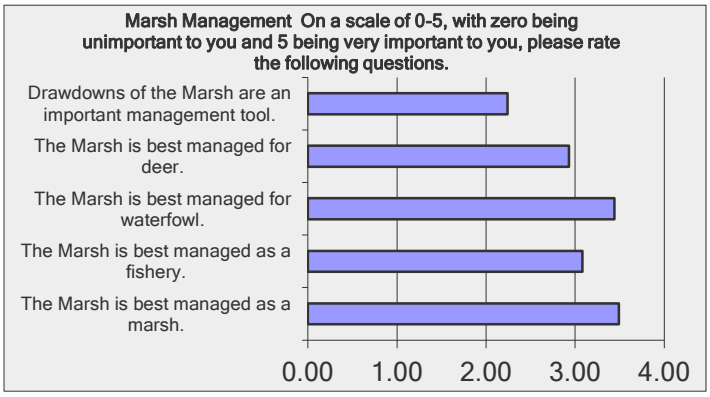


Figure 14 - Managing the Marsh

waterfowl habitat second. This ideal corresponds to the professional scientific belief and when one considers the positives and negatives surrounding the six indicators listed in Figure 9, this ideal proves the most beneficial for the overall health of the entire resource. Because of these reasons, this is the direction the County and WDNR will take in their management activities at the Marsh.

However, with that said, the other ideals should not be ignored. Throughout the *2013 Plan Update* input gathering many comments were received regarding the Marsh's fishery. Though still not popular, as compared to the public indignation surrounding the 2002 drawdown, the 2011 drawdown did not receive nearly as much outcry from the different user-groups, especially fishermen. It appears that the sentiment amongst the user-groups is that drawdowns are a necessary evil to the overall health of the resource. In fact, two public input sessions were held prior to the 2011 drawdown and excluding County and WDNR staff, only 11 members of the public attended. This compares to hundreds that attended the input sessions prior to the 2002 drawdown.

To help mollify some of the negative sentiment towards the drawdowns, WDNR has restocked the Marsh with northern pike following the drawdowns. In addition to WDNR's efforts, after the drawdown in 2011, the County and the Sheboygan County Conservation Association partnered to restock panfish in the Marsh as well. These types of activities should continue during future drawdowns. Chapter 2 shows this as an implementation objective.

It should also be noted that there are many other area lakes, streams, trails, and parks available in this region to accommodate fishing and other recreational demands. A dozen popular and productive fishing lakes lie a short distance from, or within a 30-minute drive of, *Sheboygan Marsh* – Elkhart Lake (whose outlet feeds the Marsh), Crystal Lake, Gerber Lakes, Little Elkhart Lake, Jetzer Lake, Lake Ellen, Random Lake, Crooked Lake, Long Lake, Beechwood Lake, Lake Seven, and Wolf Lake. Moreover, some of the best fishing and water recreation in North America are available a short drive east or west on Lake Michigan and Lake Winnebago, respectively.

Sheboygan Marsh should not be expected to accommodate the diversity of increasingly incompatible recreational uses. In 2013 as it was in 2001, the public seems to recognize the *Sheboygan Marsh* has a *"carrying capacity"* that is being approached and needs to be addressed.

Another wildlife related issue is concern for long-term maintenance of white-cedar stands on the Marsh. White-cedar is an important, and relatively rare, habitat type in this part of the state. It provides important food and cover for wintering deer. It is also important to other wildlife species, including ruffed grouse. Poor reproduction of white cedar is related to high deer densities and other environmental conditions.

Chapter 2 - Issues, Concerns, & Topics Implementation Objectives

Introductory Comments

The *2013 Plan Update's* implementation objectives are based on scientific methods, history, and expertise. Management of a resource, especially as extensive as the Sheboygan Marsh, must be consistent, professional, and knowledge-based. At times, the implementation of a certain method or practice may not be popular with certain user-groups of the Sheboygan Marsh. However, the implementation objectives listed in the plan set aside the temptation to please certain user-group's special interests. Rather, they are meant to serve the overall public interest of maintaining an exceptional resource for all to enjoy.

The items listed below were the prevalent issues, concerns, and/or comments consistently brought up in the online survey (see Appendix A) and at the two *2013 Plan Update* public input meetings (see Appendix A). Many of the issues, concerns, and/or comments were quite similar to those gathered in the 2001 planning effort.

Issue/Concern/Comment	Implementation	Roles	Schedule	Financials
Floating Cattail Bogs	County & WDNR will partner to moderate water level fluctuations and manage floating cattail mats through removals and spraying	WDNR to do day-to-day management with County filling in as needed, County to remove mats, joint effort for spraying	As Needed	No direct cost for water level management, ~$100/truckload to remove cattail mats, $2-5K for yearly spraying
Water Level Management	County & WDNR will aggressively pursue public support and consideration for both partial and total drawdowns on a minimum of 5 year intervals or as such ecological indicators warrant.	County, WDNR, & Public	5 Years or Sooner if Ecological Indicators Warrant	Cost-savings to County if implemented. Bog removal has cost in excess of $65,000 in certain years after lack of drawdowns.
	Investigate flow capacity of dam area compared to historical flow capacity	County, WDNR, & Ducks Unlimited	2012-2013	DNR $45,000 & Ducks Unlimited Donation
	Manage the Sheboygan Marsh as a marsh first, not as a fishery, or for a specific wildlife population	County, WDNR	Annually	No direct cost
	Replace and/or refurbish dam based on Ducks Unlimited Feasibility Study	County, WDNR, & Ducks Unlimited	2015-2016	$1,000,000

Issue/Concern/Comment	Implementation	Roles	Schedule	Financials
Smart Growth Planning & Zoning	County & adjoining Towns of Russell, Greenbush, & Rhine should collaborate on subdivision controls, zoning, & land acquisition strategies	County, Towns, DNR, & local Land Trusts	Every 10 years from adoption of Smart Growth Plan and as needed	Varies
	County & DNR to work on better nutrient management on lands surrounding the Marsh. Collaborative effort through County buffer program, conservation easements, etc. County & DNR to create a plan of prioritized adjacent land to target	County & WDNR	2015-2106 or sooner	$100,000
Land Acquisitions to Create Buffers & Protect Existing Investments	County, WDNR, Towns, SCCA, Fond du Lac County & local land trusts to collaborate in acquisitions for strategic areas around & adjacent to existing public lands, especially those areas critical for protection of the Marsh as a resource. County & WDNR to pursue & secure available public and/or private funding if an opportunity presents itself.	County, Towns, DNR, SCCA & local Land Trusts	As Opportunities Arise	$4000-$5000/acre in 2013 costs
Increase Investments at the Sheboygan Marsh	County and State should commit to Plan's project recommendations in its annual operating budget and/or 5 year Capital Plan. Both entities should maximize leveraging public and private funding sources	County, Towns, DNR, SCCA & local Land Trusts	Annually	Varies Project & associated budget derived

Issue/Concern/Comment	Implementation	Roles	Schedule	Financials
Maintain and/or Increase Educational Opportunities	Continue to foster educational opportunities and the completion of the educational multi-purpose building	County, WDNR, SCCA, Friends of the Marsh, & Other Citizen/Corporate Sponsorship	2013-2018	New Building & Storage Expected at $600,000-$1,000,000
	Develop an Educational & Interpretive Trail System	County, WDNR, SCCA, Friends of the Marsh, & Other Citizen/Corporate Sponsorship	2014-2015	<$10,000
	Develop an Informational Brochure for Visitors	County, WDNR, & Other Citizen/Corporate Sponsorship	2014	<$1,000
County & State Cooperation	County & WDNR should execute a new, formal Management Agreement for professional wildlife, fishery, & forestry management, development, protection, & maintenance	County & WDNR	2014	No direct cost
Fish Management	Survey & monitor fish community & restock after drawdowns	County, WDNR, & SCCA	Annually & post-drawdown	$2,000
Wildlife Management	Share crop approximately 200 acres with adjoining farmers	WDNR	Annually	WDNR Operating
	Maintain approximately 250 acres of grasslands	WDNR	Annually	WDNR Operating
	Maintain two runoff ponds & associated structures	WDNR	Annually	WDNR Operating
	Monitor waterfowl, grouse, & pheasant populations	WDNR	Annually	WDNR Operating
	Monitor & record water levels	WDNR & County	Daily	WDNR & County Operating
	Maintain posted refuge lines	WDNR	Annually	WDNR Operating
	Monitor & control exotic animal species	WDNR, County	Annually	WDNR Operating

Issue/Concern/Comment	Implementation	Roles	Schedule	Financials
Wildlife Management (cont.)	Gravel & grade perimeter parking lots & access areas	WDNR, County	Annually	WDNR Operating
	Partner w/ Ducks Unlimited & Pheasants Forever to execute habitat improvements	WDNR, County, SCCA, & Friends of the Sheboygan Marsh	Annually	Project-specific
	Coordinate bog removal	WDNR coordinates w/ County for equipment & manpower	Annually	WDNR & County Operating
Forest Management	Update the vegetation inventory of the Sheboygan Marsh to determine the health of the forest, vigor of the trees, and the presence and extent of any invasive plants or pests.	WDNR & County	2014-2015	WDNR & County Operating
	Based on inventory develop a harvest schedule of the forest resources to meet the goals of the County	County	2015	County
	Manage stands with 11-75% ash to reduce the density and increase non-ash species	WDNR & County	Annually	WDNR & County Operating
	Monitor & control exotic plant species	WDNR & County	Annually	WDNR Operating

Chapter 3 – Facility & Resource Inventory & Analysis

Jurisdictions & Assignments

In the past, management of the Broughton Sheboygan Marsh Park & Wildlife Area fell to the Sheboygan County Board's Property liaison committee. There was no direct staff support by a County department.

Not having day-to-day management staff responsible for the Marsh proved detrimental at times, and as such, in late 1984 the Sheboygan County Board had the foresight to transfer management from the Property liaison committee to, at that time, the Resources liaison committee. The Resources committee soon after decided that the daily management belonged to what is now the Planning & Conservation Department. It has remained this way since that time.

Wildlife, fisheries, and forestry management services at the Marsh are provided by the field staff at the Plymouth WDNR office under a formal management agreement with the County (see Appendix C).

In 1984, a seven member *Marsh Management Advisory Committee* was created to foster, facilitate and make recommendations on the wise and sound management of the Marsh. In 2000, that *Management Advisory Committee* was expanded to thirteen members to broaden its base of interests and improve its effectiveness. In 2011, the Sheboygan County Board had the foresight to yet again revise the makeup and function of the *Management Advisory Committee* to include advising on all of the County's recreational facilities, not just the Marsh. The new committee, *the Sheboygan County Recreational Facilities Advisory Committee (SCRFMAC),* added an additional representative from the Sheboygan County Conservation Association and two additional members at large.

Figure 15 - Marsh Tower

Furthermore, the *Friends of the Marsh* formed in 2005 to help protect and promote the Marsh. Their mission is to promote the increased use and appreciation of the unique beauty of the Broughton Sheboygan Marsh through education and recreation.

Investments

The most recent major investment at the Marsh has been the construction of the State of Wisconsin's tallest wooden observation tower.

In 2006, soon after formally becoming an entity, the aforementioned Friends of the Marsh (Friends) started to raise money to construct the observation tower. The kickoff began by hoisting local media and interested citizens up 100' in a fire truck bucket. Fundraising started by collecting spare change in buckets at local events. However, progress soon began in earnest when many large donations from local foundations and employers became a reality.

In 2008, the Friends applied for and were granted official non-profit status to help further the fundraising efforts, but soon after, the economic downturn of the time period took its toll on donations. Fortunately, the local construction company, Jos. Schmitt & Sons, found it in their heart to build the Tower with the promise of the Friends repaying them as they could.

With much fanfare, the Tower opened to the public Christmas Day 2009 and stands at an impressive 80' above the surrounding landscape offering expansive views of the jewel that is the Broughton Sheboygan Marsh Park & Wildlife Area.

In the *2001 Plan*, a common sentiment noted at the public meetings was that the County never spends anything at the Marsh. Based on the comments made at the public input meetings and the survey responses for the *2013 Plan Update*, the sentiment was more that people would like to see the money spent on items other than cattail removal. Though this sentiment likely stemmed from the recent memory of the two extremely large years of cattail removal (both quantity and cost), it is still a valid point. However, take away the amounts spent on cattail removal, which is an average of $13,405 per year from 2006-2012, and the average for Marsh expenditures is approximately $75,500 per year. This is not a small sum.

The County has been investing in the Marsh since Charles Broughton's initial 80 acre donation in 1937. As of 2013, the size of the County publically owned areas of the Marsh has increased nearly a hundred-fold. There are currently 8,295 acres of publically owned land that make up the Marsh. Of that amount, 7,421 acres are in County ownership and 874 acres are in State ownership. During the 20-year period 1968-1988 alone, the County authorized slightly over $1 million in acquisition and development projects. Of that, over 40% was secured in grants from the WDNR and Sheboygan County Conservation Association (SCCA). At that time of publication of this document the County is still engaged in land acquisition discussions with SCCA along with entities like the Glacial Lakes Conservancy Land Trust to protect the valuable resource of the Marsh. The last public land addition to the Marsh was in 2004 through a 10 acre donation from the SCCA.

The table in Appendix B, *Historical Expenditures at the Marsh,* provides a glimpse of the investments made at the Marsh. Undoubtedly, this is not an entire depiction of the expenditures that have been made over the years. The table only represents those figures and/or documents that were able to have been easily retrieved. The table also does not show or calculate an amount for the tremendous volunteer activities and labor that have been witnessed on various projects. This has been significant over time. In fact, in 2012 on a single project rehabilitating the south fishing area just east of the dam over 100 man hours were donated by Home Depot employees through the Sheboygan County Volunteer Center's County Day of Caring.

Historic Water Levels, Geology & Soils – 1999/2000 Field Investigations

(Note: The following language is taken verbatim from the *2001 Plan*)

Abstract

An investigation of local geology and historic water elevations was conducted around the Sheboygan Marsh by Department of Natural Resources staff during 1999 and 2000. The purpose of the investigation was to locate the historic spill point on the east end of the Marsh, and compare the elevation with the present day Marsh elevation.

By finding the historic dolomite spill point on the east side of the Marsh, it was hoped that conclusions could be made concerning the elevation of the Marsh before man attempted to alter water levels in the late 1800s. The investigation included field mapping, soil probing, surveying, and the evaluation of historical records and research papers.

The easternmost spill point of the Sheboygan Marsh was located on the Quasius property in an abandoned river channel within the abandoned Town of Rhine Mills. It was located on a bifurcated section of the river illustrated in Figure 5, about a quarter mile south of the railroad bridge (Figure 4).
The difference in elevation from the present Marsh water levels to the base of the old channel in Rhine Mills is 10.67 feet. Historic records show that there was approximately 9 feet of elevation change between Rhine Mills and the west end of the Marsh during the late 1800s (Peterson & Sinz, 1905). Assuming there were approximately 1.5 feet of water in the old channel, it appears that current water levels in the Marsh are very close to the historic levels prior to 1870.

A review of the original land surveys indicates that vegetative patterns on the Marsh in 1835 were similar to present wetland dependent vegetation patterns. An evaluation of the soils data and observed characteristics of soil profiles, slopes, types of rock and other pertinent soil facts also supports this conclusion.

Geology

The Sheboygan Marsh was formed on Silurian Dolomite which is some of the youngest bedrock in Wisconsin. The Silurian Dolomite is exposed to the east of the project site in an abandoned lime quarry on the Quasius property located in the abandoned Town of Rhine Mills. Bedrock supported hills surround the Sheboygan Marsh on the west, south and north margins.

The Sheboygan Marsh lies directly behind the front of the Green Bay glacial lobe, which was deposited during the last glacial advance. The formation of the Marsh was the result of the stagnation of a large ice block during the last glacial advance. The stagnant ice melted slowly, due to the insulating effects of the surrounding till and the sediments covering the ice block. As the ice block melted, the sediments covering the ice were sorted and deposited on the flanks of the ice block. Ridges of sorted sediments (kame type deposits) can be found surrounding the Marsh to this day. The melting ice and deep bedrock valley created a typical kettle lake surrounded by these kame terrace deposits.

As the glacial lake matured, biological activity increased and sedimentation also increased. Cores drilled in the Marsh have found up to 30 feet of marl deposits rich in shell fragments. During this period, wave activity continued to re-work sorted kame terrace deposits on the flanks of “paleo-Lake Sheboygan.”

After being a deep open water system for thousands of years, sedimentation eventually caused the lake to transform into a shallow water marsh. The marsh environment increased the deposition rate of organic rich matter. Cores taken in the Marsh have found up to 20 feet of peat on top of the open water marl deposits.

Historical Review

DNR Biologist John Masterson discovered a map at the Sheboygan County Historical Society that shows the bifurcated channel in the Sheboygan River in the abandoned Town of Rhine Mills (Figure 17). This map lead to the discovery of the old channel on the Quasius property adjacent to the Limestone Quarry. Since the current Sheboygan River channel was blasted and lowered in the early 1870s and between 1912 and 1921, it was important to find an undisturbed "spill point" to evaluate historic water levels. Since there were two mills in the Town of Rhine Mills, the gradient of the water must have been sufficient to support the power demands of the milling operations.

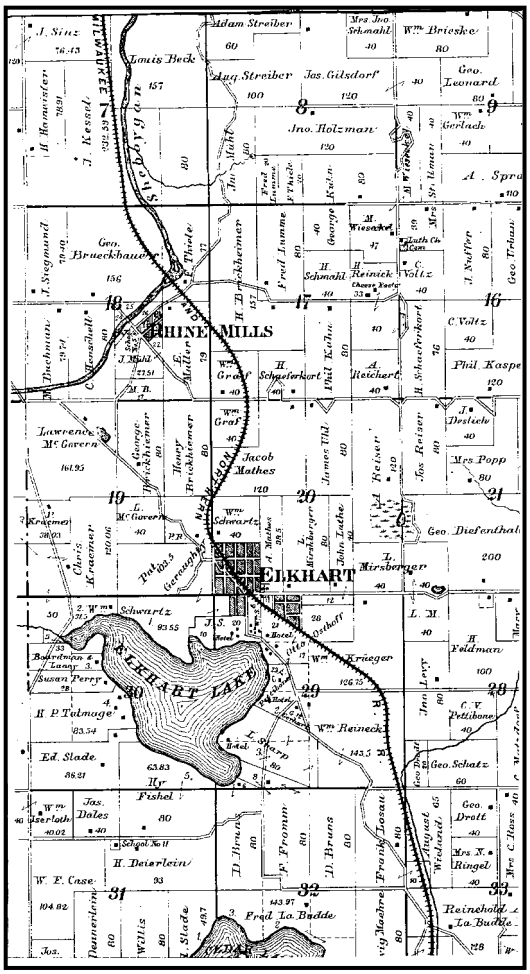


Figure 16 - 1889 Plat of the Town of Rhine

In a 1905, U.W. Madison thesis by H. Peterson & E. Sinz titled Plans for Draining the Sheboygan Marsh, it is stated that there was 9 feet of head between Rhine Mills and the west end of the marsh. Since the head difference across the Marsh is negligible, the water elevation difference between the historic outlet (current Marsh Park) and Rhine Mills (Quasius Property) would have been approximately 9 feet. This would have been more than enough head to power the grist and oil mills that operated in Rhine Mills.

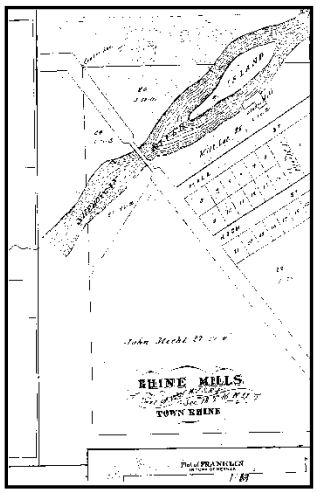


Figure 17 - 1875 View of Rhine Mills Prior To The Dredging Of The River

This information indicates that under normal water conditions prior to the first dredging attempts (1870), the glacial kame deposits located near the present day Marsh Park served as the spill point for the water levels in the Marsh. During times of high rainfall and snow melt, the narrow 15 foot wide limestone/dolomite channel east of the Marsh Park restricted flow and backed up water from the dolomite outcrop in the Town of Rhine Mills to the current dam location in Marsh Park. Soil probes taken during field evaluations confirm that the low area east of the current Marsh Park was often inundated, resulting in soils with rich organic sequences.

A review of the original land surveys of 1835 was conducted to determine vegetation types and water levels at the time European settlement. Surveyors noted trees, water, and vegetation changes as they traversed the land plotting legal descriptions for future land sales, etc. The records indicate that the vegetative cover was similar in 1835 to what exists today. There are notes of 12-inch DBH (diameter at breast height) tamarack and 17-inch DBH white cedar where tamarack and cedar exist today. There are records of marsh and cranberry marsh where emergent wetlands exist today. Other notes that support similar water levels are notes on the locations and widths of streams and rivers, as well as the edge of the pond; these locations are the same as the existing water areas. These records are consistent with the geological and soil records of water levels, and compare very closely with water levels that are currently maintained at the Sheboygan Marsh.

The landcover of the Marsh is ever evolving. This is seen in the following figures which compare the landcover in 1987 to that in 2008 (Figures 18 & 19).

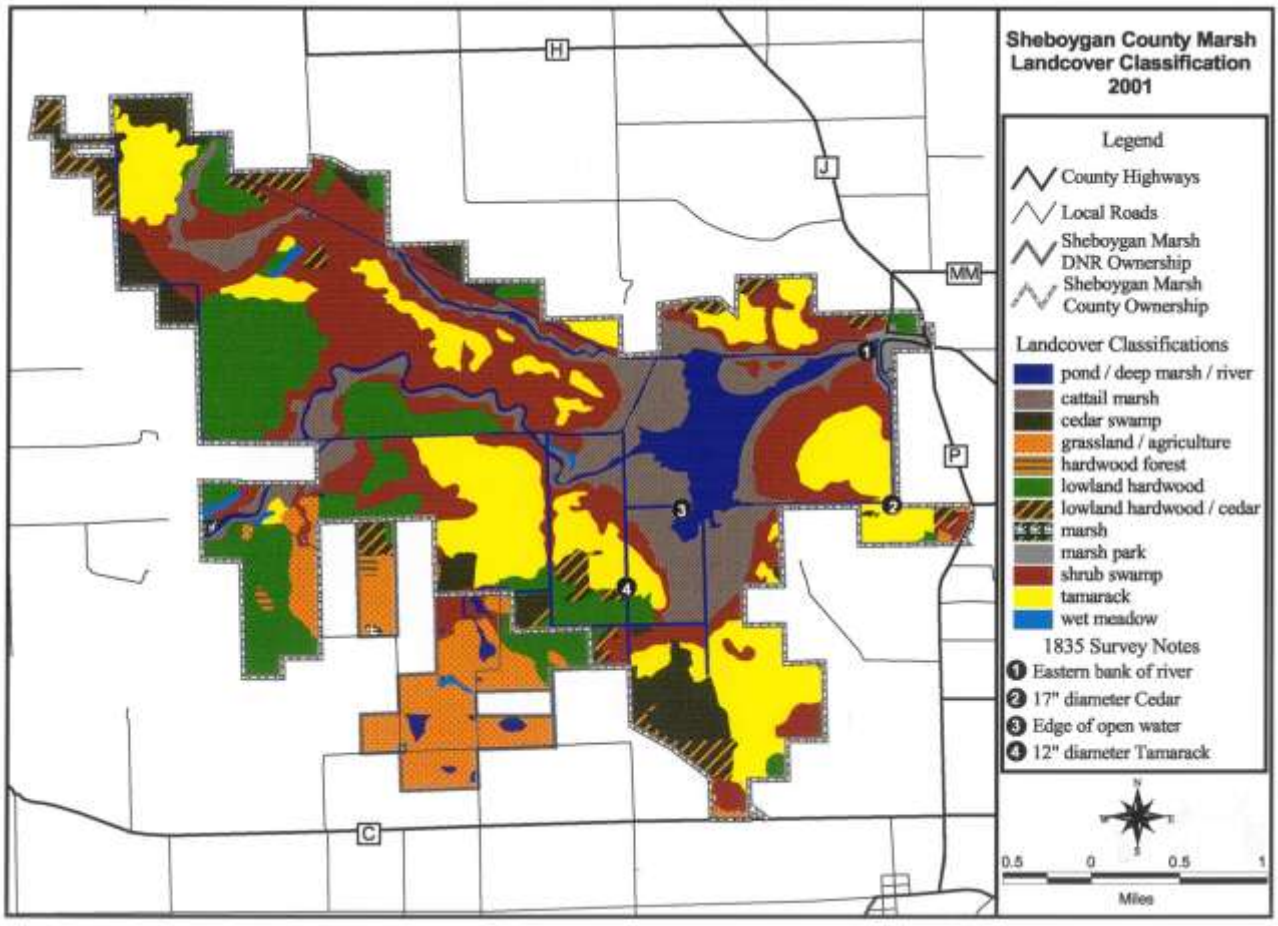


Figure 18 – WDNR 1987 Landcover

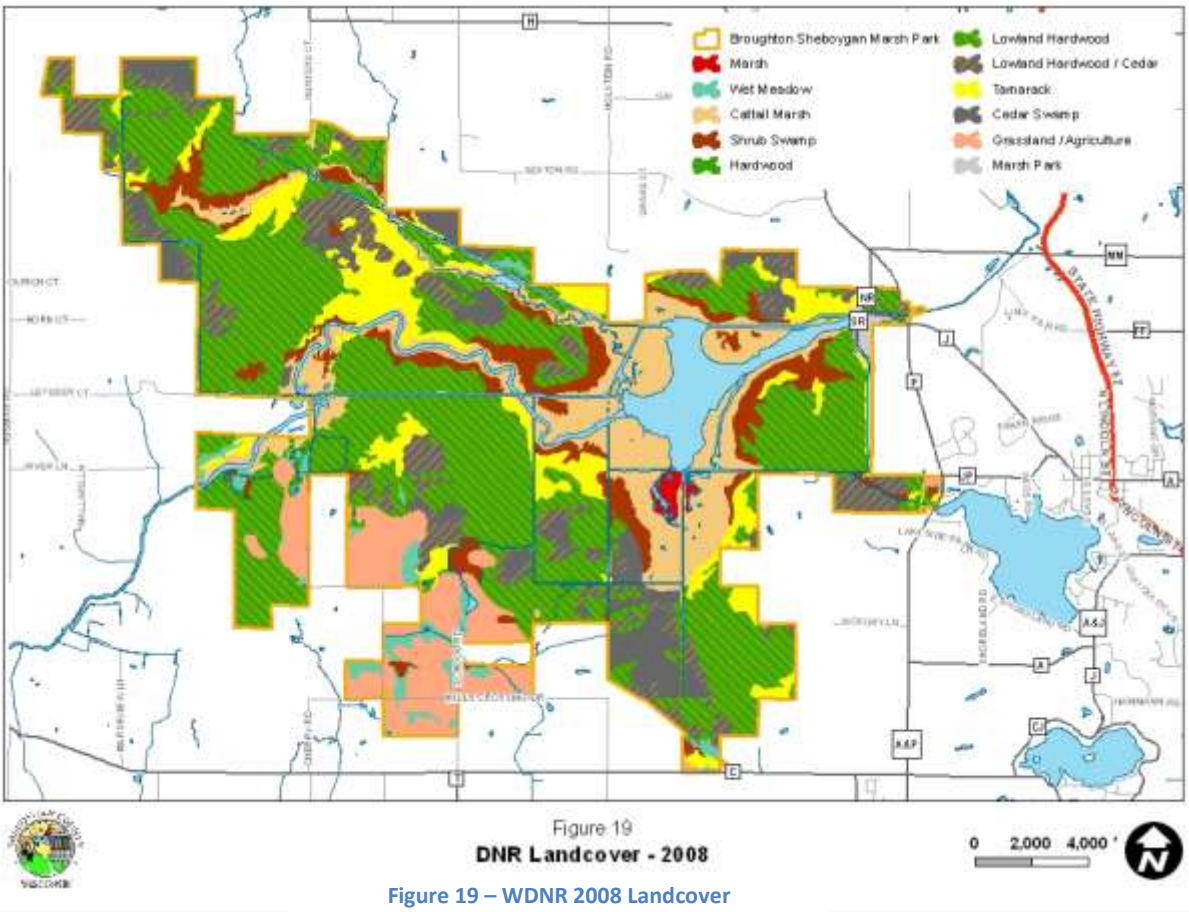


Figure 19 – WDNR 2008 Landcover

Table 3 - Acreages of Cover Types 1987 vs. 2008

Cover Types	Acres on County Land 1987	Acres on County Land 2008	Percent Change	Acres on DNR Land 1987	Acres on DNR Land 2008	Percent Change
Cattail Marsh	1053	997	-5.3%	0	0	0%
Cedar Swamp	474	533	12.4%	0	4	400%
Deep Water Marsh	537	535	.37%	0	0	0%
Grassland/Ag	124	112	-9.6%	524	523	-.13%
Hardwood Forest	8	0	-100%	12	0	-100%
Lowland Hardwood	1209	3252	168.9%	94	54	-42.5%
Lowland Hardwood/Cedar	321	617	92.2%	28	33	17.9%
Marsh	6	32	433.3%	4	0	-100%
Marsh Park	52	34	-34.6%	0	0	0%
Pond	1	20	190%	7	6	-14.2%
Runoff Pond	0	0	0%	29	29	0%
Shrub Swamp	2004	552	-72.5%	46	26	-43.5%
Tamarack	1579	682	-56.8%	0	18	180%
Wet Meadow	33	56	69.7%	6	108	170%
Totals	***7401***	***7422***		***750***	***874***	

Field Evaluations

In the fall of 1999, Department of Natural Resources scientists surveyed the elevations of the current Sheboygan Marsh dam, the soil investigation locations, the dolomite outcrops, and important geologic features on the east end of the Marsh. Table 4, entitled "Sheboygan Marsh Study," contains the survey elevation information collected.

Department scientists also conducted a thorough field evaluation of the geology and soil characteristics on the east side of the Sheboygan Marsh downstream to the County Road MM Bridge. Silurian dolomite bedrock was found in the Sheboygan River channel several hundred feet west of the County Road MM Bridge. Blast holes were photographed in the dolomite along the exposed bedrock outcrop in the Sheboygan River channel where the bedrock was lowered in an attempt to drain the Marsh (Figure 20).

A soil evaluation was conducted of the Marsh and surrounding areas in the fall of 1999. The study included reviewing field survey maps, soil probing investigations in and around the Marsh, and an investigation of dug soil profile pits. Based on the available soils information, there is no indication that major sedimentation has occurred recently in the Marsh. This conclusion is made from the fact that the

Figure 20 - A Young Dale Katsma Points to Evidence of Blasting

sediments in the soil profiles along the Marsh are uniform, there is an absence of sediment layers in the peat, and there is an absence of buried horizons in the soil profiles along the edge of the Marsh. The original physiography and distribution of soils is mainly the result of glacial outwash, alluvial and lacustrine deposits which buried the dolomite bedrock with unconsolidated deposits ranging from a few feet (1/2 mile east of the marsh) to several hundred feet in thickness.

As the glacier retreated in the Towns of Russell, Greenbush and Rhine, they left a mass of loamy material or glacial till. The main soil types, Hochheim, Theresa, Nenno, and Lamartine, formed in this material. Water from the melting glaciers transported, sorted, and deposited some of the glacial till as stratified gravel and sand on outwash plains. This is how the Casco soils on the north edge of the Marsh and the Fox soils on the east and south edge of the Marsh were primarily formed.

The low wetland areas were formed from an old glacial lake basin with areas of lacustrine soils consisting of a mixture of silt, sand, and clay. In other areas, residue from water-tolerant plants accumulated to form organic soils over the mineral soils and marl with the thickness of the muck depending on the depth of the water table, substratum and type of vegetation.

The evaluation of the information including observed characteristics of the soil profiles, slopes, types of rocks and other pertinent soil facts supports the conclusion that the current water levels compare very closely with water levels that are currently maintained at the Sheboygan Marsh.

Table 4 - Sheboygan Marsh Elevation Study

Sheboygan Marsh Study Lime Kiln Survey elevations with the adjustments based upon the Railroad Bridge Marker		
Site #	***Description of the Elevation***	***Measured ELEVATION***
1	LIMEKILN – Elevation of river bottom, downstream about 300' from abandoned bridge.	892.080
2	LIMEKILN – Elevation of river bottom, just below/east bridge (approximately 100').	892.350
3	LIMEKILN – Elevation of river at Sheboygan River shoreline, northeast of County Road MM Bridge, SW¼ NE¼, Section 18,T16N R21E.	893.270
4	LIMEKILN – Elevation of river bottom, approximately mid channel at 150' upstream from abandoned bridge.	893.910
5	LIMEKILN – Elevation of river's shoreline near abandoned bridge.	894.090
6	DAM – Bottom of stream bed downstream from dam, above concrete ledge.	894.165
7	DAM – Bottom of stream bed downstream near culvert overflow, approximately 200' below dam.	895.045
8	LIMEKILN – Elevation of old channel around island west adjacent to abandoned Lime Kiln Road, NW¼ SE¼, Section 18,T16N R21E.	895.200
9	DAM – Elevation of top of concrete ledge below dam, under water surface by 2 1/8".	896.46
10	DAM – Downstream from dam at bottom of overflow culvert on left bank.	897.225
11	LIMEKILN – Bridge marker north of County Road MM, SW¼ NE¼, Section 18, T16N R21E.	901.914
12	LIMEKILN – Marker nails, Quasius driveway, NW¼ SE¼, Section 18, T16N R21E.	901.925
13	LIMEKILN – Elevation over streambank area closer to the County Road MM roadway and bridge.	903.665

Sheboygan Marsh Study Lime Kiln Survey elevations with the adjustments based upon the Railroad Bridge Marker		
Site #	***Description of the Elevation***	***Measured ELEVATION***
14	DAM – Top of spillway ledge behind dam , 5"-6" of water going over top of ledge. **Water level of the Marsh/Sheboygan Lake would be approx**.	905.870 **906.300**
15	LIMEKILN – East end of County Road MM bridge over river, SW¼ NE¼, Section 18, T16N R21E. **Based on the topography map, the surface elevation of Sheboygan Lake was determined to be 276.2 meters or 906.2122 feet.**	905.885 **906.2122**
16	**DAM – Upstream – Elevation of marsh water at dock area adjacent to lodge.**	**906.260**
17	LIMEKILN – Elevation of overbank area measured west of old road bed.	907.73
18	DAM – Elevation of ground at base of step bridge that goes over the dam in park.	910.830
19	DAM – Elevation of flagpole base adjacent to the dam in the park.	911.020
20	DAM – PSC Brass marker on the top of the dam in the park.	910.880
21	DAM – DOT marker on County Road J, south of park entrance.	912.290
22	DAM – Sheboygan County Park at Marsh roadway entrance marker.	913.080
23	LIMEKILN – Elevation of old bridge deck with dirt overlayment.	913.300
24	LIMEKILN – Survey marker, County Road MM, 1100' west of bridge at north entrance to abandoned Lime Kiln Road, NW¼ SE¼, Section 18, T16N R21E.	945.505
Elevation of soil pits dug by the University of Wisconsin - Geosciences		
1	Soils Pit # 1	971.176
2	Soils Pit # 2	944.928
3	Soils pit # 3 Groundwater encountered at 150 cm. or 4.921 ft.	912.118 907.197
4	Soils pit # 4	921.960
5	Soils pit # 5	912.118
6	Soils pit # 6 Groundwater encountered at 50 cm. or 1.640 ft.	905.556 903.916
7	Core # 1	907.1965
8	Core # 2	905.556
9	Core # 3	905.000

The Quasius family now owns the property where the dolomite was mined and converted to lime in kilns adjacent to the abandoned dolomite/limestone quarry. The abandoned Town of Rhine Mills existed to serve the workers of the mining, milling, and lime production operations located on the east end of the Sheboygan Marsh. Tamarack trees from the marsh were used as fuel in the lime kilns; the tamarack logs were hauled out of the Marsh on sleds pulled by draft horses. An ice road was created and maintained each winter adjacent to the river for the hauling operation (Delmar Schuler, Town of Rhine, personal communication). Some of the original equipment used to maintain the ice road still exists on the Joel

Schuler farm (formerly Delmar Schuler farm) as well as some of the wooden structures that sat upon the dredge machinery.

Conclusions:

- Cores samples taken within the Sheboygan Marsh show that Glacial Lake Sheboygan was at one time over 50 feet in depth.

- Up to 30 feet of marl and 20 feet of peat have been deposited in Glacial Lake Sheboygan (Sheboygan Marsh). The fluvial/lacustrine sedimentary deposits found in the Sheboygan Marsh portray a normal evolution of a glacial lake to a shallow marsh.

- The study confirms that current water elevations in the Marsh are close to mid-1800 elevations.

- Historical records show approximately 9 feet of elevation change between the historic "spill point" of the Sheboygan Marsh and old settlement of Rhine Mills. The current difference in elevation between the dam "spill point" and the old bifurcated channel (Quasius property Rhine Mills) is 10.67 feet. By assuming 1.5 feet of water in the old channel, current water elevation in the Marsh are very close to original water levels prior to blasting the Marsh outlet (refer to Table 4).

- Records of vegetation and water areas from the original land surveys are similar to existing conditions, and therefore corroborates that water levels today are close to those at the time of settlement.

Water Resources & Wetlands

The colored maps on the following two pages depict the Sheboygan River Basin (Figure 21) and the Sheboygan River Watershed (Figure 22). They extend into the adjoining counties of Fond du Lac, Calumet, Manitowoc, and Ozaukee. *Sheboygan Marsh* lies in a 133 square mile watershed.

SHEBOYGAN LAKE/MARSH
T16N R20E, Section 23, 26; WBIC - 0058900, Sheboygan County, Sheboygan River Watershed
Surface Acres = 674, S.D.F. = 3.35, Maximum Depth = 3.5

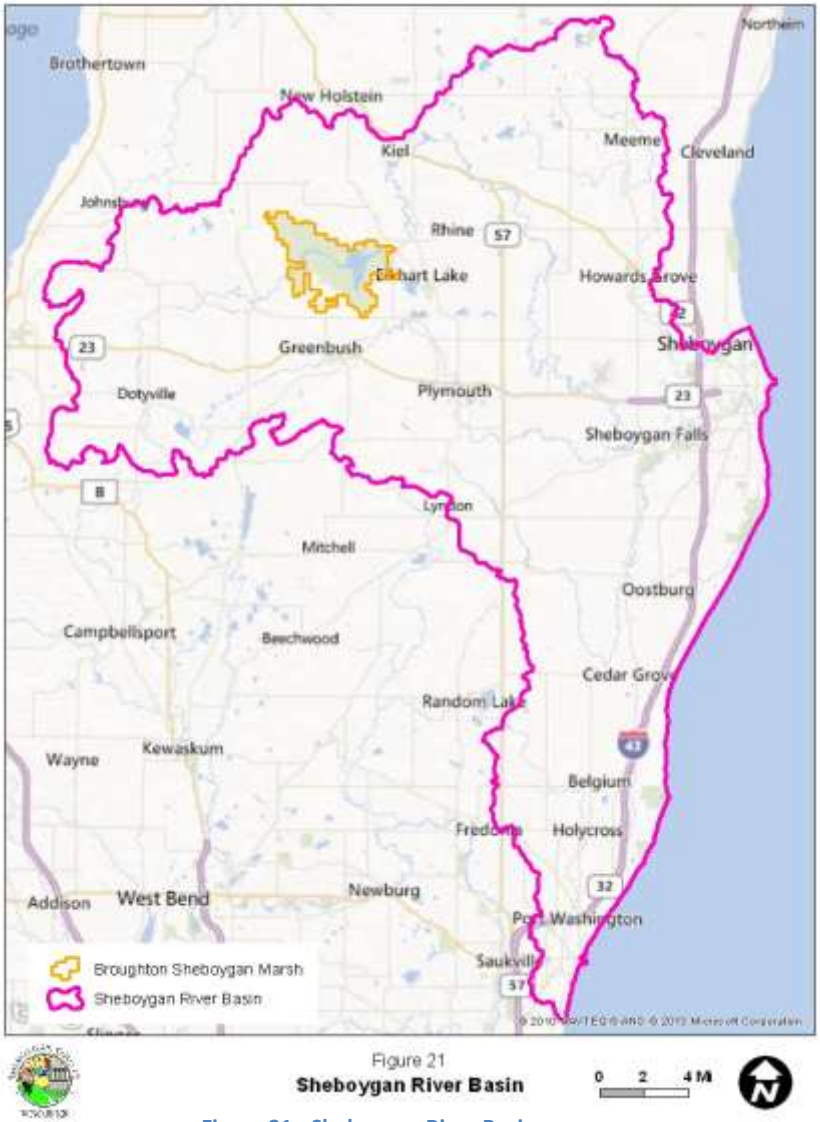


Figure 21 - Sheboygan River Basin

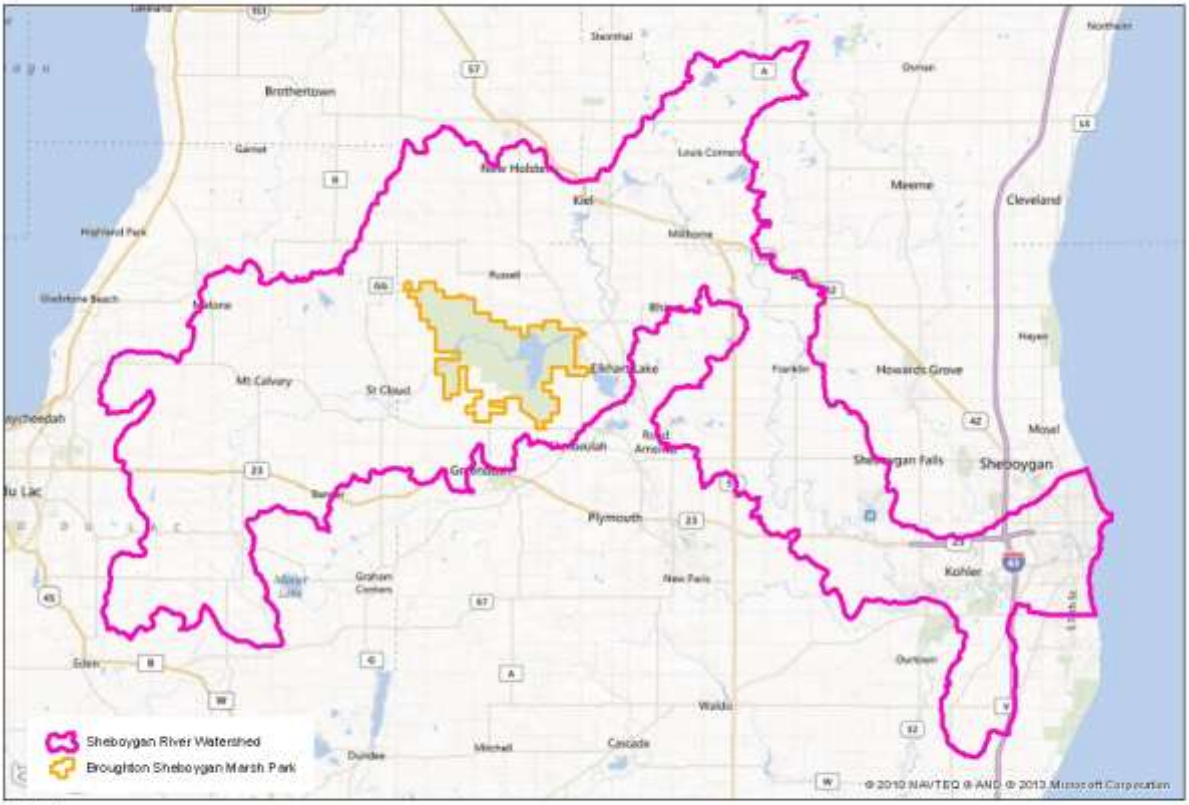


Figure 22 - Sheboygan River Watershed

Sheboygan Marsh is an extensive lake/impoundment within the Broughton Sheboygan Marsh Park & Wildlife Area. With over 14,000 acres of reclaimed land, the lake and marsh areas have become important recreational and hunting lands. Flow of water into the marsh is mainly from the Sheboygan River, but also from an outlet of Big Elkhart Lake, St. Anna Creek, and several unnamed tributaries. The total open water acreage is divided into the main lake (177 acres), the Sheboygan River (75 acres), St. Anna Creek (13 acres), and a series of artificial ditches (140 acres). (See Table 5, *Water Areas Within The Sheboygan Marsh*). These roughly 400 acres are about 275 acres less than what was reported in the *2001 Plan*. This decrease can likely be attributed to primarily two reasons. The marsh is doing what a marsh does over time; fill in with vegetation. The measuring techniques when this plan was written are significantly better than when previous plans were published.

Figure 23 - 2013 Spring Melt Flows

As is characteristic of many marsh lakes, the water is light brown in color and is occasionally low in dissolved oxygen (DO). Over 75 percent of the surface waters are less than 3 feet deep and the

maximum depth is 3.5 feet. The dredged channels range in depth from 3 to 9 feet with a 5-foot average depth. During a typical winter, the main body of the marsh and the river channel becomes very low in dissolved oxygen (DO). DO is often down to less than one ppm just above the dam. Some fish mortality occurs throughout the marsh most winters. Fish likely winter in upstream river reaches, spring areas as well as the South Ditch.

Table 5 - Water Areas Within the Sheboygan Marsh*

Waterbody Name	Length (miles)	Width (feet)	Acres
Main Lake			177.0
Sheboygan River	4.6		75.3
St. Anna Creek	2.7	~1	12.8
Ditches			
Vic's	1.3	50	6.1
Froelich	1.3	50	7.1
Bergin	1.3	50	7.3
South	2.0	75	18.5
Southwest	0.4	90	2.6
South-connecting	1.0	50	6.9
Main	7.2	75	64.4
North	3.3	75	27.0
Total	**~25.1**	**515**	**404.9**

**Acreage calculated from 1992 Sheboygan County Planimetrics & 2009 Orthophotography.*

Table 6 - Change in Open Water on Sheboygan Lake

Waterbody Name	2001 Plan Figure	2003 Orthophoto	2009 Orthophoto
Sheboygan Lake	**368 acres**	**238 acres**	**177 acres**

Source: The 2003 & 2009 figures were calculated by digitizing open water on the spring countywide orthophotography flights taken in those respective years.

Elkhart Lake Creek (unofficial name) originates as an outlet from the northwest end of Elkhart Lake, adjacent to the public boat launch near County Road P. This low gradient stream meanders approximately 0.8 miles through a large wetland complex that is part of the Sheboygan Marsh, and discharges to the South Ditch of the marsh. The surrounding watershed is primarily wetland and provides an excellent buffer for the stream.

WDNR personnel surveyed approximately 200 meters of the stream's fish community and habitat in August 2000. Only 33 fish were captured during the fish shocking survey; too few to calculate an index of biotic integrity. Fish species that were present included bluegill, pumpkinseed, johnny darter, central

mudminnow, black bullhead, common carp, largemouth bass, and northern pike. Fish communities may be limited primarily due to lack of fish cover and low flows. Stream habitat was limited due to the lack of fish cover and habitat types. The bottom substrate consists primarily of sand and silt, and the number of riffles and pools are very few.

Fish use the outlet area of Elkhart Lake as a refuge when DO levels are low in the Sheboygan Marsh. This has been observed during the hot summer months. During the winter, the flow from the creek entering the south ditch helps maintain higher DO levels and provides refuge for fish in the marsh.
Zebra mussels can be abundant in this stream near the outlet of Elkhart Lake with the population diminishing downstream towards the South Ditch. Zebra mussels extend the length of the stream and zebra mussels have been found in the Sheboygan Marsh South Ditch in low concentrations. However, due to the mucky bottom of the Marsh (an environment zebra mussels do not thrive in) the chances of zebra mussels proliferating in the Marsh is minimal.

Plant & Wildlife Communities

"Communities" usually bear the name of their dominant plant species; however, the community includes all the plants living in association with the dominant species, plus all of the animals present at a given time. The following *communities* are the main types found on *Sheboygan Marsh*.

Plant Community

Coniferous swamps are white cedar or tamarack wetlands that are usually associated with lowland hardwoods. Prior to European settlement, these cover types were probably more prevalent among the forested lowland forests in the area and they are still more abundant than indicated by wetland maps (Figure 19).

These wetlands may be inundated in spring and saturated for most of the growing season. Soils are organic peat or muck, with tamarack more common in acid soils and white cedar more common in alkaline soils.

While coniferous swamps are common in northern Wisconsin, they are rare in the southern half of the state and are home to many rare plants, such as lady slipper orchids. Other groundlayer plants include ferns, jack-in-the-pulpit, and sedge. Shrub species include alder and sumac.

Many of the same species found in lowland hardwood forests are also found in the coniferous swamps because of their close association and size in this area. They provide habitat for birds such as saw-whet owl, veery, hermit thrush, cedar waxwing, swamp sparrow, and many species of sparrows and warblers. Many northern bird species (white-throated sparrow, northern water thrush, and veery) are found in southern coniferous swamps. Mammals that use coniferous swamps year-around, or seasonally for winter cover, include deer, fox, coyote, and small mammals. White cedar provides both food and cover for wintering deer; deer concentrate, or "yard up," in these cedar areas during the winter. Coniferous swamps are important to maintaining a population of ruffed grouse in this area of the state as well.

Marshes (deep and shallow marshes) have characteristic emergent aquatic plants in permanent to seasonal shallow water. Emergent aquatic plants typically become established during low water periods or when substrate is exposed, and persist for varying periods of time after water levels return to normal. High water or rapidly fluctuating water levels tend to uproot or kill some of the emergents.

Deep water marsh, from 6 inches to 3 feet, have emergent plants like cattail, softstem bulrush, pickerelweed, giant bur-reed, Phragmites, wild rice, pond weeds, and water lilies. Floating and submergent plants include duckweed, coontail, water milfoil, and wild celery.

Shallow marshes occur in areas where the soil is saturated to up to six inches of water. They contain many of the same emergent plants as deep water marshes, along with arrowheads, herbaceous plants and sedges. It is possible that an exotic plant, purple loosestrife, could take over in shallow marsh areas and reduce the diversity and quality of this type of habitat.

Marshes are very productive wetlands for water birds and furbearers, and can provide spawning and nursery habitat for fish species. Ducks, rails, herons, and songbirds use marshes for breeding and feeding. Ospreys and northern harriers (marsh hawks) use marshes for hunting. Mammals that use the marsh habitat include muskrats, mink, otter, and beaver. Upland wildlife such as pheasant and rabbits may use them for winter cover. Fox and coyote use them during the winter for hunting. Besides providing wildlife habitat, marshes provide environmental benefits like floodwater retention, buffering shorelines from erosion, taking up nutrients, and trapping sediments.

Shrub swamps or shrub-carr wetlands are dominated by woody vegetation like small willows, red osier, and silky dogwoods. They occur on saturated or seasonally flooded muck soils and on the mineral soils of floodplains. Wet meadows may become shrub swamps after drainage and fire suppression.
Shrub swamps provide excellent winter cover for pheasants, deer, and cottontail rabbits. Common birds found in these areas include northern harrier, snipe, woodcock, ruffed grouse, downy woodpecker, willow flycatcher, eastern phoebe, eastern kingbird and catbird.

Lowland Forests (Southern Hardwood Swamps, Southern Wet-mesic Forests) are a major component of natural habitat found in the Sheboygan Marsh (Table 3). In fact, this type of forest saw a large increase in acreage of the Marsh when comparing the 1987 landcover dataset versus the 2008 landcover dataset. This type of plant community dominates the large blocks of wetlands along the western and southern edges of the Sheboygan Marsh. This type of forest can be found in old lake basins in southern Wisconsin.

Common trees found in hardwood swamps are black ash, red maple, silver maple, yellow birch, and elm. The shrub layer is comprised of seedlings of the dominant tree species, dogwoods, and alder. Groundlayer plants include ferns, sedges, grasses and forbs similar to wet meadows, and characteristic plants like skunk cabbage and marsh marigold.

Hardwood swamps adjacent to rivers and streams are extremely important for floodwater storage. They also act as reservoirs to help maintain water flow in streams during dry periods and for groundwater recharge.

The large blocks of lowland forests interconnected by corridors of similar cover along the Sheboygan River and tributary streams enhance this habitat type for many species of migratory songbirds. These large blocks of forest contiguous with other wetland cover types increase diversity of plant and wildlife in this area.

The relatively open canopy and variety of moisture regimes make lowland forests an extremely diverse habitat for reptiles and amphibians. Amphibians that occur in lowland forests include American toads, eastern gray tree frogs, spring peepers, wood frogs, blue-spotted salamanders, central newt, red-backed salamanders, and spotted salamanders. Reptiles that are commonly found in lowland forests include eastern garter, northern water, northern ringneck, brown, and red-bellied snakes. Common turtle species include painted and snapping turtles.

A rather distinct group of birds (some endangered or threatened status) inhabit floodplain forests, including prothonotary warbler, cerulean warbler, acadian flycatcher, and cardinal. Water-associated birds include belted kingfishers, green-backed herons, spotted sandpipers, woodducks, and mallards. Woodpeckers such as the flicker, red-bellied, red-headed, and pileated are present as well as many other cavity nesters (e.g., barred owls, wood ducks, hooded mergansers, great-crested flycatchers, and house wrens). Another state listed threatened bird that is likely nesting in these large blocks of lowland forests is the red-shouldered hawk.

Most mammals common to southern Wisconsin make use of the lowland forests in the Sheboygan Marsh. The stream and river corridors allow movement between cover types and increases the value of blocks of cover. The riverine and wetland areas provide ideal habitat for aquatic animals like muskrat, mink, and raccoons. White-tailed deer make extensive use of these lowland forests as cover areas during hunting seasons and during winter.

Wet meadows (sedge meadows) are vegetated with grasses, sedges and showy flowering plants like marsh milkweed, goldenrod and asters. Woody plants are absent and standing water is present only after heavy rains or spring runoff. Wet meadows are especially important for water quality protection since they are generally buffers between uplands and waterways where their dense vegetation traps sediments and takes up nutrients. An example of wet meadows on the Sheboygan Marsh is the north prairie area located in the northwest quarter of the Marsh.

Wet meadows provide habitat for a variety of wildlife species including sandhill cranes (at least one pair nests along St. Anna Creek in the wet meadow areas), pheasants, and many small mammals that provide food for mink, fox, coyote, and raptors. Sedge meadows are particularly important for reptiles, amphibians and invertebrate species. They are important as feeding areas for shorebirds and waterfowls, especially during seasonal flood events.

Grasslands, including croplands provide habitat for a variety of wildlife species—especially bird species and invertebrates. Sample and Mossman's (1997) "Managing Habitat for Grassland Birds" lists 105 species of birds that use grasslands for some part of their breeding cycle. Hayfields provide nesting habitat for ground nesting birds like pheasants and ducks, if mowing is delayed until after the nesting season. Crop fields provide food and cover for pheasants, deer, turkeys, Canada geese, raccoons and other species.

Original land surveys from 1835 indicate that the area immediately south of the wetlands of the Sheboygan Marsh held oak and oak savannah plant communities. Open landscapes continue to be maintained on the uplands on the south side of the Marsh by sharecropping with local farmers and planting areas to permanent grass cover. There are about 200 acres of land maintained in agricultural crops through sharecropping and 435 (up from 250 reported in the *2001 Plan*) acres are maintained as grasslands (per the *2008 WDNR Landcover Dataset)*; prescribed burns are used to maintain grassland areas.

Interspersed among the upland habitats are small wetland areas; some have these have been developed or restored for wildlife habitat. There are two runoff ponds—7 acres and 12 acres—where water levels can be managed to enhance wetland habitat. There are also 4 dugout ponds which when combined with the runoff ponds equate to about 29 acres. Wetlands have been restored in several areas, including two small wetland scrapes, a tile break, and a ditch block/scrape on state lands on the south side of the Marsh.

Wildlife Community

Fish Management

The earliest fish management information is the documentation of a winterkill in 1939. The Sheboygan Marsh has a lengthy history of low oxygen levels in winter except in the South Ditch area. The South Ditch oxygen levels remain suitable to support fish during winter due to the inflow of well-oxygenated water from Elkhart Lake.

Winterkills and summerkills have been a common occurrence in Sheboygan Marsh. The kills are a natural process in the Marsh due to its shallow nature and the abundance of aquatic vegetation. In winter, the decaying of vegetation uses most of the free oxygen in the water bodies of the Marsh. In summer, extremely high water temperatures and low night-time oxygen levels cause periodic fish kills. A severe fish kill in September, 1986 was associated with a major flood as oxygen depleted water from flooded terrestrial areas entered the Marsh. The Marsh was drawn down the following year and the chemical rotenone was applied to remove approximately 90 tons of carp that remained following the 1986 fish kill. The Marsh was subsequently stocked with northern pike, panfish and largemouth bass.

Periodic fish stocking has taken place in Sheboygan Marsh since 1935. The stockings took place to facilitate recovery from fish kills and drawdowns. A variety of species have been stocked at various times including northern pike, bullhead, black crappie, bluegill, yellow perch, largemouth bass and walleye. The fishery continues to be dominated by natural populations of northern pike, bluegills, black

crappie, yellow perch and carp. In 2012, following the 2011 drawdown northern pike were stocked from funding provided by the WDNR. Panfish, approximately 1,600 bluegill and 1,600 yellow perch, were also stocked by funding from the SCCA as well as the Sheboygan County Stewardship fund.

A winter fish refuge was established in the South Ditch area from 1949 to 1968, apparently to prevent over-harvest by anglers. The refuge was apparently enforced only during times when the fish trap was operated. The fish traps were located at each end of the South Ditch to remove rough fish such as carp. The rough fish removal program was in operation as early as 1940 and continued until drawdown in 1968.

> *Conservation Warden Glenn Popple announced that the state's rough fish removal crew is again busy removing carp from the Sheboygan Marsh, and fish are on sale there now to the general public at a very low price. Those purchasing fish must bring their own containers. Fish weighing 5 pounds or less will be sold for 5¢ a pound and fish weighing over 5 pounds will cost 10¢ a pound.*
>
> ***January 21, 1951***
> ***Sheboygan Press***

Drawdowns of the Sheboygan Marsh were conducted in 1968, 1984, 1987, 1995, 2001, and 2011. An unplanned natural drawdown occurred during a period of drought in 1988 as well as 2012. The human controlled drawdowns were conducted to compact bottom sediments and to manage emergent aquatic plants. It is typical that the fishery is negatively impacted by the drawdowns for several years as fish either migrate downstream or die during summer due to exposure to high water temperatures. The fish community has recovered quickly in most instances due to both stocking and natural recruitment processes.

Fishing regulations for Sheboygan Marsh generally followed the standard statewide regulations with two exceptions. Sheboygan Marsh has been regulated by a continuous open gamefish season to allow the harvest of fish in winter that are vulnerable to winterkill. Northern pike were excluded from the Southern Wisconsin northern pike regulations (26" minimum size limit, 2 bag limit) in 1999. The current northern pike regulation for Sheboygan Marsh is no minimum size limit and 5 daily bag (this is the same as in the *2001 Plan*) limit during season that lasts from May to March.

Fish Populations

Northern pike have traditionally been the dominant gamefish in the Marsh. Fish populations are comprised of mostly smaller fish, a condition that has persisted through time and is likely because of drawdowns.

Historically, yellow perch and pumpkinseed sunfish have been the dominant panfish species of Sheboygan Marsh. Since the *2001 Plan,* this may have changed (see Table 7). Even though perch and pumpkinseed are best suited for waters that experience low oxygen conditions, bluegill and black crappie appear to have increased in abundance and have been providing good quality fishing for anglers near Sheboygan Marsh Park in recent years.

Table 7 – 2012 WDNR Fish Survey

	Northern Pike	Largemouth Bass	Bluegill	Black Crappie	Pumpkin Seed	Bullhead	Common Carp
1-Sep-11	2	1	4	3	2	15	25
2-Sep-11	0	8	12	1	0	9	9
Totals	**2**	**9**	**16**	**4**	**2**	**24**	**34**

As seen in the above table, black bullhead remain abundant in Sheboygan Marsh but, are generally small in size. Largemouth bass are present, mostly in the South Ditch area and occasionally provide good angling. White sucker, mudminnow and golden shiner provide forage for northern pike.

In general, the size and abundance of gamefish and panfish has fluctuated widely with drawdowns of water levels in Sheboygan Marsh. Experience has shown that the populations recover well within five years of a drawdown and can provide good angling opportunities especially near the Sheboygan Marsh Park area as well as deeper pockets of water throughout the Marsh.

Fish Management Problems

The main water body of Sheboygan Marsh experiences low oxygen levels during most winters by mid-February. The decaying of submergent vegetation in the main water body results in low oxygen conditions. Fish that are unable to find areas of well oxygenated water either move downstream of the Marsh Dam or die. Fish that are able to move into the South Ditch area of the Marsh are able to survive because well oxygenated water enters the South Ditch from the outlet of Elkhart Lake.

Plant respiration in the main water body of the Marsh in summer can cause low oxygen levels as well. The problem is especially acute during periods of high water temperatures. Respiration effects are especially bad during night time hours when plant respiration is greatest and no oxygen is produced by photosynthesis. Northern pike and white sucker are most susceptible to summer kills.

Carp Abundance

In the *2001 Plan,* common carp were reported to have been abundant in Sheboygan Marsh. Then, carp were observed in large concentrations in the main water body, the South Ditch, and the outlet stream from Elkhart Lake. Carp cause problems by uprooting of valuable waterfowl food in the form of submergent vegetation.

Figure 24 - Carp Being Harvested

A carp eradication measure took place in 2004. According to then WDNR fisheries biologist John Nelson, over 60,000 pounds of carp were removed from the Sheboygan Marsh that winter. The carp

were trapped at the South Ditch culverts and then shipped to a local organic farm for fertilizer. Three single axle trucks were filled.

Since that time, no coordinated efforts have taken place to remove carp. They have not seemed to be a problem over the past decade, which was confirmed by WDNR's current fisheries biologist Travis Motl. During this plan update he stated, "Based on the numbers I've observed I don't think I'd say they are a problem yet." When they start to be more prevalent remediation actions should again be considered. This sentiment is also reflected in the implementation strategies identified in Chapter 2.

As it was noted in the *2001 Plan,* total elimination of carp through the use of chemicals is not feasible in the Sheboygan River watershed above the Sheboygan Marsh Dam. Therefore, the only available means of control would be the harvest of carp from traps as they move into confined areas such as the South Ditch. An additional fish trap could be established near the north end of the South Ditch to capture many of the carp as they enter the South Ditch in search of well oxygenated water in winter.

Wildlife Management

A Sheboygan Press article of the time reported the following responses immediately after completion of the dam in 1938:

> *"As the water backed up in the old drainage ditches forming a new Sheboygan lake, the wild fowl instinctively found this new haven and soon ducks of all kinds, bittern, coots, tern, killdeer, Florida Gallinule, marsh hawks, geese and great blue heron began to take up homes in the hidden recesses of the area. Conservation clubs and sportsmen planted wild rice and wild celery to keep the birds well fed. Muskrats soon found the marsh and the shy beaver, almost impossible to see, left evidence of his presence by his dams and houses and carefully cut down trees along the spoil banks. Other birds not of the aquatic variety also find the marsh a fine nesting place. Pheasants abound in the woods and fields around the edges of the marsh, and Virginia rails, yellow-billed cuckoos, song sparrows, rose breasted grosbeaks, martins, brown thrashers, several varieties of swallows and numerous other birds have all been seen in the marsh area."*

State wildlife management staff have been active in the management of the Sheboygan Marsh since the 1950s. A management agreement that was part of the 1984 master plan detailed the roles and responsibilities of the county and state regarding management activities, including; habitat management, recreational uses, timber management, wildlife refuges, enforcement of public uses, water level management, and other areas.

The earliest state wildlife management information is found in a 1953 Pittman-Robertson report that summarized waterfowl habitat surveys by Wisconsin Conservation Department biologists from 1938 through 1952 (Zimmerman, 1953):

"The area of open water on the Sheboygan Marsh has been increasing in size since 1942. Previously, this particular area had a considerable stand of wild rice, hard stem and river bulrush, and some reed grass. When visited in 1949, the area of open water appeared to be at least 150 acres in size. It is believed that this increase in size of the open water area is due in a large measure to the high water level held at the dam."

A faunal survey was done as part of a requirement for a Master of Science degree from Kansas State College of Agriculture and Life Sciences in 1939 and 1940 by E.F. Herman (1941). This survey documented reptile, amphibian, mollusks, plankton, fish, bird, and mammal species present on the marsh the first two years after being reflowed.

A management report done in 1958 by Game Manager, Les Neustadter included recommendations on wildlife refuge changes and observations on water level management. This report included some interesting hunter success data, presented below:

Table 8 - Historic Hunter Record

Year	Dates	No. Hunters	Birds Bagged		Birds Lost	
			Ducks	Coots	Ducks	Coots
1943	Sept 25	292	357	1,792	?	?
1947	Oct 7	23	45	42	6	?
1948	Oct 15,16,17	259	160	414	20	?
1949	Oct 14,15,16	441	371	650	182	?
1954	?	381	157	116	81	?
1955	Oct 1,2	394	381	87	137	?
1956	Oct 1,2,6,7	560	475	437	182	49
1957	Oct 1,5	286	360	156	79	8

Various wildlife and habitat surveys have been completed on the Sheboygan Marsh. Ruffed Grouse drumming surveys have been conducted since 1977 (Figure 24). Duck banding has been conducted on the Sheboygan Marsh annually since 1979 (Table 9). Hunter car counts and success on opening day of the waterfowl season have been recorded, almost every year, since 1965 (Table 10).

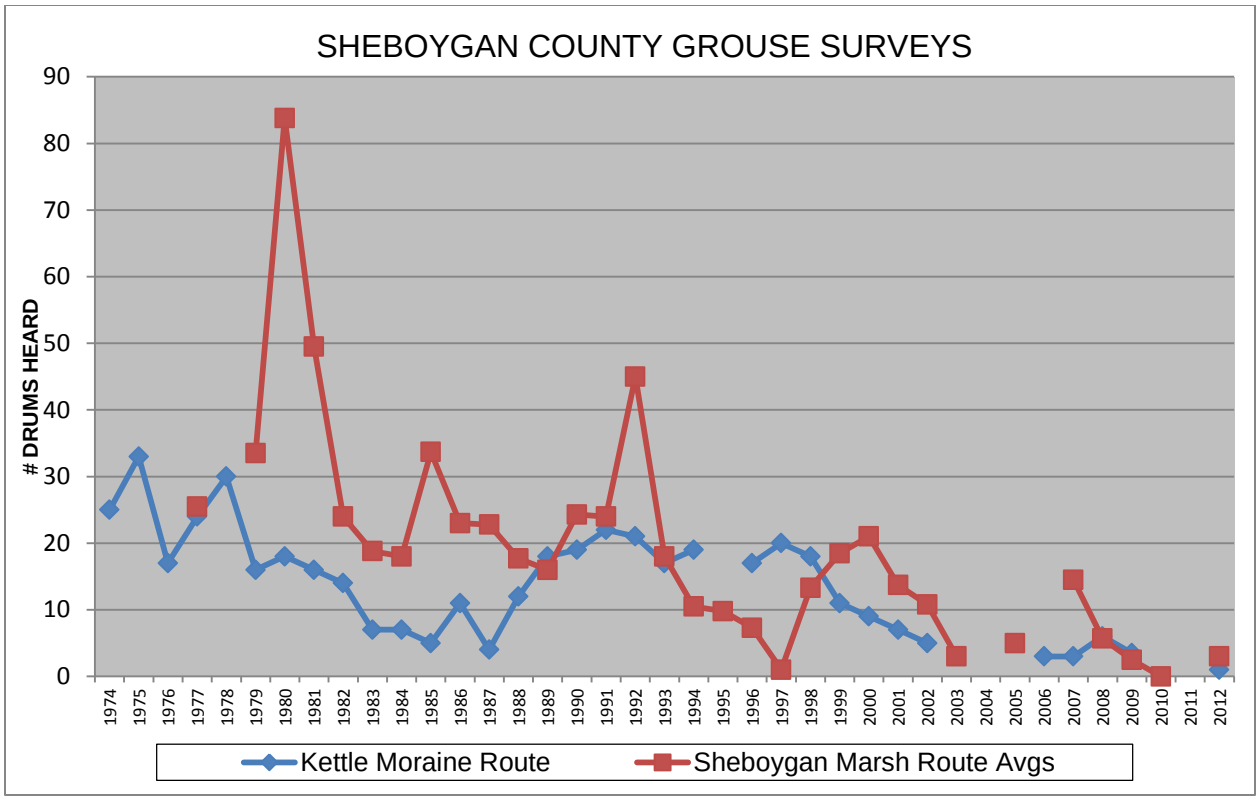


Figure 24 – Sheboygan County Grouse Surveys

Table 9 – Summary of Duck Banding Records – Sheboygan Marsh

Summary of Duck Banding Records - Sheboygan Marsh				
Year	**Total Mallards**	**Total Wood Ducks**	**Total GWT**	**Grand Total**
1979	103	269	3	375
1980	212	145	6	363
1981	***No banding***			
1982	780	31	1	812
1983	491	67	13	571
1984	***No banding due to Marsh drawdown***			
1985	453	39	3	495
1986	598	26	2	626
1987	52	8	0	60
1988	193	101	63	357
1989	72	209	118	399
1990	472	66	23	561
1991	601	83	9	693
1992	1008	109	1	1118
1993	391	143	1	535
1994	319	316	1	636
1995	59	127	43	229

Summary of Duck Banding Records - Sheboygan Marsh				
Year	Total Mallards	Total Wood Ducks	Total GWT	Grand Total
1996	768	67	2	837
1997	44	70	3	117
1998	549	76	0	625
1999	348	151	0	499
2000	319	150	0	469
2001	333	51	0	384
2002	***No banding due to Marsh drawdown***			
2003	***No banding due to statewide CWD workload***			
2004	177	24	0	201
2005	***No banding due to statewide CWD workload***			
2006	267	154	0	421
2007	513	70	0	583
2008	16	145	0	161
2009	111	252	0	363
2010	87	455	0	542
2011	274	25	0	299
2012	520	42	0	562
Total	**9658**	**3405**	**269**	**13332**

Table 10 – Duck Season Opening Day Surveys – Sheboygan Marsh

DUCK SEASON OPENING DAY SURVEYS - SHEBOYGAN MARSH								
SEASON OPENER	# CARS	# HUNTERS CHECKED	# DUCKS	SUCCESS	% MALLARD	% BWT	% GWT	% WD
10/9/1965		195	135	0.69	15.56	7.41	2.96	1.48
10/8/1966	212	51	187	3.67	34.76	5.35	15.51	6.95
10/7/1967								
10/12/1968*								
10/4/1969	351	113	107	0.95	35.51	37.38	8.41	2.80
10/3/1970	282	98	63	0.64	26.98	31.75	3.17	1.59
10/2/1971	91	219	235	1.07	32.34	55.32	5.11	1.70
10/7/1972								
10/1/1973	168	30	35	1.17	25.71	48.57	5.71	0.00
10/2/1974	80	33	26	0.79				
10/1/1975	99	91	160	1.76				
10/1/1976	163			0.77				
10/1/1977	238			0.43				
10/1/1978	143	145	142	0.98	16.20	52.82	12.68	7.75

DUCK SEASON OPENING DAY SURVEYS - SHEBOYGAN MARSH								
SEASON OPENER	**# CARS**	**# HUNTERS CHECKED**	**# DUCKS**	**SUCCESS**	**% MALLARD**	**% BWT**	**% GWT**	**% WD**
10/1/1979	91	159	158	0.99	21.52	43.04	8.86	8.86
10/6/1980	80	113	62	0.55	19.35	9.68	4.84	12.90
10/4/1981	91	74	30	0.41	26.67	46.67	6.67	23.33
10/1/1982	64	79	85	1.08	15.29	45.88	3.53	28.24
10/1/1983	51	80	81	1.01	8.64	38.27	2.47	35.80
10/01/1984~	55	75	74	0.99	8.11	55.41	9.46	8.11
10/5/1985	80	134	122	0.91	12.00	50.00	11.00	2.00
10/4/1986	76	99	93	0.94	10.75	69.89	12.90	3.23
10/01/1987*	25	39	20	0.51	40.00	25.00	10.00	15.00
10/08/1988+	80	104	88	0.85	18.18	25.00	32.95	15.91
10/7/1989	100							
10/6/1990		58	67	1.16	16.42	41.79	20.90	10.45
10/5/1991	64	71	89	1.25	22.47	43.82	25.84	2.25
10/3/1992	101	94	58	0.62	24.14	24.14	36.21	8.62
10/2/1993	90	83	102	1.23	26.47	27.45	18.63	11.76
10/1/1994	78	104	51	0.49	39.22	23.53	21.57	7.84
09/30/1995~	80	91	187	2.05	3.74	68.45	5.35	20.32
9/28/1996	86	91	129	1.42	24.00	56.00		15.50
10/4/1997	83	85	64	0.75	17.00	38.00	25.00	19.00
10/3/1998	64	66	56	0.85	18.00	39.00	36.00	4.00
10/2/1999	58	69	92	1.33	7.53	60.00	27.96	2.15
9/30/2000	53	80	55	0.69	29.10	52.70	10.90	7.27
9/29/2001		90	36	0.40	14.00	37.00	6.00	31.00
2002*	***No survey due to drawdown conditions***							
2003	***No survey due to statewide CWD workload***							
2004	***No survey due to statewide CWD workload***							
2005	***No survey due to statewide CWD workload***							
9/30/2006	64	84	91	1.08	6.59	40.66	26.37	21.98
9/29/2007	48	85	83	0.98	17.00	48.00	7.00	14.50
10/4/2008	39	50	56	1.12	7.00	52.00	7.00	20.00
10/3/2009	48	70	17	0.24	18.00	41.00	6.00	35.00
10/2/2010	53	59	42	0.71	12.00	48.00	0.00	21.00
10/01/2011*	26	***No survey due to drawdown conditions***						
09/29/2012+	88	44	70	1.59	9.00	47.00	9.00	13.00
Average	**102.2**	**94.2**	**92.2**	**1.0**	**20.6**	**41.9**	**13.7**	**12.7**

DUCK SEASON OPENING DAY SURVEYS - SHEBOYGAN MARSH								
SEASON OPENER	# CARS	# HUNTERS CHECKED	# DUCKS	SUCCESS	% MALLARD	% BWT	% GWT	% WD
* Complete drawdown on Sheboygan Marsh + Drought year ~ Partial drawdown								

A number of other activities benefiting wildlife have taken place on the Marsh during its managed history. They are:

- 1941 – First wildlife refuge established.
- 1960s – Developed 1.6 miles of flowage (i.e. dike & ditch system), a seven acre runoff pond as well as blasted potholes to create permanent open water areas.
- 1966 & 1971 – 1,662 Mallard ducks of differing strains (i.e. game farm vs. wild) stocked.
- 1989 & 1992 – Relocation of 99 Canada geese to the Marsh to establish a breeding stock.
- 1990s – Converted 250 acres of upland grassland habitat.
- 1990 & 1991 – Tag alder cut to improve cover value of woodcock and ruffed grouse.
- 2000 – Developed a 10 acre runoff pond.
- 2011 & Ongoing – County developed recreational facilities management plan that is updated yearly and lists anticipated activities for the following budget year.
- Ongoing – Purple loosestrife monitoring and control.
- Ongoing – Sharecropping agreements providing 200 acres of agriculture that provides food and cover.

Lastly, wildlife management literature recommends that deep water marshes be managed to improve the distribution of emergent plants to provide the best habitat for most wetland species (Weller, 1981). Drawdowns allow aquatic vegetation a chance to germinate and grow in more areas of the Marsh, providing more food and cover for wildlife. The abundance and variety of aquatic plants begins to decline after three or four years of maintaining consistent water levels (see *Water Level Strategies* in Chapter 1).

Timber

The Sheboygan Marsh is about 50% forested and its health is driven by both human influence and weather cycles. Major timber types include (1) Swamp Hardwoods, which are a mixture of soft maple, elm, black ash, northern white cedar, and tamarack; and (2) Northern Hardwoods, which are a mixture of upland species such as hard maple, basswood, and white ash. According to local WDNR Forester Tim Beyer, "most of these species are adapted to having their feet (roots) wet most of the year, but they are also very sensitive to large fluctuations of the water table." The forested acreage does not appear to be expanding and may even be diminishing. The high population of the white-tailed deer and a fluctuating water table are probably the primary reasons for the diminishing forest acreage. It should be noted as well that the tamarack population experienced a large die-off following 2001. Many felt the drawdown of 2001 was the cause, however, die-off's took place around many other areas of the State during the same timeframe. The drawdown likely added additional stress to an existing problem.

Mr. Beyer also noted that invasive pests and plants are a major threat to the vegetation in this area. "Invasive buckthorn, reed canary grass, phragmites, and Japanese knotweed can greatly alter wetland environments and the natural vegetation. Emerald Ash Borer can cause widespread mortality of ash and the Columbian Timber Beetle in addition a number of other timber beetles are causing log degrades and top dieback in red and silver maple."

Mr. Beyer suggested that if the long-term management of the Sheboygan Marsh includes timber harvesting for revenue, or maintenance of natural timber types, it is vital to manage the threats whether they be non-native, native, or as simple as thinning stands when the densities or age of the trees cause the stands to become stressed and decline in health.
Three major elements are responsible for the current timber types. They include soil type, ditching practices, and the water table.

Soils & Timber

Trees will grow and thrive only as well as the soils allow. Water and soil nutrient availability are the two major elements that contribute to tree growth. The predominant soils in the Sheboygan Marsh are Palms, Houghton, and Boots Muck. All three soils are similar in nature. All were formed in depressional areas on old glacial lake plains, in stream valleys, or on outwash plains. They all are poorly drained soils, which are high in organic matter.

In a representative soil profile, the organic layers are 50-60 inches thick and the upper 12-16 inches are black muck. Natural soil fertility is low because of rapid leaching of nutrients. Because of the drainage, the soils are poorly aerated. Poor soil aeration generally leads to slow tree growth and, eventually, mortality.

Ditches, Channels & Timber

Many years ago, ditches and channels were established as a means of lowering the water table; the intent was to create and market rich farmland. The effects of this channelization were beneficial for tree establishment between 1921 and 1937. Some fine stands of soft maple presently thrive along the channel system.

Water Table & Timber

The tree root zone is limited by the water table. The water table throughout Sheboygan Marsh is at or near the surface the majority of the time. A slight rise in the water table of 6 inches or more could cause significant tree mortality. Thus, tree root systems are shallow and trees are subject to windfall before they reach maturity.

The high water table and slow moving groundwater restrict aeration (oxygen) and are responsible for extremely slow tree growth. A typical site index for black ash or tamarack under these conditions can be 30-40 (30-40 feet tall in 50 years). For example, a black ash that is 5 inches diameter breast high (DBH) can be 75-80 years old.

Timber - Past, Present, & Future Management

Timber management and harvesting in the Sheboygan Marsh over the past 50 years has been minimal. Harvesting permits have been granted at various times to Sportsmen's Clubs to cut cedar posts. In 1975, Larry Baer, the local DNR forester, conducted an elm salvage sale. Mature stands of white cedar, soft maple, and tamarack do exist and could be commercially thinned. However, poor equipment accessibility and wet soil conditions make removal almost impossible.

If harvesting were to occur, it is feared that the white cedar type, for example, would be eliminated due to the high deer populations which browse on cedar regeneration. The cedar type serves as a deeryard over the cold winter months, when food for deer is scarce. The soft maple stands could also be lost by over-harvesting. Soft maple stands that are harvested too heavily can easily revert into canary grass. Once canary grass invades a site, tree growth gets choked out.

Timber Recommendations

(a) Maintain the present timber types.
(b) Maintain the forested acreage for recreational and wildlife management purposes.
(c) Attempt to increase, or at least maintain, the current forested acreage by controlling the current water levels in the marsh.
(d) Develop a forestry management plan.

Archaeological & Historical Characteristics

The Sheboygan Marsh is one of a number of extensive wetland systems in east-central Wisconsin that are situated atop the Niagara Escarpment. This escarpment is one of the major topographic features of the geographic province designated as the Eastern Ridges and Lowlands of Wisconsin. According to the Wisconsin Geoligical Survey, "The Niagara Escarpment stretches in a wide arc from eastern Wisconsin through Michigan's Upper Peninsula, across Ontario, Canada, and on past the Niagara Falls in New York. The rock forming the escarpment was originally deposited as lime mud on an ancient sea floor about 430 million years ago. What remains is the result of weathering and erosion. The Escarpment is home to over 240 different rare, threatened, or endangered plant and animal species, including white cedar trees that are more than 1,000 years old. It is also an important source of groundwater recharge."

The Sheboygan Marsh is one of several reservoirs of the Sheboygan River. The Marsh is essentially an eutrophic glacial lake formed by meltwaters of the last Wisconsinan glaciation that, along with till and other sediments, filled the pre-glacial valley of the Sheboygan River. The Physical Geography of Wisconsin (1965) notes,

> *The latter was formerly a lake, for it has beach ridges, wave-cut cliffs, and ice ramparts. The swamp covers 15 4/5 square miles. It was originally occupied by a body of water a little larger than Lake Mendota at Madison. Borings show that it was at least 45 feet deep. It has 9 feet of peat at the surface, underlain by marl and clay. Elkhart Lake is a part of the original Sheboygan Lake. There was also a shallow lake in the middle of the*

present marsh before 1868. In that year $50,000 was expended in an attempt to drain the marsh, half of this sum being provided by the state.

In spite of its large size and suspected glacial history, little extensive geophysical study has been conducted at the Sheboygan Marsh and its history is undoubtedly more complex than presently documented.

The following archaeological and historical perspective was prepared by David F. Overstreet, Ph.D., President of Great Lakes Archaeological Research Center, Inc., and published in *Archaeological Investigations in the Sheboygan River Watershed, 1989–1990 Narrative Summary.*

"Prior to clearing in the early- to mid-19th century, the Sheboygan Marsh region was characterized by southern hardwood forest. Both mesic and xeric components are in abundant evidence with oaks, maples, and pines at higher elevations. At lower elevations, water tolerant species such as black ash and tamarack are predominant. Because northwestern Sheboygan County is within the limits of the so-called tension zone, pockets of conifer-hardwood forest also may have been major elements of the floral communities surrounding the Marsh. In addition, a few pockets of prairie or oak openings may have occurred here, but at the time of historic contact the nearest major distribution of these communities was found in east-central and northeast Fond du Lac County.

Detailed post-glacial vegetation succession has not been developed for Sheboygan County, but it is likely that the immediate post-glacial habitat, from approximately 12,000 to 10,000 BC, was a mixed tundra spruce forest. With warming and drying, pines began to replace the spruce some time after approximately 9,000 to 8,000 B.C. With continued lengthy periods of drought and dry period, the mid-Holocene hypsothermal, oaks and the associated southern hardwood species became the dominant arboreal species. There has likely been little vegetational change in the region from approximately 3000 BC to the advent of historic period land clearing.

Undoubtedly the major floristic communities were exploited by prehistoric populations for mast crops, large and small mammalian species that occupied the forests, and other understory plant resources. However, the concentrated and abundant aquatic species of plants and animals certainly provided the major elements of subsistence for the region's prehistoric populations up until about AD 1000, at which time corn horticulture was introduced into the region.

Fish, waterfowl, aquatic mammals (especially muskrat and beaver), and turtles were easily acquired by the residents of the marsh fringe. Aquatic tubers also were an important food source for the prehistoric residents. The marsh/lake seemed the key to local subsistence.

Archaeological investigations conducted in and around the Sheboygan Marsh during the 1980s/1990s have yielded significant results. Surveys resulted in the identification and verification of nearly 100 prehistoric archaeological sites within the limits of the Sheboygan Marsh tract owned by Sheboygan County, or immediately adjacent to these public lands. Archaeological site locations have been mapped, but are not included in this Plan due to the risk of unwarranted or illegal exploitation.

These sites demonstrate that the Marsh environs encompass virtually the entire spectrum of prehistoric occupation in Wisconsin. For approximately 12,000 years, prehistoric inhabitants of the region utilized the post-glacial lake and its extensive aquatic habitats for both hunting and gathering.

Collectively, the known and suspected historic and prehistoric archaeological sites represent a vast storehouse of potential research with regard to aboriginal lifeways following the end of the last glacial advance.

The contexts in which these archaeological sites occur and their surrounding marsh/bog environs present superior opportunities to reconstruct the ecological setting within which human adaptations took place. The deep peat records of the Marsh contain a pollen record of climatic variations following the demise of the Wisconsinan ice sheets. They also, likely, include plant macro-fossils of twigs, bark, seeds nuts, algae, and fungi, all useful indices of past climate and flora. The record of fossil remains of such forms as mastodon, mammoth, musk ox, barren ground caribou, dire wolf, giant beaver, and big horned bison is significant, but spotty. The Sheboygan Marsh provides, because of its periodic draw-downs, a fine opportunity to implement such research.

The Broughton Sheboygan Marsh Park is a focal point for public use and interpretation. Numerous federal and state surveys relating to tourism interest have demonstrated that historic and archaeological sites are consistently near the top of stated reasons why travelers select certain locations. Coupled with regional emphases on ice-age landscapes and interpretive centers, the Sheboygan Marsh is a most appropriate locality to enhance the interpretation of human activity from the last glacial recession to historic times."

Archaeologist Alphonse Gerund, in 1920, noted:

The Sheboygan marsh, an extinct lake of about the size of Lake Mendota at Madison, still indicated on maps as Sheboygan Lake occupies the northwest corner of the county. This marsh or lake and surrounding area is undoubtedly one of the most interesting regions in Wisconsin from the standpoint of its Indian remains, village sites, hunting and

fishing grounds. Its banks were one continuous village site. Here the Indian probably made his last stand in the county, until about 1870, when he left to seek another home.

Gerund continued:

Almost everywhere along its margin have been found numerous Indian artifacts. Numerous collections of these from these banks and surrounding territory have been made. Specimens found here have been scattered widely throughout the county. Many have found their way to larger collections in Wisconsin, into eastern museums, as the Smithsonian and the Museum of Natural History, New York. The H.H. Hayssen collection now in the Milwaukee Public Museum was largely collected here.

Archaeological investigations in the Sheboygan River watershed, focused on the Sheboygan Marsh area, demonstrating that the preservation and research potential for cultural resources in inordinately high. Historic and prehistoric archaeological sites in intimate association with deep sedimentary, saturated contexts also provides a unique opportunity to reconstruct not only the lifeways of the past 10,000-12,000 years, but also to develop an absolute chronology and description of the post-ice age habitats to which these past populations adjusted those methods.

Some of the newly reported sites may have been cited in the literature (e.g., Gerund 1920, Thomas 1894) and collections from the sites are housed locally in private hands, at the Smithsonian Institution, the Milwaukee Public Museum, the State Historical Society of Wisconsin, and the Museum of The American Indian – Heye Foundation. In this respect, documentation is certainly not complete and refinement of this information should be an on-going process. It should also be noted that a very robust private collection is maintained at the Henschel Museum of Indian History which is located near the northwest corner of the Marsh.

Dam Site & Waterfront

The permanent dam on the Sheboygan River at the northeastern-most corner of Sheboygan Marsh was completed under the federal Works Progress Administration (WPA) during 1937 & 1938.

The county's 1937 dam construction application to the Public Service Commission of Wisconsin stated that its purposes are, "*To maintain a constant water level in the Sheboygan Marsh, for fire protection and conservation purposes.*"

The concrete structure has a height of 8 feet, with a top width of 65 feet and a base width of about 90 feet. During the 1990s, Sheboygan County made routine repairs to the concrete spillway and wingwalls as well as to the banks above and below the dam. In 2011, a dam inspection was completed. The inspection recommended a number of items that were required to take place to ensure the integrity of the structure. Routine repairs were made in 2011 as well as 2012. More extensive repairs are forthcoming. The inspection also listed a number of reports that are required to be completed per 2009

updated WDNR statutes. In 2013, the County will complete a dam failure analysis, an emergency action plan, as well as an inspection, operation and maintenance plan to be current per the WDNR rules.

In 1968, a 250-foot long bypass pipe, 5 feet in diameter, was constructed just north of the dam to facilitate raising and lowering the water levels. Up until 2008, the bypass was operated manually, employing a worm gear and pinion. The gear and pinion mechanism still exists but it is now operated by an electric motor. (The county replaced the bypass control valve and catwalk in 1993, enabling easier operation and access.) The bypass enables the complete drawdown of the Marsh; however, with a watershed of about 133 square miles (about 85,000 acres) draining to this tiny damsite and bypass, it is totally ineffective at "controlling" water levels, particularly following even modest precipitation or spring thaws.

Two large fishing piers are located on the south and north sides of the Sheboygan River above the dam in the Marsh Park. The pier closest to the Marsh Lodge was built and is maintained by Winooski Bowmen's Club. The pier at the main boat landing was built (most recently in 2010) and is maintained by the County. A series of fishing platforms along the South Ditch, also in the Marsh Park, were sponsored by the Johnsonville Rod & Gun Club and are now maintained by the County.

The collection and removal of floating cattail bogs at the damsite is an on-going (and expensive) maintenance responsibility for the county. A boom has been cabled upstream of the dam to prevent overtopping or blockage, and to accommodate bog retrieval. In the late-1990s, a $20,000 concrete approach was completed above the dam to better accommodate the backhoes used to pick out the floating bogs which are manually pushed from boats toward shore by WDNR and County staff.

A fairly primitive, two-lane concrete boat ramp exists on the north shore, adjacent to the pier and the large north side gravel parking lot. It provides adequate access to Marsh users though a number of comments were made at the public information meetings about updating this structure.

In the mid- 1990's, downstream of the dam on both sides of the channel, the County's Land & Water Department (now the Conservation Division) and the County's Highway Department (now the Transportation Department), with the aid of Wisconsin Conservation Corps created walkable fishing access areas. The structures on the south side of the channel were updated in 2012 by County Planning & Conservation staff with the generous help of Home Depot staff through the countywide Volunteer Center Day of Caring event. The north side of the channel updates will be completed in 2013.

In 2011, the WDNR, the County, and Ducks Unlimited entered into an agreement for Ducks Unlimited engineering staff to complete a feasibility study of the Sheboygan Marsh Dam. The goal of the study is to determine what type and/or types of structures will help pass more water during heavy rain events. The natural spillways of the Marsh are no longer present due to development so the system is quite flashy during heavy precipitation and melts. This flashiness leads to cattail mats dislodgment and the associated removal costs as well as numerous ecological issues. The study is anticipated to be complete in 2013.

Regional Context

At 14,000 acres (8,166 publicly owned), *Sheboygan Marsh* is regionally significant and ecologically important.

It accommodates a wide variety of outdoor recreation activities. However, it is most ecologically well-suited, and widely recognized, for its wildlife habitat of statewide significance. Its primary importance as a migratory waterfowl spring nesting and fall staging area is well understood in the scientific community. As such, its management has focused on wildlife, and waterfowl hunting has always been the premiere recreational activity enjoyed at *Sheboygan Marsh*.

The Broughton Sheboygan Marsh Park & Wildlife Area enjoys an interesting regional context. Figure 25 illustrates its geographic location in relation to the following nine State Wildlife Areas, listed in order of nearness to Sheboygan Marsh:

- Kiel Marsh Wildlife Area (Map #2)
- Mullet Creek Wildlife Area (Map #3)
- Killsnake Marsh Wildlife Area (Map #4)
- Collins Marsh Wildlife Area (Map #5)
- Nichols Creek Wildlife Area (Map #6)
- Eldorado Wildlife Area (Map #7)
- Brillion Wildlife Area (Map #8)
- Theresa Marsh (Map #9)
- Horicon Marsh Wildlife Area (Map #10)
- Kettle Moraine North (Map #11)

The most noteworthy State of Wisconsin Wildlife Areas which form the regional context of *Sheboygan Marsh* are depicted in Figure 25 and profiled below:

- **Kiel Marsh Wildlife Area** (Map #2). 843 acres, lying along the Sheboygan River along a 3-county boundary at north-central Sheboygan County, southwest Manitowoc County, and southeast Calumet County. It features public hunting and fishing, wildlife observation, and nature-based outdoor recreation. The Kiel Marsh Wildlife Area is located just 4 miles north of Sheboygan Marsh.
- **Mullet Creek Wildlife Area** (Map #3). 2,217 acres, lying east of Mullet Lake in east-central Fond du Lac County. It features public hunting and fishing, wildlife observation, and nature-based outdoor recreation. The Mullet Creek Wildlife Area is located about 10 miles southwest of Sheboygan Marsh.
- **Killsnake Marsh Wildlife Area** (Map #4). 7,000 acres, lying along the south-central boundary of Calumet and Manitowoc counties. It features public hunting, wildlife observation, and nature-based outdoor recreation. The Killsnake Marsh Wildlife Area is located about 12 miles north of Sheboygan Marsh.

- **Collins Marsh Wildlife Area** (Map #5). 4,200 acres, lying in central Manitowoc County. It features public hunting, wildlife observation, and nature-based outdoor recreation. The Collins Marsh Wildlife Area is located about 14 miles north-northeast of Sheboygan Marsh.
- **Nichols Creek Wildlife Area** (Map #6). 612 acres, lying within the Northern Unit, Kettle Moraine State Forest, in southwest Sheboygan County. It features public fishing on Nichols Creek, a Class I trout stream, plus public hunting, wildlife observation, and nature-based outdoor recreation. The Nichols Creek Wildlife Area is located about 12 miles south of Sheboygan Marsh.
- **Eldorado Wildlife Area** (Map #7). 6,381 acres, lying in north-central Fond Du Lac County. It features public hunting, wildlife observation, and nature-based outdoor recreation. The Eldorado Wildlife Area is located about 24 miles west of Sheboygan Marsh.
- **Brillion Wildlife Area** (Map #8). 4,800 acres, lying in the northeast corner of Calumet County. It features public hunting, wildlife observation, and nature-based outdoor recreation. The Brillion Wildlife Area is located about 20 miles north of Sheboygan Marsh.
- **Theresa Marsh** (Map #9). 5,990 acres, lying just east of the famous Horicon Marsh, at the Washington County and Dodge County boundary. It features public hunting, wildlife observation, and nature-based outdoor recreation. The Theresa Marsh is located about 26 miles southwest of Sheboygan Marsh.
- **Horicon Marsh Wildlife Area** (Map #10). 21,401 acres, lying in central Dodge County. This internationally famous waterfowl nesting and staging area—primarily Canada geese—also features public hunting and fishing, unparalleled wildlife observation, and nature-based outdoor recreation. The Horicon Marsh Wildlife Area is located about 30 miles southwest of Sheboygan Marsh and is the largest freshwater cattail marsh in the world.

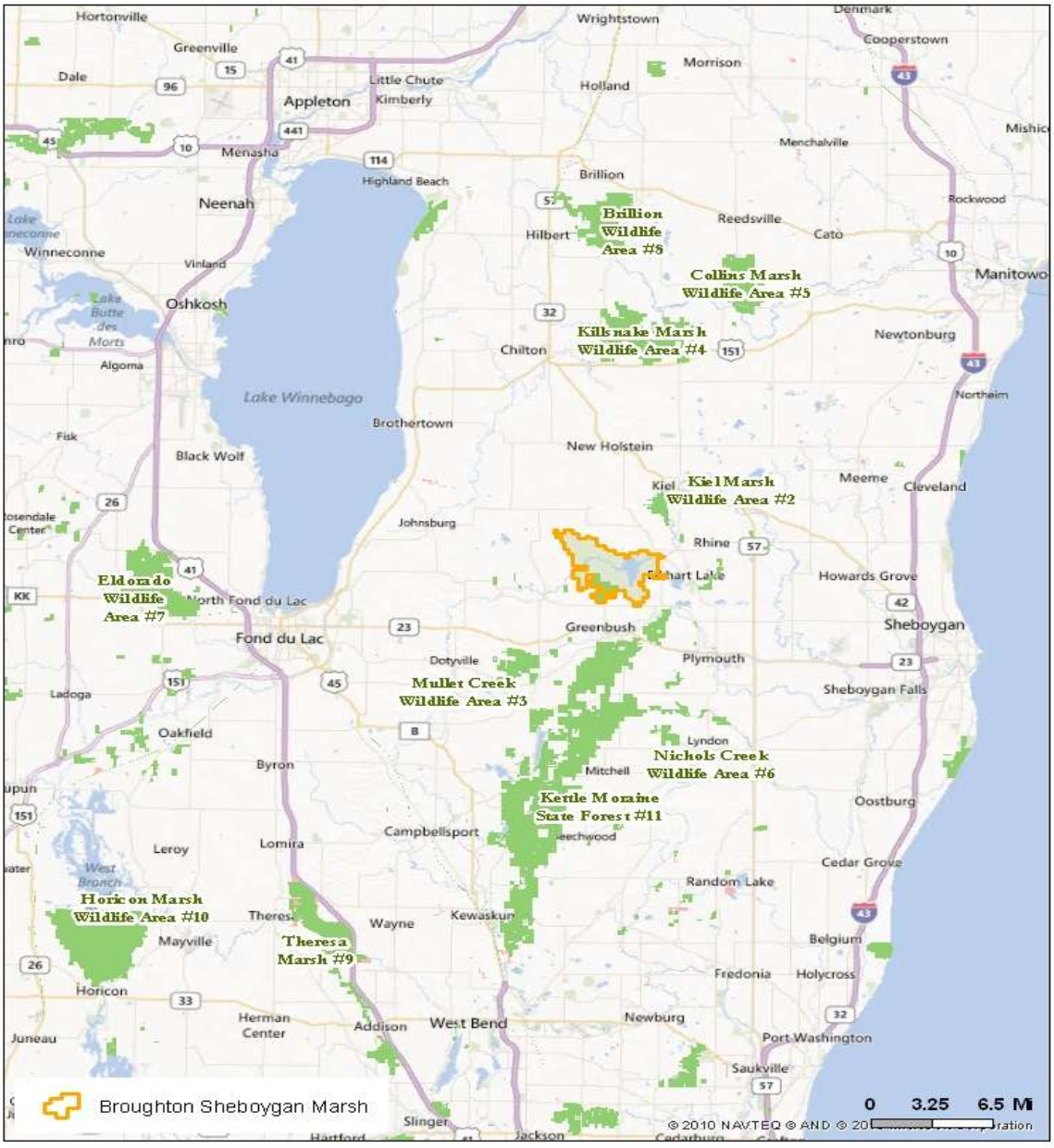


Figure 25
Broughton Sheboygan Marsh &
Comparable State of Wisconsin Wildlife Areas

Figure 25 – Regional Wildlife Areas

Chapter 4 – Recreational Activities: Demands & Needs

Introductory Comments

As with many, if not all, recreational resources there are competing demands on the Sheboygan Marsh. As mentioned in previous chapters, the Marsh hosts a variety user groups ranging from fisherman to birders. Ecologically speaking, managing the Marsh for waterfowl and wildlife habitat proves the most appropriate from a scientific perspective. This is also reflected, as previously mentioned again, in the public input and survey results.

The recreational uses at the Marsh reflect statewide recreational demands. Overall, outdoor recreation is a $11.9 billion industry in the State that provides $3.6 billion in wages for 142,000 jobs *(Outdoor Industry Ftd, 2010)*. The State breakdown of the various uses seen prevalently at the Marsh is reflected in Table 11 which is derived from the *2011-2016 Wisconsin Statewide Comprehensive Outdoor Recreation Plan*. It is assumed that these numbers accurately reflect Sheboygan County trends as well.

Table 11 – Wisconsin Recreational Demands

Activity	# WI Participating	# of Participants	Participation Trend*
Pleasure Walking	88%	3,947,000	Increasing
Visit Nature Centers	64%	2,858,000	Stable
Wildlife Viewing	58%	2,606,000	Stable
Freshwater Fishing	37%	1,683,000	Decreasing
Hiking	37%	1,652,000	Stable
Visit Wildnerness	34%	1,517,000	Increasing
Developed Camping	25%	1,143,000	Increasing
Hunting of Any Type	22%	999,000	Decreasing
Snowmobiling	18%	824,000	Stable
Canoeing	18%	806,000	Decreasing
Kayaking	7%	329,000	Increasing
(Source: 2011-2016 Wisconsin Outdoor Recreation Plan)			
*Developed by comparing the previous plan to the current plan			

All these uses have a strong presence at the Marsh. And, based on its statewide popularity it is no surprise that increasing "Walking" and "Hiking" opportunities (i.e. trails) at the Marsh was one of the most prevalent comments at the public input sessions and in the survey.

The following paragraphs provide further detail regarding the varied uses at the Marsh.

Hunting & Sport Shooting

> *"Father of Marsh Restoration Declares It Will Be Open to Hunters Forever – This announcement was made by C.E. Broughton…to definitely brand false a recent rumor that the Marsh was going to be converted into a wildlife refuge, and Mr. Broughton*

pledged that as long as he and his associates live, as long as a state conservation department exists, this will never come to pass. Sheboygan Press – September 9, 1940."

Hunting—whether big game or small game, waterfowl, or upland gamebird—is undoubtedly one of the, if not the most popular outdoor recreational activity enjoyed at Sheboygan Marsh. Wildlife habitat of such size and complexity as that found at Sheboygan Marsh is rare in this region of Wisconsin. Thus, it enjoys popularity from a wide geographical area.

Hunting and sport shooting are virtually a part of the heritage of Wisconsin and Sheboygan County as well. The hunting tradition is weaved into the fabric of this state and this county as witnessed by the opening quote from Mr. Broughton. Wisconsin's *Statewide Comprehensive Outdoor Recreation Plan* lists that hunting of any type consists of 22% of the State's adult population or about 999,000 people over the age of 16. The State plan also states that big-game hunting enjoys an 18% participation rate (which is made up of a majority of deer hunters) and that small-game hunting enjoys an 11.3% participation rate. Those figures show that there is about 7% of the population that takes part in one type of hunting, but not the other. The majority of hunters participate in both.

Game animals available in Sheboygan County, particularly at the Marsh, are illustrated in the following table.

Table 12 – Sheboygan County Game Animals

Game Animals in Sheboygan County & Marsh

Species	Abundance	Probable Future Status
White-tailed Deer	Abundant	Increasing
Cottontail Rabbit	Abundant	Stable
Gray Squirrel	Abundant	Stable
Fox Squirrel	Common	Stable
Turkey	Abundant	Increasing
Ring-necked Pheasant	Common	Decreasing
Mourning Dove	Common	Stable
Hungarian Partridge	Rare	Stable
Ruffed Grouse	Rare/Common	Stable
Woodcock	Common	Stable
Canada Goose	Abundant	Increasing
Ducks	Abundant	Stable
Red Fox	Common	Stable
Gray Fox	Common	Stable
Coyote	Common	Increasing
Raccoon	Abundant	Increasing
Mink	Common	Stable

Species	Abundance	Probable Future Status
Otter	Rare	Increasing
Muskrat	Abundant	Stable
Beaver	Rare	Stable

A 2001 report by the International Association of Fish & Wildlife Agencies states that there about 13 million hunters in the United States that generate $67 billion in economic output and support more than one million jobs. Of that $67 billion it states that in Wisconsin hunting is $1.7 billion a year industry that supports over 19,000 jobs. Those figures place Wisconsin behind only Texas and Pennsylvania in terms of economic benefit. Recent WDNR figures state that hunting is approximately a $1.4 billion a year industry. Other reports say it is at or about these figures as well. Regardless of what report you are looking at, it is no doubt an important economic driver for Wisconsin.

In 2012, Wisconsin's population was 5,726,398 with approximately 999,000 of those individuals who hunt. That equates into a per capita hunting economic benefit of $1,401 if one uses the WDNR generated figure of $1.4 billion. If that is extrapolated to Sheboygan County's 2012 adult population of 92,000, and using the 22% figure of those who hunt shown in Table 11, 20,240 Sheboygan County residents hunt and generate $28,356,240 in economic benefit annually. Granted, those dollars are not all spent in Sheboygan County, but even with that said the economic impact of this activity is significant and deserves consideration in long-range resource planning.

Another important factor to note about hunting is its availability in regards to appropriate land on which to conduct the activity. Nationwide, statewide, and countywide less high quality hunting land is available for use. Due to the economic situation of the past five years and the foreseeable future, additions to public land have been and will continue to be scarce due to limited resources. And, in the Sheboygan County area and the rest of Southeast Wisconsin more and more land is being used for residential development (both primary and secondary homes) and agricultural use due to high commodity prices. Permanent protection of high quality corridors is key for many reasons, including hunting availability, and should be a focus on any entity's long-range land use planning.

Fishing

Fishing has always been one of the most popular, and productive, outdoor recreational activities at the Sheboygan Marsh – enjoyed during all 4 seasons, by young and old alike.

In the overall management regime at Sheboygan Marsh—e.g., fish, wildlife, forestry, water levels—fish and fishing must be considered a "bonus" resource and activity. The aggressive management for an "optimal fishery" would compromise the sound, scientific, and priority, management for wildlife, forestry, and vegetation, and could upset the ecological balance at Sheboygan Marsh. This sentiment was also prevalent in the *2001 Plan.* Nonetheless, the open waters of Sheboygan Marsh remain attractive for fishing, whether from boats, piers, shores, or through the ice.

Most fishing effort is directed at panfish, specifically bluegill, yellow perch and black crappie. Anglers also target northern pike, especially in winter through the ice. Black bullheads generally are small in size, but provide fishing action for many anglers.

There have been many efforts to improve and supplement the fish population near the Marsh Park through stocking. Local conservation clubs have donated funds, the County has allocated funding through the Stewardship program, and the WDNR has allocated funding and manpower to stock the Marsh. All these efforts and expenditures is an indication that the demand for quality fish in the Marsh exceeds the availability of those fish.

There are 2,169 acres of inland fishable surface waters (1,169 acres of inland lakes and 1,000 acres of rivers and streams, see Table 13). These figures represent an approximate reduction of 478 acres over what was reported in *2001 Plan.* Most of this reduction is attributed to the decrease in open water at the Marsh. Other figures compared to the *2001 Plan* decreased or increased slightly as well. This is likely due to a number of factors including other waterbodies filling in similar to the Marsh as well as a much more accurate means for measurement available (i.e. detailed orthophotography) as compared to when the *2001 Plan* was written.

Table 13 – Fishable Inland Surface Waters of Sheboygan County

Water Body	Acres	Water Body	Acres
Beechwood Lake	22	Crystal Lake	124
Butler Lake	7	Lake Ellen	116
Crooked Lake	82	Little Elkhart Lake	58
Gerber Lakes	24	Random Lake	216
Lake Seven	27	Sheboygan Lake (Marsh)	177
Jetzer's Lake	18	Rivers & Streams	~1000
Elkhart Lake	298	**Total Acres**	**2169**

A 2006 US Fish & Wildlife study states that angling has approximately a $1.7 billion economic impact on the State while providing roughly 31,000 jobs. Using the figures in Table 11, a per capita figure of about $1010 is generated per Wisconsin angler. Using that same table which shows about 37.4% of our adult population fish and Sheboygan County's 2012 adult population of approximately 92,000, 34,411 residents fish generating about $34,755,480 in economic activity. No specific studies of the economic impact at the Marsh exist. However, we do know that charter fishing on Lake Michigan alone has nearly a $2,000,000 impact on the County *(Sheboygan County Chamber of Commerce Report 2012)*. As with hunting, the angling economic benefit in the County is significant.

Trapping

The Marsh is home to an abundance of furbearing animals. Trapping and the Marsh have been synonymous for centuries and likely dates back 12,000 years to the area's time of native occupation. Centuries ago, beaver, otter, mink, muskrat, raccoon, coyote, wolf, red and gray fox were found in

abundance. Today, with the expection beaver, otter, and wolf, the remainder of the species are present in noteworthy numbers at the Marsh.

Trapping opportunities remain good at the Sheboygan Marsh. According to Ed Harvey, a State certified trapping instructor, "The popularity of trapping appears to be increasing in the area. Increasing numbers are certain locally and likely similar at the national level." The increase is due to the increased export of pelts to China and Russia's burgeoning economies. More and more young people are enrolling in training classes as well according to Mr. Harvey. Compared to the *2001 Plan,* this popularity is a complete reversal to what was reported at that time.

Boating/Canoeing

Water recreation in Wisconsin seems to be ever evolving. While pleasure boating and personal watercraft (i.e. waverunners) are still quite popular, the trend to "silent" watercraft use is becoming increasingly prevalent. According to the *2011-2016 Wisconsin Statewide Comprehensive Outdoor Recreation Plan*, kayaking's popularity increased 604.7% between surveys taken 1994 and 2009. This is the third highest increase behind only outdoor hand/racquet ball and soccer. Canoeing also remains popular with about 17.9% of the State's adult population participating. Cheaper entry points compared to motorized watercraft and the continuous push for healthier lifestyles tend to be the driving forces behind kayaking's and canoeing's growing popularity.

The increase in "silent" watercraft activity has also helped spur new pressures on lake management with more and more user conflicts becoming ever present. The good news for the Marsh is that speed boating, personal watercraft use, and pleasure boating are not that popular on the Marsh for a variety of reasons. Smaller boats with smaller engines tend to be the norm at the Marsh. Therefore, user conflicts present on other lakes are not typically seen.

Snowmobiling, ATV Use, & Nordic Skiing

The frozen waters of the Marsh become a true paradise for snowmobilers, ATV riders, and Nordic skiers. With over 400 acres of the main lake area, the Sheboygan River, and the 21 miles of ditches, the area for use almost seems endless. Furthermore, the Marsh lies within the County's 228 mile public snowmobile trail system. The Marsh Restaurant also provides a nice reprieve to users.

The accommodation of these activities is sometimes a "double-edged sword." The user enjoyment and economic impact of these uses are clear and documented. However, there are a number of issues that take place each year. Even though users must abide by pertinent State codes (i.e. Chapter 45) that designate certain areas for use and that since 1998 the County's ordinance states there are specific entry points to the ice, certain renegade users feel it necessary to traverse critical vegetation and wildlife habitat areas. Though these nuisance activities have subsisted since the *2001 Plan* and the implementation of counter-measures at that time, consideration to improved management and enforcement is warranted.

Pleasure Driving & Wildlife Viewing

The *Wisconsin Statewide Comprehensive Outdoor Recreation Plan 2011-2016* reaffirms that *Pleasure Driving* (nearly 53% participation) and *Wildlife Viewing* (nearly 58%) continue to be two of the most popular recreational activities enjoyed by Wisconsin adults. All other recreational uses at the Marsh are trumped by these two activities. The State plan also lists that *Pleasure Driving* is increasing in demand. This is not surprising due to the retiring baby-boom generation and its propensity to drive for pleasure.

The Marsh provides many opportunities for observing a wide variety of vegetation and wildlife, whether it be from within the developed Marsh Park, the parking areas that exist around the entire resource, or the lightly traveled perimeter roadways. Sound land use planning as well as zoning controls are key to ensuring the Marsh remains an inviting, exciting, and unique visitor destination.

Appendix A – Public Input & Survey Information

The *2013 Marsh Management Plan* sought much public participation. Three primary vehicles were used to gather information. The Sheboygan County Recreational Facilities Management Committee began discussing the *Plan Update* in 2011. It was decided that two public open input sessions would take place as well as an online survey. These sessions and survey were advertised in all the local written media venues, on the County's website, as well as by targeting specific stakeholder groups (i.e. Sheboygan County Conservation Association) with announcements. The public input sessions were held on March 22, 2012 and March 29, 2012 in Sheboygan and Elkhart Lake respectively.

The public input sessions were ran by first having a brief presentation by County and WDNR staff. After that three simple questions were asked; 1) What do you like about the Marsh?, 2) What do you not like about the Marsh?, and 3) What would you like see happen at the Marsh in the future if anything? It was felt that leaving the questions rather general would facilitate more discussion and/or brainstorming than asking succinct questions. This theory appeared to prove true in that the discussions were lively and copious. After the brainstorm session the audience was asked to rate their top three answers from the brainstorm list for each of the three original questions. These answers are below.

Compared to the public input sessions, the online survey contained more succinct questions. Over 230 responses were gathered. The survey included ten questions. These questions along with their responses follow the public input session questions.

March 22 Public Input Session Responses

Ten members of the public attended the March 22 Public Input Session regarding the update of the Marsh Management Plan. The attendees were asked three general questions. They were then asked to review all of the responses and vote for their top three issues of importance.	
Question 1: What Do You Currently Like About the Marsh?	
Answers	**# of Top 3 Responses**
Education Opportunities	12
Good Waterfowl & Wetland Wildlife Species	11
Trails Along the South Ditch	5
Monitoring for Invasives	4
Public Accessibility	4
Trapping Opportunities	2
Lack of Development in the Area	2
Fishing is a Good Bonus, but Shouldn't be the Priority	1

Question 2: What Do You Not Currently Like About the Marsh?	
Answers	**# of Top 3 Responses**
Invasive Species	8
Lack of Recreational Trail Opportunities	8

Lack of Vegetative Diversity	7
Water Levels Downstream of the Dam	2
Permanent Trails	1
Bridge on CTH MC	1

Question 3: What Would You Like to See Happen at the Marsh if Anything in the Future?	
Answers	**# of Top 3 Responses**
Better Nutrient & Runoff Management of Surrounding Area	10
More Frequent Drawdowns Every 3-5 Years	8
Create a Bigger Bypass/Spillway	7
Improve the Team Approach of Management of the Resource	5
Improve the Timeliness on Water Level Management	4
Maintain Some Kind of Fishery	4
Develop More Research & Educational Opportunities & Building	3
Have More Cattail Spraying Around the Main Lake	2
Add Dams at Inputs into the Marsh	2
Develop an Auto-Sensor for the Bypass Control	1
Develop a System to Automatically Grind the Cattails	1
Develop an Invertabrate Study with Camp Y-Coda	1
Improve Fire Danger Response	0
Develop a Pump Station	0
Install a New Boom in Front of Dam	0
Lower the Water Levels in Fall	0
Improve Advertising and Tourism Efforts	0

March 29 Public Input Session Responses

Thirty-seven members of the public attended the March 29 Public Input Session regarding the update of the Marsh Management Plan. The attendees were asked three general questions. They were then asked to review all of the responses and vote for their top three issues of importance.

Question 1: What Do You Currently Like About the Marsh?	
Answers	**# of Top 3 Responses**
Lack of Development in the Area	16
The Tower	14
Education Opportunities	13
Trails Along the South Ditch	11
Drawdowns	8
Piers on the South Ditch	5
Permanent Campsites	3
Public Accessibility	1

Question 2: What Do You Not Currently Like About the Marsh?	
Answers	**# of Top 3 Responses**
Excessive Cattail Growth	23
Spending Money on Cattail Removal	16
Drawdowns	14
Invasive Species	13
Boat Launch Fee	8
Current Fishing Opportunities	6
Divesity of Marsh Management – Pick One	6
Lack of Boating Opportunities	3
Dead Trees	1
Permanent Campsites	1

Question 3: What Would You Like to See Happen at the Marsh if Anything in the Future?	
Answers	**# of Top 3 Responses**
Manage the Resource as a Marsh	16
Build a New Educational Building	14
Re/Develop More Wetlands Upstream for Water Storage	11
Maintain Some Kind of Fishery	10
Review the Feasibility of Dredging Areas	6
Develop Better Whitetail Deer Habitat	5
DNR, County & Stakeholders Team to Combat Invasives	5
Do More Surveying of Plant & Wildlife Species	3
Provide Bathrooms at Tower	2
Better Nutrient & Runoff Management of Surrounding Area	2
Redesign Campground	2
Improve Boat Launches	1
Do Not Develop Trails	1
Develop & Have More Frequent Surveys	0
Better Predator Control	0

Meeting Responses Combined

Below are the responses combined between the two public input sessions where the responses overlapped. The combined results were divided by the total number of attendees.		
Question 1: What Do You Currently Like About the Marsh?		
Answers	**# of Top 3 Responses**	**Weighted Response**
Education Opportunities	25	53%
Lack of Development in the Area	18	38%
Trails Along the South Ditch	16	34%
Tower	14	30%
Good Waterfowl & Wetland Wildlife Species	11	23%

Drawdowns	8	17%
Public Accessibility	5	11%
Piers on South Ditch	5	11%
Monitoring for Invasives	4	9%
Permanent Campsites	3	6%
Trapping Opportunities	2	4%
Fishing is a Good Bonus, But Shouldn't be a Priority	1	2%

Question 2: What Do You Not Currently Like About the Marsh?		
Answers	**# of Top 3 Responses**	**Weighted Response**
Excessive Cattail Growth	23	49%
Invasive Species	21	45%
Spending Money on Cattail Removal	16	34%
Drawdowns	14	30%
Lack of Recreational Trail Opportunities	8	17%
Boat Launch Fee	8	17%
Lack of Vegetative Diversity	7	15%
Current Fishing Opportunities	6	13%
Divesity of Marsh Management – Pick One	6	13%
Lack of Boating Opportunities	3	6%
Water Levels Downstream of Dam	2	4%
Dead Trees	1	2%
Permanent Trails	1	2%
Bridge on CTH MC	1	2%
Permanent Campsites	1	2%

Question 3: What Would You Like to See Happen at the Marsh if Anything in the Future?		
Answers	**# of Top 3 Responses**	**Weighted Response**
Develop More Research & Educational Opportunities & Building	17	36%
Manage the Resource as a Marsh	16	34%
Maintain Some Kind of Fishery	14	30%
Better Nutrient & Runoff Management of Surrounding Area	12	26%
Re/Develop More Wetlands Upstream for Water Storage	11	23%
More Frequent Drawdowns Every 3-5 Years	8	17%
Create a Bigger Bypass/Spillway	7	15%
Review the Feasibility of Dredging Areas	6	13%
Improve the Team Approach of Management of Resource	5	11%

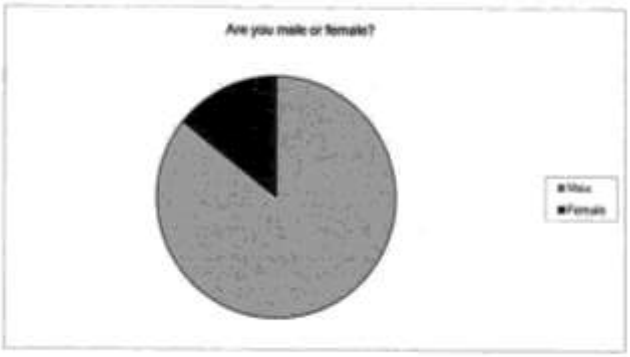
Develop Better Whitetail Deer Habitat	5	11%
DNR, County & Stakeholders Team to Combat Invasives	5	11%
Improve the Timeliness on Water Level Management	4	9%
Do More Surveying of Plant & Wildlife Species	3	6%
Have More Cattail Spraying Around Main Lake	2	4%
Add Dams at Inputs Into the Marsh	2	4%
Provide Bathrooms at Tower	2	4%
Redesign Campground	2	4%
Develop an Auto-Sensor for the Bypass Control	1	2%
Improve Boat Launches	1	2%
Do Not Develop Trails	1	2%
Develop a System to Automatically Grind the Cattails	1	2%
Develop an Invertabrate Study with Camp Y-Coda	1	2%
Improve Fire Danger Response	0	0%
Develop a Pump Station	0	0%
Install a New Boom in Front of Dam	0	0%
Lower the Water Levels in Fall	0	0%
Improve Advertising & Tourism Efforts	0	0%
Develop & Have More Frequent Surveys	0	0%
Better Predator Control	0	0%

Zip Code	Number of Responses	City/Town
53081	50	Sheboygan
53083	36	Sheboygan/T.Sheboygan
53073	28	Plymouth
53079	18	Madison
53020	17	Elkhart Lake
53085	17	Sheboygan Falls
53070	13	Oostburg
53042	7	Kiel
53013	5	Cedar Grove
53082	5	Sheboygan
53015	4	Cleveland
53061	4	New Holstein
53040	3	Kewaskum
53075	3	Random Lake
53093	3	Waldo
53057	2	Mount Calvary
54935	2	Fond du Lac
54937	2	Fond du Lac

Marsh Management Plan Update Questionaire

Are you male or female?

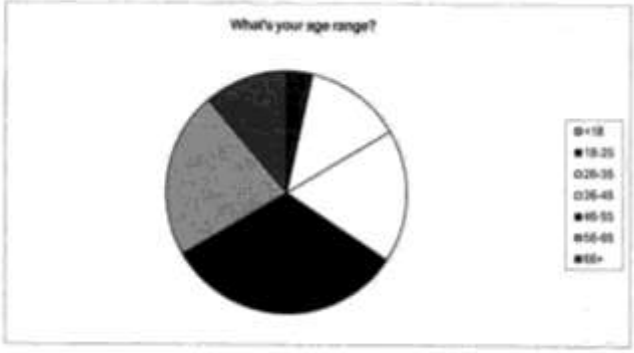
Answer Options	Response Percent	Response Count
Male	85.7%	197
Female	14.3%	33
answered question		230
skipped question		0



Marsh Management Plan Update Questionaire

What's your age range?

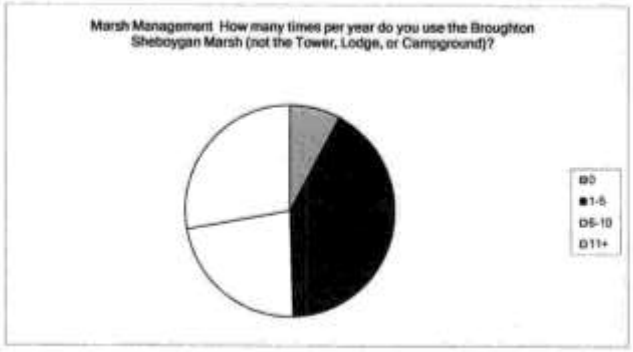
Answer Options	Response Percent	Response Count
<18	0.0%	0
18-25	3.5%	8
26-35	13.0%	30
36-45	17.8%	41
46-55	32.2%	74
56-65	22.2%	51
66+	11.3%	26
answered question		230
skipped question		0



Marsh Management Plan Update Questionaire

Marsh Management How many times per year do you use the Broughton Sheboygan Marsh (not the Tower, Lodge, or Campground)?

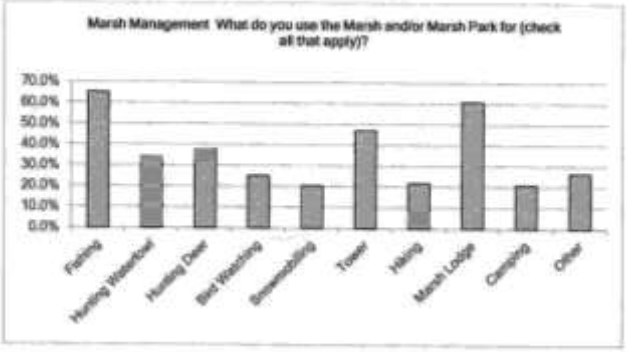
Answer Options	Response Percent	Response Count
0	7.8%	18
1-5	41.7%	96
6-10	22.6%	52
11+	27.8%	64
answered question		230
skipped question		0



Marsh Management Plan Update Questionaire

Marsh Management What do you use the Marsh and/or Marsh Park for (check all that apply)?

Answer Options	Response Percent	Response Count
Fishing	65.2%	150
Hunting Waterfowl	34.3%	79
Hunting Deer	37.8%	87
Bird Watching	25.2%	58
Snowmobiling	20.4%	47
Tower	47.0%	108
Hiking	21.7%	50
Marsh Lodge	60.9%	140
Camping	20.9%	48
Other	26.5%	61
answered question		230
skipped question		0



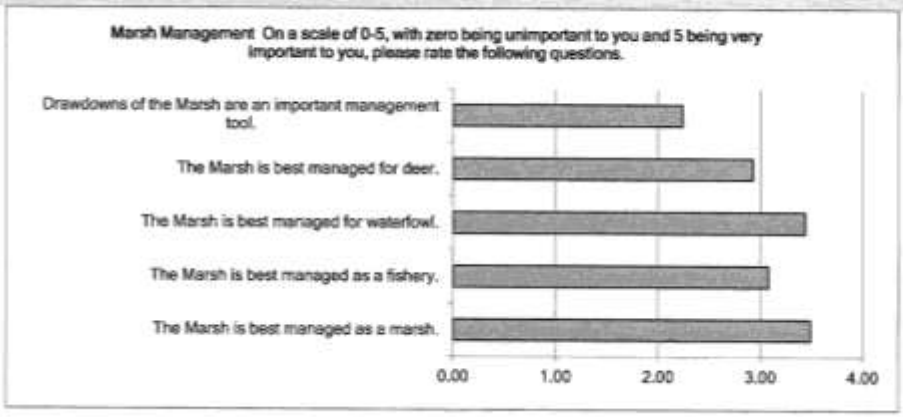
Question 6 Summary- What other types of Rec Activities

Would You Like to See if Any	Responses
Hiking/Biking/X Country Trails	16
ATV Trails	12
Educational Opportunities	11
Better fishing	8
Do nothing	8
Miscellaneous	8
Better boating opportunities (canoe/kayak, etc.)	7
Hunting Opportunities	4

Marsh Management Plan Update Questionairre

Marsh Management On a scale of 0-5, with zero being unimportant to you and 5 being very important to you, please rate the following questions.

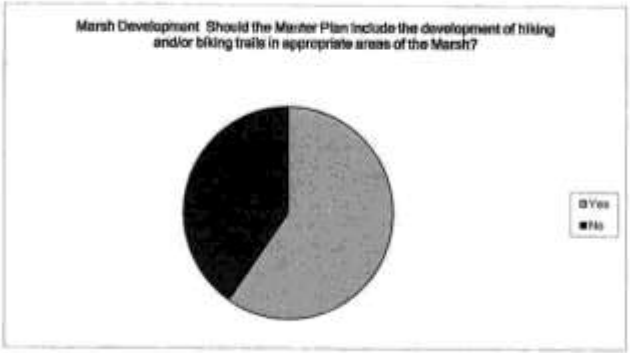
Answer Options	0	1	2	3	4	5	Rating Average	Response Count
The Marsh is best managed as a marsh.	26	16	19	28	39	101	3.49	229
The Marsh is best managed as a fishery.	29	21	23	44	49	61	3.08	227
The Marsh is best managed for waterfowl.	21	12	17	49	50	76	3.44	225
The Marsh is best managed for deer.	26	17	40	52	46	45	2.93	226
Drawdowns of the Marsh are an important management	76	24	21	30	30	47	2.24	228
							answered question	230
							skipped question	0



Marsh Management Plan Update Questionairre

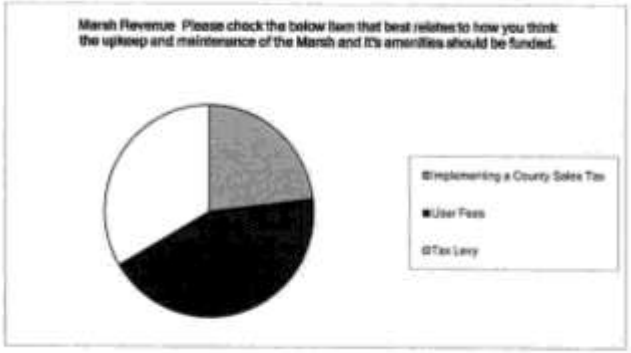
Marsh Development Should the Master Plan include the development of hiking and/or biking trails in appropriate areas of the Marsh?

Answer Options	Response Percent	Response Count
Yes	59.6%	137
No	40.4%	93
	answered question	230
	skipped question	0



Marsh Management Plan Update Questionaire

Marsh Revenue: Please check the below item that best relates to how you think the upkeep and maintenance of the Marsh and it's amenities should be funded.		
Answer Options	Response Percent	Response Count
Implementing a County Sales Tax	23.0%	53
User Fees	43.5%	100
Tax Levy	33.5%	77
answered question		230
skipped question		0



Question 10 Summary - Additional Information	Responses
Miscellaneous	17
No drawdowns/higher water levels	15
Improve Fishing	7
Support fees	7
Manage as a Marsh/do nothing	7
Keep permanent campers	4
Increase ATV opportunities	4
Do not support fees	4
Support drawdowns	3
Get better water control measures	3
No bike/hike trails	2

Appendix B – Historical Information

Table 14 – Historical Expenditures at the Marsh

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
1937	80-acre acquistion	550	550	Charles Broughton	
1937	6349-acre acquisition	17,646			17,646
1938	Dam & public park construction	169,740	130,000	WPA	39,740
1966	north parking lot and launch ramp	11,016	3,860	Water Access	7,156
1966	Ditch dredging	3,350	1,638	Fish & Game	1,712
1967	Sipple flowage & pump	3,800	3,800	ASCS & Waterfowl Mgmt Fund	
1968	Dam by-pass	16,087	6,552	Fish & Game	9,535
1968	Toilet facilities, campsites, firepits, electricity	21,142	7,500	LAWCON	13,642
1968	Blasted potholes	30,000	30,000	State & Federal grants & Koenigs Conservation Club	
1969	Fencing	1,181			1,181
1971	Ditch dredging	9,719	3,401	Fish & Game & SCCA	6,318
1972	Picnic Shelter	1,156	578	Fish & Game	578
1972	Water control structure	4,191	1,938	Fish & Game	2,253
1973	Rustic park entrance sign	181			181
1975	14’ Boats (3)	2,850			2,850
1975	Holbrook Farm Privy	4,980	4,980	State Snowmobile Aids	
1975	Runoff pond	2,728	2,500	ORAP	228
1977	Dike Work	2,971	1,486	Fish & Game	1,485
1978	South Ditch Road and parking area	3,972	725	Fish & Game	3,247
1979	Dike repair, water control structure	1,154	577	Fish & Game	577
1980	Acquisitions	144,030	69,879	LAWCON	74,151
1980	Slide gate at runoff pond	500	500	Waterfowl stamp	
1981	Feeder ditch dredge & dike road	5,700	5,700	Waterfowl stamp	
1982	Subsurface and surface drainage, road & parking pavement, playground, electricity	74,901	28,150		46,751
1983	Acquisitions	40,000	22,000	LAWCON, SCCA, Grafenstein	18,000
1983	Goff parking area	500	500	Johnsonville Rod & Gun	
1984	BBQ Grills	918			918
1984	Dredge South Ditch	23,768	13,250	Fish & Game & SCCA	10,518
1984	South Ditch Dredging	23,768	13,250	Fish & Game & SCCA	10,518
1985	Canoes, paddles and life cushions	2,398			2,398
1985	Excavation for water craft	800			800
1985	Campground rehabilitation	10,209			10,209

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
1985	Information Shelter	1,365	1,365	AFSCME Local 1749	
1985	Cooler Evaporator in Old Lodge	200			200
1985	Privy rehab	1,748			1,748
1986	New Marsh Lodge	272,32			272,326
1986	New Marsh Lodge Accessories	20,352	2,150	Dan Johnson	18,202
1986	Campground rehabilitation	513			513
1986	Well house renovation	2,601	75		2,526
1986	New RV Campground Development	7,301			7,301
1986	Main pier North	3,000	3,000	Koenigs Conservation Club	
1986	Main pier South	4,000	3,279	Fish & Game & Winooski Bowmen	721
1986	Custom park bench	265	265	John Knaus Family	
1986	Exterior restoration of old lodge	14,665	7,700	Greatwood Log Homes & Dan Johnson	6,965
1986	Interior restoration of old lodge	18,850	17,900	Crystal Lake Sportsmen, Greatwood Log Homes, Dan Johnson, Kohler Company	950
1986	Four dug wildlife ponds	4,800	4,800	Waterfowl stamp	
1986	DNR pole shed	20,000	20,000	Fish & Wildlife	
1986	Acquisitions	19,500	19,500	SCCA	
1987	Front pool dredging & waterfront restoration	27,232	10,100	SCCA, Johnsonville Rod & Gun	17,132
1987	Boat ramp	600	600	Johnsonville Rod & Gun	
1988	New RV Campground Development	60,000	30,000	LAWCON	30,000
1988	Kitchen Hood & Fire Suppression	944			944
1988	Kitchen hood	1,147			1,147
1988	RV Dump Station	3,588			3,588
1988	Charbroiler	2,553			2,553
1988	Dredging above dam	7,862			7,862
1988	Mobile home for manager	20,000			20,000
1989	Broughton lodge door	377			377
1989	blacktopping	5,638			5,638
1989	Paddles	55			55
1989	Reroof Broughton Lodge	3,575			3,575
1989	Stepladder	70			70
1989	TV Tower	700			700
1989	Remodeling Broughton Lodge	2,900			2,900
1989	Prairie grass 8 acres	800	800	WDNR	
1990	Exterior Maintenance	8,050			8,050
1990	Sandblast & paint bridge	4,500			4,500

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
1990	Marsh Lodge HVAC	22,792			22,792
1990	Life cushions	72			72
1990	Stackable chairs	445			445
1990	Security system	1,995			1,995
1990	Safe	849			849
1990	Antenna rotor	93			93
1990	landscaping	2,911			2,911
1990	Remodeling Broughton Lodge	2,602			2,602
1990	Dining tables	245			245
1990	Marsh Lodge Remodeling	1,242			1,242
1990	Shed Overhead Door	540			540
1991	Canoes, paddles and life cushions	1,685			1,685
1991	Dishwashing system	7,918			7,918
1991	Pesticide Sprayer	84			84
1991	Dam repair	7,800			7,800
1991	Stools	915			915
1991	Marsh Lodge Remodeling	9,802			9,802
1991	Park Bench	70	70	Peterman's Sportsmen	
1991	Park Bench	70	70	Smerke's Sportsmen	
1992	Well pump	1,026			1,026
1992	Mower deck	1,350			1,350
1992	Ice cuber	1,200			1,200
1992	Marsh Lodge Remodeling	2,447			2,447
1992	Alder regeneration cuts	3,000	3,000	Ruffed Grouse Society	
1993	Pave roads in campground	35,389			35,389
1993	Fire pites	3,750			3,750
1993	Dam bypass valve	7,300			7,300
1993	Well pump	960			960
1993	Relighting	1,572			1,572
1993	Park HVAC Controls	750			750
1993	Mower deck	689			689
1993	Boat	650			650
1994	Riverbank erosion control project	54,019			54,019
1994	Picnic Tables	650			650
1994	Deepfryer	1,604			1,604
1994	Charbroiler fan	926			926
1994	Ice Bin	310			310
1994	Marsh Lodge Doors	1,241			1,241
1994	Food & Equipment Inventory	7,626			7,626

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
1994	Blasting, staining, caulking – both lodges	16,457			16,457
1994	6200 Trees & Shrubs	2,000	2,000	WDNR	
1994	Osprey Platform	500	500	Elmer Becker Memorial	
1995	Shower room remodel	26,020			26,020
1995	Picnic Tables	1,404			1,404
1995	Campfire pits	1,185			1,185
1995	Branding iron	111			111
1995	Prairie grass 12 acres	1,200	1,200	WDNR	
1996	Dam repair	21,600			21,600
1996	Prairie grass 16 acres	1,500	1,500	WDNR	
1997	Picnic Shelter	26,849			26,849
1997	Small wetland creation (3)	600	600	WDNR	
1997	Prairie grass 17 acres	1,500	1,500	WDNR	
1998	Shelter parking lot	5,560			5,560
1998	Prairie grass 21 acres	1,900	1,900	WDNR	
1998	Pump and structure removal	3,000	3,000	WDNR	
1999	Bog removal platform	19,000			19,000
1999	Freezer	1,515			1,515
2000	Cooler floor	979			979
2000	Charbroiler	1,735			1,735
2000	10 acre runoff pond	19,000	19,000	NAWCA & DU	
2001	Water softener	3,165			3,165
2001	Acquisitions	112,200	112,200	State & SCCA	
2006	fiberglass reinforced backer panels	570			570
2006	service upgrade supplies	1,355			1,355
2006	install new evaporator coil in back bar	693			693
2006	Marsh tower brochure	1,209	1,209	Friends of the Marsh	
2006	warewasher	620			620
2006	replace compressor for walkin freezer	1,462			1,462
2006	inspect & repair holding tank	1,826			1,826
2006	Misc	628			628
2006	Nine 6’ pressure treated park chief tables	3,245			3,245
2006	Marsh dumpster pad	1,118			1,118
2006	cutting brush	622			622
2006	Marsh tower brochure	1,251			1,251
2006	Replace cracked windows	512			512
2007	door for well pumphouse	732			732
2007	repair work	820			820

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
2007	snow removal	688			688
2007	install new compressor & condenser fan	904			904
2007	bathroom toilet partitions	1,565			1,565
2007	bog removal	1,177			1,177
2007	revamp kitchen to UL 300 standards	1,700			1,700
2007	electrical work	938			938
2007	repair work	524			524
2007	repair work	608			608
2007	repair work	1,447			1,447
2007	warewasher	639			639
2007	run #2 wire from campsite to tower	1,500	1,500	Friends of the Marsh	
2007	marsh pedestals project	5,118	5,118	Friends of the Marsh	
2007	const of bathrooms	16,118			16,118
2007	tower project	1,588			1,588
2007	run electrical wire, panels, etc.	9,360			9,360
2007	repair work	669			669
2007	tower	17,150	17,150	Friends of the Marsh	
2007	electrical supplies	4,396			4,396
2007	electrical supplies	5,013			5,013
2007	tower	2,340			2,340
2007	new electrical service	1,029			1,029
2007	windows on log lodge bldg	1,050			1,050
2007	repair walkin freezer	738			738
2008	water treatment	1,246			1,246
2008	transfer Marsh tower to Friends	169,134	169,134	Friends of the Marsh	
2008	snow removal	650			650
2008	repair work	887			887
2008	floodplain computations	500			500
2008	repair work	740			740
2008	repair work	440			440
2008	warewasher @ marsh lodge	671			671
2008	repair work	1,100			1,100
2008	bog removal	3,389			3,389
2008	catch basin repair	545			545
2008	filing fee for Friends of Marsh Form 1023	750	750	Friends of the Marsh	
2008	repair work	653			653
2008	electrify bypass control	500			500
2008	repair work	640			640
2008	bog removal	974			974

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
2008	repair work	2,195			2,195
2008	tower – revisions for rebidding	6,876	6,876	Friends of the Marsh	
2009	bog removal	815			815
2009	repair work	968			968
2009	repair work	1,149			1,149
2009	bog removal	754			754
2009	commercial door	2,084			2,084
2009	bog removal	1,085			1,085
2009	add gravel at SR	1,507			1,507
2009	res ext-pressure wash, repaint	5,900			5,900
2009	bog removal	1,916			1,916
2009	repair work	1,789			1,789
2010	bog removal	8,080			8,080
2010	plumbing wk @ premade bldg	4,284			4,284
2010	water line repair	2,114			2,114
2010	bog removal	20,062			20,062
2010	water line repair	1,092			1,092
2010	bog removal	4,110			4,110
2010	remove underground tank @ campground well	978			978
2010	bog removal	19,873			19,873
2010	install 2 water heaters	3,377			3,377
2010	bog removal	4,415			4,415
2010	bog removal	8,028			8,028
2010	replace hose faucet @ campsite #60	551			551
2010		838			838
2010	concrete repair at Marsh sign	2,753			2,753
2010	repair work	670			670
2010	bog removal	2,406			2,406
2010	replace heat exchanger	3,331			3,331
2010	inspection	500			500
2010	snow removal	676			676
2010	repair work	1,344			1,344
2011	bog removal	632			632
2011	dam inspection	2,200			2,200
2011	blacktopping	584			584
2011	wages	572			572
2011	survey services – Marsh dam	575			575
2011	chainsaw, pole pruner, trimmer	977			977
2011	bog removal	6,848			6,848

Year	Description	Total Cost ($)	Grants/ Donations	Donor/Grantee	County Cost ($)
2011	repair water leak behind old lodge	655			655
2011	bog removal	27,032			27,032
2011	reroof kiosk	10,375			10,375
2011	bog removal	13,810			13,810
2011	60 w LED fwd throw wallpk	857			857
2011	Custom park bench	750	750	Shirley Quasius Family	
2012	annual inspection of tower	4,573			4,573
2012	landscaping	508			508
2012	boat ramp/dock repair	875			875
2012	gate repair	1,206			1,206
2012	cutting brush	664			664
2012	survey property lines-Tn of Russell	4,678			4,678
2012	pier supplies	559			559
2012	cutting brush	676			676
2012	Custom park bench	500	500	SCCA	
1962-1985	672-acres acquisition	344,835	344,835	State & Federal grants	
		2,452,755.80	**1,169,210.42**		**1,283,545.38**

Note: After 2005 expenses only over $500 are listed.

Sheboygan Press

OFFICIAL PAPER OF THE STATE OF WISCONSIN

SHEBOYGAN, WIS., WEDNESDAY MAY 5, 1937

I Of Denhardt Jury Refu

Anarchist Uprising Ended At Ba

Sheboygan County To Have Park In Marsh

Awaits Verdict

Site Given To County By Editor

Restoration Of The Sheboygan Marsh Is Assured By Funds To Build Dam

A Great Conservation Victory

C. I. O. Group To Aid Strike At Hollywood

Figure 26 - Sheboygan Press Article 1937

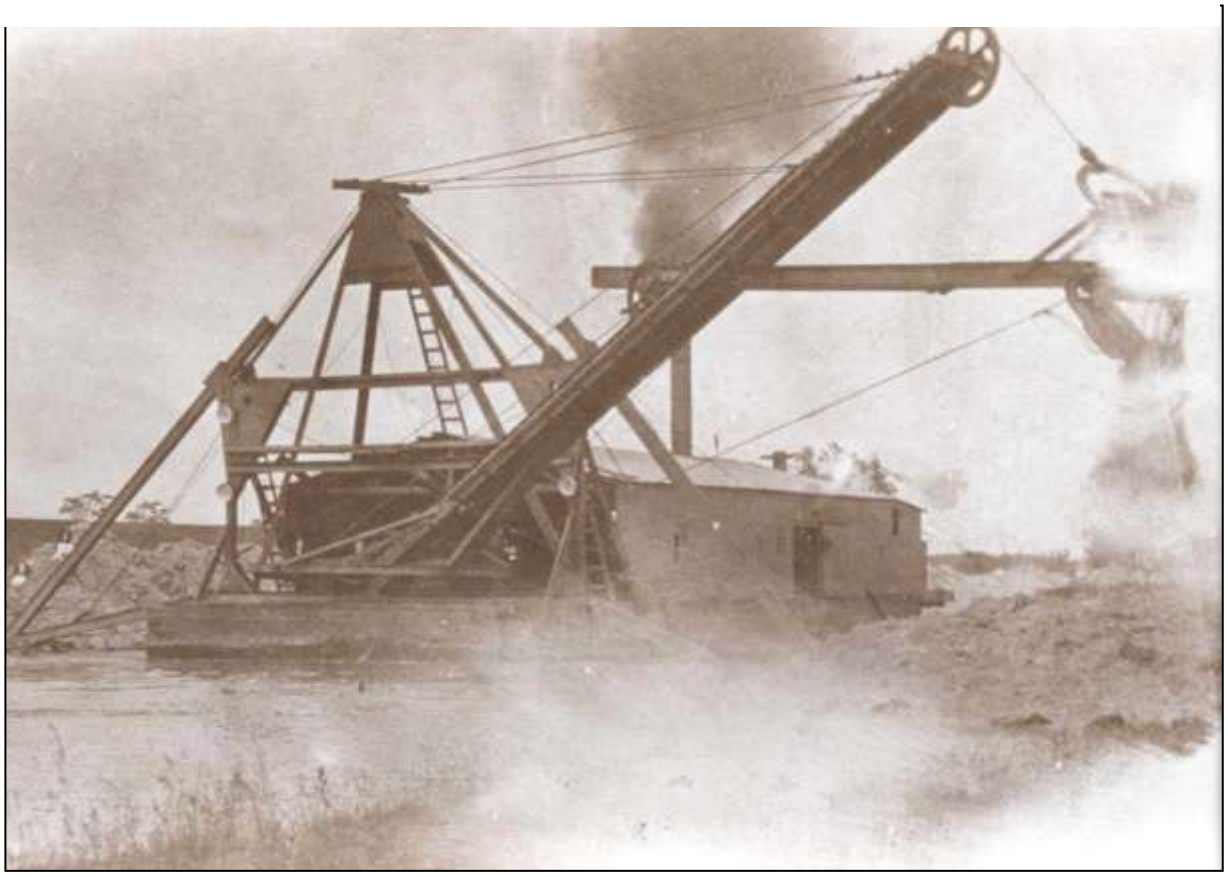
The Sheboygan Press

SHEBOYGAN, WIS., SATURDAY MAY 21, 1938

Restoring The Marsh To Nature

Figure 27 – 1938 Press Article

Figure 28 - Digging Ditches at the Marsh 1912



Members of the Sheboygan County Board took time off Monday afternoon to enjoy the annual "duck dinner" at the Sheboygan Marsh, and to a man, they will claim the afternoon was not wasted.

Members of the county board and guests numbering slightly over 50 persons in all, attended the dinner the like of which never has been held before. Everyone sang the praises of Mr. and Mrs. Joel Ferrel and their assistants for the fine dinner.

Upon arriving at the marsh the members of the board made a "tour" of the park property, inspecting the various buildings, looking over the zoo and marveling at the many improvements made since their last visit.

November 27, 1940
Sheboygan Press

We know of no other region or locality in the midwestern United States where the relational environmental contexts are so readily accessible. We view the Sheboygan Marsh…as an ice-age and post ice-age laboratory…unique…of national and international significance.

1989-1990
Dr. David Overstreet, President
Great Lakes Archaeological Research Center, Inc.

The Sheboygan marsh area, if it is to propagate fish and game, must have men of vision looking ahead, for an outlay of money will bring little in recreation for the great masses, if we do not furnish the maximum of protection for conservation.

December 1, 1941
Sheboygan Press Editorial

Sheboygan marsh, with its 15 square miles of flat, swampy surface, its strange plant and animal life, and its solitude as complete as if it lay in the heart of some unexplored country hundreds of miles from civilization, never fails to stir the imagination and excite emotions of mystery and romance.

Senator G.W. Buchen
June 29, 1945
Sheboygan Press

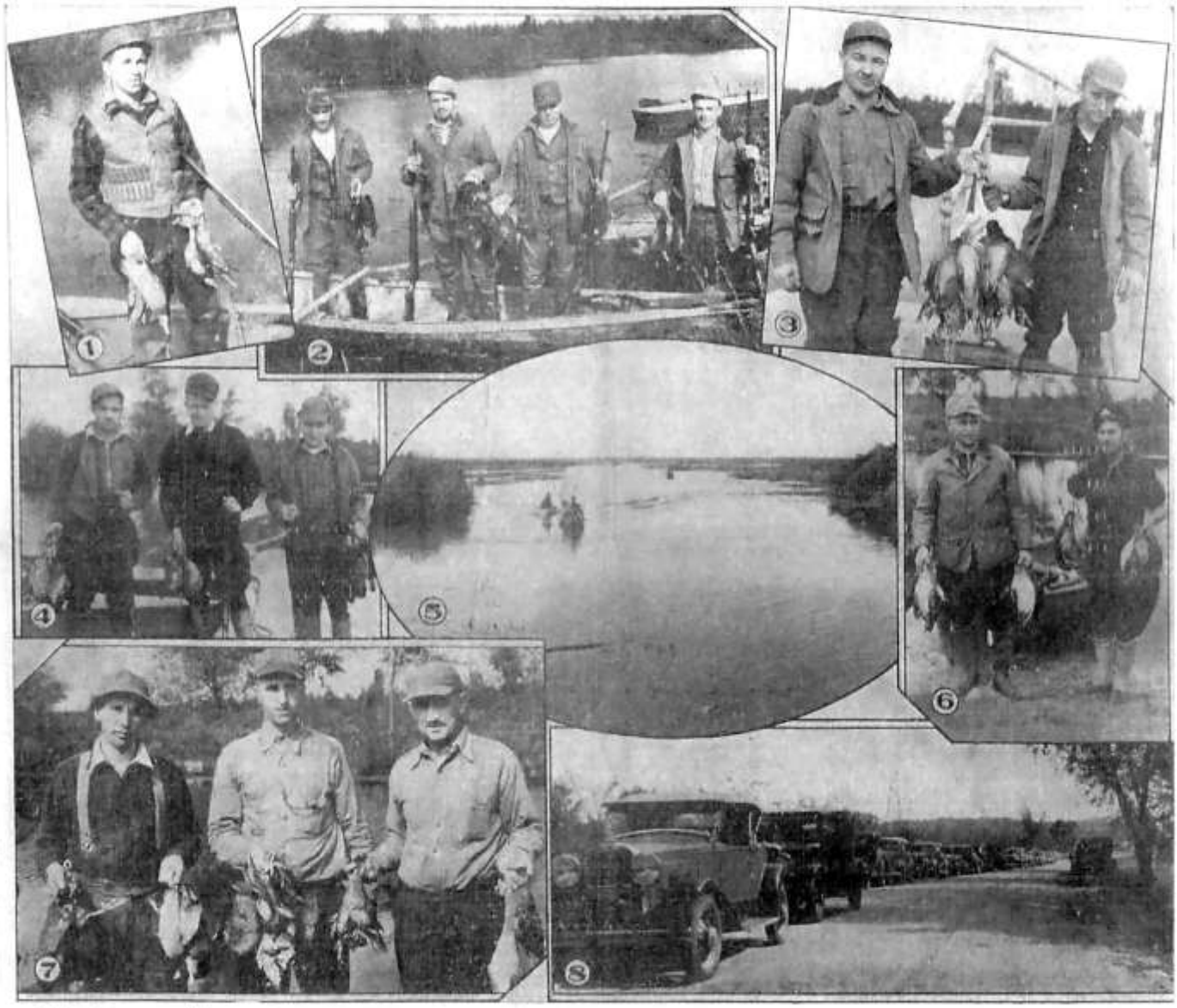
We know of no other region or locality in the midwestern United States where the relational environmental contexts are so readily accessible. We view the Sheboygan Marsh…as an ice-age and post ice-age laboratory…unique…of national and international significance.

1989-1990
Dr. David Overstreet, President
Great Lakes Archaeological Research Center, Inc.

The Sheboygan Press

Sheboygan, Wis. October 3, 1938

Camera Records Activities Of Hunters At Sheboygan Marsh



The duck season opened literally with a bang Saturday as hunters from far and wide swarmed over the marshes and areas known to be the favorite haunts of ducks and "hens" and with trigger fingers tensed for action, brought down hundreds of the feathered game as they were caught in the cross fire of an unknown number of hunters' guns. One of the favorite hunting areas on the opening day was the Sheboygan marsh. Here several boat loads of hunters were requested to display their catches before the camera as they returned from their trips up the marsh and in picture No. 1 we have Neal McDonald of Milwaukee with his bag of four teal and one spoonbill. In the second picture Steve Guetchaw, George Andre, Jim McBrair and Roman Steinbruecker are shown with their catch of two mallards and nine teal. Picture No. 3 shows Roland Froh and George Parker with their mixed bag of 19 teal and mudhens. In No. 4 Roman Versch, Russell Lunker and Ben Cole are shown with 10 teal and seven mudhens. Picture No. 5 is a view looking up Sheboygan marsh as a few of the returning hunters come into view in their boats. In the sixth picture E. Keller and Bert Llethen are shown with their full catch of 14 teal, one shoveler and five mallards. Picture No. 7 depicts John Gröber, Al. Lutgen and Art Polzin with their catch of seven teal, one pintail and 10 mudhens. In the eighth picture appears a glimpse of the long line of hunters' cars parked on the Sheboygan marsh road near the dam while the opening of the 1938 duck season was taking place.—Press photos.

Appendix C – "Marsh Management Agreement" Between Sheboygan County & WDNR

To be inserted after negotiated

Appendix D – Feasibility Study of the Sheboygan Marsh Dam

To be inserted after completed by Ducks Unlimited