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APPENDIX A

Lake Puckaway Issues Assessment,
L Stoll Consulting

Lake Puckaway Issues Assessment

August 1, 2015

Conducted and Prepared by

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Lake Puckaway Protection and Rehabilitation District

Acknowledgements:

This issues assessment was done as part of a project funded by the Department of Natural Resources Lake Planning Grant Program and the Lake Puckaway Protection and Restoration District to gather scientific data and background information for the development of a management plan for Lake Puckaway in anticipation of the replacement of the dam on the Fox River above the city of Princeton.

Special thanks go to the Lake Puckaway Protection and Restoration District, the Wisconsin Department of Natural Resources and Onterra, LLC for their help and guidance during the assessment process and to the people who were willing to be interviewed for the issue assessment.

Executive Summary

The Wisconsin Department of Natural Resources (WDNR) and the Lake Puckaway Protection and Rehabilitation District (LPLPPRD) have been jointly managing the water levels on Lake Puckaway. Current methods include placing boards on the existing dam on the Fox River above the city of Princeton to raise the water levels on Lake Puckaway during the summer months. A Memorandum of Understanding (MOU) between these two entities describes the protocol for this process. Increasing safety concerns has prompted the WDNR to consider replacing the dam. Prior to that being done, they have asked the LPPRD to update the Lake Management Plan for Lake Puckaway. This Issues assessment is the first step in the plan update. The assessment was conducted using one-on-one in person interviews with 16 people who are actively involved in the management of Lake Puckaway or directly impacted by the management decisions. The results will be added to information received from a citizen's survey, existing scientific data and new scientific information collected by Onterra, LLC and used to guide the development of the lake management plan.

For many users, the lake is currently in fairly good condition. Fishing is good and there is only a small algae problem. The walleye restocking program is a success. After some challenges in finding a company to continue to remove carp, the current program with the goal of removing 400,000lbs of carp per year seems to be working. While the carp are less of an issue, the previous damage and several high water years have led to erosion on the dredge banks and island. Added stress from cormorants defoliating trees and subsequent loss of the tree root structure has increased the loss of the island. Several interviewees remarked that the pelicans are also having a negative impact though there was no consensus as to what the impact was. Water fowl may be experiencing some stress. At one time, this lake was a premier duck/waterfowl hatchery and stopover site. There was lots of food (wild rice) and vegetation for safety and breeding. Higher water levels have reduced all types of vegetation and increased erosion. The current practice for managing water levels includes adding 16.5 inches of boards to the existing dam when water levels stop topping the dam. There are safety concerns with this practice and the LPPRD has asked for another method to raise water levels.

There is however a minority opinion that the lake is in terrible shape and no one is satisfied. The bottom is mucky, the water dirty, the carp have and are currently destroying the lake. There is a loss of fishing and the ability to recreate. "No one would swim in this water." Some did not understand how the lake could be successfully managed for more than one use. It was either a fishing lake, a boating lake or was managed for water quality. The management strategies for each of these goals were not compactible. A new dam was needed only if the lake was going to be solely managed for recreation. Over $150,000 in grant money has been spent on this lake and these people believed little has been accomplished.

Water quantity is the key issue for everyone that was interviewed. It was believed that in general, recreational boat users and property owners want higher water levels. Others are concerned with flood management and the impact high water has on their property. Downstream communities and property owners want to be assured of a minimum base flow and a more natural decline in water flow.

Erosion control was the second most-mentioned issue of those directly associated with the lake. Interviewees felt that the dredge banks and the east-basin island need to be restored. Supporting and improving the fishery was generally accepted as an important goal. There is a conflicting desire for increased vegetation (erosion control and improved fishery) in the lake while having higher water levels.

Water quality was almost a non-issue with the exception of the professional lake managers and up river property owners. The lack of massive algae blooms - especially blue green algae – and aquatic invasive plants led many to believe that water quality was good. Education on phosphorus issues has occurred but more will need to be done so more people will understand how the lake system works.

A substantial communications program will be essential to the success of this project.

Recommendations

After reviewing all of the comments made in the personal interviews, the following recommendations should be considered as this project moves forward.

1. As soon as possible, a Public Participation/Communications Plan should be developed and implemented so that various components are working effectively prior to the start of dam reconstruction.
2. Decisions need to be based on one set of data whose interpretations have been generally agreed upon. All of this information should be readily available to the public.
3. There needs to be a clear understanding of how decisions will be made and the lake management plan put together. This process should be explained to the public before the start of the planning process. It should include what decisions are already made and not subject to change and what is still open for discussion. People need to know how things will be decided and by whom. Are their opinions just thoughts for consideration by others or will participants actually get to decide? Will a vote be taken or will this be done by consensus? What happens if people can't agree?
4. Citizen education will be critical to the project's success. These following areas were noted in the report. Others may be identified as the project moves forward. Whenever possible, maps, photos, charts and graphs should be created to help people better understand the issues.
    a. What is the current water quality of this lake and why is it like this? Do we know if septic systems are impacting the lake?
    b. What is the stability of the pan fishery?
    c. How does the Upper Fox River system function and what is Lake Puckaway's role in this system? What are reasonable expectations for this lake?
    d. What is the impact of the current dam and the proposed replacement dam - upstream, downstream and on the lake? (See detailed questions raised in this report)
    e. Will there be more than one draw-down of the lake? Will these have a long-term impact considering the new dam height?
    f. How effective will the lock be in managing water levels on the lake?
5. There needs to be a clear understanding of how water levels will be managed and by whom. People need to know that whoever is responsible has the capacity to do this job according to the management objectives of the plan.
6. A complete timeline for this project needs to be readily available to the public.

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Interview Assessment

Introduction

The Wisconsin Department of Natural Resources (WDNR) and the Lake Puckaway Protection and Restoration District (LPPRD) have been jointly managing the water levels on Lake Puckaway. Current methods include placing boards on the existing dam on the Fox River above the city of Princeton to raise the water levels on Lake Puckaway during the summer months. A Memorandum of Understanding (MOU) between these two entities describes the protocol for this process. Increasing safety concerns has prompted the WDNR to consider replacing the dam. Prior to that being done, they have asked the LPPRD to update the Lake Management Plan for Lake Puckaway. This Issues assessment is the first step in the plan update. The results will be added to information received from a citizen's survey, existing scientific data and new scientific information collected by Onterra, LLC and used to guide the development of the lake management plan.

The assessment was conducted using one-on-one in person interviews with 16 people who are actively involved in the management of Lake Puckaway or directly impacted by the management decisions. A list of people interviewed is found in Appendix B of this report. Interviews were conducted over a period of 4 days –July 9-10 and 13-14, 2015 at locations convenient to the person being interviewed. Everyone was asked the same set of questions found in Appendix A. Results were recorded and compiled into this report. The report will be sent to the LPPRD, WDNR and Onterra, LLC and shared with the public.

NOTE: This report was written as a narrative to improve readability. Technically, every sentence should be in quotes as the statement was made by at least one person if not more. This was not done however, because the sentences are summaries and not "word-for-word" statements. When quotes are used, it denotes an actual "word-for-word" quote. No other research information has been included, only what was heard during the interviews. The narrative may suggest that given information is fact. No attempt has been made to check all statements against current research. The purpose of this report is to reflect what people believe to be true, not to be an actual research document.

Findings

Background

According to people interviewed, the lake was in great condition prior to the mid 1960's with lots of vegetation, good fishing and a successful program to remove carp. The rough fish removal program was halted and in 10yrs the only fish remaining were carp and croppies. Vegetation was uprooted and the fish stirred the bottom sediment. Upstream muck farming added to the sediment load. The Lake District was formed to address the declining lake and in the late 1980's the lake was drained and the carp poisoned. Six million pounds of fish were removed. The DNR restocked the lake with fish. It took several years for the lake to recover.

Current Conditions Summary

For many users, the lake is currently in fairly good condition. Fishing is good and there is only a small algae problem. The walleye restocking program is a success. After some challenges in finding a company to continue to remove carp, the current program with the goal of removing 400,000lbs of carp per year seems to be working. While the carp are less of an issue, the previous damage and several high water years have led to erosion on the dredge banks and island. Added stress from cormorants defoliating trees and subsequent loss of the tree root structure has increased the loss of the island.

Several interviewees remarked that the pelicans are also having a negative impact though there was no consensus as to what the impact was. Water fowl may be experiencing some stress. At one time, this lake was a premier duck/waterfowl hatchery and stopover site. There was lots of food (wild rice) and vegetation for safety and breeding. Higher water levels have reduced all types of vegetation and increased erosion. The current practice for managing water levels includes adding 16.5 inches of boards to the existing dam when water levels stop topping the dam. There are safety concerns with this practice and the LPPRD has asked for another method to raise water levels.

There is however a minority opinion that the lake is in terrible shape and no one is satisfied. The bottom is mucky, the water dirty, the carp have and are currently destroying the lake. There is a loss of fishing and the ability to recreate. No one would swim in this water. They did not understand how the lake could be successfully managed for more than one use. It was either a fishing lake, a boating lake or was managed for water quality. A new dam was needed only if the lake was going to be solely managed for recreation. Over $150,000 in grant money has been spent on this lake and these people believed little has been accomplished.

Fishing

Interviewees who fished felt that the fishing on the lake was excellent and several mentioned that ice fishing last winter was the best it's ever been. The current walleye stocking program is seen as very successful and people agree that it should continue. Northern Pike are naturally reproducing in an acceptable number. The carp removal program has had a very positive impact not only on the fishery but also on plant populations and erosion reduction. Some believe that the carp are responsible for poor water quality yet all of the current reduction in population has not made an impact. People were less sure about the sustainability of the pan fishery. Some thought that they were still benefitting from the drawdown of Buffalo Lake and that this fishery would begin to decline due to loss of habitat in Lake Puckaway and the resulting inability for these fish to reproduce. Other people who fished felt that the pan fish were already declining and blamed this on the loss of vegetation both for spawning and for protection. The lake has lots of predators that impact the sustainability of these fish. More information on the stability of the pan fishery would be helpful for decision-making.

Erosion

Erosion was a concern for everyone interviewed. People reported seeing big chunks of bog float down the lake. The loss of vegetation reduced shoreline protection which in turn resulted in more erosion and declining water quality. Rebuilding the dredge banks and possibly creating a breakwater to protect the island was seen as key to improving the lake. This would reduce erosion and provide habitat on the calm side of these structures. It would also improve habitat for wildlife, in particular for terns. Certain areas may need to be protected with riprap. The floods in 2004 and 2008 caused a lot of erosion upriver from the lake. No-wake zones have been increased to try to prevent new washouts but this is still a problem. Powerful boats and jet skis have a big impact on erosion and loss of vegetation. There is a recommendation for additional "no wake" areas in the current management plan but this was never carried out.

Water quality

Water quality was almost a non-issue with the exception of the professional lake managers and up river property owners. The lack of massive algae blooms - especially blue green algae – and aquatic invasive plants led many to believe that water quality was good. Water skiers and boaters found the water acceptable for their use. The water is colored due to the silt it contains but people felt that this had no impact on fish, waterfowl or people. Many campgrounds and rental units offer a swimming pool on

their property and customers use that instead of swimming in the lake. Several people that had been on the lake for many years commented that it looked good compared to times in the past.

Those that had concerns noted that the spring of 2015 produced one of the worst algae blooms up river and some reported the presence of blue-green algae. Others mentioned high phosphorus readings and the increase in sediment in the water as you traveled through the lake. A demonstration that collected water samples starting with water coming into the lake, included several in the lake along an east-west line and ended with water leaving the lake was very convincing that there actually was a water quality issue. This demonstration however, was not seen by everyone. Others mentioned a change in Secchi disk readings from three feet just before the river widens into the lake to six inches or less when the lake empties into the river. Phosphorous readings show that water coming into the lake meets current standards but water leaving the lake has phosphorous reading three times higher than accepted levels.

Lake Puckaway is part of the water system that empties into Green Bay which has been designated as an "Area of Concern" on the Great Lakes for phosphorus. A Total Maximum Daily Load (TMDL) has been established for the Fox-Wolf River Basin and phosphorous targets have been set. If improvements can be made in the system, DNR is required to make them. In order for the Upper Fox River to meet its required reductions, Lake Puckaway will also have to reduce its loading to the system. There has been a loss of wetlands around the lake and plant diversity is decreasing. Some suggest that up to 80% of the original plant beds are gone. Emergent and submergent plants will need to be restored in order to reduce the phosphorus loading. In drought years when water levels are lower, lake vegetation increases but this gain is only temporary as plants die back when water level rises.

It was noted that while there has been education on water quality in the past, this was not enough and though many may have heard it, they still don't understand. There were mixed thoughts on the source for the phosphorus. Everyone mentioned internal loading from the existing sediments but others thought that old and failing septic systems and farm runoff were a factor. Information that would confirm or rule out these sources would be helpful in decision-making.

Change

Interviewees had mixed thoughts on what would happen if the current management plan were to continue. (A "make no changes" approach.) Some felt that what was being done was working just fine and would continue on this course. They wondered why the dam needed to be replaced. They were upset that the DNR would spend $2 million dollars on a dam that wasn't failing. Others suggested that they should stop putting the boards on and let the river run naturally which would save everyone a lot of money and eliminate the current safety issues associated with using the boards. Someone suggested that the dam should be removed altogether so the system could operate with nature instead of against it.

Many believed that if no changes were made, the lake would begin to decline (fishing, wildlife and water quality) and maybe reach a tipping point where it would crash like in the early 1970's. "The system and conditions are always changing so you have to change management strategies too in order to just keep conditions the same." There was concern that the remaining rice beds would disappear resulting in further decline in waterfowl and wildlife. The White River Marsh and the Puckyan Marsh would continue to decline due to the fast drain of the river. "Water level in the marshes never seems to catch up after the boards are put on." There is increasing evidence of bank erosion and fish trapped in the marshes after the water level drops can't adapt, especially in drought conditions.

With the exception of those that didn't want to spend any money on this project, most believed that the lake needed to be managed and could not be left to run itself. There has been so much development and changes that the system could not be returned to its true natural state. It needs to be managed

within the parameters of the current conditions. For some, it was important that the lake be kept at a steady level that people could count on. Downstream users didn't care what was done or not done as long as they were guaranteed some type of flow. Whatever is done, there needs to be a reasonable chance that it will succeed.

No one felt that the lake was so good that improvement wasn't needed or wouldn't be appreciated. The response was mixed as to the urgency. Anything that improved the fishery or reduced erosion placed higher than activities that were described as solely addressing water quality. Given the failure of several past efforts (attempts to add aquatic plants), people were unsure what would work and what wouldn't. It was noted that people's definition of improvement was based on their personal needs and not necessarily on the natural system in general.

Safety issues with installing and removing the boards on the dam and the irregular schedule with which that was done were mentioned by almost everyone, including people living downstream, as something that needed to be addressed. Past accidents have resulted in the need for increased safety procedures that have raised the cost as well as made scheduling difficult.

When the river is drawn down to build the dam, it will be important to have good baseline information in place and a plan to collect data while water levels are low and document changes when water levels return. The lake was drawn down in the past and no documents exist that systematically track the impact of this action. Someone asked how will we know if this new proposed draw down will actually work – especially if the new dam will keep water levels higher?

A number of people remarked that no matter what types of changes are proposed, people can't choose one over the other unless they understand how the river system works. Lake Puckaway cannot be managed in a vacuum.

New Dam and Water Quantity

Water quantity is the key issue for everyone in this system. Comments varied from "I pay higher property taxes as well as district taxes and should be able to have water at boatable levels throughout the summer" to "placing boards on the dam violates state code by actively eliminating navigable water". Others are concerned with flood management and the impact high water has on their property. Someone commented that people may not be happy with the current management of water levels (either too high or too low) but they also may be disappointed in what is achieved after the new dam is built. It is not the "silver bullet" for all of the problems in the system – even for those who only want higher water levels because the dam is not the key, inflow of water from upstream is.

Downstream

The biggest complaint of downstream participants is the total loss of flow. They indicated that they too pay higher taxes for waterfront property and they aren't asking for higher water like people on the lake, they just want to have flowing water at any level. The downstream impact of placing the boards on the dam varies with the amount of rainfall received after the boards are on. In an average year, it takes about a week for the water to top the new dam height. During that time, flow completely stops and water level can drop up to 9 feet in some locations. (recorded at the Berlin gaging station) Others noted a regular 2-3 foot drop. Water that was navigable the day before the boards are put up is nothing but intermittent puddles two days later. Boats that were floating are now sitting on bottom. People wondered if riparian lake owners would be content if the upstream dam at Montello were managed like this and caused Lake Puckaway to "dry up for a week". Why do downstream land owners have to accept this? On paper, water levels are supposed to return once the lake level tops the dam. However, the boards are put up when river flow is slowing. Depending on how soon there is a rain event and how

much water is received, it could be several weeks before there is consistent flow again. In many summers, the river is never again truly navigable until well below Berlin. This has had a negative economic impact on both Princeton and Berlin as well as on people who earn their living from the river. Because the date the boards go in changes every year and downstream cities get at most three to four days' notice, it is impossible to plan civic events that depend on the water. It is felt that requests to consider downstream events have often been met with a deaf ear. Some commented that once the boards come off in the fall, water levels come back up and stay up for the rest of the year.

Downstream users understood that river water levels will change and decline over the summer. It is the sudden total drop that they find unacceptable and is devastating on fish and wildlife. Photos and gage levels at Berlin document this impact. Building structures to increase public access that accommodate this rapid change can be challenging. The rapid water level drop negatively impacts wildlife in the surrounding downstream marshes to the point where populations in some areas are no longer sustainable. Adults cannot move nests and young fast and far enough for them to survive. This especially impacts fur-bearing animals. Turtles and frogs (including some that are endangered) also suffer. The rapid water level drop concentrates the fish and makes them very vulnerable to predators. Occasionally, the water level drop occurs during the walleye run and has a negative impact on this fish population. Vegetation also suffers. Photos show riparian areas that used to be vegetated are now barren or eroded. This is accelerated if a large rain event occurs before plants recover and have grown new roots that stabilize river banks. Someone commented, "What good does it do to increase lake vegetation if you lose an equal amount or more downstream?"

Due to the lack of elevation change in the watershed, water level drop impacts more than just the immediate riparian area. Anecdotal information includes a pond 50 yards from the river drying up as well as a similar loss for sand point wells fifty feet from the river used to water plants. Stagnant water results in algae that further degrades the water and produces bad smells.

Downstream residents had no opinion on the dam height other than being able to be guaranteed some level of water flow. They were concerned that in times of drought and with the new dam height, evaporation and low flow would leave them with no water for even longer periods of time than they currently experience now.

Lake and upstream

Lake Puckaway riparian owners face water level issues as well. The two major lake shorelines respond differently to any action that is taken. The south shore of the lake is steeper which protects the land from floods due to high water levels and continues to allow lake access when water levels are low. The north shore has a very long, low slope. Higher water reaches further inland and leaves long areas of sand with no lake access when it is low. If several large rain events occur after the boards are in place, the north shore as well as both riverbanks above the lake can flood. Dredging water access in low water years is expensive and must be regularly redone due to high wave action and the amount of sediment in the water. Actions that reduce access and the amount of "boatable" lake were not seen as favorable. This included increasing lake vegetation in the deeper western basin of the lake. It was also noted that increasing the height of the dam to the height with the boards in place (an increase of 16.5 inches) resulted in a six inch increase of water height at the west end of the lake. This was again due to the lack of elevation change from west to east. Water flows outward before it rises. The dam may not increase the amount of recreation space. It might improve access for some to the deeper parts of the lake.

Lake Puckaway is a very long east-west running lake and this long fetch produces waves that erode many parts of the shoreline. The erosion puts additional sediment in the water and reduces and/or

eliminates fish and wildlife habitat. Wind and wave action were perceived as a bigger problem than carp. This issue makes some people feel that the lake is balancing on edge and it will not take much for it to degrade to past levels. Someone offered that the lake could be management in two parts – the west basin more for recreation and the east basin for habitat and water cleaning. Many felt that it was imperative that protective structures are put in place in the east basin and around the island so that vegetation is restored. Someone mentioned that increasing the island could have a positive impact on nesting terns and egrets. The current Common Tern project using rafts is a great success and additional nesting areas would certainly improve conditions. Cormorants may try to take over but the LPPRD has a permit to control this. Some would accept a lake drawdown to improve both submergent and emergent vegetation. It was also noted that the county public boat landing on the north shore is unusable in the summer. The landing should be dredged out and protected with a break wall. This could be used for fishing. Additional dredging could be done to improve access for north shore property owners and the material used to restore the island and dredge banks.

Proponents of a fixed height dam at the height of the current dam with the boards in place feel that it would be the easiest to manage. The lock gates could be used to reduce high water levels when necessary and there would be no need for the sudden change in downstream water levels that happens now.

Concern was raised regarding the higher water levels that would result from a higher dam and its impact on lake vegetation. They were told that water level fluctuation was needed to maintain plants, especially lower levels in the summer. What was the point of building a higher dam if you needed to lower the water levels? If you wanted to follow nature, the best thing to do is not put the boards on the existing dam.

Not everyone has kept up with information regarding the proposed dam. They wanted to know who proposed this project, what was the problem they were trying to fix and what guarantees are there that the dam would actually do what they said? It won't raise the lake level any more than we do now. They didn't understand why people felt so strongly about the proposal and wondered if this was just a DNR problem and why should they be the ones to have to fix it.

Some people interviewed wanted information on how big a storm would have to be before the locks were no longer effective and could the locks be counted on to manage spring thaw and the resulting runoff. It was noted that in the last eight years, the boards have not been put on until June or even later. Even at the lower height, parts of the lake and upriver shoreline were underwater in the spring. People wanted to know how many properties would be underwater every spring with the higher dam height. Someone mentioned that it currently takes almost a month for flood waters to fully drain from the system and that there needs to be a buffer zone for spring runoff and flood events. It was noted that given the size of the lake and the size of the locks, the locks could not be used to micro-manage lake levels.

Information needs and other considerations

Several people around the lake and downstream mentioned the success of the tern project. Efforts to advance this project would also help protect the east basin of the lake. People were in favor of continuing these efforts.

It would be good to have other success stories of restoration of water similar to Lake Puckaway to help guide decision-making. However others commented that Lake Puckaway was so unique that comparisons to other systems were not valid. Buffalo Lake was mentioned as an example of what might happen if the proposed changes were made to Lake Puckaway. Interestingly, both people for and against the new dam project cited that lake. Some believe that what was done to Buffalo Lake ruined it

while others saw the increase in vegetation – especially the rice beds – as an example of positive change. The latter noted an increase in waterfowl and clearer water. Yet others believe the higher water levels are resulting in declining emergent vegetation.

Downstream cities and residents would like a downstream impact statement to be included in the decision-making process for the proposed dam and management plan. Downstream businesses that depend on having at least some water in the river are greatly impacted by the current management strategy and are struggling to stay in business. The impact to all businesses needs to be considered in the new plan not just those on Lake Puckaway. Downstream communities need to be part of the plan development.

It was recommended that all the plans and permits to make shoreline and in-lake structure changes need to be approved and in place before the water level is lowered to build the dam. All construction needs to be timed to happen during the time the dam is being built so the lake doesn't need to be lowered again to complete these projects.

There was concern that the land market around the lake is poor especially on the north shore. A number of properties are for sale and they are not moving. Whatever is done should not have a negative impact on property values.

It takes a lot of effort to manage this lake. If you do something once, there is an expectation that this action will continue. Examples: the fish hatchery, buoy placement, managing the carp removal, producing the newsletter. People are critical of everything but disappear when you ask them for help.

Lake Puckaway should not be managed as a stand-alone entity. It should be part of a river system management plan. The plan should be designed as a partnership with nature. The more it has to fight the natural systems, the more expensive management will be and the greater likelihood that it will fail. The plan should include buffering for times of high flow and flood and continuous flow (at lower levels) throughout the system in times of drought.

There were requests for clearer information on the impact for various management decisions. Questions asked included:

- What would the system look like if we kept the original dam and stopped putting the boards on (upstream, downstream and within the lake - spring, summer and fall)? How much control of spring and other flood events can be gained from the locks at the current dam height? How much vegetation regrowth would be gotten? What would be the impact on fish and wildlife? What would be the impact on recreation? What types of mitigation could take place for negative impacts? How much would it cost? How much management would be required for this scenario and what is the estimated cost?
- What would the system look like if we built a dam at the higher level - level of the dam with the boards in place (upstream, downstream and within the lake - spring, summer and fall)? How much control of spring and other flood events can be gained from the locks? What would be the impact on vegetation? What would be the impact on fish and wildlife? What would be the impact on recreation? What types of mitigation could take place for negative impacts? How much would it cost? How much management would be required for this scenario and what is the estimated cost?
- The need for drawdowns is repeatedly mentioned. Does this mean more than just what is needed to build the dam? If so, how many, how often and to what level for how long? How do we know that this will actually gain us anything in the long term? Past efforts to restore

vegetation didn't work. Why can't we just leave the level high? That's why we are building a new dam and it's what people who actually live on the lake want.

- People want a timeline for this project. When will the project begin, how long will it take to lower the lake, how long will the water be down in order to build the dam. After the dam is completed, when will they let the water rise and how long will it take?

A number of people mentioned the loss of the relationship they once had with the DNR. Staff used to attend local meetings and be personally available for conversation and questions. Now their focus seems to be elsewhere. This lack of personal contact has decreased communications and resulted in a loss of trust. This translates into a feeling that things are happening behind peoples' backs. Yes, you can call the DNR office but you usually get a machine and you do not always get a return call. Having to drive to Oshkosh or Wautoma is not convenient so people don't do it. The DNR used to reach out to us not the other way around. There is a concern from some that waterfowl people get preferred treatment and others think that most management is for the fishery. Someone commented that you get these conflicting views because of the loss of regular communication and people having to rely on assumptions and not the facts. Sometimes we receive conflicting information from different people in DNR. Who do we believe?

Actions by Green Lake County are not always communicated to people around the lake. There is concern by some that the Lake District is not doing its job because people pay high taxes and they don't feel they get what they pay for which for many is the right to have high water throughout the summer season.

Communications

An informed public is a happy public. Too much information comes from angry people. There needs to be lots more detail available for people that want it. Not everyone may want all of the scientific data but some do and this should be made available. There needs to be better information on how people will be affected by whatever changes are made. Anything that can be done to stop and/or refute the "rumor mill" will be beneficial. Too many people get information from places like "Lake Link" (a website with public comment about various lakes and fishing conditions in the Midwest) and have no easy place to go to find out if what they are reading is true or false. As a result, if it is found in Lake Link, it must be true.

For some, it was difficult to know what information was really true and what was colored to support someone's personal opinion. There must be a real effort to continually put out information as people need to hear information many times before they understand it. Pictures, maps, charts and graphs often tell the story much better than just words or even oral presentations. Downstream communities want to be kept in the loop and not find out things second hand.

District residents agreed that the best communication was the annual newsletter sent in May prior to the annual meeting in June. All felt that more than that was needed for this project. People acknowledged that mailing was expensive and the letters time-consuming to produce and mail**.** However, if everyone really needed to have some information, it would be best to mail out a notice.

The annual meeting also provided an opportunity to receive information but that occurs early in the summer and not everyone attends. Additional face-to-face meetings might help but attendance would vary and it was thought that many would not be willing to take more time out of their summer for these meetings. Depending on how they were run, some felt that they would not be worth it.

Several local papers were recommended as good places to place information. The "Green Laker" is a good summertime paper. The Berlin Journal is widely read as well as the Marquette County Tribune. Princeton and Markesan also have weekly newspapers. While not everyone receives a paper and there is no one paper that covers the entire watershed, it is still important to put some information in the press. This information should be facts not colored by opinion.

Several people mentioned the idea of posting information in the kiosks that were put up at boat landings and at community bulletin boards such as the one at the Marquette post office. Bars around the lake would also be good places to post information.

The LPPRD has a good website but there was a sense that few people accessed it on a regular basis. It has been designed so that it is easy to manage. Currently no one pushes out information that brings people back to the website. It would be a good location to make a lot of data continually available to the public.

Social media and email provide another avenue for communication and could be used on a weekly if not even a daily basis. Currently the LPPRD does not use social media for communication. It does occasionally send information through email and has been collecting addresses for a listserv. It was noted that people were OK with a few more email letters but may get overwhelmed if notes started to come daily. People may be more willing to accept daily posts on Facebook. It was noted that not everyone is on Facebook or monitors their email or social media on a regular basis. An effort would need to take place before the project begins to get people in the habit of looking for information in electronic media. Suggestions made included a weekly electronic newsletter that contained photos of family events or good fishing stories as well as regional and lake issues. Short daily posts containing local information to a Lake Facebook page might work. It was noted that the LPPRD does not have the capacity to support these communication suggestions. Several suggested that the LPPRD hire someone who lives on the lake to serve as a summer communications coordinator.

Analysis

Opportunities to work together

There is general agreement that the dredge banks, East Basin Island, and other shoreline and marsh protections are important to rebuild. These benefit the fishery, wildlife and help to improve water quality. The drawdown for dam construction would provide an ideal opportunity to build or rebuild these structures. It would also be a good time to add any shoreline rip rap where needed and build a breakwall at the northshore boat landing to deflect sediment and help keep the landing usable. Adding fishing opportunities on this wall would increase the benefit of the structure. All of these projects would be seen as very positive for the lake.

Using the locks to manage water levels would better enable a minimum downstream flow and eliminate the sudden drop in water level and its negative impacts for the downriver area.

Interviewees liked the idea of better communications about the lake and its management. They would welcome any of the changes suggested in the report. They are dissatisfied with the negative impact of the "rumor mill". People commented that it was better to have the facts even if you disagree with them than to only have conflicting rumors and assumptions.

Obstacles to reaching an agreement

There is a disconnect between people wanting higher water levels and see the construction of a new higher dam as a guarantee of getting this and the people who want regular lower water levels to

increase plant growth. Several people commented, “Why build a new dam if we can’t keep water levels up?” It is unclear what the timeline for these lower levels would be and what decrease in water level is needed. Until that is made clear, people will be reluctant to accept any proposal.

Higher dam height could also mean higher water levels in the spring on upstream properties and on the north shore of the lake. These areas have flooded now with the lower dam. People are uncertain that the locks can mitigate this problem.

Recommendations

After reviewing all of the comments made in the personal interviews, the following recommendations should be considered as this project moves forward.

1. As soon as possible, a Public Participation/Communications Plan should be developed and implemented so that various components are working effectively prior to the start of dam reconstruction.
2. Decisions need to be based on one set of data whose interpretations have been generally agreed upon. All of this information should be readily available to the public.
3. There needs to be a clear understanding of how decisions will be made and the lake management plan put together. This process should be explained to the public before the start of the planning process. It should include what decisions are already made and not subject to change and what is still open for discussion. People need to know how things will be decided and by whom. Are their opinions just thoughts for consideration by others or will participants actually get to decide? Will a vote be taken or will this be done by consensus? What happens if people can’t agree?
4. Citizen education will be critical to the project’s success. These following areas were noted in the report. Others may be identified as the project moves forward. Whenever possible, maps, photos, charts and graphs should be created to help people better understand the issues.
    a. What is the current water quality of this lake and why is it like this? Do we know if septic systems are impacting the lake?
    b. What is the stability of the pan fishery?
    c. How does the Upper Fox River system function and what is Lake Puckaway’s role in this system? What are reasonable expectations for this lake?
    d. What is the impact of the current dam and the proposed replacement dam - upstream, downstream and on the lake? (See detailed questions raised in this report)
    e. Will there be more than one draw-down of the lake? Will this have a long-term impact considering the new dam height?
    f. How effective will the lock be in managing water levels on the lake?
5. There needs to be a clear understanding of how water levels will be managed and by whom. People need to know that whoever is responsible has the capacity to do this job according to the management objectives of the plan.
6. A complete timeline for this project needs to be readily available to the public.

Appendix A: Personal Interview Questions

1. How would you describe the current condition of Lake Puckaway?
    a. What is good?
    b. What needs work?

2. How would you feel if Lake Puckaway were to remain as it is today (no change)?
    a. If it were to decline?
    b. If it were to improve?
    c. How important is it to you that the lake should improve?

3. What are your thoughts on the proposed new dam and changes to water level management?
    a. There may be others who feel differently about this than you do. Why do you think that they feel that way?

4. Is there anything else we need to keep in mind if any changes are made?

5. Is there any information you feel you need to better understand what is happening with the lake?

6. Communication is always a challenge during a major project. What is the best way for you to receive information? How do you think others in the area might be contacted?

7. Do you have any other comments you would like to share regarding Lake Puckaway or past projects that have occurred on the lake?

8. Who else do I need to talk to?

Appendix B: Participants

1.	Dave Bartz	Wisconsin Department of Natural Resources Fish Management
2.	Greg Blaskowski	Downstream resident
3.	Daryl Christianson	Active in Lake Puckaway management
4.	Jerry Disterhaf	Fox of the River Voyageur Canoe, LLC
5.	Paul Gettleman	Sec., LPPRD
6.	Ted Johnson	Wisconsin Department of Natural Resources Watershed Management
7.	Derek Kavanaugh	Green Lake County Land and Water Conservation Department
8.	Phil Malasack	Pres., LPPRD
9.	Mick Masters	LPPRD
10.	Rob McLennan	DNR
11.	Mary Lou Neubauer	Administrator for the City of Princeton
12.	Richard Pergande	LPPRD
13.	David Richter	County Appointee to the Lake Puckaway LPPRD
14.	Randy Schmidt	Riparian owner
15.	Richard Schramer	Mayor of the City of Berlin
16.	Gene Weber	LPPRD

B

APPENDIX B

Stakeholder Participation Materials

Lake Puckaway Management Planning Project

December 2015 Update
Submitted by: Dan Cibulka, Onterra, LLC

With the help of a Lake Management Planning Grant from the Wisconsin Department of Natural Resources (WDNR), the Lake Puckaway Protection & Rehabilitation District (LPPRD) is working to update a lake management plan for Lake Puckaway. The lake management plan will contain historic and current data from the lake as well as provide guidance for management by integrating stakeholder perceptions and goals with what is ecologically beneficial and feasible for the ecosystem. With the WDNR replacing the Princeton Dam in 2018, the plan will also examine water level management, which is to be incorporated into the new dam's operating order.

As described further below, numerous field studies were carried out upon the lake during 2015. As much data analysis is still occurring, this update intends to bring the LPPRD and other stakeholders up-to-date on the scientific studies that have occurred, provide some initial observations on the ecology of the lake and project a rough timeline for the remaining portions of this planning project.

2015 Field Studies

In April of 2015, Onterra staff had their first glimpse of the lake with a water quality sampling visit. Water quality was sampled throughout the summer of 2015, during a fall mixing period and will also be examined for under-ice conditions during February of 2016. Lake Puckaway was listed first in 2010 on the State of Wisconsin's Impaired Waters 303(d) list. The 303(d) designation is a list of waterbodies that do not meet water quality standards. In the case of Lake Puckaway, the lake is included on this list due to high total phosphorus levels and water column turbidity. Figure 1 displays the total phosphorus concentrations collected from the past five years (including data collected within this study in 2015) from the western and eastern basin of the lake.

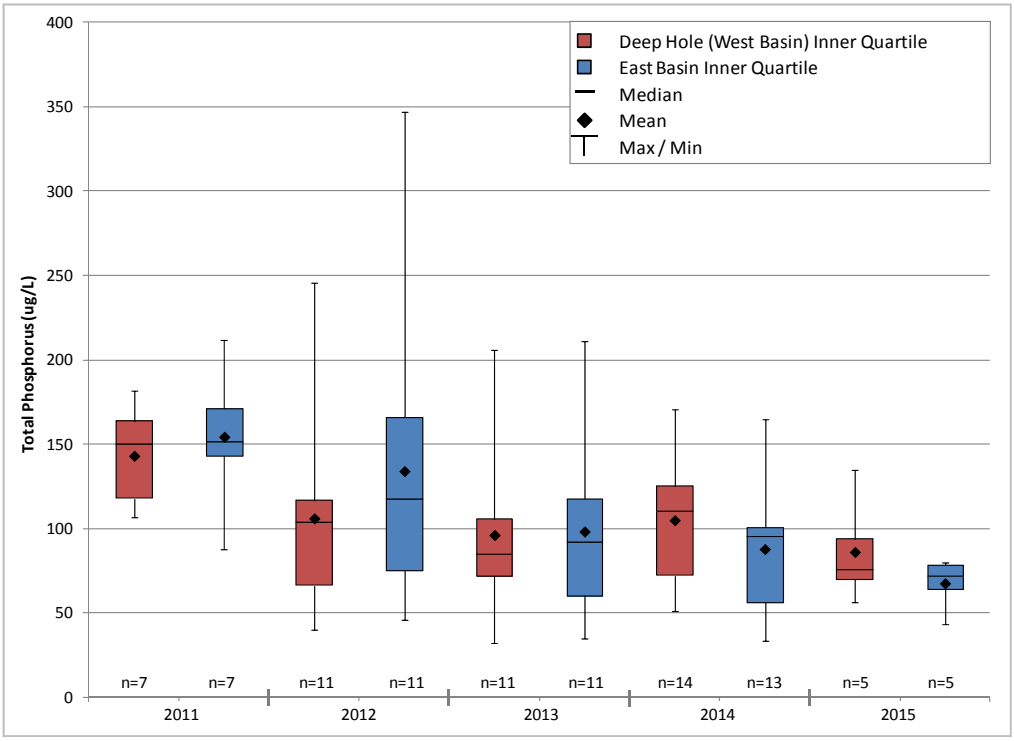


Figure 1. Total phosphorus box-plots, Lake Puckaway, 2011-2015. Data indicate concentrations from the west basin (red) and east basin (blue) from 2011-2015.

The data in Figure 1 indicate much variability in the phosphorus data set; for example, the maximum concentration in 2012 was measured at 347 ug/L in the east basin, while a minimum concentration of 32 ug/L was measured in the west basin that next year (2013). For context, the total phosphorus Recreational Use threshold that the 303(d) methodology utilizes for lakes similar to Lake Puckaway is 40 ug/L. So, it is apparent that the concentrations in the lake often exceed this threshold. Concentrations may change greatly over the course of the summer due to a number of factors, including external sources such as rainfall and river flow conditions, and internal sources such as rough fish dynamics, water chemistry flux and aquatic plant community growth. These variables and their complexity will be discussed thoroughly within the Lake Puckaway Management Plan report.

All aquatic plant surveys were conducted as scheduled, first with a visit to the lake in mid June 2015 to complete the Early Season Aquatic Invasive Species (ESAIS) survey. This survey's purpose is to search the lake for invasive species that reach their peak growth during this time (curly-leaf pondweed and pale yellow iris). On July 20-21, Onterra ecologists visited the lakes to complete the point-intercept survey. This is a grid-based survey designed to sample aquatic plants within the lake. A third aquatic plant survey, the community mapping survey, was completed that next day (July 22). The purpose of this survey is to map the floating-leaf and emergent species that are found within the lake and are typically underestimated in the point intercept survey. Finally, during an August 31 visit, Onterra staff mapped Eurasian water milfoil within the lake.

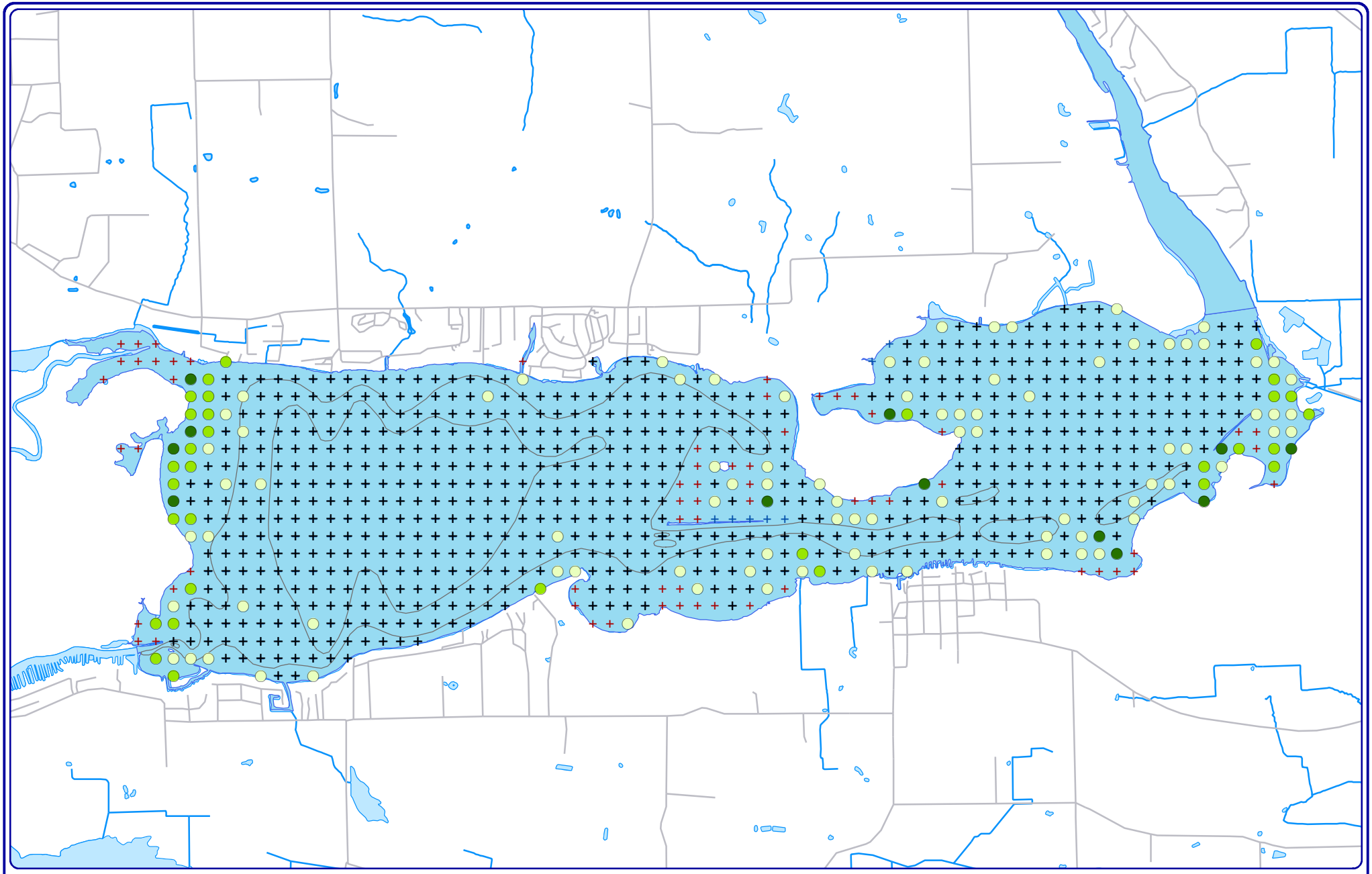
A total of 31 aquatic plants were found in Lake Puckaway, 24 during the point-intercept survey and 7 more species found incidentally. During the point-intercept survey plants were found growing to a depth of 5 ft., however the majority of submergent plant growth was between 1 and 2.5 feet of depth. Map 1 displays the location of aquatic plants amongst point-intercept sampling locations. In all, 19% of the lake's littoral zone (plant growing zone) held aquatic plants.

Remaining steps

In addition to the ecological data collected from Lake Puckaway, sociological data will be collected from the people in the LPPRD. This is currently being approached in the form of a stakeholder survey, which was developed by Onterra staff and the LPPRD Board of Directors. A postcard advertising the survey will be distributed to all property owners, with instructions to navigate to an online survey website or contact a contractor for a paper copy of the survey. Data collected through this survey will be integrated within the management plan to provide an indication of stakeholder knowledge on the lake ecosystem and concerns they have regarding the lakes management.

On December 10, 2015, the LPPRD submitted a Phase II planning grant to the WDNR to fund the remaining portions of the study. This grant would fund completion of the ecological studies, which include 2016 water quality monitoring, an in-lake wave and erosion modeling exercise and integration of fisheries data from WDNR staff. A larger portion of this grant would fund the implementation of a Lake Puckaway Communication Plan. This plan would allow for great transparency during the management planning process through sharing of information on the LPPRD website, news articles, social media updates, etc. The communication would keep all Lake Puckaway stakeholders knowledgeable about the ecological studies, project meetings, and more.

During next summer, several meetings will be held to share the results of the study with the public. Additionally, forums will be held and moderated by a professional facilitator on planning for a water level management plan, which would be incorporated following the construction of the new Princeton Dam. Stakeholder participation will be crucial to the success of the project, so please join us during these 2016 meetings and do not hesitate to ask questions.



3,750
Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Hydro and Roads: WDNR
Bathymetry: WDNR, digitized by Onterra
Aquatic Plant Survey: Onterra, 2015
Map Date: December 10, 2015
Filename: Puckaway_TRFPI.mxd

Project Location in Wisconsin

Legend

2015 Total Rake Fullness

- \+ No Vegetation
- Total Rake Fullness = 1
- Total Rake Fullness = 2
- Total Rake Fullness = 3
- \+ Too Deep
- \+ Non-navigable/Temporary Obstacle

Map 1

Lake Puckaway

Green Lake County, Wisconsin

2015 PI Survey: Vegetation Distribution

Why create a lake management plan?

A goal without a plan is just a wish!

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Why does Lake Puckaway need an updated management plan?

- **Current Comprehensive Plan is from 2004**
  - Many studies completed since then (5 grant-funded projects)
  - 2007 project had minor management recommendations
- **Total Maximum Daily Load Development**
  - Requirements of TMDL will need to be considered in plan update
- **Princeton Dam Reconstruction – 2018**
  - Development of water level management alternatives for lake restoration will be a condition of the reconstruction project
  - If this plan does not include those alternatives, WDNR will be forced to complete EIS, which would very likely call for WLMP

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Elements of an Effective Lake Management Planning Project

Data and Information Gathering
Environmental & Sociological

Planning Process
Brings it all together

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Data and information gathering

- Study Components Completed/Ongoing
  - Water Quality Analysis
  - Watershed Assessment (TMDL Integration)
  - Aquatic Plant Surveys
  - Fetch Modeling
  - Bathymetric Study
  - Fisheries Data Integration
  - Shoreland Assessment
  - MWH Drawdown Study
  - Stakeholder Survey

Onterra, LLC Lake Management Planning

Lake Puckaway Planning Process

Five Planning/Information Meetings Scheduled

Monday, June 13, 6:30pm, Mecan Town Hall
Aquatic Plant Community & Aquatic Invasive Species
Derek Kavanaugh, Green Lake County and Onterra

Tuesday, June 28, 6:30pm, Marquette Village Hall
Fisheries & Shoreland
Dave Bartz, WDNR and Onterra

Monday, July 18, 6:30pm, Mecan Town Hall
Water Quality & Watershed
Keith Marquardt, WDNR and Onterra

Monday, Aug 8 , 6:30pm, Marquette Village Hall
Summary/Conclusions, Water Level Mgmt Alternatives, & Additional Goals and Actions
Ted Johnson, WDNR & Onterra

Monday, Sept 26, 6:30pm, Marquette Village Hall
Draft Management Plan Meeting
Onterra

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Lake Puckaway Planning Process

- **Planning Committee**
  - Core group of involved individuals
    - Board of Commissioners
    - Active riparians
    - Local experts
  - Act as project focus-group and primary contact
    - Meetings are intended to inform Planning Committee
    - Facilitate their input for development of management plan

Onterra, LLC Lake Management Planning

Lake Puckaway Planning Process

- **Public invited to all meetings**
  - Professional facilitator will manage meetings
  - Comments and questions will be accepted
    - Must be written on forms provided at meeting
      - Contact information must be provided
    - If time permits - questions will be answered
    - If time does not permit - contact information will be used to answer question/respond to comment
    - All questions, comments, and responses will be posted to district website (anonymously)
  - Summaries/info will be posted to district website

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Other Important Items

- Press releases to Marquette Tribune & Berlin Journal Newspapers
- Check www.lakepuckaway.com frequently
  - Meeting announcements and summaries
  - Comments, questions, and responses
  - Draft management plan

Thank You

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Lake Management Planning

C

APPENDIX C

Planning-Information Meeting Materials

Press Release

Lake Puckaway District to Hold Informational and Planning Meeting about Puckaway Aquatic Plants and Invasive Species

Green Lake & Marquette Counties, WI, May 27, 2016. On Monday, June 13th, the Puckaway Protection and Rehabilitation District will be holding the first in a series of five informational and planning meetings, open to the public, regarding the development of the lake's new management plan. The June 13th meeting will be held at the Town of Mecan town hall (W1561 Evergreen Ln., Montello) and begin at 6:30pm. The meeting will focus on the aquatic plants and aquatic invasive species (AIS) of Lake Puckaway.

Vascular aquatic plants – those with roots, stems, and leaves, are the foundation of an ecosystem and fulfill many functions in a healthy lake. Through photosynthesis, they convert the sun's energy into food for aquatic and terrestrial wildlife. Their roots hold bottom sediments in place within the lake and on its shores. All varieties of aquatic plants, whether they float on the lake's surface, emerge from the lake near shore, or are completely underwater, provide important habitat for fish. Vascular aquatic plants compete with free-floating algae for light and nutrients, which helps to increase water quality and clarity.

Over the course of its life, the plant population in Lake Puckaway has changed drastically and not necessarily for the best. At the June 13th meeting, speakers will present information on how the lake's plant community has changed and how those changes have impacted the lake. Reasons for why these changes have occurred will also be discussed, as well as possible ways to correct them.

The next meeting will be held on Tuesday, June 28th and will focus upon the Lake Puckaway fishery.

Aquatic Plant Community and Aquatic Invasive Species

June 13, 2016
Mecan Town Hall

The first of 5 meetings being held for the update to the Lake Puckaway Management Plan was held on June 13, 2016 at 6:30 pm at the Mecan Town Hall. The purpose of this meeting was to present information on the plants in Lake Puckaway from historic times to the most recent survey work. Discussion was held after the presentations to make sure the planning committee clearly understood the data and there was agreement on what the information meant.

Present were the following members of the Planning Committee:
Mick Masters, Jeff Kimbur, Kurt McCulloch, Randy Schmidt, and Paul Gettleman.

In addition, present were the night's speakers Derek Kavanaugh - Green Lake County Conservation Department and Brenton Butterfield - Onterra, Tim Hoyman and Paul Garrison – Onterra, Ted Johnson– DNR, and 11 members of the public. Linda Stoll – L Stoll Consulting served as meeting facilitator.

Derek Kavanaugh began with a presentation on historic plant records for the lake up to more recent studies in the early 2000's. Prior to the construction of the first lock and dam at Princeton in 1860, the area was a riverine marsh with a predominant vegetation of wild rice. Often this was so thick that it was difficult to find the river channel. Reports in the 1940's documented the first die-off of plants with restoration attempts beginning in the early 1950's. Additional plant and water quality issues in the early 1970's led to the formation of the Lake District in 1977 to address them. For a full description of the early restoration efforts, historic plant species and their distribution in the lake, please see the PowerPoint presentation posted on the Lake District website.

Brenton Butterfield followed with a report on the most recent plant study conducted in 2015 in conjunction with this effort to update the lake management plan. He began with information on how plants function as part of the lake ecology and why they are a key piece to management success. See the PowerPoint presentation on the Lake District website for information on location, species and numbers of aquatic plants found. Brenton summed up his report by saying that the lake has a good diversity of native species with only small issues of invasive species. The lake has a good base of plant stock. The difficulty lies with the very low occurence of plants for the lake as a whole. Currently there are 679 acres of floating leaf and emergent plants. While this seems like a lot, it is less than 19% of the total acreage of the lake which when compared to other lakes is a low percentage. Restoring plant numbers will be key to restoring the lake.
The meeting was then opened for questions and comments from the planning committee. Written questions on plants were taken from the public.

Planning Committee Comments and Questions:

1. A comment was made that the water seemed clearer this spring? Was this due to less snow? No one could confirm this observation. A comment was made that since water coming into the lake was cleaner than water in the lake, it would seem that low spring water would produce the opposite effect.

2. A committee member observed that when a previous plant restoration was made that the number of pan fish increased. In his mind, this highlighted the importance of plants. Someone else commented that they didn't want Puckaway to look like Buffalo Lake where there were so many plants that they had to cut a path for boat travel and you couldn't move around. Brenton commented that these two lakes are very different and will probably be managed for different purposes. People should not assume that what happened at Buffalo will happen here. Much of the plant problems in Buffalo Lake were brought on by exotic species. Before the dam was reconstructed on Buffalo and the water level was drawn down, 83% of the lake had exotic Eurasian water milfoil in it. Following the drawdown, Eurasian water milfoil occupies less than 15%.
3. Another commented that Lake Puckaway is used for more than just fishing and that boats with big motors and personal water craft have changed the lake.
4. It was noted that the current amount of Curly Pond Leaf seems less than in 2002
5. It was noted that the island and cane beds are going away. In the late 70's and early 80's when the barriers were in place, there were a lot more cane beds in the protected areas.
6. It was good to see that the foundation of plants is still present and there is a better chance for plant restoration because of that.
7. A committee member asked what the impact was of the general flow of water through the lake. There is little change in elevation from the inflow to the outflow so stream flow alone does no damage. Water coming into the lake is significantly cleaner than the water leaving the lake so the inflow – even large amounts of inflow is helping the lake.
8. The muck farms had a large negative impact on the lake. Fortunately, they are no longer in existence.
9. The final comment noted the differences between the plant issues in the west and east sections of the lake and the possible need to manage each differently. Others agreed with this observation.

Written Questions:

1. *Wouldn't "no wake" periods help to establish plant growth and reduce turbidity?*

Even in lakes that are much smaller and have a much greater amount of boating on them, we do not see a lack of aquatic vegetation brought on by boating. While boating in very shallow areas through emergent and floating-leaf communities can cause damage, it would take an intense amount of boating to destroy the community entirely. Often points that jut out into open water see a great deal of wear on their plant communities and while those areas can suffer from boat-produced waves, they also see a great deal of pressure from wind-induced waves as well.
Regarding the turbidity – studies completed on Lake Ripley near Cambridge, which is about 30 minutes outside of Madison, indicated that recreational boating can decrease water clarity by resuspending bottom sediments, but the effect is only temporary. Lake Ripley is not a big lake and because of its proximity to Madison, receives a ton of recreational boat use, especially during the weekends. While turbidity, phosphorus concentrations, and water clarity are impacted over the weekend, the researchers found that they returned to pre-weekend levels, when boating is much less, by Monday afternoon.

This is not to say that boating does not have impact on plants and turbidity, because it does, but likely not in a lake the size of Puckaway with the level of boating it sees. Much of Puckaway's turbidity is brought on by wind-induced wave action and algae blooms.

2. *Loss of emergent habitat has been blamed on many factors. I would like to know the main reason for its demise?*

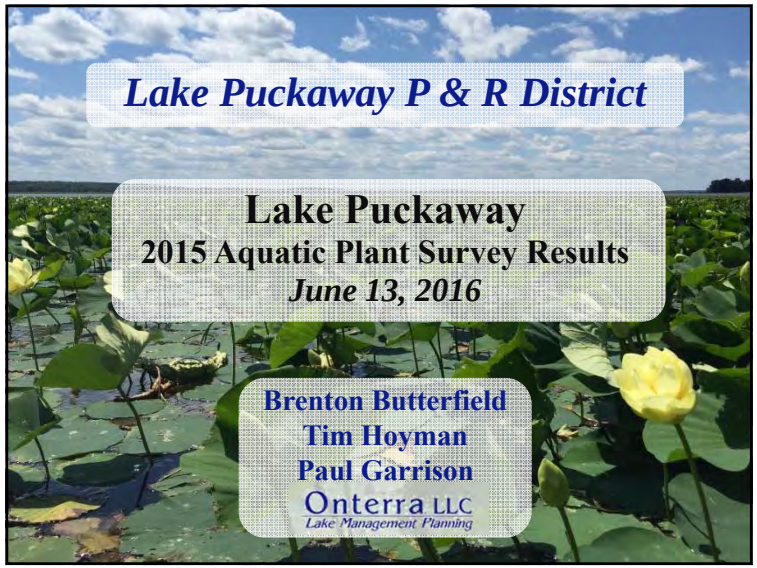
There really is no main reason for the loss of emergent habitat, and other types of vegetation In Lake Puckaway. However, native aquatic plants evolved in natural lakes that have fluctuating water levels, both interannually and seasonally, and as a result, many types of aquatic plants, especially emergent species, rely on those variations as a part of their lifecycle. Some emergent species need exposed sediments occasionally to survive and thrive. As described in Derek Kavanaugh's presentation, dams allow man to bypass those seasonal fluctuations and for the most part actually reverse them. This, along with the dampening of interannual variations and the eradication of occasional exposed sediments, has a significant negative impact on emergent species and other types of aquatic vegetation as well. There are accounts of many lakes seeing drastic reductions in their plant communities after the introduction of carp because they increase turbidity and root up plants during feeding. Further, increased turbidity brought on by nutrient-fueled algae blooms or increased sediment loads from the watershed have also reduced plant populations in lakes. The compounding effect of all of these reasons accounts for the decreased plant population in Lake Puckaway.

3. *With the loss of habitat, we have seen wind action creating havoc to the remaining cane beds and bulrushes. What are the plans to help preserve those critical plants?*

Wind action is likely not the only factor impacting the emergent beds on the lake. See the discussion above regarding other factors impacting emergent habitat. The largest concern with wind action on Puckaway revolves around increased turbidity. Onterra is currently modeling wind effects on Lake Puckaway. The results will be used to determine feasible actions to reduce these impacts and as a result, increase quality habitat.

4. *One extremely successful habitat rehabilitation project that still pays dividends today was the planting of submergent weeds in protected / fenced in areas on the west end of the lake. This took place in the early Nineties. The lake association group planted some 1400 sprouts into the sand bottom of the lake in the bay and shoreline just north of the river mouth. Some of those sprouts are still with us today. Why can't we do additional shoreline restoration projects like that? Will the DNR fund those plants and the lake district association supply the man power? Or at least some type of cost share?*

We know that if the factors that are limiting natural plant reproduction and survival are not addressed, there is little chance that in-lake plantings will survive, or at least thrive and spread, which would be the ultimate goal. If the factors described above are addressed or at least minimized, there will be opportunities to complete in-lake restorations to increase habitat. Also, there would be an expectation that natural reproduction and establishment would occur from the existing seed bank. Studies have shown that aquatic plant seeds can germinate after centuries of being buried in lake sediments. State funds would be available for these activities.



Shallow Lakes are Special

Aquatic Plants
- Stabilize bottom sediments
- Provide zooplankton habitat
- Uptake of nutrients from water (coontail, waterweed)
- Create more diverse fishery

Factors which cause loss of aquatic vegetation cause transition to turbid state
- Excessive nutrient loading
- Water level stabilization
- Benthivorous fish (e.g. common carp)
- Once in a turbid state, very difficult to revert back to clear state

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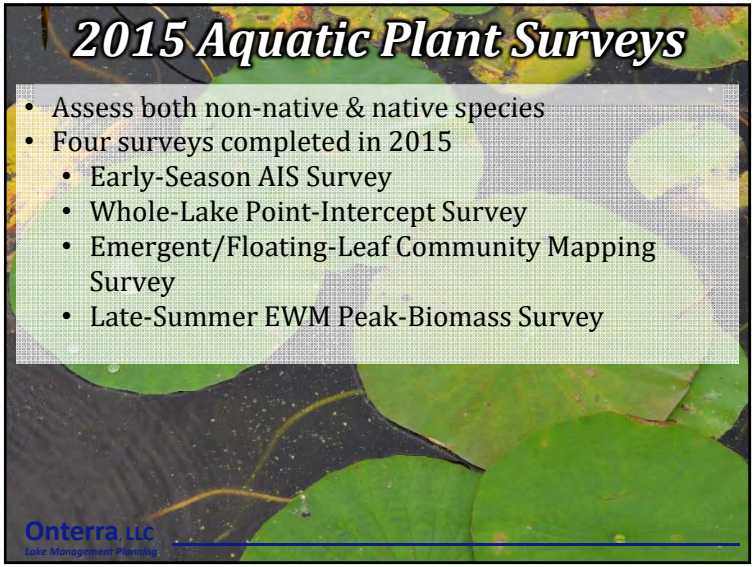
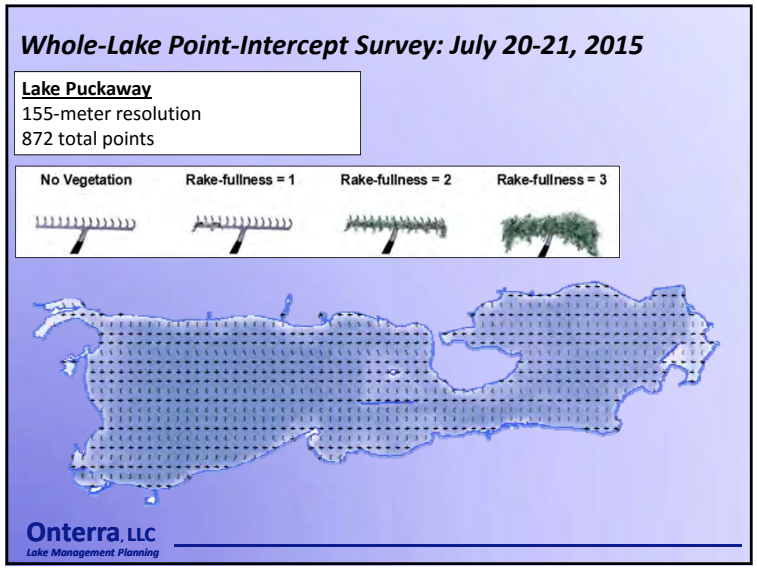
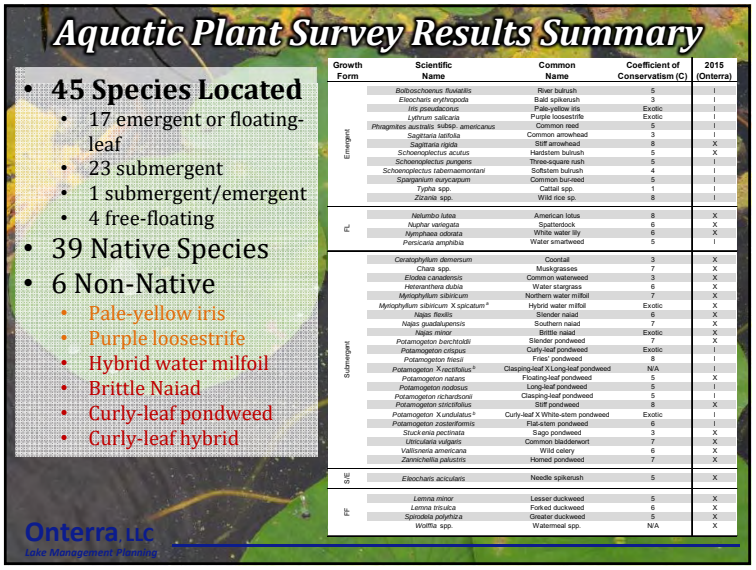
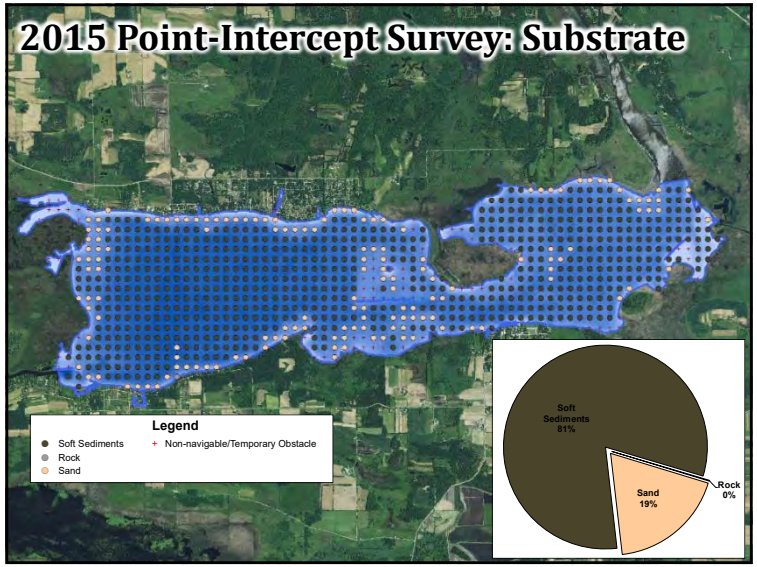
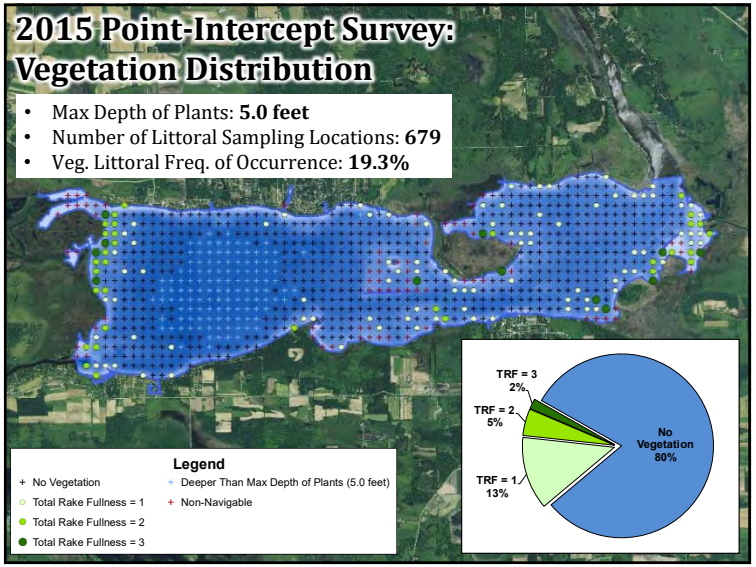


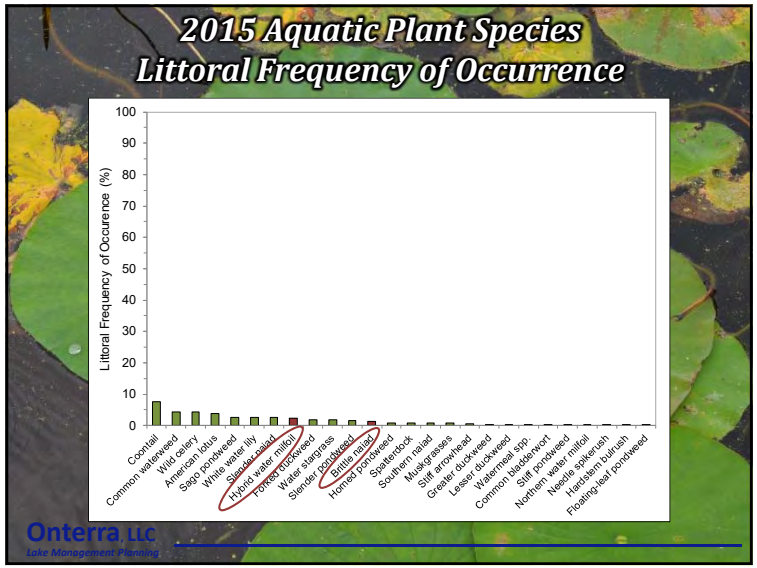




Growth Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	2015 (Onterra)
Emergent	*Bolboschoenus fluviatilis*	River bulrush	5	I
	Eleocharis erythropoda	Bald spikerush	3	I
	Iris pseudacorus	Pale-yellow iris	Exotic	I
	Lythrum salicaria	Purple loosestrife	Exotic	I
	Phragmites australis subsp. americanus	Common reed	5	I
	Sagittaria latifolia	Common arrowhead	3	I
	Sagittaria rigida	Stiff arrowhead	8	X
	Schoenoplectus acutus	Hardstem bulrush	5	X
	Schoenoplectus pungens	Three-square rush	5	I
	Schoenoplectus tabernaemontani	Softstem bulrush	4	I
	Sparganium eurycarpum	Common bur-reed	5	I
	Typha spp.	Cattail spp.	1	I
	Zizania spp.	Wild rice sp.	8	I
FL	*Nelumbo lutea*	American lotus	8	X
	Nuphar variegata	Spatterdock	6	X
	Nymphaea odorata	White water lily	6	X
	Persicaria amphibia	Water smartweed	5	I
Submergent	*Ceratophyllum demersum*	Coontail	3	X
	Chara spp.	Muskgrasses	7	X
	Elodea canadensis	Common waterweed	3	X
	Heteranthera dubia	Water stargrass	6	X
	Myriophyllum sibiricum	Northern water milfoil	7	X
	Myriophyllum sibiricum X spicatum [4]	Hybrid water milfoil	Exotic	X
	Najas flexilis	Slender naiad	6	X
	Najas guadalupensis	Southern naiad	7	X
	Najas minor	Brittle naiad	Exotic	X
	Potamogeton berchtoldii	Slender pondweed	7	X
	Potamogeton crispus	Curly-leaf pondweed	Exotic	I
	Potamogeton friesii	Fries' pondweed	8	I
	Potamogeton X nericifolius [5]	Clasping-leaf X Long-leaf pondweed	N/A	I
	Potamogeton natans	Floating-leaf pondweed	5	X
	Potamogeton nodosus	Long-leaf pondweed	5	I
	Potamogeton richardsonii	Clasping-leaf pondweed	5	I
	Potamogeton strictifolius	Stiff pondweed	8	X
	Potamogeton X undulatus [6]	Curly-leaf X White-stem pondweed	Exotic	I
	Potamogeton zosteriformis	Flat-stem pondweed	6	I
	Stuckenia pectinata	Sago pondweed	3	X
	Utricularia vulgaris	Common bladderwort	7	X
	Vallisneria americana	Wild celery	6	X
	Zannichellia palustris	Horned pondweed	7	X
S/E	*Eleocharis acicularis*	Needle spikerush	5	X
FF	*Lemna minor*	Lesser duckweed	5	X
	Lemna trisulca	Forked duckweed	6	X
	Spirodela polyrhiza	Greater duckweed	5	X
	Wolffia spp.	Watermeal spp.	N/A	X






2015 Aquatic Plant Species
Littoral Frequency of Occurrence
Littoral Frequency of Occurence (%)
Coontail
Common waterweed
Wild celery
American lotus
Sago pondweed
White water lily
Slender naiad
Hybrid water milfoil
Forked pondweed
Water stargrass
Slender pondweed
Brittle naiad
Horned pondweed
Spatterdock
Southern naiad
Muskgrasses
Stiff arrowhead
Greater duckweed
Lesser duckweed
Watermeal spp.
Common bladderwort
Stiff pondweed
Northern water milfoil
Needle spikerush
Hardstem bulrush
Floating-leaf pondweed
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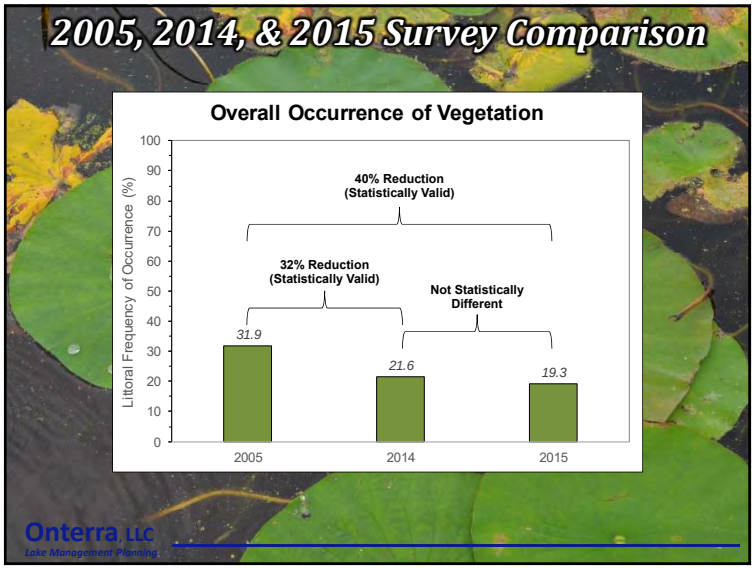
2005, 2014, & 2015 Survey Comparison
Overall Occurrence of Vegetation
Littoral Frequency of Occurrence (%)
40% Reduction
(Statistically Valid)
32% Reduction
(Statistically Valid)
Not Statistically
Different
31.9
21.6
19.3
2005
2014
2015
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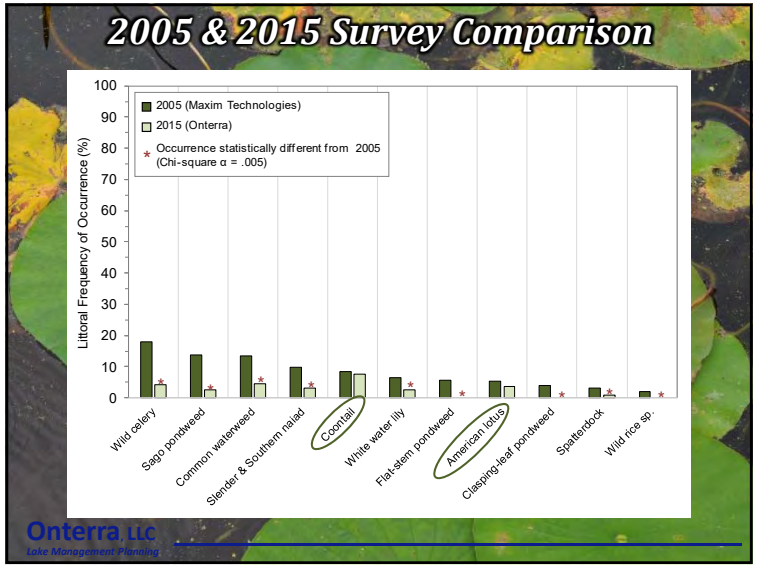
2005 & 2015 Survey Comparison
2005 (Maxim Technologies)
2015 (Onterra)
Occurrence statistically different from 2005
(Chi-square α = .005)
Littoral Frequency of Occurrence (%)
Wild celery
Sago pondweed
Common waterweed
Slender & Southern naiad
Coontail
White water lily
Flat-stem pondweed
American lotus
Clasping-leaf pondweed
Spatterdock
Wild rice sp.
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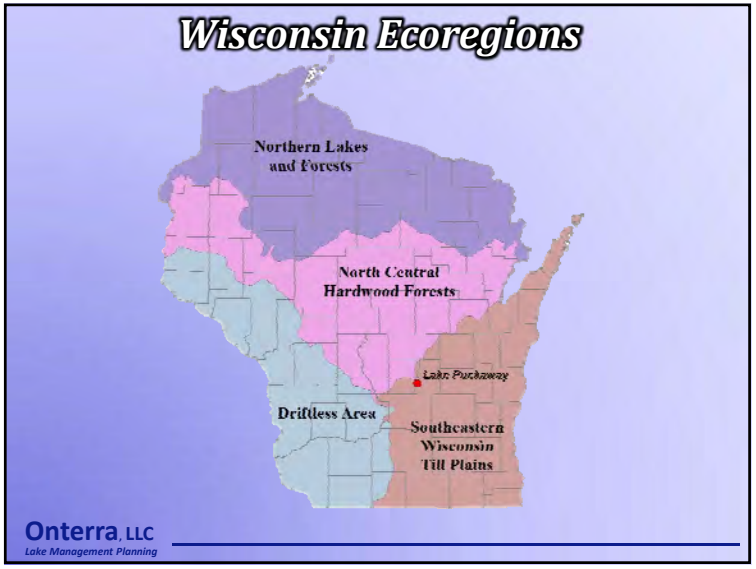
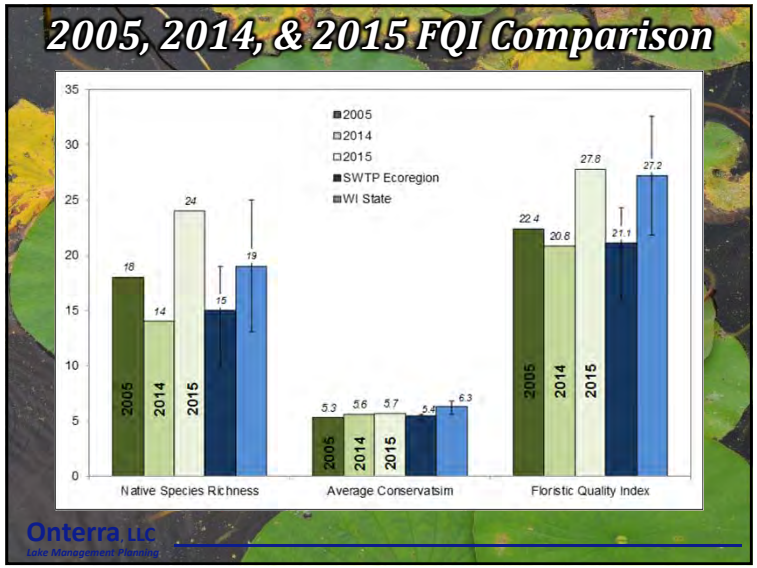
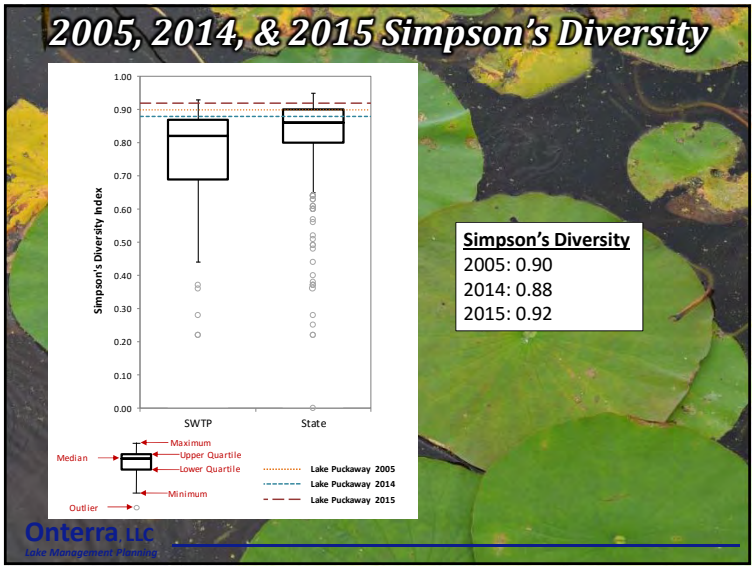

Wisconsin Ecoregions
Northern Lakes
and Forests
North Central
Hardwood Forests
Lake Puckaway
Driftless Area
Southeastern
Wisconsin
Till Plains
Onterra LLC
Lake Management Planning


2005, 2014, & 2015 FQI Comparison
2005
2014
2015
SWTP Ecoregion
WI State
Native Species Richness
Average Conservatsim
Floristic Quality Index
Onterra LLC
Lake Management Planning


2005, 2014, & 2015 Simpson's Diversity
Simpson's Diversity Index
SWTP
State
Median
Maximum
Upper Quartile
Lower Quartile
Minimum
Outlier
Lake Puckaway 2005
Lake Puckaway 2014
Lake Puckaway 2015
Simpson's Diversity
2005: 0.90
2014: 0.88
2015: 0.92
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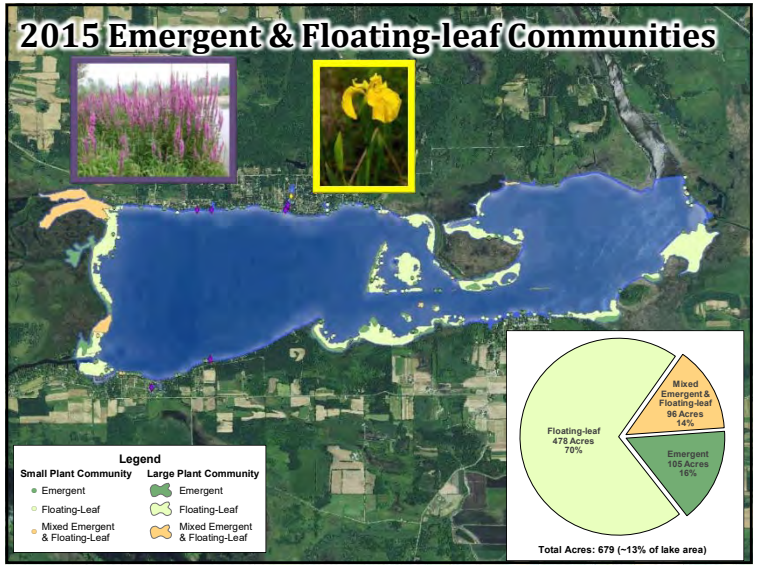
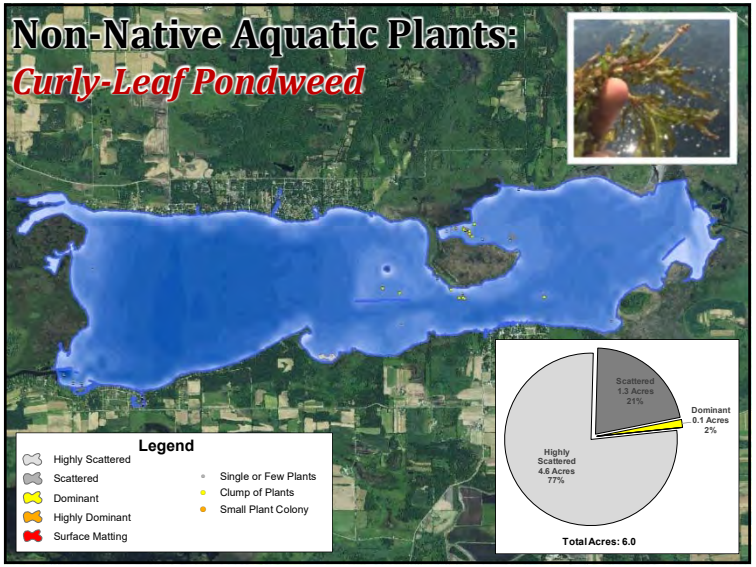
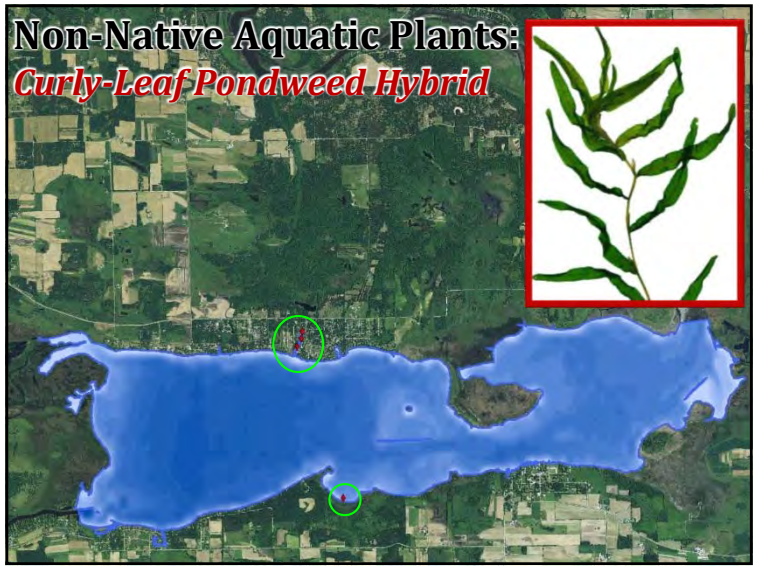
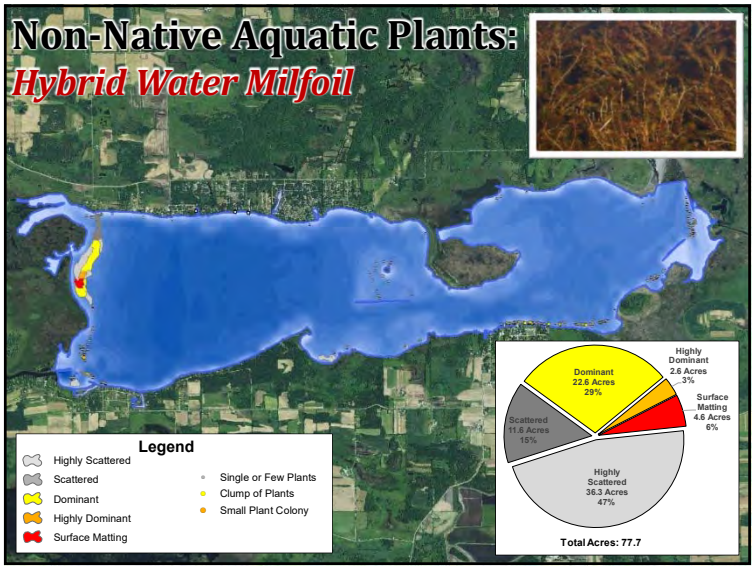
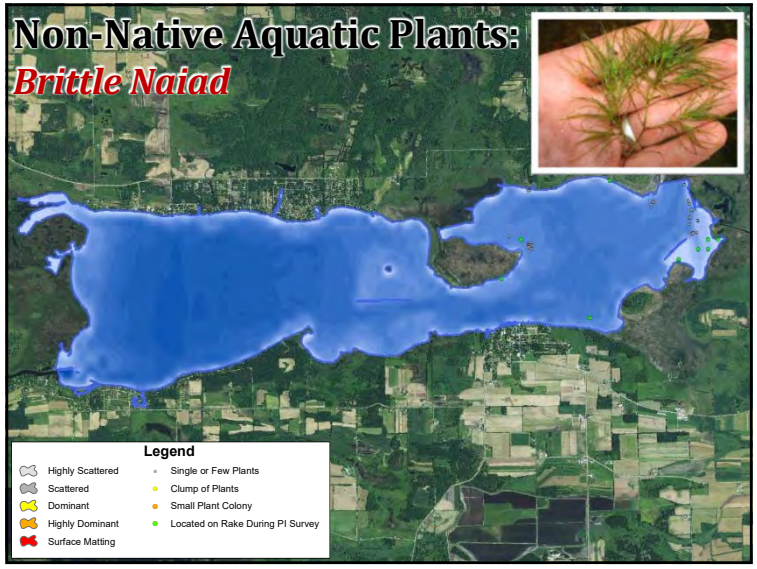

2015 Emergent & Floating-leaf Communities
Legend
Small Plant Community
Large Plant Community
Emergent
Floating-Leaf
Mixed Emergent & Floating-Leaf
Floating-leaf 478 Acres 70%
Mixed Emergent & Floating-leaf 96 Acres 14%
Emergent 105 Acres 16%
Total Acres: 679 (~13% of lake area)


Non-Native Aquatic Plants:
Curly-Leaf Pondweed
Legend
Highly Scattered
Scattered
Dominant
Highly Dominant
Surface Matting
Single or Few Plants
Clump of Plants
Small Plant Colony
Scattered 1.3 Acres 21%
Dominant 0.1 Acres 2%
Highly Scattered 4.6 Acres 77%
Total Acres: 6.0







Aquatic Plant Community Conclusions

Native Plant Community

- Species richness, diversity, and average conservatism are high, but…
- Overall occurrence of submersed vegetation is very low
- High-quality native emergent/floating-leaf plant communities present (limited in area)
- Reduced light availability, carp, and unnatural water level regime inhibit growth

Non-Native Plants

- Few occurrences of purple loosestrife & pale-yellow iris
- Occurrence of CLP (& CLP hybrid) & brittle naiad low
- HWM most prevalent non-native plant (~78 acres)

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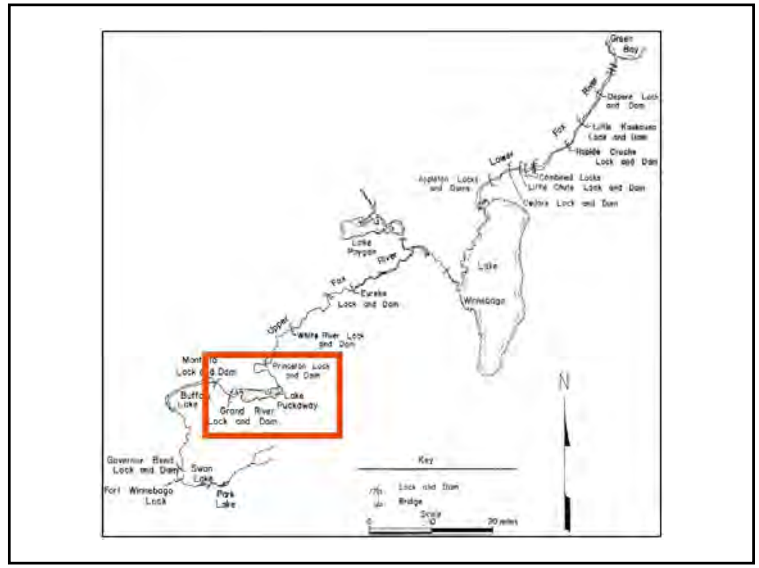
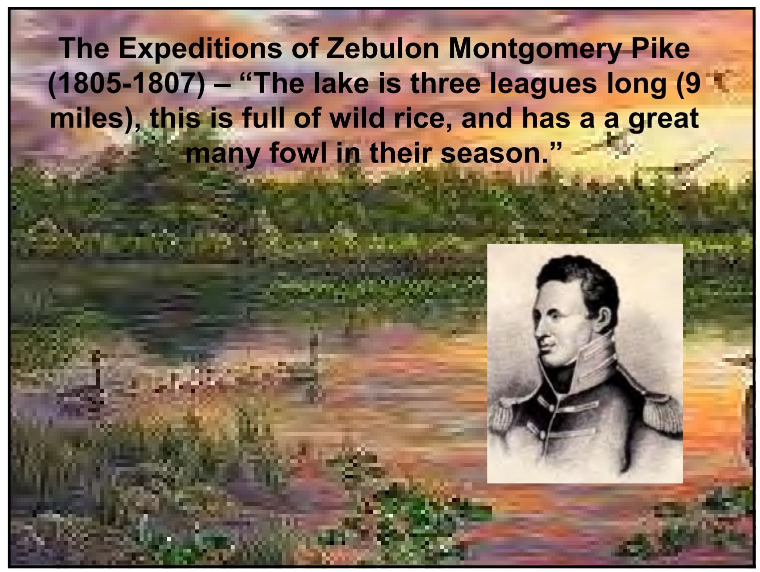
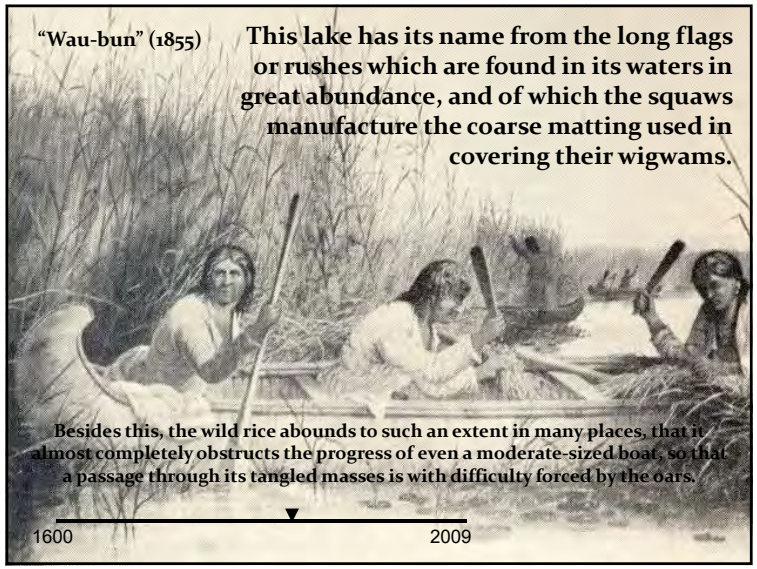
Lake Puckaway's
Aquatic Plant Trends
1673-2009

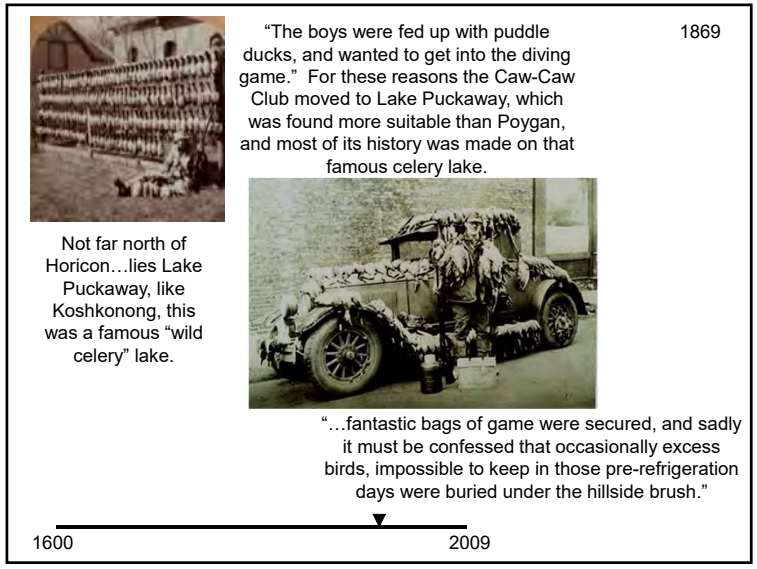

Green Bay
Fox
Lower
Eureka Lock and Dam
White River Lock and Dam
Princeton Lock and Dam
Lake Puckaway
Grand River Lock and Dam
Buffalo Lake
Governor Bend Lock and Dam
Swan Lake
Fort Winnebago Lock
Park Lake
Lake Winnebago
Lake Poygan
River
Upper
Key
Lock and Dam
Bridge
Scale
20 miles
N

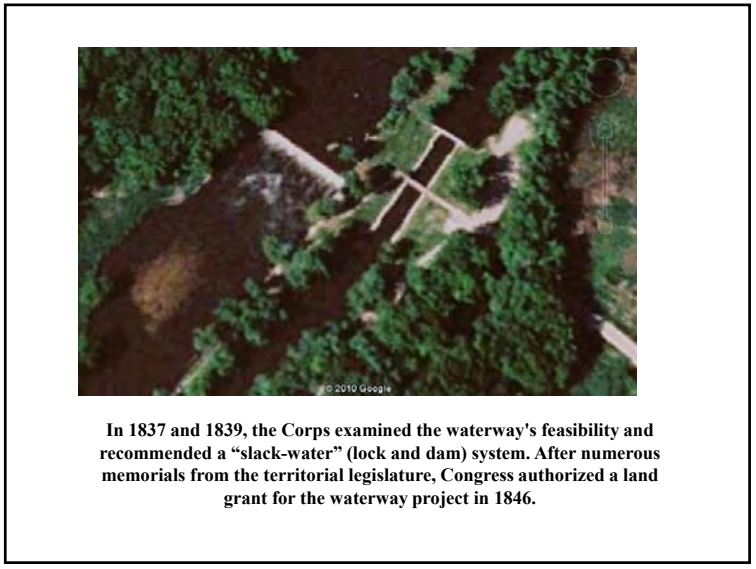

"It is easy to lose one's way, especially as the River leading thither is so full of wild rice that it is difficult to find the Channel" Father Marquette (1673)
1600
2009

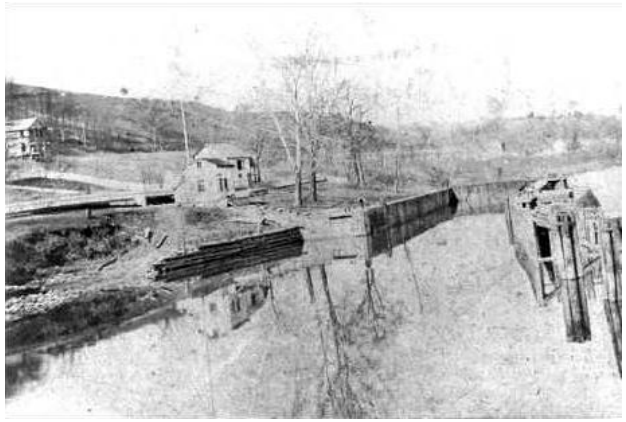

The Expeditions of Zebulon Montgomery Pike (1805-1807) – "The lake is three leagues long (9 miles), this is full of wild rice, and has a a great many fowl in their season."


"Wau-bun" (1855)
This lake has its name from the long flags or rushes which are found in its waters in great abundance, and of which the squaws manufacture the coarse matting used in covering their wigwams.
Besides this, the wild rice abounds to such an extent in many places, that it almost completely obstructs the progress of even a moderate-sized boat, so that a passage through its tangled masses is with difficulty forced by the oars.
1600
2009


Nee Pee Nauk Duck Hunting Club, whose diary tells of members around 1885:
"Shooting lousy. We killed only 30 canvasback, 50 bluebill, 21 pintail, and 18 redhead."
"Fishing only fair. We caught 63 smallmouth and 66 pike."
1600
2009


Not far north of Horicon…lies Lake Puckaway, like Koshkonong, this was a famous "wild celery" lake.
"The boys were fed up with puddle ducks, and wanted to get into the diving game." For these reasons the Caw-Caw Club moved to Lake Puckaway, which was found more suitable than Poygan, and most of its history was made on that famous celery lake.
1869
"…fantastic bags of game were secured, and sadly it must be confessed that occasionally excess birds, impossible to keep in those pre-refrigeration days were buried under the hillside brush."
1600
2009


In 1837 and 1839, the Corps examined the waterway's feasibility and recommended a "slack-water" (lock and dam) system. After numerous memorials from the territorial legislature, Congress authorized a land grant for the waterway project in 1846.



Original Lock and Dam built around 1860 soon feel into disrepair

The Princeton Dam was built by the Army Corps of Engineers in 1897 in an effort to provide water deep enough for commercial freight steamers.

In 1922, War Department abandoned the Upper Fox River canal project planned to make the river navigable to barges between Green Bay and the Wisconsin River.

Historical Accounts
Modern Era

By 1946, local residents noticed a significant decline in aquatic plants, and water quality was reduced

Historical Management

- 1946 – Puckaway Restoration League attempts to improve declining emergent plants by planting hundreds of lbs of wild rice.
- 1949 – Large expanses of open water start to develop.

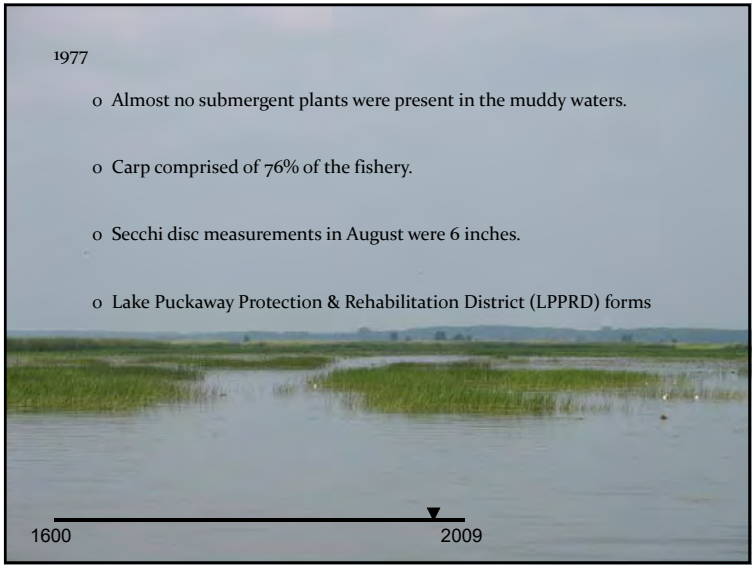
Historical Management

- 1951: “Only 2550 Acres” of Emergent Plants Remain, Nearly Half of previous decades
- 1950-1951: Water levels are drawn down for 2 consecutive springs to improve plant growth.

“Should the openings continue to expand, the breakup of this marsh (Lake Puckaway) can be expected with conditions similar to Beaver Dam Lake and Lake Koshkonong appearing. Intensive prosecution of the carp and careful regulation of water levels is necessary to avoid such a development…Largely because of high water the carp are able to invade the shallows which had the best stands of wild rice and arrowhead. Both are now scarce in former areas of abundance. To maintain the marsh ecology of Lake Puckaway a decrease in the water level of 6 inches to 1 foot from what it was on August 11, 1952 is justified.” (Thompson 1959)

Historical Accounts

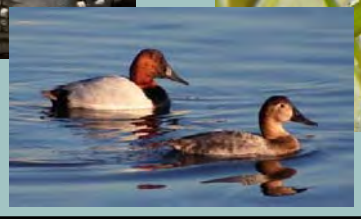
- “Wild rice has “precipitously declined” since 1880, whereas is is no longer a dominant species.” - 1959
- “Once famous fish and waterfowl haven into a dead mud puddle” - 1959



WI DNR worked with LPPRD and LPIA to develop a management plan.

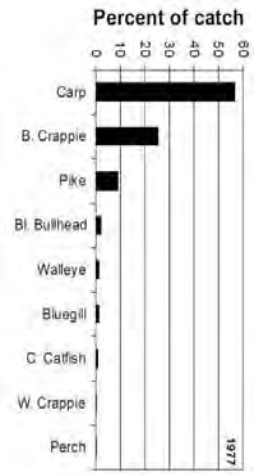
The 1978 Three-phase plan:

- ❑ Partial drawdown of the lake
- ❑ Mechanical removal of carp
- ❑ Restocking of game fish species.

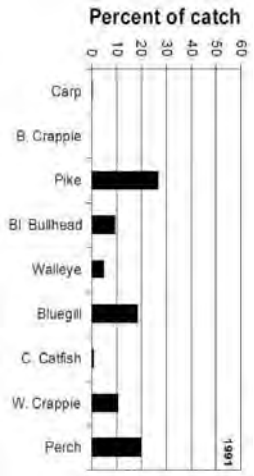


Historical Management

- 1983-1984: Plant restoration project planted wild rice, wild celery, sago pondweed.
- 1991 Fishery Study Shows change in fisheries.



Prior to 1977 Lake Plan Implementation

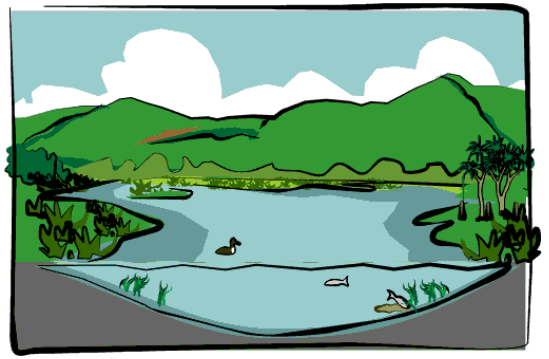


1991

Adaptive Lake Management

GOAL:

Maintain and Improve Water Quality, Sport Fishing, and a Natural and Serene Environment that is enjoyed by many Families of Lake Residents and Visitors for years into the future.



1. Why do we care about reduction in emergent beds?
2. How do we measure it?
3. What is causing the reduction?
4. How do we manage it?

1. Why do we care about reduction in emergent beds?

A diverse emergent plant community is important to lakes –

Especially in shallow, littoral dominated system, such as Puckaway

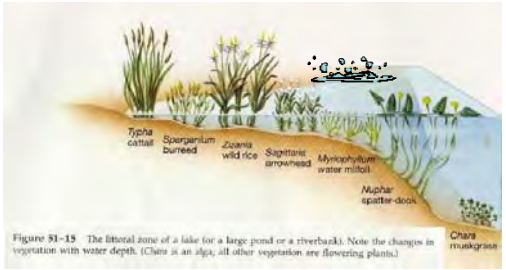
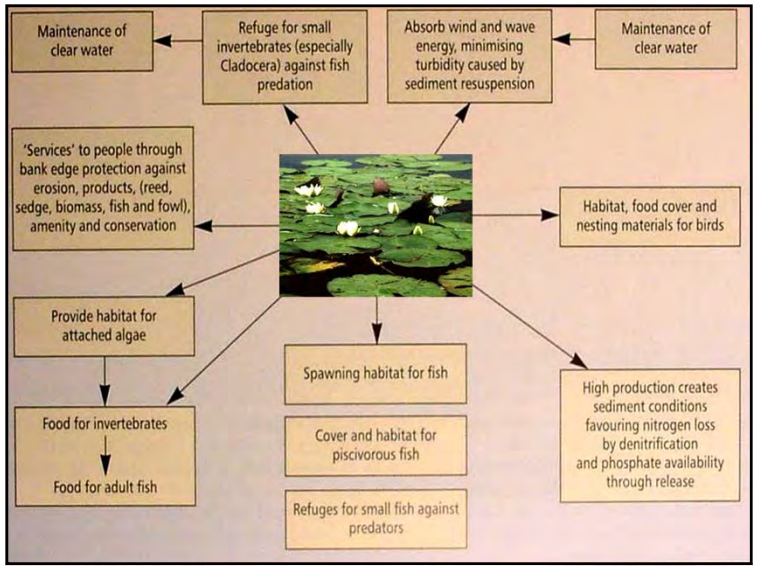


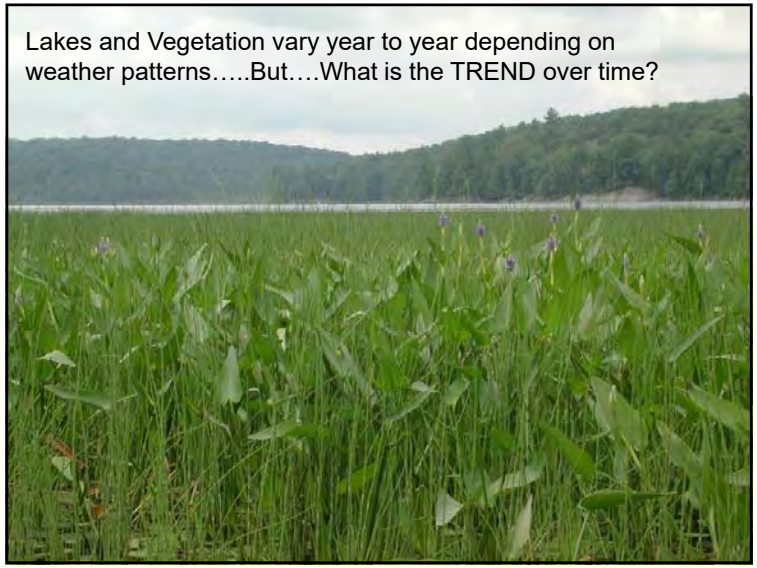
Figure 51-15 The littoral zone of a lake (or a large pond or a riverbank). Note the changes in vegetation with water depth. (Chara is an alga; all other vegetation are flowering plants.)

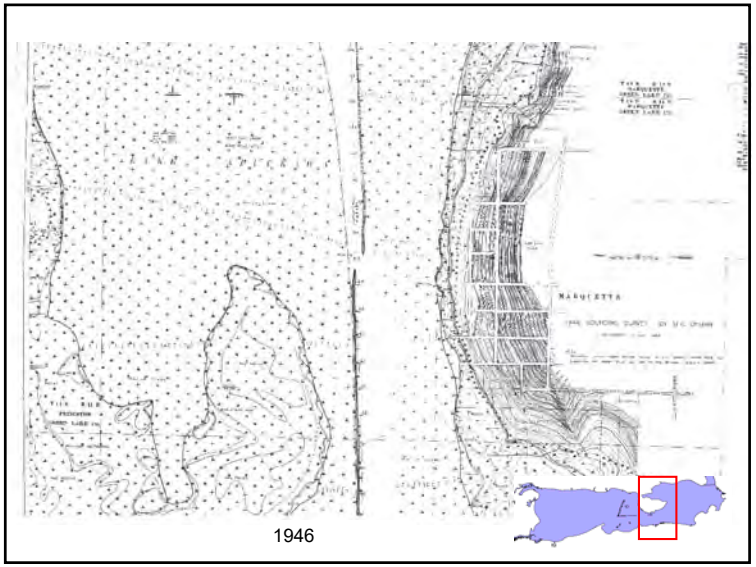


A lake without plants is like a forest without trees…..

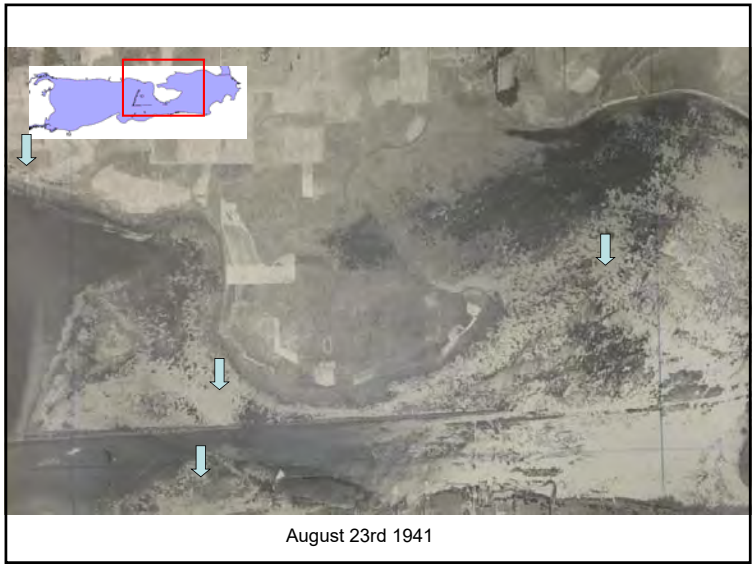
Endangered Species, such as the Foster's Tern, is found on Lake Puckaway, and uses dead emergent vegetation to nest on.

2. How do we measure it?

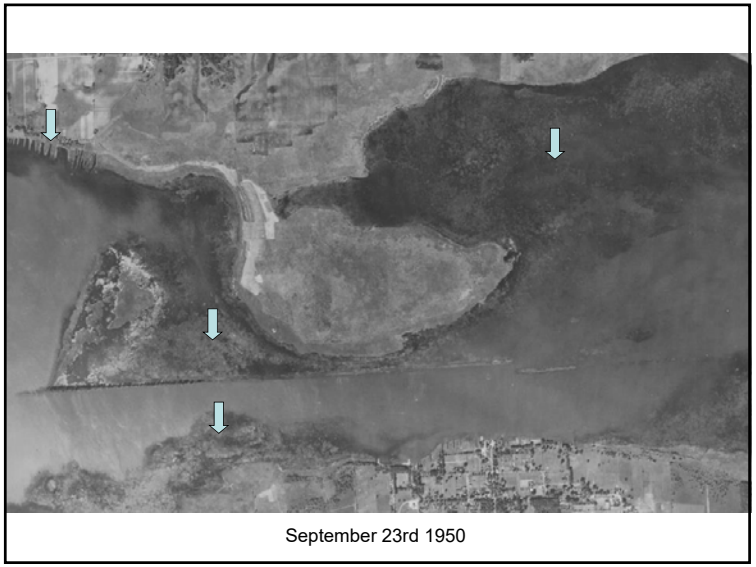




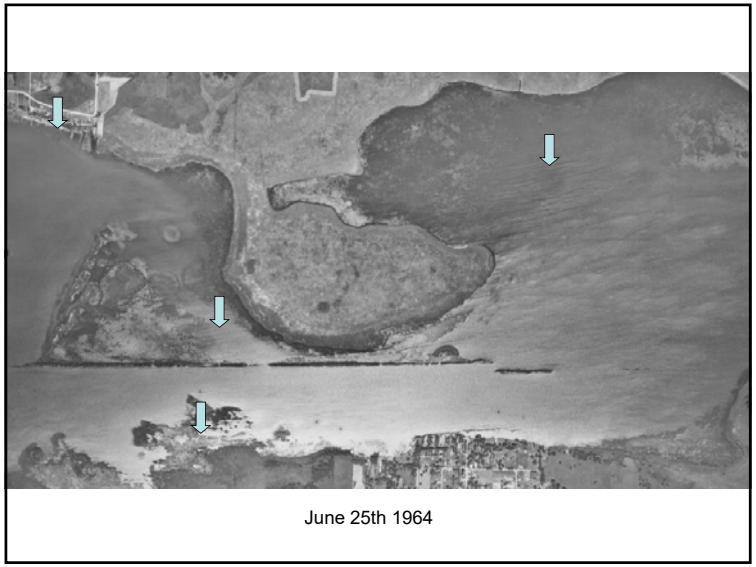
1946



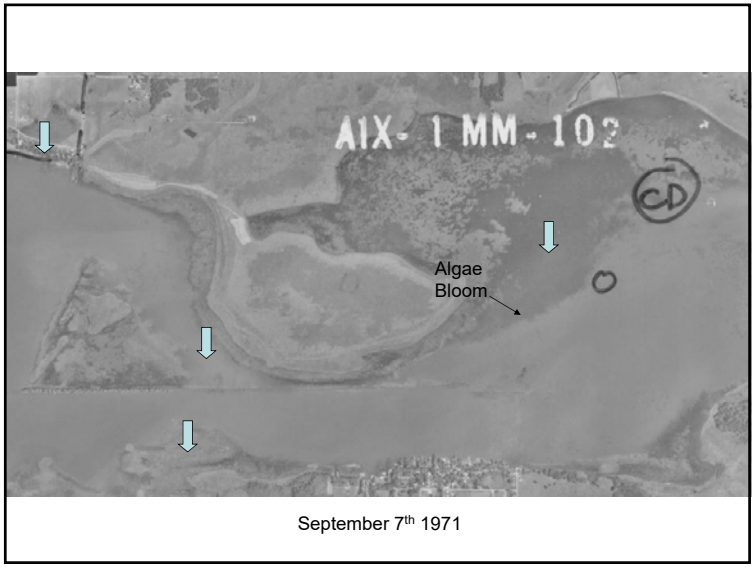
August 23rd 1941



September 23rd 1950

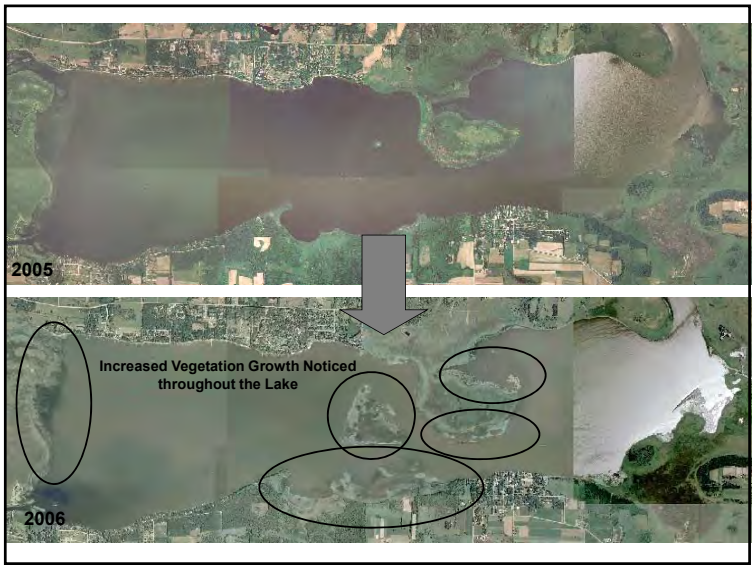


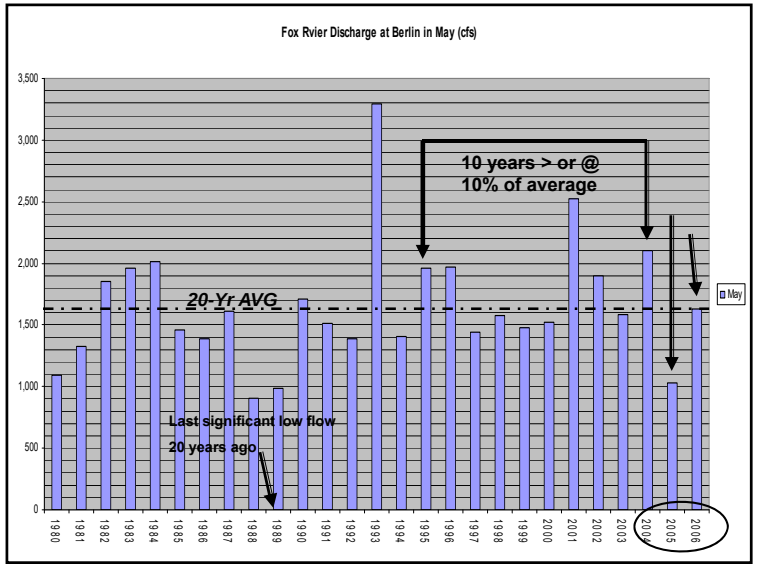
June 25th 1964

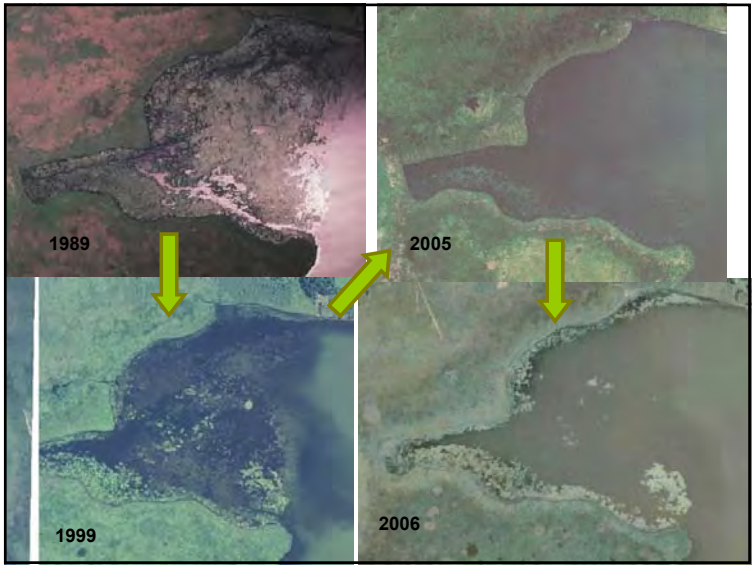


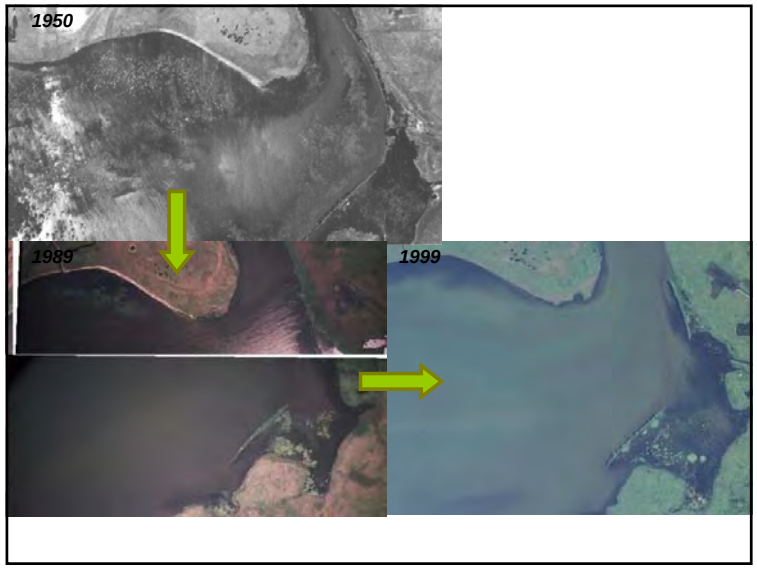
September 7th 1971

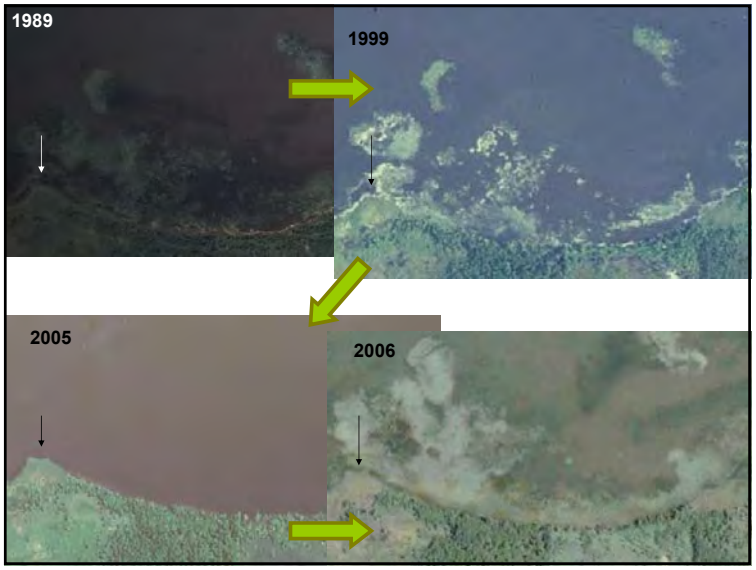

2005
2006

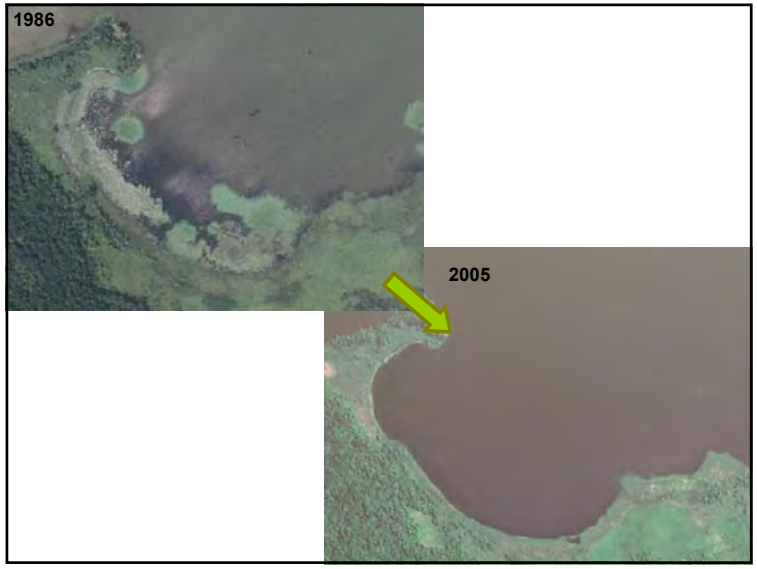

2005
Increased Vegetation Growth Noticed throughout the Lake
2006

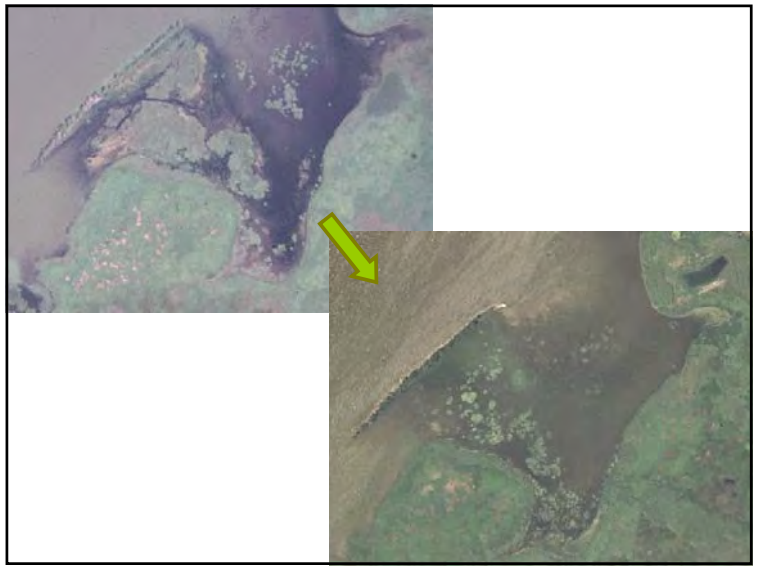

Fox Rvier Discharge at Berlin in May (cfs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
10 years > or @ 10% of average
20-Yr AVG
Last significant low flow 20 years ago
May
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006

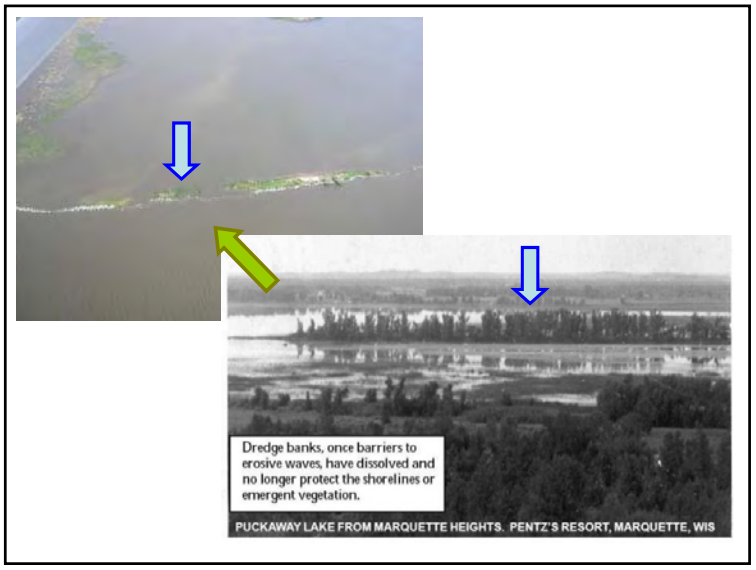

1989
2005
1999
2006

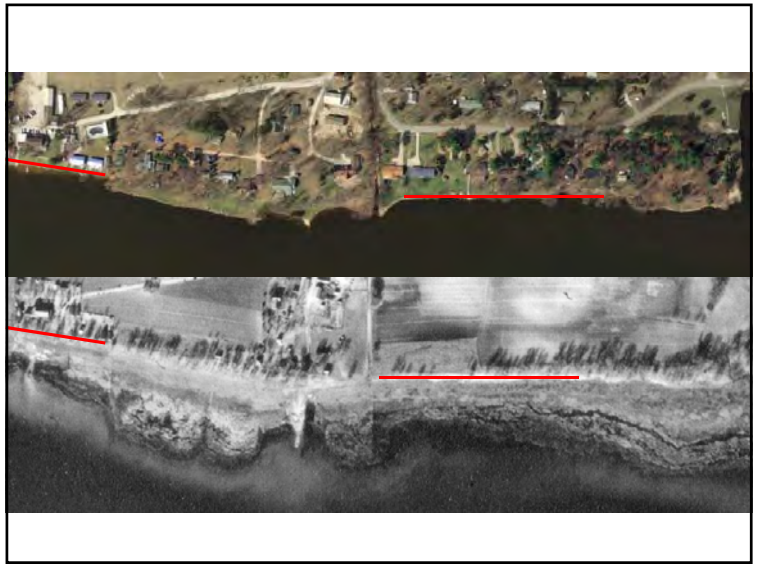

1950
1989
1999

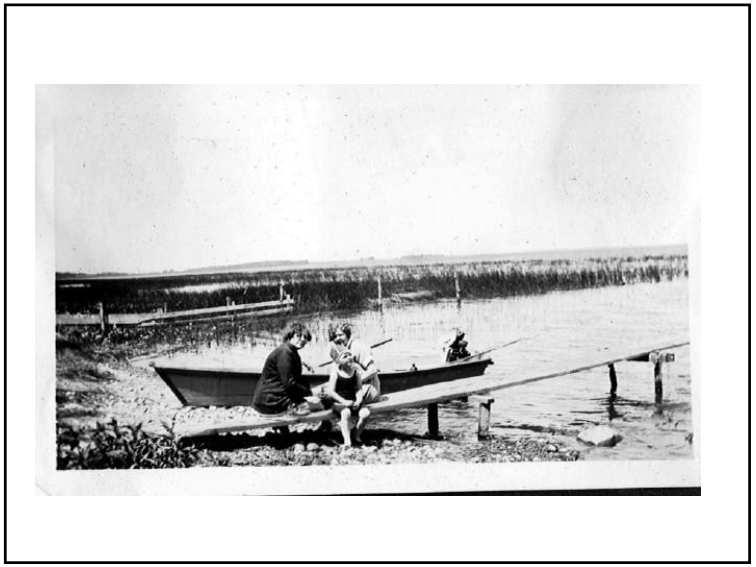

1989
1999
2005
2006


1986
2005

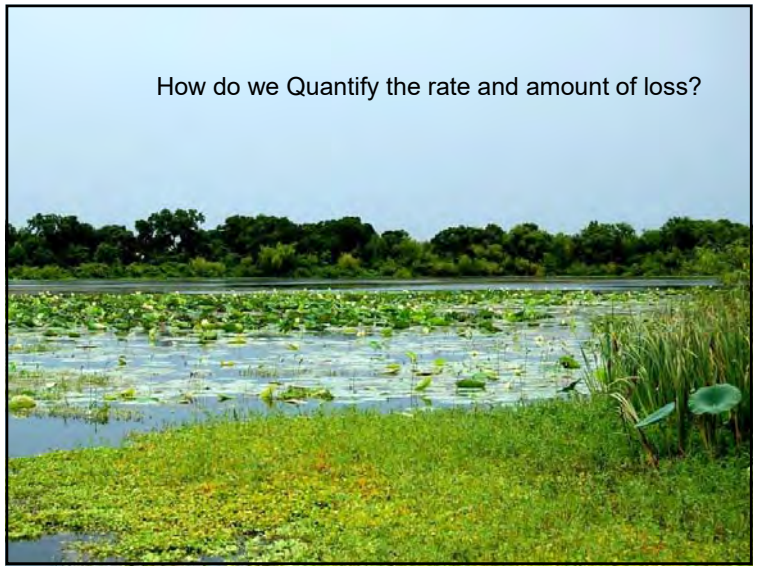


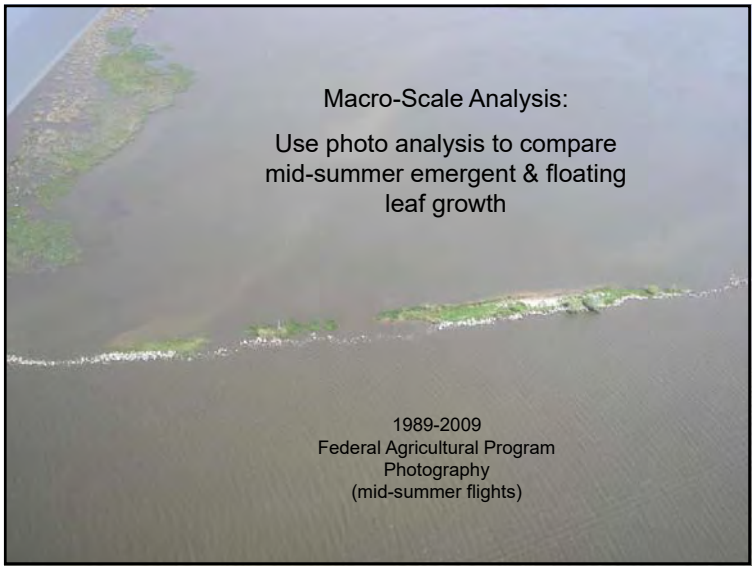

Dredge banks, once barriers to erosive waves, have dissolved and no longer protect the shorelines or emergent vegetation.
PUCKAWAY LAKE FROM MARQUETTE HEIGHTS. PENTZ'S RESORT, MARQUETTE, WIS

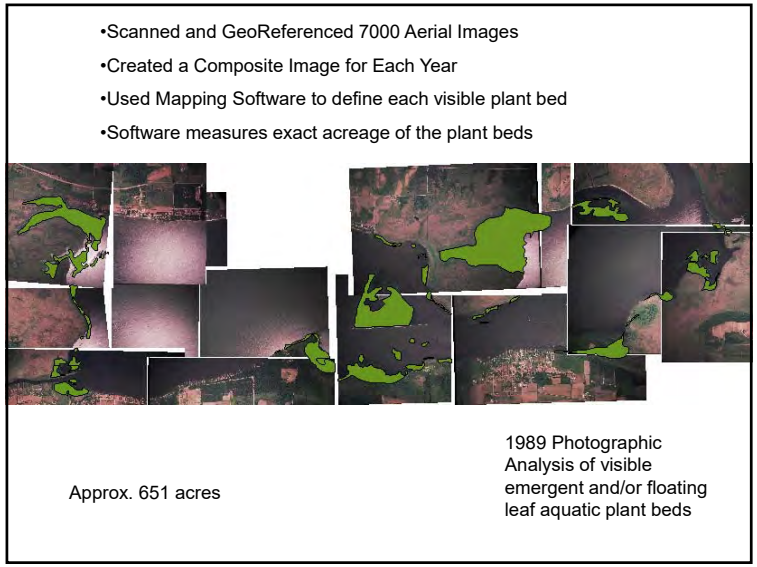


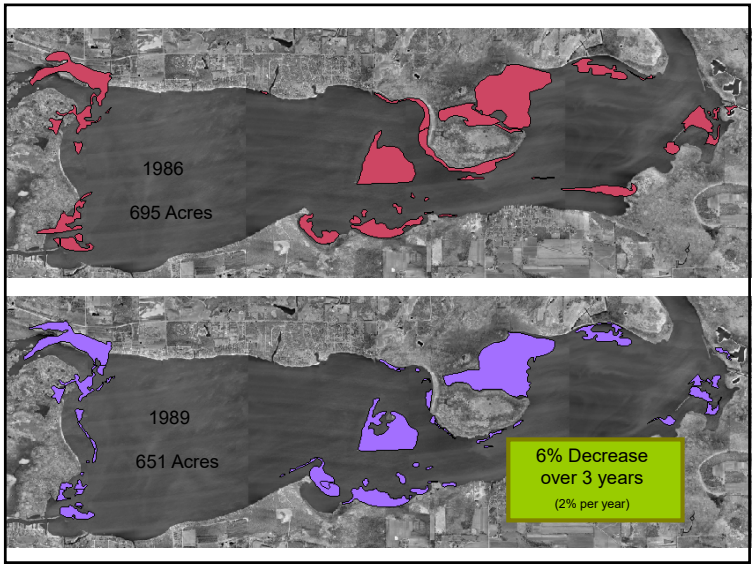


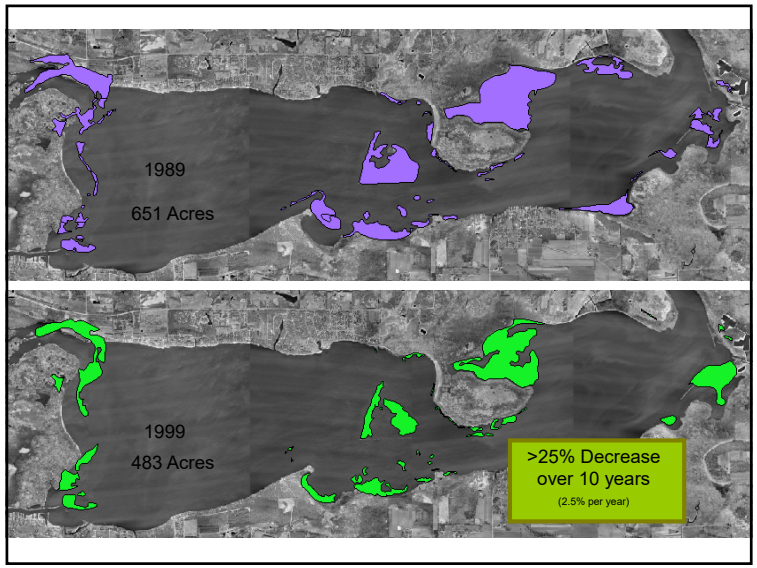
Puckaway

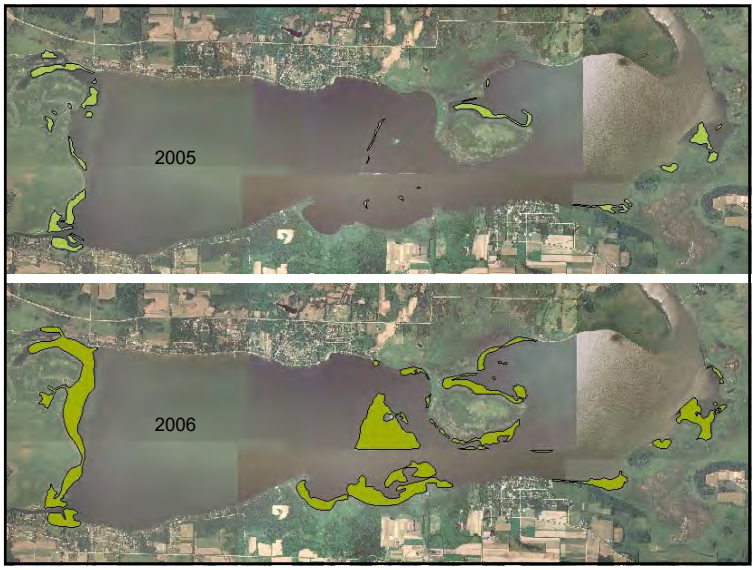

How do we Quantify the rate and amount of loss?

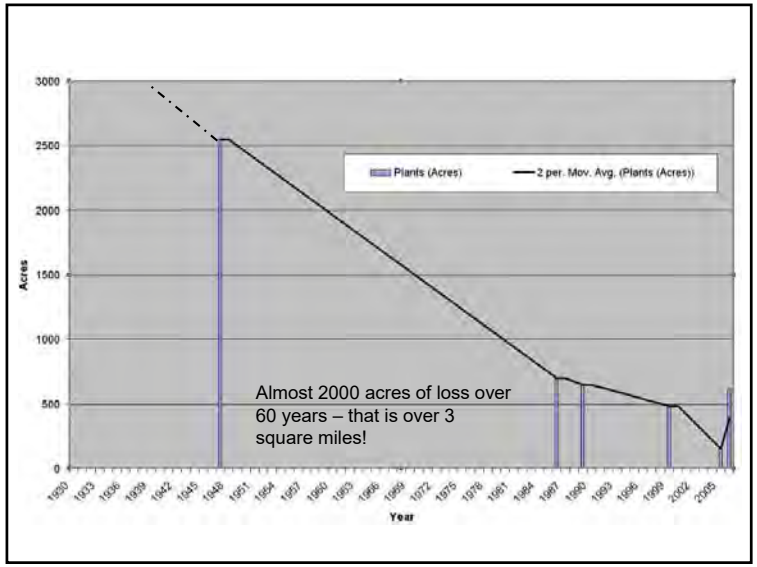

Macro-Scale Analysis:
Use photo analysis to compare mid-summer emergent & floating leaf growth
1989-2009
Federal Agricultural Program
Photography
(mid-summer flights)


•Scanned and GeoReferenced 7000 Aerial Images
•Created a Composite Image for Each Year
•Used Mapping Software to define each visible plant bed
•Software measures exact acreage of the plant beds
Approx. 651 acres
1989 Photographic Analysis of visible emergent and/or floating leaf aquatic plant beds


1986
695 Acres
1989
651 Acres
6% Decrease over 3 years
(2% per year)







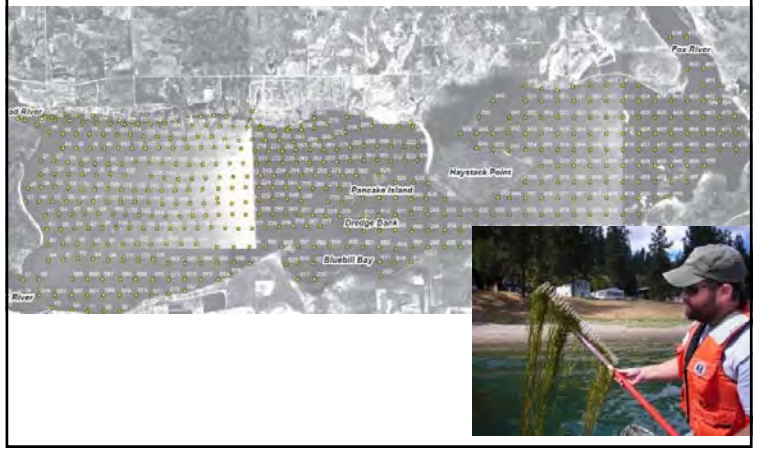
Micro-Scale Analysis:

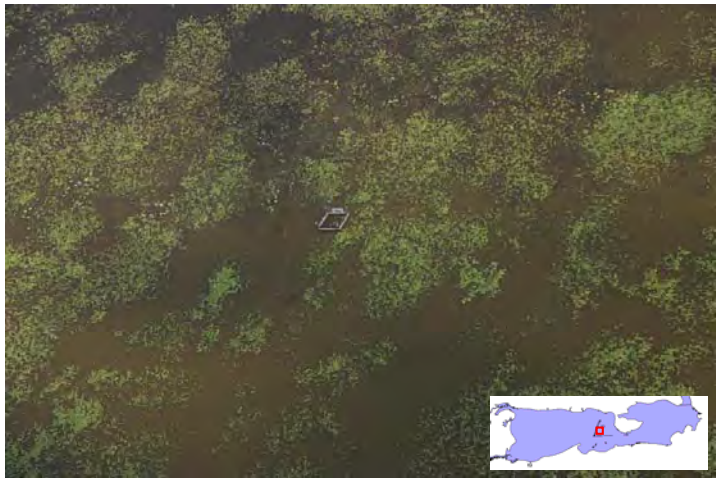
Establish set sample points throughout the lake and conduct a plant survey annually at the same location.

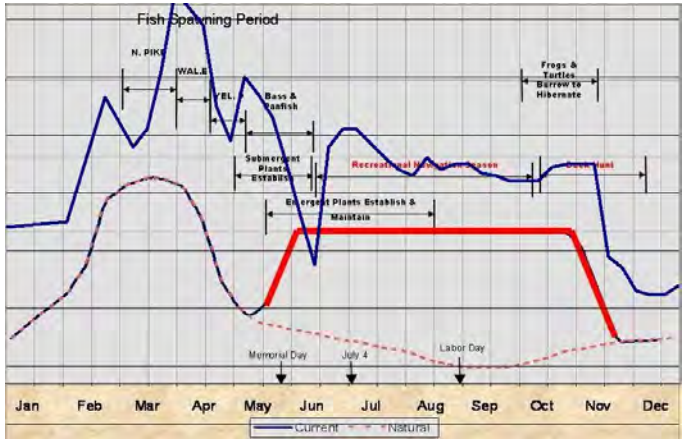
Use GPS to delineate edge of emergent plant beds for comparison over time.

Begin monitoring in 2010.

Aquatic Plants Projects

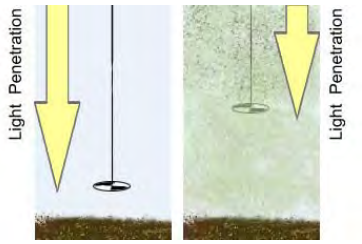


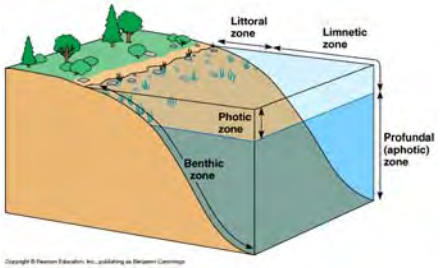




3. What causing the reduction?

•Algae prevents light front reaching bottom.



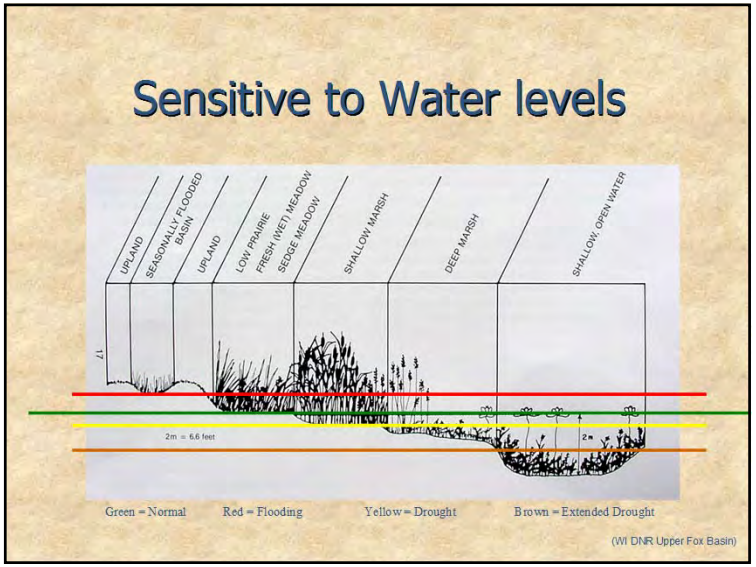


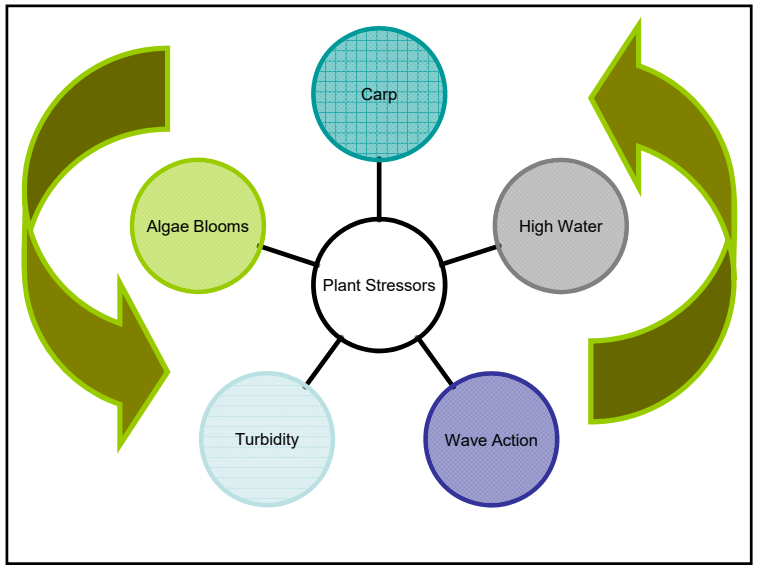
•Rooted plants utilize phosphorus

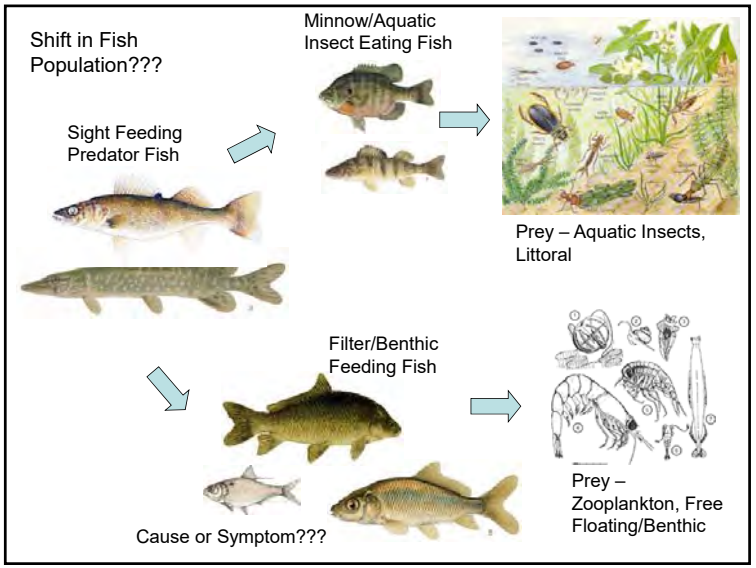
•Reduced phosphorus results in less algal blooms

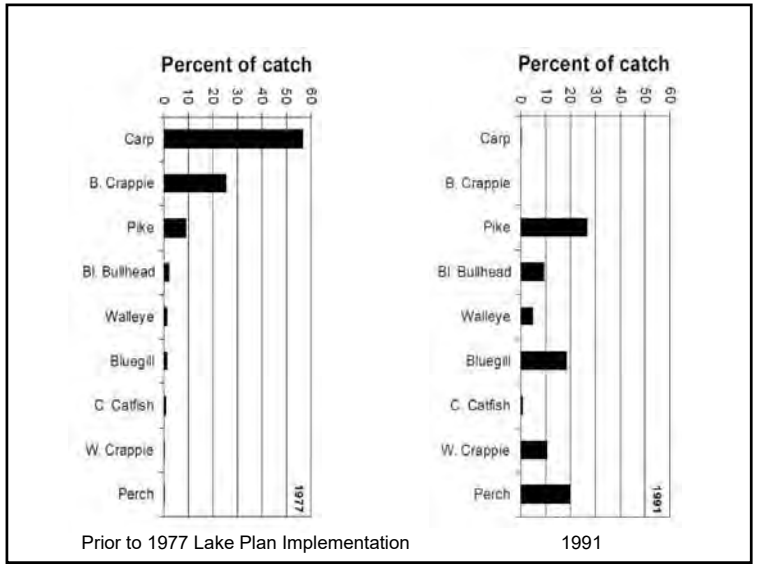
•Reduced algal blooms results in clearer water

•Clearer water allows more sunlight to reach the bottom for rooted plants



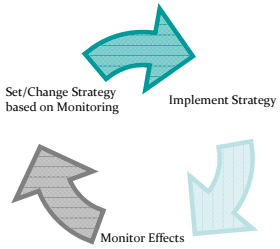






Moving Forward by Looking Back…

- Establish a Baseline Trend with Historical Data
- Set Objectives
- Establish Strategy to achieve Objectives
- Continuously Monitor and Adjust Strategy



Adaptive Management
approach that incorporates the results of a new monitoring program into management action in order to adapt and learn over time.

Management Activities

- Historical Photo Analysis
- Increase carp removal
- Dredgebank Enhancement
- Carp Exclosures monitoring plots
- Aquatic Plant Monitoring
- AIS Monitoring
- Water Level Monitoring
- Shoreland Restoration
- Boater Education (maps, kiosk, etc)
- Cormorant Control
- Water Level Manipulation
- Fisheries Study
- Watershed Management (Runoff Control Projects, NMP, etc)
- Historical Data Collection

Take Home Message….

Modified water levels are a lake stressor that needs to be managed.

(i.e. Lakes with artificially manipulated water levels need to be properly managed to meet the needs of the lake to prevent degradation over time.)

Press Release

Lake Puckaway Fisheries, Shorelands, and Habitat – Past, Present, and Future

Green Lake & Marquette Counties, WI, Date. The Lake Puckaway Protection and Rehabilitation District will be holding an information and planning meeting as a part of the project they are conducting to update Lake Puckaway's management plan. The meeting will be held at the Marquette Village Hall (127 E. 4th St, Marquette, WI) and begin at 6:30pm on Tuesday, June 28th. Presenters will include Ted Johnson, Wisconsin DNR Water Resource Specialist and Dave Bartz, Wisconsin DNR Fisheries Biologists.

Bartz will discuss the historical and present fisheries of Lake Puckaway. "With increases in quality lake habitat, we see increases in fisheries quality as well," said Bartz. "We could see an even better fish population in Lake Puckaway with better habitat and water quality, but it will take work to make the necessary changes.", he continued.

Johnson, who oversees the management of Lake Puckaway is also interested in increasing quality habitat in the lake. Habitat that would benefit the lake's ecology, wildlife, and fish. "The Department of Natural Resources is interested in forming a team made up of Lake Puckaway stakeholders to plan and implement restoration projects utilizing state and federal dollars," Johnson stated. Johnson also said, "Investigating options and applying for those funds can be done in parallel with the current planning project being completed by the Puckaway District."

The Lake Puckaway District developed a management plan in 2004, but many changes have occurred in the lake over the last twelve years. Changes have also occurred in the way lakes are managed in Wisconsin and the rest of the nation. The Lake Puckaway District successfully applied for two state grants in the last two years to help fund the current project slatted to produce a draft plan later this fall.

Tim Hoyman, an aquatic ecologist with Onterra, LLC, a lake management planning firm out of De Pere and Madison, met with the district membership at their annual meeting on June 4th. During his presentation, Hoyman said, "Our job is to help the Lake Puckaway District create a management plan that will meet the needs of the folks who use and care for the lake while meeting the needs of the lake itself, as well." "The first step in the planning process is to understand the lake and make sure everyone has realistic expectations," he continued.

Five meetings have been scheduled over the summer to deliver the results of the many studies that have been completed on Lake Puckaway over the past decades. Each meeting has specific topics about Lake Puckaway. Following the June 28th meeting on fisheries and habitat, the district will host a meeting on Monday, July 18th regarding the lake's water quality and watershed.

Fisheries and Habitat Workgroup

June 28, 2016
Marquette Village Hall

The second of 5 meetings being held for the update to the Lake Puckaway Management Plan was held on June 29, 2016 at 6:30 pm at the Marquette Village Hall. The purpose of this meeting was to present information on the fishery in Lake Puckaway from 1970 to the most recent survey work. Discussion was held after the presentations to make sure the planning committee clearly understood the data and there was agreement on what the information meant.

Present were the following members of the Planning Committee:
Mick Masters, Jeff Kimber, Kurt McCulloch, Randy Schmidt, Paul Gettelman, Roger Swanke, and Gene Weber.

In addition, present were the night's speakers Dave Bartz, WDNR Fisheries Biologist and, Ted Johnson– WDNR, Water Resource Management Specialist and 14 members of the public. Linda Stoll – L Stoll Consulting served as meeting facilitator.

Dave Bartz began with a presentation on the fishery in Lake Puckaway. Lake Puckaway covers 5,039 acres with a maximum depth of 5-7ft and an average depth of 3-4ft. It is part of the Upper Fox River system. While the dam and added boards have a slight impact on water levels, rain and snowfall control the system. Dave has fish data beginning in 1970. At that time the lake was turbid with few plants and a large amount of carp. Beginning in 1980, carp removal and a restocking program was put in place. Native to the lake and of interest are Walleye, Northern Pike, Large Mouth Bass, Catfish and Panfish. For a complete list of all fish found, please see the PowerPoint presentation located on the Lake Puckaway website. The lake is successfully used for open water and ice fishing. He noted that this is an open system in that fish are free to swim up and down stream. Dave focused on a graph displaying spawning time and needs of the major fish found in the lake (see PowerPoint presentation). He noted that all need vegetation and clean flowing water. Panfish and bass numbers appear to be declining and this could be due to a lack of sufficient submergent aquatic plants as well as the high number of predator fish. Better habitat could improve spawning as well as offer protection.

Carp on the lake have been a problem since 1930 and various attempts have been made to control them. It wasn't until the recent establishment of a market for them that any real progress has been seen. Dave noted that at times the boards go up on the dam right at carp spawning time and they actually increase the area available for spawning and thus increase the success of carp reproduction. He also presented some new research that is looking at the ability of panfish to control carp as the panfish have been seen to eat the fry. Dave noted that there is still a lot to learn about how to manage the carp population. The timing of board placement on the dam can also impact reproduction of other fish species. Dave gave an example of downstream habitat drying up right at the time catfish were spawning.

Dave closed his presentation with a reminder that plants and clean water were key to a successful fishery and that plants need water level fluctuation to survive. He noted that less plants usually means more algae. It is extremely important that this lake is treated as part of a system – that the

conditions in Puckaway are important but what happens up and down stream impacts Puckaway as well.

Ted Johnson followed with information on the creation of a Lake Puckaway work group whose purpose would be to look at all of the potential on-the-ground projects, prioritize them and develop a plan for implementation. He hoped that this could be completed about the same time that the management plan was adopted so that restoration could be an effective, coordinated effort and that they could take best advantage of multiple funding sources. Ted gave examples of restoration of the dredge banks and cane beds as key to improving Lake Puckaway. He hoped that they could improve on the dredge bank design to increase habitat both above and in the water. It would be important to look at efforts done elsewhere to increase the success of lake projects. He mentioned five major funding sources: US Army Corp of Engineers, US Fish Wildlife, WDNR and local organizations such as Ducks Unlimited and Walleyes for Tomorrow. Having a strategy and workgroup in place would greatly improve the chances of receiving money. Ted would like to put the group together in the near future.

Planning Committee Comments and Questions:

1. *Would a fixed crest dam improve spawning of flathead?*

   Yes, because it would eliminate that chance that there would be a drastic change in the water level downstream right at the time these fish are spawning.

2. *Why did we have a big carp kill this spring?*

   We don't really know. It seemed that most of the fish that died were the same size. It couldn't be determined if this was a virus because no one brought in a fresh sample. It was noted that if it was a virus, you could assume that many more fish would have died and that they would have been of all different sizes. This possibly could have been due to stress on that particular age class.

3. *Is it time to rethink the 32" size on Northern?*

   Yes. DNR is looking at managing Lake Winnebago and the Upper Fox as a system with consistent regulations. This fish is very successful here which could be a reason for the reduction in panfish. It will be important for the public to weigh in on this decision. Dave also discussed how each species of gamefish in Wisconsin has a WDNR Team. The northern pike team had not met for years, but is now starting to meet again, so this may help produce a change at Lake Puckaway.

4. *Are panfish numbers really down?*

   Yes. This could be due to high levels of predation but also to lack of good spawning habitat and habitat that could offer year-round protection. Recent studies have shown that a healthy panfish population can assist in controlling carp, so an improved panfish population would be beneficial to the lake in many ways.

5. *Could holding water levels higher over winter improve spawning?*

No. Spring water levels are higher than the dam anyway and this is determined by rain and snowfall.

6. *Would slot limits help the walleye fishery?*

Higher slot limits are put in place to protect reproduction which is not an issue here.

7. *There is talk about removing the size limits on Walleye. How would this impact Lake Puckaway?*

It is not sure whether the population could withstand this so it would be questionable whether we would do this here.

8. *In some areas they have changed the number of Walleye you can take from 5 to 3. Is this something we should do? What about people that are "double-dipping"?*

We are monitoring the impact of this decision and so far it has not really had an impact on populations in the lakes where this has been done. Future discussions will be held on this topic and it's going to be really important for the public to weigh in on expanding this to more lakes. Double-dipping is an enforcement issue. So far, the occurrence of this is small and has not had a big impact. However, if people are concerned, they should contact their warden who can address this.

9. *Several general comments were made regarding potential restoration projects.*

It was hoped that when doing the dredge banks and if any islands were created that they be more than a pile of rocks. It was requested that additional habitat be created on top of them as well as improved design under water. The cane bed project should also be designed for maximum benefit. It was noted that using improved modeling programs and reviewing the impact of projects done elsewhere can help improve the overall outcome of these project.

10. *What can be done about the Northshore boat landing?*

The Issue Assessment identified the need to improve the Northshore boat landing to increase the ability to use this site for a longer period of time. There was a request to add a break wall to protect the landing as well as provide additional fishing access. The Lake District is exploring the possibility of initially dredging the landing and then designing something to provide protection. This project would certainly qualify as something that the proposed workgroup could take up and get funding for. It was noted that the design should have the input of an appropriate engineer and be part of the overall plan for the lake.

Written Questions:

1. *Why don't we stock tiger musky in Puckaway? Their number can be <u>controlled</u> and they have been beneficial in other lakes and systems. Why can't we stock more perch in bluegill in Puckaway? Barrier reefs have been built by [power company] and other [?] cement & flyash bank, so why not utilize that source?*

There are currently Great Lake Spotted musky being stocked in the Winnebago system. Some of those fish have shown up in the Fox river as far up as the Berlin area. Over time, these fish may inhabit the entire system? Currently much of our effort has been to stick with species, that in the past, were present in the system and not mix in other genetics. Also, with the density of other gamefish, walleye and northern pike, and the hopes of rebuilding the panfish populations with habitat improvements; I don't believe it is in the best interest of Lake Puckaway to stock another "top" line predator. As far as perch go; over the years we have seen large year classes of perch, but it appears that few recruit to the anglers creel. There are obvious reason why this is and it may be mainly related to predation by gamefish and loss of habitat that stimulates perch survival. Again, I see habitat improvement as the way to improve perch populations. (Answer provided by Dave Bartz, WDNR Fisheries Biologist)

We have not heard of the barriers being constructed of flyash and cement. Civil engineers would be used to design any barrier structures and would provide guidance on proper materials.

2. *Lake Buffalo residents are upset due to the fact that they 6" of water due to the fish ladder. Is that going to happen on Puckaway? If so, why don't we raise the dam 6 more inches because of the fish ladder?*

   As far as the design of the Montello Dam (Buffalo Lake) spillway is concerned, I have not been on site recently to be able to reference this summer's conditions. The previous spillway had a 190' long spillway with a fixed elevation of 768.3 NAVD88. A set of 0.5' flashboards were installed on 130 feet of that length to bring much of the spillway elevation up to 768.8 NAVD88. This configuration was in place for more than 15 years prior to the reconstruction…60 feet at 768.3 and 130 feet at 768.8.

   The new configuration was designed to mimic the old spillway over the entire range of flows and maintain a summer pool within the operating range under typical summer flow conditions (drought not included). The total spillway width is 188', 20' within the fish passage set at 768.2NAVD 88 and 168' of fixed crest set at 768.75 NAVD88. This is hydraulically similar to the pre-project condition.

   The summer operating range is between 769.0 and 769.5 NAVD88. I have only collected water level data once since completing the project (11/11/14 at 769.34NAVD88) but have utilized the water level on the u/s wing walls (masonry joint at 769 and 770) as an antidotal reference to be able to say that I have not once witnessed the water level near 769.0 much less six inches below it in the two years since the impoundment was refilled. [It has always been over 769].

   Since there are no impacts from the fish passage at Buffalo there wouldn't be a reason to modify the Montello Dam. Any fish passage at the Princeton Dam would have the same criteria. Raising the lake is not a feasible option as 100% of the affected riparian owners

would have to voluntarily give the State approval by easement for the additional flowed lands and then it would need to pass environmental review. (Answer provided by Brent Binder, WDNR Natural Resource Engineer and Montello Dam Reconstruction Project Manager)

3. *Is the goal to make Puckaway like Buffalo Lake and Montello Lake – shallow and full of weeds?*

   Of course not. Buffalo Lake contains two primary weed species, curly-leaf pondweed, and Eurasian water milfoil, which are both aggressive and troublesome exotic species. Following the lake's drawdown for the reconstruction of the Montello Dam, Eurasian water milfoil has declined in occurrence by 83%, native aquatic plant species richness has increased from 11 to 24 species, average conservatism has increased from 5.5 to 5.8, floristic quality has increased from 18.2 to 28.5, and Simpson's diversity has increased from 0.84 to 0.87. All of these indicate a healthier plant population and a healthier Buffalo Lake. We have not worked on Montello Lake, so we are unable to comment on its condition.

   At this time, no particular goals have been set for Puckaway Lake as the planning process is still in progress. The overarching goal of the plan will be to help Puckaway to be an overall healthier lake. As the presentations thus far have shown and future presentations will touch on, Puckaway is currently not a healthy system and among other things, exhibits poor water quality that not only impacts the lake itself, but also downstream waterbodies. Lack of vegetation in much of the lake is part of the lake's health issue and impacts its water quality and fishery. Increases in plant abundance will create better water quality and better habitat within the lake, which will make the lake and fishery healthier.

Lake Puckaway

Fisheries and Habitat

Lake Puckaway

- 5,039 acres
- 5-7’ max depth – 3-4’ average
- Widening of the Fox River
  - Historically part of the Fox River System
- Slightly impounded by Princeton Dam
- Variable water levels due to Nature
- Dam operation has often been controversial

Lake Puckaway

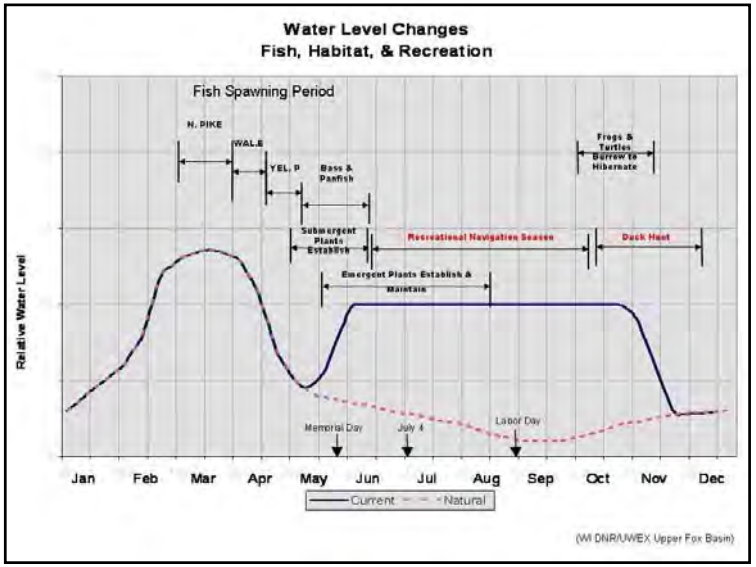
- 1970’s
  - Turbid conditions
  - Very few aquatic plants
  - Carp dominated
  - Few desirable species
- 1980’s and 90’s
  - Huge restoration efforts
  - Carp removal and treatment
  - Intensive stocking, NP, WE, LMB, MU, BG

Fishery

- Heavily utilized
  - Open water
  - Ice
- Open system
- Native populations
  - Gamefish
  - Panfish
  - Non-game

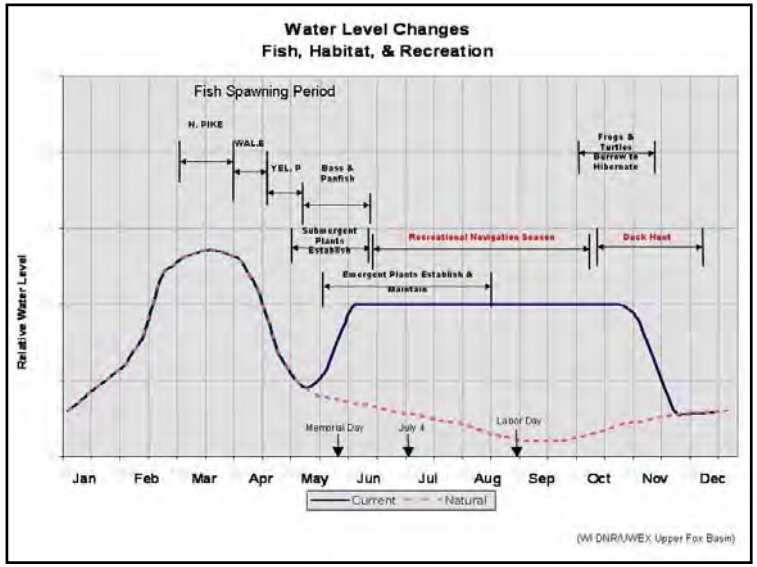
Fishery

- Native populations
  - Walleye
  - Northern Pike
  - Largemouth Bass
  - Catfish, channel and flathead
  - Panfish, including bluegill, crappie and yellow perch
  - Carp
  - Lake Sturgeon, White Bass
  - Numerous minnow and nongame species



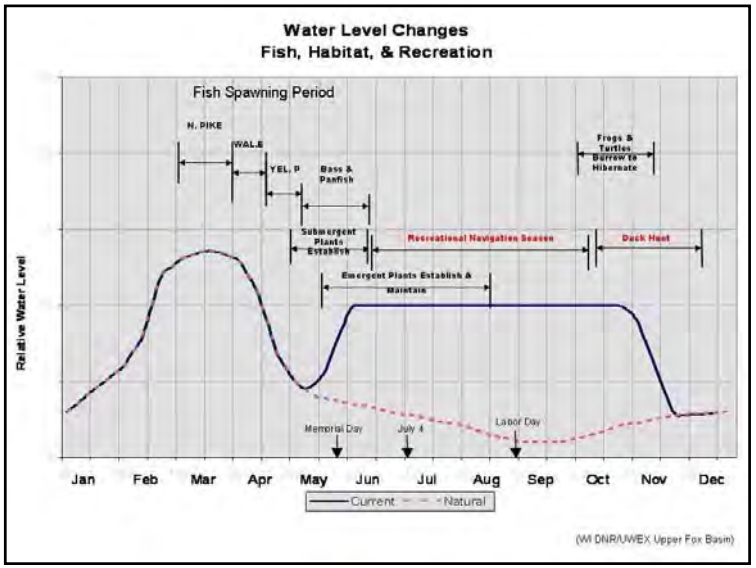
Northern Pike

- Spring spawner, ice out
- Rely on vegetation and good water quality
- High density with good growth
  - Need good food source
  - Prey fish need good habitat



Walleye

- Spring spawner
- Clean rocky shoreline
- Clean flowing water over marsh
- Bulk of population is natural
- Studies indicate contribution from fry stocking
- Benefits greater in low natural years
- Need good food source

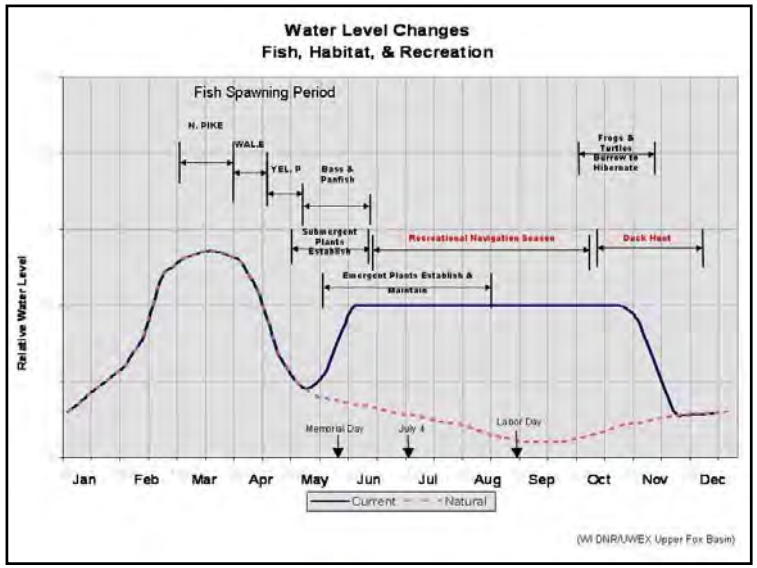


Panfish

- Size structure and growth rates good
- Low catch rates may indicate low densities
  - High gamefish densities
  - Habitat?
- Rely heavily on –
  - Healthy submergent aquatic vegetation
    - Food
    - Cover
  - Aquatic invertebrates and “minnows”
  - Good water quality

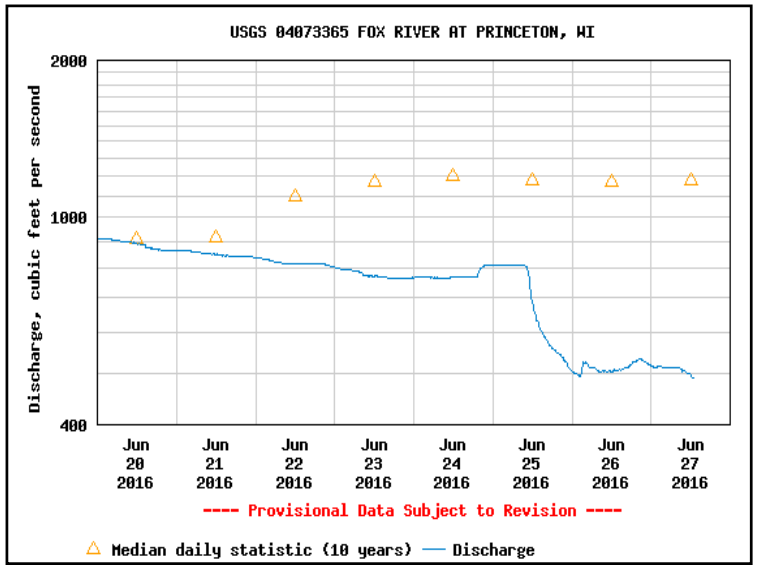
Carp

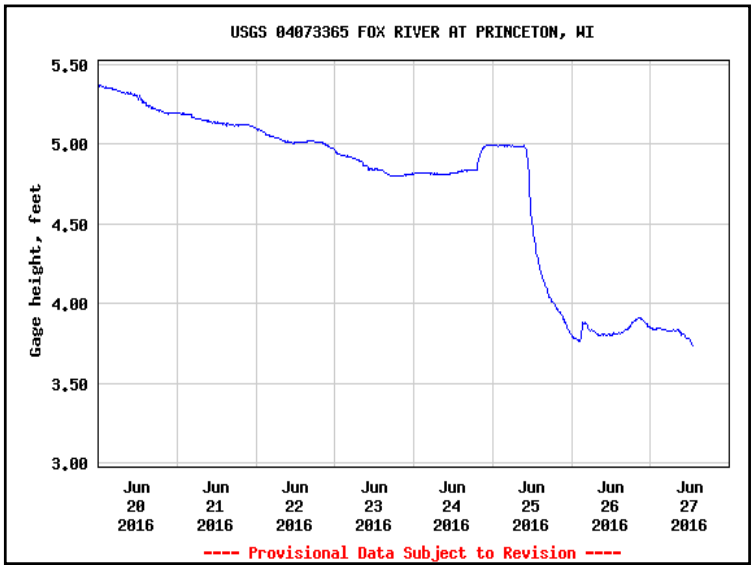
- First planted in the late 1800’s
- Full scale removal efforts by the 1930’s
- Electrical barrier on Princeton Dam
- DNR rough fish crews
- Contract removal
- Millions of pounds removed
- Capable of establishing large year classes

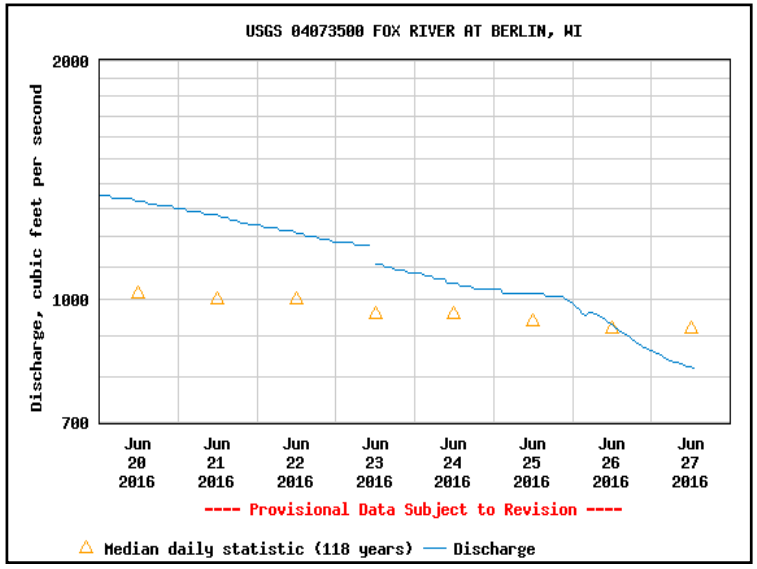


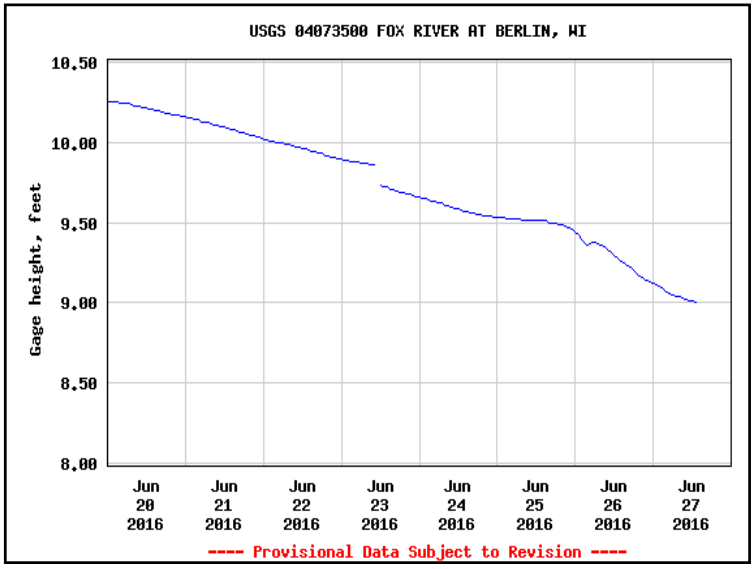
Sturgeon, Catfish and White Bass

- Sturgeon
  - Spring river run from Winnebago
  - Rely on spring flows to access rocky banks
- White Bass
  - Late spring
  - Spring flows
- Catfish
  - Channel
  - Flathead


USGS 04073365 FOX RIVER AT PRINCETON, WI
Discharge, cubic feet per second
2000
1000
400
Jun 20 2016
Jun 21 2016
Jun 22 2016
Jun 23 2016
Jun 24 2016
Jun 25 2016
Jun 26 2016
Jun 27 2016
---- Provisional Data Subject to Revision ----
Median daily statistic (10 years)
Discharge

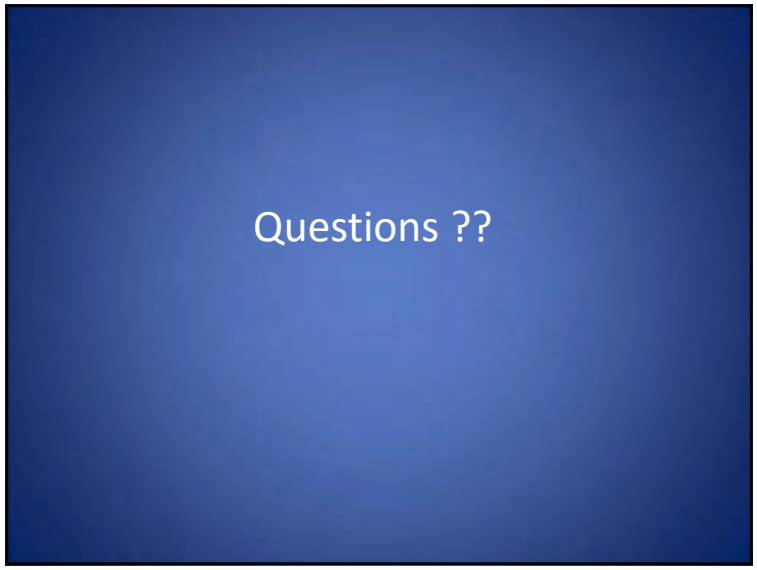

USGS 04073365 FOX RIVER AT PRINCETON, WI
Gage height, feet
5.50
5.00
4.50
4.00
3.50
3.00
Jun 20 2016
Jun 21 2016
Jun 22 2016
Jun 23 2016
Jun 24 2016
Jun 25 2016
Jun 26 2016
Jun 27 2016
---- Provisional Data Subject to Revision ----


USGS 04073500 FOX RIVER AT BERLIN, WI
Discharge, cubic feet per second
2000
1000
700
Jun 20 2016
Jun 21 2016
Jun 22 2016
Jun 23 2016
Jun 24 2016
Jun 25 2016
Jun 26 2016
Jun 27 2016
---- Provisional Data Subject to Revision ----
Median daily statistic (118 years)
Discharge


USGS 04073500 FOX RIVER AT BERLIN, WI
Gage height, feet
10.50
10.00
9.50
9.00
8.50
8.00
Jun 20 2016
Jun 21 2016
Jun 22 2016
Jun 23 2016
Jun 24 2016
Jun 25 2016
Jun 26 2016
Jun 27 2016
---- Provisional Data Subject to Revision ----

Habitat

- Emergent and submergent plants
  - Relies on fluctuating levels
  - Improves water quality by filtering
  - Inhibits growth of algae by using nutrients
  - Cover for fish, insects, amphibians and other aquatic organisms


Questions ??

Shallow Lake Management Workgroup??

June 28, 2016

Ted M. Johnson
Lake Biologist
DNR - Oshkosh

Concept

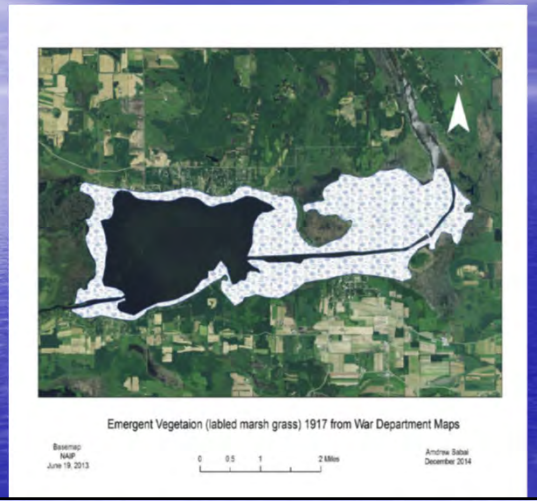
Form a multi-discipline workgroup to do the following

1. Convene team & establish clear objectives / expectations
2. Collaborate with Mississippi River Habitat Team
3. Identify potential habitat restoration projects
4. Develop criteria to prioritize and rank potential projects
5. Identify & meet with representatives from potential funding sources
6. Project development
   - Design work
   - Management & monitoring strategies
   - Project funding proposals
7. Implement Projects

Who?

1. Lake Stakeholders (1-4)
   - District board members, fisherman, recreational users, etc
2. DNR (4)
   - Water Resources, Fisheries, Wildlife, Lands
3. County (1-2)
4. Federal agency staff
5. Ad Hoc
   - As needed experts

1917 Emergent Vegetation



Reconstruct / Expand Dredge-bank

Cane-bed Restoration / Enhancement

Funding Sources

1. U.S. Army Corp of Engineers
   - Planning Assistance to States (PAS)
   - Section 206: Aquatic Ecosystem Restoration
2. U.S. Fish & Wildlife Service
   - NRDA Funds
3. DNR
   - Lake Protection Grants
4. Local
   - Ducks Unlimited, Wisconsin Waterfowlers

Interest Level????

Press Release

For Immediate Release

Lake Puckaway Water Quality and Watershed will be the Primary Topics of Discussion at Next Information & Planning Meeting

Green Lake & Marquette Counties, WI, July 11, 2016. The third in a series of informational and planning meetings open to the public regarding Lake Puckaway will be hosted by the Lake Puckaway Protection and Rehabilitation District on Monday, July 18th. The meeting will be held at the Town of Mecan town hall (W1561 Evergreen Ln., Montello) and begin at 6:30pm. The evening's presentations will focus upon Lake Puckaway's water quality and on the lake's watershed. A watershed, also known as a drainage basin, is the area of land that drains to the lake through gravity. Lake Puckaway's drainage basin is enormous and is a key factor in the lake's water quality because it delivers nutrients, sediments, and other pollutants to the lake throughout the year. Of most concern is phosphorus. Phosphorus is the plant nutrient that controls the level of algae and other plant growth in most Wisconsin Lakes. However, meeting attendees will discover that the watershed is not the only source of phosphorus impacting Lake Puckaway. In fact, much of the phosphorus being used by algae in Lake Puckaway comes from the lake itself as a result of internal nutrient cycling.

In 2013, the Wisconsin Department of Natural Resources began a project with the U.S. Environmental Protection Agency to determine the maximum amount of phosphorus that can be added to the Upper Fox River and Wolf River drainage basins and still allow the waterbodies within them to remain healthy. The project is actually a part of a nationwide effort to determine Total Maximum Daily Loads (TMDLs) for all watersheds in the U.S.

"Determining the loads for each waterbody within a watershed the size of the Fox-Wolf Basin is a tremendous undertaking, but we expect to have the final report from the contractor working with the EPA by next summer." said Keith Marquardt, Water Resource Management Specialist with the Wisconsin DNR. "While the analysis is not fully completed, I will be able to share some preliminary results for Lake Puckaway and its watershed during my presentation Monday night." he continued.

Marquardt will explain why the development of TMDLs is important in protecting our waterbodies and how they work to assure we will have clean water in the future. He will also discuss how the state will implement the TMDL for the Fox-Wolf Basin once it is completed.

Paul Garrison, an Aquatic Ecologist with Onterra, LLC, will discuss historical and current water quality data from Lake Puckaway during his presentation Monday evening. "Like all lakes, nutrient levels and algal biomass fluctuate from year-to-year in Lake Puckaway." stated Garrison. "Interestingly, there appears to be a strong relationship between greater amounts of plants in the lake and years with better water quality."

Tim Hoyman, an Aquatic Ecologist with Onterra and the company's owner, notes a trend in what we are learning about Lake Puckaway as the project progresses. "During the first meeting we learned that aquatic plant abundances with Lake Puckaway have fluctuated over the past century, but overall, there has been a great decline in this type of important habitat." Hoyman said. "We learned at the June 28th meeting that a healthier plant population would lead to greater panfish numbers; and in turn, a larger panfish population would help control the carp population." Hoyman continued. "Next Monday we are going to discuss how the current lack of plants in Lake Puckaway impacts the quality and clarity of the lake's water." "It is all linked together with a healthy plant population being the foundation of a healthy lake."

Watershed, Water Quality, TMDL and Shoreland Assessment

July 18, 2016
Mecan Town Hall

The third of 5 meetings scheduled for the update to the Lake Puckaway Management Plan was held on July 18, 2016 at 6:30 pm at the Mecan Town Hall. The purpose of this meeting was to present information on the watershed of Lake Puckaway, the current quality of the water, progress to date on the Total Maximum Daily Load (TMDL) for phosphorus in the Fox-Wolf river basin and the results of the shoreland assessment for the lake. Discussion was held after the presentations to make sure the planning committee and those present clearly understood the data and there was agreement on what the information meant.

Present were the following members of the Planning Committee:
Mick Masters, Jeff Kimbur, Kurt McCulloch, Randy Schmidt, Paul Gettleman and Gene Weber.

In addition, present were the night's speakers Tim Hoyman and Paul Garrison - Onterra, LLC, Keith Marquardt – Wisconsin Department of Natural Resources, Krista Kamke – Golden Sands Resource Conservation and Development Council and 9 members of the public. Linda Stoll – L Stoll Consulting served as meeting facilitator.

Tim Hoyman began with a presentation on the watershed of Lake Puckaway. Photos and charts depicting the watershed can be found in the accompanying PowerPoint presentation on the Lake District website. Tim emphasized that in order to manage Lake Puckaway, it was important to understand the water flowing into the lake, the current conditions in the lake and how the water leaving the lake would impact those downstream. He explained that lakes are classified based on how water reaches the lake, the size of the lake and the depth of the lake. Lakes can also be classified by the state ecosystem in which they are located. It is important when comparing lakes to use lakes of similar classification. Lake Puckaway is classified as a shallow, lowland drainage lake in the Southeastern Wisconsin Till Plains Ecoregion

Landcover in the watershed has a direct impact on water quality. Runoff from development and agriculture can result in pollutants, nutrients and sediment entering the water. Landcover maps can be found in the PowerPoint presentation. Three parameters were focused upon to determine the health of the lake: phosphorus, chlorophyll-a and Secchi disk transparency. Phosphorus is naturally occurring and is essential for all life. It is also the "limiting nutrient" for plant growth in most of the lakes in Wisconsin. In short, this nutrient controls how much plant growth occurs in a lake both beneficial and detrimental. It was noted that human activity often increases phosphorus input to a lake above what is needed for beneficial plant growth. Chlorophyll-a is the plant pigment used in photosynthesis. Its measurement can be used as a surrogate for the amount of algae in water. Secchi disk transparency in a measurement of how clear the water is. It is impacted by the turbidity (sediment and algae) and the natural color of the water. See the PowerPoint presentation for past and current readings.

Keith Marquardt explained the Total Maximum Daily Load (TMDL) program. It is part of a federal regulation that began with the Clean Water Act of 1972. This act set water quality standards for the various types of water bodies with the overall goal of being fishable and swimmable. Water not meeting this goal was listed as "impaired" and a plan was required to

restore the water based on what was causing the problem. The Bay of Green Bay – part of the Great Lakes System - is listed as impaired for excess phosphorus. A TMDL is the determination of how much of a given pollutant, in this case phosphorus, a waterbody can assimilate before it is impaired. The bay is at the mouth of the Fox-Wolf River System and in order to restore the bay, it will be necessary to reduce phosphorus loading in all water in the system. Industrial and municipal point sources (water coming out of a pipe) have already made some reductions and are regulated by the permits they are required to obtain. The next effort will focus on runoff from urban and rural land. Lake Puckaway may have a goal of 40 micrograms of phosphorus per liter of water. Part of the new lake management plan will need to address this issue.

Paul Garrison provided the results of historical and current lake monitoring. See his PowerPoint presentation on the Lake District website for actual findings. On average, phosphorus concentrations exceeded 130 micrograms per liter. It was noted that both this measurement and that of chlorophyll-a are highly variable. Comparison to upstream water flowing into the lake suggests that this variability is due to internal loading not from outside sources. The lake is impacted by wind due to its shallow nature and long east-west stretch of open water. Sediments containing phosphorus are easily resuspended. When water flow is low, water stays in the lake longer and as a result, receives more internal loading. Plants in the lake play a critical role in reducing the amount of internal loading. This is supported by historical lake data that shows that in years with lots of plants present in the lake, the level of phosphorus is lower. In summary, to improve water quality, it will be important to reduce the input of phosphorus external sources, continue to control the presence of carp that increase the resuspension of bottom sediments, and to improve aquatic plant growth.

Krista Kamke displayed the results of the shoreland assessment conducted on Lake Puckaway. This study focused on the land vegetation in the first 35 feet from shore. Data is currently available for 456 parcels of the approximately 500 land parcels around the lake. About 37% of the shoreline has no human influence. The rest has been impacted to varying degrees. Restoration in some areas may help to reduce phosphorus loading to the lake.

Planning Committee Comments and Questions:

1. *When phosphorus is high in Grand Lake, does that influence the reading in Lake Puckaway?*

   Grand Lake only makes up a very small amount of the input to Lake Puckaway. Also, the water flowing out of Grand Lake filters through the Grand River Marsh prior to entering the Fox River and Lake Puckaway.

2. *Will changes to our septic systems be mandated by the federal government as a result of the TMDL?*

   It is not anticipated that this will happen as loading from this source is very small.

3. *Will the spreading of septic waste on land in the watershed be included in the equation?*

   Yes. This will be included when the overall reductions are examined.

4. *How will the shoreline study be used?*

It will help us target areas for increased habitat which is better for the lake as well as help identify areas for further restoration.

5. *What are the TMDL ramifications if we can't meet the goals?*

All point sources will be required to meet their goals in order to obtain the necessary permits to operate. Nonpoint sources are more of a challenge. Municipalities currently have stormwater management requirements. We are still working with agriculture.

6. *Is the management of Lake Puckaway being looked at for what happens downstream?*

Yes – absolutely! The TMDL looks at how upriver sources impact Lake Puckaway water quality and Lake Puckaway is looked at in terms of how it impacts waterbodies down stream from it.

7. *Are there restrictions on farm animals entering or standing in the water?*

No, not at this time.

Written Questions:

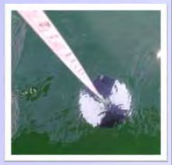
No written questions were received.

Introduction to Lake Water Quality

Phosphorus
Naturally occurring & essential for all life
Regulates phytoplankton biomass in **most** WI lakes
Most often 'limiting plant nutrient' (shortest supply)
Human activity often increases P delivery to lakes

Chlorophyll-*a*
Pigment used in photosynthesis
Used as surrogate for phytoplankton biomass

Secchi Disk Transparency
Measure of water clarity
Measured using a Secchi disk



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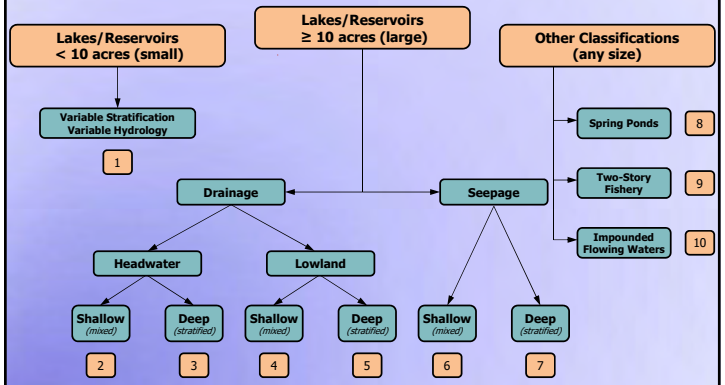
Wisconsin Lakes Natural Community Types



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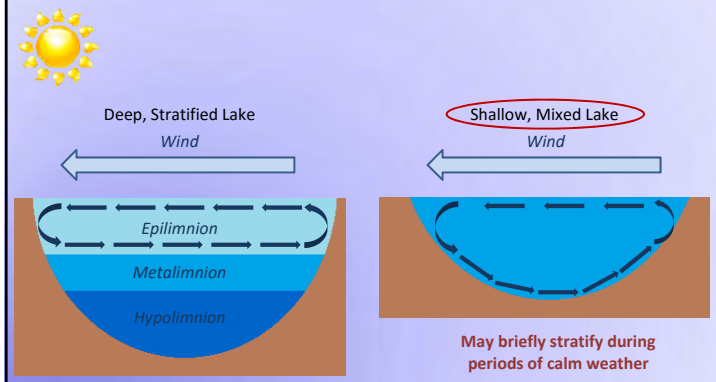
Wisconsin Lakes Classification



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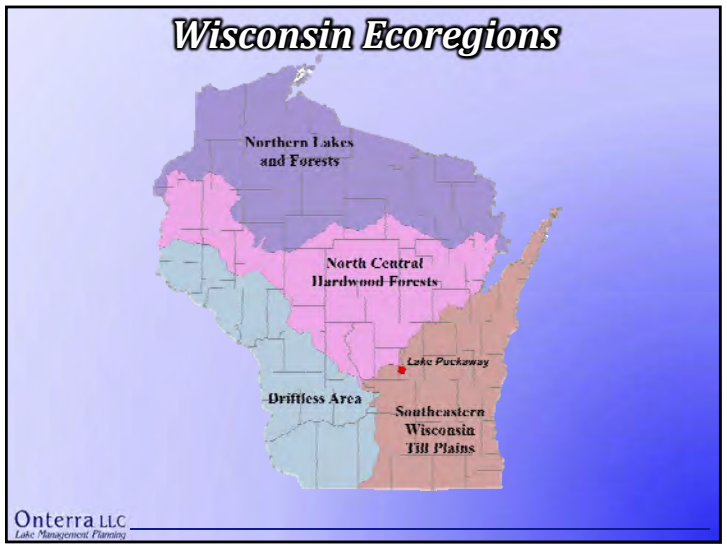
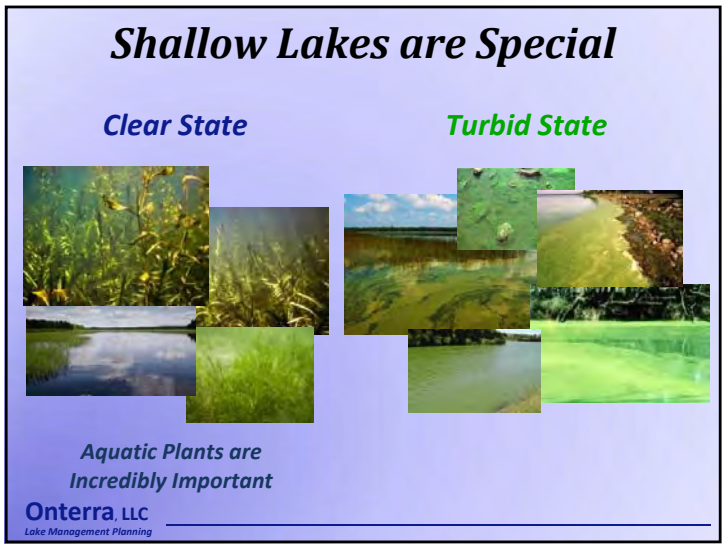
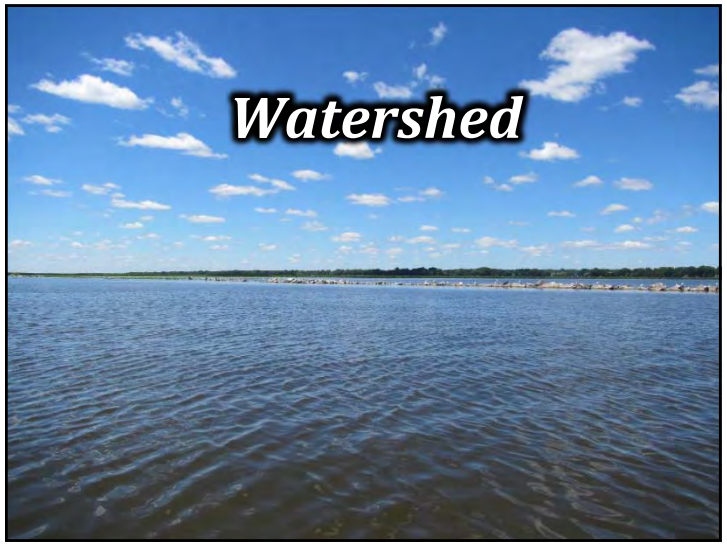
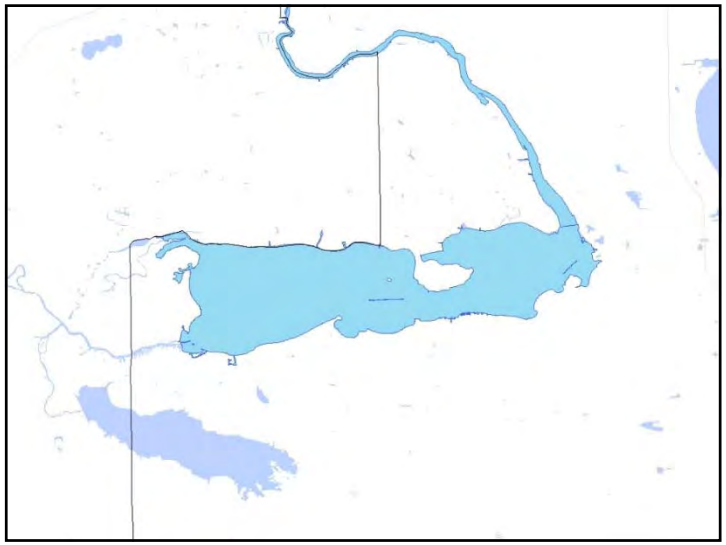
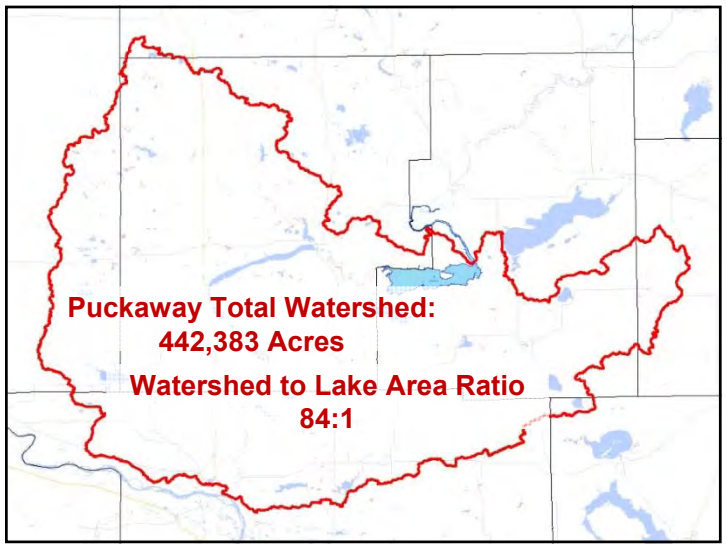
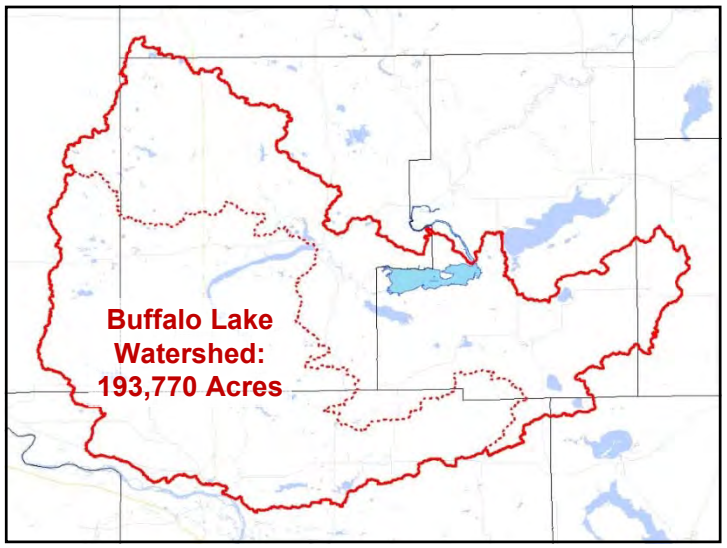

Wisconsin Ecoregions
Northern Lakes and Forests
North Central Hardwood Forests
Lake Puckaway
Driftless Area
Southeastern Wisconsin Till Plains
Onterra LLC
Lake Management Planning

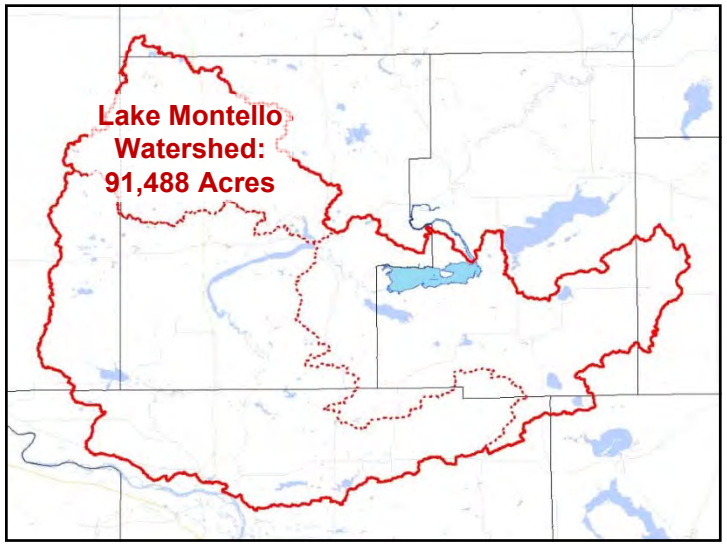

Shallow Lakes are Special
Clear State
Turbid State
Aquatic Plants are Incredibly Important
Onterra LLC
Lake Management Planning

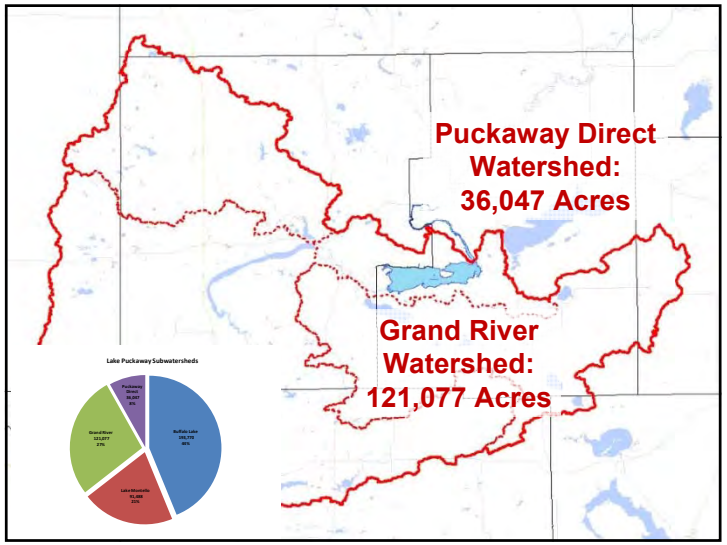

Watershed

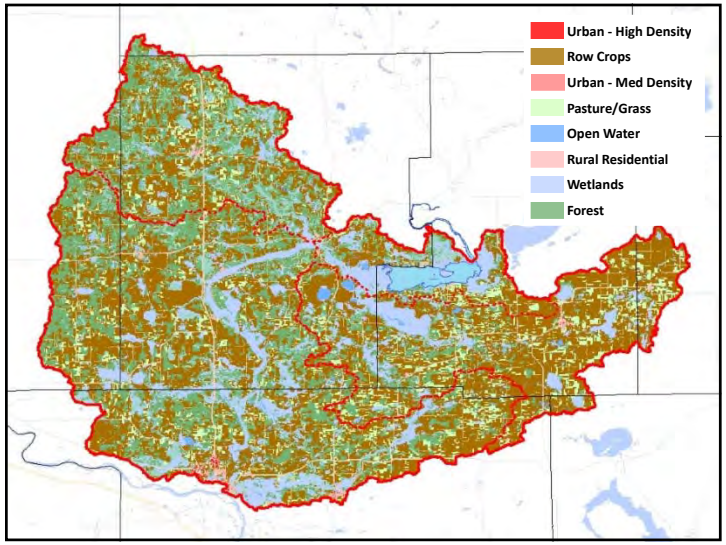


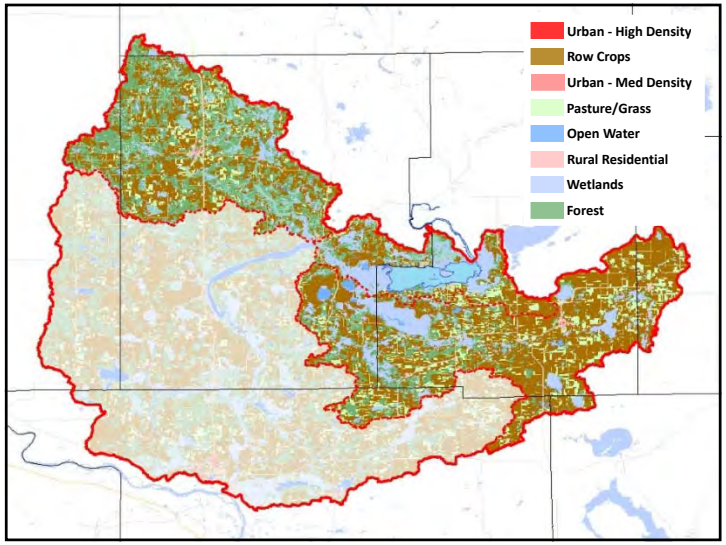

Puckaway Total Watershed:
442,383 Acres
Watershed to Lake Area Ratio
84:1

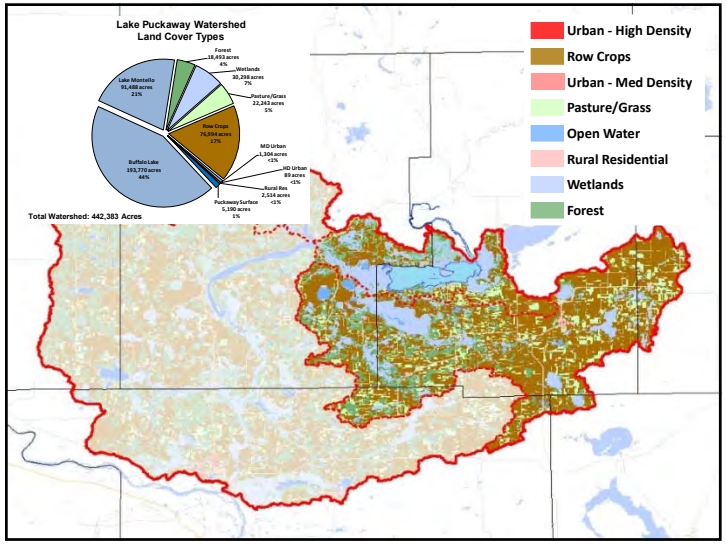

Buffalo Lake
Watershed:
193,770 Acres

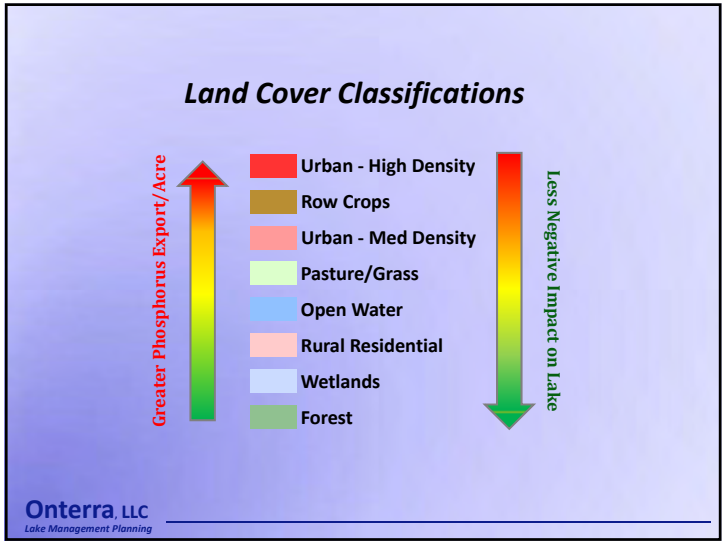

Lake Montello
Watershed:
91,488 Acres

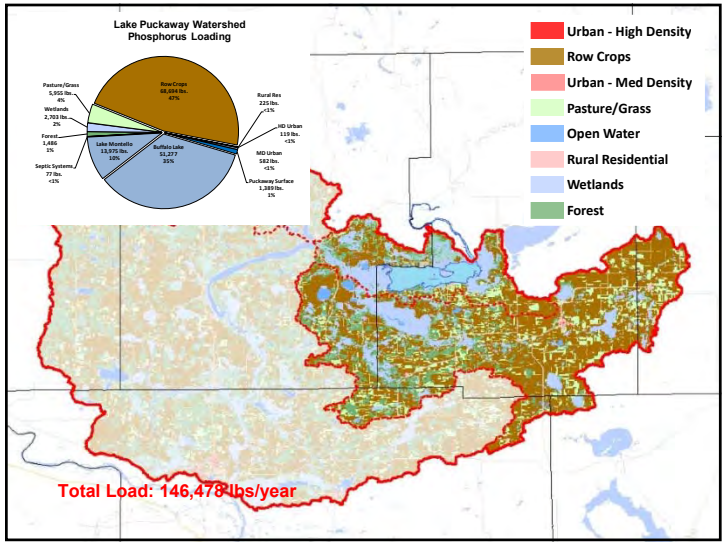

Puckaway Direct
Watershed:
36,047 Acres
Grand River
Watershed:
121,077 Acres
Lake Puckaway Subwatersheds


Urban - High Density
Row Crops
Urban - Med Density
Pasture/Grass
Open Water
Rural Residential
Wetlands
Forest


Urban - High Density
Row Crops
Urban - Med Density
Pasture/Grass
Open Water
Rural Residential
Wetlands
Forest


Lake Puckaway Watershed
Land Cover Types
Total Watershed: 442,383 Acres
Urban - High Density
Row Crops
Urban - Med Density
Pasture/Grass
Open Water
Rural Residential
Wetlands
Forest


Land Cover Classifications
Greater Phosphorus Export/Acre
Urban - High Density
Row Crops
Urban - Med Density
Pasture/Grass
Open Water
Rural Residential
Wetlands
Forest
Less Negative Impact on Lake
Onterra, LLC
Lake Management Planning



Phosphorus Loading to Puckaway

What happens when 146,448 pounds of phosphorus is added to Lake Puckaway?

Predicted Phosphorus Concentration: 101 µg/L Growing Season Mean

Actual Phosphorus Concentration: 118 µg/L Growing Season Mean

Difference: Internal Nutrient Loading

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Key Water Quality Conclusions

- Lake Puckaway is a very complex lake ecosystem
- Phosphorus and chlorophyll levels are high and variable from year to year
- Annual variability is largely the result of internal loading
- Plants reduce internal loading.

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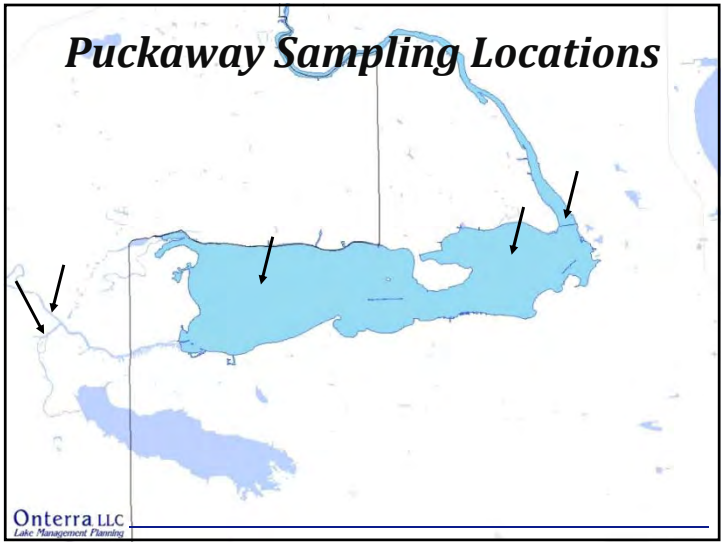
Puckaway Sampling Locations



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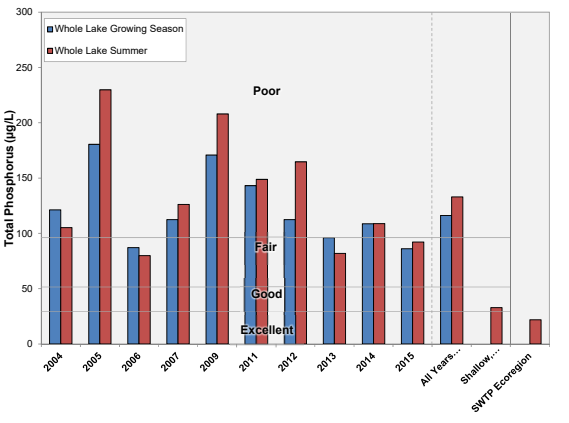
TOTAL PHOSPHORUS



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COMPARISON OF MAIN LAKE SITES SUMMER

Trophic Parameter	Deep Hole	East Mid-Basin
Total Phosphorus (µg/L)	132	135
Chlorophyll-a (µg/L)	61	80
Secchi Disc Depth (ft)	2.7	2.1

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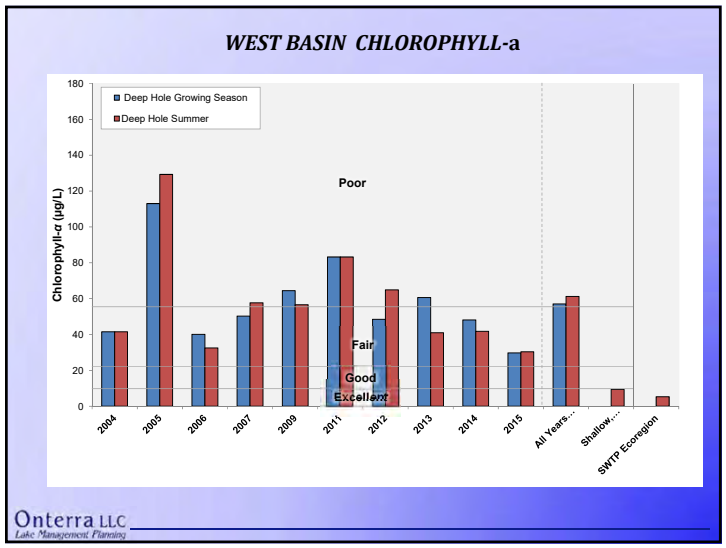
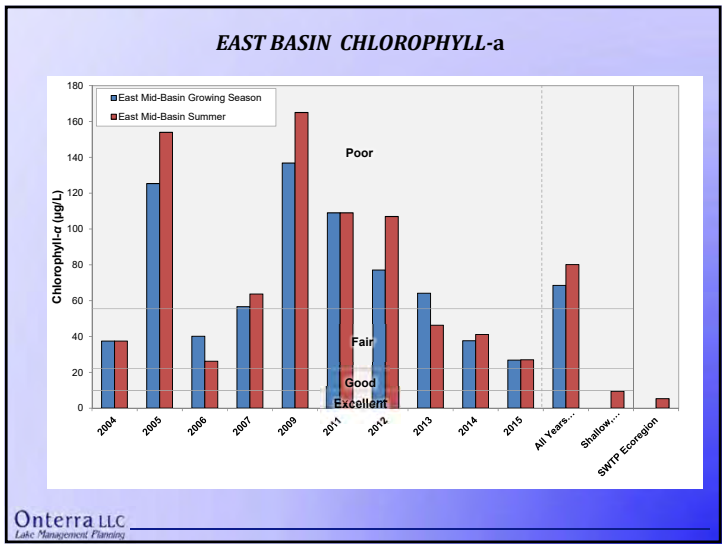
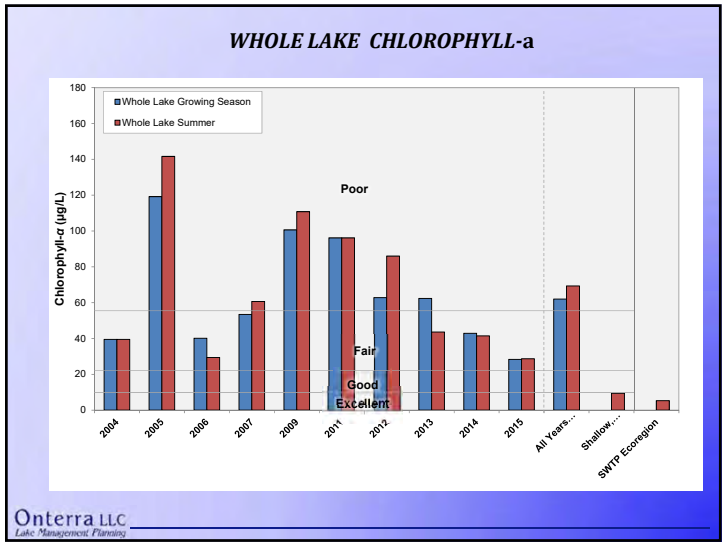
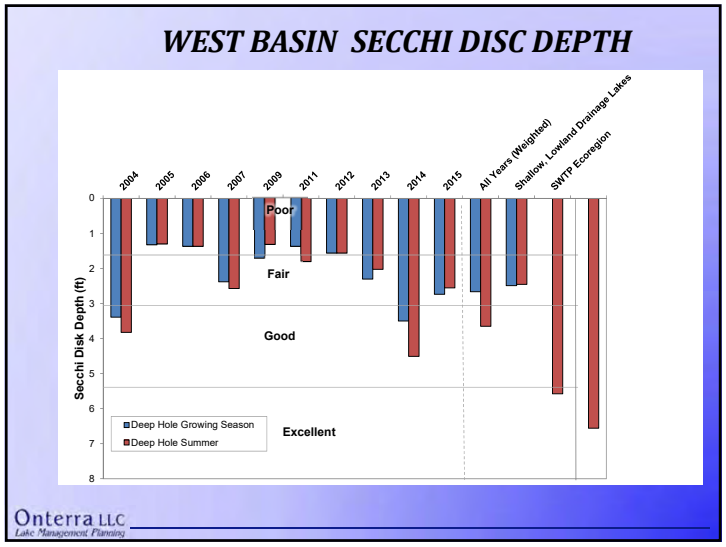
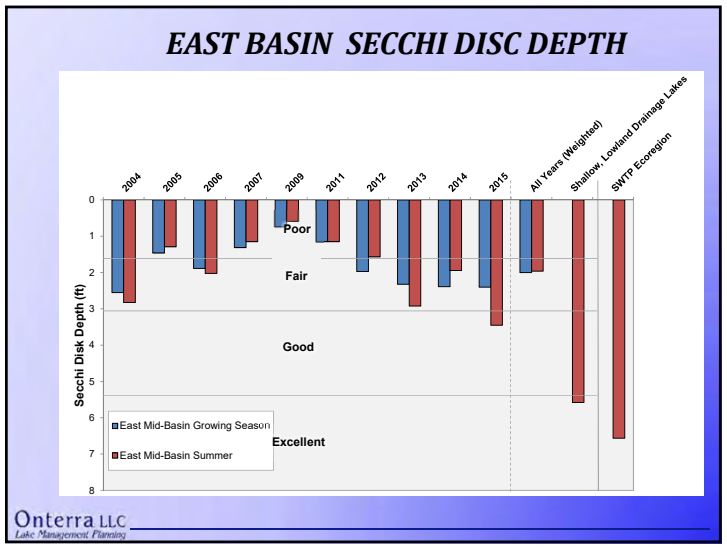
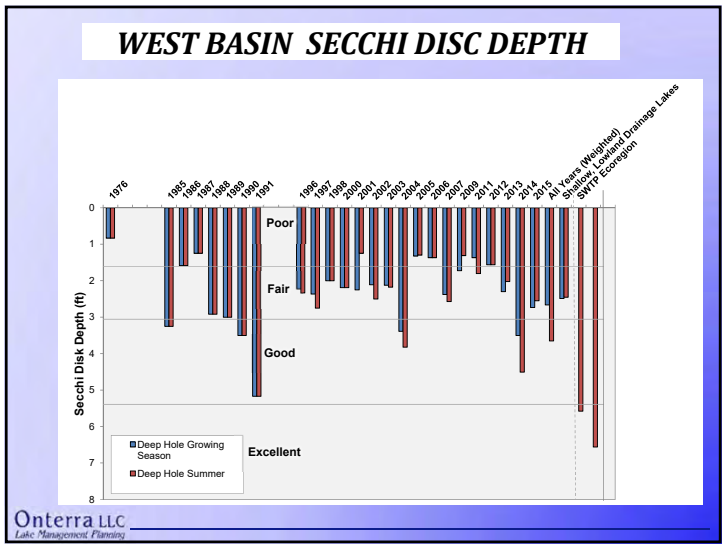

WEST BASIN CHLOROPHYLL-a
Deep Hole Growing Season
Deep Hole Summer
Chlorophyll-a (µg/L)
Poor
Fair
Good
Excellent
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years...
Shallow,...
SWTP Ecoregion
Onterra LLC
Lake Management Planning


EAST BASIN CHLOROPHYLL-a
East Mid-Basin Growing Season
East Mid-Basin Summer
Chlorophyll-a (µg/L)
Poor
Fair
Good
Excellent
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years...
Shallow,...
SWTP Ecoregion
Onterra LLC
Lake Management Planning

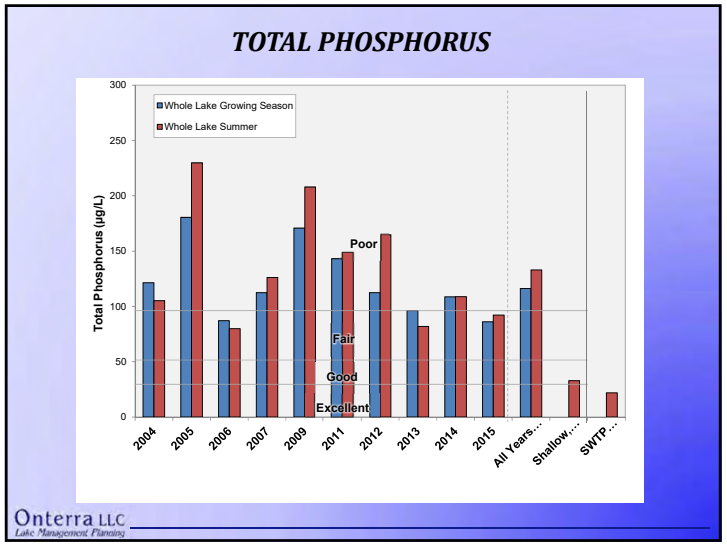

WHOLE LAKE CHLOROPHYLL-a
Whole Lake Growing Season
Whole Lake Summer
Chlorophyll-a (µg/L)
Poor
Fair
Good
Excellent
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years...
Shallow,...
SWTP Ecoregion
Onterra LLC
Lake Management Planning

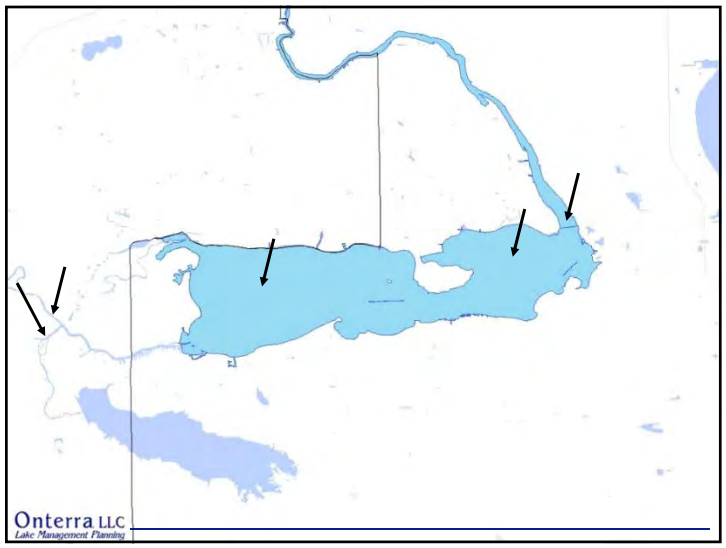

WEST BASIN SECCHI DISC DEPTH
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years (Weighted)
Shallow, Lowland Drainage Lakes
SWTP Ecoregion
Secchi Disk Depth (ft)
Poor
Fair
Good
Excellent
Deep Hole Growing Season
Deep Hole Summer
Onterra LLC
Lake Management Planning

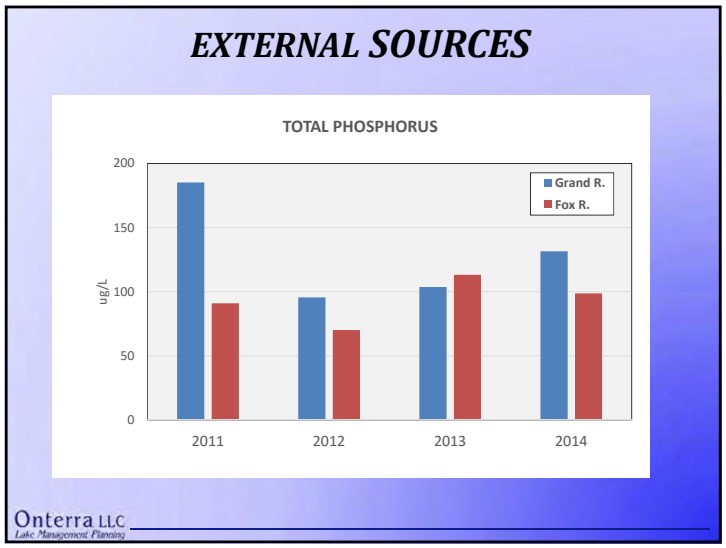

EAST BASIN SECCHI DISC DEPTH
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years (Weighted)
Shallow, Lowland Drainage Lakes
SWTP Ecoregion
Secchi Disk Depth (ft)
Poor
Fair
Good
Excellent
East Mid-Basin Growing Season
East Mid-Basin Summer
Onterra LLC
Lake Management Planning

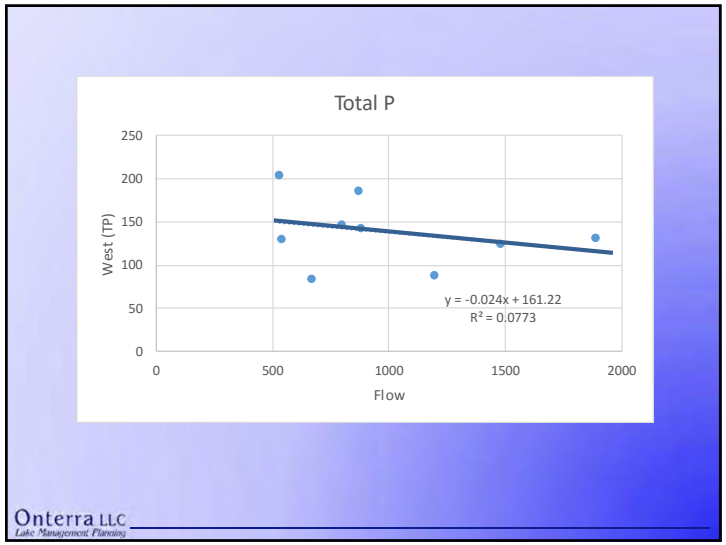

WEST BASIN SECCHI DISC DEPTH
1976
1985
1986
1987
1988
1989
1990
1991
1996
1997
1998
2000
2001
2002
2003
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years (Weighted)
Shallow, Lowland Drainage Lakes
SWTP Ecoregion
Secchi Disk Depth (ft)
Poor
Fair
Good
Excellent
Deep Hole Growing Season
Deep Hole Summer
Onterra LLC
Lake Management Planning


WHY ANNUAL VARIABLITY?


TOTAL PHOSPHORUS
Whole Lake Growing Season
Whole Lake Summer
Total Phosphorus (µg/L)
Poor
Fair
Good
Excellent
2004
2005
2006
2007
2009
2011
2012
2013
2014
2015
All Years...
Shallow,...
SWTP...
Onterra LLC
Lake Management Planning


Onterra LLC
Lake Management Planning


EXTERNAL SOURCES
TOTAL PHOSPHORUS
200
150
100
50
0
ug/l
Grand R.
Fox R.
2011
2012
2013
2014
Onterra LLC
Lake Management Planning


Total P
250
200
150
100
50
0
West (TP)
0
500
1000
1500
2000
Flow
y = -0.024x + 161.22
R² = 0.0773
Onterra LLC
Lake Management Planning

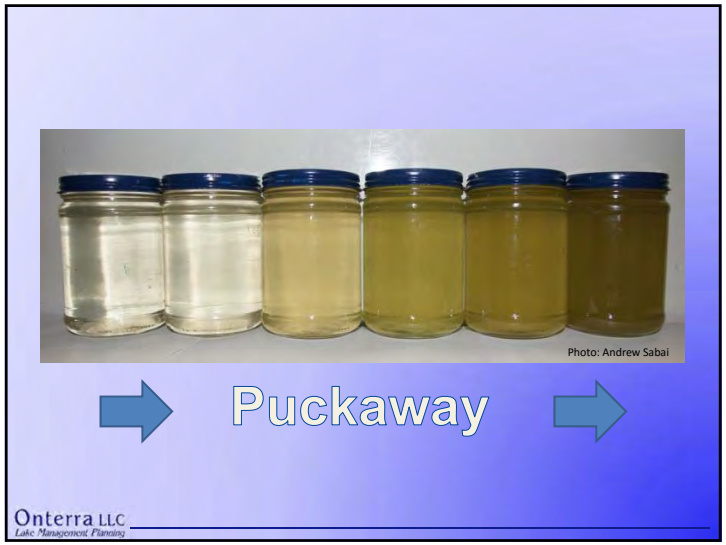
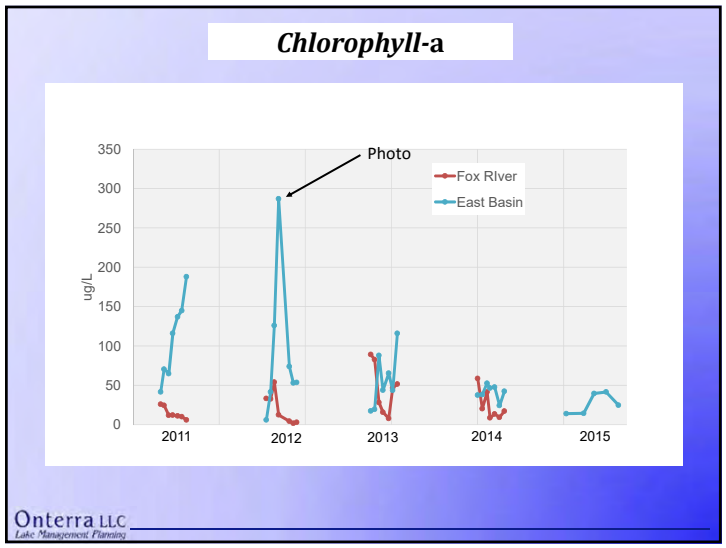
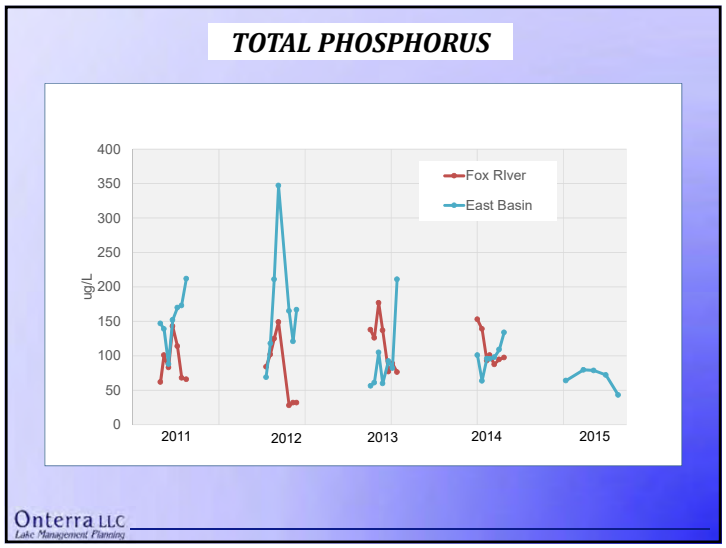
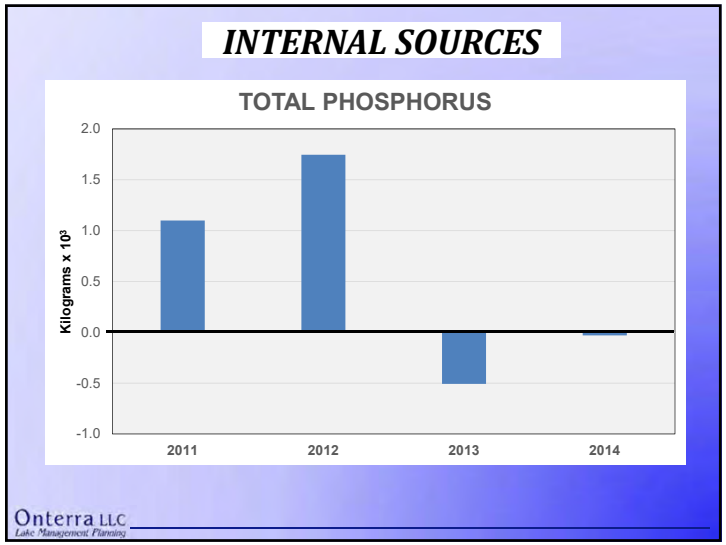
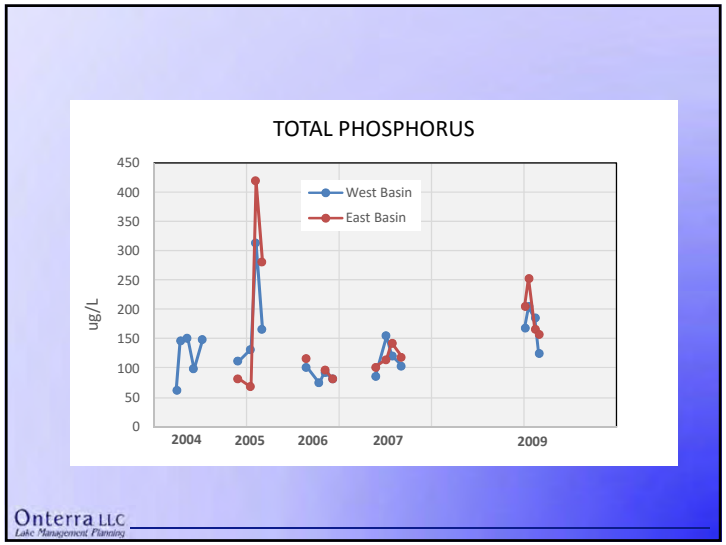


Photo: Andrew Sabai
Puckaway
Onterra LLC
Lake Management Planning


Chlorophyll-a
Photo
Fox RIver
East Basin
ug/L
350
300
250
200
150
100
50
0
2011
2012
2013
2014
2015
Onterra LLC
Lake Management Planning


TOTAL PHOSPHORUS
Fox RIver
East Basin
ug/L
400
350
300
250
200
150
100
50
0
2011
2012
2013
2014
2015
Onterra LLC
Lake Management Planning


INTERNAL SOURCES
TOTAL PHOSPHORUS
Kilograms x 10³
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
2011
2012
2013
2014
Onterra LLC
Lake Management Planning


TOTAL PHOSPHORUS
West Basin
East Basin
ug/L
450
400
350
300
250
200
150
100
50
0
2004
2005
2006
2007
2009
Onterra LLC
Lake Management Planning

WHY DOES INTERNAL LOADING ONLY OCCUR SOME YEARS?

- Largely dependent upon flow into the lake.
- Less flow means water stays in the lake longer thus allowing phosphorus and algae to build up.
- Higher lake levels results in lower flushing rate and more internal loading.

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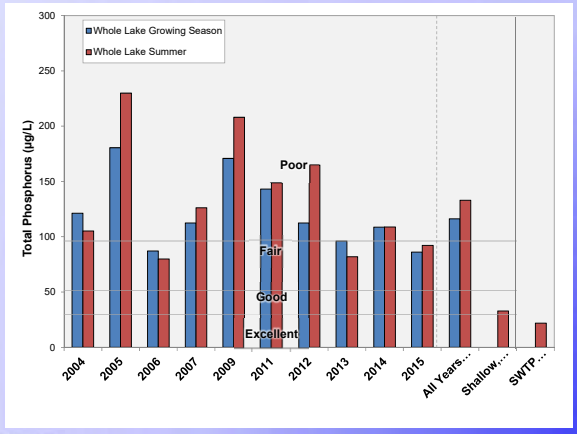

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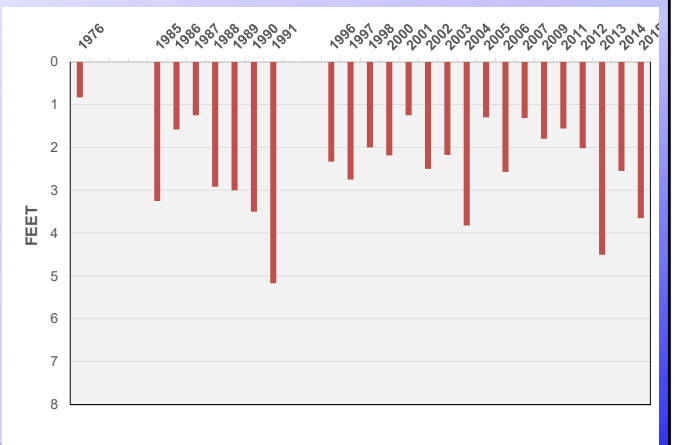
Lake Management Planning

SECCHI DISC DEPTH



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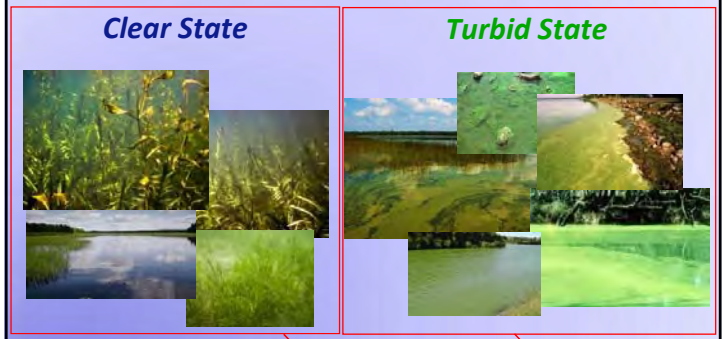
Shallow Lakes are Special



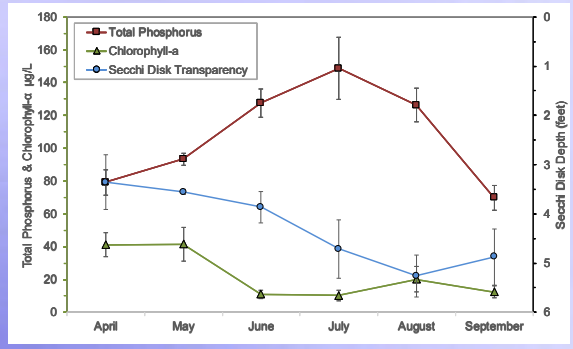
Aquatic Plants are Incredibly Important

Buffalo Lake

Lake Puckaway

Onterra LLC
Lake Management Planning

BUFFALO LAKE



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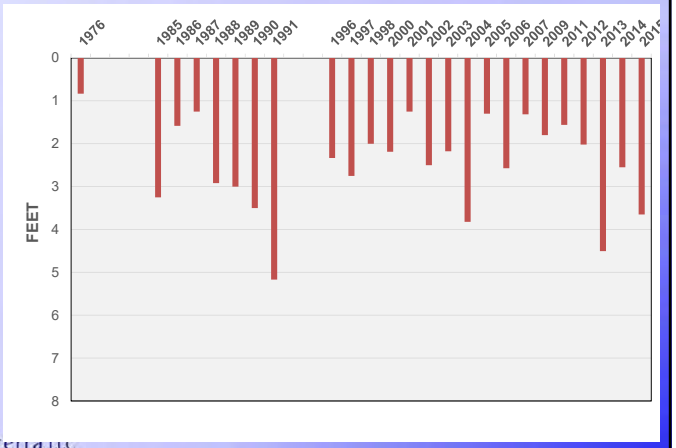
SECCHI DISC DEPTH



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Shallow Lakes are Special

Improving water quality requires:

- Reducing phosphorus input
- Minimizing Benthivorous fish, e.g. **CARP**
- Facilitating plant growth

Water Quality Results Summary

- Lake Puckaway is a complex ecosystem because of shallow depth and inflowing river.
- The lake experiences high annual variability for phosphorus and chlorophyll and thus water clarity
- The highest levels of phosphorus are the result of internal loading during years when summer flow is low.
- During years with increased plant growth water clarity is better.

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Lake Management Planning


QUESTIONS

Total Maximum Daily Loads (TMDLs)

Keith Marquardt
WDNR, Water Resources Management Specialist
Bureau of Water Quality

Lake Puckaway Protection and Rehabilitation District

July 18, 2016

Outline

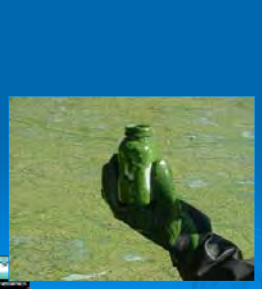
- Background
  - Clean Water Act
  - Impaired waters
  - TMDLs
- TMDL Development in the Upper Fox and Wolf Basins
- Lake Puckaway
- Implementation of TMDLs

Clean Water Act

- Federal Law
  - Established in 1972
  - Amended in 1977
  - Established 303(d) and TMDL in law
- Goal of "fishable, swimmable waters"
- Reliance on NPDES/WPDES process with little early use of TMDL process
- Requires States to identify and list impaired waters

What is an Impaired Water? – 303D List

- Waters that do not meet water quality standards



Water Quality Standards

Designated Uses:

- Fish & Aquatic Life
- Public Health
- Recreation

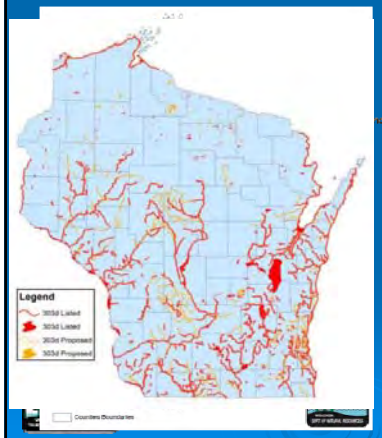
Water Quality Criteria:

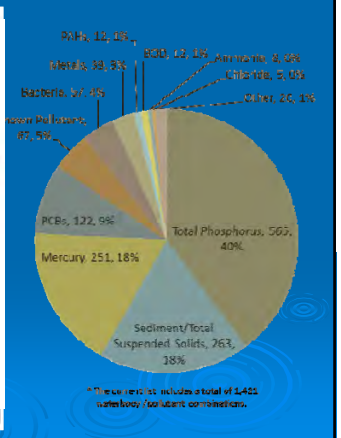
- Numeric: dissolved oxygen, pH, bacteria, toxic substances, phosphorus, etc.
- Narrative: "no objectionable deposits," "substances in concentrations or combinations shall not be harmful to humans, fish, plants, or other aquatic life."

Phosphorus Criteria NR 102.06

- Rivers $_{\text{NR 102.06(3)(a)}}$ = 100 µg/L
- Streams = 75 µg/L
  - All unidirectional flowing waters not in NR 102.06(3)(a)
- Reservoirs
  - Stratified = 30 µg/L
  - Not Stratified = 40 µg/L
- Lakes range from 15-30 µg/L
- Lake Michigan =7 µg/L
- Lake Superior = 5 µg/L
- Exclusions
  - Ephemeral Streams
  - Wetlands
  - Lakes <5 ac

2014 Impaired Waters List





What's the Problem? Phosphorus

What's the Problem?

UWM
toddrexmiller.com/

Question: One (1) pound of phosphorus in a waterbody can produce:

A. one (1) pound of algae

B. 300 to 500 pounds of algae (wet weight)

C. 60 to 100 pounds of algae (dry weight)

D. 50 to 100 pounds of algae (wet weight)

Answer: One (1) pound of phosphorus in a waterbody can produce:

A. one (1) pound of algae

B. 300 to 500 pounds of algae (wet weight)

C. 60 to 100 pounds of algae (dry weight)

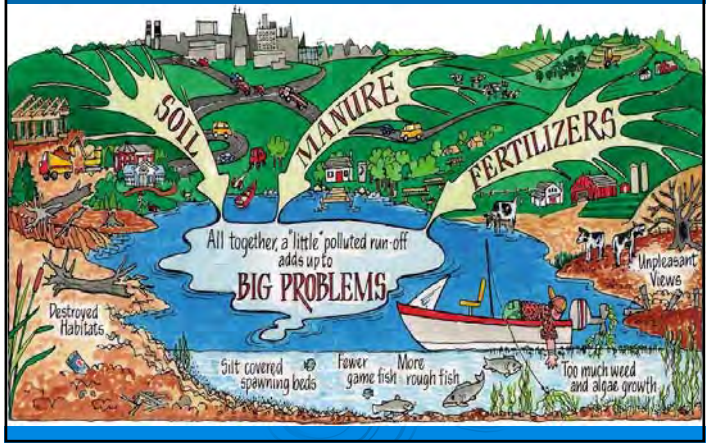
D. 50 to 100 pounds of algae (wet weight)

Sidenote 2 : Phosphorus

- Nonmetal, +15
- DNA, RNA, cell
- Uses: fertilizers,…
- Limited Supplies? Calcium phosphate in rock--------fertilizer

What's the Problem? TSS

Sources of TSS & P



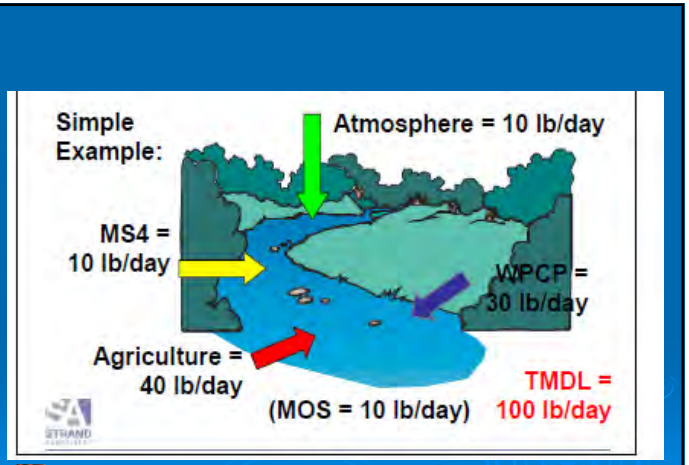
What are TMDLs?

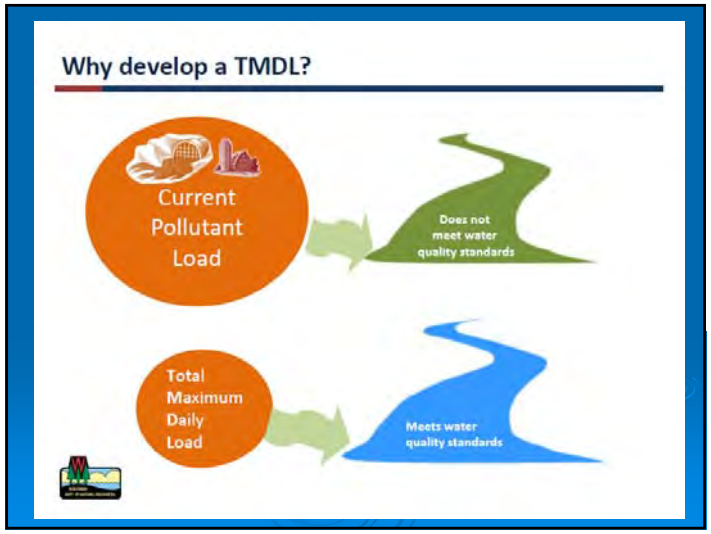
Total Maximum Daily Load

The amount of a pollutant a waterbody can receive and still meet water quality standards

Total Maximum Daily Load =

Load Allocation + Waste Load Allocation + Margin of Safety





Fox & Wolf TMDLs

Upper Fox and Wolf River Basins (UFW) TMDL Development

Project Objectives

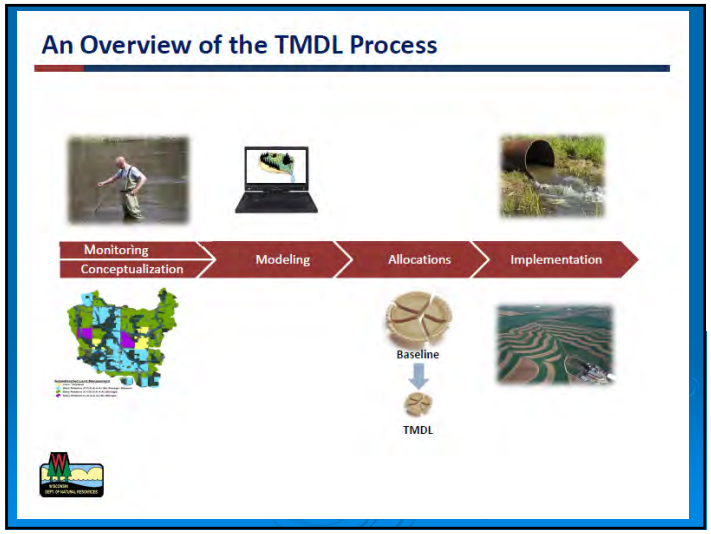
- Address eutrophication, degraded habitat, low DO, and sedimentation impairments within the Upper Fox and Wolf basins (UFWB).
- Develop total maximum daily loads (TMDLs) for waters impaired by total phosphorus (TP) or total suspended solids (TSS).
- Develop an implementation plan to facilitate restoration efforts.

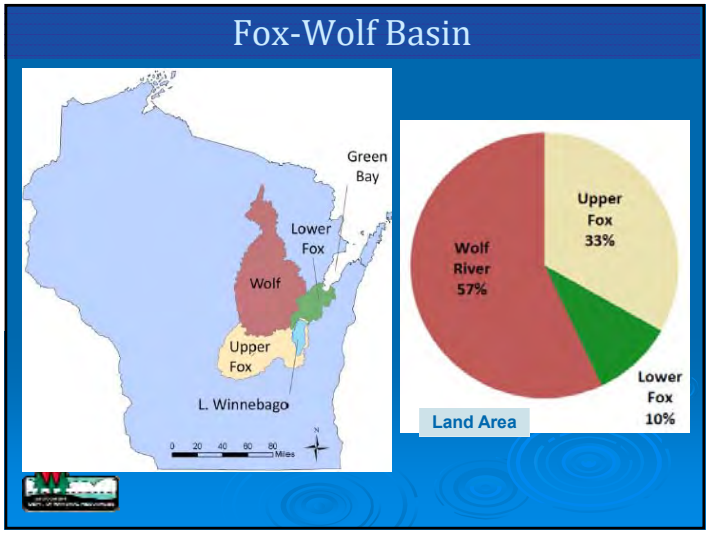
Upper Fox – Wolf TMDL

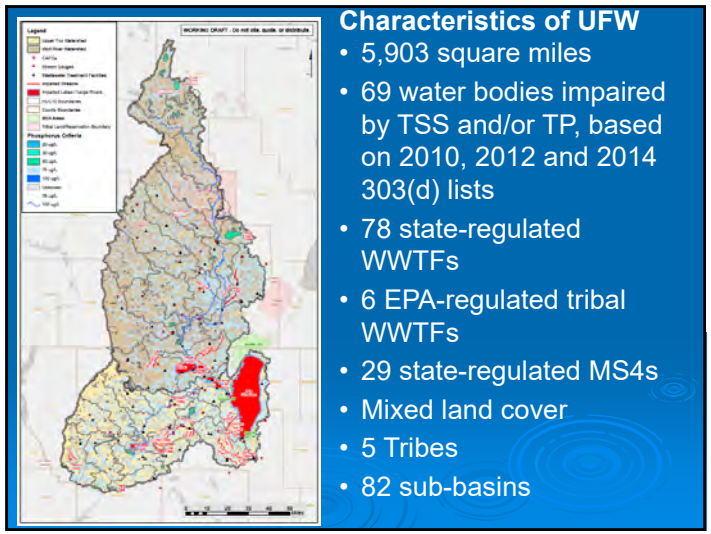
- Funded by EPA through GLRI funding. CADMUS, Inc. contracted by EPA to develop the TMDL. Anticipated completion date of 2017.
- Includes Lake Winnebago and the other "pool" lakes in the system. USGS performing the pool lake modeling. CADMUS the remaining lakes.

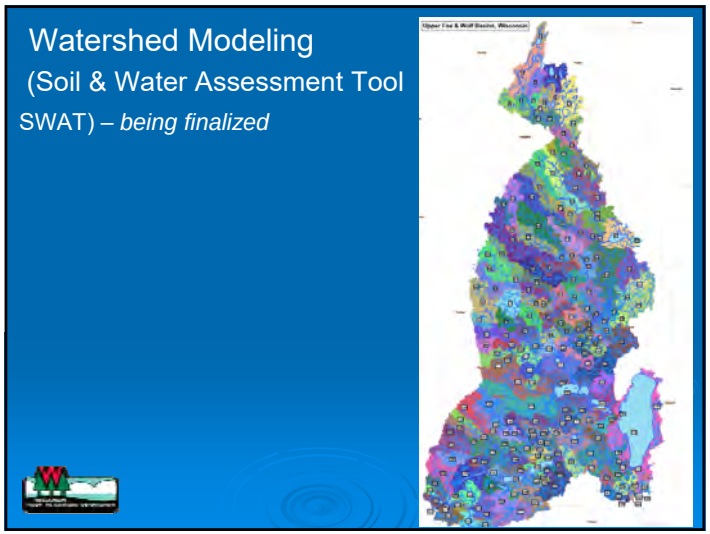
CADMUS

USGS science for a changing world


An Overview of the TMDL Process
Monitoring
Conceptualization
Modeling
Allocations
Implementation
Baseline
TMDL

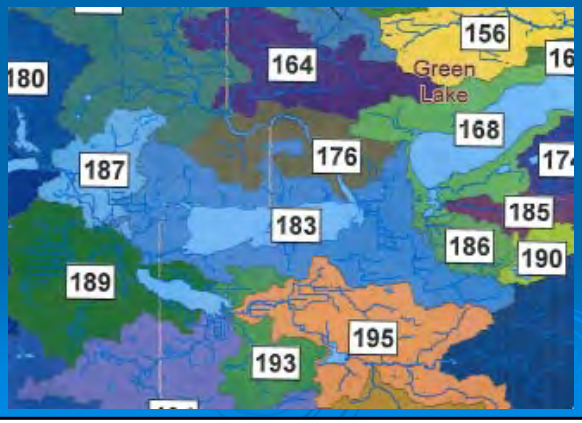

Fox-Wolf Basin
Green Bay
Lower Fox
Wolf
Upper Fox
L. Winnebago
Upper Fox 33%
Wolf River 57%
Lower Fox 10%
Land Area


Characteristics of UFW
• 5,903 square miles
• 69 water bodies impaired by TSS and/or TP, based on 2010, 2012 and 2014 303(d) lists
• 78 state-regulated WWTFs
• 6 EPA-regulated tribal WWTFs
• 29 state-regulated MS4s
• Mixed land cover
• 5 Tribes
• 82 sub-basins


Watershed Modeling
(Soil & Water Assessment Tool
SWAT) – being finalized

SWAT – watershed model

Preliminary

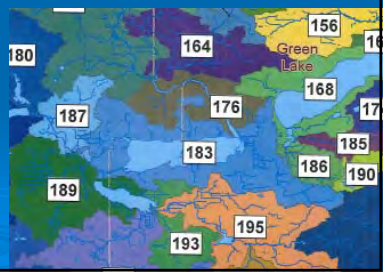


SWAT – watershed model

Preliminary - existing loads for Total Phosphorus
Subbasin 183

Ag = 6,844 acres (34%); 3,066 lbs P/yr (67%); (0.45 lbsP/ac/yr)
MS4 = 0
Nonreg urban = 893 acres (4%); 186 lbsP/yr (4%); (0.21 lbsP/ac/y
Forested = 12,239 acres (61%); 1,295 lbsP/yr (28%); (0.11 lbsP/ac
Point Sources = 0

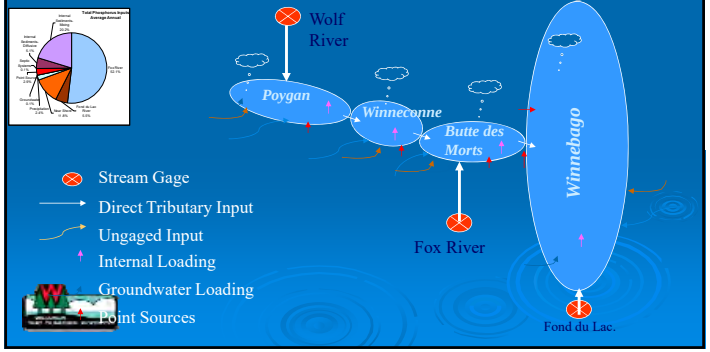
Total = 19,976 acres;
4,546 lbs P /yr

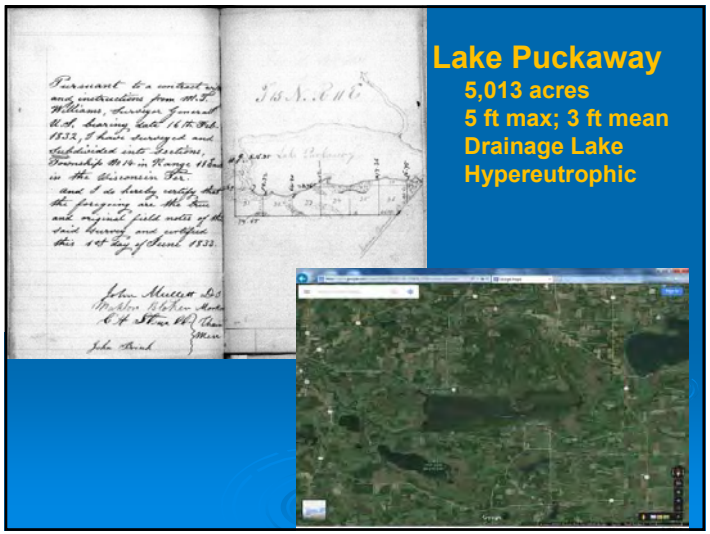


Schematic for the Eutrophication Model Bathtub (Simulations of Winnebago Pools)

IN PROGRESS

Phosphorus loading





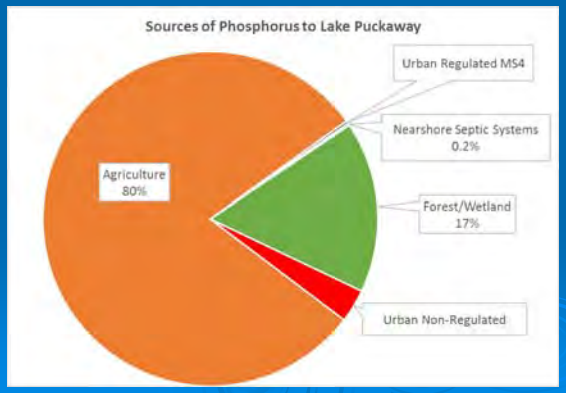
Lake Puckaway

5,013 acres
5 ft max; 3 ft mean
Drainage Lake
Hypereutrophic

Wisconsin Lake Modeling Suite

WiLMS – lake model

Preliminary



WiLMS – lake model

Preliminary

Average growing season TP ~ 130 ug/l (criteria 40 ug/l)

WiLMS predicting a 75% reduction of sources

Anticipated Project Schedule

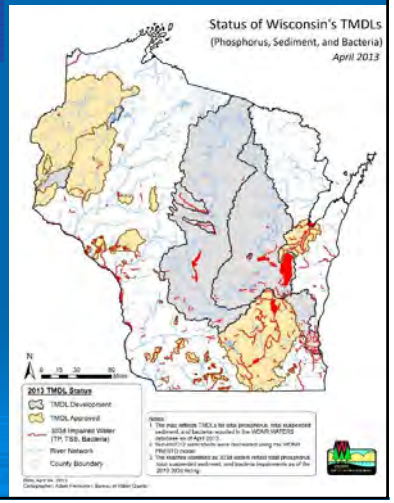
- Watershed Modeling (SWAT) – *being finalized*
- Lake Modeling – *current*
- Stakeholder meeting – June 2016
- Load Allocations - *winter 2016*
- TMDL Report – *summer 2017*

Upper Fox & Wolf Basin TMDL webpage

http://dnr.wi.gov/topic/tmdls/foxwolf/

Update on TMDL Development

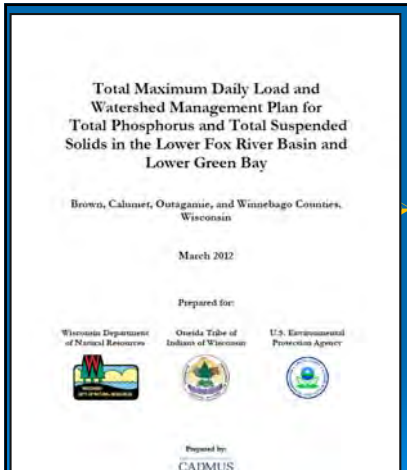
- WI has several TMDLs currently under development.
- These TMDLs are addressing phosphorus, TSS, and in one case bacteria.
- TMDL development a combination of 3rd party, DNR led, or EPA funded.



Fox and Wolf Basins

IMPLEMENTATION of TMDLs

Lower Fox River Basin



Total Maximum Daily Load and Watershed Management Plan for Total Phosphorus and Total Suspended Solids in the Lower Fox River Basin and Lower Green Bay

Brown, Calumet, Outagamie, and Winnebago Counties, Wisconsin

March 2012

Prepared for:

Wisconsin Department of Natural Resources | Oneida Tribe of Indians of Wisconsin | U.S. Environmental Protection Agency

Prepared by:
CADMUS

Lower Fox TMDL Development

EPA approved TMDLs in May 2012

- Total Phosphorus
- Total Suspended Solids

Figure 21. Sub-basins in the Lower Fox River Basin

Lower Fox Reduction Goals

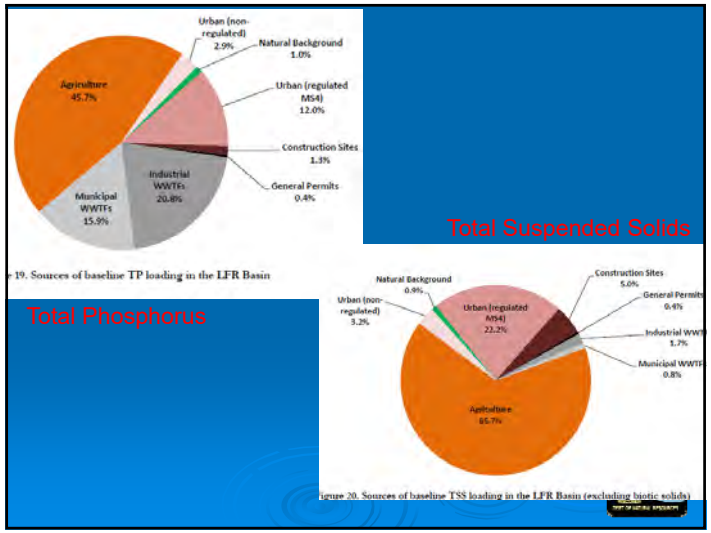
Based on Cadmus TMDL Report

TP = 549,700 lbs/yr -224,300 lbs/yr =

325,400 lbs/yr or 59%

TSS = 176,000,000 lbs/yr - 79,500,000 lbs/yr =

96,900,000lbs/yr or 55%



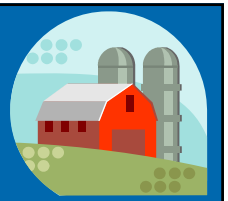
Point Sources (WLA) – Implementation of TMDLs

WWTFs (Industrial & Municipal) = WPDES permit

MS4s = GP WPDES permit

CAFOs = WPDES permit

Non-Point Sources (LA)



Agriculture

Regulations: NR151 Etc…..

Voluntary Practices

Partners: DATCP, LCDs, Ag Consultants, FSA, NRCS, DNR

Options:

- BMPs - structural and nonstructural
- *Water Quality Trading
- *Adaptive Management

IMPLEMENTATION of TMDLs

QUESTIONS

Contact Information

Keith Marquardt
WDNR
625 E. County Road Y, Suite 700
Oshkosh, WI 54901

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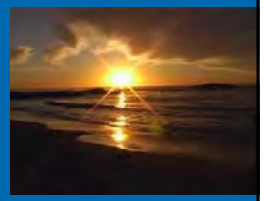


http://dnr.wi.gov

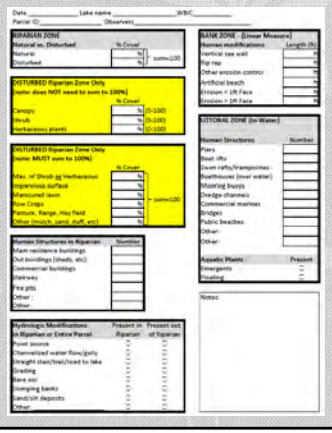
PUCKAWAY SHORELINE SURVEY

Green Lake Land Conservation

Golden Sands Resource Conservation and Development

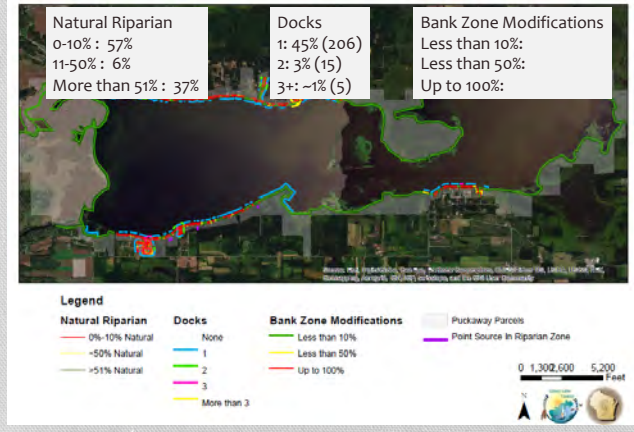
Data Collection – Summer 2015

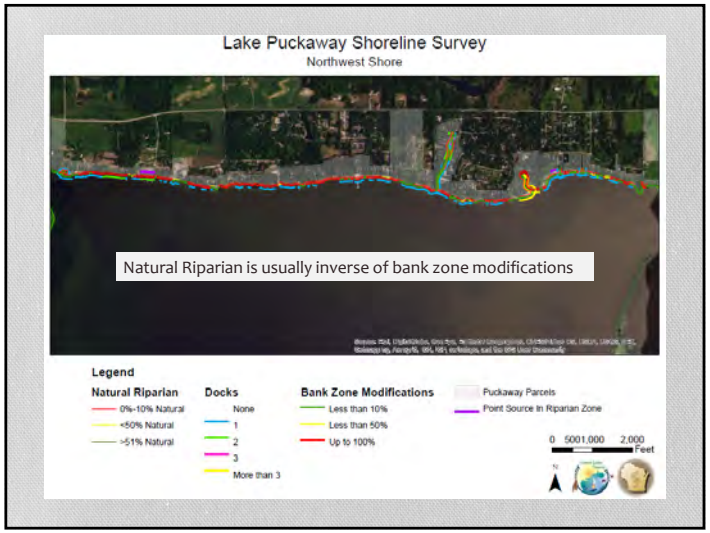
- Wisconsin Department of Natural Resources
- All lakes in Green Lake County
- 450+ parcels on Puckaway

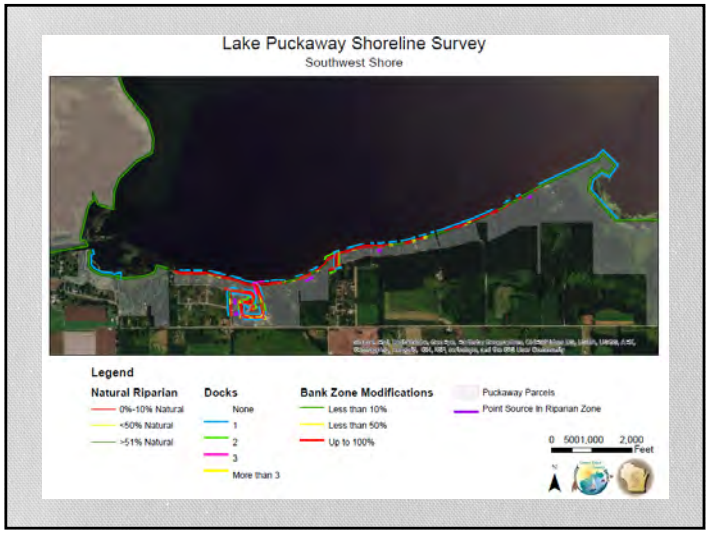


Lake Puckaway Shoreline Survey

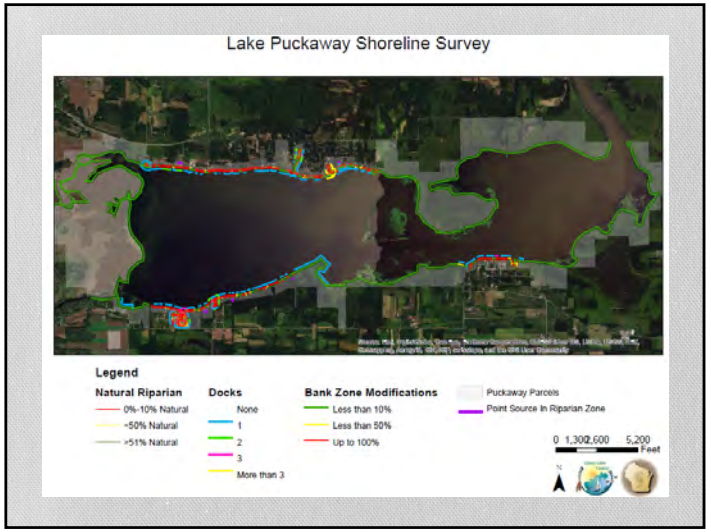
Lake Puckaway Shoreline Survey

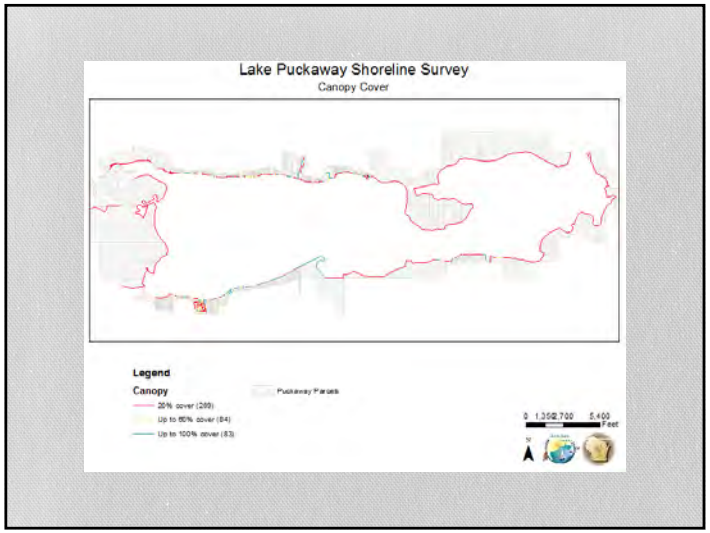



Lake Puckaway Shoreline Survey
Northwest Shore
Natural Riparian is usually inverse of bank zone modifications
Legend
Natural Riparian
0%-10% Natural
<50% Natural
>51% Natural
Docks
None
1
2
3
More than 3
Bank Zone Modifications
Less than 10%
Less than 50%
Up to 100%
Puckaway Parcels
Point Source in Riparian Zone
0 500 1,000 2,000
Feet


Lake Puckaway Shoreline Survey
Southwest Shore
Legend
Natural Riparian
0%-10% Natural
<50% Natural
>51% Natural
Docks
None
1
2
3
More than 3
Bank Zone Modifications
Less than 10%
Less than 50%
Up to 100%
Puckaway Parcels
Point Source in Riparian Zone
0 500 1,000 2,000
Feet


Lake Puckaway Shoreline Survey
Southeast Shore
Legend
Natural Riparian
0%-10% Natural
<50% Natural
>51% Natural
Docks
None
1
2
3
More than 3
Bank Zone Modifications
Less than 10%
Less than 50%
Up to 100%
Puckaway Parcels
Point Source in Riparian Zone
0 500 1,000 2,000
Feet


Lake Puckaway Shoreline Survey
Legend
Natural Riparian
0%-10% Natural
<50% Natural
>51% Natural
Docks
None
1
2
3
More than 3
Bank Zone Modifications
Less than 10%
Less than 50%
Up to 100%
Puckaway Parcels
Point Source in Riparian Zone
0 1,300 2,600 5,200
Feet



Main Points

- Of all parcels, 57% have less than 10% natural shoreline in the first 35'
- Plant cover within these human-influenced parcels is sparse
- 37% of the lake has no human-influence on the riparian zone
- Most parcels on the lake do no have a dock at all (230 of 456, or 50%), with another 45% (206 parcels) having just one dock

Press Release

For Immediate Release

Lake Puckaway Holding Final Information Meeting Before Draft Management Plan is Completed for Public Review

Green Lake & Marquette Counties, WI, August 1, 2016. Since the beginning of June, the Lake Puckaway Protection and Rehabilitation District has held five informational and planning meetings regarding the development of Lake Puckaway's updated management plan. Agency experts and scientists from Onterra, LLC, the district's lake management consultant, have presented current and historical data about Lake Puckaway's ecology and condition. The presentation topics have included Puckaway's fishery, its aquatic plant community, the characteristics and quality of the lake's water, the condition of its shorelines, and the impacts of the drainage basin that provides the lake with its water. At each meeting, questions were answered and comments recorded from the Lake Puckaway Planning Committee and the general public.

Tim Hoyman, who is leading the project for Onterra, LLC out of De Pere, WI said, "The intent of the meetings has been to make sure that the Planning Committee and the general public in attendance are using the same information and data to understand the actual condition of Lake Puckaway." "A common theme has come forth in all the information presented – water clarity, the lake's fishery, and habitat value can be all be improved with a better aquatic plant population." "For instance, having more submergent plants within the lake would likely increase the panfish population within the lake." "Panfish have been shown to feed heavily on carp fry, which in turn would reduce the carp population in the lake." he continued.

The final informational and planning meeting before the first draft of the management plan is created, will be held on Monday, August 8th at the Marquette Village Hall (127 E. 4th St, Marquette, WI) starting at 6:30pm. The evening will begin with a presentation summarizing the information delivered during the previous meetings. Management alternative aimed at improving Lake Puckaway's ecological health will also be discussed, including water level management and in-lake habitat restoration.

"Overall, this meeting will tie together the information we have heard at the other meetings and distill it down to how Lake Puckaway can be improved from its water quality to its fishery.", Hoyman said. "We will discuss the challenges the lake faces now and the hurdles that will come about when implementing any kind of a management plan.", he continued. "We know that Lake Puckaway has some complicated issues, so there are no silver bullets that will make the lake better; it is going to take an integrated approach using multiple techniques to make a positive change.", Hoyman finshed.

Fetch Modeling &Sediment Resuspension, Summary/Conclusions, Water Level Management

August 8, 2016
Marquette Village Hall

The fifth of six meetings scheduled for the update to the Lake Puckaway Management Plan was held on August 8, 2016 at 6:30 pm at the Marquette Village Hall. The purpose of this meeting was to present information on fetch modeling and sediment resuspension, provide a summary of previous information and explain options for water level management. Discussion was held after the presentations to make sure the planning committee and those present clearly understood the data and there was agreement on what the information meant.

Present were the following members of the Planning Committee:
Mick Masters, Jeff Kimbur, Kurt McCulloch, Randy Schmidt, Paul Gettelman, Brian Zimmerman, and Gene Weber.

In addition, present were the night's speakers Tim Hoyman and Paul Garrison - Onterra, LLC and 34 members of the public. Linda Stoll – L Stoll Consulting served as meeting facilitator.

Fetch Modeling and Sediment Resuspension
Tim Hoyman began with a presentation on fetch modeling and how this is used to better understand sediment resuspension caused by wind-induced wave action. Fetch is the distance wind blows over open water. Greater fetch leads to longer wavelengths with the same wind speed. When a wave moves into water one-half its wavelength or less in depth – resuspension can occur. Tim provided maps showing the impact various wind speeds and wind directions have on the resuspension of sediments in the lake. These can be found in the PowerPoint presentation on the Lake District website. These calculations suggest that at times, 35% of the lake bottom is open to sediment resuspension 1/3 of the time during open water. Tim ran the model using the increased size of the dredge banks found in 1937 and the results indicated a reduction in resuspension to 28% of lake bottom 1/3 of the time. Besides restoring the original banks, further reduction may be achieved by changing the angle of some bank sections to better match predominant wind directions. Now that it is set up, the model can be ran on additional scenarios to determine the best configuration of constructed islands and reconstructed dredge banks to reduce sediment resuspension and provide additional habitat.

Summary
Tim provided a review of all of the information presented to date:
Aquatic Plants – Based on a maximum depth for the lake of approximately 7.5 feet, the entire lake bottom should be available for plant growth. Currently only a small portion supports aquatic plants (13% of the lake area). Puckaway has good native plants and the seedbed seems to be intact however the plants are not plentiful. The lake has the potential for a much healthier plant population. There are two types of shallow lakes – Clear and Turbid. Clear lakes have lots of vascular plants while turbid lakes have few plants and lots of algae. Lake Puckaway is classified as turbid lake. Enhancing the plant population will lead to less algae and clearer water.

Water Quality – Lake Puckaway is considered impaired for sediment/suspended solids and for total phosphorus (an excessive amount of both). Note that phosphorus is the limiting nutrient for

algae growth – increased phosphorus leads to increased algae. The lake experiences high annual variability for phosphorus and chlorophyll (a surrogate measurement for algae) and thus water clarity. The highest levels of phosphorus are the result of internal nutrient loading when phosphorus that is normally bound in the sediments is recycled into the water column and used by algae. During years with increased plant growth, water quality is better. Wind, flow and carp all add to water quality issues. These issues travel downstream to the rest of the river system.

Fisheries – Lake Puckaway has a strong fishery. Pike and walleye are good now, but biologists believe their numbers and size can be greater with habitat improvement. Panfish and bass populations may be on the decline. Increased aquatic habitat would benefit the fishery. Pike and perch use emergent plants as spawning substrate. Increase submergent plants would lead to increased panfish population which would likely lead to less carp. Panfish predation on carp fry has been documented in other systems.

Improving Aquatic Habitat - In order to improve aquatic habitat, water levels would need to more closely mimic natural conditions on the river system. The dam prevents natural fluctuations from occurring. Water level management with occasional reductions in water level during the growing season would establish additional aquatic plant habitat. Reconstruction of dredge banks and creation of additional islands would reduce fetch and add niches for emergent and floating-leaf species. An integrated approach will be required to improve the lake as no single technique would lead to better aquatic habitat on its own.

Water Level Management

Tim began the discussion on water level management with an explanation of how to determine the starting lake level. The most benefit would be gained by having water levels lowered by early to mid-July. Maps were provided that depicted what the lake would look like at various levels of reduction and what could be predicted for plant growth. These can be found in the PowerPoint presentation on the website. The ability to reduce lake levels is dependent on rainfall in the watershed. Multiple studies on Mississippi pool waters have shown that reducing water levels to expose sediments and deeper areas to light penetration for two consecutive growing seasons can lead to aquatic plant establishment that will thrive for up to 7 years. In the first year, annual plants establish and in the second, perennial plants establish.

A suggested DRAFT strategy for Lake Puckaway is as follows:

Year 1 – begin reducing water levels around June 15th by opening lock gates which would remain open through September. A two to three-foot reduction in water levels would be expected.

Year 2 - begin reducing water levels around June 15th by opening lock gates which would remain open through September. A two to three-foot reduction in water levels would be expected.

Reductions would be attempted in two consecutive years. If a suitable reduction is not anticipated to occur in either of those two years, then during the next two years, no reductions would be attempted. A reduction of 1.5 feet or more is considered adequate for a reduction in the following year. As an example, if the discharge at the USGS Princeton Dam station is greater than 1,250 cfs on June 30 of either the first attempt or second attempt year, the attempt would be abandoned.

Construction of the dam will result in low water levels for two years and will act as a test for this strategy. The lake will be evaluated before and after construction to better understand how to go forward. If successful, water level management would likely occur two years in a decade. The most recent information suggests that the dam construction would not begin until 2019 or 2020. The WDNR has the project in their proposed 2017-2019 biennium budget. That budget will be considered by state legislature likely starting this coming fall.

Planning Committee Comments and Questions:

1. *What would be the impact of extending the dredge banks in a north-south direction as well as east-west?*

   This could increase the beneficial impact of these structures. The fetch information will be used to determine the best design for the dredge banks. The examples shown in the presentation are just that, examples. The Shallow Lake Management Team being headed by Ted Johnson, WDNR would work to define applicable in-lake changes.

2. *Is it doable to dredge and create islands?*

   Yes, we could put dredged materials into sediment bags to create the islands. This has been done elsewhere. It would put to good use materials taken from the lake. We would need to explore the cost for doing this vs other methods. Again, the Shallow Lake Management Team would develop the plans.

3. *How does Puckaway and Buffalo Lakes compare when it comes to phosphorus?*

   Buffalo has a strong plant community and is a sink for phosphorus. Water has less phosphorus leaving that lake than coming into it. Puckaway is the opposite – more phosphorus leaves the lake than enters it in many years. The Buffalo Lake drawdown resulted in the replacement of invasive plants with more native plants. Puckaway does not have a serious invasive plant problem but it lacks plants in general, so its management is different than Buffalo Lake's management.

4. *Would the TMDL require drawdowns?*

   It is a tool in the toolbox and could be used to increase plant growth as a means of reducing phosphorus in the system. The proposed fixed-crest dam will have an environmental impact and will need a strategy to reduce any negative impacts.

5. *The current dam is over 150 years old. The water quality appeared to be good for almost 100 years. Was the carp responsible for the decline?*

   The carp had an impact but historical information suggests that plants were starting to decline much earlier. It takes a long time to show any impact.

6. *By lowering water levels, don't we expose more area to the impact of resuspension?*

   Yes, we do but studies show that the benefits outweigh the impact of this action.

7. *Are the muck farms an issue?*

   Yes, they are, but their impact has been included in the watershed modeling completed by Onterra and the modeling completed as a part of the TMDL.

8. *Why did the bulrushes that were in front of my house disappear?*

We do not have enough information to answer that for a specific area on the lake; however, other lakes have seen slow declines in emergent populations with steady-water levels.

9. *Comment: The west side of the lake is not the best for plants. The east side is better. The seed source is still there.*
10. *Does the topography impact the fetch?*

    It can if there are hills or mountains. The area around Lake Puckaway is very flat so has little impact.
11. *What if the first set of drawdowns doesn't work, will we keep doing them?*

    If real data shows little to no impact, then we will stop and develop a different strategy. Restoring the dredge banks and creating islands should help.
12. *What about phosphorus coming from upstream marshes?*

    This has been taken into account in the watershed model.
13. *Comment: The two years of draw down for dam construction will begin the "drawdown" cycle. High water may cause delay in this process.*
14. *Where is most of the phosphorus coming from in the watershed? Is it from agriculture?*

    In the Upper Fox River, yes, it is from agriculture. The TMDL will take this into account and provide ideas for reductions.
15. *Where does the phosphorus originally come from?*

    Phosphorus occurs naturally but humans accelerate its loading into a water system.
16. *Is the June 15th a set day?*

    It is an approximate day and will depend on water flow and fish spawning.
17. *Why spend money on a dam if you are just going to leave the lock gates open?*

    The lock gates would only be open for the growing season for 2yrs in every 10. The rest of the time they would function normally.
18. *What is the impact of the drawdown on the fish?*

    There will be some impact but the increased habitat will help the recovery. The lake is part of a river system that can feed fish back into the lake so it will not be like a stand-alone lake that would have to be restocked. Also, even during a drawdown, the lake would still have a great deal of water in it. The fish will be monitored as part of the evaluation of the impact of water-level management.
19. *How do we get boats out during drawdown?*

    Part of the overall lake plan could include dredging in areas to help with lake access. These materials could be used in the dredge banks and in island construction.
20. *What will happen for lake management while we are waiting for the dam?*

    We will continue with the current strategy of boards placement on the dam.

21. *What is the economic impact of the drawdown?*

    We don't know the exact numbers but we know that this is a big thing. The lake is unhealthy and that has an economic impact as well. It's not like nothing has been tried to correct lake issues. It just hasn't been enough. It will take big steps to fix this problem.

22. *Will all of these studies still be good if we don't start the dam until 2020?*

    Yes, the information will still help us. No matter when the dam is started, we will need to continue monitoring – before, during and after.

Written Questions:

No written questions were received.

Next meeting will be September 26 and will consist of the presentation of the draft lake management plan.

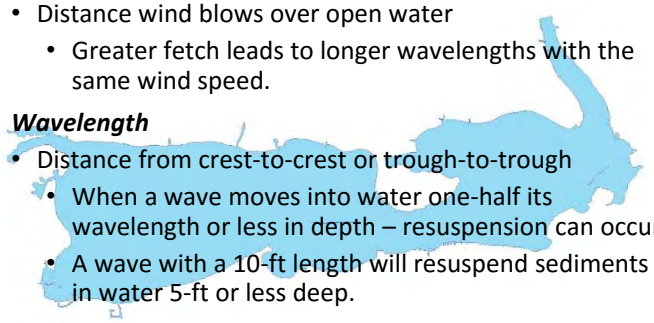
Fetch Modeling

Effective Fetch

- Distance wind blows over open water
  - Greater fetch leads to longer wavelengths with the same wind speed.

Wavelength

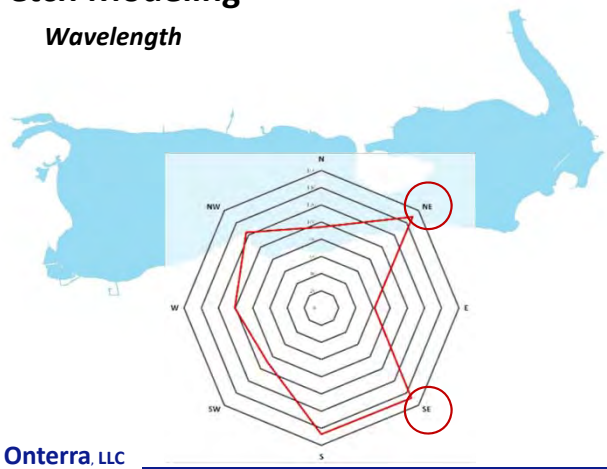
- Distance from crest-to-crest or trough-to-trough
  - When a wave moves into water one-half its wavelength or less in depth – resuspension can occur
  - A wave with a 10-ft length will resuspend sediments in water 5-ft or less deep.



Onterra, LLC
Lake Management Planning

Fetch Modeling

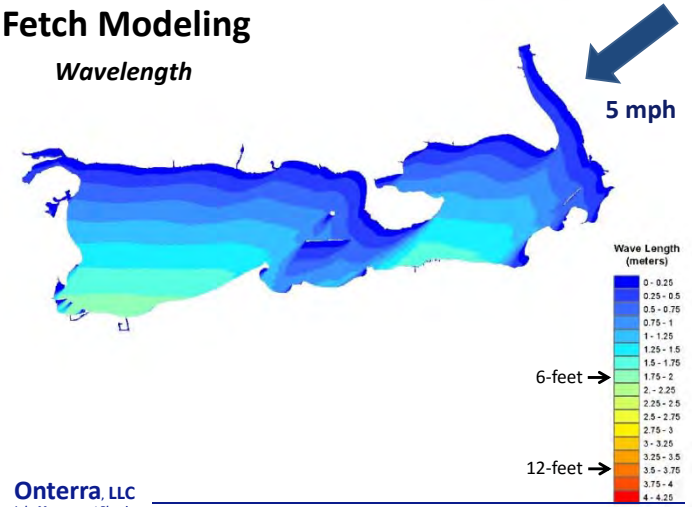
Wavelength



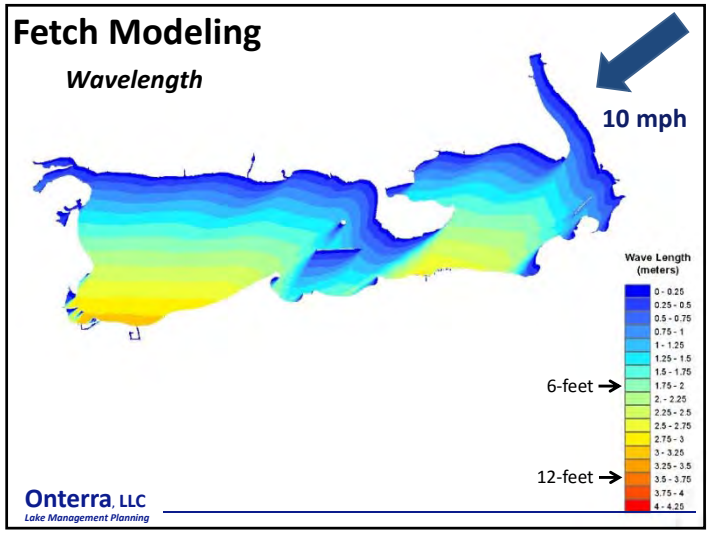
Onterra, LLC
Lake Management Planning

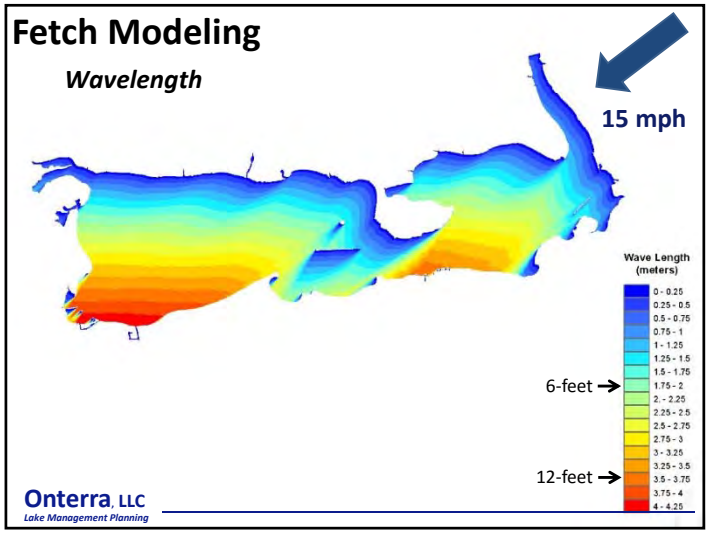
Fetch Modeling

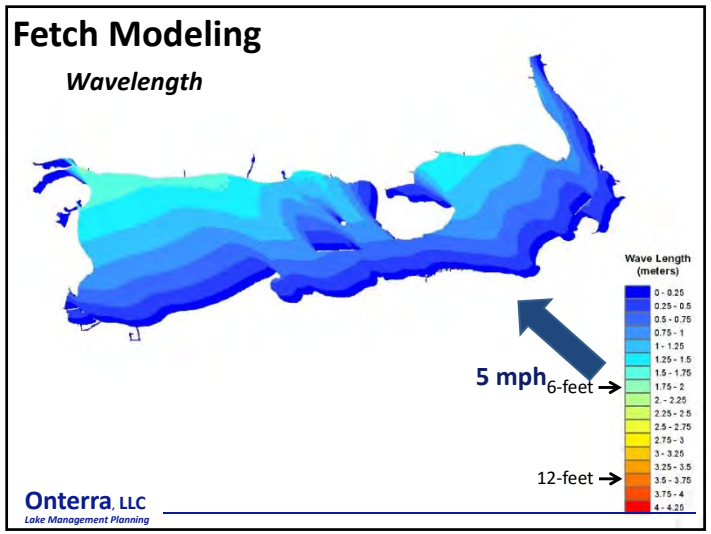
Wavelength

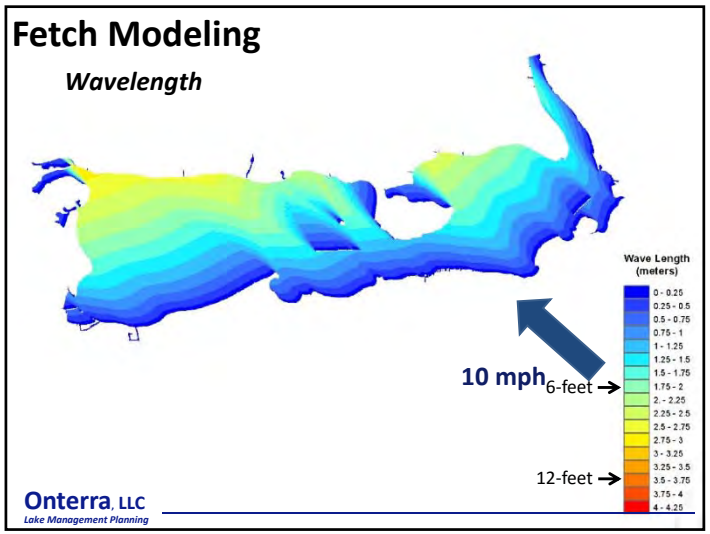


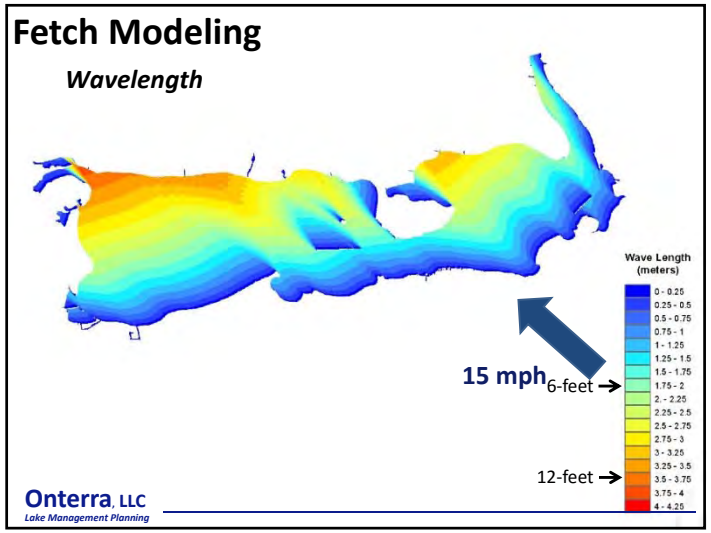
Onterra, LLC
Lake Management Planning

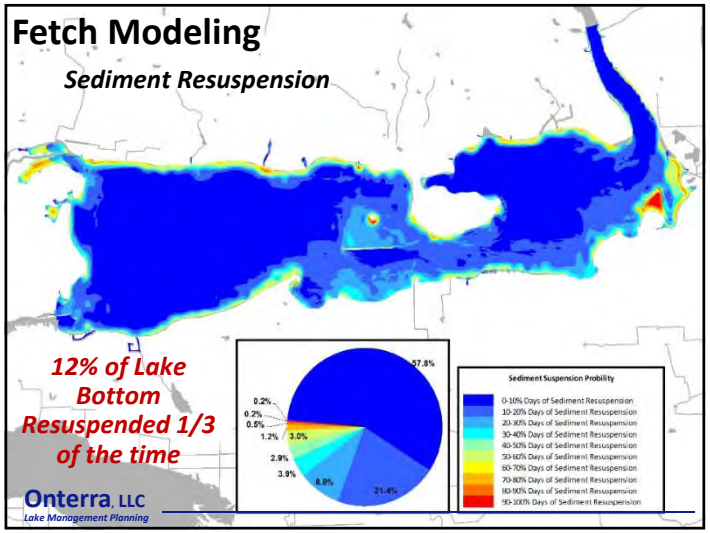

Fetch Modeling
Wavelength
10 mph
Wave Length (meters)
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2. - 2.25
2.25 - 2.5
2.5 - 2.75
2.75 - 3
3 - 3.25
3.25 - 3.5
3.5 - 3.75
3.75 - 4
4 - 4.25
6-feet
12-feet
Onterra, LLC
Lake Management Planning

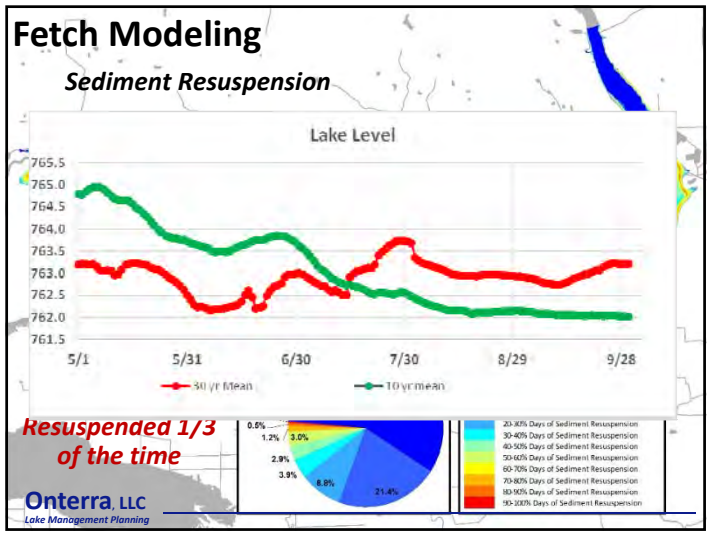

Fetch Modeling
Wavelength
15 mph
Wave Length (meters)
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2. - 2.25
2.25 - 2.5
2.5 - 2.75
2.75 - 3
3 - 3.25
3.25 - 3.5
3.5 - 3.75
3.75 - 4
4 - 4.25
6-feet
12-feet
Onterra, LLC
Lake Management Planning

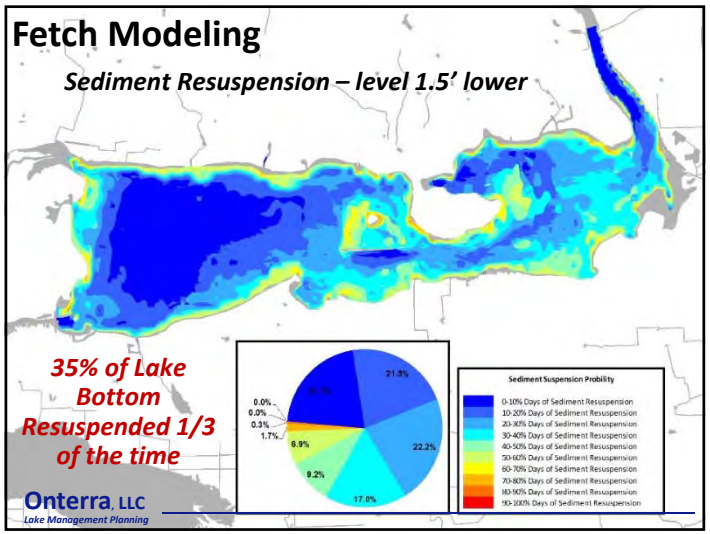

Fetch Modeling
Wavelength
5 mph
Wave Length (meters)
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2. - 2.25
2.25 - 2.5
2.5 - 2.75
2.75 - 3
3 - 3.25
3.25 - 3.5
3.5 - 3.75
3.75 - 4
4 - 4.25
6-feet
12-feet
Onterra, LLC
Lake Management Planning


Fetch Modeling
Wavelength
10 mph
Wave Length (meters)
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2. - 2.25
2.25 - 2.5
2.5 - 2.75
2.75 - 3
3 - 3.25
3.25 - 3.5
3.5 - 3.75
3.75 - 4
4 - 4.25
6-feet
12-feet
Onterra, LLC
Lake Management Planning


Fetch Modeling
Wavelength
Wave Length (meters)
0 - 0.25
0.25 - 0.5
0.5 - 0.75
0.75 - 1
1 - 1.25
1.25 - 1.5
1.5 - 1.75
1.75 - 2
2. - 2.25
2.25 - 2.5
2.5 - 2.75
2.75 - 3
3 - 3.25
3.25 - 3.5
3.5 - 3.75
3.75 - 4
4 - 4.25
15 mph
6-feet
12-feet
Onterra, LLC
Lake Management Planning

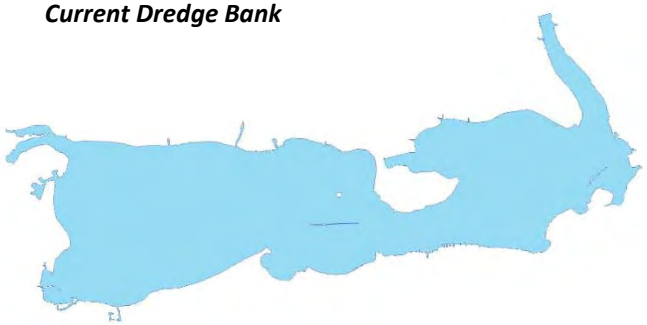

Fetch Modeling
Sediment Resuspension
12% of Lake Bottom Resuspended 1/3 of the time
Sediment Suspension Probility
0-10% Days of Sediment Resuspension
10-20% Days of Sediment Resuspension
20-30% Days of Sediment Resuspension
30-40% Days of Sediment Resuspension
40-50% Days of Sediment Resuspension
50-60% Days of Sediment Resuspension
60-70% Days of Sediment Resuspension
70-80% Days of Sediment Resuspension
80-90% Days of Sediment Resuspension
90-100% Days of Sediment Resuspension
Onterra, LLC
Lake Management Planning


Fetch Modeling
Sediment Resuspension
Lake Level
765.5
765.0
764.5
764.0
763.5
763.0
762.5
762.0
761.5
5/1
5/31
6/30
7/30
8/29
9/28
30 yr Mean
10 yr mean
Resuspended 1/3 of the time
Onterra, LLC
Lake Management Planning


Fetch Modeling
Sediment Resuspension – level 1.5' lower
35% of Lake Bottom Resuspended 1/3 of the time
Sediment Suspension Probility
0-10% Days of Sediment Resuspension
10-20% Days of Sediment Resuspension
20-30% Days of Sediment Resuspension
30-40% Days of Sediment Resuspension
40-50% Days of Sediment Resuspension
50-60% Days of Sediment Resuspension
60-70% Days of Sediment Resuspension
70-80% Days of Sediment Resuspension
80-90% Days of Sediment Resuspension
90-100% Days of Sediment Resuspension
Onterra, LLC
Lake Management Planning

Fetch Modeling

Sediment Resuspension
Current Dredge Bank



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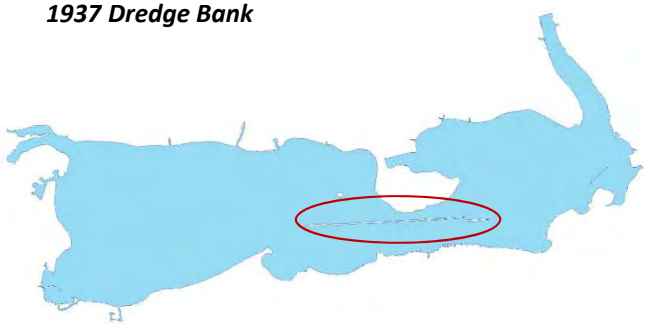
Fetch Modeling

Sediment Resuspension
1937 Dredge Bank



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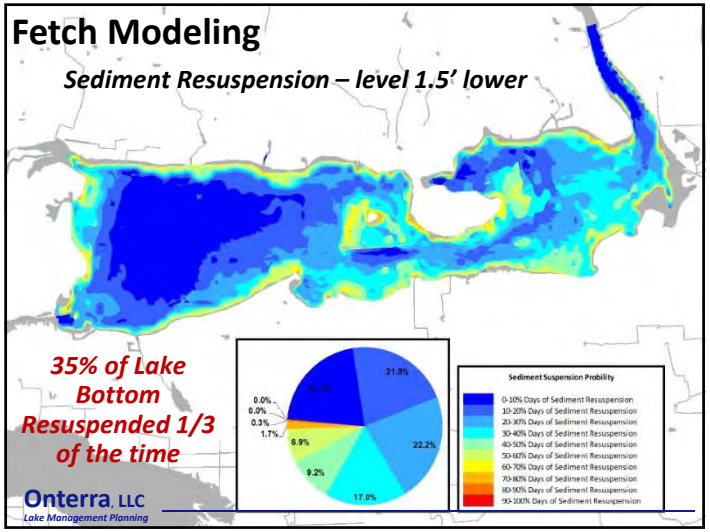
Fetch Modeling

Sediment Resuspension – level 1.5' lower



35% of Lake Bottom Resuspended 1/3 of the time

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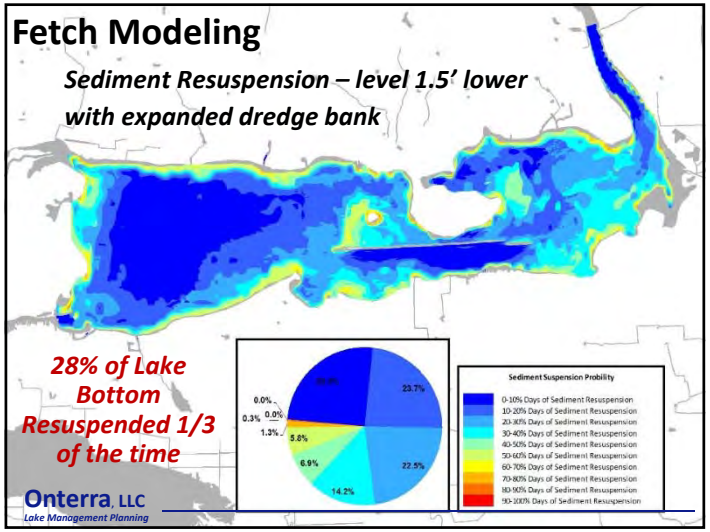
Fetch Modeling

Sediment Resuspension – level 1.5' lower with expanded dredge bank



28% of Lake Bottom Resuspended 1/3 of the time

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Summary and Conclusions

Aquatic Plants

- Based upon a maximum depth of roughly 7.5 feet entire lake bottom should be available to plant growth
- Currently, only a small portion supports aquatic plant growth
- Overall, Lake Puckaway could have a much healthier plant population

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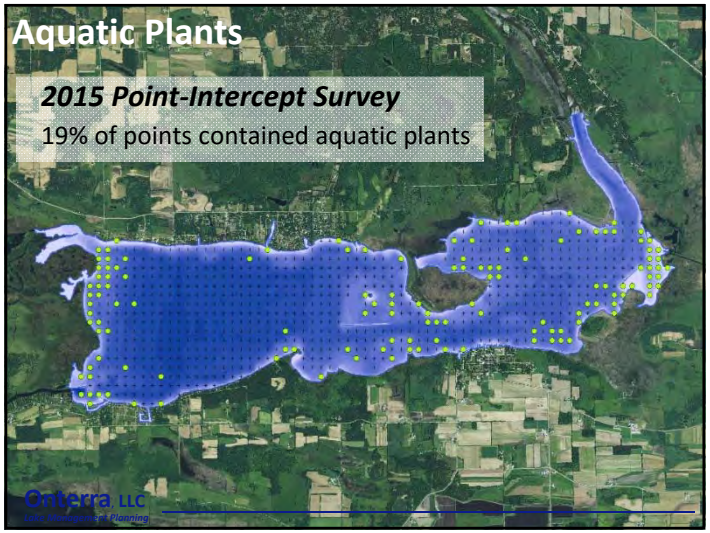
Aquatic Plants

2015 Point-Intercept Survey

19% of points contained aquatic plants



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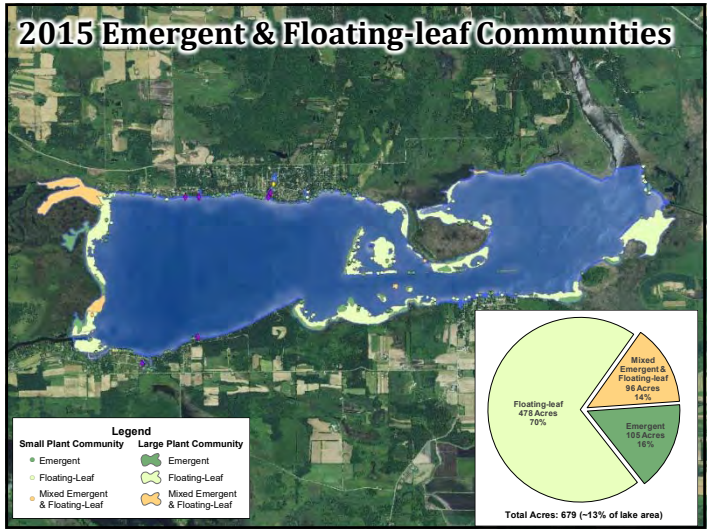
2015 Emergent & Floating-leaf Communities



Shallow Lakes are Special

Clear State ***Turbid State***

Aquatic Plants are Incredibly Important

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Summary and Conclusions

Water Quality

- Lake Puckaway is considered impaired for sediment/suspended solids and for total phosphorus
- Lake Puckaway is a complex ecosystem because of shallow depth and inflowing river
- The lake experiences high annual variability for phosphorus and chlorophyll and thus water clarity
- The highest levels of phosphorus are the result of internal loading during years when summer flow is low
- During years with increased plant growth water quality is better
- Wind, flow, & carp all add to water quality issues
- These issues travel downstream to other lakes

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Summary and Conclusions

Fisheries

- Lake Puckaway has a strong fisheries
  - Pike and walleye populations are good now, but biologists believe their numbers and size can be greater with habitat improvements
  - Panfish and bass populations may be on the decline
- Increased aquatic plant habitat would benefit fisheries
  - Pike and perch use emergent plants as spawning substrate
  - Increased submergent plants would lead to increased panfish population
  - Increased panfish would likely lead to less carp

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Summary and Conclusions

Improving Aquatic Plant Habitat

- Fluctuating water levels to more closely mimic natural conditions on system like Puckaway
  - Dam prevents natural fluctuations from occurring

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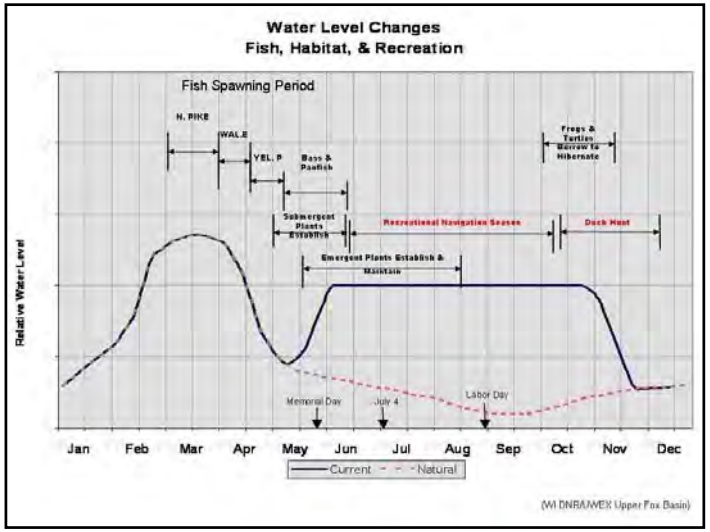

Summary and Conclusions

Improving Aquatic Habitat

- Fluctuating water levels to more closely mimic natural conditions on system like Puckaway
  - Dam prevents natural fluctuations from occurring
- Water level management plan with occasional reductions in water level would establish additional aquatic plant habitat
- Reconstruction of dredge banks and creation of additional islands would reduce fetch and add niches for emergent and floating-leaf species
  - Ted Johnson's Shallow Lake Management Workgroup
  - Increased habitat for fish and waterfowl
- Many other actions are available to improve Puckaway

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Lake Management Planning

Water Level Management Plan - Draft

Puckaway Water Levels

- Building a 30-year water level dataset
  - Berlin Flows >> Princeton Flows >> Puckaway Levels

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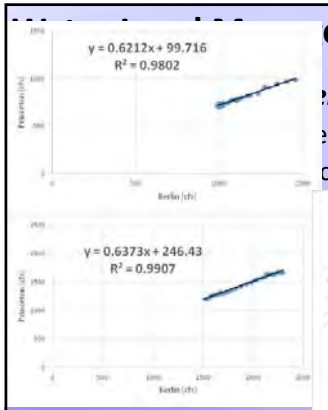
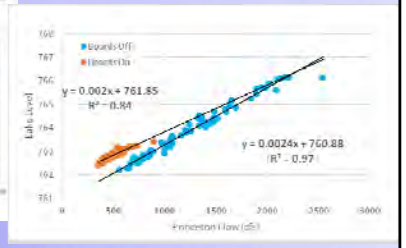
ement Plan - Draft

ls

r level dataset

ceton Flows >> Puckaway Levels





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Water Level Management Plan - Draft

Determining a Water Level Starting Point

- Based upon bathymetry data collected in 2015 and aligned with Green Lake County's water level loggers, the starting lake level on June 15 is 764.375' MSL.
- The elevation aligns well with the reference water level used by MWH in their January 2016 Lake Puckaway study of 764.44 for an average summer flow of 571 cfs at the Princeton Dam USGS site.

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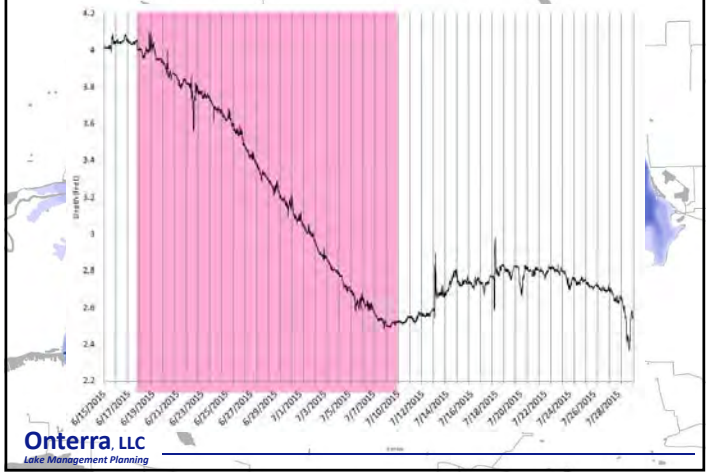
Water Level Management Plan - Draft



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Water Level Management Plan - Draft

Determining Possibility & Extent of Reductions

- MWH based the attainable reduction in water levels upon starting flow rate. Most benefit will be gained by having water levels lowered by early to mid-July; therefore, the starting point is June 15.
- The average 30-year flow at Princeton on June 15 is approximately 550 cfs. Based upon MWH study, at that flow, a roughly 3-foot reduction could occur in about 21 days.

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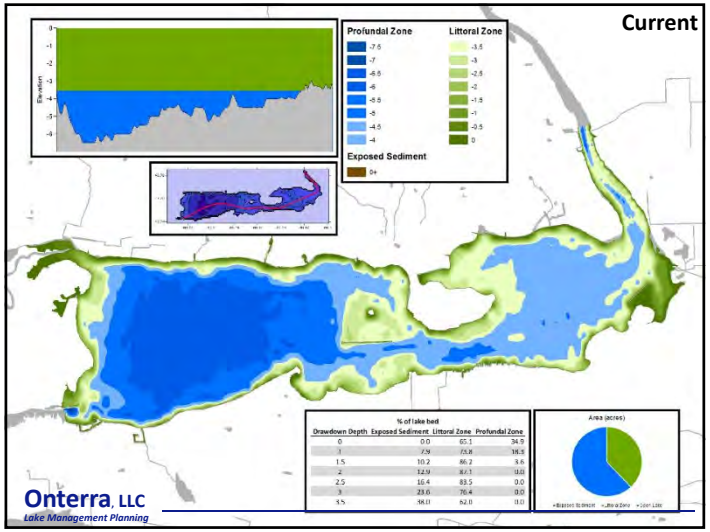

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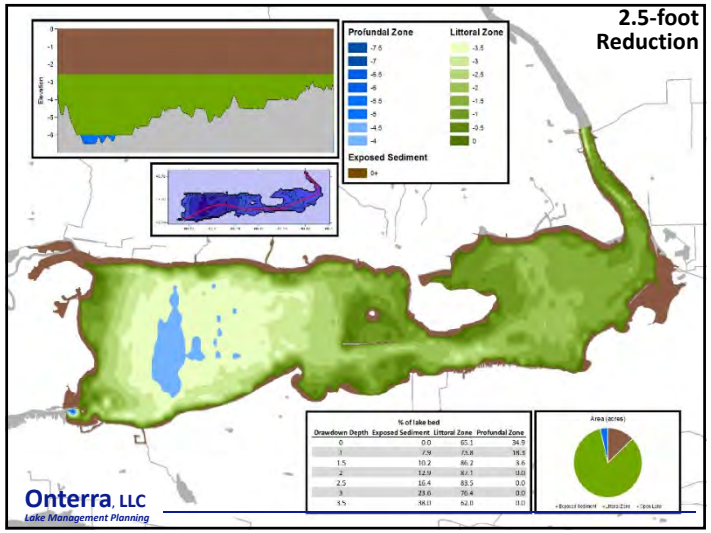
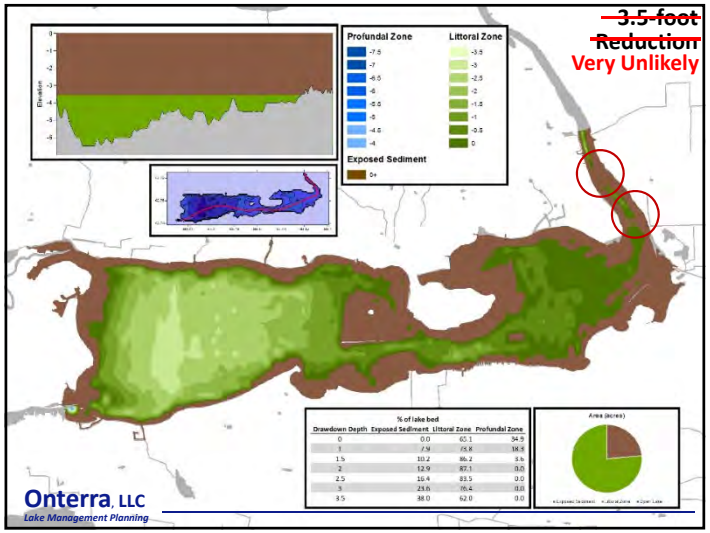

2.5-foot
Reduction
Profundal Zone
Littoral Zone
Exposed Sediment
Onterra, LLC
Lake Management Planning


~~3.5-foot~~
~~Reduction~~
Very Unlikely
Profundal Zone
Littoral Zone
Exposed Sediment
Onterra, LLC
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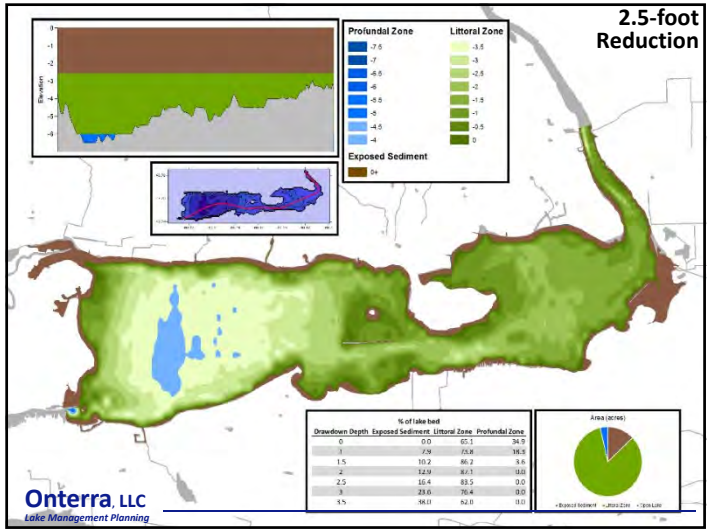
2.5-foot
Reduction
Profundal Zone
Littoral Zone
Exposed Sediment
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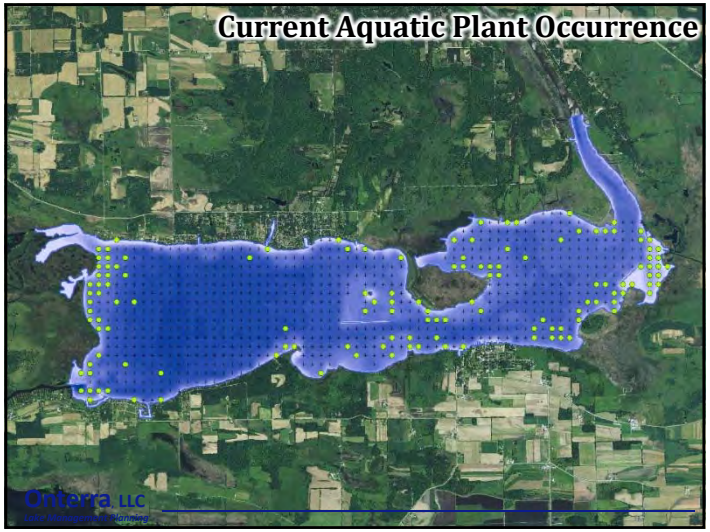
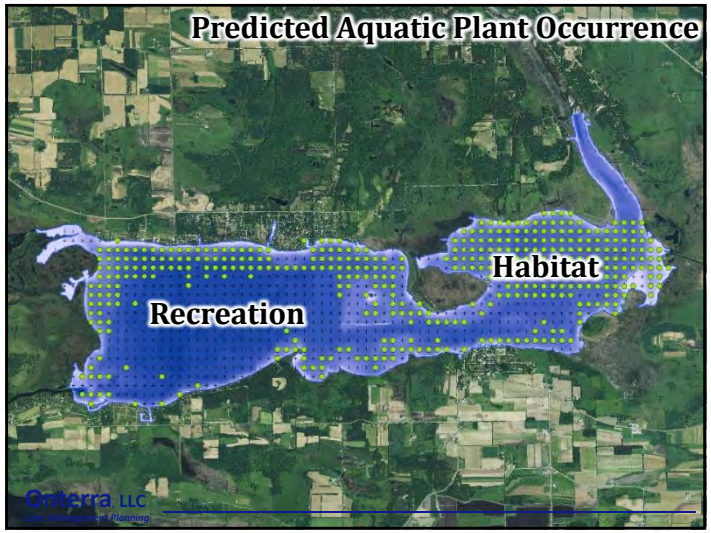
Lake Management Planning


Current Aquatic Plant Occurrence
Onterra, LLC



Water Level Management Plan - Draft

Determining Possibility & Extent of Reductions

- MWH based the attainable reduction in water levels upon starting flow rate. Most benefit will be gained by having water levels lowered by early to mid-July; therefore, the starting point is June 15.
- The average 30-year flow at Princeton on June 15 is approximately 550 cfs. Based upon MWH, at that flow, a greater than 3-foot reduction could occur in about 21 days.
- It must be noted that the 10-year average flow on June 15 (excluding 2008) approaches 1,200 cfs at the Princeton Dam, meaning that less than a 2' reduction could be achieved in greater than 24 days.

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Lake Management Planning

Water Level Management Plan - Draft

Water Level Management Rationale

- Multiple studies on Mississippi pool waters have shown that reducing water levels to expose sediments and expose deeper areas to light penetration for two consecutive growing seasons can lead to aquatic plant establishment that will thrive for up to 7 years.
  - First year – annual plants establish
  - Second year – perennial plants establish

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Water Level Management Plan - Draft

Water Level Management Specifics

Year 1 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

Year 2 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

Specific Conditions on Attempts at Reductions

Reductions will be attempted in two consecutive years. If a suitable reduction is not anticipated to occur (see abandonment below) in either of those two years, than during the next two years, no reductions would be attempted.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

- Reductions will be attempted in two consecutive years. If a suitable reduction is not anticipated to occur (see abandonment below) in either of those two years, than during the next two years, no reductions would be attempted.
- If during either of the two years in which a water level reduction is attempted, a reduction of 1.5 or more achieved, on June 15 of the following year, the lock gates will be opened and remain open through September and the water levels reduced as far as possible.
- **Abandonment** If discharge at the USGS Princeton Dam station is greater than 1,250 cfs on June 30 of either the first attempt or second attempt year, the attempt will be abandoned.

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Water Level Management Plan - Draft

Princeton Dam Reconstruction

- Dam reconstruction to begin summer 2018
- Water levels would be reduced beginning in Fall 2017
- Levels will remain down in 2018 for dam construction and remain down through the winter of 2018/2019
- To facilitate remaining dam construction and habitat construction, water levels will remain down during the summer of 2019.
- Lake levels will be raised during the fall of 2019
- UPDATE: WDNR does not believe dam construction will be in 2018. Maybe 2020, so plan above would be altered

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Water Level Management Plan - Draft

Princeton Dam Reconstruction

- Pre-water level reduction data collection
  - 2015/2016 water quality & plant studies would be used
  - Fisheries data should be collected in 2017
- Post dam construction/water level reduction
  - Three years - aquatic plant and water quality surveys
  - 2021 fisheries studies
- The results of these studies would document success or failure of water level management plan and determine future course of actions.
- Likely frequency 2 years in a decade.

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Thank You

Many of the graphics used in this presentation were supplied by:

Wisconsin Lakes Partnership

UW Extension

Wisconsin Dept. of Natural Resources

Onterra, LLC
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Press Release

For Immediate Release

Lake Puckaway Draft Management Plan to be Presented on September 26th.

Green Lake & Marquette Counties, WI, September 12, 2016. Since early June of this year, the Lake Puckaway Protection and Rehabilitation District has hosted five meetings in conjunction with the development of the lake's updated management plan. All aspects of the planning project and studies were presented to and discussed with the district's planning committee and the general public during the meetings and included general lake ecology, Fox River and Lake Puckaway water quality, the aquatic plants of the lake, the lake's current and past fishery, the impacts of the lake's drainage basin on the lake's ecology, and how water levels have fluctuated over the last 30 years and the last 10 years. Due to high nutrient levels and algae content, the lake is considered impaired. A key aspect to correcting those impairments is enhancing the plant population within the lake. At this time, Puckaway has very little aquatic plant life, which allows algae blooms to more easily occur and provides very little fish habitat. Increasing the plant population in the lake will lead to reduced algae blooms, increased water clarity, and a stronger panfish population. Increased panfish have shown to have a substantial impact at reducing carp in other lakes due to panfish predation on young carp.

On September 26th, the Lake Puckaway Protection and Rehabilitation District will host its final scheduled meeting of the management planning project. At that meeting, Tim Hoyman, Lead Aquatic Ecologist with Onterra, LLC, will present the draft management plan for Puckaway Lake. "The plan will be based upon management goals and actions to meet those goals," Hoyman stated. The district is creating several management goals that will be included in the draft plan, each of those goals will include one or more management actions that if implemented, will allow the district to meet that goal." he continued.

The meeting will be held at the Marquette Village Hall (127 E. 4th St, Marquette, WI) beginning at 6:30pm.

In October, the draft management plan will be available for download from the district's web site (http://www.lakepuckaway.com/) and at the Princeton and Markesan libraries. Written comments will be accepted via email and US Post through the end of the year.

Conclusions Review, Management Goals and Actions

September 26, 2016
Marquette Village Hall

The sixth meeting scheduled for the update to the Lake Puckaway Management Plan was held on September 26, 2016 at 6:30 pm at the Marquette Village Hall. The purpose of this meeting was to review the conclusions presented at the last meeting and to discuss the proposed management goals and actions for the updated Lake Puckaway Management Plan. Discussion was held after the presentation to make sure the planning committee and those present clearly understood the data and there was agreement on what the information meant.

Present were the following members of the Planning Committee: Jeff Kimbur, Kurt McCulloch, Randy Schmidt, Paul Gettelman, Brian Zimmermann and Gene Weber.

In addition, present were the night's speakers Tim Hoyman and Paul Garrison - Onterra, LLC, 19 members of the public, and Ted Johnson, WDNR. Linda Stoll – L Stoll Consulting served as meeting facilitator.

Conclusion Review

Aquatic Plants

Tim Hoyman began with a review of the conclusions of the research and analysis that was conducted for this project. Aquatic plants are a critical component to the health of the lake. Based on the approximate maximum depth of 7.5 feet, the entire lake bottom should be able to support some type of plants. While light penetration is a main factor, it was noted that this is a complex lake and other influences would prevent the entire lake from supporting plants. However, the most recent grid survey only found plants in 19% of the survey points – considerably less than what would be expected in a healthy system.

Shallow lakes are special systems and are typically either in a clear state or turbid state. Lake Puckaway is definitely in a turbid state. Clear lakes have abundant aquatic vegetation that competes for light and nutrients with algae. Turbid lakes are dominated by algae and have frequent blooms. The aquatic plants in clear state lakes also provide refuge for zooplankton. These microscopic animals graze heavily on algae, working to keep the water clear. If the aquatic plants disappear, so do the zooplankton due to easy predation by fish.

Water Quality

Lake Puckaway is consider impaired for sediment/suspended solids and for total phosphorus. The lake is a very complex system because of its shallow depth and the inflowing river. Previous surveys as well as surveys conducted for this project demonstrate that the lake experiences high annual variability for phosphorus and chlorophyll and thus water clarity. It should be noted that the highest levels of phosphorus are due to internal loading during years when summer flow is low. Water coming into the lake is considerable cleaner than the water that is leaving. During years with increased plant growth, the water quality was better. Wind, flow and carp all add to the water quality issues. These issues travel downstream to other lakes.

Fisheries

Lake Puckaway has a strong fishery. The pike and walleye populations are good but biologists believe their numbers and size can be greater with habitat improvement. Panfish and bass may be on the decline. Increased aquatic plant habitat would benefit all of these fish species. Pike and perch use emergent plants as spawning substrate. Increased submergent plants would improve the panfish population. Panfish eat carp fry so increases in panfish population would likely lead to less carp.

Overarching Conclusions

Over the course of greater than a century, Lake Puckaway has degraded. It has slowly, but surely, degraded to the point that its ecology is very ill and it is degrading waterbodies downstream from it. While the lake is meeting the needs of some users, like anglers and boaters, much of the time, it is not its full potential and it is definitely negatively impacting systems that receive its waters. Like all lakes, sick or healthy, Lake Puckaway experiences its good years and its bad years, but there is no doubt that overall the lake is in poor condition. Human actions in Puckaway's watershed and at manipulating its water levels have fostered the degradation of the lake. Dredging a navigation channel, building a lock and dam, draining wetlands and clear-cutting trees for farming, building roads and towns in its watershed, and developing its shorelines are all drastic measures taken by humans that have led to the lake's problems. To counteract some of those problems and produce a positive change in the lake, humans will need to take drastic measures. It will take an integrated approach of managing water levels, creating in-lake habitat, and minimizing impacts from the watershed to see that positive change.

Lake Puckaway Management Plan

The management plan for Lake Puckaway has been designed with three sections. The first consists of all of the reports created to summarize the historical and current data. It includes Water Quality, Wind Fetch Modeling, Aquatic Plants, Watershed Information and Shoreland Conditions. The four previous meetings focused on each one of these sections. The second section summarizes all of the findings and discusses the conclusions that were drawn. The third section is the Implementation Plan. This section contains the management goals and the actions that will be completed by the district to meet those goals. A timeline and facilitator for each action is also listed. It was noted that this plan is still considered a "draft" and not the final product.

Management Goal: Enhance Lake Puckaway Fishery

1. Continue annual harvesting of common carp from Lake Puckaway
    a. WDNR and the District will work together to complete this action.
2. Continue annual operation of Lake Puckaway walleye hatchery
    a. The District will continue the operation of the hatchery.

Management Goal: Improve the overall ecological health of Lake Puckaway

1. Initiate volunteer-based annual water quality monitoring of Lake Puckaway through the WDNR Citizen Lake Monitoring Network.
    a. The District will participate in this program. This is important for tracking long-term changes in water quality.
2. Form the Lake Puckaway Shallow Lake Management Workgroup
    a. This group would be made up of District members, agency staff and ad-hoc members as needed. The group would help coordinate various lake projects such

as restoring the dredge banks and islands, improving the north shore boat ramp and other projects identified in the citizen survey, issue assessment and previous plans.

3. Implement the Lake Puckaway Water Level Management Plan
    a. This plan will work with other goals and actions to increase aquatic plants and habitat within Lake Puckaway. The objective is to promote significant plant growth within Lake Puckaway by temporarily extending the littoral zone to allow submergent and floating-leaf plant establishment and to temporally expose bottom sediments in near-shore areas to allow for the establishment of emergent species.
    b. Multiple studies on Mississippi River pool waters and other systems have shown that reducing water levels to expose sediments and expose deeper areas to light penetration for two consecutive growing seasons can lead to aquatic plant establishment that will thrive for up to seven years or more. During the first year, annual plants begin establishment and during the second year, perennial plants begin establishment. Having both of these groups of plants establish is important to extending the benefits of the reductions.
    c. Having low water levels in Lake Puckaway for two consecutive growing seasons will be difficult and inconvenient for riparian property owners and businesses. The water level management plan contains specifications to provide surety of when water levels will be reduced, how frequently they will be reduced, and importantly flow conditions that will lead to abandonment or early start of reductions. This is done with the goal of assuring riparians that reductions will not be attempted year-after-year leading to somewhat low levels that inconvenience lake users, but provide no benefits to the ecology of Lake Puckaway. The detailed information on the justification for the operation strategies, the drawdown cycles, the conditions for modifying or abandoning a cycle, and the monitoring plan to measure success or need for changes can be found in the PowerPoint presentation for this meeting and in the plan itself. Both can be found on the District website.

<u>Management Goal: Improve Dam Operation Safety at the Princeton Dam</u>

1. Urge the State of Wisconsin to reconstruct the Princeton Dam as a fixed-crest dam.
    a. The reconstruction project is in the WDNR proposed budget request for the 2017-19 biennial state budget. However, it still needs to make it through the Governor, Joint Committee on Finance, the Senate, and the House before it is in the state budget, which means that it is actually funded.
    b. The District is encouraged to lobby their elected officials in the House and the Senate as well as the Governor on the merits and importance of this project.

<u>Management Goal: Increase the Communication Capacity of the Lake Puckaway Protection and Restoration District</u>

1. Create a Communication and Education Committee
    a. The District should consider creating multiple newsletters per year to help educate members and keep them informed on the progress of plan implementation.
    b. The District should use the District website and Facebook page to their full potential
    c. The District should develop a District-wide email list
    d. The District should consider the possibility of hiring professionals for some of the tasks

Next Steps

Onterra, LLC will produce a second draft of the Implementation Section of the plan integrating comments from this meeting and the committee. The other two sections of the plan will be finalized. The entire Lake Puckaway Management Plan will be posted for public review and comment by late October. The plan will be posted on the District website and hard copies will be located in the Markesan and Princeton libraries. Written comments from the public, agencies, board and committee will be accepted by email and US Post through February 2017. These comments will be integrated into the plan and a final draft will be created for board and committee review. The District will have an opportunity to approve the plan at its 2017 annual meeting.

Planning Committee Comments and Questions:

1. *Why wait for ten years to pass before doing another drawdown instead of doing it at 7 years as recommended in the research?*
   While there is a recommended number in the plan, it will be important to look at the annual monitoring data to base the frequency of reductions on what is actually happening in the lake and adjust the time accordingly. It will be important not to lose all of the benefits of a successful reduction sequence and have to start at the beginning again. This is why continued monitoring will be so important.
2. *Should we be looking at planting more plants? If we did that, would that reduce the frequency of drawdowns?*
   Attempting to establish plants by adding them to the lake without first removing or at least reducing the factor that is keeping them from growing there naturally is pointless. Past attempts have met with limited and short-term success, not only on Lake Puckaway, but on many other systems around the state.
3. *What is the impact of recreation – large motors, etc. – on the lake?*
   The motors may have some impact on plant growth but the percentage of plants in the lake was lower and dropping before these motors were present.
4. *There was a plant goal in the previous plan. How does this compare?*
   On June 6, 2009, the LPPRD Board passed a motion to accept the Emergent Plant Stabilization Program (EPSP) recommended by the District's Adaptive Management Committee (AMC). This program called for leaving the flashboards off the dam for an extra 30 days from May 15th for 3 out of 5 years. The intent was to lower water levels during the late spring and early summer to foster emergent plant growth and allow for the planting of emergent species in select areas of the lake. During those 5 years, flows were high and the flashboards would not have been able to be put on anyways, so water levels were not reduced. The plantings did not establish; however, some remnants may remain. Further, research indicates that water level reductions early in the growing season are not sufficient to foster emergent establishment. In a natural lake, like Puckaway once was, water levels recede throughout the growing season, so native emergent plants have evolved to flourish in those conditions.
5. *Has upstream input of phosphorus been taken into account in this plan?*
   Yes, it has and there will need to be reductions made especially as a part of the Total Maximum Daily Load (TMDL) determination. It is important to understand that a great deal of nutrients enter the lake from the watershed, especially from agriculture; however,

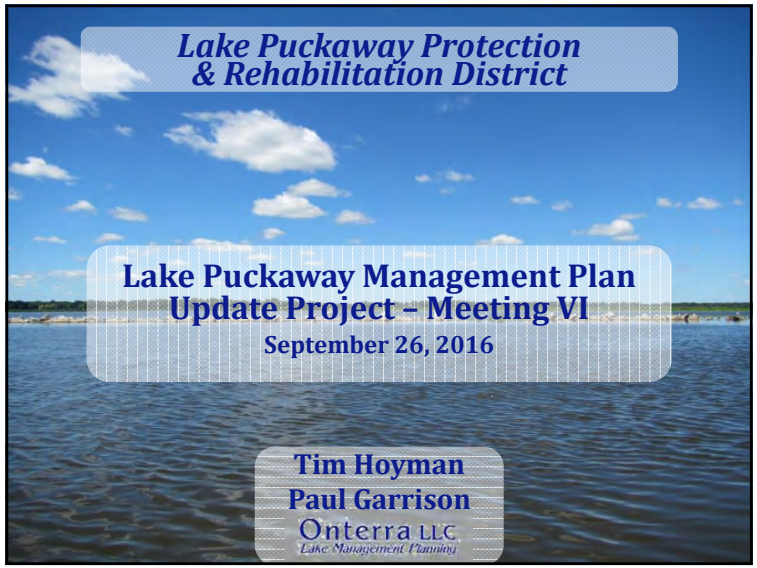
that is only part of the problem on Lake Puckaway. In Lake Puckaway, water coming into the lake is often less polluted than the water leaving the lake. Internal loading from the lake adds to the problems in the lake and downstream. All of this is why it is important to do what can be done to have more plants in Lake Puckaway.

6. *How will we know if we should put our docks in if it is a drawdown year?*
   Waiting until approximately June 15 will be an imposition but it is important that spawning activity is not upset for the year. Note that residents will know ahead of time if levels will be reduced. The rest of the time, docks can go in when they normally do.
7. *Does the year qualify if we get a late summer flood?*
   This is a very unusual year and it will have to be looked at in greater detail. It is possible that given the flat nature of the watershed, that the water will be able to be accommodated. Upstream water level management strategies that could assist us in a drawdown year can also be reviewed.
8. *Comment:* We need to remain flexible and base decisions on good data not a prescribed order. The District will need to look at the data and decide what is best for the lake and the residents.
9. *Where will the fish go?*
   First, even during a 2.5-ft water level reduction, there will be over 4,600 acres of open water remaining and water will be moving through the lake at its inlet and outlet. So, fish be able to go either upstream or downstream. With habitat improvements brought on by the reductions, the lake will have a better fishery.
10. *What happens to plants in winter in low water years? Won't they die when it freezes to the bottom?*
    Shallow lakes do not "freeze to the bottom". Even in a lake with 2 feet of ice, in an area 1-foot deep, the ice does not extend to the bottom. If this happened, all shallow lakes and wetlands in Wisconsin would have no plants. Further, Lake Puckaway's water levels would begin to rise at the end of September because the lock gates would be closed.
11. *Comment:* We need to ask upstream watersheds to help with water levels in drawdown years.
12. *Where can we find the Mississippi River Studies?*
    These and other studies will be referenced within the draft management plan. The biggest gain in knowledge in regards to this practice was in the need for the second year of reduction to allow for the growth of perennial plants.
13. *Will we see a difference in the impact of the drawdown from east to west on the lake?*
    The east pool of the lake has a better chance of growing more plants though there will be improvement in the west pool as well. The typography of the area is basically the same – flat – and it will determine the impact.
14. *Has any other lake in Wisconsin done a drawdown sequence like this?*
    Reductions have been done on smaller impoundments and they were effective. This is the first attempt on a large lake, so the best data available for comparison is the Mississippi River studies.
15. *Comment:* If the drawdown begins on June 15, you will not see the full affect until at least 21 days.

16. *Comment:* If we don't do anything and just keep on like we have been, conditions on the lake will only get worse and it will be even harder to make things better.
17. *Why are we focusing so much on water levels? Don't other things impact the plants too?* Wind and carp also impact the plants, but not to the degree that the water level does. The District will continue to harvest carp and look at repairing the dredge banks and making improvements to the islands but these by themselves without water level management will not restore the plants.
18. *Comment:* The goals of the TMDL for Green Bay will impact Lake Puckaway. We could wait for someone else to determine what we must do or we can be proactive and address these issues in a way that makes sense for us and includes some or our own goals in the effort.

Written Questions:

No written questions were received.



Presentation Outline

- Conclusions Review
- Management Goals & Actions
- Comments & Questions

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Summary and Conclusions

Aquatic Plants

- Based upon a maximum depth of roughly 7.5 feet entire lake bottom should be available to plant growth
- Currently, only a small portion supports aquatic plant growth

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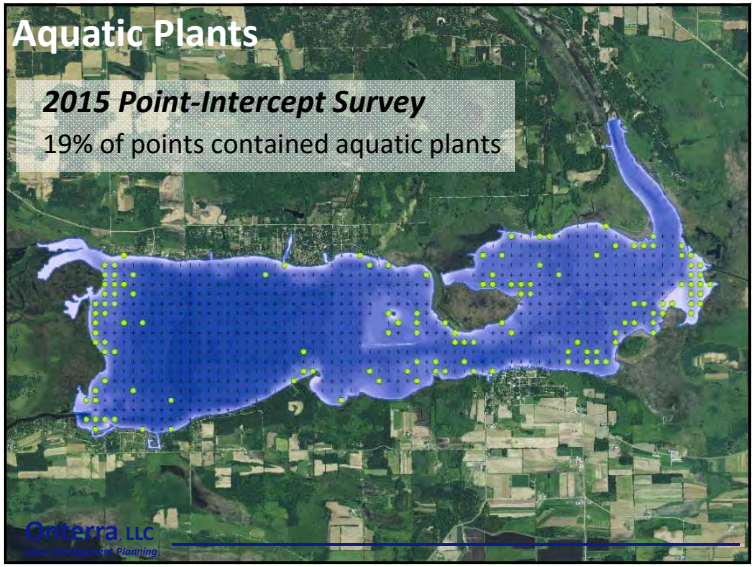

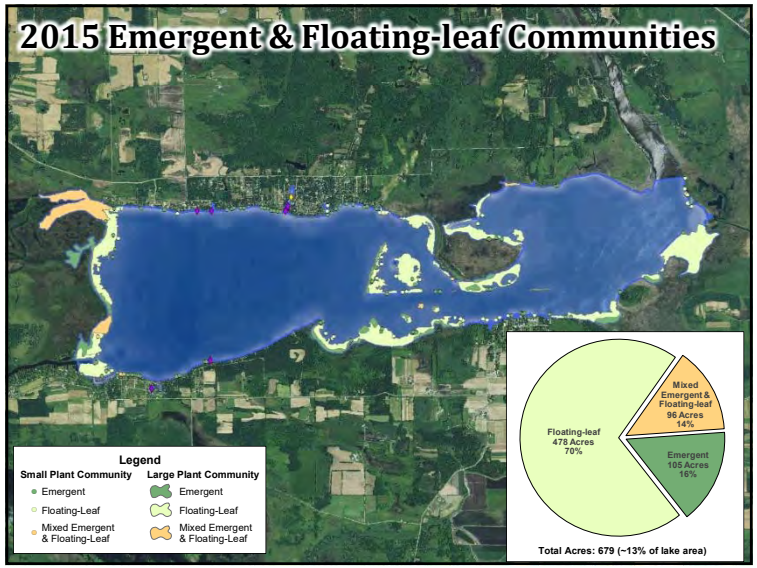

Shallow Lakes are Special

Clear State ***Turbid State***

Aquatic Plants are Incredibly Important

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Summary and Conclusions

Aquatic Plants

- Based upon a maximum depth of roughly 7.5 feet entire lake bottom should be available to plant growth
- Currently, only a small portion supports aquatic plant growth
- Overall, Lake Puckaway could have a much healthier plant population

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Summary and Conclusions

Water Quality

- Lake Puckaway is considered impaired for sediment/suspended solids and for total phosphorus
- Lake Puckaway is a complex ecosystem because of shallow depth and inflowing river
- The lake experiences high annual variability for phosphorus and chlorophyll and thus water clarity
- The highest levels of phosphorus are the result of internal loading during years when summer flow is low
- During years with increased plant growth water quality is better
- Wind, flow, & carp all add to water quality issues
- These issues travel downstream to other lakes

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Summary and Conclusions

Fisheries

- Lake Puckaway has a strong fisheries
  - Pike and walleye populations are good now, but biologists believe their numbers and size can be greater with habitat improvements
  - Panfish and bass populations may be on the decline
- Increased aquatic plant habitat would benefit fisheries
  - Pike and perch use emergent plants as spawning substrate
  - Increased submergent plants would lead to increased panfish population
  - Increased panfish would likely lead to less carp

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Lake Puckaway Management Plan

Report Sections

- Water Quality and Fetch Modeling
- Aquatic Plants
- Watershed
- Shoreland Condition

Summary & Conclusions

- Sums it all up

Implementation Plan

- Management Goals
  - Management Actions
  - Timeline
  - Facilitator

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Management Goal:
Enhance Lake Puckaway Fishery

Management Actions

1. **Continue annual harvesting of common carp from Lake Puckaway.**
   WDNR and District work together to complete actions.
2. **Continue annual operation of Lake Puckaway Walleye Hatchery.**
   Over 9.2 million walleye fry have been released in Lake Puckaway since the start of the hatchery.

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Management Goal:
Improve overall ecological health of Lake Puckaway

Management Actions

1. **Initiate volunteer-based annual water quality monitoring of Lake Puckaway through the WDNR Citizen Lake Monitoring Network.**
   Important for tracking long-term changes.
2. **Form Lake Puckaway Shallow Lake Management Workgroup**
   Made up of district members, agency staff, & ad-hoc members as needed.
3. **Implement Lake Puckaway Water Level Management Plan**
   Will work with other actions to increase aquatic plants and habitat within Lake Puckaway.

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Lake Management Planning

Water Level Management Plan - Draft

Water Level Management Rationale

- Multiple studies on Mississippi pool waters have shown that reducing water levels to expose sediments and expose deeper areas to light penetration for two consecutive growing seasons can lead to aquatic plant establishment that will thrive for up to 7 years.
  - First year – annual plants establish
  - Second year – perennial plants establish

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Lake Management Planning

Water Level Management Plan - Draft

Specifications and Definitions

Objective - promote significant plant growth within Lake Puckaway by temporarily extending the littoral zone to allow submergent and floating-leaf plant establishment and to temporally expose bottom sediments in near-shore areas to allow for the establishment of emergent species.

Starting Lake Level - based upon the bathymetry collected during June and July 2015 and verified with data collected by LPPRD level-loggers at Fish Camp, the starting lake level for the purpose of this WLMP is **764.375** feet MSL.

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Water Level Management Plan - Draft

Specifications and Definitions

level for the purpose of this WLMP is **764.375** feet MSL.

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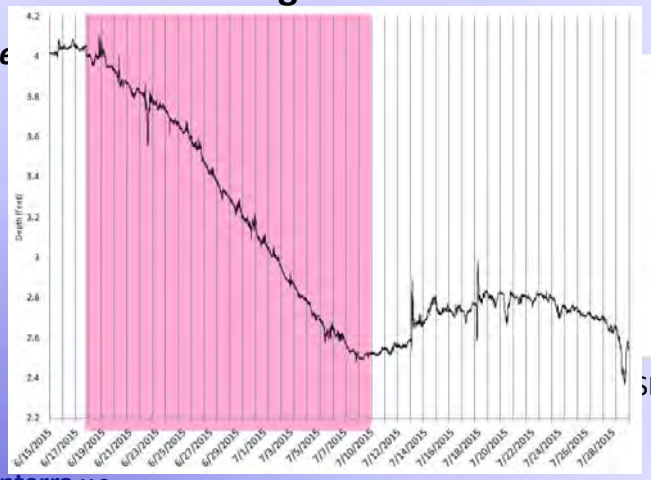
Water Level Management Plan - Draft



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Water Level Management Plan - Draft

Specifications and Definitions

Suitable Water Level Reduction - would expand the area available to plant growth to 75% of the lake area and expose sediments in nearshore areas. To accomplish this, a water level reduction of 2.5 feet (761.875) or greater would be needed; however it is anticipated that the newly encompassed deeper depths would not maintain high occurrences of aquatic plants just as they do not now.

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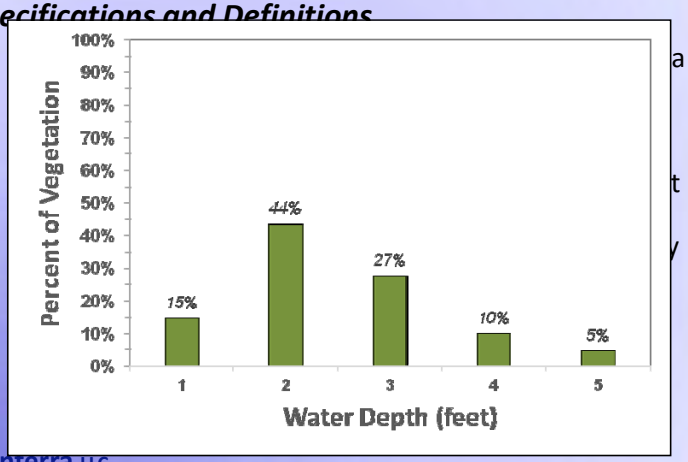
Water Level Management Plan - Draft

Specifications and Definitions



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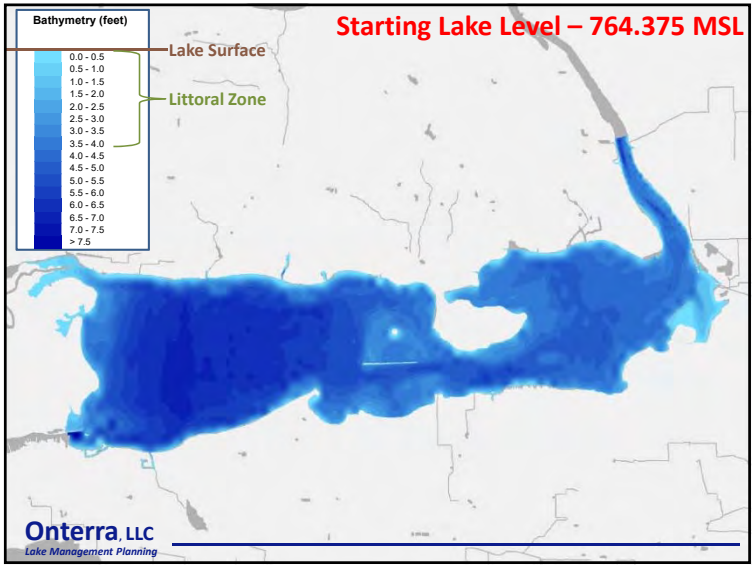

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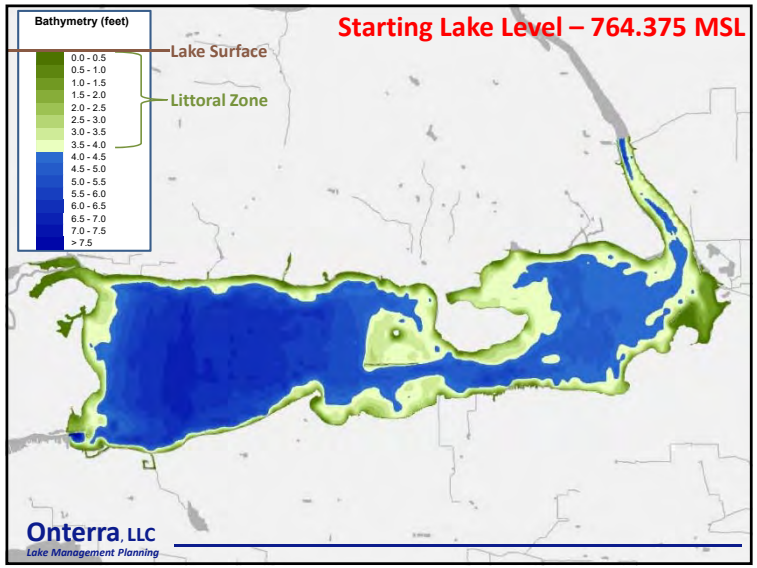

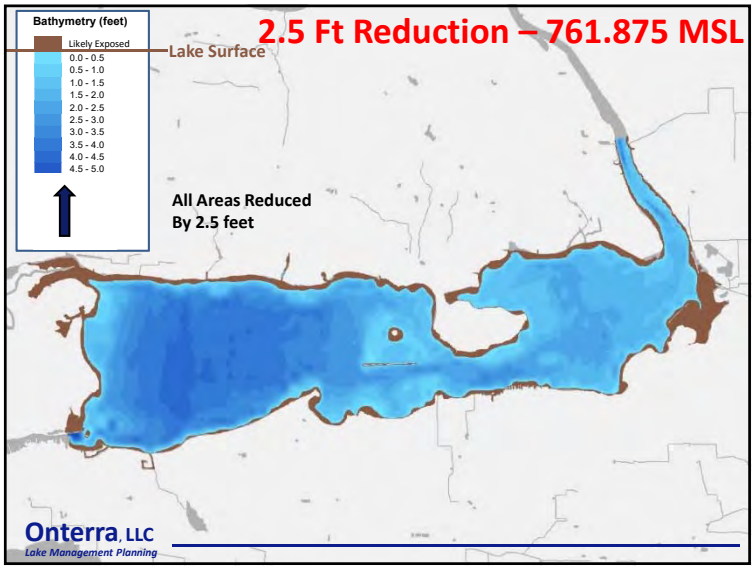

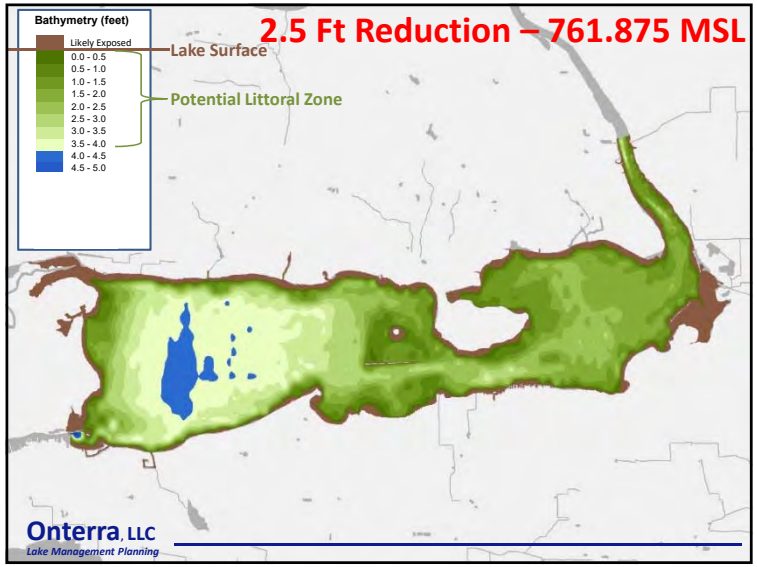

Water Level Management Plan - Draft

Specifications and Definitions

Suitable Water Level Reduction - would expand the area available to plant growth to 75% of the lake area and expose sediments in nearshore areas. To accomplish this, a water level reduction of 2.5 feet (761.875) or greater would be needed; **however it is anticipated that the newly encompassed deeper depths would not maintain high occurrences of aquatic plants just as they do not now.**

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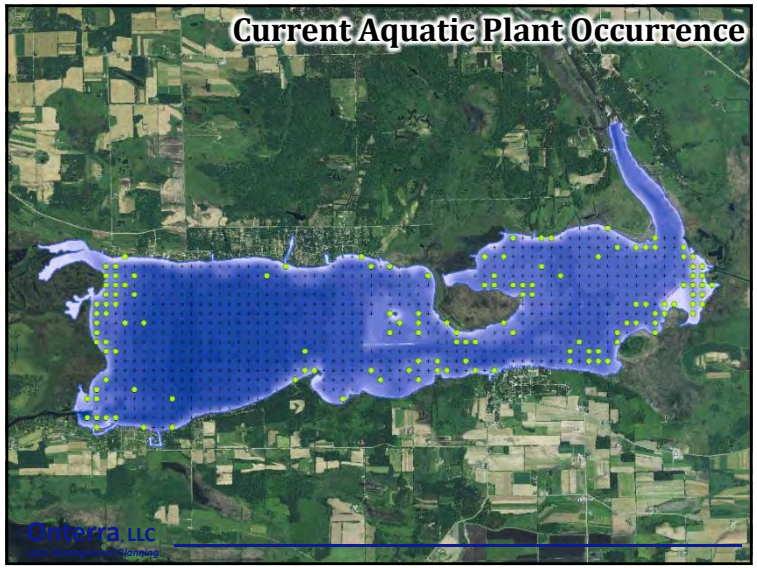

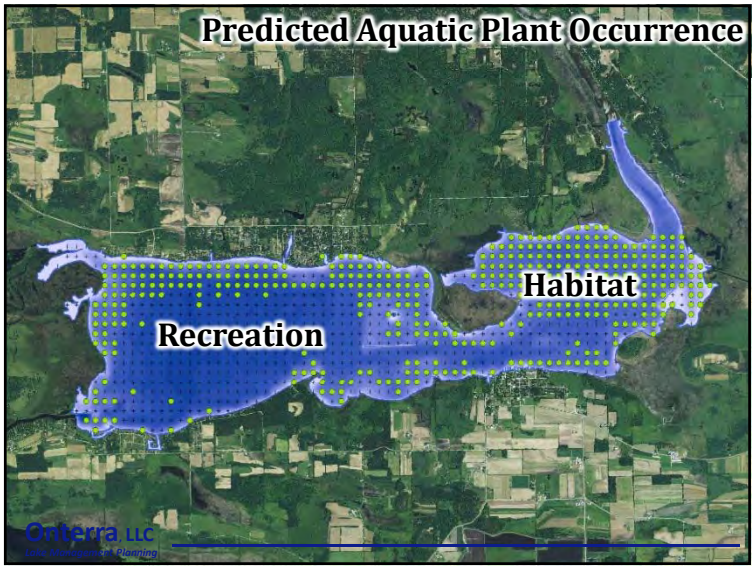

Water Level Management Plan - Draft

Specifications and Definitions

Successful Reduction Sequence - The probability of reducing water levels in Lake Puckaway by 2.5 feet in two consecutive growing seasons is low; however, if the first year does reach a reduction of 2 feet and the second only 1.5, some benefits would likely emerge. Therefore, a successful reduction sequence would include the first year's reduction reaching 2.0 feet or more and the second year's reduction reaching 1.5 feet or more.

Duration of Water Level Reduction - To meet the objective of the WLMP, the water levels would need to be reduced by early to mid-July and remain at the reduced level through September.

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Water Level Management Plan - Draft

Specifications and Definitions

Flow Rates - USGS stream site on the Fox River at Princeton, WI (USGS 04073365).

Lake Puckaway Water Level - staff gauge or water level sensor installed at Fish Camp on the west end of Lake Puckaway at the Fox River inlet.

Fish Camp Staff Gauge: Add 761.21 for Mean Sea Level

Fish Camp Level Sensor: Add 760.275 for Mean Sea Level

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Water Level Management Plan - Draft

Water Level Management Specifics

Year 1 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

Year 2 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Reduction Attempts - Reductions will be attempted in two consecutive years. If a sufficient water level reduction is not anticipated to occur (see abandonment below) in either of those two years, than during the next two years, no reductions would be attempted. If during either of the two years in which a water level reduction is attempted, a reduction of 2.0 feet or more is achieved, on June 15 of the following year, the lock gates will be opened and remain open through September and the water levels reduced as far as possible.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Abandonment - If discharge at the USGS Princeton site is greater than 1,200 cfs on June 15 OR greater than 1,000 cfs on June 30th of either the first attempt or second attempt year, the attempt will be abandoned.

Early Start of Water Level Reduction – During dry springs, water levels on Lake Puckaway may be naturally low causing navigation issues on the lake; therefore, during those low-flow springs that occur during a water level reduction attempt, the lock gates would be opened early to allow for the greatest benefit of reduction. If water flows at the USGS Princeton site are at 600 cfs or less on June 1, the lock gates would be opened immediately.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Frequency of Water Level Reductions - If a successful reduction sequence is achieved, a second set of reductions would not be attempted for 10 years. It is important that this specification remain flexible to assure that the ecological benefits gained by completing a successful reduction sequence are not lost. The frequency of reductions should be determined by the results of the studies completed as outlined in the monitoring plan.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

WLMP Modification or Abandonment - Enhancements to the aquatic plant community will be the foundation and the greatest indicator of improving ecological health of the lake. However, implementing water level reductions, as mentioned above, will have negative impacts on recreation while water levels are low; therefore, if certain predetermined thresholds are not met by a successful reduction sequence, then the WLMP should be modified or abandoned all together.

- Reduction amounts/duration reconsidered
- Incorporations of additional actions
- Creation of entirely new plan

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Aquatic Plant Improvement Goals – The following thresholds would represent improvement goals being met:

- Increase of 50% in littoral frequency from 19.3% to 29%
- Increase of 25% acreage of floating-leaf and emergent plant communities from 679 acres (~13%) to 848 acres (~16%)
- These may need to be adjusted if pre-data is collected and significantly different than 2015 results.

Monitoring Plan – Pre-reduction data would be collected within 3 years of first reduction year. Post data collected for 3 years following second reduction year, and 5 years and 8 years after. Water quality would be collected throughout. Fishery surveys to be determined.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Princeton Dam Reconstruction – It is not known when the project will begin (see following Goal/Action).

- Best case scenario: water level reductions over the two-year project meet Successful Reduction Sequence levels.
- If reconstruction water level reductions do not reach suitable reduction levels, then a reduction would not be attempted for 5 years.
- If reconstruction project is not funded in 2017-19 or 2019-21 biennial state budgets, then water level reductions would be attempted utilizing current dam following WLMP.

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Management Goal:
Improve Dam Operation Safety at Princeton Dam

Management Action

1. **Urge State of Wisconsin to reconstruct Princeton Dam as a fixed-crest dam.**

   Reconstruction project is in WDNR proposed budget request for 2017-19 biennial budget.

   For inclusion in state budget, it must make through:

   1. WDNR Budget Development
      a) Management & Budget (M & B)
      b) Natural Resources Board
   2. Department of Administration (DOA)
   3. Governor
   4. Joint Committee on Finance (JCF)
   5. House/Senate
   6. Senate/House
   7. Governor

Board Resolution
District-wide Petition
Meeting with Legislatures

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Management Goal:
Increase Communication Capacity of LPPRD

Management Action

1. **Create LPPRD Communication & Education Committee**
   - *Multiple newsletters per year*
   - *Use district website and Facebook page to full potential*
   - *Develop district-wide email list*
   - *Possible hiring of professionals for some of these tasks*

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Next Steps

Produce second draft of implementation plan integrating comments from this meeting and committee.

Complete all study reports and other sections of Lake Puckaway Management Plan

Post for public review and comment (mid to late-October)

- District website, Markesan and Princeton Libraries
- Written comments accepted through email and US Post
- Comments accepted February 2017

Integrate comments from public, agencies, board, and committee

Produce second full draft of management plan for board and committee review

Acceptance by district

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Thank You

Many of the graphics used in this presentation were supplied by:

Wisconsin Lakes Partnership

UWEX Extension

Wisconsin Dept. of Natural Resources

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D

APPENDIX D

Stakeholder Survey Results

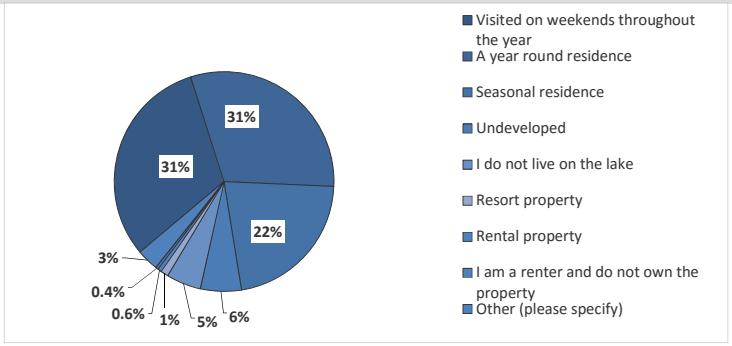
Lake Puckaway - Anonymous Stakeholder Survey

Surveys Distributed: 850
Surveys Returned: 533
Response Rate: 63%

Lake Puckaway Property

1. How is your property on or near Lake Puckaway utilized?

Answer Options	Response Percent	Response Count
Visited on weekends throughout the year	31.2%	165
A year round residence	30.6%	162
Seasonal residence	21.7%	115
Undeveloped	6.0%	32
I do not live on the lake	5.1%	27
Resort property	1.1%	6
Rental property	0.6%	3
I am a renter and do not own the property	0.4%	2
Other (please specify)	3.2%	17
answered question		**529**
skipped question		**4**

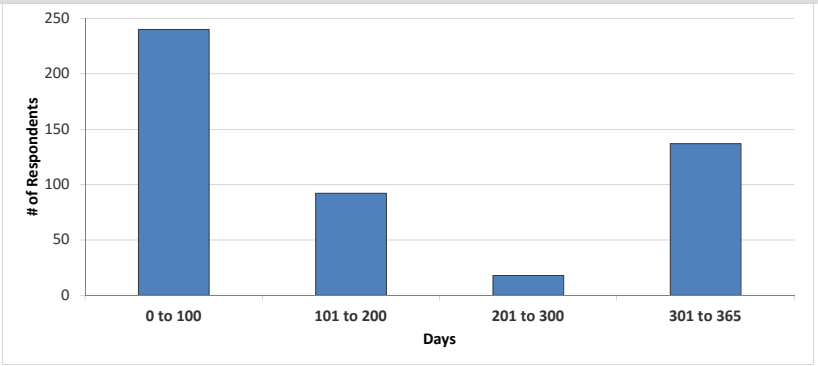


Number	Other (please specify)
1	Weekends plus 2-3 full weeks
2	Seasonal in the Village of Marquette. Boathouse only
3	April thru Nov.
4	visit as often as possible
5	HUNTING ONLY
6	RESTAURANT
7	3 SEASON RESIDENCE
8	spring to fall, when we can to tolerate the campground crowds near our
9	maybe once a month
10	I do not live on the lake have no private access and am forced to pay
11	Don't own lake property and shouldn't be paying a dime as it doesn't
12	utilize residence throughout year; some weekends and some weekdays
13	I have a year around home just off the lake. We have been in this area
14	Year around home with in the District but not on the lake shore. In the
15	Recreation land campsite weekend
16	All summer, all December, all holidays and weekends throughout the
17	Recreation land

2. How many days each year is your property used by you or others?

Answer Options	Response Count
	487
answered question	487
skipped question	46

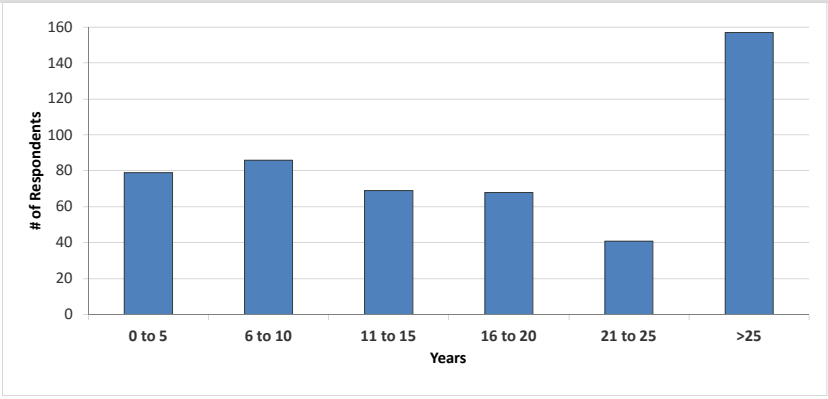
Category (# of days)	Responses	
0 to 100	240	49%
101 to 200	92	19%
201 to 300	18	4%
301 to 365	137	28%



3. How long have you owned or rented your property on Lake Puckaway?

Answer Options	Response Count
	500
answered question	500
skipped question	33

Category (# of years)	Responses	% Response
0 to 5	79	16%
6 to 10	86	17%
11 to 15	69	14%
16 to 20	68	14%
21 to 25	41	8%
>25	157	31%

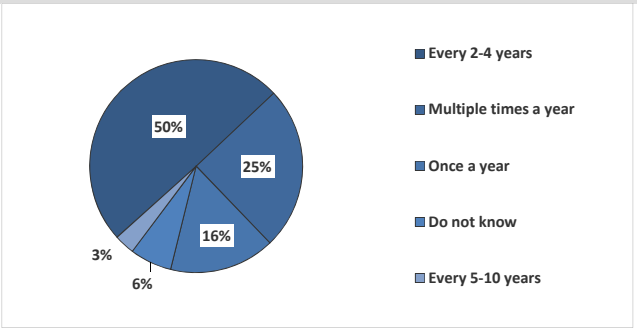


4. What type of septic system does your property utilize?

Answer Options	Response Percent	Response Count
Holding tank	41.0%	206
Conventional system	30.2%	152
Mound	15.9%	80
No septic system	8.5%	43
Advanced treatment system	2.6%	13
Do not know	1.6%	8
Municipal sewer	0.2%	1
answered question		503
skipped question		30

5. How often is the septic system on your property pumped?

Answer Options	Response Percent	Response Count
Every 2-4 years	49.7%	226
Multiple times a year	24.8%	113
Once a year	16.0%	73
Do not know	6.4%	29
Every 5-10 years	3.1%	14
answered question		455
skipped question		78

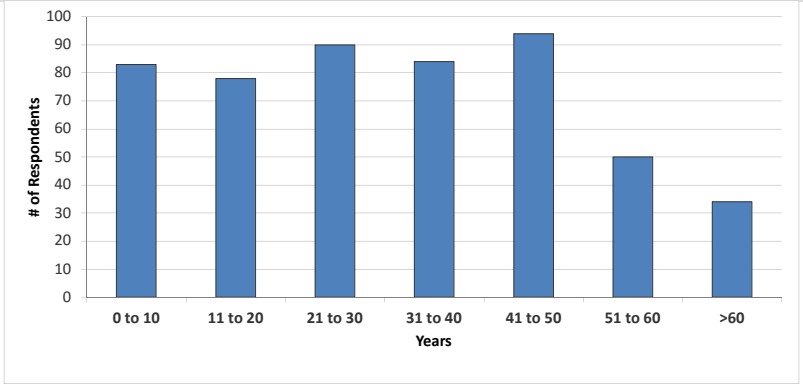


Recreational Activity on Lake Puckaway

6. How many years ago did you first visit Lake Puckaway?

Answer Options	Response Count
	513
answered question	**513**
skipped question	**20**

Category (# of days)	Responses	% Response
0 to 10	**83**	**16%**
11 to 20	**78**	**15%**
21 to 30	**90**	**18%**
31 to 40	**84**	**16%**
41 to 50	**94**	**18%**
51 to 60	**50**	**10%**
>60	**34**	**7%**



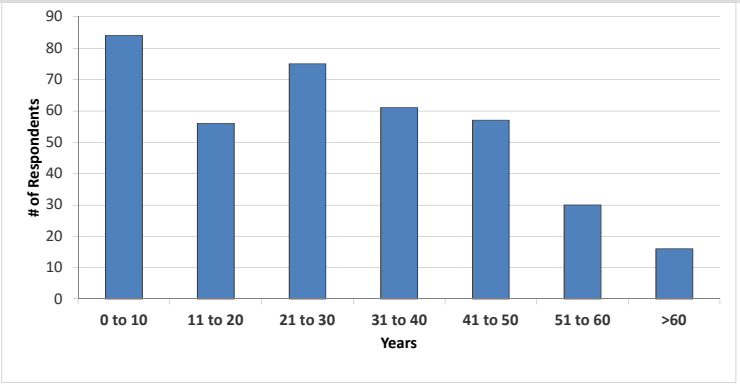
7. Have you personally fished on Lake Puckaway in the past three years?

Answer Options	Response Percent	Response Count
Yes	73.4%	386
No	26.6%	140
answered question		**526**
skipped question		**7**

8. For how many years have you fished Lake Puckaway?

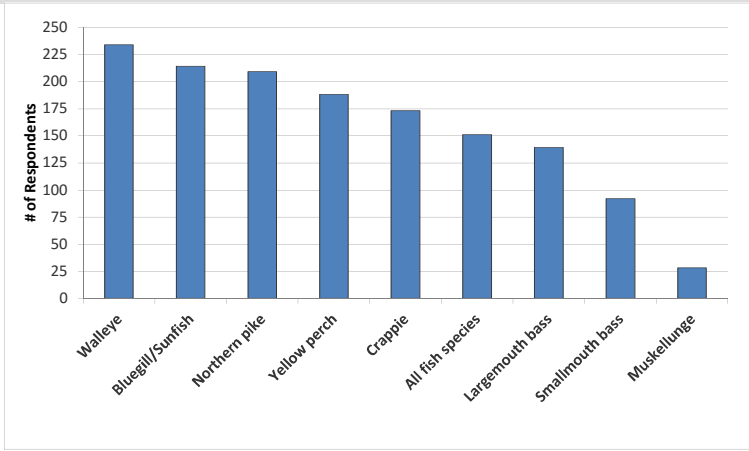
Answer Options	Response Count
	379
answered question	379
skipped question	154

Category (# of years)	Responses	% Response
0 to 10	84	22%
11 to 20	56	15%
21 to 30	75	20%
31 to 40	61	16%
41 to 50	57	15%
51 to 60	30	8%
>60	16	4%



9. What species of fish do you like to catch on Lake Puckaway?

Answer Options	Response Percent	Response Count
Walleye	60.8%	234
Bluegill/Sunfish	55.6%	214
Northern pike	54.3%	209
Yellow perch	48.8%	188
Crappie	44.9%	173
All fish species	39.2%	151
Largemouth bass	36.1%	139
Smallmouth bass	23.9%	92
Muskellunge	7.3%	28
Other (please specify)	10.1%	39
answered question		385
skipped question		148

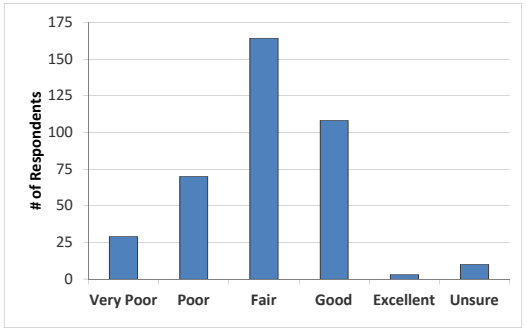


Number	Other (please specify)
1	catfish
2	Haven't caught any species
3	i like to fish for all but the damn DNR got this lake so screwed up its terrible and the lake district is no better
4	walleye northern

5	catfish	17	Catfish	29	CATFISH
6	Bullheads, Catfish	18	Any Fish	30	CATFISH
7	Fish occassionally	19	Flat heads	31	CATFISH
8	catfish, whitebass	20	Catfish	32	NOT CARP
9	Catfish	21	White Bass	33	CATFISH
10	Catfish	22	Cats	34	CATFISH/CARP
11	Catfish	23	Bullheads many years ago	35	CATFISH
12	Catfish	24	Catfish	36	CATFISH
13	Catfish	25	Catfish	37	CATFISH
14	Catfish, Sheepheads	26	CATFISH	38	bullheads and catfish
15	Catfish	27	TUNA	39	Catfish, Drum, Dogfish
16	Catfish	28	CATFISH		

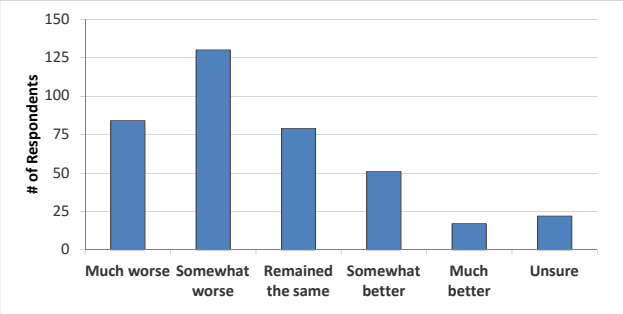
10. How would you describe the current quality of fishing on Lake Puckaway?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Unsure	Response Count
	29	70	164	108	3	10	384
						answered question	**384**
						skipped question	**149**



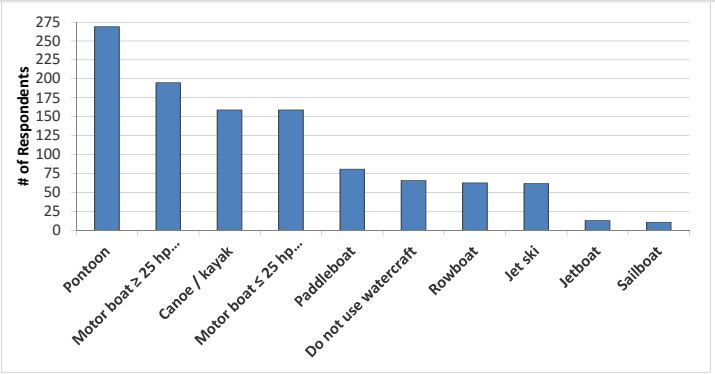
11. How has the quality of fishing changed on Lake Puckaway since you have started fishing the lake?

Answer Options	Much worse	Somewhat worse	Remained the same	Somewhat better	Much better	Unsure	Response Count
	84	130	79	51	17	22	383
						answered question	**383**
						skipped question	**150**



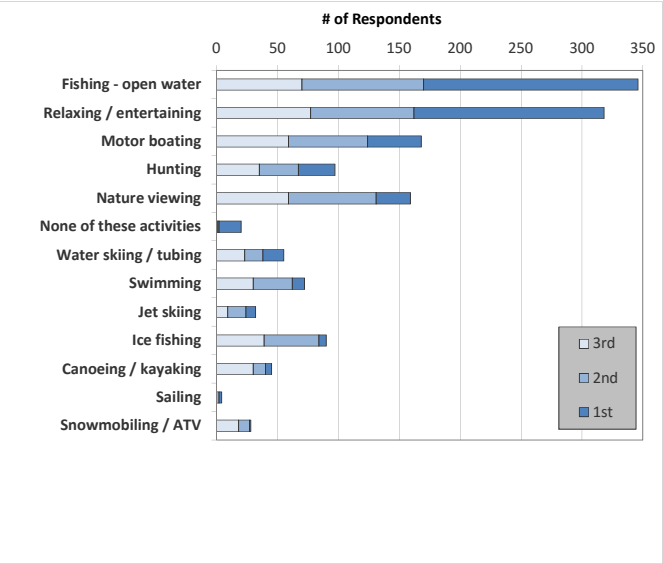
12. What types of watercraft do you currently use on Lake Puckaway?

Answer Options	Response Percent	Response Count
Pontoon	51.4%	269
Motor boat ≥ 25 hp motor	37.3%	195
Canoe / kayak	30.4%	159
Motor boat ≤ 25 hp motor	30.4%	159
Paddleboat	15.5%	81
Do not use watercraft	12.6%	66
Rowboat	12.0%	63
Jet ski	11.9%	62
Jetboat	2.5%	13
Sailboat	2.1%	11
answered question		**523**
skipped question		**10**



13. For the list below, rank your top three activities that are important reasons for owning or renting your property on or near Lake Puckaway, with 1 being the most important activity.

Answer Options	1st	2nd	3rd	Rating Average	Response Count
Fishing - open water	176	100	70	1.71	346
Relaxing / entertaining	156	85	77	1.75	318
Motor boating	44	65	59	2.15	168
Hunting	30	32	35	1.96	97
Nature viewing	28	72	59	2.09	159
None of these activities	18	1	1	0.74	20
Water skiing / tubing	17	15	23	2.02	55
Swimming	10	32	30	2.30	72
Jet skiing	8	15	9	2.05	32
Ice fishing	6	45	39	2.41	90
Canoeing / kayaking	5	10	30	2.49	45
Sailing	2	2	0	0.50	4
Snowmobiling / ATV	1	9	18	2.62	28
Other (please specify below)	11	4	9	2.21	24
Please specify "Other" response here					41
				answered question	**519**
				skipped question	**14**



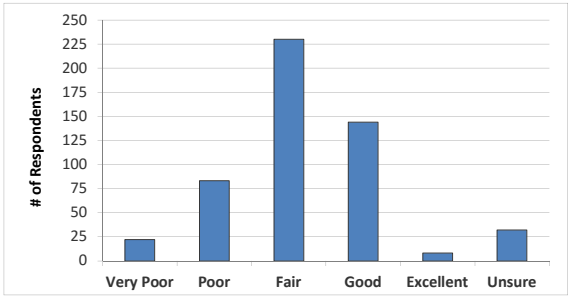
Number	"Other" responses
1	Duck hunting
2	we also fish off our pier, utv on ice, view nature & animals all year, pontooning to entertain & fish & take grandkids tubing
3	Kayaking
4	Peace & Quite
5	County living
6	Family
7	Family
8	Its home
9	Cutting Marsh thoy. Stop high horse power boats and go debils. limit areas of activity to encourage plant growth in Puck hunting areas to promote plant growth!!! Boat traffic kills plants!!
10	Water skiing/tubing---4th
11	Nature Viewing---4th
12	Family-- 1st
13	Flea Market Princeton--2nd
14	Do NOT want anything else built on Marquette Village side that will block my view. Those condos that were built were the worst possible thing ever! Not only are they ugly and don't fit in the atmosphere of our village, but they block the view of the property owners who were there first.
15	Shore fishing
16	a Fondable -- 1st
17	Pasturing Cattle-- 1st
18	Pasturing-- 1st
19	Put pets

20 FAMILY MEMORIES
21 PONTOONING
22 WILDLIFE HABITAT
23 RETIRED HERE
24 REGULATED AND CLEAN WATER
25 OWN A BUSSINESS
26 BIKE RIDING
27 FAMILY HOME
28 Family Owned Property for Years
29 Privacy
30 Relaxing, water skiing and tubing with grand kids.
31 trapping
32 Family summer home
33 Pontooning
34 water is so low in summer cant even get pontoon off lift
35 the key here is I don't own property on or near the lake how ever last i checked every person in the USA owns these lakes not the DNR or the lake district
36 disabled
37 wildlife habitat
38 handicap
39 Golf
40 waterfowl hunting
41 Access & Ability to Boat up River to River's Bend

Lake Puckaway Current and Historic Condition, Health and Management

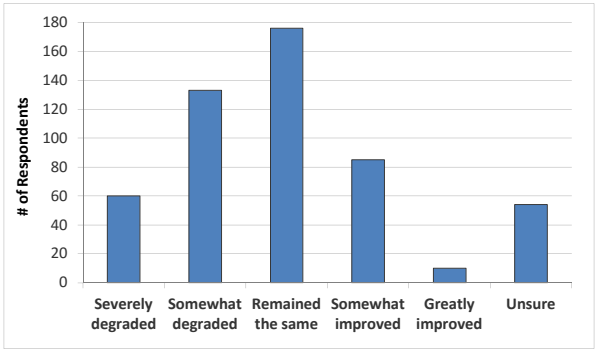
14. How would you describe the current water quality of Lake Puckaway?

Answer Options	Very Poor	Poor	Fair	Good	Excellent	Unsure	Response Count
	22	83	230	144	8	32	519
						answered question	**519**
						skipped question	**14**



15. How has the current water quality changed in Lake Puckaway since you first visited the lake?

Answer Options	Severely degraded	Somewhat degraded	Remained the same	Somewhat improved	Greatly improved	Unsure	Response Count
	60	133	176	85	10	54	518
						answered question	**518**
						skipped question	**15**



16. Before reading the statement above, had you ever heard of aquatic invasive species?

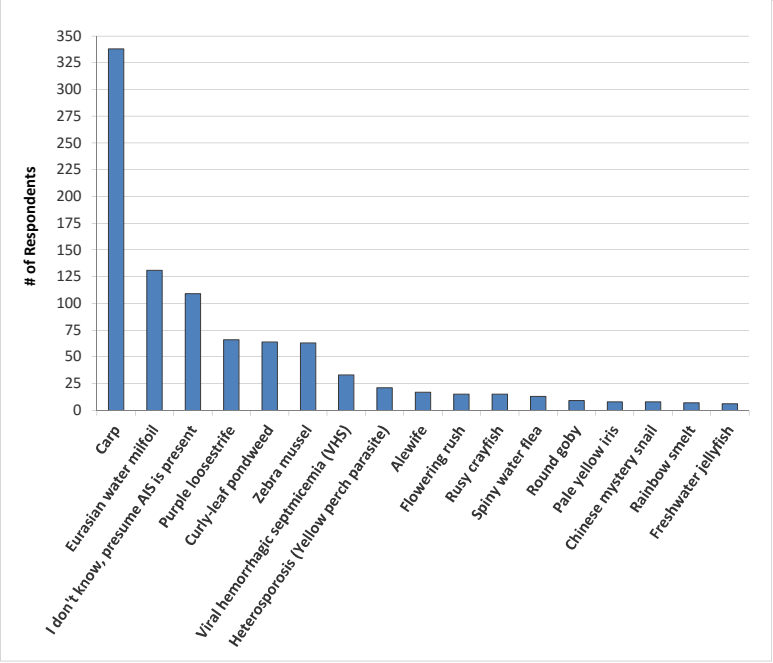
Answer Options	Response Percent	Response Count
Yes	90.9%	470
No	9.1%	47
answered question		**517**
skipped question		**16**

17. Do you believe aquatic invasive species are present within Lake Puckaway?

Answer Options	Response Percent	Response Count
Yes	87.0%	395
No	13.0%	59
answered question		**454**
skipped question		**79**

18. Which aquatic invasive species do you believe are in Lake Puckaway?

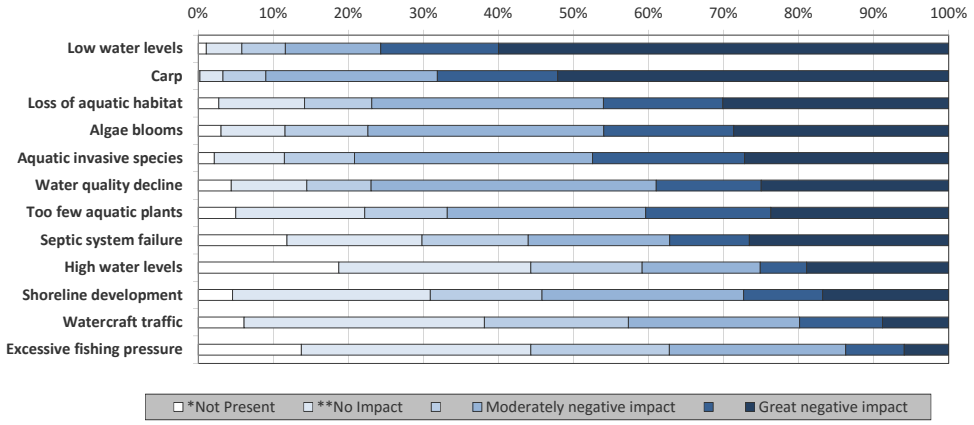
Answer Options	Response Percent	Response Count
Carp	83.7%	338
Eurasian water milfoil	32.4%	131
I don't know, presume AIS is present	27.0%	109
Purple loosestrife	16.3%	66
Curly-leaf pondweed	15.8%	64
Zebra mussel	15.6%	63
Viral hemorrhagic septmicemia (VHS)	8.2%	33
Heterosporosis (Yellow perch parasite)	5.2%	21
Alewife	4.2%	17
Flowering rush	3.7%	15
Rusy crayfish	3.7%	15
Spiny water flea	3.2%	13
Round goby	2.2%	9
Pale yellow iris	2.0%	8
Chinese mystery snail	2.0%	8
Rainbow smelt	1.7%	7
Freshwater jellyfish	1.5%	6
Other (please specify)	3.7%	15
answered question		**404**
skipped question		**129**



Number	"Other" responses
1	Overall Pollution
2	fishing has gone downhill since they started netting the carp and raised the size limit on the northerns
3	I am unsure of the name of the weeds that grow now by the shore
4	it muddys the water
5	Weeds
6	narrow Eurasian cattails
7	Very weedy along shore hard to swim.
8	Something that make my legs itch
9	Do not know plant names
10	Sheephead
11	NO CONTROL NEED DAM
12	WHAT EVER YOU FOLKS PLANT
13	NOT SURE
14	shad
15	dogfish

19. To what level do you believe each of the following factors may currently be negatively impacting Lake Puckaway?
*** Not Present means that you believe the issue does not exist on Lake Puckaway.**
**** No Impact means that the issue may exist on Lake Puckaway but it is not negatively impacting the lake.**

Answer Options	*Not Present	**No Impact		Moderately negative impact		Great negative impact	Unsure: Need more information	Rating Average	Response Count
Low water levels	5	22	27	59	73	279	36	3.02	500
Carp	1	14	26	104	73	237	43	2.99	498
Loss of aquatic habitat	11	46	36	124	64	121	77	1.99	479
Algae blooms	12	34	44	125	69	114	72	2.13	468
Aquatic invasive species	8	35	35	119	76	102	91	1.95	466
Water quality decline	18	41	35	155	57	102	79	1.86	487
Too few aquatic plants	20	69	44	106	67	95	79	1.78	480
Septic system failure	40	61	48	64	36	90	134	1.35	472
High water levels	82	112	65	69	27	83	38	1.35	476
Shoreline development	19	110	62	112	44	70	54	1.40	470
Watercraft traffic	27	142	85	101	49	39	40	1.26	481
Excessive fishing pressure	58	129	78	99	33	25	55	0.96	477
Other (please specify)									60
							answered question		**508**
							skipped question		**25**

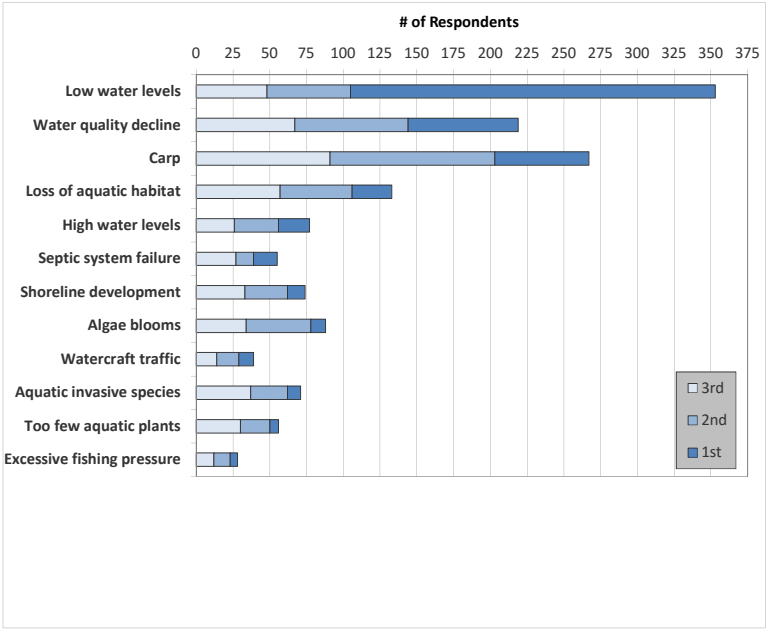


Number	Other (please specify)
1	Longstanding Pollution by Consistent Overuse of a Shallow Lake
2	Concerned about cows grazing on south shore and the activities of Gary Cahoon emptying his septic into the lake.
3	birds eating fish and contributing to water quality decline
4	cormorants, sea gulls and the DNR are destroying the lake
5	draining the ponds and dredging the ditches to drain the run-off into the lak
6	burning & pollution
7	years ago lots of wild rice and bullrushes.allowing large motors on this shallow of a lake is distroying the plant growth
8	keep the water level up year round you wouldn't have a problem
9	wonder about all the grandfather systems of homes and trailor resorts camps etc
10	snowplowing to lake from roads
11	Low water levels is a grave issue on Puckaway this lake could be a gem for the area!! High water levels could bring huge revenue to the area. Montello would benefit greatly, Lake Arrowhea would benefit greatly all areas around the lake would benefit greatly!
12	Grand River Marsh Dam - Great Impact? (Historic)
13	Other Great negative impact: Wildlife disturbance,
14	field run off
15	Shoreline erosion/pier usage
16	the original plan called for removal of the lock and dam not adding to it
17	we need a dam to keep the water level stable and higher
18	Water levels need to be better maintained!!!
19	Shoreline erosion, excessive boat traffic, high horsepower boats,
20	Silt is a major problem with it's issue with loss of acquatic plants, it has 2 feet of silt at the bottom that if removed would dramatically address the health of this body of water. Until silt can b signifantly removed, higher water levels are much more effective in terms of improved water quality than the continuous draining. Please get this silt topic added to discussion points as it seems to be a majorily ignored part which is likely the biggest issue with this body of water and it's long term health. Read up on this subject, low impact silt removal should be discussed, silt can possibly be sold as fertilizer
21	Birds that eat all the fish - great negative impact
22	Erosion--- between no impact and moderately negative impact
23	Fertilized farm run off-- between moderately and great negative impact
24	DNR---5
25	Cormorant birds
26	Water is always way low in the Fall and weeds are bad in August
27	inconsistant water level--- great negative impact
28	inconsistant water level--- great negative impact
29	inconsistant water level--- great negative impact
30	inconsistant water level--- great negative impact
31	Water level changes--- great negative impact
32	Too many people that don't respect property owners
33	Farm land runoff-- great negative impact

Number	Other (please specify)
34	No Current through Lake-- Between moderate and great negative impact
35	Resting waterfall in fall need hold over area -- Great negative impact
36	Dredge the channel | it is rumored that Gary Cahoon dumps raw sewage from his cabins into the lake during the middle of the nigh
37	All the sediment from upstream lakes and Grandriver Marsh used to be a sand bottom, its there but you can't find it. (Great Negative Impact
38	Comorants-- Great Negative Impact
39	Need dam/ control
40	Not respecting no wake zones--- (betweeen moderate and great negative impact)
41	Very poor water level management--- Great negative impact
42	Not respecting no wake zones--- (betweeen moderate and great negative impact)
43	Overpopulation and pollution of small shallow lake--Great Negative Impact
44	Farmers Run Off---Great Negative Impact
45	INCONSISTANT MGT OF WATER LEVELS
46	SILT UP TO 2 FEET HURTING AQUATIC HABITAT
47	FARM RUN OFF DRAINAGE DITCHES INTO LAKE
48	FEW PEOPLE CAN TRULY ANSWER THE ABOVE? RESULTS ARE QUESTIONABLE
49	CHANGING WATER LEVELS
50	FARMING
51	BIRDS
52	MUD BOTTOM
53	NOT INSTALLING DAM BOARDS ON TIME
54	EXTREAM LARGE MOTORS ON BOATS
55	POOP/WASTE FROM GROWNG NUMBER OF CATTLE BROUGHT OVER TO ZACHARY ISLAND FROM NEIGHBORHOOD FARMS
56	FISH MANAGEMENT WDNR 4
57	Open drainage ditches running into the lake with farm run off. This is by far the bigest problem on lake puckaway
58	controll water levels!
59	need the waterlevel to remain steady as it is currently
60	Low water level

20. From the list below, please rank your top three concerns regarding Lake Puckaway, with 1 being your greatest concern.

Answer Options	1st	2nd	3rd	Response Count
Low water levels	248	57	48	353
Water quality decline	75	77	67	219
Carp	64	112	91	267
Loss of aquatic habitat	27	49	57	133
High water levels	21	30	26	77
Septic system failure	16	12	27	55
Shoreline development	12	29	33	74
Algae blooms	10	44	34	88
Watercraft traffic	10	15	14	39
Aquatic invasive species	9	25	37	71
Too few aquatic plants	6	20	30	56
Excessive fishing pressure	5	11	12	28
Other (please specify)	5	5	5	15
Please specify "Other" response here				29
		answered question		511
		skipped question		22



Number	"Other" responses
1	Too many disrespectful people
2	Low Water Levels
3	Carp-- 4th
4	Too Many Weeds--3rd
5	dam needed
6	Appears unclean
7	Low water level--Big Problem
8	CORMORANTS
9	TRESPASSING/ENCROACHMENT
10	TOO MANY FISHING CONTESTS ALL YEAR--NEED FAR LESS CONTESTS
11	no opinion
12	Longstanding Pollution by Consistent Overuse of Shalow Lake
13	too many birds
14	the lake needs a set water level. not up and down.
15	cormorants sea gulss DNR
16	the agricultural run-off and pond drainage from cty c has greatly affected all aspects of the lake
17	The size limit on Northern is too large
18	Spring flooding dangers.
19	There is rumor that the lake is going to be drained due to work at the dam. This will be devastating to the lake--there are other ways to get this accomplished without draining the lake.
20	Fluctuating Water Levels
21	Decline in multiple Fish Species, Not just stocking walleye
22	chemical field run off
23	water levels not stable septic systems of resorts and homes not code old systems
24	weeds

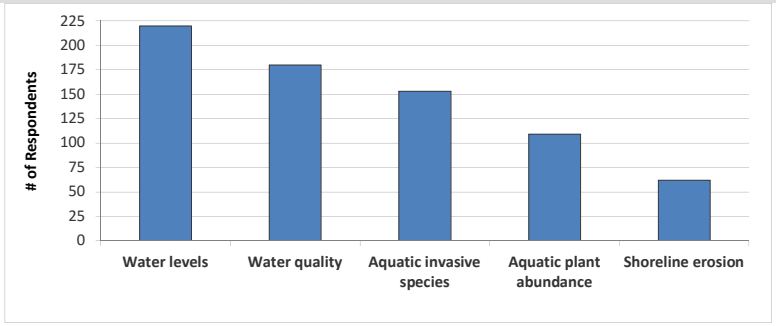
25	A problem with the lake is loose sand sediment an wave action look at the depth deviation of early studies compared to current . Forget putting more water in let current residence dig boat channels to the deeper water areas.
26	remove silt to improve water quality for long term acquatic improvement
27	Drainage ditches farm run off
28	Continueing discussion about dam removal
29	Dam Control, we need to maintain a higher water level.

21. Do you believe the management of Buffalo Lake impacts various aspects of the Lake Puckaway ecosystem? Please select one answer.

Answer Options	Response Percent	Response Count
Yes	61.2%	316
No	5.0%	26
Unsure	33.7%	174
answered question		**516**
skipped question		**17**

22. If you responded "yes" to Question #21, indicate below what aspects you believe are impacted. Select all that apply.

Answer Options	Response Percent	Response Count
Water levels	70.1%	220
Water quality	57.3%	180
Aquatic invasive species	48.7%	153
Aquatic plant abundance	34.7%	109
Shoreline erosion	19.7%	62
Other (please specify)	5.1%	16
answered question		**314**
skipped question		**219**



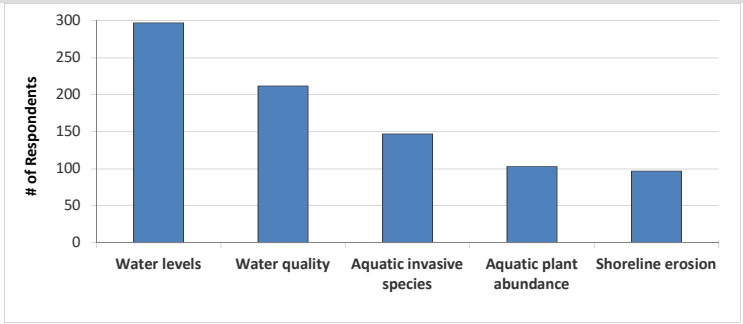
Number	"Other" responses
1	not entirely sure as B Lake was not in it's normal condition in recent years
2	when they cut weeds they come down the river and end up on our shore and lake for us to clean up.
3	DNR removes all the damns ,opens gates to the marsh ,floods where you think all this sediments go
4	all waters run together everyone needs to manage
5	It provides a source of cleaner water then the direct farm run off and failed septic tanks
6	The addition of a Fish ladder to the dam in Montello now allows easy movement of Carp and other Invasive Species between the two lakes. This will allow carp to run freely into buffalo and hide nicely in the weeds where siening is impossible. The negatives of Puckaway are now the negatives for Buffalo and vice versa.
7	cut weeds floating
8	Cat plants drift into lake
9	Fish Ramp to Buffalo lake
10	Sediment. Do dredging and you will have a quality lake system once again
11	Fish migration and reproduction
12	LOSS OF FISH DUE TO FISH LADDER
13	SEPTIC SYSTEM FAILURE
14	Water Quality; Aquatic invasive species; water levels
15	all of the above
16	all of the above

23. Do you believe the management of Lake Puckaway impacts various aspects of the Fox River downstream of Lake Puckaway? Please select one answer.

Answer Options	Response Percent	Response Count
Yes	70.4%	362
Unsure	22.0%	113
No	7.6%	39
answered question		514
skipped question		19

24. If you responded "yes" to Question #21, indicate below what aspects you believe are impacted. Select all that apply.

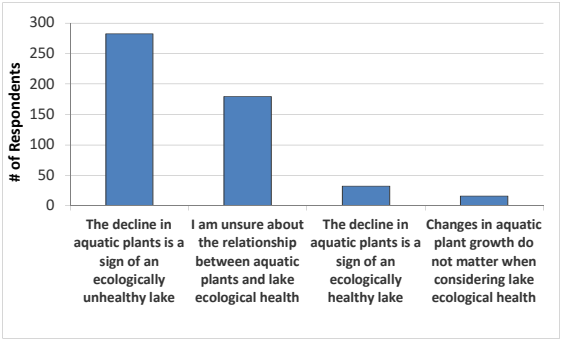
Answer Options	Response Percent	Response Count
Water levels	81.6%	297
Water quality	58.2%	212
Aquatic invasive species	40.4%	147
Aquatic plant abundance	28.3%	103
Shoreline erosion	26.6%	97
Other (please specify)	3.8%	14
answered question		364
skipped question		169



Number	"Other" responses
1	fewer weeds
2	Fish
3	once the lake can't handle any more sediment it will head downstream
4	Dam control
5	THINGS GO DOWN STREAM
6	soon puck away will be filled in with all this sediment you will just have a river running through it start dredging
7	anything that happens up stream runs down stream
8	Anything that runs down hill affects the next system
9	Fish Diseases
10	may not be a negative impact
11	Lake Puckaway's Fish Hatchery spawns fish for downstream lakes and rivers
12	water quality; water levels (temporarly)
13	all of above and this will not allow more than one answer again
14	all of the above

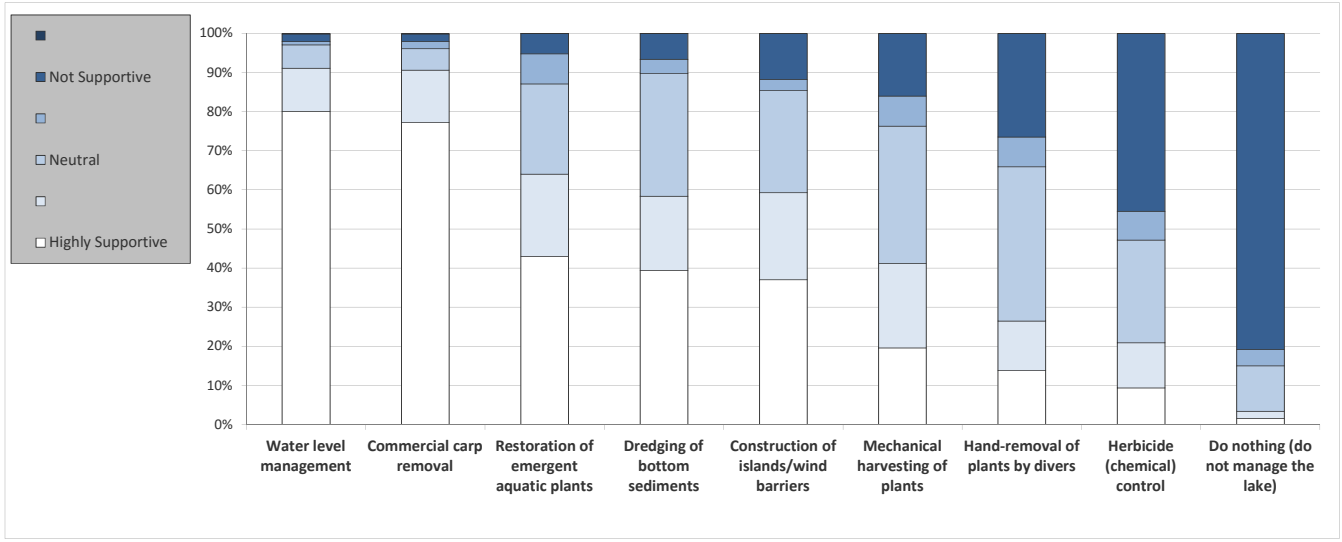
25. Aquatic plants form the foundation of a lake ecosystem and contribute to healthy lakes by reducing erosion and providing habitat for a number of aquatic animals. It has been noted in past lake management reports that Lake Puckaway currently holds fewer aquatic plants than the lake did prior to the 1960's. Do you believe the decline in aquatic plant abundance has had a healthy or unhealthy impact on Lake Puckaway? Please select one response below.

Answer Options	Response Percent	Response Count
The decline in aquatic plants is a sign of an ecologically unhealthy lake	55.4%	282
I am unsure about the relationship between aquatic plants and lake ecological health	35.2%	179
The decline in aquatic plants is a sign of an ecologically healthy lake	6.3%	32
Changes in aquatic plant growth do not matter when considering lake ecological health	3.1%	16
answered question		**509**
skipped question		**24**



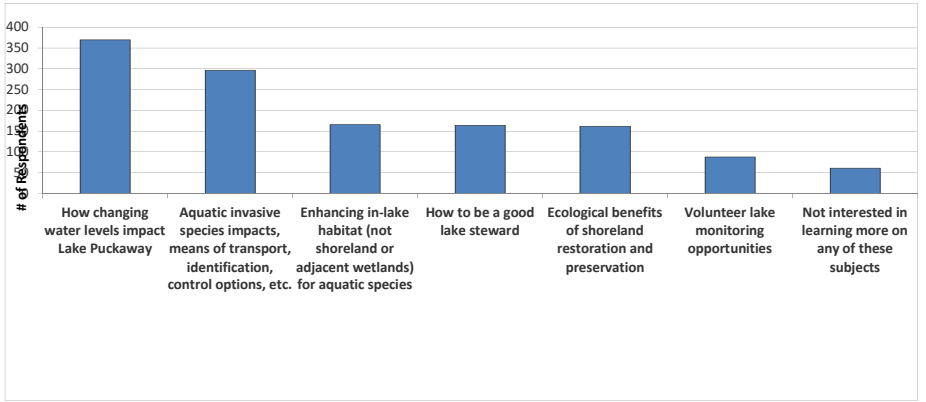
26. There are many techniques that can be used to manage aspects of a lake. Please indicate your level of support for the responsible use of the following techniques to increase the ecological health of Lake Puckaway. Please select one option for each management technique. If you require more information to respond, indicate "U" for Unsure.

Answer Options	Not Supportive		Neutral		Highly Supportive	Unsure: Need more information	Rating Average	Response Count
Water level management	9	4	28	52	376	34	3.36	503
Commercial carp removal	9	9	26	64	367	27	3.49	502
Restoration of emergent aquatic plants	22	33	99	90	184	58	2.29	486
Dredging of bottom sediments	27	15	129	78	162	77	2.18	488
Construction of islands/wind barriers	45	11	100	85	142	89	1.96	472
Mechanical harvesting of plants	62	30	136	84	76	82	1.51	470
Hand-removal of plants by divers	98	28	146	47	51	104	1.06	474
Herbicide (chemical) control	185	30	107	47	38	74	1.20	481
Do nothing (do not manage the lake)	307	16	44	7	6	49	0.92	429
							answered question	**515**
							skipped question	**18**



27. Stakeholder education is an important component of every lake management planning effort. Which of these subjects would you like to learn more about? Please select all that apply.

Answer Options	Response Percent	Response Count
How changing water levels impact Lake Puckaway	74.6%	370
Aquatic invasive species impacts, means of transport, identification, control options, etc.	59.9%	297
Enhancing in-lake habitat (not shoreland or adjacent wetlands) for aquatic species	33.5%	166
How to be a good lake steward	33.1%	164
Ecological benefits of shoreland restoration and preservatior	32.7%	162
Volunteer lake monitoring opportunities	17.7%	88
Not interested in learning more on any of these subjects	12.3%	61
Other (please specify)	5.2%	26
	answered question	**496**
	skipped question	**37**



Number	"Other" responses
1	The balance between lake home shoreline and non-human habitat of shoreline
2	How to stop disrespectful people that have more rights than owners
3	Why are we looking at draining the lake for dam repair?
4	Just Dredge
5	DAM
6	"Quit wasting time and get something done"
7	STUDY ON SILT REMOVAL FOR LAKE HEALTH
8	FILL IN DITCHES THAT RUN INTO PUCKAWAY
9	INTEREST-YES-CONSERNED-NOT SO MUCH
10	WHY DO DNR OR CTY NEED PERMITS TO PUT ROCKS ON SHRELINE?
11	WHEN WILL THE DNR ADMIT THAT WE HAVE MORE WEEDS IN HIGH WATER (DRAW DOWNS DON'T WORK)
12	FISH POPULATIONS-PERCH, WALLEYE ECT.
13	LAKE HISTORY
14	lake level is to low, constantly ruining propellers, landings suck, not enough of them
15	How to Stop Pollution casued by overuse that leads to destruction of healty lake
16	controlling access due to uncontrolled and unregulated campground and similar situations growth
17	Construction of a dam to keep water levels at an acceptable level.
18	seems lake has more weeds
19	disabled
20	#26 - we are not supportive if water level management refers to lowering levels.
21	Get rid of comeran
22	why cant all of the debri be removed from the river dead tree branches and such
23	What is the DNR doing
24	HOW TO plant on my shoreline and WHAT TO plant
25	How can we maintain a higher lake level
26	Cormorant removal!!!! They are eating the fish.

28-1. Princeton Dam Operation and Impact on Lake Puckaway Water Levels

Answer Options	Response Percent	Response Count
Ineffective at maintaining adequate water levels in Lake Puckaway	70.1%	356
No knowledge / Unsure of impact on Lake Puckaway water levels	15.6%	79
Effective at maintaining adequate water levels in Lake Puckaway	14.4%	73
answered question		508
skipped question		25

28-2. Princeton Dam Operation and Impact on Lake Puckaway Emergent and Other Aquatic Vegetation

Answer Options	Response Percent	Response Count
No knowledge / Unsure of impact on emergent and other aquatic vegetation	49.4%	251
Ineffective at maintaining emergent and other aquatic vegetation in Lake Puckaway	40.6%	206
Effective at maintaining emergent and other aquatic vegetation in Lake Puckaway	10.0%	51
answered question		508
skipped question		25

28-3. Princeton Dam Operation and Impact on Lake Puckaway Dam Safety

Answer Options	Response Percent	Response Count
No knowledge / Unsure of impact on dam safety	53.5%	272
Has provided unsafe dam conditions for maintenance crews and others	30.3%	154
Has provided safe dam conditions for maintenance crews and others	16.1%	82
answered question		508
skipped question		25

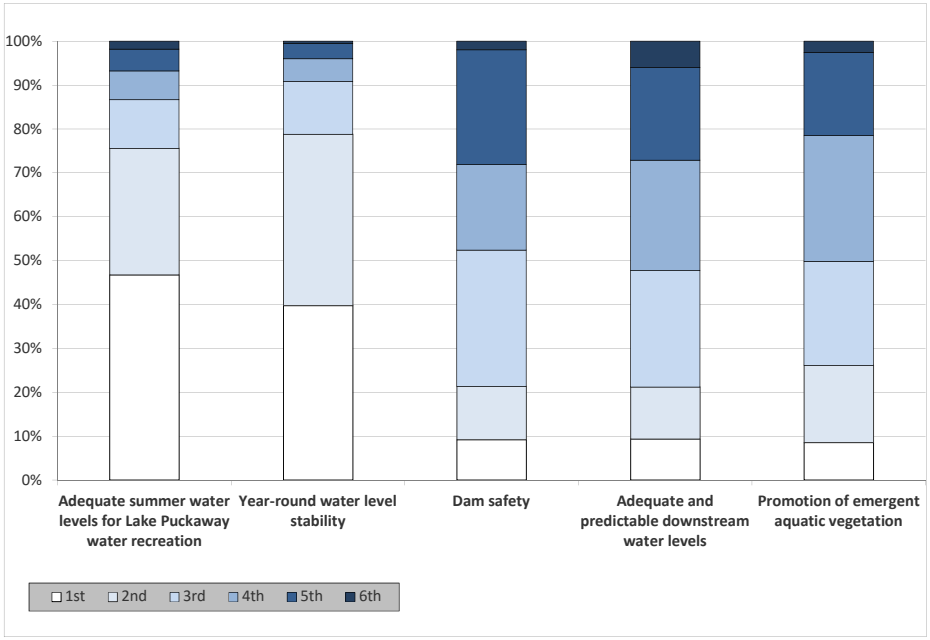
28-4. Princeton Dam Operation and Impact on Downstream Water Levels

Answer Options	Response Percent	Response Count
No knowledge / Unsure of impact on downstream water levels	48.4%	245
Has provided inadequate and / or unpredictable downstream water levels	39.5%	200
Has provided adequate and / or predictable downstream water levels	12.1%	61
answered question		506
skipped question		27

29. Which of the following factors would you like to see addressed in construction of a new dam in Princeton (downstream from Lake Puckaway)? Please select as many factors as you would like, with "1" being your top factor, "2" being your second rated factor, etc.

Answer Options	1st	2nd	3rd	4th	5th	6th	Response Count
Adequate summer water levels for Lake Puckaway water recreation	207	128	49	29	22	8	443
Year-round water level stability	182	179	55	24	16	2	458
Dam safety	34	45	115	72	97	7	370
Adequate and predictable downstream water levels	33	42	94	89	75	21	354
Promotion of emergent aquatic vegetation	31	64	86	104	69	9	363
Other (please specify)	4	8	7	2	9	21	51
Please specify "Other" response here							40
						answered question	**496**
						skipped question	**37**

Number	"Other" responses
1	Unsure
2	Stop summer water recreation in areas when plant life would return if there is no activity
3	Fish
4	Maintain the recreatonal quality of Puckaway during Dam reconstruction
5	Good luck
6	Water Quality
7	a new dam will accelarate the decline water quality
8	Constant overpopulation = pollution of small shallow lake!
9	Low water level big problem
10	PROVIDE FISH ACCESS
11	CLOSE DITCHES
12	ABILITY TO LOWER WATER LEVELS
13	ALLOW LAKE LEVEL CONTROL FOR PURPOSES OF IMPROVING HABITAT
14	DAM SAFETY SHOULD NOT BE CONTROLLED BY THE DNR
15	HIGHER CONSTANT WATER LEVELS
16	CARP REMOVAL
17	STABLE FISH POPULATIONS
18	FISH LADDER
19	SHORE LINE DAMAGE FROM WINTER ICE
20	Stop illegal & failing septic systems
21	keep vegetation off the lake
22	Adequate lake management board, educated and effective. This is currently not so, nor has been for years.
23	maintain adequate navigable water level until end of waterfowl season
24	set the water level for puckaway and leave it alone
25	Water level has not been satisfactory due to too late installation of the dam boards. It's my opinion that if you are trying tc keep something "full" don't let it go "empty" in the first place. A new dam will not help if the same people are calling the shots concerning water levels.
26	construct a new dam and maintain that level year round no removing boards



27	mamage all the floating and submerged tree and crab
28	Higher levels equate to more visitors which equates to more revenue!
29	The district has been talking about this issue for years. I wish something would be done so we can move forward.
30	Ability to effectively lower water levels
31	no opinion
32	reduce weeds
33	Meet the current clean water standards for everyone. Prepare for the cost to the district when the water system fails the future clean water standards and the down stream community hands the lake Puckaway district with the problem.
34	Allowing effective water level drawdown
35	Lock to go up or down river
36	Provide/ maintain water levels on Puckaway during reconstruction by using shoring
37	fish passageway
38	do not know where hiawatha lake is
39	Dam safety must attend any other options
40	do the right thing for all

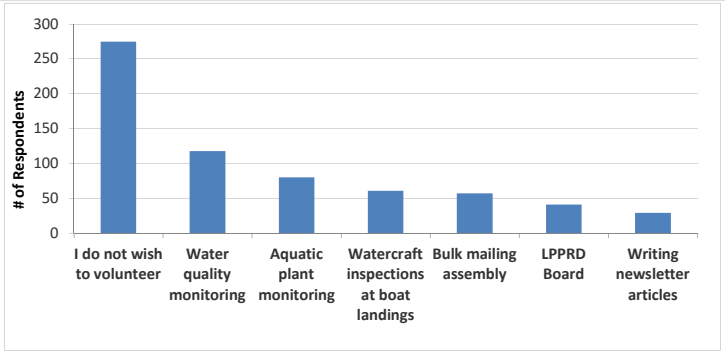
Lake Puckaway Protection and Rehabilitation District (LPPRD)

30. How informed has the LPPRD kept you regarding issues with Lake Puckaway and its management?Please select one choice.

Answer Options	Not at all informed	Not too informed	Unsure	Fairly well informed	Highly informed	Response Count	Response Count
	28	109	93	236	43	2.32	509
						answered question	**509**
						skipped question	**24**

31. Please note that because this survey is anonymous, your answer to this question will not be regarded as a commitment to participate, but instead will be used to gauge potential participation of stakeholders in the LPPRD.The effective management of your lake will require the cooperative efforts of numerous volunteers. Please circle the activities you would be willing to participate in if the LPPRD requires additional assistance. Select all that apply.

Answer Options	Response Percent	Response Count
I do not wish to volunteer	55.8%	275
Water quality monitoring	23.9%	118
Aquatic plant monitoring	16.2%	80
Watercraft inspections at boat landings	12.4%	61
Bulk mailing assembly	11.6%	57
LPPRD Board	8.3%	41
Writing newsletter articles	5.9%	29
Other (please specify)	8.3%	41
answered question		**493**
skipped question		**40**

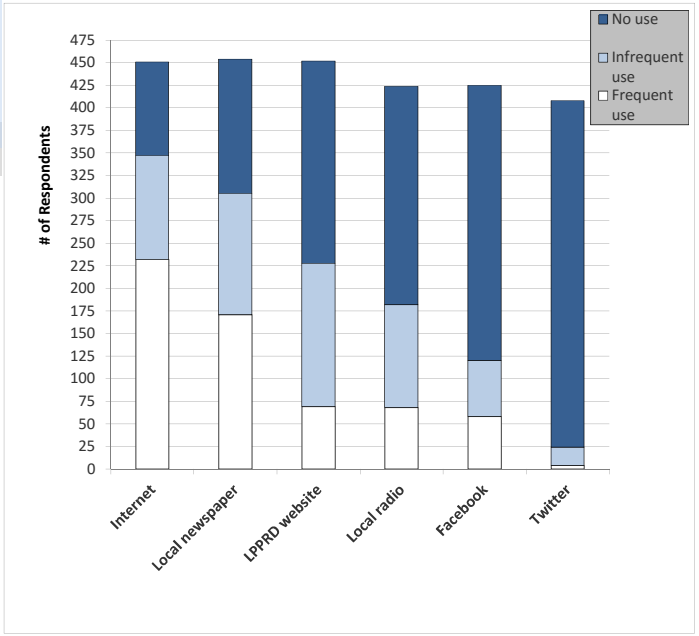


Number	"Other" responses
1	n/a till retirement
2	Can't volunteer because of mpy age!
3	not living there full time.
4	why do anything--the DNA runs it their way i dont believe the lpprd has any say
5	to old to help
6	At this time I would be unable to assist in any of the above activities.
7	i wish i could go fishing with my children and not have to through every thing you catch back in because it is not big enough this is not a trophy lake nor do we want it to be
8	handicap

9	disabled
10	Help gather signatures in protest over constant low water levels.
11	Anything to maintain and improve the lake water quality
12	Wiiling to help if i can contribute
13	Health reasons
14	I am too old 88
15	I will be leaving the area in the near future
16	[I do not wish to volunteer] at this time
17	[I do not wish to volunteer] at this time
18	[I do not wish to volunteer] due to age
19	Next year I'll be available [for bulk mailing]. [I do not wish to volunteer] at this time
20	Too old
21	I am considering selling my land because of disrespectful people, i want to be left alone, these people have more rights than I do it. Why should I pay taxes so snowmobiles can use my land fo free and whatever I do does not stop them, and disrespectful duck hunters that park on top of us
22	Not at this time
23	Not at this time
24	Any way possible
25	[I do not wish to volunteer] at this time but would like to later on
26	Out of state
27	Weed Removal
28	Anything you would do, the DNR would screw up, seen it way too much here (just dredge)
29	Work days
30	Whatever i am capable of doing
31	Water level management
32	Too old to volunteer
33	DONATIONS
34	HABITATE IMPROVEMENT ACTIVITIES, PLANTING PLANTS; REMOVING INVASIVE; ETC
35	IF IT IS ANONYMOUS HOW DID YOU KNOW WHO TO RESEND THIS TO?
36	DISABLED
37	ANYTHING I CAN DO
38	none
39	tern rafts, walleye hatchery, navigation buoys
40	not sure what it all entails from the tern rafts to the hatchery etc but i would like to be briefed and attend some meetings to learn. i assume others would also, but we do not know what i needed
41	I can't help at this time

32. Please indicate how frequently you use the following media sources to stay current on local or non-local news, current events, and your interests. Please select one use rating for each media source.

Answer Options	No use	Infrequent use	Frequent use	Response Count	Response Count
Internet	104	115	232	2.37	451
Local newspaper	149	134	171	2.01	454
LPPRD website	224	159	69	1.76	452
Local radio	242	114	68	1.60	424
Facebook	305	62	58	1.47	425
Twitter	384	20	4	1.08	408
Other (please specify)					31
				answered question	**485**
				skipped question	**48**

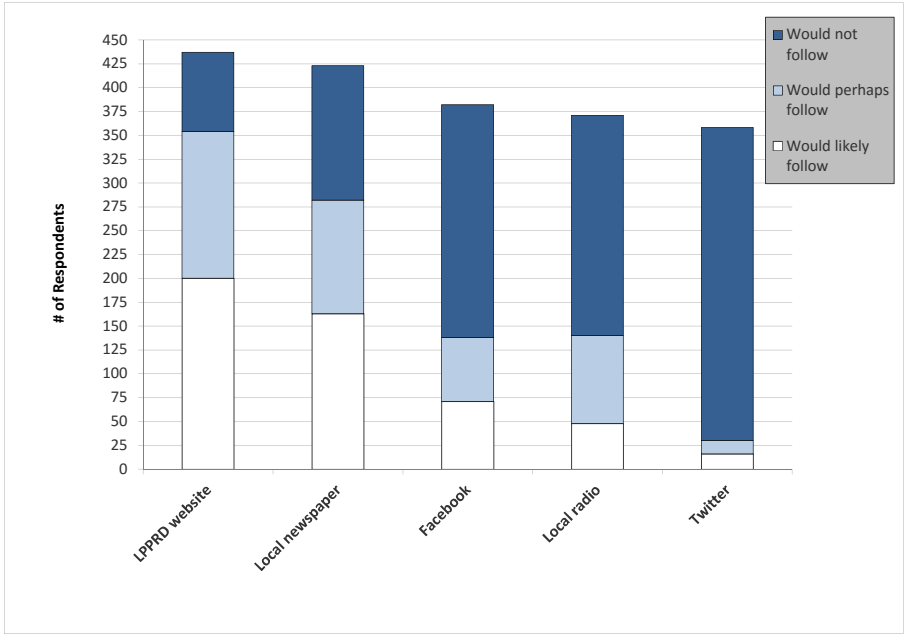


Number	"Other" responses
1	Wisconsin Outdoor News
2	I go on Puckaway Lake-Link daily.
3	TV NEWS
4	green bay tv
5	madison tv
6	Brochure in mail
7	madison TV
8	TV contacting elected officials with questions or talk to neighbors
9	National News, CNN, NYT
10	word of mouth which is usually gossip and wrong
11	(I didn't realize there is a LPPRD website)
12	TV for non local and would prefer email updates or info on a regular basis
13	mailings
14	Mail
15	Neighbors and local people
16	Newsletter
17	TV
18	Television-- Frequent Use
19	Word of mouth
20	Newsletter (frequent use)
21	Newsletter (frequent use)
22	Newsletter (frequent use)
23	WOULD LIKE TO SEE A BLOG ON WEBSITE FOR OPEN CONNUNICATIONS
24	WORD OF MOUTH (NEIGHBORS)
25	RELY ON MAIL
26	OUTDOOR NEWS
27	NEWSLETTER
28	DIDN'T KNOW THEY HAD A WEB PAGE
29	TALKING WITH PEOPLE THAT LIVE ON THE LAKE ALL YEAR--NEIGHBORS
30	none other than annual mtg noitice

33. Brief updates on the Lake Puckaway management planning project, aspects of the lake's ecology and lake water level management information could be provided through several media sources. Below, please indicate which sources you would follow in order to receive more information about Lake Puckaway. Please select one rating for each media source.

Answer Options	Would not follow	Would perhaps follow	Would likely follow	Response Count	Response Count
LPPRD website	83	154	200	2.38	437
Local newspaper	141	119	163	1.95	423
Facebook	244	67	71	1.57	382
Local radio	231	92	48	1.43	371
Twitter	328	14	16	1.13	358
Other (please specify)					40
			answered question		**481**
			skipped question		**52**

Number	"Other" responses
1	Mailings-- would likely follow
2	Newsletter (would likely follow)
3	Email-- would likely follow
4	Mailing info paper
5	Newsletter
6	Mail
7	Neighbors and local people-- would likely follow
8	Text to view website when changes addede --- would likely follow
9	Mail-- Would likely follow
10	Markesau/ Berlin Weekly
11	Mail-- Would likely follow
12	Newsletter (would likely follow)
13	I have poor or no internet receptiopn at this residence
14	Newsletter
15	Newsletter (would likely follow)
16	DIRECT MAILING
17	LAKE PUCKAWAY WEB SITE
18	MAILINGS & NEWSLETTER
19	MAILINGS
20	MAILINGS & NEWSLETTER
21	NEWSLETTER
22	LAKE LINK
23	EMAIL UPDATE
24	NEWSLETTER
25	LAKE LINK
26	MAILINGS
27	KIOSK POSTINGS
28	MAILINGS



29	Wisconsin Outdoor News	**35**	tv green bay
30	post in local public areas	**36**	madison tv
31	Newsletter	**37**	Brochure in mail
32	Please	**38**	FACE TO FACE MEETINGS
33	NEWSLETTER	**39**	TV Madison
34	Mailings or newsletters	**40**	I am connected buy restoration shore line projects which I am co founding with the Green Lake county

34. Please feel free to provide written comments concerning Lake Puckaway, its current and/or historic condition and its management.

Answer Options	Response Count
	221
answered question	**221**
skipped question	**312**

Number	"Other" responses
1	I don't have a large boat, but I have to drag the boat or paddle out about 100 yards before I can safely start my motor, I am very unhappy about that.
2	Lake Puckaway is beginning to deteriorate at an advanced rate. When the lake was left at a constant level through all seasons it showed great improvement. I feel that the lake draw down is ridiculous and unsafe. We still experience flooding routinely in the spring and that is with boards drawn out. Shoreline erosion is due to the lack of shoreline emergent weeds to protect from wind and waves. We have maintained a buffer belt of natural grasses to assist in deterring erosion and we have a base shoreline that has maintained it's position for over 100 years. Not man on the lake can say that because they have decided back in the late 70's and 80's that pulling bulrushes and natural emergent weeds and then running manicured lawn right down to the lake as being very important. It has come back to hurt those properties and now new owners are in place that are concerned about the disappearing shoreline.
3	You have done a good job,for witch you have had to work with.
4	I'm sure everything here is important 4 lake management, but it is hard 2 answer many of these ?'s when we are seasonal residents. We love the Lake, the area & the people. Please do what is best for the lake & it's users, be they fishermen, boaters, hunters, or plain water recreational users (swimmers). Thanks 4 all u do.
5	The reason we have a decline in healthy aquatic plants is a direct result of longstanding consistent overuse of a shallow lake that was not meant to withstand the stress of overpopulation. Trolling should be banned. No wake periods should be put in place. Too many people look at Lake Puckaway only from a recreational standpoint - they do not care about pollution from overuse or it's long term ecological health. They only want to selfishly use to abuse it for their own personal gain.
6	The LPPRD has done virtually nothing to maintain a consistent and usable water level which is the most important concern.
7	Need to keep the water level up.
8	please increase the lake depth it is annoying for the motor to be stuck in the mud. would like to sail on lake but too shallow for keel.
9	It is clear that the board would like to replace the Princeton dam. It is imperative that this effort be carried out by a temporary dam/water diversion system and not drain down the entire lak as Buffalo was.
10	Don't build anything else n the south shore and watch Gray Cahoon
11	Owner should be allowed to manage their shorelinesto protect against erosion without expensive permits
12	Lake is slowly dying for fishing and recreation and is becoming more of a place to do bird watching
13	I love this Lake!
14	Restoring habitat, cover, and food would have a very positive impact on migrating and local waterfowl. Years ago, Puckaway was a major waterfowl lake. The decline of the above has alsc contributed to the declining waterfowl.
15	The water levels have been a great concern for all users of the lake! This needs to change immediately to keep people coming back to enjoy the lake!
16	DNR needs to monitor the lake more often. Have heard people say that when the walleyes, gills and crappies are biting, they get their limit, take them to shore and go back out to get mor limits,
17	You need to get the good weeds to grow . Like 40 yrs ago bull rushes etc. Drain the lake down to promote . Duck hunting is horrible . No VEGETATION
18	fifty years ago this was a great lake for fishing. today it is a terrible lake-32 inch Northerns--stupidthat's why most people I know fish somewhere else
19	maintain better water levels and drop the size limit on the northerns
20	Stop carp netting May -June.way too much interference during prime fishing times.Public launches blocked to unload carp .Net stretched across lake shuts down any fishing on public wate while dragging game Fish all over
21	The lake has really changed the 58 years to the worst.

Number	"Other" responses
22	I think a new Princeton Dam would make a big difference on this lake.
23	Been coming here for the past seven years and we just love the lake and the whole area. The fishing has improved for me but that is a result of learning the system. I hope the lake doesn't hav to be drawn down for the dam reconstruction, don't want those forever weeds to form as I am on the north shore.
24	The water level is the worst problem, by August I have to take my boats out of the water! In the last 7 years , it has gotten worse
25	Since we entertain friends and family members via Pontoon, it has been very embarrassing when when bottom out and explain the low water problem. sometimes even having to get off the pontoon....not good publicity for a great area.
26	I would really like to see the building of a new dam and common sense used to maintain an acceptable water level. Letting the lake get so low and then deciding to add the boards or close then dam does not work once the typical dry summer months arrive. Very seldom do we get sufficient rains to recover from the low water levels.
27	I feel the carp removal program has been very successful in recent years and encourage it to continue even if it additional cost to property owners. Carp will never be eliminated do to upstrean influence(i.e. Grand River Marsh and Buffalo lake).
28	would like to see a more constant water level maintainedif possible and is done with out hurting the lake or the property on and around the lake
29	Lake Puckaway has declined under the current board members. They do not listen and act on the requests of the citizens. They try and evade answering questions presented to them. They have their own agenda. If someone volunteers to help unless they are a friend or good buddy they are turned away. The only time the need you is if they are in a jam. They fail to inform the public and think that an annual meeting is all that's necessary. They seem to think tax dollars are never ending and that its their agenda not the public. I wish the board would disband because very little is being accomplished.
30	I feel that good water stewardship is essential for our survival
31	The biggest problem I see is the water levels to low,not a lot of panfish and a 32 inch size limit on pike.
32	You would only need to visit Lazy lake Fall River to see what a real dam system should look like. I grew up on this lake 74 years ago. Water control is a joke. Cant remember the last time i caugh panfish or bullheads on the lake.
33	This lake has gone down hill for years ,all the sediment that has come down from the marsh and removal of damns Buffalo lake the DNR does absolutely nothing to clean the lake but can come up with excuses , low water levels from the Princton Dam only hurt the lake . You talk about no vegitation low water levels in the winter ice freezes at that low level and wind and ice flows tear the vegitation from its roots and all this sediment it can't grow , the size limit on the northern is foolish, you caught more and bigger fish when there was no size limit again you can blame the DNR and the individuals who want trophys, fishing is not for kids anymore ,all this is how i feel and many others share the same opinion.
34	Keep up the good work. I admit that I am not very knowledgeable regarding the management of the lake, but I have seen newsletters indicating that there are a number of people activel involved with the management of the lake. It is much appreciated.
35	the effort to establish emergent vegetation over the past several years was worthwhile to the extent that we now know that it will not work. The sacrifice on water level during the summer is a high cost to recreational water users as it affects boating, fishing (too warm) and fosters excessive algae blooms in late summer. The new dam should maintain a water level at least 14" higher than the "no boards in" level. 18" higher would be perfect. Lake shore property owners should also be given the opportunity to participate in a emergent vegetation management program adjacent to their shoreline...with plants and instructions (possibly guidance) provided by the LPPRD and/or DNR representative. Let's get people engaged in helping...not just complaining.
36	I have seen the decline of fishing and lake over the years seems like we have more weeds, more floating debri and the corrants killed off the island and have moved to another location and killing off the trees. Chased the Eagles farther away. People call it the dead sea.
37	lake has rapidly declined over the years. water quality fishing and the growth of algae and weeds
38	Keep up the good work
39	Water quality and clarity is a big issue for trying to swim in late summer. Water levels change to often, making piers, and beach water activities hard at times.
40	We love this lake. It seems to me that ever since the regulation went to the 33inch slot limit, it has hurt the population of the Northern Pikes. Water levels have impacted our use of the lake which has been disappointing over the years. We just had to replace our septic, which was a financial burden, and welcome any additional info on impact on septic systems. Thank you for taking the time to communicate with stakeholders.
41	See lotus bed restored. Get wild rice back. Get ducks back.
42	Keep water levels at a natural level for this lake. Don't do anything special for recreational uses. Shore line erosion is an issue.
43	Water level stability is a very important issue to me. A boat lift is rendered useless when the water level drops drastically - as it has virtually every year - half-way through the summer.
44	Unhappy at the low water level of the lake in the summer months. We are unable to get our pontoon out on the water when it is so low.

Number	"Other" responses
45	I'm glad to see that the County has done more to clean up the blight areas of the North Shore. It was a great improvement seeing the trash trailers etc removed from the area just to the East of the Good Old Days. Yet there are still some unkept places along the shoreline. The low water levels are the most heard complaints. our lake loses out on vacationers who would rather go elsewhere just because of the levels. There could be so many more advantages getting the levels high and keeping them high. Regarding the work on the dam. Lowering Puckaway would be a disaster and travesty. redirect the water at the dam---but don't drain the lake. If that happens one of the best campgrounds around Lake Arrowhead will suffer the consequences and we wouldn't be able to give our properties away. Let's think about those of us who have had a history here and who love it here....we all pay taxes as well---we should expect a Lake that we can enjoy for swimming, fishing, boating, skiing etc....and should not have to be concerned about how we are going to get our boats in the lake or out---because the levels were lowered. This is the one way you can save our Lake!! raise the levels and keep them raised. generate revenue for the preservation of the Lake by making it the recreational lake that people want to use.
46	I have noticed the duck migration pattern has changed. What is being done to address this if anything? Also, the carp and drum population is out of control and are damaging this lake back to 1970's conditions. Nothing was mentioned about the Grand River Dam in this survey, only Buffalo Lake. Nothing was mentioned about the cormorants unless this was inherent in the invasive species questions. Finally, what can be done to bring back the bull rush population?
	Take the necessary steps to bring back the lake to life! It is up to all of us to do our part, but it is up to you to lead us.
	I thank the district for their past and futures efforts.
47	The LPPRD is doing a great job. My only concern is with the proposed Princeton dam construction and the possibility of a draw down, which we need to avoid as much as possible.
48	20 yrs ago the lake was more clearer pan fish were more plentiful, and now at times the water is extremely smelly and dirty. needs to be dredged to promote better plant life
49	We love Lake Puckaway, and we are VERY upset over the current weed conditions...it is almost as bad as Buffalo Lake. We moved from there and don't want to move from Lake Puckaway..Please address the weeds asap
50	The last two or three years we have seen an ever increasing ugly weed increase on the north side of the lake. It is starting to look like Buffalo Lake. This is not why I came to Puckaway to rake weeds off my water surface. I'm very concerned that these weeds are on a rapid increase and no one is doing anything about it. I also can't wait for a permanent solution to the water level with a fixed damn in Princeton will do.
51	I have been using this Lkae for over 50 years and with in the last 15 years or so the water level has been dropping downing the summer so low you can not use your water craft,pontoons and boats ,,At this time you are unable to fish . Why do you own land on or around the lake if you can not even use the lake for fishing.. or water sports ... Please address this in a news letter to all the owners
52	Keep water levels HIGH . With dropping the water levels you can not use your water craft and the fishing also hurts downing the summer months. With higher water you are able to fish from your piers along with your pontoons. Limit the fishing Tournaments on the lake
53	Please keep the water levels HIGH,It is very disappointing every year when you put your water craft in in the spring ,,you are unable to use it all year seeing the water levels drop so low you can,t get your boats/ pontoon OFF THE LIFTS. Fishing is much better all around the lake when the levels stay high . We should not have to worrie about An other lake/ I was told Green Lake needs our water . What about the people paying for Lake Puckaway.Please keep monitoring the Carp and removing them as needed . Thank you
54	There is too much focus on summer recreation and not enough on overall lake management. High water does not equal lake health. Part of the District's name is Rehabilitation. Let's rehab this lake to it's historical condition when hunting was great and fishing was record breaking. This lake could be restored to its fishing greatness and break its own northern pike state record. That's when resort business was at its best as well. Take proper care of the lake and the lake will take care of you!
55	It is very important to maintain summer water levels. There is way to much fluctuation
56	VARY CONCERN ABOUT FLOODING AND HIGHWATER LEVELS.
57	Very pleased by the efforts to manage the health of the lake.Interested in information that as a year round south shore "Weekender" what we can do to do our part.
58	Over the years Puckaway has been dying. Fishing of Perch nothing. use to catch 50 per day limit years back in the day ducks were plentiful too
59	Haven't felt anything has really improved since the LPPRD was formed Years people have been asking for stable water levels. Seems too many weeds fishing is very very poor. The lake has suffered many disasters in the past few years with heat wave, fish dying water levels. No Perch a lot of debri from the high waters
60	The management group has worked very hard anddone a very good job. Applying for dam funds takesa long time.
61	Would like to ease restrictions on creating a more appealing and protective shoreline on owners property. Too restrictive!
62	The low water levels combined with increase in silt levels are of great concern.
63	LAKE PUCKAWAY HAS MANY NICE DESTINATIONS BY BOAT.LOW WATER OFTEN PROHIBITS THERE USE.LAKE IS NOT JUST FOR FISHING
64	We need a dam to keep the water level up at all times
65	Please try to keep water levels up during summer holidays!

Number	"Other" responses
66	The present board has done an excellent job protecting and improving the Lake quality over the years. It is a job that requires dedication and hard work. I am not a board member! I thank al who are and have been board members.
67	More stable water level in the summer
68	It is hard to get off lifts and into lake because of low water and weeds tangle in motors. Lake quality is such that you would not want to swim in it.
69	Stop chasing water levels to pay for someone to purchase a bigger boat. it's about water Quality in the long run. Let rich landowners dig there own boat cannel a. DNR permit/regulate spoils b tax it as a property improvement $ c. then Stop putting boards on dam every year. Natural inexpensive solution for water plant and fish improvement. Trade off for the boat channel access program to existing domicles for low water chance with boards of one in 6 years.
70	The towns and counties are going to need to address the septic issue. The drain fields are saturated with water water during high water periods when the water system floods. They fail. We do not want to get tagged with the responsibility of solving surface water problems for other property tax districts on the Fox river system
71	My biggest concern would be water levels in the open water seasons.
72	Past management of putting boards in/out of dam has been a joke and bunch of poor excuses. This has cast a negative spotlight on the LPPRD board of directors. I know the board does it's bes but I don't think a lot of people trust the board members anymore. I hear comments that some board members have their own agendas and that's all that matters to them. Maybe that is why the turn out for the LPPRD meetings is not better. Good luck!
73	The lake is a MESS! I pay a HUGE amount of Taxes to Live on and Enjoy the Lake.Every year the taxes go up and the lake water level goes down!!! If I wanted to sell my property, it would be virtually impossible due the Lakes Condition...I am sick and tired of all the Talk, it's time for some action...If the water level got any lower there would not be any water at all.....
74	A stable water environment has always brought about the best situation for the fish and for the habitat(weed growth). A removal of sediment and recreation of an Island would in turn creat a positive response in the lake. By dredging it would actually lower the lake level by increasing the main lakes depth and would then allow the shorelines to grow emergent plants out further i the Lake. One control can benefit much.
75	water level inconsitentcy and floating weed bogs really a problem
76	I have lived full time on Lake Puckaway for 24 years now. And own two homes on the lake that are full time residences. I have seen this lake go through many changes in my life. Excellent fishing when I was young. The lake died off for many years. (kind of funny the same affect as routinone) I have done a study on carp and there control and believe the best control practices is to increase the preadators.While the netting of carp is only good public relations. Dose anyone Monitor these netters and what they are doing on a day to day basis!!!!!!! Or do they just do what they want. I currently hold a current state of Wisconsin Commecial Aqautic Applicator. I have seen tax payers money wasted for many years on puc. Leaves a bad taste in your mouth. Tw districts that could not get along. I do not attend meetings for this reason. It is easy to sit and write this but I should not be able to critize the district as I do not participate. But you sent the card.
77	You need to get a handle on the water level. Summer levels are very disappointing. The whole area gets a bad name and loses tourist money
78	I support a healthy lake
79	Lake Puckaway conditions are almost worthless. Water is too low, which makes it impossible to get into any boat before walking out 400 ft to run motor. This has caused vacationers to cance or make this a one-time visit, even with your little 12 ft. boats. No older person wants to do this. Also more could be done to protect the north shore, which washes out at least a foot each year. Thank you for asking.
80	I would like to see the water level management done better.
81	The Lake District must do a better job of informing the public about lake management and activities. Current public information is inadequate. Too many people know too little about decisions made by too few.
82	Over the years, management has done a good job with its limited funding & deaf, slow to respond democract DNR! Fishing & duck hunting was much better 45 years ago. Let's make Lake Puckaway Great Again! TY Cathy S.
	Am very concerned about the low water levels and lack of good fishing in this lake. It has steadily declined and continues in a downward direction. There appears that more is being done t attract birds than to improve the lake and its fishing. Would be an economic boon to the area to restore its once great fishing reputation.

Number	"Other" responses
83	The lake level management has been pretty brutal over the last several years. Lowering the lake level has not appeared to help acquatic quality based on what I have seen. The 2' of silt appears to be the biggest issue with this body of water based on 100 years of biological build up on the bottom that is not going anywhere. By removing mass amounts of the silt, it will lower the lake level in the main basin and will certainly help address the issue that the water quality comes into Lake Puckaway fairly clean and leaves dirty. If we really want to address the long term viability of this body of water for both plants and fish species. We have lots of data that has been collected, can we work on trying to get some state/federal grant applications to try and clean up the lake bottom so that it can start to rebuild back to health? It may be good to network with a similar style lake as well for techniques, a similar lake to Puckaway in Michigan is Houghton Lake, I believe it would be very interesting to reach out to their lake management to see what Michigan is doing differently over there or ideas on what has or has not worked for that body of water as another idea as Michigan DNR has been pretty good on lake management over the years over there. Thanks for doing this, it has been nice to be able to communicate out some concerns and ideas, we all want to see Puckaway here as a great family destination for generations to come.
84	A draw down on Puckaway will effect fishing on the Lake for five to seven years. I would hold the lake water level before dam reconstruction. There are a lot of seniors and there families on th lake not very promising for the next five the seven years.
85	Fantastic that LPPRD has the Walleye Hatchery and has released so many fry. Like the work that they are doing with removing of carp, hatchery, aquatic plants, endangered terns, cormoran removal and buoys.
86	Please keep the water levels high - it benefits all the businesses, livelihood of lodging providers and property values of everyone around and upstream from Puckaway.
87	I would like information on how we, as lake-front property owners, could maintain weed and plant-life control along our shoreline so we could swim. I like having plant life further away fo fishing off the piers. We have wonderful sandy beaches which go out as far as waist-high, but plant-life, whether evasive [invasive] or not, is taking over the swimming areas - since I've owned my lake home. It's getting more uncomfortable to swim
88	Spent the winter in Florida that's the reason for delay
89	I know lake link has fishing reports but not really helpful. How about a webcam at Good Ol Days for lake laughs and ice formation. Keep up the good work and thanks.
90	I read all mail
91	Another survey!? Why the expense? Just review the last 5...nothings changed! Improve/replace the damn dam! Where's the "special" Dam Fund! Dredge silt and create structures with silt!
92	When the Princeton Dam is replaced, you need to find a way to do that without draining the entire lake. Walleyes are coming back. We don't want to lose that momentum. Thank you!
93	In the 9 years since we purchased the property we've seen the lake conditions deteriorate to the point we are selling our property and searching for a cleaner and friendly lak
94	Its current condition is just awful! Its current management stinks!
95	Dam management to keep lake water levels up and consistent. Levels drop over 2 feet between spring and summer. Dredging of North side shoreline and deepening of lake
96	Keep the DNR our of Lake Puckaway. What is the use of the LPPRD when the DNR runs it.
97	Thanks for the survey. FYI your postcard arrived 3 days AFTER on line due date
98	If water levels were stabilized at 12-16 inches higher than recent low levels the past few years, then emergent plants would have a chance to grow along shorelines with proper depth. Bul Bushes and Reeds would also grow. Meanwhile it would meet the satisfaction recreational users. Landowners and others should be given the opportunity to plant and reestablish aquatic plants with LPPRD assistance.
99	It is important to us that the water level is maintained at a useable level for boating and pontooning. When the water level gets too low we can't even get our boats, etc off the lift The lake isn't even pleasurable to look at when the boards are not put in early enough to hold the water in.
100	This lake has gotten worse and soon to be DEAD!!! The drain down will kill it!!
101	great care should be given in preseuy [?] the water level and water quality up the lake to retain property values and if possible revive property value
102	The lake levels are horrible
103	Very nice work! Thank you!
104	Thank you for all your volunteering and work at managing but anonymous - but I received survey?? Really??
105	In our many years problem with consistent water levels is very important. All we ever heard was are the boards on in spring-- answer NO. Water too high. No insurance available. Who is authorized to do this? That question NEVER answered. Some early spring low water level from winter run off. yes no board put on until May.
106	You can tell by the questions that you are trying to increase navigation by controlling water level. The question about vegetation compared to pre 1960 doesn't mention that the lake wa always unusable because of the vegetation at that time
107	Donna Warth died last April. I have not been up there in years. I have family that has.

Number	"Other" responses
108	I believe one of the major decline of vegetation in the lake is due to carp. I have noticed in the last 2 to 3 years we have more vegetation due to the commercial fishermen doing an excellent job. Low water levels in summer with boating activity creates lots of turbulence in the water resulting n less sunlight and which its plant growth
109	I plan on moving next year so I will be more involved at that time
110	My husband and I have spent a good part of our life at Lake Puckaway. Also our four children. First we rented a cottage from Mrs. and Mr. Hopeks. Then we rented a spot for a small trailer fron Hank Dopek. and we liked it so much we bought a piece of land from Hank for a bigger trailer. The water was clear for swimming. The fishing was great. The water is not clear anymore. The fishing is not as good anymore. My wish for Lake Puckaway is to have it as we did in our lifetime. Good Luck
111	Keep water level the same year round. In the fall the level is too low
112	The lake was great, as was the fishing until the draw down approximately 20 years ago. Until that time we had vegetation growing in front of our property and I had no problems catching a wide variety of fish. After the drawdown the vegetation disappeared and the quality of the fishing had never been as good.
113	Fix the dam. Keep the carp out. If water levels stay the same the lake will be fine
114	It was a wonderful lake when I was young (40s and 50s). We had a slide and an area to swim. Boating was good.. Fishing and hunting were great. I do not use the lake anymore so I don't keep up with all this. Sorry. Good Luck!!
115	If you get rid of disrespectful people the lake would be better off. Stop the use of GoDevils and limit horse power on boats. Stop snowmobiles from trespassing on private property when I pu signs up and ribbon they just wont around on ran it over. Go Devils will run over wild rice and ruin whatever they want and argue that they are legal. some people will park within 100 yards of my old hunting buddys blind and wont move because they are legal. I call it disrespectuf, my buddy has been hunting that corner for over 50 years cant these people leave us some space? There should be a ensonceable law on boats parking by blinds!
116	The current management condition is good
117	Water levels are the only real concern. Fishing is always good.
118	It seems every summer the water is drawin down too low for boating etc. Because I had heard that they lower the level of the lake for the duck hunters which I think is causing all the negativ things you hear about this lake. Hopefully this fall the lake will not be lowered because that affects the ice fishing. The last two years I have not went ice fishing. Until I see the water levels stay up I will not use this lake at all for any type of fishing.
119	From when we bought our hunting land (used mainly for duck hunting), there has been a drastic down turn in the ducks that stop over on this lake. I don't know the answer but would sure lik the vegetation to come back.
120	Clean the river. Take out tree in the river. ones that are in the middle of the river.
121	Every August we have to pull our boats out and take to Madison because they are sitting on the sand! The lave levels are horrible! Never consistent in 6 years.
122	walleye wangon is a good thing. Wood hope it wood ged bigen. Plant more grass ilands.
123	We love the area but is embarrassing when entertaining guest in August in the river/lake levels are so low you bottom out on a pontoon ride as you are showing the great features of the lake Some how there must be a way for both using the water as recreational and fishing.
124	What is the DAM construction going to do/ effect the fishing and hunting on Puckaway. What is the restoration process? How long before we have a lake?
125	I am pleased that the condition of the lake is always being addressed. I would like to see more beaches developed along the lake. Thank yo
126	35/40 years ago I purchased an undeveloped piece of property with the thought for recreational use. being 190 miles from Puckaway I have only frequented the property perhaps 5 times in that 35/40 year period. As I'm getting older and retired my thought is to perhaps have one of my children find interest and possibly enjoy it as I have not. It will remain within my family.
127	Water levels need to stay higher.
128	fishing has gone down due to water levels being too high or too low
129	The future for this lake is looking better every year. Keep up the good work.Thomas G Zodrger [?]
130	I am in favor of doing whatever is necessary to the Princeton dam that would maintain a decent water level during summer months. The "boards" are usually put in way too late. My theory is if you're trying to keep something full, don't let it go empty in the first place. I can't believe safety is a legitimate excuse for the boards going in so late.
131	I hate fishing just like to relax and enjoy beautiful sunsets and relax.
132	The fishing has greatly deteriorated over the past 50 years. (I used to fish in the late 1960s until present time The water quality is getting worse as well. It is a beautiful lake in a beautiful setting. I would love to see better fishing and cleaner water for wildlife and water sports.

Number	"Other" responses
133	I don't know if this is the proper place to say this but I am very concerned about the raw sewage that I HEAR is dumped into the lake at night by a certain resort owner. Also concerned about the cattle that are able to "poop" right on the water's edge too.
134	I've lived here all my life, seen the lake go through different stages from great to bad mostly all because of DNR decisions, poisoning the fish with helicopters to kill the carp, but instead killin everything to draining of the marsh, removal of dams upstream and all the sediment that is now in this lake, you could find sand bottoms many areas of the lake now its a struggle to get a boat through, plants won't grow in that environment low water levels in the winter helped to have ice freeze down so far that it either killed the vegetation or was ripped out when ice came off with wind. The size limit on northern was also stupid, was better fishing without that size limit 32" and you could keep 5, I'm to the point I really don't care to fish on this lake anymore. I don't fish for trophies I fish to catch a meal of fish to eat. P.S. If there was dredging done on the lake would improve. And I did fill out this form online, it is too bad that website sucks and didn't get it to you.
135	Prohibit motor trolling anywhere on the lake. Change the daily bag limit on walleye to three and change the size limit to only fish from 15" to 20" and one fish may be over 25" Change size limit on northern to one fish over 26"
136	I believe the overall quality and condition of the lake have declined. I believe the allowance of the Cormorants have wiped out the perch. The removal of the locks/ dam/ spillway between Buffalo Lake and Puckaway was not a good move
137	No ComputerM- 90yrsF-87yrs
138	We bought a condo in Marquette on Lake Puckaway mostly as a weekend and summer getaway retreat. My sons and I have always enjoyed fishing and hunting on the lake and would like to be able to continue to participate in those activities
139	I would like to become more involved in 4 years when I live on Puckaway year round...Sorry I'm sending you this so late!!
140	Love the lake but water levels make it hard to get to business on the lake. So its hard to support local business if you can't get your boat to their docks. Not all people are willing to jump in an walk to piers
141	Need good dam/ fish ladder / good water level / boat launch OAH st Junk! Dredge??
142	Overall doing a good job of improving conditions, Changes of this water the time
143	My main concern is the new dam does not make the spring floods linger into late May. We could potentially lose 100's of acres to high water. Late high water could cause thousands of dollar in losses to our operation.
144	Somebody please read "Andrew Sabai's" Final report!!
145	over the years the interest in Lake Puckaway has improved in maintaining/improving the ecosystem. communication regarding different aspects of the ecosystem and the lake district in general have improved as well.
146	We are in our 80's and do not fish the lake like we did so many years ago but would like to see lake Puckaway stay in good fishing condition along with water quality of the lake. we had many years of been on Lake Puckaway . also lobe to go down and watch all the birds and beautiful sun sets over the lake. "Best of luck"
147	Lake Puckaway used to be a great lake that my grandfather and I fished all year it was fun. Now I own property on it and I don't use it as much as I would like to mainly because of the quality o the lake and its fishing. Make it a great lake again for me and my grandchildren to be able to use. Thanks
148	Appreciate all that your organization has done to oversee the maintenance of the lake for all of us stakeholders. I am unable to do much to help right now as unable to get up to lake property a much as would like to. Sincerely want the lake to be maintained to be a safe and recreational waterway.
149	Fix the dam already!! STOP giving "bonuses" payments to carp removal fisherman! they are ALREADY paid for the job! These "bonuses" are robbing taxpayers of the funds they contribute to the LLPRD. Also, consistent overpopulation of this small shallow lake equals POLLUTION!! too many people abuse this small shallow lake!! Put "no wake" periods in place and STOP TROLLING!! also do not drain the lake as this would be a waste of all the efforts of the fish hatchery, etc. I believe "more restrictions on the use of the lake" would help the water quality and fish and wildlife and plants.
150	Am very happy LPPRD exists and support your efforts
151	Sorry I didn't respond to your previous mailings. I do not have a computer. That is a luxury I cannot afford. If I didn't have to pay 5,000 a year for taxes I could afford a computer. Lake Puckaway should be called Muckaway because that is what it is by the 4th of July. Last year I could not have my great grand kids go into the lake. It was so stinky and full of algae. Sometimes the smell (like a sewer) is so bad we cannot sit outside. People who have been around many years before I bought my cottage tell me how it used to be and how clear and clean it was. Now I'm paying
152	Zoning regulations seem quite strict if you are wishing to build or improve your property.
153	Need the water level to increase more than 2 feet to provide proper boat usage. Sold pontoon boat because of that water level problem. Unable to enjoy the lake because of that problem. Commercial carp removal needs to continue

Number	"Other" responses
154	My family has been on this lake for better than sixty years. In that time water clarity went from excellent to very poor.Also pan fishing went from excellent to almost non-existent. The reasons I feel for the decline of pan-fishing are: nesting program in the Grand River Marsh to re-introduce The Cormorants to this area, flocks of pelicans on the lake, excessive carp population, lack of vegetation, water clarity, making lake Puckaway a trophy lake for marathoners which resulted in too many Northerners that stunted in growth from 26-28 in
155	IN THE 60'S WHEN I WAS LITTLE I WOULD GO TO VISIT MY GRANDPARENTS ON LAKE PUCKAWAY. I REMEMBER CATCHING SO MANY FISH WITH MY GRANDFATHER& UNCLE. THE WATER WAS CLEANER THEN. CERTAIN TIMES OF YEAR I WOULD SEE THE LILY PADS. NOW THE ONLY FISH MY FAMIL CATCHES IS CARP & MAYBE A BASS. HAVEN'T GOTTEN THE CRAPPIES, PERCH, OR BLUEGILL FOR YEARS. I DON'T SEE THE LILY PDS EITHER.
156	THE SIZE LIMIT FOR NORTHERNS IS 32"; IT SHOULD BE BROUGHT DOWN TO 30".
157	THE LAKE NEEDS A CONSISTANT WATER LEVEL WHICH CAN BE MANAGEABLE WITH A MODERN DAM. BASED ON BSUES ON THIS LAKE DRAWDONS HAVE PROVEN INEFFECTIVE. THE BEST REPAIR FOR PUCKAWAY IS MAJOR SILT REMOVAL IN THE ENTIRE WEST BASIN AREA & DREDGE BANK TO REMOVE 100 YEARS OF ORGANIC BUILD UP. 2 FEET OF SILT IS KEEPING PLANTS FROM PROPERLY ROOTING & IS THE MAIN CAUSE FOR DECLINING LAKE HEALTH. LET'S PLEASE APPLY FOR GRANTS FOR MAJOR SILT REMOVAL. THANKS FOR EVERYTHING THAT YOU DO! PS SILT REMOVAL ALSO HELPSINPROVE LAKE DEPTHS WITHOUT CAUSING MORE EROSION.
158	CORMORANT CONTROL—POOR PAN FISHING EMERGENT PLANTS NURSING AREAS SHOULD BE CLOSED TO WATER CRAFT I WOULD LIKE TO SEE DREDGING IN THE OLD CHANNEL TO PROVIDE BETTER ACCESS TO THE RIVER CHANNELS
159	WE INHERITED 3 LOTS AND ARE CONSIDERING SELLING THEM. NEVER SEEN THE LAKE! WATER LEVEL HAS BEEN EXTREMELY MANAGED POORLY TOO MUCH SILT, MUCK
160	DAM NEEDS WORK NO WILD RICE TO HOLD WATERFOWL POOR MANAGEMENT ON REGULATIONS FOR NORTHERN –LOWER SIZE LIMIT ON PIKE NEED IMPROVED LAUNCH SITES & PARKING
161	NOTIFY US WHEN CARP ARE GOING TO BE REMOVED
162	WE WOULD LIKE TO SEE A MINIMAL LAKE DRAW DOWN DURING THE DAM PROJECT.
163	LAKE PUCKAWAY WILL NEVER BE LIKE IT WAS IN THE 50'S & 60'S. TOO MUCH HOUSING. BIGGEST PROBLEM IS ALL FARM RUN OFF IN THE LAKE. JUST LOOK AT THE MILES OF DITCHES THAT DRAIN FARM FIELDS AND RUN DIRECTLY IN THE LAK.E. THIS SHOULD BE STOPPED DITCHES SHOULD BE FILLED IN. LET THE FARM FIELDS ABSORB THE WATER LIKE THEY ONCE DID. THE LAKE WOULD BE SO MUCH CLEANER. HIGHER WATER LEVELS WOULD STOP ALGE BLOOMS. THIS ALL SHOULD BE A NO BRAINER TO YOU AND THE DNR. QUIT PLAYING AROUND AND PUT IN A FIXED CREST DAM LIKE BUFFALO LAKE. THIS HAS BEEN TALKED ABOUT SINCE 1963 THAT I KNOW OF.
164	BEAUTIFUL LAKE--BUT WATER LEVEL VERY INCONSISTENT. CASE IN POINT-DAMAGE OF SHORELINE THIS YEAR ON NORTH SIDE OF LAKE BY ICE. I'VE HEARD THAT IT WAS FAULT OF DAM MANAGEMENT. FORGETTING TO CONTROL DAM.
165	I'VE MY OWNED PROPERTY FOR 30 YEARS NOW AND THEY HAVE BEEN DOING NOTHING BUT TALKING ABOUT THE DAMN DAM. BUT AS FAR AS I CAN SEE THEY HAVE DONE NOTHING. I LOVE LAKE PUCKAWAY AND WOULD LOVE TO DONATE TO FUNDING FOR ITS CARE
166	LAKE PUCKAWAY NEEDS INFORMED, SCIENTIFALLY-BASED MANAGEMENT. TOO MUCH POWER AND DECISIONS IS GIVEN TO A SMALL GROUP OF LOCALS WHO DO NOT BASE DECISIONS SOUNDLY, BIOLOGICAL-BASED INFORMATION. THE MANAGEMENT OF THIS IS FOCUSED ON SUMMER WATERLEVELS FOR RECREATION, NOT FOCUSED ON THE HEALTH OF THE LAKE. A DAM AT PRINCETON HAS IMPACT, BUT IT SHOULD NOT BE THE FOCUS. IN STEAD THE FOCUS SHOULD BE TAKING ON THE TOUGH, BUT NECESSARY, MANAGEMENT STEP NEEDED TO MADE REAL CHANGE FOR THE RESTORATION OF THE LAKE. GET RID OF CARP, RESORE AQUATIC SUBMERSED AND EMERGENT VEGITATION, LOWER LEVELS WHEN THE LONG TERM BENIFIT OUT WEIGHS THE SHORT TERM CHALLANGES, DO ALL THAT IS NECESSARY TO RESTORE WILDLIFE TO HISTORIC LEVELS, LIMIT FISHING AT CRITICAL TIMES FOR CERTIAN SPECIES, TAKE A LOOK AND ACT ON A LONG TERM PLAN TO RESTORE AND PROTECT PUCKAWAY.

Number	"Other" responses
167	I AM DISAPOINTED BY THE IMPACT THE CURRENT MANAGEMENT LAKE PUCKAWAY HAS HAD. THERE IS TO MUCH CONCERN ABOUT KEEPING LAKE LEVELS ARTIFICIALLY HIGH. THIS IS A RIVER SYSTEM AND LOW WATER LEVELS ARE NATURAL AND SHOULD BE ALLOWED TO OCCURE IN ORDER TO PROMOTE HABITATE IMPROVEMENT. THERE SEEMS TO BE TO MUCH CONCERN ABOUT ECONOMIC IMPACT WITH LOW WATER LEVELS. THERE HAS BEEN GOOD SCIENCE TESTED RECOMMENDATIONS MADE THAT DO NOT SEE IMPLEMENTATION. PLEASE ALLOW SCIENCE BASED PROFESSIONALS TO HAVE GREATER CONTROL OVER IMPROVING THE LAKE. THANK YOU THE LAKE NEEDS A LOT OF IMPROVEMENT--CARP, LOSS OF HABITATE, ARTIFICIALLY, HIGH WATER LEVELS, ALL CONTINUE TO HAVE RESETANCEIMPACTS--AS THEY HAVE FOR YEARS
168	WHAT HAPPENED TO ALL THE PLANS THAT WERE PRESENTED AT THE MEETINGS YEARS AGO. I RECALL ATTENDING A MEETING AT PRINCETON WITH VARIOUS EXPERTS THERE--WHAT HAPPENED TO ALL THOSE PLAY? HERE ARE SOME SUGGESTIONS; 1-PUT INDEPENDENT SCIENCE BASED PROFESSIONAL IN CHARGE OF DECISSION MAKING WITH THE HEALTH OF THE LAKE. LAKE SIZE BE GUIDEDANCE FOR THEIR DECISSION MAKING VS. WATER LEVELS HIGH (DNR) 2-RAISE ASSESSMENTS AS NEEDED TO ALLOW IMPROVEMENTS TO OCCURE MORE RAPIDLY. 3-MANAGE SPECIFICLY OF THE LAKE FOR SPECIFIC OUT COME. EXP; EAST END QUIETWATER; LOW WATER FOR EMERGENT VEGITATION AND WATER FOW USE. EXMP. WEST END MORE RECREATIONAL USE. 4-MOVE FROM STATUS QUO TO AGGRESSIVE. 5- STOP MAKING--KEEPING THE LAKE LEVES UP-THE PRIMARY DRIVER- MAKE HABITATE AND HEALTH OF THE WHATTHE LAKE SHOULD BE THE PRIMARY DRIVER.
169	I WOULD LIKE TO KNOW HOW WE COULD MAINTAIN A HIGHER WATER LEVEL IN SUMMER IF THAT IS POSSIBLE
170	WATER QUALITY SEEMS OKWATER DEPTH NEEDS BETTER CONTROL-TO SHALLOWMOST OF THE TIME-REDICULOUS
171	THANK YOU FOR THE OPPORTUNITY OF GIVING YOU A REPLY
172	DAM AT PRINCETON IS NECESSARY FOR THE EXISTANCE OF LAKE PUCKAWAY IN SUMMER. THE REMOVAL OF DAM NEAR RIVERS BEND PROMOTES HIGHER WATER LEVELS IN SPRING CAUSING MORE SHORE EROSION.
173	EROSIN ISSUES HAVE BEEN VERY COSTLY FOR HOME OWNER. WEEDS IN SHORELINE ARE BAD AND MAKE SWIMMING UNINVITING.
174	DOING A GOOD JOB/DON'T OVER RUN AND MAKE A PROBLEM
175	IN THE LAKES CURRENT CONDITION IT IS FUN TO FISH & BOAT ON. I SOMETIMES BELIEVE WE SHOULD LET NATURE TAKE ITS COURSE.
176	LAKE HAS WENT TO HELL EVER SINCE I WAS A LITTLE BOY. ONE OF THE MAIN REASONS IN MY OPINION IS THE LARGER MOTORS ON A SHALLOW LAKE. THERE SHOULD BE A LIMIT ON MOTOR SIZE OF 25 HP. WATER LEVELS MAY HAVE BEEN MAINTAINED TO HIGH AND SHORELINE IS ERODING ALONG WITH AQUATIC WEEDS.
177	MY NORTH SHORE SHORELINE RECIEVED SEVERE ICE DAMAGE THIS WINTER. WAS TOLD THE FLOODGATES COULD NOT BE OPENED DUE TO DNR RED TAPE? AS A RESORT OWNER W/315' SHORELINE I LOOSE ALL INTEREST IN IMPROVING WHEN EVERYTHING I WANT TO DO HS A PAPER PRICE TAG (PERMIT) JUST TOO MUCH CONTROL BY PEOPLE WHO ARE VERY LACKING IN KNOWLEDGE OF WHAT I HAVE IN MIND. AS A OWNER-LAKE QUALITY & ENJOYMENT IS # 1 FOR OUR CUSTOMERS- GROWING WEEDS IN SWIMMING AREAS & NOT ALLOWING OWNERS TO CONTROL THIS IS NOT A GOOD BUSINESS PRACTICE.
178	I HAVE BEEN HERE FOR 23 YEARS. THE LAST 5 AT OUR SUMMERTIME RECREATION HOME. WATER LEVELS CONCERN ME THE MOST. IT'S TIME FOR A NEW DAM IN PRINCETON AND PROPERLY CONTROL THE WATER LEVEL.
179	IT WOULD BE NICE IF THEY WOULD HARVEST SHEEPHEAD LIKE THEY DO THE CARP.ALSO LOWER THE SIZE LIMIT ON NORTHERNS BACK TO 26"
180	ALL THE DRAW DOWNS FOR WEED GROWTH HAVE NOT WORKED. WHEN THE WEEDS GROW THE LOW WATER LEVEL WASH OUT THE WEEDS WITH THE WAVE ACTION AND THE ICE EITHER SUFFICATES OR PULL THEM OUT AT ICE OUT. HIGHER WATER LEVELS HERE ARE ONLY 3-5 FEET AND THE WEEDS STILL GROW. THE HIGH SPRING WATER THIS SPRING AND THE WEEDS ARE GROWING AS I SEE WHEN I HAVE BEEN OUT FISHING THIS SPRING. NO MORE DRAW DOWNS WE NEED CONSTANT WATER LEVELS
181	I LIKE TO SEE MORE CARP REMOVAL, IT WOULD HELP RESTORE AQUATIC PLANTS.ALSO HELP FISH REPRODUCTION
182	YOUR FAILED SINCE I PREVIOUSLY FILLED OUT THE SURVEY IN A TIMELY MANNER. BUT THIS LETTER CLAIMES YOU DID NOT RECEIVE IT.
183	THE LOW WATER LEVEL IS OUR PRIMARY CONCERN. THANKS FOR ALL THAT YOU DO TO IMPROVE THE LAKE
184	THE SUMMER LEVELS DO NOT ALLOW RECREATIONAL USE TO ITS FULLEST EXTENT. ALSO THE DROP IN WATER LEVELS & HEAT FROM SUMMER HEAT THE LAKE TO UNFAVORABLE CONDITIONS RE: FISH (OXYGEN) & ALLOWS OTHER FACTORS (BACTERIA) IN WATER TO STAY ALIVE. BIRDS AND LARGE ONES CONTINUE TO REDUCE THE FISH & ITS FRY. AS LAKE GOES DOWN IN LEVEL IT ALLOWS FOR WIND TO ERODE THE SHORELINE AS WELL AS ALLOW OTHER WEEDS TO GROW IN SAND WHERE WATER SHOULD BE
185	THE LAKE BOTTOM USED TO BE ALL SAND. WHAT HAPPENED?
186	THE LAKE WILL NEVER REACH THE PLANT LEVELS PRIOR TO THE DAM. AS WE HAVE TOLD THE DNR THE CARP ARE THE BIGGEST PROBLEM ON PUCKAWAY. THE CURRENT PROGRAM IS WORKING. KEEP IT UP. WIND BEARIERS WOULD HELP THE PLANT STATUS.
187	THE LAKE HAS BEEN DRAWN DOWN AND POISONED TO CONTROL INVASIVE SPECIES OVER THE YEARS. AFTER THIS THE FISHING HAS STEADILY DECLINED. THE WORST DISASTER HAS BEEN THE ATTEMPT AT KEEPING THE LAKE LEVELS LOW TO WAIT UNTIL LATE JUNE TO INSTALL THE BOARDS WHICH I BELIEVE IS A COMPLETE DISASTER. DRAWING DOWN THE LAKE AFTER ALL THE STOCKING OF FRY OR POISONING THE LAKE IS PROBABLY THE STUPIDEST IDEA SOMEONE EVER CONCEIVED.

Number	"Other" responses
188	THE FISHING HAS GOTTEN WORSE SINCE THE DRAINING THE LAKE AROUND 1972 TO SUPPOSE OF RID OF CARP. WHICH DID NOT HAPPEN. ONLY THING THAT DID WAS RUN OFF THE ABUNDAT OF YELLOW PERCH, WHICH COULD CATCH WAY BACK 20 TO 25 TO A HOME TO ??? NOW RARE TO CATCH MANY PERCH. PLEASE STOCK THE LAKE WITH YELLOW PERCH AGAIN & NOT TAKE FISH OUT TO OTHER LAKES. ENOUGH IS ENOUGH. MAKE LAKE PUCKAWAY A GREAT LAKE AGAIN I DID TAKE THE ON LINE SURVEY
189	I DID ALL OF THIS ON LINE-YOU PEOPLE REALLY NEED SOME HELP! TALK IS CHEAP--FIX THE DAM! I PAY HIGH TAXES TO LIVE ON WATER...THE LAKE HAS BECOME SHIT.
190	PERCH POPULATION--80'S, 90'S, 2000 WAS STABLE NOW CAN'T FIND MANY
191	GET LAKE WATER LEVEL UP IN SUMMER!HIGHWATER LEVEL = SPENDING MONEY AROUND THE LAKE
192	HIGHER WATER EQUAL CLEARER WATER THIS PROMOTES GROWTH OF VEGITATION WHICH FILTERS THE WATER THIS MEANS BETTER FISHING BETTER BOATING AD BETTER WATER QUALITY.
193	WE ARE MOVING TO OUR COTTAGE THIS YEAR AND ARE EXCITED ABOUT OUR COMING YEAR ON LAKE PUCKAWAY AND HOPE TO BE OF ASSISTANCE TO THOSE IN CHARGE OF PROTECTING THE HABITATE & RECREATIONAL ACTIVITIES ON THIS LAKE.
194	IN THE PAST WATER LEVELS WERE NEVER AS IMPORTANT AS THEY ARE TODAY. SOMETIMES THE WATER IS SO SHALLOW WE CAN'T EVEN PUT OUR BOAT IN!
195	I AM HAPPY THERE IS A LPPRD! "THANK YOU" FOR THE CARING YOU SHOW FOR LAKE PUCKAWAY. I APPRECIATE YOUR HARD-WORK. YOU ROCK
196	ON THE MOTOR SIZE ON THE LAKE. YEARS AGO A 25 HP MOTOR WAS CONSIDERED LARGE. ON A SHALLOW LAKE ESPECIALLY WITH LOWER SUMMER WATER LEVELS. MY OPINION IS THE PROP WASH BELOW THE SURFACE WOULD HAVE TO BE TEARING OUT VEGITATION ON THE BOTTOM. I DON'T UNDERSTAND WHY SOMEONE NEED 200+ HP MOTORS TO GET FROM POINT A TO POINT B.
197	LACK OF INTEREST BY LANDOWNERS ATTENDING YEARLY LAKE MEETING HURTS. unable TO ADJUST WATER LEVELS NOW WITH FLASHBOARDS AS PRECIPATIONINCREASE OR DECREASE FOLLOWING HIGH OR LOW WATER LEVELS. AS PER SUMMER OF 2015, LOW PRECIPATION LED TO LOW LEVELS OF WATER, FOLLOWED BY INCREASED WATER TEMPS AND ALGE BLOOMS. LANDOWNERS UNABLE TO ACCESS LAE FOR FISHING AND RECREATION USE AND VISITORS UNABLE TO LAUNCH AT PUBLIC LANDING POSSSIBLY MEANS VISITORS NOT RETURNING--$ NOT IN TO LOCAL AREA (LODGING, MEALS, ETC) LAKE DECREASED PROPERTY VALVES--LESS TAXES FOR COUNTY/DISTRICT REDUCE NORTHERN PIE SIZELIMITSFOR LAKE & FOX RIVER.
198	IT IS IMPORTANT TO REMEMBER LAKE PUCKAWAY'S RECREATIONAL USE BRINGS LOTS OF MONEY TO OUR COMMINTES. WITH THAT IN MIND, IT MAKE MOST SENSE TO APPEASAE THE GREATER NUMBERS THAT USE IT MOST. I LEAN TOWARDS FISHING BECAOUSE IT IS A YEAR ROUND EVENT.
199	I AM DELIGHTED THAT THE LPPRD EXISTS & IS ACTIVE IN MANAGING OUR IMPORTANT LAKE RESOURCE. KEEP UP THE GOOD WORK!
200	PANFISH NUMBERS (PERCH & CRAPPIE) PAN FISH NUMBERS HAVE DECLINED AS SHOWN BY DNR LAKE SURVEY--NUMBERS AND SIZE DRASTICLLY DROPOOED. REMOVAL YEARS AGO (70'S) OF BREEDING CRAPPIES TO RESTOCK BEAVER DAM LAKE DEVASTATED BLACK CRAPPIE NUMBERS & FEEDING OF FRY BY BASS, WALLEYE & NORTHERNS & SMALL # OF crappies HAVE NOT ALLOWED FOR SURVIVAL OF NATURAL HATCHING FRY. MONITORING OF CHEMICAL RUN OFF FROM AGRICULTURIAL FIELDS SUROUNDING PUCKAWAY WATERSHED IS NEEDS ALONG WITH INCREASING CONSERVATION MEASURES FOR INCREASING FILTER STRIPS & BUFFERS. LEVELS OF HEAVY METALS & AG CHEMICKALS, NITROGEN, PHOS. POTTASIUM NEED TO BE PUBLISHED. LAKE SEDIMENT SAMPLES FROM VARIOUS SITES PULLED AND ANALIZED & DISCOVER POSSIBLE SOURCES E-COLI; DETERMINED & PUBLISH IF COMING FROM FAILING SEPTIC SYSTEM OR ANIMAL AG-WAST RUNOFF. THIS IMPORTANT FOR SWIMMING & WATER SKIING HAVE OR ARE THESE TESTED FOR BY DNR OR UW STEVENS POINT LAB & RESULTS SHARED
201	LAKE PUCKAWAY IS A GRAT LAKE WHEN WATER LEVELS ARE UP. KEEPING WATER LEVELS AT UABLE LEVELS ARE IMPROTANT TO ECONOMIC IMPACT OF AREA. NOT MARKING HAZZARDS AND LOW WATER ARE RUNING THE REPUTATION OF LAKE PUCKAWAY.
202	HAS NOT DEVELOPED AS ORIGINALLY ANTICIPATED SINCE ORIGINALLY PURCHASED. WOULD LIKE TO SELL OR WOULD BE WILLING TO DONATE IT. ANY IDEAS?
203	Make the size limit on Northern pike 26 as is the river system. This is not the 1950's and never will be again. STOP the drainage ditches from running into the lake. Make the farmers stop the run off and qoit draining the marshes.
204	Only problem as I see it is the water levels. Too much variation, needs control. Too low cant use the lake, too high floods cabins. Years ago was not this type of problem and seemed to hav better fishing etc.
205	Maintain a consistent lake level year round.
206	lake drawdown, my parents owned a home on lake sinissippi and a 1971? drawdown ruined the lake
207	Too many cormorants and pelicans that eat all the panfish and destroyed the dredge bank
208	Would like to see higher water levels in summer but I really do not know the history of the lake if this is possible. This is one of the best lakes in Wisconsin .
209	maintain consistent water level & Princeton damn replacement has been talked about and nothing accomplished for decades. this survey is just 'another dog & pony show' !
210	The higher the water, the better the quality. The higher the water, the better the fishing. Watching the decline of ice fishing is indicative of the direction this lake is going. The boat landing have also had plenty of parking from May until the carp trucks have them clogged up in Oct/Nov. The carp boats have wrecked every landing they have used. That's a fact. Keep them out of the new landing in Marquette.

Number	"Other" responses
211	We want to know if Lake Puckaway is going to be drained if the Princeton dam is rebuilt in 2018? When are we going to find out?
212	the lake was fine 38+ years ago, until they did a draw down to kill carp. they killed the vegetation and it has not come back. the constant draw downs WILL NOT fix what was once done. put the fix crest on the dam. re-build the dredge bank and the lake will be back to normal
213	We would like to see a deeper lake in the main section of the lake to be about 8ft deep. Next, I'd like to see the lake maintain higher water levels until mid to late October.
214	FIx the Dam so the summer water level is maintained. They have been talking about it for over 35 years! My property value would go up if the lake level was kept higher, and the need to have a pier sticking out 60 feet would no longer be needed.
215	This last summer, we went form the inlet to the middle of the lake and hit a object which cause sever damage to our motor. Who can this be reported to so others won't have to incur a expense like us from low water levels?
216	I appreciate that something is being done and all the effort that you folks put in!
217	Water levels at times make it hard to navigate or dock if levels are too low
218	Growing up fishing was much better, I'd like to see fishing get better. I'd like to see a higher lake levelmaintained!!
219	Extremely low water levels in July and August hampered use of the lake and caused huge algae blooms. Water levels must be maintained so we can enjoy fishing and swimming.
220	I appreciate all the work you do on our behalf. My primary concern is the low water levels in the summer. Thanks. I would be open to volunteering once I retire in a few years.
221	Lake Puckaway needs to be maintained at adequate levels and to be an all around great experience for all visitors. Board needs to manage whole lake not just vegetation. Seems like all effort are restoring plants. Always have excuses for lake level. I understand if there is no rain but level is never stable

E

APPENDIX E

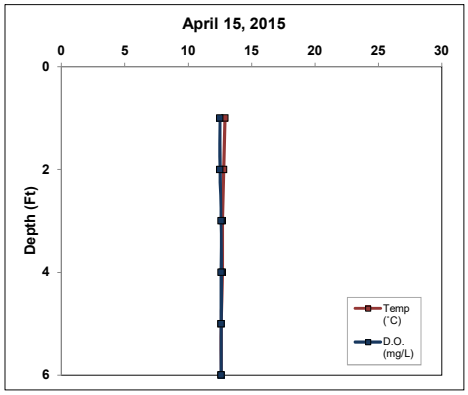
Water Quality Data

Puckaway Lake - Deep Hole

Date: 4/15/2015
Time: 11:15
Weather: 54F, 90% clouds, steady breeze
Entry: EEH

Max Depth: 6.7
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 2.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.9	12.5	9.2	
2	12.8	12.5	9.1	
3	12.7	12.6	9.1	
4	12.7	12.6	9.0	
5	12.6	12.6	9.0	
6	12.6	12.6	9.0	



Parameter	PULDHS	PULDHB
Total P (µg/L)	70.10	NA
Dissolved P (µg/L)	ND	NA
Chl-*a* (µg/L)	18.10	NA
TKN (µg/L)	1280.00	NA
NO_3 + NO_2-N (µg/L)	388.00	NA
NH_3-N (µg/L)	ND	NA
Total N (µg/L)	1668.00	0.00
Lab Cond. (µS/cm)	333.00	NA
Lab pH	8.55	NA
Alkalinity (mg/L $CaCO_3$)	148.00	NA
Total Susp. Solids (mg/L)	10.80	NA
Calcium (mg/L)	35.50	NA
Magnesium (mg/L)	22.60	NA
Hardness (mg/L)	182.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

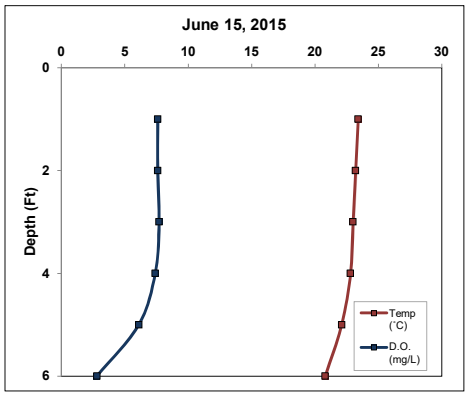
Data collected by BTB and EEH (Onterra)

Puckaway Lake - Deep Hole

Date: 6/15/2015
Time: 14:00
Weather: 80F, 100% clouds
Entry: EEH

Max Depth: 6.8
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 5.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.4	7.6		
2	23.2	7.6		
3	23.0	7.7		
4	22.8	7.4		
5	22.1	6.1		
6	20.8	2.8		



Parameter	PULDHS	PULDHB
Total P (µg/L)	75.70	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	16.00	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

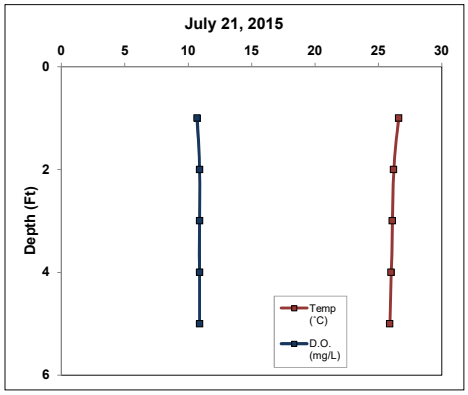
Data collected by SDF (Onterra)

Puckaway Lake - Deep Hole

Date: 7/21/2015
Time: 14:45
Weather: Rough, 80F, Windy, 30% clouds
Entry: EEH

Max Depth: 5.5
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 2.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.6	10.7		
2	26.2	10.9		
3	26.1	10.9		
4	26.0	10.9		
5	25.9	10.9		



Parameter	PULDHS	PULDHB
Total P (µg/L)	135.00	NA
Dissolved P (µg/L)	4.80	NA
Chl-*a* (µg/L)	44.80	NA
TKN (µg/L)	1470.00	NA
NO_3 + NO_2-N (µg/L)	ND	NA
NH_3-N (µg/L)	ND	NA
Total N (µg/L)	1470.00	NA
Lab Cond. (µS/cm)	383.00	NA
Lab pH	8.94	NA
Alkalinity (mg/L $CaCO_3$)	185.00	NA
Total Susp. Solids (mg/L)	28.00	NA
Calcium (mg/L)	41.50	NA
Magnesium (mg/L)	27.90	NA
Hardness (mg/L)	218.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

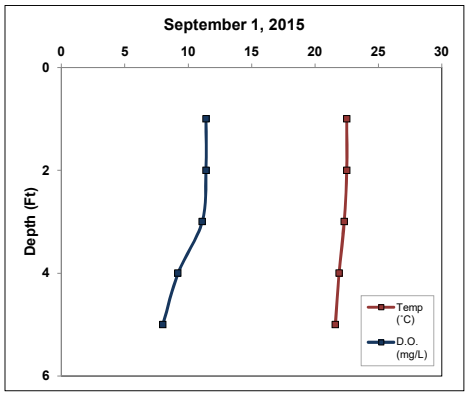
Data collected by TAH (Onterra)

Puckaway Lake - Deep Hole

Date: 9/1/2015
Time: 9:15
Weather: 10% clouds, 78F, hazy sun
Entry: EEH

Max Depth: 5.0
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 1.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.5	11.4		
2	22.5	11.4		
3	22.3	11.1		
4	21.9	9.2		
5	21.6	8.0		



Parameter	PULDHS	PULDHB
Total P (µg/L)	56.30	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	34.20	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

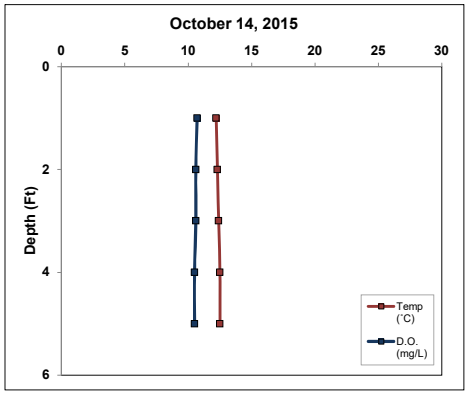
Data collected by TWH and DAC (Onterra).

Puckaway Lake - Deep Hole

Date: 10/14/2015
Time: 11:30
Weather: 100% sun, breezy, 54F
Entry: EEH

Max Depth: 5.4
PULDHS Depth (ft): 3.0
PULDHB Depth (ft): -
Secchi Depth (ft): 2.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.2	10.7		
2	12.3	10.6		
3	12.4	10.6	9.0	
4	12.5	10.5		
5	12.5	10.5		



Parameter		PULDHS	PULDHB
Total P (µg/L)		93.80	NA
Dissolved P (µg/L)		NA	NA
Chl-*a* (µg/L)		36.00	NA
TKN (µg/L)		NA	NA
NO_3 + NO_2-N (µg/L)		NA	NA
NH_3-N (µg/L)		NA	NA
Total N (µg/L)		NA	NA
Lab Cond. (µS/cm)		NA	NA
Lab pH		NA	NA
Alkalinity (mg/L $CaCO_3$)		NA	NA
Total Susp. Solids (mg/L)		17.00	NA
Calcium (mg/L)		NA	NA
Magnesium (mg/L)		NA	NA
Hardness (mg/L)		NA	NA
Color (SU)		NA	NA
Turbidity (NTU)		NA	NA

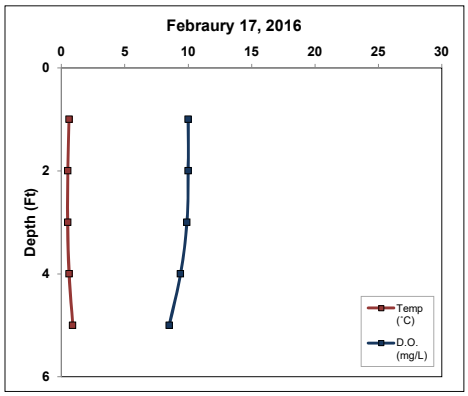
Data collected by TWH (Onterra)

Puckaway Lake - Deep Hole

Date: 2/17/2016
Time: 12:45
Weather: 1% clouds, 25F
Entry: EEH

Max Depth: 5.4
PULDHS Depth (ft): .
PULDHB Depth (ft): -
Secchi Depth (ft): hit bottom

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.6	10.0		
2	0.5	10.0		
3	0.5	9.9		
4	0.6	9.4		
5	0.9	8.5		



Parameter	PULDHS	PULDHB
Total P (µg/L)	29.00	NA
Dissolved P (µg/L)	8.90	NA
Chl-*a* (µg/L)	NA	NA
TKN (µg/L)	669.00	NA
NO_3 + NO_2-N (µg/L)	2580.00	NA
NH_3-N (µg/L)	106.00	NA
Total N (µg/L)	3249.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH & JLW (Onterra). Ice thickness: 1.4 ft

Water Quality Data

2015-2016	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	5	2.7	NA	NA
Total P (µg/L)	5	76.7	0	NA
Dissolved P (µg/L)	2	6.9	0	NA
Chl a (µg/L)	5	ND	0	NA
TKN (µg/L	2	ND	0	NA
NO3+NO2-N (µg/L)	2	ND	0	NA
NH3-N (µg/L)	2	ND	0	NA
Total N (µg/L)	2	ND	0	NA
Lab Cond. (µS/cm)	2	ND	0	NA
Lab pH	2	ND	0	NA
Alkal (mg/l CaCO3)	2	ND	0	NA
Total Susp. Solids (mg/l)	3	ND	0	NA
Calcium (µg/L)	2	ND	0	NA
Magnesium (mg/L)	2	ND	0	NA
Hardness (mg/L)	2	ND	0	NA
Color (SU)	2	ND	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1996			64.9
1997			62.5
1998			67.1
2000			65.8
2001			73.9
2002			63.9
2003			65.4
2004	74.5	67.2	57.8
2005	80.8	78.3	77.1
2006	68.0	64.8	
2007	74.4	70.4	
2009	79.5	70.2	68.7
2010			
2011	75.7	74.0	70.7
2012	76.2	71.5	67.0
2013	68.7	67.0	55.4
2014	73.7	67.2	63.6
2015	71.3	64.1	58.5
All Years (Weighted)	74.6	71.2	64.0
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
SWTP Ecoregion	48.7	47.0	50.0

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1996	8	2.2	6	2.3								
1997	11	2.4	4	2.8								
1998	8	2.0	8	2.0								
2000	8	2.2	4	2.2								
2001	4	2.3	2	1.3								
2002	7	2.1	4	2.5								
2003	8	2.2	6	2.2								
2004	11	3.4	7	3.8	4	41.6	4	41.6	5	121.4	3.0	131.7
2005	7	1.1	4	1.0	6	113.1	5	129.3	4	180.5	3.0	203.7
2006					4	40.1	2	32.6	4	87.3	2.0	83.5
2007					4	50.3	2	57.7	4	112.5	2.0	130.5
2009	3	1.4	1	1.8	4	64.5	2	56.7	4	170.8	2.0	186.5
2010												
2011	7	1.6	7	1.6	7	83.2	7	83.2	7	143.1	7.0	143.1
2012	10	2.3	5	2.0	10	48.5	5	65.0	10	112.5	5.0	147.4
2013	11	3.5	6	4.5	11	60.6	6	41.0	11	96.2	6.0	87.9
2014	12	2.7	6	2.6	13	48.1	6	41.8	13	108.8	6.0	123.9
2015	5	2.7	2	3.7	5	29.8	2	30.4	5	86.2	2.0	105.4
All Years (Weighted)		2.4		2.5		58.4		62.7		117.0		132.3
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

July 2015 N: 1470.0
July 2015 P: 135.0

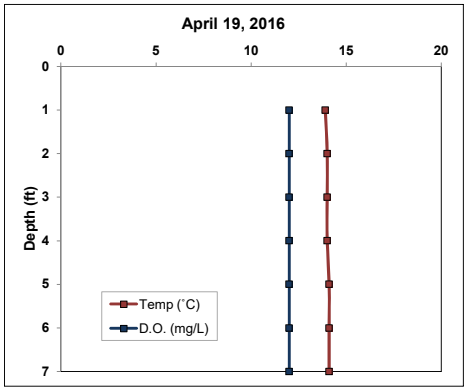
Summer 2015 N:P 11 :1

Puckaway Lake - Deep Hole

Date: 4/19/2016
Time: 14:30
Weather: 100% clouds, 50F
Entry: EEH

Max Depth: 7.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	13.9	12.0		
2	14.0	12.0		
3	14.0	12.0	8.8	
4	14.0	12.0		
5	14.1	12.0		
6	14.1	12.0		
7	14.1	12.0		



Parameter	LS	LB
Total P (µg/L)	61.90	NA
Dissolved P (µg/L)	3.00	NA
Chl-a (µg/L)	21.10	NA
TKN (µg/L)	1330.00	NA
NO_3 + NO_2-N (µg/L)	1300.00	NA
NH_3-N (µg/L)	18.60	NA
Total N (µg/L)	2630.00	NA
Lab Cond. (µS/cm)	385.00	NA
Lab pH	8.73	NA
Alkalinity (mg/L $CaCO_3$)	163.00	NA
Total Susp. Solids (mg/L)	8.25	NA
Calcium (mg/L)	41.80	NA
Magnesium (mg/L)	23.20	NA
Hardness (mg/L)	200.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

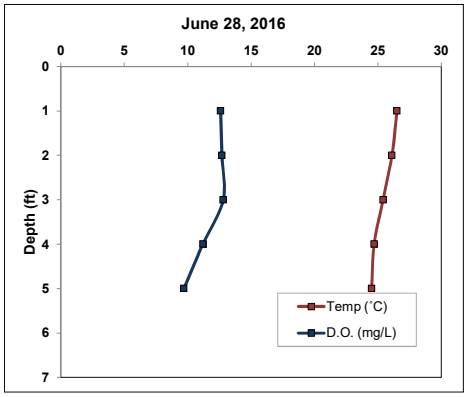
Data collected by TWH (Onterra).

Puckaway Lake - Deep Hole

Date: 6/28/2016
Time: 14:13
Weather: 70F, 10% clouds, light breeze
Entry: EEH

Max Depth: 5.4
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.4

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.5	12.6		
2	26.1	12.7		
3	25.4	12.8		
4	24.7	11.2		
5	24.5	9.7		



Parameter	LS	LB
Total P (µg/L)	89.50	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	59.50	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

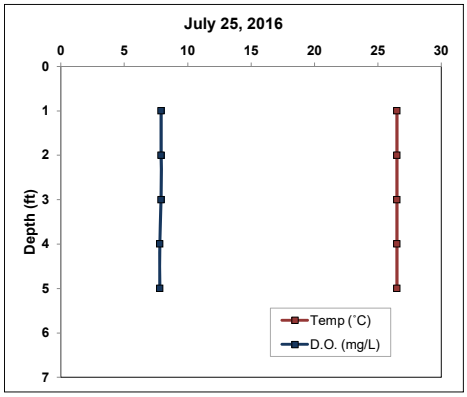
Data collected by TAH (Onterra)

Puckaway Lake - Deep Hole

Date: 7/25/2016
Time: 9:15
Weather: 75F, 0% clouds
Entry: JLW

Max Depth: 5.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.5	7.9		
2	26.5	7.9		
3	26.5	7.9	8.7	
4	26.5	7.8		
5	26.5	7.8		



Parameter	LS	LB
Total P (µg/L)	95.40	NA
Dissolved P (µg/L)	2.50	NA
Chl-*a* (µg/L)	65.50	NA
TKN (µg/L)	1200.00	NA
NO_3 + NO_2-N (µg/L)	ND	NA
NH_3-N (µg/L)	17.30	NA
Total N (µg/L)	1200.00	NA
Lab Cond. (µS/cm)	345.00	NA
Lab pH	8.44	NA
Alkalinity (mg/L $CaCO_3$)	164.00	NA
Total Susp. Solids (mg/L)	14.40	NA
Calcium (mg/L)	30.40	NA
Magnesium (mg/L)	29.40	NA
Hardness (mg/L)	197.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

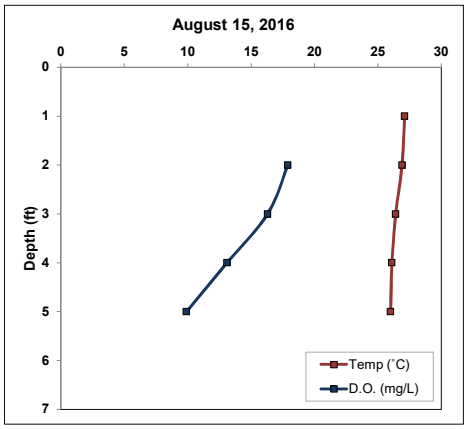
Data collected by BTB & LJS (Onterra)

Puckaway Lake - Deep Hole

Date: 8/15/2016
Time: 12:30
Weather: 75% clouds, 82F
Entry: JMB

Max Depth: 5.5
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 1.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	27.1	17.9		
2	26.9	16.3		
3	26.4	13.1		
4	26.1	9.9		
5	26.0	9.1		



Parameter	LS	LB
Total P (µg/L)	98.10	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	119.00	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

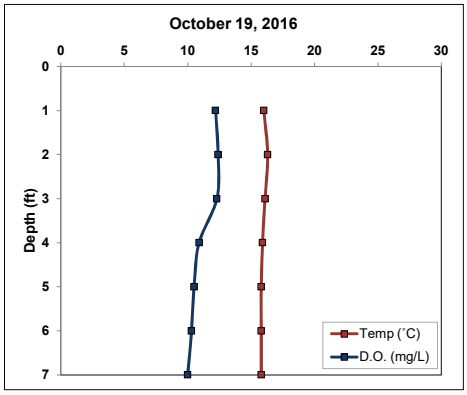
Data collected by TWH and LJS (Onterra).

Puckaway Lake - Deep Hole

Date: 10/19/2016
Time: 11:48
Weather: 75% clouds, 70F, no wind
Entry: JMB

Max Depth: 7.9
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	16.0	12.2		
2	16.3	12.4		
3	16.1	12.3		
4	15.9	10.9		
5	15.8	10.5		
6	15.8	10.3		
7	15.8	10.0		



Parameter	LS	LB
Total P (µg/L)	96.50	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	63.50	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	7.40	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

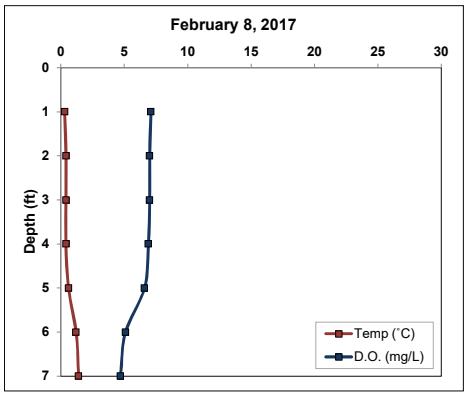
Data collected by JMB and LJS (Onterra).

Puckaway Lake - Deep Hole

Date: 2/8/2017
Time: 13:20
Weather: 18F, 30% clouds, light wind
Entry: EEH

Max Depth: 7.1
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 5.8

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	7.1		
2	0.4	7.0		
3	0.4	7.0		
4	0.4	6.9		
5	0.6	6.6		
6	1.2	5.1		
7	1.4	4.7		



Parameter	LS	LB
Total P (µg/L)	68.20	NA
Dissolved P (µg/L)	25.10	NA
Chl-*a* (µg/L)	NA	NA
TKN (µg/L)	875.00	NA
$NO_3 + NO_2$-N (µg/L)	2440.00	NA
NH_3-N (µg/L)	122.00	NA
Total N (µg/L)	3315.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and LJS (Onterra). Ice depth = 1.4 ft.

Water Quality Data

2016-2017	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	2.8	NA	NA
Total P (µg/L)	6	84.9	0	NA
Dissolved P (µg/L)	3	10.2	0	NA
Chl a (µg/L)	5	65.7	0	NA
TKN (µg/L	3	1135.0	0	NA
NO_3+NO_2-N (µg/L)	3	1870.0	0	NA
NH_3-N (µg/L)	3	52.6	0	NA
Total N (µg/L)	3	2381.7	0	NA
Lab Cond. (µS/cm)	2	365.0	0	NA
Alkal (mg/l $CaCO_3$)	2	163.5	0	NA
Total Susp. Solids (mg/l)	3	10.0	0	NA
Calcium (mg/L)	2	36.1	0	NA
Magnesium (mg/L)	2	26.3	0	NA
Hardness (mg/L)	2	198.5	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
1976			79.7
1985			60.1
1986			70.5
1987			73.9
1988			61.7
1989			61.3
1990			59.1
1991			53.5
1996			64.9
1997			62.5
1998			67.1
2000			65.8
2001			73.9
2002			63.9
2003			65.9
2004	74.5	67.2	57.8
2005	80.8	75.9	73.4
2006	68.0	64.8	63.5
2007	74.4	70.4	73.2
2009	79.5	70.2	68.7
2011	75.7	74.0	70.7
2012	76.2	71.5	67.0
2013	68.7	67.0	55.4
2014	73.7	67.2	63.6
2015	71.3	64.1	58.5
2016	69.7	73.7	68.1
All Years (Weighted)	74.3	70.4	64.3
SLDL Median	54.6	52.6	52.4
SWTP Ecoregion Median	48.7	47.0	50.0

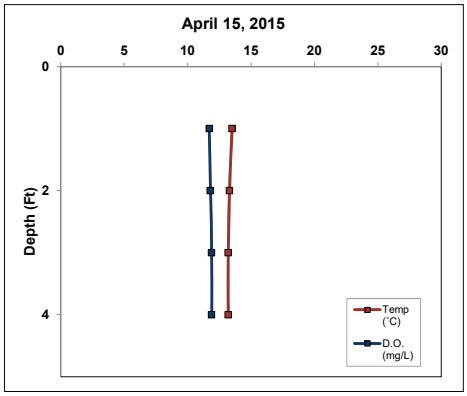
	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
1976	1	0.8	1	0.8								
1985	1	3.3	1	3.3								
1986	1	1.6	1	1.6								
1987	1	1.3	1	1.3								
1988	1	2.9	1	2.9								
1989	1	3.0	1	3.0								
1990	1	3.5	1	3.5								
1991	1	5.2	1	5.2	1	0.0	1	0.0				
1996	8	2.2	6	2.3								
1997	11	2.4	4	2.8								
1998	8	2.0	8	2.0								
2000	8	2.2	4	2.2								
2001	4	2.3	2	1.3								
2002	7	2.1	4	2.5								
2003	7	2.1	5	2.2								
2004	11	3.4	7	3.8	4	41.6	4	41.6	5	121.4	3	131.7
2005	11	1.3	7	1.3	4	84.1	3	101.5	4	180.5	3	203.7
2006	4	2.4	3	2.6	4	40.1	2	32.6	4	87.3	2	83.5
2007	4	1.7	2	1.3	4	50.3	2	57.7	4	112.5	2	130.5
2009	3	1.4	1	1.8	4	64.5	2	56.7	4	170.8	2	186.5
2011	7	1.6	7	1.6	7	83.2	7	83.2	7	143.1	7	143.1
2012	10	2.3	5	2.0	10	48.5	5	65.0	10	112.5	5	147.4
2013	11	3.5	6	4.5	11	60.6	6	41.0	11	96.2	6	87.9
2014	12	2.7	6	2.6	13	48.1	6	41.8	13	108.8	6	123.9
2015	5	2.7	2	3.7	5	29.8	2	30.4	5	86.2	2	105.4
2016	5	2.2	3	1.9	5	65.7	3	81.3	5	88.3	3	94.3
All Years (Weighted)		2.4		2.4		55.0		57.5		115.0		129.5
SLDL Median				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

Puckaway Lake - Mid Basin

Date: 4/15/2015
Time: 12:20
Weather: 54F, 90% clouds, steady breeze
Entry: EEH

Max Depth: 5.1
PULMBS Depth (ft): 3.0
PULMBB Depth (ft): -
Secchi Depth (ft): 2.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	13.5	11.7	9.2	
2	13.3	11.8	9.2	
3	13.2	11.9	9.2	
4	13.2	11.9	9.2	
5				



Parameter	PULMBS	PULMBB
Total P (µg/L)	64.10	NA
Dissolved P (µg/L)	2.50	NA
Chl-*a* (µg/L)	14.00	NA
TKN (µg/L)	1170.00	NA
NO_3 + NO_2-N (µg/L)	ND	NA
NH_3-N (µg/L)	ND	NA
Total N (µg/L)	1170.00	NA
Lab Cond. (µS/cm)	303.00	NA
Lab pH	8.66	NA
Alkalinity (mg/L $CaCO_3$)	137.00	NA
Total Susp. Solids (mg/L)	13.40	NA
Calcium (mg/L)	31.60	NA
Magnesium (mg/L)	20.50	NA
Hardness (mg/L)	163.00	NA
Color (SU)	30.00	NA
Turbidity (NTU)	NA	NA

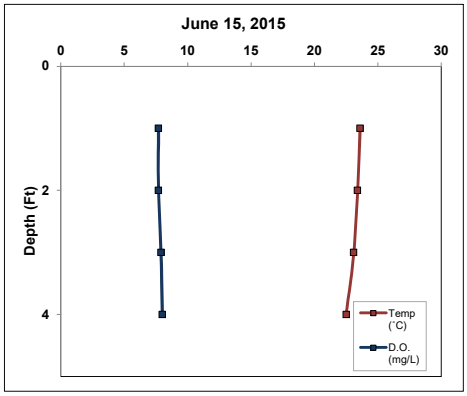
Data collected by EEH and BTB (Onterra).

Puckaway Lake - Mid Basin

Date: 6/15/2015
Time: 12:45
Weather: 80F, 95% clouds
Entry: EEH

Max Depth: 5.0
PULMBS Depth (ft): 3.0
PULMBB Depth (ft): -
Secchi Depth (ft): 5.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	23.6	7.7		
2	23.4	7.7		
3	23.1	7.9		
4	22.5	8.0		



Parameter	PULMBS	PULMBB
Total P (µg/L)	79.70	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	14.40	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

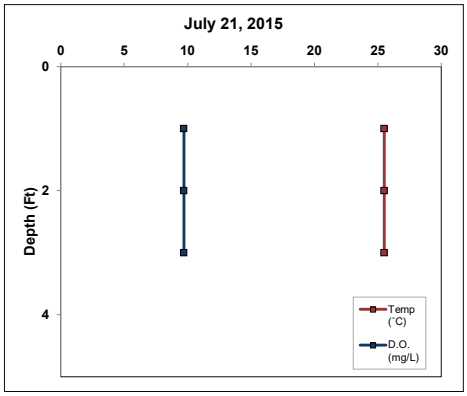
Data collected by SDF (Onterra)

Puckaway Lake - Mid Basin

Date: 7/21/2015
Time: 15:45
Weather: Rough, 80F, Windy, 30% clouds
Entry: EEH

Max Depth: 3.8
PULMBS Depth (ft): 2.0
PULMBB Depth (ft): -
Secchi Depth (ft): 1.9

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	25.5	9.7		
2	25.5	9.7		
3	25.5	9.7		



Parameter	PULMBS	PULMBB
Total P (µg/L)	78.70	NA
Dissolved P (µg/L)	1.90	NA
Chl-*a* (µg/L)	39.60	NA
TKN (µg/L)	1740.00	NA
$NO_3 + NO_2$-N (µg/L)	ND	NA
NH_3-N (µg/L)	16.50	NA
Total N (µg/L)	1740.00	NA
Lab Cond. (µS/cm)	361.00	NA
Lab pH	9.05	NA
Alkalinity (mg/L $CaCO_3$)	173.00	NA
Total Susp. Solids (mg/L)	24.80	NA
Calcium (mg/L)	38.50	NA
Magnesium (mg/L)	27.20	NA
Hardness (mg/L)	208.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

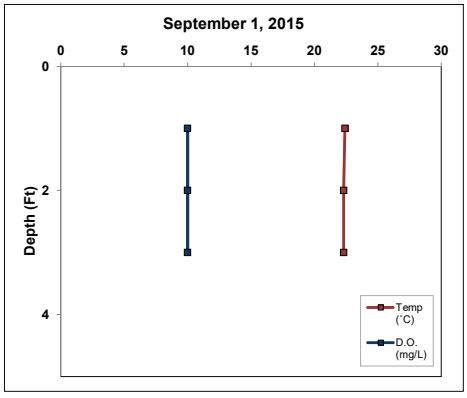
Data collected by TAH (Onterra)

Puckaway Lake - Mid Basin

Date: 9/1/2015
Time: 9:00
Weather: 78F, hazy sun, 0% clouds
Entry: EEH

Max Depth: 3.0
PULMBS Depth (ft): 1.5
PULMBB Depth (ft): -
Secchi Depth (ft): 1.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	22.4	10.0		
2	22.3	10.0		
3	22.3	10.0		



Parameter	PULMBS	PULMBB
Total P (µg/L)	72.30	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	41.60	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and DAC (Onterra)

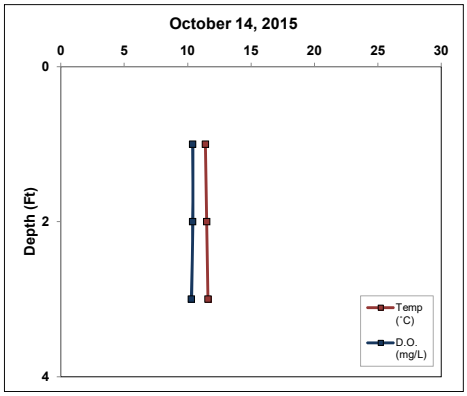
Puckaway Lake - Mid Basin

Date: 10/14/2015
Time: 11:05
Weather: 54F, light breeze, 100% sun
Entry: EEH

Max Depth: 3.4
PULMBS Depth (ft): 2.0
PULMBB Depth (ft): -
Secchi Depth (ft): 1.5

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	11.4	10.4		
2	11.5	10.4	8.8	
3	11.6	10.3		

Parameter	PULMBS	PULMBB
Total P (µg/L)	43.20	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	24.80	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	21.00	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA



Data collected by TWH (Onterra)

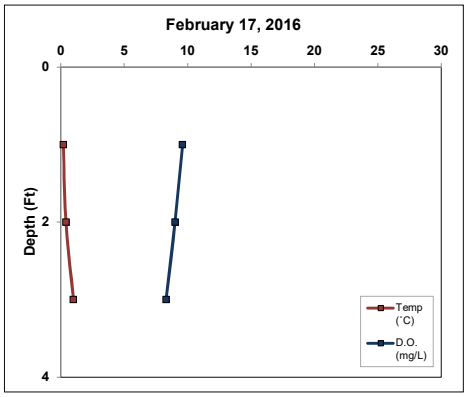
Puckaway Lake - Mid Basin

Date: 2/17/2016
Time: 13:15
Weather: % clouds, 25F
Entry: EEH

Max Depth: 5.4
PULMBS Depth (ft): 3.0
PULMBB Depth (ft): -
Secchi Depth (ft): hit bottom

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.2	9.6		
2	0.4	9.0		
3	1.0	8.3		

Parameter	PULMBS	PULMBB
Total P (µg/L)	43.40	NA
Dissolved P (µg/L)	8.20	NA
Chl-a (µg/L)	NA	NA
TKN (µg/L)	744.00	NA
$NO_3 + NO_2$-N (µg/L)	2570.00	NA
NH_3-N (µg/L)	111.00	NA
Total N (µg/L)	3314.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA



Data collected by TWH and JLW (Onterra). Ice thickness: 1.3 ft

Water Quality Data

2015-2016	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	5	2.4	NA	NA
Total P (µg/L)	6	63.6	0	NA
Dissolved P (µg/L)	3	4.2	0	NA
Chl a (µg/L)	5	26.9	0	NA
TKN (µg/L	3	1218.0	0	NA
NO3+NO2-N (µg/L)	3	2570.0	0	NA
NH3-N (µg/L)	3	63.8	0	NA
Total N (µg/L)	3	2074.7	0	NA
Lab Cond. (µS/cm)	2	332.0	0	NA
Lab pH	2	8.9	0	NA
Alkal (mg/l CaCO3)	2	155.0	0	NA
Total Susp. Solids (mg/l)	3	19.7	0	NA
Calcium (µg/L)	2	35.1	0	NA
Magnesium (mg/L)	2	23.9	0	NA
Hardness (mg/L)	2	185.5	0	NA
Color (SU)	2	40.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2004	67.2	66.2	62.2
2005	84.1	80.0	
2006	66.7	62.7	
2007	73.4	71.4	
2009	82.5	80.7	84.5
2011	76.8	76.6	75.1
2012	79.2	76.4	70.7
2013	66.6	68.2	61.7
2014	69.6	67.1	67.6
2015	67.2	62.9	59.3
All Years (Weighted)	74.9	73.6	66.7
Shallow, Lowland Drainage Lakes	54.6	52.6	52.4
SWTP Ecoregion	48.7	47.0	50.0

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2004	10	2.6	7	2.8	1	37.5	1	37.5	2	115.5	1.0	79.0
2005					4	125.4	3	154.0	5	185.6	3.0	256.0
2006					4	40.2	2	26.3	4	87.8	2.0	76.5
2007					4	56.7	2	63.8	5	117.2	3.0	122.0
2009	4	0.8	2	0.6	4	136.8	2	165.0	4	195.8	2.0	229.5
2011	7	1.2	7	1.2	7	109.0	7	109.0	7	154.4	7.0	154.4
2012	10	2.0	5	1.6	10	77.1	5	106.9	10	141.4	5.0	182.0
2013	10	2.3	5	2.9	11	64.1	6	46.3	11	98.3	6.0	76.1
2014	13	2.4	6	1.9	12	37.7	6	41.2	13	87.9	6.0	93.9
2015	5	2.4	2	3.5	5	26.9	2	27.0	5	67.6	2.0	79.2
All Years (Weighted)		2.1		2.1		69.3		80.2		120.2		135.0
Shallow, Lowland Drainage Lakes				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

July 2015 N: 1740.0
July 2015 P: 78.7

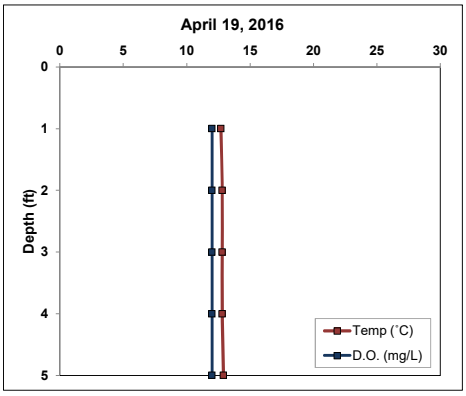
Summer 2015 N:P 22 :1

Puckaway Lake - Mid Basin

Date: 4/19/2016
Time: 14:00
Weather: 100% clouds, 50F
Entry: EEH

Max Depth: 5.7
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.9

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	12.7	12.0		
2	12.8	12.0		
3	12.8	12.0	9.0	
4	12.8	12.0		
5	12.9	12.0		



Parameter	LS	LB
Total P (µg/L)	33.60	NA
Dissolved P (µg/L)	4.30	NA
Chl-*a* (µg/L)	30.20	NA
TKN (µg/L)	1590.00	NA
NO_3 + NO_2-N (µg/L)	1300.00	NA
NH_3-N (µg/L)	ND	NA
Total N (µg/L)	2890.00	NA
Lab Cond. (µS/cm)	393.00	NA
Lab pH	8.71	NA
Alkalinity (mg/L $CaCO_3$)	166.00	NA
Total Susp. Solids (mg/L)	6.25	NA
Calcium (mg/L)	41.70	NA
Magnesium (mg/L)	22.80	NA
Hardness (mg/L)	198.00	NA
Color (SU)	50.00	NA
Turbidity (NTU)	NA	NA

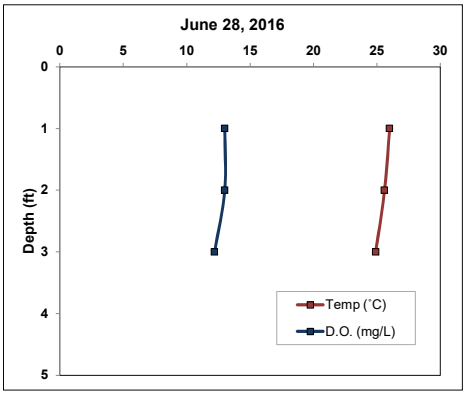
Data collected by TWH (Onterra)

Puckaway Lake - Mid Basin

Date: 6/28/2016
Time: 13:40
Weather: 70F, 10% clouds, light breeze
Entry: EEH

Max Depth: 3.4
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.7

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.0	13.0		
2	25.6	13.0		
3	24.9	12.2		



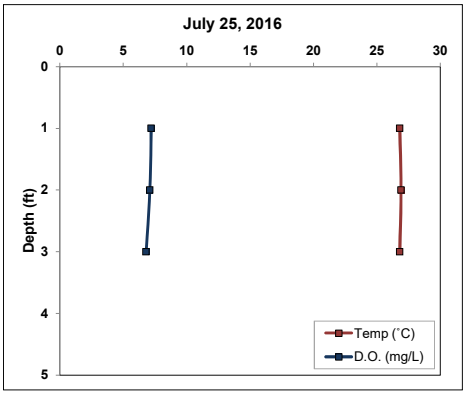
Parameter	LS	LB
Total P (µg/L)	112.00	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	103.00	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Puckaway Lake - Mid Basin

Date: 7/25/2016
Time: 10:00
Weather: 75F, 0% clouds
Entry: JLW

Max Depth: 3.9
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.2

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	26.8	7.2		
2	26.9	7.1	8.8	
3	26.8	6.8		



Parameter	LS	LB
Total P (µg/L)	127.00	NA
Dissolved P (µg/L)	3.50	NA
Chl-a (µg/L)	89.00	NA
TKN (µg/L)	2020.00	NA
$NO_3 + NO_2$-N (µg/L)	ND	NA
NH_3-N (µg/L)	36.20	NA
Total N (µg/L)	2020.00	NA
Lab Cond. (µS/cm)	330.00	NA
Lab pH	8.54	NA
Alkalinity (mg/L $CaCO_3$)	160.00	NA
Total Susp. Solids (mg/L)	42.70	NA
Calcium (mg/L)	31.90	NA
Magnesium (mg/L)	29.10	NA
Hardness (mg/L)	199.00	NA
Color (SU)	40.00	NA
Turbidity (NTU)	NA	NA

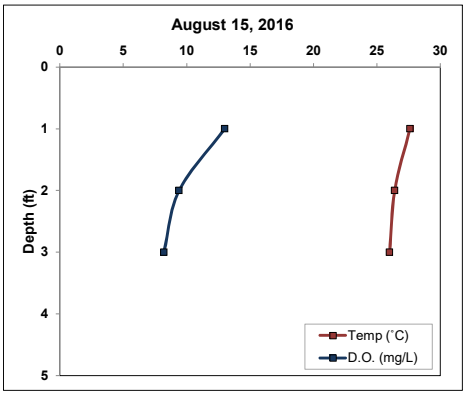
Data collected by BTB & LJS (Onterra).

Puckaway Lake - Mid Basin

Date: 8/15/2016
Time: 12:10
Weather: 75% clouds, 82F
Entry: JMB

Max Depth: 3.7
LS Depth (ft): 2.0
LB Depth (ft):
Secchi Depth (ft): 1.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	27.6	13.0		
2	26.4	9.4		
3	26.0	8.2		



Parameter	LS	LB
Total P (µg/L)	101.00	NA
Dissolved P (µg/L)	NA	NA
Chl-a (µg/L)	82.40	NA
TKN (µg/L)	NA	NA
$NO_3 + NO_2$-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

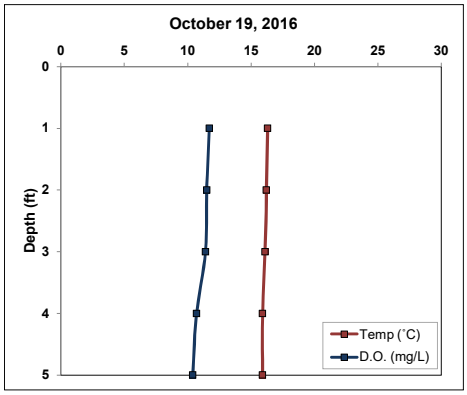
Data collected by TWH and LJS (Onterra). Water is brown, maybe a little low?

Puckaway Lake - Mid Basin

Date: 10/19/2016
Time: 11:30
Weather: 75% clouds, 70F, no wind
Entry: JMB

Max Depth: 5.8
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 2.1

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	16.3	11.7		
2	16.2	11.5		
3	16.1	11.4		
4	15.9	10.7		
5	15.9	10.4		



Parameter	LS	LB
Total P (µg/L)	73.70	NA
Dissolved P (µg/L)	NA	NA
Chl-*a* (µg/L)	61.00	NA
TKN (µg/L)	NA	NA
NO_3 + NO_2-N (µg/L)	NA	NA
NH_3-N (µg/L)	NA	NA
Total N (µg/L)	NA	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	12.80	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

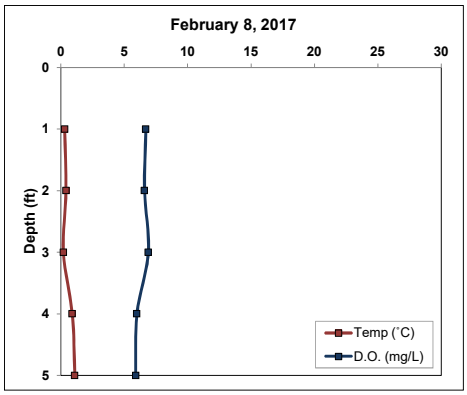
Data collected by JMB and LJS (Onterra).

Puckaway Lake - Mid Basin

Date: 2/8/2017
Time: 12:55
Weather: 18F, 30% clouds, light wind
Entry: EEH

Max Depth: 5.5
LS Depth (ft): 3.0
LB Depth (ft):
Secchi Depth (ft): 5.0

Depth (ft)	Temp (˚C)	D.O. (mg/L)	pH	Sp. Cond. (µS/cm)
1	0.3	6.7		
2	0.4	6.6		
3	0.2	6.9		
4	0.9	6.0		
5	1.1	5.9		



Parameter	LS	LB
Total P (µg/L)	79.10	NA
Dissolved P (µg/L)	32.60	NA
Chl-*a* (µg/L)	NA	NA
TKN (µg/L)	884.00	NA
NO_3 + NO_2-N (µg/L)	2120.00	NA
NH_3-N (µg/L)	121.00	NA
Total N (µg/L)	3125.00	NA
Lab Cond. (µS/cm)	NA	NA
Lab pH	NA	NA
Alkalinity (mg/L $CaCO_3$)	NA	NA
Total Susp. Solids (mg/L)	NA	NA
Calcium (mg/L)	NA	NA
Magnesium (mg/L)	NA	NA
Hardness (mg/L)	NA	NA
Color (SU)	NA	NA
Turbidity (NTU)	NA	NA

Data collected by TWH and LJS (Onterra). Ice depth = 1.3 feet.

Water Quality Data

2016-2017	Surface		Bottom	
Parameter	Count	Mean	Count	Mean
Secchi Depth (feet)	6	2.3	NA	NA
Total P (µg/L)	6	87.7	0	NA
Dissolved P (µg/L)	3	13.5	0	NA
Chl a (µg/L)	5	73.1	0	NA
TKN (µg/L	3	1498.0	0	NA
NO_3+NO_2-N (µg/L)	3	1710.0	0	NA
NH_3-N (µg/L)	3	78.6	0	NA
Total N (µg/L)	3	2678.3	0	NA
Lab Cond. (µS/cm)	2	361.5	0	NA
Alkal (mg/l $CaCO_3$)	2	163.0	0	NA
Total Susp. Solids (mg/l)	3	20.6	0	NA
Calcium (mg/L)	2	36.8	0	NA
Magnesium (mg/L)	2	26.0	0	NA
Hardness (mg/L)	2	198.5	0	NA
Color (SU)	2	45.0	0	NA
Turbidity (NTU)	0	NA	0	NA

Trophic State Index (TSI)

Year	TP	Chl-a	Secchi
2004			62.2
2005			73.4
2006	66.7	62.7	67.0
2007	73.4	71.4	75.1
2009	82.5	80.7	84.5
2011	76.8	76.6	75.1
2012	79.2	76.4	70.7
2013	66.6	68.2	61.7
2014	69.6	67.1	67.6
2015	67.2	62.9	59.3
2016	72.4	74.9	73.3
All Years (Weighted)	74.7	73.7	67.8
SLDL Median	54.6	52.6	52.4
SWTP Ecoregion Median	48.7	47.0	50.0

	Secchi (feet)				Chlorophyll-*a* (µg/L)				Total Phosphorus (µg/L)			
	Growing Season		Summer		Growing Season		Summer		Growing Season		Summer	
Year	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean	Count	Mean
2004	10	2.6	7	2.8	1	37.5	1	37.5	2	115.5	1.0	79.0
2005	4	1.5	3	1.3	4	125.4	3	154.0	5	185.6	3.0	256.0
2006	4	1.9	3	2.0	4	40.2	2	26.3	4	87.8	2.0	76.5
2007	4	1.3	2	1.1	4	56.7	2	63.8	5	117.2	3.0	122.0
2009	4	0.8	2	0.6	4	136.8	2	165.0	4	195.8	2.0	229.5
2011	7	1.2	7	1.2	7	109.0	7	109.0	7	154.4	7.0	154.4
2012	10	2.0	5	1.6	10	77.1	5	106.9	10	141.4	5.0	182.0
2013	10	2.3	5	2.9	11	64.1	6	46.3	11	98.3	6.0	76.1
2014	13	2.4	6	1.9	12	37.7	6	41.2	13	87.9	6.0	93.9
2015	5	2.4	2	3.5	5	26.9	2	27.0	5	67.6	2.0	79.2
2016	5	1.8	3	1.3	5	73.1	3	91.5	5	89.5	3.0	113.3
All Years (Weighted)		2.0		1.9		69.6		81.0		118.1		133.4
SLDL Median				5.6				9.4				33.0
SWTP Ecoregion				6.6				5.3				22.0

F

APPENDIX F

Watershed Analysis WiLMS Results

Date: 7/15/2016 Lake Puckaway

Lake Id: LakePuckaway

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 151935.0 acre
Total Unit Runoff: 9.30 in.
Annual Runoff Volume: 117749.6 acre-ft
Lake Surface Area <As>: 5190.0 acre
Lake Volume <V>: 22484.0 acre-ft
Lake Mean Depth <z>: 4.3 ft
Precipitation - Evaporation: 3.1 in.
Hydraulic Loading: 395543.5 acre-ft/year
Areal Water Load <qs>: 76.2 ft/year
Lake Flushing Rate <p>: 17.59 1/year
Water Residence Time: 0.06 year
Observed spring overturn total phosphorus (SPO): 77.2 mg/m^3
Observed growing season mean phosphorus (GSM): 116.2 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	76994.0	0.50	1.00	3.00	46.9	15580	31159	93478
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	22243.0	0.10	0.30	0.50	4.1	900	2701	4501
HD Urban (1/8 Ac)	89.0	1.00	1.50	2.00	0.1	36	54	72
MD Urban (1/4 Ac)	1304.0	0.30	0.50	0.80	0.4	158	264	422
Rural Res (>1 Ac)	2514.0	0.05	0.10	0.25	0.2	51	102	254
Wetlands	30298.0	0.10	0.10	0.10	1.8	1226	1226	1226
Forest	18493.0	0.05	0.09	0.18	1.0	374	674	1347
Lake Surface	5190.0	0.10	0.30	1.00	0.9	210	630	2100

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %
Buffalo Lake	2.5E+008	0.0	23258.9	0.0	35.0
Lake Montello	9.1E+007	0.0	6338.5	0.0	9.5

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	704.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		4.22	35.20	112.64	0.1

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	40872.7	146478.2	228207.4	100.0
Total Loading (kg)	18539.7	66442.1	103514.2	100.0
Areal Loading (lb/ac-year)	7.88	28.22	43.97	
Areal Loading (mg/m^2-year)	882.71	3163.43	4928.50	
Total PS Loading (lb)	0.0	65250.4	0.0	44.5
Total PS Loading (kg)	0.0	29597.4	0.0	44.5
Total NPS Loading (lb)	40400.4	79761.0	223328.5	55.4
Total NPS Loading (kg)	18325.5	36179.4	101301.2	55.4

Water and Nutrient Outflow Module: Lake Puckaway

Date: 7/15/2016 Scenario: 6
Average Annual Surface Total Phosphorus: 113.24mg/m^3
Annual Discharge: 3.96E+005 AF => 4.88E+008 m^3
Annual Outflow Loading: 116468.1 LB => 52829.6 kg

Water and Nutrient Outflow Module: Lake Montello

Date: 5/31/2016 Scenario: 4
Average Annual Surface Total Phosphorus: 72.86mg/m^3
Annual Discharge: 7.38E+004 AF => 9.10E+007 m^3
Annual Outflow Loading: 13973.9 LB => 6338.5 kg

Water and Nutrient Outflow Module: Buffalo Lake

Date: 5/31/2016 Scenario: 5
Average Annual Surface Total Phosphorus: 98.9mg/m^3
Annual Discharge: 2.00E+005 AF => 2.46E+008 m^3
Annual Outflow Loading: 51276.6 LB => 23258.9 kg

Grand River Marsh Loading : 67129 LB => 30449 KG

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/15/2016 Scenario: 16
Observed spring overturn total phosphorus (SPO): 77.2 mg/m^3
Observed growing season mean phosphorus (GSM): 116.2 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	25	88	138	-28	-24
Canfield-Bachmann, 1981 Natural Lake	32	103	152	-13	-11
Canfield-Bachmann, 1981 Artificial Lake	29	83	116	-33	-28
Rechow, 1979 General	22	80	125	-36	-31
Rechow, 1977 Anoxic	33	119	186	3	3
Rechow, 1977 water load<50m/year	26	92	144	-24	-21
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	31	111	173	34	44
Vollenweider, 1982 Combined OECD	26	73	105	-24	-25
Dillon-Rigler-Kirchner	20	73	114	-4	-5
Vollenweider, 1982 Shallow Lake/Res.	21	64	94	-33	-34
Larsen-Mercier, 1976	31	110	171	33	43
Nurnberg, 1984 Oxic	24	87	135	-29	-25

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	42	132	z Tw	0	GSM
Canfield-Bachmann, 1981 Natural Lake	32	297	FIT	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	26	239	FIT	1	GSM
Rechow, 1979 General	37	123	FIT	0	GSM
Rechow, 1977 Anoxic	58	176	FIT	0	GSM
Rechow, 1977 water load<50m/year	43	140	P	0	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	45	186	FIT	0	SPO
Vollenweider, 1982 Combined OECD	30	126	FIT	0	ANN
Dillon-Rigler-Kirchner	35	108	P L	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	26	109	FIT	0	ANN
Larsen-Mercier, 1976	55	159	P Pin	0	SPO
Nurnberg, 1984 Oxic	37	141	P	0	ANN

Date: 5/31/2016 Scenario: Lake Montello Current

Lake Id: LakeMontello

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 91147.0 acre
Total Unit Runoff: 9.70 in.
Annual Runoff Volume: 73677.2 acre-ft
Lake Surface Area <As>: 341.0 acre
Lake Volume <V>: 1676 acre-ft
Lake Mean Depth <z>: 4.9 ft
Precipitation - Evaporation: 3.0 in.
Hydraulic Loading: 73762.4 acre-ft/year
Areal Water Load <qs>: 216.3 ft/year
Lake Flushing Rate <p>: 44.01 1/year
Water Residence Time: 0.02 year
Observed spring overturn total phosphorus (SPO): 65.5 mg/m^3
Observed growing season mean phosphorus (GSM): 77.2 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	33053.0	0.50	1.00	3.00	80.9	6688	13377	40130
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	10282.0	0.10	0.30	0.50	7.6	416	1248	2081
HD Urban (1/8 Ac)	36.0	1.00	1.50	2.00	0.1	15	22	29
MD Urban (1/4 Ac)	184.0	0.30	0.50	0.80	0.2	22	37	60
Rural Res (>1 Ac)	1327.0	0.05	0.10	0.25	0.3	27	54	134
Wetlands	15054.0	0.10	0.10	0.10	3.7	609	609	609
Forest	31211.0	0.05	0.09	0.18	6.9	632	1137	2274
Lake Surface	341.0	0.10	0.30	1.00	0.3	14	41	138

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	18568.8	36431.3	100207.9	100.0
Total Loading (kg)	8422.7	16525.1	45454.0	100.0
Areal Loading (lb/ac-year)	54.45	106.84	293.86	
Areal Loading (mg/m^2-year)	6103.53	11974.91	32938.22	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	18538.3	36340.0	99903.7	100.0
Total NPS Loading (kg)	8408.9	16483.7	45316.0	100.0

Water and Nutrient Outflow Module

Date: 5/31/2016 Scenario: 4
Average Annual Surface Total Phosphorus: 72.86mg/m^3
Annual Discharge: 7.38E+004 AF => 9.10E+007 m^3
Annual Outflow Loading: 13973.9 LB => 6338.5 kg

Phosphorus Prediction and Uncertainty Analysis Module

Date: 5/31/2016 Scenario: 12
Observed spring overturn total phosphorus (SPO): 65.5 mg/m^3
Observed growing season mean phosphorus (GSM): 77.2 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	66	129	354	52	67
Canfield-Bachmann, 1981 Natural Lake	79	148	368	71	92
Canfield-Bachmann, 1981 Artificial Lake	69	120	258	43	56
Rechow, 1979 General	67	132	363	55	71
Rechow, 1977 Anoxic	82	160	441	83	108
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	78	152	419	75	97
Walker, 1977 General	81	158	435	93	142
Vollenweider, 1982 Combined OECD	57	98	226	27	38
Dillon-Rigler-Kirchner	64	126	346	61	93
Vollenweider, 1982 Shallow Lake/Res.	48	88	214	17	24
Larsen-Mercier, 1976	80	158	434	93	142
Nurnberg, 1984 Oxic	76	149	410	72	93

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	76	274	z Tw	0	GSM
Canfield-Bachmann, 1981 Natural Lake	46	426	L	1	GSM
Canfield-Bachmann, 1981 Artificial Lake	37	346	FIT	1	GSM
Rechow, 1979 General	75	283	FIT	0	GSM
Rechow, 1977 Anoxic	97	339	FIT	0	GSM
Rechow, 1977 water load<50m/year	N/A	N/A	N/A	N/A	N/A
Rechow, 1977 water load>50m/year	107	315	P Pin	0	GSM
Walker, 1977 General	80	350	FIT	0	SPO
Vollenweider, 1982 Combined OECD	49	200	FIT	0	ANN
Dillon-Rigler-Kirchner	75	267	P L	0	SPO
Vollenweider, 1982 Shallow Lake/Res.	44	183	FIT	0	ANN
Larsen-Mercier, 1976	98	332	P Pin p	0	SPO
Nurnberg, 1984 Oxic	79	326	P L	0	ANN

Date: 7/15/2016 Scenario: 24

Lake Id: Grand River Marsh

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 121077.0 acre
Total Unit Runoff: 9.30 in.
Annual Runoff Volume: 93834.7 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.1 in.
Hydraulic Loading: 93834.7 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low Loading (kg/ha-year)	Most Likely Loading (kg/ha-year)	High Loading (kg/ha-year)	Loading %	Low Loading (kg/year)	Most Likely Loading (kg/year)	High Loading (kg/year)
Row Crop AG	65879.0	0.50	1.00	3.00	87.6	13331	26661	79984
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	19024.0	0.10	0.30	0.50	7.6	770	2310	3850
HD Urban (1/8 Ac)	65.0	1.00	1.50	2.00	0.1	26	39	53
MD Urban (1/4 Ac)	209.0	0.30	0.50	0.80	0.1	25	42	68
Rural Res (>1 Ac)	1947.0	0.05	0.10	0.25	0.3	39	79	197
Wetlands	20029	0.10	0.10	0.10	2.7	811	811	811
Forest	13924.0	0.05	0.09	0.18	1.7	282	507	1014
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description	Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)	0.30	0.50	0.80	

# capita-years	0.0				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	33694.9	67128.3	189541.2	100.0
Total Loading (kg)	15283.9	30449.2	85975.3	100.0
Areal Loading (lb/ac-year)	23.39	46.69	131.97	
Areal Loading (mg/m^2-year)	2621.85	5233.43	14792.24	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	33694.9	67128.3	189541.2	100.0
Total NPS Loading (kg)	15283.9	30449.2	85975.3	100.0

Phosphorus Prediction and Uncertainty Analysis Module

Date: 7/15/2016 Scenario: 15
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
Back calculation for SPO total phosphorus: 0.0 mg/m^3
Back calculation GSM phosphorus: 0.0 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir					
Canfield-Bachmann, 1981 Natural Lake					
Canfield-Bachmann, 1981 Artificial Lake					
Rechow, 1979 General					
Rechow, 1977 Anoxic					
Rechow, 1977 water load<50m/year					
Rechow, 1977 water load>50m/year					
Walker, 1977 General					
Vollenweider, 1982 Combined OECD					
Dillon-Rigler-Kirchner					
Vollenweider, 1982 Shallow Lake/Res.					
Larsen-Mercier, 1976					
Nurnberg, 1984 Oxic					

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir					GSM
Canfield-Bachmann, 1981 Natural Lake					GSM
Canfield-Bachmann, 1981 Artificial Lake					GSM
Rechow, 1979 General					GSM
Rechow, 1977 Anoxic					GSM
Rechow, 1977 water load<50m/year					GSM
Rechow, 1977 water load>50m/year					GSM
Walker, 1977 General					SPO
Vollenweider, 1982 Combined OECD					ANN
Dillon-Rigler-Kirchner					SPO
Vollenweider, 1982 Shallow Lake/Res.					ANN
Larsen-Mercier, 1976					SPO
Nurnberg, 1984 Oxic					ANN

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APPENDIX G

Aquatic Plant Survey Data

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
1	43.770029	-89.127337	135	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	1	2	Sand	Pole	SAMPLED			0																												
2	43.770014	-89.125411	136	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	2	2	Sand	Pole	SAMPLED			0																												
3	43.769999	-89.123485	167	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	3	2	Sand	Pole	SAMPLED			0																												
4	43.769984	-89.121560	91	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	4	2	Sand	Pole	SAMPLED			1																										1	1
5	43.768735	-89.140836	48	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	5	2	Muck	Pole	SAMPLED			1		1			1																						
6	43.768721	-89.138911	49	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	6	3	Muck	Pole	SAMPLED			0																												
7	43.768706	-89.136985	50	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	7	2	Sand	Pole	SAMPLED			0																												
8	43.768692	-89.135059	78	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	8	1	Sand	Pole	SAMPLED			1										1												1					
9	43.768677	-89.133134	79	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	9	2	Sand	Pole	SAMPLED			1		1																										
10	43.768663	-89.131208	106	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	10	2	Sand	Pole	SAMPLED			0																												
11	43.768648	-89.129283	107	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	11	3	Muck	Pole	SAMPLED			0																												
12	43.768633	-89.127357	134	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	12	3	Muck	Pole	SAMPLED			0																												
13	43.768618	-89.125431	137	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	13	3	Muck	Pole	SAMPLED			0																												
14	43.768604	-89.123506	166	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	14	3	Muck	Pole	SAMPLED			0																												
15	43.768589	-89.121580	92	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	15	3	Muck	Pole	SAMPLED			0																												
16	43.768574	-89.119655	90	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	16	3	Sand	Pole	SAMPLED			0																												
17	43.768515	-89.111952	24	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	17	2	Sand	Pole	SAMPLED			1				1																							
18	43.768500	-89.110027	23	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	18	3	Muck	Pole	SAMPLED			0																												
19	43.768485	-89.108101	22	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	19	3	Muck	Pole	SAMPLED			0																												
20	43.768470	-89.106175	21	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	20	1	Sand	Pole	SAMPLED			0																												
21	43.767984	-89.231359	56	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	21	0			NONNAVIGABLE (PLANTS)																															
22	43.767971	-89.229434	55	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	22	0			NONNAVIGABLE (PLANTS)																															
23	43.767958	-89.227508	54	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	23	0			NONNAVIGABLE (PLANTS)																															
24	43.767383	-89.146633	47	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	24	0			SHALLOW																															
25	43.767369	-89.144707	46	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	25	2	Muck	Pole	SAMPLED			0																												
26	43.767354	-89.142782	45	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	26	3	Muck	Pole	SAMPLED			0																												
27	43.767340	-89.140856	44	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	27	3	Muck	Pole	SAMPLED			0																												
28	43.767325	-89.138931	43	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	28	3	Muck	Pole	SAMPLED			0																												
29	43.767311	-89.137005	51	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	29	3	Muck	Pole	SAMPLED			0																												
30	43.767296	-89.135079	77	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	30	4	Muck	Pole	SAMPLED			0																												
31	43.767282	-89.133154	80	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	31	4	Muck	Pole	SAMPLED			0																												
32	43.767267	-89.131228	105	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	32	4	Muck	Pole	SAMPLED			0																												
33	43.767252	-89.129303	108	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	33	4	Muck	Pole	SAMPLED			0																												
34	43.767238	-89.127377	133	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	34	4	Muck	Pole	SAMPLED			0																												
35	43.767223	-89.125452	138	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	35	4	Muck	Pole	SAMPLED			0																												
36	43.767208	-89.123526	165	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	36	4	Muck	Pole	SAMPLED			0																												
37	43.767194	-89.121601	93	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	37	4	Muck	Pole	SAMPLED			0																												
38	43.767179	-89.119675	89	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	38	4	Muck	Pole	SAMPLED			1		1																										
39	43.767164	-89.117749	88	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	39	3	Sand	Pole	SAMPLED			0																												
40	43.767149	-89.115824	87	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	40	2	Sand	Pole	SAMPLED			1																												1
41	43.767134	-89.113898	86	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	41	2	Sand	Pole	SAMPLED			1			1																								1
42	43.767119	-89.111973	25	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	42	2	Sand	Pole	SAMPLED			1				1																		1					

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
43	43.767104	-89.110047	26	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	43	3	Muck	Pole	SAMPLED			0																												
44	43.767089	-89.108122	27	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	44	3	Muck	Pole	SAMPLED			0																												
45	43.767074	-89.106196	20	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	45	2	Muck	Pole	SAMPLED			2																							2						
46	43.766589	-89.231377	33	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	46	0			NONNAVIGABLE (PLANTS)																															
47	43.766576	-89.229452	32	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	47	0			NONNAVIGABLE (PLANTS)																															
48	43.766563	-89.227526	30	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	48	0			NONNAVIGABLE (PLANTS)																															
49	43.766550	-89.225600	29	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	49	0			NONNAVIGABLE (PLANTS)																															
50	43.766537	-89.223675	28	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	50	0			NONNAVIGABLE (PLANTS)																															
51	43.766511	-89.219824	25	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	51	1	Sand	Pole	SAMPLED			2	1																						2						
52	43.766282	-89.187089	330	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	52	0			NONNAVIGABLE (PLANTS)																															
53	43.766227	-89.179387	329	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	53	3	Muck	Pole	SAMPLED			0																												
54	43.766200	-89.175536	298	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	54	2	Sand	Pole	SAMPLED			0																												
55	43.766186	-89.173610	297	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	55	2	Sand	Pole	SAMPLED			0																												
56	43.766172	-89.171685	123	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	56	1	Sand	Pole	SAMPLED			1																						1						
57	43.766002	-89.148578	65	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	57	0			SHALLOW																															
58	43.765988	-89.146653	38	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	58	2	Muck	Pole	SAMPLED			1		1			1																1						
59	43.765973	-89.144727	39	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	59	3	Muck	Pole	SAMPLED			0																												
60	43.765959	-89.142802	40	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	60	3	Muck	Pole	SAMPLED			1					1																						
61	43.765944	-89.140876	41	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	61	3	Muck	Pole	SAMPLED			0																												
62	43.765930	-89.138951	42	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	62	4	Muck	Pole	SAMPLED			0																												
63	43.765915	-89.137025	52	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	63	4	Muck	Pole	SAMPLED			0																												
64	43.765901	-89.135100	76	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	64	4	Muck	Pole	SAMPLED			0																												
65	43.765886	-89.133174	81	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	65	4	Muck	Pole	SAMPLED			0																												
66	43.765872	-89.131249	104	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	66	4	Muck	Pole	SAMPLED			0																												
67	43.765857	-89.129323	109	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	67	4	Muck	Pole	SAMPLED			0																												
68	43.765842	-89.127397	132	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	68	4	Muck	Pole	SAMPLED			0																												
69	43.765828	-89.125472	139	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	69	4	Muck	Pole	SAMPLED			0																												
70	43.765813	-89.123546	164	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	70	4	Muck	Pole	SAMPLED			1		1			1																						
71	43.765798	-89.121621	94	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	71	4	Muck	Pole	SAMPLED			0																												
72	43.765783	-89.119695	82	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	72	4	Muck	Pole	SAMPLED			0																												
73	43.765768	-89.117770	83	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	73	4	Muck	Pole	SAMPLED			0																												
74	43.765754	-89.115844	84	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	74	4	Sand	Pole	SAMPLED			0																												
75	43.765739	-89.113919	85	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	75	3	Sand	Pole	SAMPLED			0																												
76	43.765724	-89.111993	30	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	76	3	Sand	Pole	SAMPLED			0																												
77	43.765709	-89.110068	29	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	77	3	Muck	Pole	SAMPLED			0																												
78	43.765694	-89.108142	28	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	78	3	Muck	Pole	SAMPLED			0																												
79	43.765679	-89.106217	19	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	79	3	Muck	Pole	SAMPLED			1										1																	
80	43.765664	-89.104291	16	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	80	2	Muck	Pole	SAMPLED			1		1	1																				1					
81	43.765206	-89.233321	34	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	81	0			NONNAVIGABLE (PLANTS)																															
82	43.765154	-89.225618	31	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	82	0			NONNAVIGABLE (PLANTS)																															
83	43.765141	-89.223693	27	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	83	2	Sand	Pole	SAMPLED			3		3				1		1					1									1					
84	43.765128	-89.221767	26	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	84	2	Sand	Pole	SAMPLED			2	1	1			1			1													1		1			1		

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
85	43.765115	-89.219842	24	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	85	3	Muck	Pole	SAMPLED			0																												
86	43.765102	-89.217916	23	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	86	4	Muck	Pole	SAMPLED			0																												
87	43.765089	-89.215991	22	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	87	4	Muck	Pole	SAMPLED			0																												
88	43.765076	-89.214065	21	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	88	4	Muck	Pole	SAMPLED			0																												
89	43.765062	-89.212140	20	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	89	4	Sand	Pole	SAMPLED			0																												
90	43.765049	-89.210214	19	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	90	2	Sand	Pole	SAMPLED			0																												
91	43.765036	-89.208289	18	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	91	2	Sand	Pole	SAMPLED			0																												
92	43.765022	-89.206363	17	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	92	2	Sand	Pole	SAMPLED			0																												
93	43.765009	-89.204438	16	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	93	2	Sand	Pole	SAMPLED			0																												
94	43.764996	-89.202512	17	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	94	3	Sand	Pole	SAMPLED			0																												
95	43.764982	-89.200587	48	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	95	2	Sand	Pole	SAMPLED			0																												
96	43.764969	-89.198661	49	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	96	3	Sand	Pole	SAMPLED			0																												
97	43.764955	-89.196735	79	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	97	2	Sand	Pole	SAMPLED			0																												
98	43.764942	-89.194810	80	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	98	3	Sand	Pole	SAMPLED			0																												
99	43.764928	-89.192884	109	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	99	4	Sand	Pole	SAMPLED			0																												
100	43.764914	-89.190959	110	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	100	3	Sand	Pole	SAMPLED			0																												
101	43.764901	-89.189033	137	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	101	2	Sand	Pole	SAMPLED			0																												
102	43.764887	-89.187108	138	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	102	2	Sand	Pole	SAMPLED			1																						1		1						
103	43.764818	-89.177480	328	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	103	2	Sand	Pole	SAMPLED			0																												
104	43.764804	-89.175555	299	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	104	4	Muck	Pole	SAMPLED			0																												
105	43.764790	-89.173629	296	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	105	4	Muck	Pole	SAMPLED			0																												
106	43.764776	-89.171704	122	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	106	6	Muck	Pole	SAMPLED			0																												
107	43.764762	-89.169778	124	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	107	3	Sand	Pole	SAMPLED			1		1																				1						
108	43.764748	-89.167853	131	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	108	2	Sand	Pole	SAMPLED			0																												
109	43.764734	-89.165927	256	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	109	1	Sand	Pole	SAMPLED			1																												1
110	43.764692	-89.160151	228	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	110	0			NONNAVIGABLE (PLANTS)																															
111	43.764592	-89.146673	37	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	111	3	Muck	Pole	SAMPLED			0																												
112	43.764578	-89.144747	36	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	112	3	Muck	Pole	SAMPLED			0																												
113	43.764563	-89.142822	35	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	113	3	Muck	Pole	SAMPLED			0																												
114	43.764549	-89.140896	34	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	114	4	Muck	Pole	SAMPLED			0																												
115	43.764535	-89.138971	33	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	115	3	Muck	Pole	SAMPLED			0																												
116	43.764520	-89.137045	53	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	116	3	Muck	Pole	SAMPLED			0																												
117	43.764505	-89.135120	75	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	117	3	Muck	Pole	SAMPLED			1																	1										
118	43.764491	-89.133194	82	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	118	4	Muck	Pole	SAMPLED			0																												
119	43.764476	-89.131269	103	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	119	4	Muck	Pole	SAMPLED			0																												
120	43.764462	-89.129343	110	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	120	4	Muck	Pole	SAMPLED			0																												
121	43.764447	-89.127418	131	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	121	4	Muck	Pole	SAMPLED			0																												
122	43.764432	-89.125492	140	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	122	4	Muck	Pole	SAMPLED			0																												
123	43.764417	-89.123567	163	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	123	4	Muck	Pole	SAMPLED			0																												
124	43.764403	-89.121641	95	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	124	4	Muck	Pole	SAMPLED			0																												
125	43.764388	-89.119716	81	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	125	4	Muck	Pole	SAMPLED			0																												
126	43.764373	-89.117790	80	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	126	4	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
127	43.764358	-89.115865	79	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	127	4	Muck	Pole	SAMPLED			0																												
128	43.764343	-89.113940	78	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	128	4	Muck	Pole	SAMPLED			0																												
129	43.764328	-89.112014	31	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	129	3	Muck	Pole	SAMPLED			0																												
130	43.764313	-89.110089	32	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	130	4	Muck	Pole	SAMPLED			0																												
131	43.764298	-89.108163	33	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	131	3	Muck	Pole	SAMPLED			0																												
132	43.764283	-89.106238	18	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	132	3	Muck	Pole	SAMPLED			0																												
133	43.764268	-89.104312	15	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	133	2	Muck	Pole	SAMPLED			2																								2				
134	43.764253	-89.102387	1	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	134	2	Sand	Pole	SAMPLED			1		1				1																				
135	43.763746	-89.223711	35	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	135	1	Sand	Pole	SAMPLED		YES	2								1		2			1				1					1				
136	43.763733	-89.221785	36	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	136	2	Sand	Pole	SAMPLED		YES	2	1				2	1																		1		
137	43.763720	-89.219860	37	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	137	3	Sand	Pole	SAMPLED			0																												
138	43.763707	-89.217934	38	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	138	4	Muck	Pole	SAMPLED			1					1																						
139	43.763693	-89.216009	39	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	139	4	Muck	Pole	SAMPLED			0																												
140	43.763680	-89.214083	40	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	140	5	Muck	Pole	SAMPLED			0																												
141	43.763667	-89.212158	41	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	141	5	Muck	Pole	SAMPLED			0																												
142	43.763654	-89.210232	42	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	142	5	Muck	Pole	SAMPLED			0																												
143	43.763640	-89.208307	43	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	143	5	Muck	Pole	SAMPLED			0																												
144	43.763627	-89.206382	16	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	144	5	Muck	Pole	SAMPLED			0																												
145	43.763614	-89.204456	15	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	145	5	Muck	Pole	SAMPLED			0																												
146	43.763600	-89.202531	18	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	146	5	Muck	Pole	SAMPLED			0																												
147	43.763587	-89.200605	47	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	147	5	Sand	Pole	SAMPLED			0																												
148	43.763573	-89.198680	50	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	148	5	Muck	Pole	SAMPLED			0																												
149	43.763560	-89.196754	78	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	149	5	Muck	Pole	SAMPLED			0																												
150	43.763546	-89.194829	81	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	150	5	Muck	Pole	SAMPLED			0																												
151	43.763533	-89.192903	108	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	151	5	Muck	Pole	SAMPLED			0																												
152	43.763519	-89.190978	111	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	152	5	Muck	Pole	SAMPLED			1		1																										
153	43.763505	-89.189052	136	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	153	5	Muck	Pole	SAMPLED			0																												
154	43.763492	-89.187127	139	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	154	4	Sand	Pole	SAMPLED			0																												
155	43.763478	-89.185201	162	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	155	2	Sand	Pole	SAMPLED			0																												
156	43.763464	-89.183276	163	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	156	2	Sand	Pole	SAMPLED			0																												
157	43.763450	-89.181350	184	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	157	2	Sand	Pole	SAMPLED			0																												
158	43.763437	-89.179425	185	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	158	2	Sand	Pole	SAMPLED			0																												
159	43.763423	-89.177500	327	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	159	4	Muck	Pole	SAMPLED			0																												
160	43.763409	-89.175574	300	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	160	4	Muck	Pole	SAMPLED			0																												
161	43.763395	-89.173649	295	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	161	4	Muck	Pole	SAMPLED			0																												
162	43.763381	-89.171723	121	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	162	4	Muck	Pole	SAMPLED			0																												
163	43.763367	-89.169798	125	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	163	4	Muck	Pole	SAMPLED			0																												
164	43.763353	-89.167872	132	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	164	4	Muck	Pole	SAMPLED			0																												
165	43.763339	-89.165947	255	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	165	4	Muck	Pole	SAMPLED			0																												
166	43.763325	-89.164021	254	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	166	3	Muck	Pole	SAMPLED			0																												
167	43.763311	-89.162096	229	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	167	3	Sand	Pole	SAMPLED			0																												
168	43.763297	-89.160170	227	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	168	0			NONNAVIGABLE (PLANTS)																															

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
169	43.763282	-89.158245	226	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	169	3	Muck	Pole	SAMPLED			1																				1								
170	43.763254	-89.154394	181	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	170	0			NONNAVIGABLE (PLANTS)																																
171	43.763240	-89.152469	180	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	171	0			NONNAVIGABLE (PLANTS)																																
172	43.763226	-89.150543	27	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	172	0			NONNAVIGABLE (PLANTS)																																
173	43.763211	-89.148618	26	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	173	3	Muck	Pole	SAMPLED			0																												
174	43.763197	-89.146692	28	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	174	3	Muck	Pole	SAMPLED			0																												
175	43.763182	-89.144767	29	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	175	3	Muck	Pole	SAMPLED			1		1			1																							
176	43.763168	-89.142841	30	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	176	3	Muck	Pole	SAMPLED			0																												
177	43.763154	-89.140916	31	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	177	3	Muck	Pole	SAMPLED			0																												
178	43.763139	-89.138991	32	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	178	3	Muck	Pole	SAMPLED			0																												
179	43.763125	-89.137065	54	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	179	3	Muck	Pole	SAMPLED			0																												
180	43.763110	-89.135140	74	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	180	4	Muck	Pole	SAMPLED			0																												
181	43.763095	-89.133214	83	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	181	4	Muck	Pole	SAMPLED			0																												
182	43.763081	-89.131289	102	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	182	4	Muck	Pole	SAMPLED			1		1																										
183	43.763066	-89.129363	111	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	183	4	Muck	Pole	SAMPLED			0																												
184	43.763051	-89.127438	130	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	184	4	Muck	Pole	SAMPLED			0																												
185	43.763037	-89.125513	141	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	185	4	Muck	Pole	SAMPLED			0																												
186	43.763022	-89.123587	162	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	186	4	Muck	Pole	SAMPLED			0																												
187	43.763007	-89.121662	96	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	187	4	Muck	Pole	SAMPLED			0																												
188	43.762992	-89.119736	74	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	188	4	Muck	Pole	SAMPLED			0																												
189	43.762978	-89.117811	75	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	189	4	Muck	Pole	SAMPLED			0																												
190	43.762963	-89.115886	76	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	190	4	Muck	Pole	SAMPLED			0																												
191	43.762948	-89.113960	77	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	191	4	Muck	Pole	SAMPLED			0																												
192	43.762933	-89.112035	36	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	192	4	Muck	Pole	SAMPLED			0																												
193	43.762918	-89.110109	35	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	193	3	Muck	Pole	SAMPLED			0																												
194	43.762903	-89.108184	34	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	194	3	Muck	Pole	SAMPLED			0																												
195	43.762888	-89.106259	17	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	195	3	Muck	Pole	SAMPLED			0																												
196	43.762873	-89.104333	14	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	196	2	Muck	Pole	SAMPLED			2		1			1				1													2					
197	43.762858	-89.102408	2	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	197	2	Muck	Pole	SAMPLED			2		1													1						2					
198	43.762350	-89.223729	52	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	198	2	Sand	Pole	SAMPLED		YES	2		2						1						1							1					
199	43.762337	-89.221804	51	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	199	2	Sand	Pole	SAMPLED			2	2									1																
200	43.762324	-89.219878	50	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	200	3	Muck	Pole	SAMPLED			1		1																								
201	43.762311	-89.217953	49	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	201	4	Muck	Pole	SAMPLED			0																												
202	43.762298	-89.216027	48	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	202	5	Muck	Pole	SAMPLED			0																												
203	43.762285	-89.214102	47	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	203	5	Muck	Pole	SAMPLED			0																												
204	43.762271	-89.212176	46	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	204	5	Muck	Pole	SAMPLED			0																												
205	43.762258	-89.210251	45	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	205	5	Muck	Pole	SAMPLED			0																												
206	43.762245	-89.208325	44	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	206	5	Muck	Pole	SAMPLED			0																												
207	43.762231	-89.206400	15	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	207	5	Muck	Pole	SAMPLED			0																												
208	43.762218	-89.204475	14	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	208	5	Muck	Pole	SAMPLED			0																												
209	43.762205	-89.202549	19	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	209	6	Muck	Pole	SAMPLED			0																												
210	43.762191	-89.200624	46	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	210	5	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
211	43.762178	-89.198698	51	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	211	6	Muck	Pole	SAMPLED			0																												
212	43.762164	-89.196773	77	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	212	5	Muck	Pole	SAMPLED			0																												
213	43.762151	-89.1948474	82	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	213	5	Muck	Pole	SAMPLED			0																												
214	43.762137	-89.19292198	107	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	214	5	Muck	Pole	SAMPLED			0																												
215	43.762123	-89.19099655	112	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	215	5	Muck	Pole	SAMPLED			0																												
216	43.76211	-89.18907113	135	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	216	5	Muck	Pole	SAMPLED			0																												
217	43.762096	-89.18714571	140	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	217	5	Muck	Pole	SAMPLED			0																												
218	43.762082	-89.18522029	161	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	218	5	Muck	Pole	SAMPLED			0																												
219	43.762069	-89.18329487	164	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	219	5	Muck	Pole	SAMPLED			0																												
220	43.762055	-89.18136945	183	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	220	5	Muck	Pole	SAMPLED			0																												
221	43.762041	-89.17944404	186	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	221	5	Muck	Pole	SAMPLED			0																												
222	43.762027	-89.17751862	326	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	222	5	Muck	Pole	SAMPLED			0																												
223	43.762013	-89.17559321	301	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	223	5	Muck	Pole	SAMPLED			0																												
224	43.761999	-89.1736678	294	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	224	5	Muck	Pole	SAMPLED			0																												
225	43.761986	-89.17174239	120	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	225	4	Muck	Pole	SAMPLED			0																												
226	43.761972	-89.16981698	126	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	226	4	Muck	Pole	SAMPLED			0																												
227	43.761958	-89.16789157	133	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	227	4	Muck	Pole	SAMPLED			0																												
228	43.761944	-89.16596616	252	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	228	4	Muck	Pole	SAMPLED			0																												
229	43.761929	-89.16404076	253	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	229	4	Muck	Pole	SAMPLED			0																												
230	43.761915	-89.16211536	230	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	230	3	Muck	Pole	SAMPLED			0																												
231	43.761901	-89.16018995	224	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	231	3	Muck	Pole	SAMPLED			0																												
232	43.761887	-89.15826455	225	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	232	3	Muck	Pole	SAMPLED			0																												
233	43.761816	-89.14863757	24	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	233	0			NONNAVIGABLE (PLANTS)																																
234	43.761801	-89.14671218	25	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	234	2	Muck	Pole	SAMPLED			3		3										1			1														
235	43.761787	-89.14478679	23	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	235	2	Muck	Pole	SAMPLED			2		1			2							1			1													
236	43.761773	-89.1428614	22	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	236	3	Muck	Pole	SAMPLED			0																												
237	43.761758	-89.14093601	21	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	237	2	Muck	Pole	SAMPLED			1		1																										
238	43.761744	-89.13901063	20	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	238	2	Muck	Pole	SAMPLED			1		1										1	1														1	
239	43.761729	-89.13708524	55	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	239	3	Muck	Pole	SAMPLED			1										1																	
240	43.761715	-89.13515986	73	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	240	3	Muck	Pole	SAMPLED			0																												
241	43.7617	-89.13323447	84	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	241	4	Muck	Pole	SAMPLED			0																												
242	43.761685	-89.13130909	101	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	242	4	Muck	Pole	SAMPLED			0																												
243	43.761671	-89.12938371	112	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	243	4	Muck	Pole	SAMPLED			0																												
244	43.761656	-89.12745834	129	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	244	4	Muck	Pole	SAMPLED			0																												
245	43.761641	-89.12553296	142	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	245	4	Muck	Pole	SAMPLED			0																												
246	43.761627	-89.12360759	161	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	246	4	Muck	Pole	SAMPLED			0																												
247	43.761612	-89.12168221	97	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	247	4	Muck	Pole	SAMPLED			0																												
248	43.761597	-89.11975684	73	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	248	4	Muck	Pole	SAMPLED			0																												
249	43.761582	-89.11783147	72	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	249	4	Muck	Pole	SAMPLED			0																												
250	43.761567	-89.1159061	71	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	250	4	Muck	Pole	SAMPLED			0																												
251	43.761552	-89.11398073	70	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	251	4	Muck	Pole	SAMPLED			0																												
252	43.761537	-89.11205537	37	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	252	4	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
253	43.761522	-89.11013	38	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	253	3	Muck	Pole	SAMPLED			0																												
254	43.761507	-89.10820464	39	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	254	3	Muck	Pole	SAMPLED			0																												
255	43.761492	-89.10627928	13	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	255	1	Muck	Pole	SAMPLED			1		1											1									1					
256	43.761477	-89.10435392	12	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	256	2	Muck	Pole	SAMPLED			1		1								1												1			1		
257	43.761462	-89.10242856	3	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	257	2	Muck	Pole	SAMPLED			1		1													1										1	
258	43.761447	-89.1005032	4	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	258	1	Muck	Pole	SAMPLED			2		1											1		1									2	
259	43.760955	-89.22374699	53	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	259	2	Sand	Pole	SAMPLED		YES	3		3						1																	
260	43.760942	-89.22182158	57	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	260	2	Sand	Pole	SAMPLED			2	1				1						1											2				
261	43.760929	-89.21989619	58	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	261	3	Sand	Pole	SAMPLED			0																										
262	43.760916	-89.21797079	59	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	262	5	Muck	Pole	SAMPLED			1					1																				
263	43.760902	-89.21604539	60	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	263	5	Muck	Pole	SAMPLED			0																										
264	43.760889	-89.21412	61	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	264	5	Muck	Pole	SAMPLED			0																										
265	43.760876	-89.2121946	62	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	265	5	Muck	Pole	SAMPLED			0																										
266	43.760863	-89.21026921	63	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	266	5	Muck	Pole	SAMPLED			0																										
267	43.760849	-89.20834382	64	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	267	5	Muck	Pole	SAMPLED			0																										
268	43.760836	-89.20641843	14	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	268	6	Muck	Pole	SAMPLED			0																										
269	43.760823	-89.20449304	13	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	269	6	Muck	Pole	SAMPLED			0																										
270	43.760809	-89.20256765	20	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	270	6	Muck	Pole	SAMPLED			0																										
271	43.760796	-89.20064227	45	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	271	6	Muck	Pole	SAMPLED			0																										
272	43.760782	-89.19871688	52	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	272	6	Muck	Pole	SAMPLED			0																										
273	43.760769	-89.1967915	76	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	273	6	Muck	Pole	SAMPLED			0																										
274	43.760755	-89.19486612	83	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	274	6	Muck	Pole	SAMPLED			0																										
275	43.760742	-89.19294074	106	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	275	5	Muck	Pole	SAMPLED			0																										
276	43.760728	-89.19101536	113	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	276	6	Muck	Pole	SAMPLED			0																										
277	43.760714	-89.18908998	134	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	277	5	Muck	Pole	SAMPLED			0																										
278	43.760701	-89.1871646	141	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	278	5	Muck	Pole	SAMPLED			0																										
279	43.760687	-89.18523923	160	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	279	5	Muck	Pole	SAMPLED			0																										
280	43.760673	-89.18331385	165	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	280	5	Muck	Pole	SAMPLED			0																										
281	43.760659	-89.18138848	182	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	281	5	Muck	Pole	SAMPLED			0																										
282	43.760646	-89.17946311	187	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	282	5	Muck	Pole	SAMPLED			0																										
283	43.760632	-89.17753774	325	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	283	5	Muck	Pole	SAMPLED			0																										
284	43.760618	-89.17561237	302	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	284	5	Muck	Pole	SAMPLED			0																										
285	43.760604	-89.173687	293	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	285	5	Muck	Pole	SAMPLED			0																										
286	43.76059	-89.17176164	119	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	286	4	Muck	Pole	SAMPLED			0																										
287	43.760576	-89.16983627	127	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	287	4	Sand	Pole	SAMPLED			0																										
288	43.760562	-89.16791091	134	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	288	3	Sand	Pole	SAMPLED			0																										
289	43.760548	-89.16598555	251	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	289	3	Sand	Pole	SAMPLED			0																										
290	43.760534	-89.16406019	250	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	290	3	Muck	Pole	SAMPLED			0																										
291	43.76052	-89.16213483	231	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	291	3	Muck	Pole	SAMPLED			0																										
292	43.760506	-89.16020947	223	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	292	3	Muck	Pole	SAMPLED			0																										
293	43.760492	-89.15828412	222	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	293	0			NONNAVIGABLE (PLANTS)																														
294	43.760363	-89.14095598	19	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	294	0			NONNAVIGABLE (PLANTS)																														

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
295	43.760348	-89.13903064	18	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	295	2	Muck	Pole	SAMPLED			1		1													1													
296	43.760334	-89.1371053	56	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	296	3	Muck	Pole	SAMPLED			1										1																			
297	43.760319	-89.13517996	72	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	297	3	Muck	Pole	SAMPLED			0																													
298	43.760305	-89.13325462	85	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	298	3	Sand	Pole	SAMPLED			0																													
299	43.76029	-89.13132929	100	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	299	4	Muck	Pole	SAMPLED			0																													
300	43.760275	-89.12940395	113	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	300	4	Sand	Pole	SAMPLED			0																													
301	43.760261	-89.12747862	128	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	301	4	Muck	Pole	SAMPLED			0																													
302	43.760246	-89.12555329	143	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	302	4	Muck	Pole	SAMPLED			0																													
303	43.760231	-89.12362796	160	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	303	4	Muck	Pole	SAMPLED			0																													
304	43.760216	-89.12170263	98	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	304	4	Muck	Pole	SAMPLED			0																													
305	43.760202	-89.1197773	66	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	305	4	Muck	Pole	SAMPLED			0																													
306	43.760187	-89.11785198	67	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	306	4	Muck	Pole	SAMPLED			0																													
307	43.760172	-89.11592665	68	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	307	4	Muck	Pole	SAMPLED			0																													
308	43.760157	-89.11400133	69	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	308	4	Muck	Pole	SAMPLED			0																													
309	43.760142	-89.11207601	41	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	309	3	Muck	Pole	SAMPLED			0																													
310	43.760127	-89.11015069	40	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	310	3	Muck	Pole	SAMPLED			0																													
311	43.760112	-89.10822537	45	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	311	0			NONNAVIGABLE (PLANTS)																																
312	43.760097	-89.10630005	11	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	312	0			NONNAVIGABLE (PLANTS)																																
313	43.760082	-89.10437474	10	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	313	2	Muck	Pole	SAMPLED			1		1											1														1	
314	43.760067	-89.10244942	5	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	314	2	Muck	Pole	SAMPLED			1		1																								1	
315	43.759612	-89.23146646	76	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	315	0			NONNAVIGABLE (PLANTS)																																
316	43.759599	-89.2295411	75	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	316	0			NONNAVIGABLE (PLANTS)																																
317	43.759573	-89.22569038	74	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	317	2	Sand	Pole	SAMPLED			3		3																										
318	43.759559	-89.22376503	73	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	318	2	Sand	Pole	SAMPLED		YES	2	1	2																					1				1		
319	43.759546	-89.22183967	72	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	319	3	Sand	Pole	SAMPLED			1	1				1																		1						
320	43.759533	-89.21991432	71	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	320	4	Muck	Pole	SAMPLED			0																													
321	43.75952	-89.21798896	70	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	321	5	Muck	Pole	SAMPLED			0																													
322	43.759507	-89.21606361	69	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	322	5	Muck	Pole	SAMPLED			0																													
323	43.759494	-89.21413826	68	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	323	5	Muck	Pole	SAMPLED			0																													
324	43.75948	-89.21221291	67	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	324	5	Muck	Pole	SAMPLED			0																													
325	43.759467	-89.21028757	66	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	325	5	Muck	Pole	SAMPLED			0																													
326	43.759454	-89.20836222	65	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	326	5	Muck	Pole	SAMPLED			0																													
327	43.75944	-89.20643687	13	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	327	6	Muck	Pole	SAMPLED			0																													
328	43.759427	-89.20451153	12	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	328	6	Muck	Pole	SAMPLED			0																													
329	43.759414	-89.20258619	21	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	329	6	Muck	Pole	SAMPLED			0																													
330	43.7594	-89.20066085	44	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	330	6	Muck	Pole	SAMPLED			0																													
331	43.759387	-89.19873551	53	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	331	6	Muck	Pole	SAMPLED			0																													
332	43.759373	-89.19681017	75	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	332	6	Muck	Pole	SAMPLED			0																													
333	43.75936	-89.19488483	84	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	333	6	Muck	Pole	SAMPLED			0																													
334	43.759346	-89.19295949	105	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	334	6	Muck	Pole	SAMPLED			0																													
335	43.759332	-89.19103416	114	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	335	6	Muck	Pole	SAMPLED			0																													
336	43.759319	-89.18910883	133	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	336	6	Muck	Pole	SAMPLED			0																													

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
337	43.759305	-89.18718349	142	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	337	5	Muck	Pole	SAMPLED			0																												
338	43.759291	-89.18525816	159	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	338	5	Muck	Pole	SAMPLED			0																												
339	43.759278	-89.18333283	166	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	339	6	Muck	Pole	SAMPLED			0																												
340	43.759264	-89.18140751	181	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	340	5	Muck	Pole	SAMPLED			0																												
341	43.75925	-89.17948218	188	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	341	5	Muck	Pole	SAMPLED			0																												
342	43.759236	-89.17755686	324	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	342	5	Muck	Pole	SAMPLED			0																												
343	43.759222	-89.17563153	303	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	343	5	Muck	Pole	SAMPLED			0																												
344	43.759209	-89.17370621	292	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	344	5	Muck	Pole	SAMPLED			0																												
345	43.759195	-89.17178089	118	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	345	4	Muck	Pole	SAMPLED			0																												
346	43.759181	-89.16985557	128	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	346	3	Sand	Pole	SAMPLED			0																												
347	43.759167	-89.16793025	135	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	347	0			NONNAVIGABLE (PLANTS)																																
348	43.759153	-89.16600493	248	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	348	2	Sand	Pole	SAMPLED			0																												
349	43.759139	-89.16407962	249	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	349	3	Muck	Pole	SAMPLED			0																												
350	43.759124	-89.16215431	232	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	350	3	Muck	Pole	SAMPLED			0																												
351	43.75911	-89.16022899	233	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	351	3	Muck	Pole	SAMPLED			0																												
352	43.759096	-89.15830368	221	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	352	2	Sand	Pole	SAMPLED			0																												
353	43.758953	-89.13905065	17	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	353	2	Sand	Pole	SAMPLED			0																												
354	43.758938	-89.13712535	57	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	354	2	Muck	Pole	SAMPLED			0																												
355	43.758924	-89.13520006	71	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	355	3	Muck	Pole	SAMPLED			0																												
356	43.758909	-89.13327477	86	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	356	3	Sand	Pole	SAMPLED			0																												
357	43.758894	-89.13134948	99	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	357	4	Sand	Pole	SAMPLED			0																												
358	43.75888	-89.12942419	114	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	358	4	Muck	Pole	SAMPLED			0																												
359	43.758865	-89.1274989	127	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	359	4	Muck	Pole	SAMPLED			0																												
360	43.75885	-89.12557361	144	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	360	4	Muck	Pole	SAMPLED			0																												
361	43.758836	-89.12364833	159	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	361	4	Muck	Pole	SAMPLED			0																												
362	43.758821	-89.12172304	99	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	362	4	Muck	Pole	SAMPLED			0																												
363	43.758806	-89.11979776	65	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	363	4	Muck	Pole	SAMPLED			0																												
364	43.758791	-89.11787248	64	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	364	4	Muck	Pole	SAMPLED			0																												
365	43.758776	-89.1159472	63	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	365	4	Muck	Pole	SAMPLED			1					1																						
366	43.758761	-89.11402192	62	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	366	4	Muck	Pole	SAMPLED			1					1																						
367	43.758746	-89.11209664	42	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	367	4	Muck	Pole	SAMPLED			0																												
368	43.758732	-89.11017137	44	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	368	2	Muck	Pole	SAMPLED			3		1			3								1														
369	43.758717	-89.1082461	47	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	369	2	Muck	Pole	SAMPLED			2		1										1													2	
370	43.758701	-89.10632082	46	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	370	0			NONNAVIGABLE (PLANTS)																																
371	43.758686	-89.10439555	7	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	371	2	Muck	Pole	SAMPLED			2		2											1														
372	43.758671	-89.10247029	6	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	372	1	Muck	Pole	SAMPLED			3		3					1	1					1		1			1		1						
373	43.758177	-89.22570838	77	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	373	3	Muck	Pole	SAMPLED			2		2																							1		
374	43.758164	-89.22378307	78	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	374	3	Sand	Pole	SAMPLED			2	2	1																					1				
375	43.758151	-89.22185776	79	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	375	3	Sand	Pole	SAMPLED			0																												
376	43.758138	-89.21993245	80	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	376	4	Muck	Pole	SAMPLED			0																												
377	43.758125	-89.21800714	81	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	377	5	Muck	Pole	SAMPLED			0																												
378	43.758111	-89.21608183	82	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	378	5	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
379	43.758098	-89.21415653	83	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	379	5	Muck	Pole	SAMPLED			0																												
380	43.758085	-89.21223122	84	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	380	5	Muck	Pole	SAMPLED			0																												
381	43.758072	-89.21030592	85	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	381	5	Muck	Pole	SAMPLED			0																												
382	43.758058	-89.20838062	86	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	382	5	Muck	Pole	SAMPLED			0																												
383	43.758045	-89.20645532	12	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	383	6	Muck	Pole	SAMPLED			0																												
384	43.758032	-89.20453002	11	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	384	6	Muck	Pole	SAMPLED			0																												
385	43.758018	-89.20260472	22	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	385	6	Muck	Pole	SAMPLED			0																												
386	43.758005	-89.20067942	43	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	386	6	Muck	Pole	SAMPLED			0																												
387	43.757991	-89.19875413	54	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	387	6	Muck	Pole	SAMPLED			0																												
388	43.757978	-89.19682883	74	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	388	6	Muck	Pole	SAMPLED			0																												
389	43.757964	-89.19490354	85	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	389	6	Muck	Pole	SAMPLED			0																												
390	43.757951	-89.19297825	104	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	390	6	Muck	Pole	SAMPLED			0																												
391	43.757937	-89.19105296	115	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	391	6	Muck	Pole	SAMPLED			0																												
392	43.757923	-89.18912767	132	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	392	6	Muck	Pole	SAMPLED			0																												
393	43.75791	-89.18720239	143	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	393	5	Muck	Pole	SAMPLED			0																												
394	43.757896	-89.1852771	158	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	394	5	Muck	Pole	SAMPLED			0																												
395	43.757882	-89.18335182	167	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	395	5	Muck	Pole	SAMPLED			0																												
396	43.757868	-89.18142653	180	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	396	5	Muck	Pole	SAMPLED			0																												
397	43.757855	-89.17950125	189	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	397	5	Muck	Pole	SAMPLED			0																												
398	43.757841	-89.17757597	323	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	398	5	Muck	Pole	SAMPLED			0																												
399	43.757827	-89.17565069	304	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	399	5	Muck	Pole	SAMPLED			0																												
400	43.757813	-89.17372541	291	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	400	5	Muck	Pole	SAMPLED			0																												
401	43.757799	-89.17180014	117	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	401	4	Muck	Pole	SAMPLED			0																												
402	43.757785	-89.16987486	129	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	402	2	Sand	Pole	SAMPLED			0																												
403	43.757771	-89.16794959	136	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	403	0			NONNAVIGABLE (PLANTS)																																
404	43.757757	-89.16602432	247	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	404	2	Sand	Pole	SAMPLED			1						1																						
405	43.757743	-89.16409905	246	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	405	0			NONNAVIGABLE (PLANTS)																																
406	43.757729	-89.16217378	235	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	406	0			NONNAVIGABLE (PLANTS)																																
407	43.757715	-89.16024851	234	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	407	3	Muck	Pole	SAMPLED			1	V																									1		
408	43.757701	-89.15832324	220	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	408	2	Sand	Pole	SAMPLED			0																												
409	43.757557	-89.13907066	16	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	409	2	Muck	Pole	SAMPLED			0																												
410	43.757543	-89.13714541	58	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	410	3	Muck	Pole	SAMPLED			0																												
411	43.757528	-89.13522016	70	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	411	3	Muck	Pole	SAMPLED			0																												
412	43.757514	-89.13329491	87	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	412	4	Sand	Pole	SAMPLED			0																												
413	43.757499	-89.13136966	98	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	413	4	Muck	Pole	SAMPLED			0																												
414	43.757484	-89.12944442	115	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	414	4	Muck	Pole	SAMPLED			0																												
415	43.75747	-89.12751918	126	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	415	4	Muck	Pole	SAMPLED			0																												
416	43.757455	-89.12559393	145	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	416	4	Muck	Pole	SAMPLED			0																												
417	43.75744	-89.12366869	158	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	417	4	Muck	Pole	SAMPLED			0																												
418	43.757425	-89.12174345	100	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	418	4	Muck	Pole	SAMPLED			0																												
419	43.757411	-89.11981822	58	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	419	4	Muck	Pole	SAMPLED			0																												
420	43.757396	-89.11789298	59	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	420	4	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
421	43.757381	-89.11596775	60	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	421	4	Muck	Pole	SAMPLED			0																												
422	43.757366	-89.11404251	61	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	422	3	Muck	Pole	SAMPLED			0																												
423	43.757351	-89.11211728	43	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	423	3	Muck	Pole	SAMPLED			2					2						1																
424	43.757336	-89.11019205	48	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	424	2	Sand	Pole	SAMPLED			1					1																				1		
425	43.757291	-89.10441637	8	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	425	1	Muck	Pole	SAMPLED			2		2											1		1				1	1							
426	43.756782	-89.22572638	96	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	426	3	Muck	Pole	SAMPLED			2		2																	1				1				
427	43.756769	-89.22380111	95	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	427	3	Muck	Pole	SAMPLED			0																											
428	43.756755	-89.22187584	94	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	428	3	Muck	Pole	SAMPLED			0																											
429	43.756742	-89.21995058	93	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	429	4	Muck	Pole	SAMPLED			1		1																									
430	43.756729	-89.21802531	92	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	430	5	Muck	Pole	SAMPLED			0																											
431	43.756716	-89.21610005	91	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	431	5	Muck	Pole	SAMPLED			1		1																									
432	43.756703	-89.21417479	90	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	432	5	Muck	Pole	SAMPLED			0																											
433	43.75669	-89.21224953	89	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	433	5	Muck	Pole	SAMPLED			0																											
434	43.756676	-89.21032427	88	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	434	5	Muck	Pole	SAMPLED			0																											
435	43.756663	-89.20839902	87	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	435	6	Muck	Pole	SAMPLED			0																											
436	43.75665	-89.20647376	11	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	436	6	Muck	Pole	SAMPLED			0																											
437	43.756636	-89.20454851	10	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	437	6	Muck	Pole	SAMPLED			0																											
438	43.756623	-89.20262325	23	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	438	6	Muck	Pole	SAMPLED			0																											
439	43.756609	-89.200698	42	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	439	6	Muck	Pole	SAMPLED			0																											
440	43.756596	-89.19877275	55	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	440	6	Muck	Pole	SAMPLED			0																											
441	43.756582	-89.1968475	73	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	441	6	Muck	Pole	SAMPLED			0																											
442	43.756569	-89.19492225	86	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	442	6	Muck	Pole	SAMPLED			0																											
443	43.756555	-89.19299701	103	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	443	6	Muck	Pole	SAMPLED			0																											
444	43.756542	-89.19107176	116	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	444	6	Muck	Pole	SAMPLED			0																											
445	43.756528	-89.18914652	131	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	445	6	Muck	Pole	SAMPLED			0																											
446	43.756514	-89.18722128	144	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	446	5	Muck	Pole	SAMPLED			0																											
447	43.756501	-89.18529603	157	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	447	5	Muck	Pole	SAMPLED			0																											
448	43.756487	-89.1833708	168	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	448	5	Muck	Pole	SAMPLED			0																											
449	43.756473	-89.18144556	179	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	449	5	Muck	Pole	SAMPLED			0																											
450	43.756459	-89.17952032	190	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	450	5	Muck	Pole	SAMPLED			0																											
451	43.756445	-89.17759508	322	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	451	5	Muck	Pole	SAMPLED			0																											
452	43.756432	-89.17566985	305	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	452	5	Muck	Pole	SAMPLED			0																											
453	43.756418	-89.17374462	290	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	453	5	Muck	Pole	SAMPLED			0																											
454	43.756404	-89.17181939	116	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	454	5	Muck	Pole	SAMPLED			0																											
455	43.75639	-89.16989416	130	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	455	0			NONNAVIGABLE (PLANTS)																															
456	43.756376	-89.16796893	137	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	456	0			NONNAVIGABLE (PLANTS)																															
457	43.756362	-89.1660437	245	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	457	2	Sand	Pole	SAMPLED			0																											
458	43.756348	-89.16411847	243	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	458	2	Sand	Pole	SAMPLED			1	V											1															
459	43.756334	-89.16219325	237	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	459	0			NONNAVIGABLE (PLANTS)																															
460	43.756319	-89.16026803	236	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	460	3	Muck	Pole	SAMPLED			1																									1		
461	43.756305	-89.15834281	219	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	461	3	Muck	Pole	SAMPLED			0																											
462	43.756291	-89.15641759	217	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	462	2	Sand	Pole	SAMPLED			0																											

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
463	43.756277	-89.15449237	195	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	463	1	Muck	Pole	SAMPLED			1																										1		
464	43.756191	-89.14294108	5	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	464	1	Muck	Pole	SAMPLED			3															1					1						3	
465	43.756176	-89.14101587	6	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	465	0			NONNAVIGABLE (PLANTS)																															
466	43.756162	-89.13909067	15	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	466	3	Muck	Pole	SAMPLED			0																												
467	43.756147	-89.13716546	59	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	467	4	Muck	Pole	SAMPLED			0																												
468	43.756133	-89.13524026	69	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	468	4	Muck	Pole	SAMPLED			0																												
469	43.756118	-89.13331505	88	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	469	4	Sand	Pole	SAMPLED			0																												
470	43.756104	-89.13138985	97	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	470	4	Muck	Pole	SAMPLED			0																												
471	43.756089	-89.12946465	116	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	471	4	Muck	Pole	SAMPLED			0																												
472	43.756074	-89.12753945	125	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	472	4	Muck	Pole	SAMPLED			0																												
473	43.75606	-89.12561426	146	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	473	4	Muck	Pole	SAMPLED			0																												
474	43.756045	-89.12368906	157	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	474	4	Muck	Pole	SAMPLED			0																												
475	43.75603	-89.12176387	101	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	475	4	Muck	Pole	SAMPLED			0																												
476	43.756015	-89.11983867	57	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	476	3	Muck	Pole	SAMPLED			0																												
477	43.756	-89.11791348	53	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	477	3	Muck	Pole	SAMPLED			1					1																						
478	43.755985	-89.11598829	52	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	478	3	Muck	Pole	SAMPLED			1					1																						
479	43.755971	-89.1140631	51	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	479	3	Muck	Pole	SAMPLED			0																												
480	43.755956	-89.11213792	49	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	480	2	Muck	Pole	SAMPLED			2	1				2																		1				
481	43.755896	-89.10443718	9	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	481	0			NONNAVIGABLE (PLANTS)																															
482	43.755386	-89.22574437	97	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	482	2	Muck	Pole	SAMPLED		YES	3	1	3									1		1												1		
483	43.755373	-89.22381915	98	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	483	3	Muck	Pole	SAMPLED			0																												
484	43.75536	-89.22189393	99	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	484	4	Muck	Pole	SAMPLED			0																												
485	43.755347	-89.21996871	100	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	485	5	Muck	Pole	SAMPLED			0																												
486	43.755334	-89.21804349	101	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	486	5	Muck	Pole	SAMPLED			0																												
487	43.755321	-89.21611827	102	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	487	5	Muck	Pole	SAMPLED			0																												
488	43.755307	-89.21419305	103	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	488	5	Muck	Pole	SAMPLED			0																												
489	43.755294	-89.21226784	104	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	489	6	Muck	Pole	SAMPLED			0																												
490	43.755281	-89.21034262	105	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	490	6	Muck	Pole	SAMPLED			0																												
491	43.755267	-89.20841741	106	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	491	6	Muck	Pole	SAMPLED			0																												
492	43.755254	-89.2064922	10	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	492	6	Muck	Pole	SAMPLED			0																												
493	43.755241	-89.20456699	9	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	493	6	Muck	Pole	SAMPLED			0																												
494	43.755227	-89.20264178	24	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	494	6	Muck	Pole	SAMPLED			0																												
495	43.755214	-89.20071658	41	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	495	6	Muck	Pole	SAMPLED			0																												
496	43.7552	-89.19879137	56	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	496	6	Muck	Pole	SAMPLED			0																												
497	43.755187	-89.19686617	72	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	497	6	Muck	Pole	SAMPLED			0																												
498	43.755173	-89.19494096	87	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	498	6	Muck	Pole	SAMPLED			0																												
499	43.75516	-89.19301576	102	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	499	6	Muck	Pole	SAMPLED			0																												
500	43.755146	-89.19109056	117	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	500	6	Muck	Pole	SAMPLED			0																												
501	43.755132	-89.18916536	130	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	501	6	Muck	Pole	SAMPLED			0																												
502	43.755119	-89.18724016	145	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	502	5	Muck	Pole	SAMPLED			0																												
503	43.755105	-89.18531497	156	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	503	5	Muck	Pole	SAMPLED			0																												
504	43.755091	-89.18338977	169	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	504	5	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
505	43.755078	-89.18146458	178	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	505	5	Muck	Pole	SAMPLED			0																												
506	43.755064	-89.17953939	191	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	506	5	Muck	Pole	SAMPLED			0																												
507	43.75505	-89.1776142	321	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	507	5	Muck	Pole	SAMPLED			0																												
508	43.755036	-89.17568901	306	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	508	5	Muck	Pole	SAMPLED			0																												
509	43.755022	-89.17376382	289	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	509	5	Muck	Pole	SAMPLED			0																												
510	43.755008	-89.17183863	115	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	510	4	Muck	Pole	SAMPLED			0																												
511	43.754994	-89.16991345	138	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	511	0			NONNAVIGABLE (PLANTS)																																
512	43.75498	-89.16798826	140	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	512	0			NONNAVIGABLE (PLANTS)																																
513	43.754966	-89.16606308	244	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	513	3	Muck	Pole	SAMPLED			1																					1							
514	43.754952	-89.1641379	242	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	514	3	Sand	Pole	SAMPLED			0																												
515	43.754938	-89.16221272	239	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	515	0			NONNAVIGABLE (PLANTS)																																
516	43.754924	-89.16028754	238	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	516	3	Muck	Pole	SAMPLED			3	1																				3							
517	43.75491	-89.15836236	218	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	517	3	Muck	Pole	SAMPLED			0																												
518	43.754896	-89.15643719	216	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	518	3	Muck	Pole	SAMPLED			0																												
519	43.754881	-89.15451202	196	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	519	3	Muck	Pole	SAMPLED			0																												
520	43.754867	-89.15258684	194	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	520	2	Sand	Pole	SAMPLED			1																										1		
521	43.754853	-89.15066167	185	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	521	0			NONNAVIGABLE (PLANTS)																																
522	43.754838	-89.1487365	184	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	522	0			NONNAVIGABLE (PLANTS)																																
523	43.754824	-89.14681133	173	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	523	0			NONNAVIGABLE (PLANTS)																																
524	43.75481	-89.14488617	172	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	524	2	Muck	Pole	SAMPLED			0																												
525	43.754795	-89.142961	4	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	525	2	Muck	Pole	SAMPLED			0																												
526	43.754781	-89.14103584	7	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	526	3	Muck	Pole	SAMPLED			1																										1		
527	43.754766	-89.13911067	14	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	527	4	Muck	Pole	SAMPLED			0																												
528	43.754752	-89.13718551	60	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	528	4	Muck	Pole	SAMPLED			0																												
529	43.754737	-89.13526035	68	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	529	4	Muck	Pole	SAMPLED			0																												
530	43.754723	-89.13333519	89	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	530	4	Muck	Pole	SAMPLED			0																												
531	43.754708	-89.13141004	96	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	531	4	Muck	Pole	SAMPLED			0																												
532	43.754693	-89.12948488	117	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	532	4	Muck	Pole	SAMPLED			0																												
533	43.754679	-89.12755973	124	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	533	4	Muck	Pole	SAMPLED			0																												
534	43.754664	-89.12563458	147	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	534	4	Muck	Pole	SAMPLED			0																												
535	43.754649	-89.12370942	156	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	535	4	Muck	Pole	SAMPLED			0																												
536	43.754635	-89.12178427	102	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	536	4	Muck	Pole	SAMPLED			0																												
537	43.75462	-89.11985913	56	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	537	3	Muck	Pole	SAMPLED			1					1						1																
538	43.754605	-89.11793398	54	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	538	2	Sand	Pole	SAMPLED			0																												
539	43.75456	-89.11215855	50	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	539	2	Muck	Pole	SAMPLED			3		3												1											1		
540	43.753991	-89.22576236	116	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	540	1	Sand	Pole	SAMPLED	to point due		2						1				2				1			1				1				
541	43.753978	-89.22383719	115	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	541	3	Sand	Pole	SAMPLED		YES	2	1										1											2				1		
542	43.753964	-89.22191201	114	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	542	3	Sand	Pole	SAMPLED			0																												
543	43.753951	-89.21998683	113	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	543	5	Muck	Pole	SAMPLED			0																												
544	43.753938	-89.21806166	112	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	544	5	Muck	Pole	SAMPLED			0																												
545	43.753925	-89.21613649	111	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	545	5	Muck	Pole	SAMPLED			0																												
546	43.753912	-89.21421131	110	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	546	5	Muck	Pole	SAMPLED			0																												

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547	43.753899	-89.21228614	109	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	547	6	Muck	Pole	SAMPLED			0																												
548	43.753885	-89.21036098	108	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	548	6	Muck	Pole	SAMPLED			0																												
549	43.753872	-89.20843581	107	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	549	6	Muck	Pole	SAMPLED			0																												
550	43.753859	-89.20651064	9	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	550	6	Muck	Pole	SAMPLED			0																												
551	43.753845	-89.20458548	8	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	551	6	Muck	Pole	SAMPLED			0																												
552	43.753832	-89.20266031	25	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	552	6	Muck	Pole	SAMPLED			0																												
553	43.753818	-89.20073515	40	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	553	6	Muck	Pole	SAMPLED			0																												
554	43.753805	-89.19880999	57	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	554	6	Muck	Pole	SAMPLED			0																												
555	43.753791	-89.19688483	71	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	555	6	Muck	Pole	SAMPLED			0																												
556	43.753778	-89.19495967	88	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	556	6	Muck	Pole	SAMPLED			0																												
557	43.753764	-89.19303451	101	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	557	6	Muck	Pole	SAMPLED			0																												
558	43.753751	-89.19110936	118	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	558	6	Muck	Pole	SAMPLED			0																												
559	43.753737	-89.1891842	129	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	559	5	Muck	Pole	SAMPLED			0																												
560	43.753723	-89.18725905	146	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	560	6	Muck	Pole	SAMPLED			0																												
561	43.75371	-89.1853339	155	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	561	6	Muck	Pole	SAMPLED			0																												
562	43.753696	-89.18340875	170	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	562	5	Muck	Pole	SAMPLED			0																												
563	43.753682	-89.1814836	177	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	563	5	Muck	Pole	SAMPLED			0																												
564	43.753668	-89.17955845	192	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	564	5	Muck	Pole	SAMPLED			0																												
565	43.753654	-89.17763331	320	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	565	5	Muck	Pole	SAMPLED			0																												
566	43.753641	-89.17570816	307	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	566	5	Muck	Pole	SAMPLED			0																												
567	43.753627	-89.17378302	288	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	567	5	Muck	Pole	SAMPLED			0																												
568	43.753613	-89.17185788	114	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	568	4	Sand	Pole	SAMPLED			0																												
569	43.753599	-89.16993274	139	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	569	0			NONNAVIGABLE (PLANTS)																																
570	43.753585	-89.1680076	141	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	570	0			NONNAVIGABLE (PLANTS)																																
571	43.753571	-89.16608246	241	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	571	0			ROCKS																																
572	43.753557	-89.16415732	240	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	572	0			ROCKS																																
573	43.753543	-89.16223219	215	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	573	0			ROCKS																																
574	43.753528	-89.16030706	214	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	574	0			ROCKS																																
575	43.753514	-89.15838192	205	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	575	0			ROCKS																																
576	43.7535	-89.15645679	204	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	576	3	Sand	Pole	SAMPLED			0																												
577	43.753486	-89.15453166	197	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	577	4	Sand	Pole	SAMPLED			0																												
578	43.753472	-89.15260653	193	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	578	3	Muck	Pole	SAMPLED			1								1																			
579	43.753457	-89.15068141	186	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	579	3	Muck	Pole	SAMPLED			1																										1		
580	43.753443	-89.14875628	183	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	580	3	Muck	Pole	SAMPLED			1	1																				1				1		
581	43.753429	-89.14683116	174	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	581	3	Muck	Pole	SAMPLED			0																												
582	43.753414	-89.14490604	171	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	582	3	Muck	Pole	SAMPLED			0																												
583	43.7534	-89.14298092	3	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	583	4	Muck	Pole	SAMPLED			0																												
584	43.753385	-89.1410558	8	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	584	4	Muck	Pole	SAMPLED			0																												
585	43.753371	-89.13913068	13	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	585	4	Muck	Pole	SAMPLED			0																												
586	43.753356	-89.13720556	61	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	586	4	Muck	Pole	SAMPLED			0																												
587	43.753342	-89.13528045	67	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	587	4	Muck	Pole	SAMPLED			0																												
588	43.753327	-89.13335533	90	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	588	4	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
589	43.753313	-89.13143022	95	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	589	4	Muck	Pole	SAMPLED			0																												
590	43.753298	-89.12950511	118	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	590	4	Muck	Pole	SAMPLED			0																												
591	43.753283	-89.12758	123	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	591	4	Muck	Pole	SAMPLED			1											1																
592	43.753269	-89.12565489	148	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	592	4	Muck	Pole	SAMPLED			0																												
593	43.753254	-89.12372979	155	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	593	4	Muck	Pole	SAMPLED			0																												
594	43.753239	-89.12180468	103	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	594	4	Muck	Pole	SAMPLED			0																												
595	43.753224	-89.11987958	55	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	595	3	Sand	Pole	SAMPLED			1																												1
596	43.752582	-89.22385522	117	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	596	1	Sand	Pole	SAMPLED		YES	1											1						1	1								1		
597	43.752569	-89.22193009	118	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	597	3	Muck	Pole	SAMPLED			1		1														1										
598	43.752556	-89.22000496	119	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	598	5	Muck	Pole	SAMPLED			0																												
599	43.752543	-89.21807983	120	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	599	5	Muck	Pole	SAMPLED			0																												
600	43.75253	-89.2161547	121	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	600	5	Muck	Pole	SAMPLED			0																												
601	43.752516	-89.21422957	122	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	601	6	Muck	Pole	SAMPLED			0																												
602	43.752503	-89.21230445	123	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	602	6	Muck	Pole	SAMPLED			0																												
603	43.75249	-89.21037932	124	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	603	6	Muck	Pole	SAMPLED			0																												
604	43.752476	-89.2084542	125	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	604	6	Muck	Pole	SAMPLED			0																												
605	43.752463	-89.20652908	8	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	605	7	Muck	Pole	SAMPLED			0																												
606	43.75245	-89.20460396	7	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	606	6	Muck	Pole	SAMPLED			0																												
607	43.752436	-89.20267884	26	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	607	6	Muck	Pole	SAMPLED			0																												
608	43.752423	-89.20075372	39	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	608	6	Muck	Pole	SAMPLED			0																												
609	43.752409	-89.19882861	58	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	609	6	Muck	Pole	SAMPLED			0																												
610	43.752396	-89.19690349	70	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	610	6	Muck	Pole	SAMPLED			0																												
611	43.752382	-89.19497838	89	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	611	6	Muck	Pole	SAMPLED			0																												
612	43.752369	-89.19305327	100	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	612	6	Muck	Pole	SAMPLED			0																												
613	43.752355	-89.19112816	119	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	613	6	Muck	Pole	SAMPLED			0																												
614	43.752342	-89.18920305	128	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	614	6	Muck	Pole	SAMPLED			0																												
615	43.752328	-89.18727794	147	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	615	6	Muck	Pole	SAMPLED			0																												
616	43.752314	-89.18535283	154	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	616	5	Muck	Pole	SAMPLED			0																												
617	43.7523	-89.18342773	171	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	617	5	Muck	Pole	SAMPLED			1																								1				
618	43.752287	-89.18150262	176	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	618	5	Muck	Pole	SAMPLED			0																												
619	43.752273	-89.17957752	193	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	619	5	Muck	Pole	SAMPLED			0																												
620	43.752259	-89.17765242	319	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	620	5	Muck	Pole	SAMPLED			0																												
621	43.752245	-89.17572732	308	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	621	5	Muck	Pole	SAMPLED			0																												
622	43.752231	-89.17380222	287	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	622	5	Muck	Pole	SAMPLED			0																												
623	43.752217	-89.17187712	113	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	623	4	Sand	Pole	SAMPLED			0																												
624	43.752203	-89.16995203	257	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	624	4	Sand	Pole	SAMPLED			0																												
625	43.752189	-89.16802693	258	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	625	4	Muck	Pole	SAMPLED			0																												
626	43.752175	-89.16610184	259	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	626	4	Muck	Pole	SAMPLED			0																												
627	43.752161	-89.16417675	260	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	627	4	Muck	Pole	SAMPLED			0																												
628	43.752147	-89.16225166	261	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	628	4	Sand	Pole	SAMPLED			0																												
629	43.752133	-89.16032657	213	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	629	4	Sand	Pole	SAMPLED			0																												
630	43.752119	-89.15840148	206	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	630	4	Muck	Pole	SAMPLED			0																												

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631	43.752105	-89.15647639	203	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	631	4	Muck	Pole	SAMPLED			0																													
632	43.75209	-89.15455131	198	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	632	5	Muck	Pole	SAMPLED			0																													
633	43.752076	-89.15262623	192	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	633	4	Muck	Pole	SAMPLED			0																													
634	43.752062	-89.15070114	187	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	634	4	Muck	Pole	SAMPLED			0																													
635	43.752048	-89.14877606	182	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	635	4	Muck	Pole	SAMPLED			0																													
636	43.752033	-89.14685098	175	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	636	5	Muck	Pole	SAMPLED			0																													
637	43.752019	-89.14492591	170	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	637	5	Muck	Pole	SAMPLED			0																													
638	43.752004	-89.14300083	2	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	638	5	Muck	Pole	SAMPLED			0																													
639	43.75199	-89.14107576	9	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	639	5	Muck	Pole	SAMPLED			0																													
640	43.751975	-89.13915068	12	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	640	4	Muck	Pole	SAMPLED			0																													
641	43.751961	-89.13722561	62	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	641	4	Muck	Pole	SAMPLED			0																													
642	43.751946	-89.13530054	66	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	642	4	Muck	Pole	SAMPLED			0																													
643	43.751932	-89.13337547	91	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	643	4	Muck	Pole	SAMPLED			0																													
644	43.751917	-89.1314504	94	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	644	4	Muck	Pole	SAMPLED			0																													
645	43.751903	-89.12952534	119	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	645	4	Muck	Pole	SAMPLED			1					1																							
646	43.751888	-89.12760027	122	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	646	4	Muck	Pole	SAMPLED			0																													
647	43.751873	-89.12567521	149	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	647	4	Muck	Pole	SAMPLED			1					1																							
648	43.751858	-89.12375015	154	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	648	4	Muck	Pole	SAMPLED			3					3																							
649	43.751844	-89.12182509	104	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	649	4	Muck	Pole	SAMPLED			0																													
650	43.751174	-89.22194817	133	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	650	4	Sand	Pole	SAMPLED			0																													
651	43.75116	-89.22002308	132	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	651	4	Muck	Pole	SAMPLED			0																													
652	43.751147	-89.218098	131	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	652	5	Muck	Pole	SAMPLED			0																													
653	43.751134	-89.21617291	130	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	653	5	Muck	Pole	SAMPLED			0																													
654	43.751121	-89.21424783	129	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	654	5	Muck	Pole	SAMPLED			0																													
655	43.751108	-89.21232275	128	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	655	5	Muck	Pole	SAMPLED			0																													
656	43.751094	-89.21039767	127	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	656	5	Muck	Pole	SAMPLED			0																													
657	43.751081	-89.20847259	126	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	657	6	Muck	Pole	SAMPLED			0																													
658	43.751068	-89.20654752	7	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	658	7	Muck	Pole	SAMPLED			0																													
659	43.751054	-89.20462244	6	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	659	6	Muck	Pole	SAMPLED			0																													
660	43.751041	-89.20269737	27	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	660	6	Muck	Pole	SAMPLED			0																													
661	43.751027	-89.20077229	38	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	661	6	Muck	Pole	SAMPLED			0																													
662	43.751014	-89.19884722	59	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	662	6	Muck	Pole	SAMPLED			0																													
663	43.751	-89.19692215	69	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	663	6	Muck	Pole	SAMPLED			0																													
664	43.750987	-89.19499708	90	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	664	6	Muck	Pole	SAMPLED			0																													
665	43.750973	-89.19307202	99	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	665	6	Muck	Pole	SAMPLED			0																													
666	43.75096	-89.19114695	120	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	666	6	Muck	Pole	SAMPLED			0																													
667	43.750946	-89.18922189	127	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	667	5	Muck	Pole	SAMPLED			0																													
668	43.750932	-89.18729682	148	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	668	5	Muck	Pole	SAMPLED			0																													
669	43.750919	-89.18537176	153	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	669	5	Muck	Pole	SAMPLED			0																													
670	43.750905	-89.1834467	172	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	670	4	Muck	Pole	SAMPLED			0																													
671	43.750891	-89.18152164	175	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	671	3	Sand	Pole	SAMPLED			0																													
672	43.750877	-89.17959658	194	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	672	4	Muck	Rope	SAMPLED			0																													

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
673	43.750864	-89.17767153	318	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	673	5	Muck	Pole	SAMPLED			0																												
674	43.75085	-89.17574647	309	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	674	5	Muck	Pole	SAMPLED			0																												
675	43.750836	-89.17382142	286	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	675	5	Muck	Pole	SAMPLED			0																												
676	43.750822	-89.17189636	112	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	676	4	Muck	Pole	SAMPLED			0																												
677	43.750808	-89.16997131	266	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	677	4	Sand	Pole	SAMPLED			0																												
678	43.750794	-89.16804626	265	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	678	4	Muck	Pole	SAMPLED			0																												
679	43.75078	-89.16612121	264	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	679	4	Muck	Pole	SAMPLED			0																												
680	43.750766	-89.16419617	263	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	680	4	Sand	Pole	SAMPLED			0																												
681	43.750752	-89.16227112	262	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	681	3	Sand	Pole	SAMPLED			0																												
682	43.750738	-89.16034608	212	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	682	2	Sand	Pole	SAMPLED			1	1																											
683	43.750723	-89.15842104	207	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	683	2	Sand	Pole	SAMPLED			0																												
684	43.750709	-89.15649599	202	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	684	2	Sand	Pole	SAMPLED			2																											2		
685	43.750695	-89.15457095	199	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	685	4	Muck	Pole	SAMPLED			0																												
686	43.750681	-89.15264592	191	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	686	4	Muck	Pole	SAMPLED			0																												
687	43.750666	-89.15072088	188	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	687	4	Muck	Pole	SAMPLED			1	1																											
688	43.750652	-89.14879584	179	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	688	5	Muck	Pole	SAMPLED			0																												
689	43.750638	-89.14687081	176	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	689	5	Muck	Pole	SAMPLED			0																												
690	43.750623	-89.14494578	169	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	690	4	Muck	Pole	SAMPLED			0																												
691	43.750609	-89.14302074	1	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	691	4	Muck	Pole	SAMPLED			0																												
692	43.750595	-89.14109571	10	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	692	3	Muck	Pole	SAMPLED			0																												
693	43.75058	-89.13917069	11	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	693	3	Muck	Pole	SAMPLED			0																												
694	43.750566	-89.13724566	63	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	694	3	Muck	Pole	SAMPLED			0																												
695	43.750551	-89.13532063	64	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	695	3	Muck	Pole	SAMPLED			0																												
696	43.750536	-89.13339561	92	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	696	3	Muck	Pole	SAMPLED			0																												
697	43.750522	-89.13147059	93	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	697	3	Muck	Pole	SAMPLED			0																												
698	43.750507	-89.12954556	120	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	698	4	Muck	Pole	SAMPLED			1					1																						
699	43.750492	-89.12762054	121	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	699	3	Muck	Pole	SAMPLED			0																												
700	43.750478	-89.12569553	150	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	700	3	Muck	Pole	SAMPLED			1																											1	
701	43.750463	-89.12377051	153	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	701	3	Muck	Pole	SAMPLED			1		1			1																					
702	43.750448	-89.12184549	105	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	702	3	Muck	Pole	SAMPLED			3					3				1	1																
703	43.750433	-89.11992048	108	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	703	0			NONNAVIGABLE (PLANTS)																														
704	43.749791	-89.22389129	135	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	704	0			NONNAVIGABLE (PLANTS)																														
705	43.749778	-89.22196625	134	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	705	4	Muck	Pole	SAMPLED			0																												
706	43.749765	-89.22004121	136	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	706	5	Muck	Pole	SAMPLED			0																												
707	43.749752	-89.21811617	137	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	707	5	Muck	Pole	SAMPLED			0																												
708	43.749739	-89.21619113	138	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	708	5	Muck	Pole	SAMPLED			0																												
709	43.749725	-89.21426609	139	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	709	5	Muck	Pole	SAMPLED			0																												
710	43.749712	-89.21234105	140	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	710	6	Muck	Pole	SAMPLED			0																												
711	43.749699	-89.21041602	141	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	711	5	Muck	Pole	SAMPLED			0																												
712	43.749686	-89.20849099	142	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	712	6	Muck	Pole	SAMPLED			0																												
713	43.749672	-89.20656595	6	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	713	6	Muck	Pole	SAMPLED			0																												
714	43.749659	-89.20464092	5	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	714	6	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
715	43.749645	-89.20271589	28	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	715	6	Muck	Pole	SAMPLED			0																												
716	43.749632	-89.20079086	37	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	716	6	Muck	Pole	SAMPLED			0																												
717	43.749618	-89.19886584	60	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	717	6	Muck	Pole	SAMPLED			0																												
718	43.749605	-89.19694081	68	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	718	6	Muck	Pole	SAMPLED			0																												
719	43.749591	-89.19501579	91	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	719	6	Muck	Pole	SAMPLED			0																												
720	43.749578	-89.19309077	98	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	720	6	Muck	Pole	SAMPLED			0																												
721	43.749564	-89.19116574	121	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	721	5	Muck	Pole	SAMPLED			0																												
722	43.749551	-89.18924072	126	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	722	5	Muck	Pole	SAMPLED			0																												
723	43.749537	-89.18731571	149	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	723	5	Muck	Pole	SAMPLED			0																												
724	43.749523	-89.18539069	152	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	724	3	Sand	Pole	SAMPLED			0																												
725	43.749509	-89.18346567	173	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	725	2	Sand	Pole	SAMPLED			1																						1						
726	43.749496	-89.18154066	174	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	726	1	Sand	Pole	SAMPLED			1																						1						
727	43.749482	-89.17961564	195	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	727	3	Muck	Pole	SAMPLED			0																												
728	43.749468	-89.17769063	317	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	728	5	Muck	Pole	SAMPLED			0																												
729	43.749454	-89.17576562	310	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	729	4	Muck	Pole	SAMPLED			0																												
730	43.74944	-89.17384061	285	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	730	4	Sand	Pole	SAMPLED			0																												
731	43.749426	-89.1719156	111	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	731	3	Sand	Pole	SAMPLED			0																												
732	43.749412	-89.1699906	267	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	732	3	Sand	Pole	SAMPLED			1						1																					
733	43.749398	-89.16806559	272	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	733	4	Muck	Pole	SAMPLED			0																												
734	43.749384	-89.16614059	273	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	734	4	Muck	Pole	SAMPLED			0																												
735	43.74937	-89.16421559	274	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	735	2	Sand	Pole	SAMPLED			0																												
736	43.749356	-89.16229059	275	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	736	2	Sand	Pole	SAMPLED			1																										1		
737	43.749342	-89.16036559	211	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	737	3	Muck	Pole	SAMPLED			0																												
738	43.749328	-89.15844059	208	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	738	3	Muck	Pole	SAMPLED			0																												
739	43.749314	-89.15651559	201	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	739	3	Muck	Pole	SAMPLED			1																										1		
740	43.7493	-89.1545906	200	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	740	2	Sand	Pole	SAMPLED			2																										2		
741	43.749285	-89.1526656	190	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	741	3	Muck	Pole	SAMPLED			0																												
742	43.749271	-89.15074061	189	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	742	3	Muck	Pole	SAMPLED			0																												
743	43.749257	-89.14881562	178	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	743	1	Sand	Pole	SAMPLED			1			1																									1
744	43.749242	-89.14689063	177	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	744	2	Sand	Pole	SAMPLED			0																												
745	43.749228	-89.14496564	168	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	745	3	Muck	Pole	SAMPLED			1					1																						
746	43.749082	-89.12571584	151	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	746	0			NONNAVIGABLE (PLANTS)																														
747	43.749068	-89.12379087	152	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	747	0			NONNAVIGABLE (PLANTS)																														
748	43.749053	-89.1218659	106	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	748	0			NONNAVIGABLE (PLANTS)																														
749	43.749038	-89.11994093	107	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	749	0			NONNAVIGABLE (PLANTS)																														
750	43.748409	-89.22583432	152	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	750	0			NONNAVIGABLE (PLANTS)																														
751	43.748396	-89.22390932	151	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	751	2	Sand	Pole	SAMPLED			2																								2			1		
752	43.748383	-89.22198432	150	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	752	4	Muck	Pole	SAMPLED			0																												
753	43.748369	-89.22005933	149	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	753	5	Muck	Pole	SAMPLED			0																												
754	43.748356	-89.21813433	148	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	754	5	Muck	Pole	SAMPLED			0																												
755	43.748343	-89.21620934	147	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	755	5	Muck	Pole	SAMPLED			0																												
756	43.74833	-89.21428435	146	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	756	5	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
757	43.748317	-89.21235935	145	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	757	6	Muck	Pole	SAMPLED			0																												
758	43.748303	-89.21043436	144	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	758	6	Muck	Pole	SAMPLED			0																												
759	43.74829	-89.20850938	143	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	759	6	Muck	Pole	SAMPLED			0																												
760	43.748277	-89.20658439	5	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	760	6	Muck	Pole	SAMPLED			0																												
761	43.748263	-89.2046594	4	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	761	6	Muck	Pole	SAMPLED			0																												
762	43.74825	-89.20273442	29	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	762	6	Muck	Pole	SAMPLED			0																												
763	43.748236	-89.20080943	36	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	763	6	Muck	Pole	SAMPLED			0																												
764	43.748223	-89.19888445	61	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	764	6	Muck	Pole	SAMPLED			0																												
765	43.748209	-89.19695947	67	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	765	6	Muck	Pole	SAMPLED			0																												
766	43.748196	-89.19503449	92	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	766	6	Muck	Pole	SAMPLED			0																												
767	43.748182	-89.19310951	97	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	767	6	Muck	Pole	SAMPLED			0																												
768	43.748169	-89.19118454	122	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	768	5	Muck	Pole	SAMPLED			0																												
769	43.748155	-89.18925956	125	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	769	4	Sand	Pole	SAMPLED			0																												
770	43.748141	-89.18733459	150	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	770	2	Sand	Pole	SAMPLED			0																												
771	43.748128	-89.18540961	151	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	771	1	Sand	Pole	SAMPLED			2																						1		2						
772	43.7481	-89.18155967	200	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	772	0			NONNAVIGABLE (PLANTS)																															
773	43.748086	-89.1796347	196	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	773	3	Muck	Pole	SAMPLED			0																												
774	43.748073	-89.17770974	316	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	774	4	Muck	Pole	SAMPLED			0																												
775	43.748059	-89.17578477	311	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	775	3	Sand	Pole	SAMPLED			0																												
776	43.748045	-89.17385981	284	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	776	3	Sand	Pole	SAMPLED			0																												
777	43.748031	-89.17193484	110	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	777	0			NONNAVIGABLE (PLANTS)																															
778	43.748017	-89.17000988	268	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	778	0			NONNAVIGABLE (PLANTS)																															
779	43.748003	-89.16808492	279	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	779	2	Sand	Pole	SAMPLED			1												1						1							1		
780	43.747989	-89.16615996	278	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	780	3	Sand	Pole	SAMPLED			0																												
781	43.747975	-89.16423501	277	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	781	3	Muck	Pole	SAMPLED			0																												
782	43.747961	-89.16231005	276	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	782	3	Sand	Pole	SAMPLED			0																												
783	43.747947	-89.16038509	210	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	783	3	Sand	Pole	SAMPLED			1	V																									1		
784	43.747933	-89.15846014	209	Lake Puckaway	Green Lake	7/20/2015	EEH & JLW	784	0			NONNAVIGABLE (PLANTS)																															
785	43.747013	-89.22585231	154	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	785	2	Muck	Pole	SAMPLED			1						1				1																
786	43.747	-89.22392735	153	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	786	4	Muck	Pole	SAMPLED			0																												
787	43.746987	-89.2220024	162	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	787	4	Muck	Pole	SAMPLED			0																												
788	43.746974	-89.22007745	163	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	788	4	Muck	Pole	SAMPLED			0																												
789	43.746961	-89.2181525	164	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	789	5	Muck	Pole	SAMPLED			1		1																										
790	43.746948	-89.21622755	165	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	790	5	Muck	Pole	SAMPLED			0																												
791	43.746934	-89.2143026	166	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	791	5	Muck	Pole	SAMPLED			0																												
792	43.746921	-89.21237765	167	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	792	5	Muck	Pole	SAMPLED			0																												
793	43.746908	-89.21045271	168	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	793	5	Muck	Pole	SAMPLED			0																												
794	43.746895	-89.20852776	169	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	794	5	Muck	Pole	SAMPLED			0																												
795	43.746881	-89.20660282	4	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	795	5	Sand	Pole	SAMPLED			0																												
796	43.746868	-89.20467788	3	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	796	5	Muck	Pole	SAMPLED			0																												
797	43.746854	-89.20275294	30	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	797	6	Muck	Pole	SAMPLED			0																												
798	43.746841	-89.200828	35	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	798	6	Muck	Pole	SAMPLED			0																												

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
799	43.746828	-89.19890306	62	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	799	6	Muck	Pole	SAMPLED			0																												
800	43.746814	-89.19697813	66	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	800	6	Muck	Pole	SAMPLED			0																												
801	43.7468	-89.19505319	93	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	801	5	Muck	Pole	SAMPLED			0																												
802	43.746787	-89.19312826	96	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	802	5	Muck	Pole	SAMPLED			0																												
803	43.746773	-89.19120333	123	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	803	5	Muck	Pole	SAMPLED			0																												
804	43.74676	-89.1892784	124	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	804	2	Sand	Pole	SAMPLED			0																												
805	43.746705	-89.18157869	199	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	805	0			NONNAVIGABLE (PLANTS)																															
806	43.746691	-89.17965376	197	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	806	3	Muck	Pole	SAMPLED			0																												
807	43.746677	-89.17772884	315	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	807	3	Muck	Pole	SAMPLED			0																												
808	43.746663	-89.17580392	312	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	808	3	Sand	Pole	SAMPLED			0																												
809	43.746649	-89.173879	283	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	809	2	Sand	Pole	SAMPLED			0	V																											
810	43.746635	-89.17195408	109	Lake Puckaway	Green Lake	7/20/2015	DAC & RAK	810	0			NONNAVIGABLE (PLANTS)																															
811	43.746622	-89.17002917	269	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	811	0			NONNAVIGABLE (PLANTS)																															
812	43.746608	-89.16810425	271	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	812	0			NONNAVIGABLE (PLANTS)																															
813	43.746593	-89.16617934	280	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	813	0			NONNAVIGABLE (PLANTS)																															
814	43.746579	-89.16425442	281	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	814	3	Muck	Pole	SAMPLED			0																												
815	43.746565	-89.16232951	282	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	815	0			NONNAVIGABLE (PLANTS)																															
816	43.745644	-89.22972012	157	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	816	0			NONNAVIGABLE (PLANTS)																															
817	43.745631	-89.2277952	156	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	817	1	Muck	Pole	SAMPLED		YES	2							1	1		2			1				1		1		1		1						
818	43.745618	-89.22587029	155	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	818	2	Muck	Pole	SAMPLED		YES	2		2					1	1					1									1	1						
819	43.745605	-89.22394538	160	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	819	3	Muck	Pole	SAMPLED			0																												
820	43.745592	-89.22202047	161	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	820	3	Muck	Pole	SAMPLED			0																												
821	43.745579	-89.22009557	176	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	821	4	Muck	Pole	SAMPLED			0																												
822	43.745565	-89.21817066	175	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	822	4	Muck	Pole	SAMPLED			0																												
823	43.745552	-89.21624576	174	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	823	4	Muck	Pole	SAMPLED			0																												
824	43.745539	-89.21432085	173	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	824	5	Muck	Pole	SAMPLED			0																												
825	43.745526	-89.21239595	172	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	825	5	Muck	Pole	SAMPLED			0																												
826	43.745512	-89.21047105	171	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	826	5	Muck	Pole	SAMPLED			1		1																										
827	43.745499	-89.20854615	170	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	827	6	Muck	Pole	SAMPLED			0																												
828	43.745486	-89.20662125	3	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	828	5	Sand	Pole	SAMPLED			0																												
829	43.745472	-89.20469636	2	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	829	5	Muck	Pole	SAMPLED			0																												
830	43.745459	-89.20277146	31	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	830	6	Muck	Pole	SAMPLED			0																												
831	43.745446	-89.20084657	34	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	831	5	Muck	Pole	SAMPLED			0																												
832	43.745432	-89.19892167	63	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	832	5	Muck	Pole	SAMPLED			0																												
833	43.745419	-89.19699678	65	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	833	5	Muck	Pole	SAMPLED			0																												
834	43.745405	-89.19507189	94	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	834	4	Sand	Pole	SAMPLED			0																												
835	43.745391	-89.193147	95	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	835	2	Sand	Pole	SAMPLED			0																												
836	43.745296	-89.17967282	198	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	836	0			NONNAVIGABLE (PLANTS)																															
837	43.745282	-89.17774794	314	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	837	0			NONNAVIGABLE (PLANTS)																															
838	43.745268	-89.17582307	313	Lake Puckaway	Green Lake	7/21/2015	EEH & JLW	838	2	Sand	Pole	SAMPLED			1	1				1	1		1		1														1			
839	43.744248	-89.22973801	159	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	839	0			NONNAVIGABLE (PLANTS)																															
840	43.744235	-89.22781314	177	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	840	0			NONNAVIGABLE (PLANTS)																															

Point Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	ID	Lake Name	County	Date	Field Crew	Point Number	Depth (Feet)	Sediment	Pole; Rope	Comments	Notes	Nuisance	Total Rake Fullness	Myriophyllum spicatum	Ceratophyllum demersum	Chara spp.	Eleocharis acicularis	Elodea canadensis	Heteranthera dubia	Lemna minor	Lemna trisulca	Myriophyllum sibiricum	Najas flexilis	Najas guadalupensis	Nuphar variegata	Nymphaea odorata	Potamogeton natans	Potamogeton pusillus	Potamogeton strictifolius	Sagittaria rigida	Schoenoplectus acutus	Spirodela polyrhiza	Stuckenia pectinata	Utricularia vulgaris	Vallisneria americana	Wolffia spp.	Freshwater sponge	Filamentous algae	Nelumbo lutea	Najas minor	Zannichellia palustris
841	43.744222	-89.22588828	178	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	841	6	Sand	Pole	SAMPLED			0																												
842	43.744209	-89.22396341	184	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	842	4	Muck	Pole	SAMPLED			0																												
843	43.744196	-89.22203855	185	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	843	4	Muck	Pole	SAMPLED			0																												
844	43.744183	-89.22011368	186	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	844	4	Muck	Pole	SAMPLED			0																												
845	43.74417	-89.21818882	189	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	845	4	Muck	Pole	SAMPLED			0																												
846	43.744157	-89.21626396	190	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	846	5	Muck	Pole	SAMPLED			0																												
847	43.744143	-89.21433911	195	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	847	5	Muck	Pole	SAMPLED			0																												
848	43.74413	-89.21241425	196	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	848	5	Muck	Pole	SAMPLED			0																												
849	43.744117	-89.21048939	201	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	849	5	Muck	Pole	SAMPLED			0																												
850	43.744104	-89.20856454	202	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	850	5	Muck	Pole	SAMPLED			0																												
851	43.74409	-89.20663968	2	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	851	5	Sand	Pole	SAMPLED			0																												
852	43.744077	-89.20471483	1	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	852	5	Sand	Pole	SAMPLED			0																												
853	43.744064	-89.20278998	32	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	853	3	Sand	Pole	SAMPLED			0																												
854	43.74405	-89.20086513	33	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	854	4	Sand	Pole	SAMPLED			0																												
855	43.744037	-89.19894028	64	Lake Puckaway	Green Lake	7/20/2015	TWH & NLS	855	3	Sand	Pole	SAMPLED			0																												
856	43.74284	-89.22783108	179	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	856	2	Muck	Pole	SAMPLED			2		2					1		1					1													
857	43.742827	-89.22590626	183	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	857	2	Muck	Pole	SAMPLED		YES	1		1																							1		
858	43.742814	-89.22398144	182	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	858	2	Sand	Pole	SAMPLED			1			1				1				1												1					
859	43.742801	-89.22205662	181	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	859	3	Sand	Pole	SAMPLED			1		1					1																				
860	43.742788	-89.2201318	187	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	860	4	Muck	Pole	SAMPLED			0																												
861	43.742774	-89.21820698	188	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	861	5	Muck	Pole	SAMPLED			0																												
862	43.742761	-89.21628217	191	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	862	5	Muck	Pole	SAMPLED			0																												
863	43.742748	-89.21435736	194	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	863	5	Muck	Pole	SAMPLED			0																												
864	43.742735	-89.21243254	197	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	864	5	Muck	Pole	SAMPLED			0																												
865	43.742721	-89.21050773	200	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	865	5	Muck	Pole	SAMPLED			0																												
866	43.742708	-89.20858292	203	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	866	4	Sand	Pole	SAMPLED			0																												
867	43.742695	-89.20665811	1	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	867	1	Rock	Pole	SAMPLED			0																												
868	43.741431	-89.22592424	180	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	868	2	Muck	Pole	SAMPLED		YES	2		1					1		1		1			1									1				1		
869	43.741366	-89.21630037	192	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	869	1	Sand	Pole	SAMPLED			1										1													1					
870	43.741353	-89.21437561	193	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	870	2	Sand	Pole	SAMPLED			0																												
871	43.741339	-89.21245084	198	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	871	2	Sand	Pole	SAMPLED			0																												
872	43.741326	-89.21052607	199	Lake Puckaway	Green Lake	7/20/2015	BTB & SDF	872	1	Sand	Pole	SAMPLED			1			1																		1		1						

H

APPENDIX H

March 2017 Draft
Public & Agency Comments and Responses

Project Contacts (not for publication)

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Press Release

For Immediate Release

Lake Puckaway Draft Management Plan Available and Information Meetings Set for May

Green Lake & Marquette Counties, WI, March 20, 2017. The Lake Puckaway Protection and Rehabilitation District is pleased to announce that a draft of the Lake Puckaway Comprehensive Management Plan has been completed and is available on the district website (www.lakepuckaway.com). Additional information can be found at the Lake Puckaway Facebook page as well. Hardcopies of the management plan are also available for viewing at the public libraries located in Markesan, Montello, and Princeton. Each copy, whether electronic or hardcopy, contain specific information regarding the submittal of written comments via email and US Post. Only written comments can be accepted and must be provided on or before April 7, 2017.

"The Lake Puckaway project is one of the most complicated I have worked on in the past decade," said Tim Hoyman, Lead Aquatic Ecologist at Onterra, LLC, the lake management planning firm hired by the district to assist with the development of the plan. "An Executive Summary is included within the document and does a fine job of hitting the highlights, but to gain the best understanding of the Lake Puckaway ecosystem, the reader should also read over the main document and the implementation plan, he continued. Hoyman finished by saying, "It is a draft document, so written comments are welcomed."

The Lake Puckaway Protection and Rehabilitation District will host two identical information meetings regarding the draft management plan. Both meetings will be held at the Marquette Village Hall (127 E. 4th St, Marquette, WI) and include time to answer questions and accept comments from the general public. The first meeting will be on Thursday, May 4th, starting at 6:30pm and the second meeting will be held on Saturday, May 6th starting at 10:00am.

Tim,

After taking the time to read and reread your action plan and then reading Randy's comments I will put forth my 2 Cents. First I agree with what Randy all noted. Good points. Now for my thoughts.

I will go through it page by page in comments. **Basis for water Level Management on Lake Puckaway**. In here you *note the pattern of maintaining high water levels late in the growing season over the past decades that brought about the documented decline in aquatic pant abundances.* It should be noted first that the LPPRD wasn't necessarily responsible for the high water during this time along with high water not being the sole culprit to the decline of the aquatic vegetation. The document leans toward high water as being bad, but yet this year with higher than normal water during part of the summer we haven't had the algae blooms as we have had in years past and the water has been the clearest it has been in years.

I intentionally focused on wording that portion of the document so it would not lead the reader to believe that the district was responsible for any of the issues that plague the lake. I believe it reads that way now, but admittedly, I may have missed something because I have read it so many times. If you can direct me to something particular, please do and I will make changes.

I will make sure to reword this section (and other that are being created) to not point only at water levels for the degradation.

Regarding the conditions on the lake this year – like just about every year on Lake Puckaway, it is different than the year before and will likely be different than the next. Still, over the course of time the lake has degraded to where it is now. We cannot focus on one year and use that to make a determination of what is going to happen the following years.

The document refers to the Mississippi River pool waters with lowering water during growing seasons. Yes, this has been effective THERE. We

are talking 2 entirely different water systems. As I am sure you are aware the Mississippi is a large fast flowing river with back waters created by a dam system. Water level can be controlled rather easily in normal water level years (this past week or so isn't one of them). Puckaway on the other hand is a slow flow water system with one dam which we have very little control over through the course of the spring, summer seasons. Our only back water so to speak would be the East Basin of the lake. It should be noted that the LPPRD a few years ago designated the east basin as our aquatic vegetation key impact area that demanded our attention. It was this area that we were keying in on rather than the West basin or the "big Lake". I think this concept should be maintained in this lake management plan and would make it easier for folks to understand and accept. You also note that "Periodic reductions in water levels during the growing season" is the best path for increasing aquatic plants in Lake Puckaway. Is there any documentation of this in any other lake that we can review that is similar to Puckaway. Is water level reduction the only method for increasing aquatic plants in Puckaway???? There must be other tools in the tool box for us to consider and should be noted in the plan.

I believe that the Mississippi backwaters are comparable. The studies we refer to and Ted introduced to your group sometime ago, were not completed in the main channel of the river, they were completed in the massive backwaters of it. We are never going to find a perfect comparison to Lake Puckaway because it is unique, like every other lake in the world is unique. And yes, there are other studies that look at the use of water level management as a good tool for establishing plants in lakes and flowages. In the main portion of the document and in the summary/conclusions section we will be sure to highlight them. We will also expand upon alternatives, like adding plants back to the lake, but as we discussed during our presentations, without removing the factor that has not allowed the plants to establish on their own, we cannot expect plants that we add to the lake to thrive. Also, the management plan does not just call for the water level management plan to be implemented to improve the aquatic plant community, it also points to the work that the Shallow Lake Management

Committee would be facilitating, such as the dredgebank rebuild and work on Pancake Island.

In my August 8 presentation I purposely demonstrated to the group that the bulk of plant (and other habitat) improvements would be found in the east basin and that the west basin would primarily be open. The truth is, we cannot dictate where plants will and will not grow, but based upon the morphology of the lake and past conditions, I suspect that will be the case.

Specifications and Definitions; the plan notes that the *objective of the WLMP is to promote significant plant growth within Lake Puckaway…* As I noted earlier the LPPRD has designated the eastern basin as the area of our main interest in establishing the aquatic vegetation. Again, this would be easier to address and be more acceptable to the public. We realize that by keying on the east basin there still would be positive effects on the west basin (big lake).

Please see above.

Starting Lake Level; The plan addresses the water levels and that the ordinary high water mark has not been established. Have you checked with Green Lake County Zoning? The have the High water level established for when you want to build a home and the set back from the high water level mark.

According to a July 28, 2016 email from Matthew E. Kirkman, Code Enforcement Officer, Land Use Planning & Zoning Department, Green Lake County, “There is no common OHWM for Lake Puckaway.”

Specific Conditions on Attempts at Reductions; The plan addresses this but when do the water level reductions begin? Dam Reconstruction? 10 years after that?

In the Princeton Dam Reconstruction section of the Implement Lake Puckaway Water Level Management Plan action, I discuss the best case scenario would be for the reductions associated with the dam reconstruction to meet the successful reduction sequence. I also layout a plan if they do not meet the criteria. Further, I layout what would happen if the dam was not rebuilt during the next two biennial budgets. Does that not answer your question?

Frequency of water level reductions; The plan notes that a 2nd set of reductions would not be attempted for 8-10 years. Not in favor of this. 10 years at the earliest.

Please see my response to Randy.

Goal 3 Enhance Lake Puckaway Fishery

Action Steps

The plan notes that the LPPRD will work closely with Dave Bartz……This should be written that the LPPRD and WDNR local fisheries will work closely together on the continued aggressive, annual harvesting of common carp by commercial fisherman for Lake Puckaway. It must be a 2 way street not a one way as written.

Got it.

The plan has in it the LPPRD offering incentives to commercial fisherman. This is NOT to be in here. This is a specific budgetary item and we should not be held to this in a Lake Plan. There is no reason for it to be in there.

I am trying to make the plan as complete as possible while keeping it flexible. I would like to discuss this more with the committee as a whole, but will not get into details during my presentation Monday.

Not sure why we need specific info on hatchery budget and why this too would need to be in the lake plan. Addressing the hatchery and it goals fine, but the budget????

Please see response above.

Well, this should get it started. I am sure the more I think on some of this I will have more to say, but for now this is a good start.

Paul

From: Bolha, David A - DNR
Sent: Tuesday, April 04, 2017 1:10 PM
To: Marquardt, Keith A - DNR; Johnson, Ted M - DNR; Bartz, David H - DNR; Bunde, Scott B - DNR; Kamke, Kendall K - DNR; McLennan, Robin - DNR; Bartz, David H - DNR; Holzwart, James C - DNR
Subject: RE: First Draft of Lake Puckaway Management Plan

Thanks Ted,

The summary is well written, providing a great amount of important information. I would add a few comments however.

- The 3rd full paragraph on pg 4 refers to nitrogen/phosphorus limitation in a lake which seems too complicated for the executive summary. The same can be said for the 2nd full paragraph on pg 5 referring to changes in pH and release of phosphorus from the sediments. Perhaps combining the two paragraphs and simplifying can be better read by our non-technical audience.

This has been reworded as best as possible.

- Stick with the term "algae" rather than phytoplankton to avoid confusion.

I have done this in the ES and have added clarity in first use of "phytoplankton"

- In the 4th full paragraph on pg 8, I think it is important to list examples of annual and perennial species for folks to understand the benefits observed in the Mississippi Pools.

Added examples.

- I understand Keith's questions on pg 9 regarding the EPA expecting water level management to be used to meet our water quality standards/TMDL. Perhaps it is better put as the state recommends water level mgmt. to meet TMDL and water quality standard requirements.

This has been added.

As for the rest of the plan, here are my comments:

- The 1st full paragraph on pg 39 regarding TSS. The Deep Hole highest value in summer was listed as 14.4 mg/L and yet the average Deep Hole concentration was 18.6 mg/L.

This has been corrected.

- How do we explain the difference in flushing rate calculated by WiLMS and the actual data by USGS since 2009?

WiLMS uses average precipitation levels throughout several years based upon county. As discussed within the document, water levels and flows are much higher in the past decade than over the past 30 years, so that brings about the difference.

- Do we agree with the WiLMS assessment of internal loading not being a significant source to the lake on a regular basis? Regardless of a significant impact to the lake, does that preclude an impact to the Fox River downstream in most years?

We did not use WiLMS to calculate the internal loading during 2011 and 2012 – actual flow rates and concentrations entering and leaving Puckaway were utilized. We really only have sufficient data for about 4 years to make these calculations, so we really do not know how often internal loading is an issue that impacts downstream waterbodies. We try to use the term "often" instead of always or mostly.

- In the 1st paragraph under Water Level Drawdown, the plan states "the process will likely need to be repeated every two or three years to keep target species in check". I think that should be rephrased or it could scare most folks away from the idea of water level management.

That text is in regards to the control of aquatic plants and is part of the primer sections, which is pointed out in the side box near the section's start. However, a citizen brought this up in their comments as well, so we have made it clear that those words do not pertain to Puckaway.

- Should reconstruction of the dredge banks be listed as a Management Action specifically? Right now, it falls under "Form Puckaway Shallow Lake Management Workgroup" but is not specifically mentioned besides in the Executive Summary. Giving some indication of foreseen projects may be good for public buy-in.

I added text in the implementation plan description for the PSLWG action, but I do not believe that it should be called out as a separate action because we do not know if it is really possible at this time.

- What about an abandonment threshold of 1300 cfs at Princeton on June 15th and 1100 cfs on June 30th? A quick look at the 2010 – 2016 data from Princeton and no two consecutive years met the 1200 and/or 1000cfs thresholds. Only 2012 and 2016 met those thresholds. Is it reasonable to expect two consecutive years meeting those thresholds? 2015 and 2016 were close to meeting the 1300cfs and 1100cfs thresholds. If 1300 cfs on June 15th and 1100 cfs on June 30th thresholds will not meet the WLMP objective (1.5 foot reduction by 7/15?), then is just summer time (June through September) water level reductions going to give us the reductions we are hoping for?

Considering what was found on the Mississippi pool studies concerning having the water levels down by early to mid-July for best results, and the results of the MWH study on Puckaway, those thresholds make since. You are correct, there is a small chance that two consecutive years would meet those thresholds, actually we calculated it at about 7%, so that is why once we meet the first year's requirement, the second year is basically take what we can get, but needs to be at least 1.5 ft.

Let me know if you have any questions on my comments. Would you like to forward my comments onto Tim or should I?

Dave

We are committed to service excellence.
Visit our survey at http://dnr.wi.gov/customersurvey to evaluate how I did.

David Bolha
Phone: (920) 424-7892
david.bolha@wisconsin.gov

From: Johnson, Ted M - DNR [mailto:TedM.Johnson@wisconsin.gov]
Sent: Friday, April 7, 2017 2:35 PM
To: Tim Hoyman <THoyman@onterra-eco.com>
Cc: McLennan, Robin - DNR <Robin.McLennan@wisconsin.gov>; Bolha, David A - DNR <David.Bolha@wisconsin.gov>; Marquardt, Keith A - DNR <KeithA.Marquardt@wisconsin.gov>
Subject: Comments on draft LMP

Hi Tim:

I think that you've done a good job with this plan. My main comment is to simplify the wording and jargon as much as possible, especially in the executive summary (ES). Most people will not read the entire plan but more likely will at least read the ES. Seeing as this is our best chance to educate and inform folks, I would focus on a writing style that is most comprehensible to the lay person. Most of the ES is fine but there are areas that could be improved.

In regards to regulatory requirements for water level management, I'd like to schedule a meeting with you, Dave Bolha, Keith Marquardt and Rob McLennan to discuss the best way to present this information.

1. **Page 4, 4th paragraph**: BGA blooms. You verbiage is not definitive enough. "potential and may be intense". I'd say this as a fact. Have been intense, dangerous to human health, etc.

I added more definitive wording in the second full paragraph of the ES.

2. **Page 6, 2nd paragraph**: I wouldn't mention 8 feet as this exceeds the max depth of the lake unless experiencing a flood. You may lose some credibility with locals if you use 8 feet. Six feet is reasonable.

This has been removed and additional information regarding actual drawdown elevations added verbiage to the Implementation plan to further clarify the actual relative levels.

3. **Page 13, 2nd paragraph**: Increased panfish habitat sentence; replace "but" with and.

That is much better, thank you.

4. **Page 13 3rd paragraph**: unnecessarily technical; "suppression of sediment re-suspension", "hampering water turbulence"; Please simplify.

Done.

5. **Page 13, 3rd paragraph, last sentence**: As opposed not "and opposed"

Done.

6. **Page 15, 3rd paragraph**: You mention a 2.5 foot drawdown goal from June through September. I think that people read 2.5 feet and think that the lake level will be 2.5 feet lower than normal (all summer). This may seem less drastic if contrasted against average historic water level records. For example, in most years lake levels in July and August are already down by 1-1.5 feet naturally (guess on my part to make a point). Let's say 1.2 feet down is the summer average so to achieve 2.5 feet the lake is being brought down an additional 1.3 feet over average natural conditions. In my opinion, this would be more palatable to most lake stakeholders.

I removed the specific numbers for the drawdown from this paragraph, and as mentioned above, added verbiage to the Implementation plan to further clarify the actual relative levels. I also altered the text under "Successful Reduction Sequence" to make it relative to MSL as opposed to feet below the starting level.

7. **Page 15, 3rd paragraph**: Some complicated concepts are described here. I know that it will be difficult but this paragraph is long and may be confusing to the average stakeholder. Maybe split this paragraph into two shorter ones.

I split the paragraph and reworded portions.

Thanks, Ted

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Ted M. Johnson
Lake Biologist – Bureau of Water Quality – Eastern District
Wisconsin Department of Natural Resources
Phone: (920) 424-2104
Fax: (920) 424-4404
tedm.johnson@wi.gov

Riparian 1:

Hello Mr. Anastasi,

Thank you for taking the time to review the draft plan and provide your obviously well thought through comments. Also, thank you for attending last summer's informational meetings. I have provided answers and comments to the best of my knowledge within the text of your email below.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "Phil" <philanastasi72@gmail.com>
To: info@lakepuckaway.com
Sent: Tuesday, April 4, 2017 8:00:04 PM
Subject: Comments Lake Puckaway Comprehensive Lake Management Plan

Dear Sirs,

Reviewing the draft of the plan there are several questions that I'd like you to address;

1. When will the Wisconsin Department of Natural Resources finish developing its Total Maximum Daily Load for water bodies within the upper Fox River Water shed you make reference to in the report?

As of last summer, the TMDL was to be completed sometime in 2017. I am sorry, but I do not know if that is still accurate.

2. What will the total cost be to enact the plan?

This is unknown because the elements that will actually be taken on, like the work the Shallow Lake Management Workgroup is developing, have not been determined. This is a good question though and for our plans that are more straight forward, like those calling for herbicide treatments of exotic species or those enacting an alum treatment, we would include some rough costs.

3. How do you propose to eliminate the invasive species and undesirable plants that don't help with the removal of pollutants in the lake?

Based upon the results of the 2015 plant studies, the level of exotic plants in the lake does not warrant action to control them.

4. By drawing down the water levels in the lake, won't you be increasing the nitrogen and phosphorus in the lake because there will be very little water flow?

This may be the case temporarily while the drawdowns are being conducted, but the overall gain in water quality and habitat brought on by the gain in plants would be much better for the lake in the long-run.

5. By drawing down the water level two consecutive years and potentially every eight to ten years how can we be reassured that you will not upset and irrevocably damage the eco system significantly and cause more devastation?

The Water Level Management Plan contains a monitoring plan that will provide real data to determine if the actions are making the lake better or worse. Similar actions in other systems have shown improvement in those systems, so there is no reason to believe that damage would be caused, especially permanent damage. However, as discussed in the plan, the purpose of the monitoring is to allow for flexibility and refinement so the lake can be improved as much as possible – that may include never doing a drawdown ever again.

6. By lowering the water level two feet or more won't you create more stress to fish trapped in the lake because of high water temperatures, high nitrogen and phosphorus? This example occurred a few years ago when we had drought conditions and lost more than two thousand Northern Pike. We could lose a lot more fish and the lake would take years if not decades to recover.

Fisheries biologist do not believe this would be the case because the Fox River system is so large. This is not a high concern because the gains brought on by the increased habitat will bring about a better fishery as elaborated upon within the plan.

7. A fish survey should occur at least every three years if a plan is approved to gauge the impact of lower water levels and weed growth.

Agreed. The WDNR is completing a survey this year and will hopefully be prepared to complete the same following any water level manipulation. Unfortunately, our current administration is cutting funding and staff in the WDNR, but hopefully those cuts will not impact important work like we are discussing here.

8. Will the plan presented at the June 2017 annual meeting allow for amendments?

Any changes to the plan would likely occur prior to that meeting and be based upon comments received at the informational meetings being held this week.

Thank you,

Phil Anastasi

W 6766 Hill St.

Markesan, WI 53946

April 4, 2017

Riparian 2:

Hello Mr. and Mrs. Schultz,

Thank you for taking the time to review the draft plan and provide comments. The alternatives that you bring forth below are discussed within the management plan. For instance, the district has worked with the WDNR for many years to have carp removed. While it is difficult to keep carp numbers down in such a big system, the program has worked and in fact, numbers were down this past fall to the point that the contractor cancelled the harvest due to lack of fish. The islands and artificial barriers that you mention are currently being developed by the Shallow Lake Management Committee that has been formed by the district and is discussed in detail within the plan. With our assistance, the district successfully applied for a grant that will partially fund work to be completed by the US Army Corps of Engineers that will determine appropriate placement and methods for these enhancements to the lake. However, these enhancements will not allow the establishment of aquatic plants on their own. In order to establish truly significant amounts of plants in the lake, enough plants to see changes in water quality and improvements in habitat long-term, the water level management plan must be initiated. Since the dam was built over a century ago, water levels have fluctuated from year-to-year, but they have always been consistently higher than what would have occurred without the dam in place. Those consistently higher levels have worked, along with the carp of course, to reduce plant levels in the lake. That is without a doubt. Studies from many lakes, in many states, and in many countries, have shown that maintaining unnatural water levels reduces aquatic plants in lakes, especially emergents like rice, rushes, and reeds – even in lakes where carp do not exist. The district has attempted adding plants to the lake, like many other lake groups have as well in other lakes, but those plants do not last for the same reasons that the plants do not grow naturally in the lake.

Regarding how the watershed impacts Lake Puckaway and how work in the watershed will affect the lake, there is a lot of information in the draft plan. Below, I have included some text that will appear in the district's newsletter that will be sent out in the next couple of days:

While agricultural lands do deliver a large portion of the phosphorus that enters the lake, studies completed as a part of this project indicate that even converting half of the agricultural land to forested land would still result in high phosphorus levels in the lake. High enough that the lake would still be considered overly productive and support high levels of algae. While work in the watershed is important and will be called for as a part of the TMDL for the Fox River Basin, it is not the silver-bullet to solve Lake Puckaway's water quality problems. In fact, during many of the years, phosphorus being recycled in Lake Puckaway is substantial and adds to Puckaway's water quality problems and those of the waterbodies downstream. Increased plant abundances in Lake Puckaway would do much to reduce the internal cycling of phosphorus while competing with algae for the phosphorus that is entering the lake from the watershed.

Regarding being more proactive in the grant process – the Lake Puckaway Protection and Rehabilitation District has worked diligently at obtaining grants for decades. In fact, the group has received so many grants, that when we applied for the grant I mention above, the district needed to obtain a special variance because their past grants had exceeded the $100,000 cap required by state law. Honestly Mr. and Mrs. Schultz, the district has worked to figure out ways to make Lake Puckaway healthier and over the years the same issues rise to the surface and the same actions, like water level management are brought forth as solutions, but the district members resist. As a result of the last planning effort, the district did attempt to extend the lower winter levels into the spring by holding off on placing the flash

boards until after June 15th. However, high flows during those years kept the water levels high - high enough that the flash boards would not have been placed any earlier.

Everyone that has worked on this plan understands the sacrifice everyone around the lake will have to make by utilizing the water level management plan. However, it is necessary, along with the other actions discussed above and in the draft management, if people are serious about making Lake Puckaway an overall healthier system.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "Randy Schultz" <randyandmaryschultz@gmail.com>
To: info@lakepuckaway.com
Sent: Thursday, April 6, 2017 10:22:49 AM
Subject: Lake drawdown

Some of us that fish this lake consistantly, and also live on it feel there are other alternatives to a lake drawdown that would promote better weed growth in Lake Puckaway. Consistant carp removal certainly helps the cause for better weed growth and more of it.Islands or artificial barriers made of rock,cement,etc. out in the middle of lake would reduce wave action which hurts weed growth and the islands would help with natural spawning for all types of fish.Higher lake levels also promote better weed growth which was proven in the years of real high water 2004,and 2008.Keeping up good water clarity also promotes good weed growth.Controlling the bad runoff into the lake from both the river and lake area also would help.Keeping a better check on boat trailers bringing bad weeds like milfoil into our lake and river system.Planting more of things like wild rice etc.into the system.Applying for more grants that might be out there to fit our needs related to this problem. Again these are both my thoughts and some others who fish and use the lake for recreation on a regular basis.There are many good weeds in our system now so we have a start with those.Again we need to be more proactive on the grant process to get ahead of the game.Having a drastic lake drawdown certainly has no guaranties and may have to be done more than once to work causing a lot of hardship to lake and river users ,businesses, and wildlife. Thanks Randy & Mary Schultz W6190 Lakeview Drive North

Riparian 3:

Hello Mr. and Mrs. Schultz,

Thank you for taking the time to review the draft plan and provide your well thought through comments. There is no denying that Mother Nature, especially in the last 10 years, has brought about great fluctuations in water levels and water quality in Lake Puckaway. However, there is also no denying that in most years since the dam was constructed, not just the last 10, 20, or even 30 years, that it has brought about higher water levels within the Lake Puckaway basin. That was the entire intent of creating the dam – consistently higher water levels to facilitate navigation through the system. Those higher levels over the decades have done more to weaken the plant community in the lake than any other factor. To be clear, I am not saying that carp have not been an issue, and a big one at that, but they are only a portion of the problem and the district is doing what it can to keep their numbers low. Carp are low enough now that the contractor did not fish this past fall.

When we manage a system such as Lake Puckaway, we must look at the overall big picture, not just the past few years. Options to improve the health of Lake Puckaway are few and none of them are easy or silver bullets. It took decades for the lake to degrade to the poor condition it is in now, so significant actions will be required to even partially correct it.

Again, thank you for taking the time to provide your thoughts – I know it is not always easy to do so. Also, thank you to your husband for his work for the district.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "Dotti Schultz" <rogdot71@hotmail.com>
To: info@lakepuckaway.com
Sent: Friday, April 7, 2017 8:14:27 PM
Subject: lake management plan opinion

TO: The Lake Puckawy Protection & Rehabilitation District

FROM: Roger & Dorothy Schultz, Lake Puckaway Landowners

DATE: April 7, 2017

We appreciate the opportunity as Lake Puckaway landowners to give you our point of view on the lake management plan. We have lived on the southwest shore since 1999 and owned our property since 1992.

Roger has volunteered on committees for the last lake management plan and also worked with the Walleyes for Tomorrow trailer. Previous to that, his parents owned land on Beaver Dam Lake. We have watched the results of several lake draw downs and from our observations, there have been no more beneficial weeds to show for the effort. From what we have seen, high carp population, wave action and low winter water levels either pull out or suffocate the weeds. A lake drawdown won't solve any of these problems. We don't believe the percentage of weeds that you hope to gain from a draw down is worth the expense to both the DNR and to the landowners and businesses on the lake.

Because Lake Puckaway is not truly a lake, but a widening of the Fox River, it is subject to constant water level changes that affect water clarity and weed growth. At the present time, that is simply something controlled by Mother Nature and not by man as our current dam has very little effect on maintaining water levels. We have just had two years of higher than normal water levels due to abundant rainfall and also a lower number of carp due to good removal efforts. The weeds appear to be growing and multiplying. Visitors to our home often remark on the water clarity we have as they can see the bottom of the lake. When water levels have been low and carp have been out of control, the number of weeds decreased. Recreational use of the lake was also greatly reduced, something we as Lake Puckaway landowners pay very high taxes to enjoy.

In our opinion, the only good option for Lake Puckaway is to make the dam a workable system that will help stabilize the water levels. This has been the promise to Lake Puckaway landowners for many, many years, but is always delayed for more studies, surveys, funding, etc. The Lake Puckaway landowners and businesses are paying very high lake property taxes without many of the benefits that living on the lake should offer. A lake draw down will significantly lower property values and business income in those years that the draw down is in effect. That should be a concern to all of us. It is our view that until we have a dam that can maintain a more consistent water level, we will not have a lake that works for all of us and, most of all, a lake that has a chance of staying healthy. A lake draw down is not the answer.

Respectfully yours,

Roger & Dorothy Schultz
W6738 Marine Dr
Markesan WI 53946

Riparian 4:

Mr. Edwards,

Thank you for taking the time to review the draft plan and provide comments. The alternatives that you bring forth below are discussed within the management plan draft. For instance, the district has worked with the WDNR for many years to have carp removed. While it is difficult to keep carp numbers down in such a big system, the program has worked and in fact, numbers were down this past fall to the point that the contractor cancelled the harvest due to lack of fish. Since the dam was built over a century ago, water levels have fluctuated from year-to-year, but they have always been consistently higher than what would have occurred without the dam in place. Those consistently higher levels have worked, along with the carp of course, to reduce plant levels in the lake. During those fluctuations in water level, the lake has seen more plants in some years, but even during the best years, the plant levels have not approached what is needed to make a significant improvement in the lake. That is without a doubt. Studies from many lakes, in many states, and in many countries, have shown that maintaining unnatural water levels reduces aquatic plants in lakes, especially emergents like rice, rushes, and reeds – even in lakes where carp do not exist. As you mention, the district has attempted adding plants to the lake, like many other lake groups have as well in other lakes, but those plants do not last for the same reasons that the plants do not grow naturally in the lake.

The water level management plan proposed within the Lake Puckaway Management Plan aims at increasing the lake's aquatic plant population so the lake can see significant changes in water quality and habitat. By meeting that goal, Lake Puckaway will be healthier in the long run and be able to withstand fluctuations in water level brought on by Mother Nature.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "John Edwards" <jcedwards42@yahoo.com>
To: mickmas@centurytel.net
Sent: Thursday, March 30, 2017 8:50:20 AM
Subject: Re: Management Plan

I completely disagree with this, I have lived on this lake for 45 plus years and have used the lake for everything, I went through the removal of carp, netting, poisoning, planting Celery, wild rice constructing reefs from tires, listening to the dnr about the lake 30 years of building the dam, many many studies of it and the lake, The agenda of the dnr about the weeds,turtles,frogs, lake depth etc, While our association has done much to the good fishing in the lake they need to stop listening to the dnr, they are trying to blackmail the land owners as to the buffer idea, As to the dam I have heard this for 30 years and I still do not believe it will be built, and if it were to be built, Did no one think that while it is being constructed, the lake would naturally be lower, a one year draw down. As to the tax base of the property owners that will not have access for a two year period The taxes should be lowered ,not a chance, I am sure some grant or free money is involved with your plan, The taxes have kept going up in our area every year,

school,town county every utility, As for the lake the water quality was great this year, very clear, go to the southwest end of the lake to see weeds growing bigger every year, go out on the lake and look, All we had to do over the years is control the carp, and that took care of itself, did anyone see the size and number of dead carp out there, The fisherman couldn't find enough, I believe that alone will greatly help our lake. The fishing also will improve as to the massive shad die off that just happened, Keep the lake higher not lower. My opinion!!

Riparian 5:

Hello Mr. Knoepke,

Thank you for taking the time to review the draft plan and provide your obviously well thought through comments. I have provided answers and comments to the best of my knowledge within the text of your email below.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "Matt Knoepke" <matt.knoepke@apriant.com>
To: info@lakepuckaway.com
Sent: Tuesday, March 28, 2017 10:27:03 PM
Subject: Lake Puckaway assessment feedback

The assessment that you have presented is comprehensive, articulate, and easy to read. The conclusion reached is the same as previous work in the past...

Thank you and you are correct.

1. Phosphorus levels caused by row crops and bottom sediment churn are the enemy.

This is mostly correct, but for the list to be complete, internal nutrient loading, lack of plants caused consistently high water levels brought on by the dam since it was built over a century ago. I would remove sediment churn, either by wind-induced waves or boating as a major issue.

2. We cannot materially affect phosphorus runoff given the massive size of the watershed.

Unfortunately, this is mostly true. Just stopping phosphorus from runoff would not help the lake on its own. Even if we went as far as completing some of the truly unrealistic scenarios described in the plan.

3. Native shorelines are the gold standard. Voluntary land owner restoration of native habitats would go a long way to increasing biodiversity and reestablishing favorable habitats.

This is true for nearly every lake we have ever worked on. I believe you understand this more than most riparian property owners – restoring the shoreline is more about restoring habitat than stopping pollutants from entering the lake. Unless the lake is close to 50% or 75% developed with urban landscapes, shoreland runoff is usually a small portion of the phosphorus load.

4. The most controllable and the most controversial intervention would be to successfully lower water levels to an almost unnavigable point for two consecutive summers.

Yes, I believe this is a fair assessment.

5. The survey results show that carp get a larger portion of the blame as a cause, and that the one factor that will help significantly, lowering water levels during the summer, will be a tough sell.

Yes, most people around the lake believe that carp are the primary cause. Over the long-term, we do not believe this to be the case, but that does not mean that reducing the district's efforts in having carp harvested annually is a good idea. In fact, it would be a very bad idea.

6. Backing the reconstruction of the Princeton Dam would give a one season, built-in excuse for lowering water levels. If we can pull it off for another year, we can take a break for up to ten years.

Yes, if the dam reconstruction methodology calls for the levels to be lowered and the work is completed during spring and summer. As I mention in the plan, this would be the best case scenario.

Some thoughts...

There are a few entrances to the lake from the three or four channels that will landlock boat traffic completely when water levels are lowered. The inclusion of dredged access to allow access to the lake would prevent tens or even hundreds of opposing votes from those unable to simply extend their piers.

This is part of the work being considered by the Shallow Lake Workgroup discussed in the plan.

Perhaps a bit beyond the scope of your assessment, but a section on the economic impact of healthy vs unhealthy lakes on surrounding communities. Fishing and tourism are the lifeblood of the community. The short term boating impact during the two year

drawdown can be offset by the long term health of the lake. This should be quantified and presented to the Lake District.

Yes, determining the economic impact of the water level management is well beyond the scope and need of this project. Recent research completed in Wisconsin, Minnesota, and other areas of the country have shown that lakes with higher water quality and general lake quality, such as habitat, fishing, and aesthetics, produce higher property values than lakes with poor water quality and general lake quality. Improving the health of Lake Puckaway will lead to higher property values and could very well increase business in the area.

What concessions can be made to the plan to make the once every decade drawdown worth the pain? 100' x 10' wide dredging for access? No wake on the Eastern basin? Proposal to add a year to the non-drawdown period for every 200 landowners who adopt the 35' buffer 35'viewing, 35' buffer plan?

This is an interesting concept, but I believe it makes this into more a business plan than a plan to manage a natural resource, and a very unhealthy one at that. Frankly, you and I could discuss this over beers for hours and hours, which is acceptable to me by-the-way, but to keep it short, let me put it this way. If your doctor said that you need to lose 100 lbs or your risk of a heart attack is 90%, it would not be possible to negotiate with him and ask if you could lose only 50 lbs, but promise to cut back on the drinking and smoking. Really, to make yourself healthier and reduce the chance of a heart attack, you should do all those things.

Address the carp issue. This is a passionate belief for many on the lake. It might not amount to a top 3 contributor to lake degradation in reality, but it is a hard belief. Adding a section about carp harvesting and its value will acknowledge its importance in the survey results. The absence of a section on carp will be used as a reason to invalidate these findings.

This is a very good point and we have obtained harvesting data from the WDNR that will be included in the fishery section of the final draft. I am also going to try to include some of this information for the meetings this Thursday and Saturday.

Anecdotally, in years of lower lake levels, the temperature of the lake soars, as our maximum depth falls under 4 feet. Immediately following a hot and dry spell, algae blooms occur like clockwork. In 2013, lake temps exceeded 90 degrees farenheit for at least 4 days.

Deeper lake levels, again anecdotally, seem to prevent much of the sediment churn caused by boating traffic. In years of deeper water, e.g. 2016, algae was not much of an issue. Secchi disk readings were the best in years. I'd like to hear about the effect of lower lake levels on lake temps and sediment churn, and hear an arguement why, while

temporary, the encouragement of vegetation growth over the ensuing decade would offset a warmer and shallower lake.

As mentioned earlier, I do not believe that boat traffic causes significant issues on Lake Puckaway. Studies have been completed on much smaller lakes with much higher boats/acre usage, and the results indicate that any disturbance is typically short-term. Regarding water clarity, the water was actually clearer in both basins during 2013, 2014, and 2015 compared to 2016. Regardless, your question about lower water levels and lake temps (while temporary), is very good. Basically, in the long-run, having a healthier plant population, meaning significantly increased abundance and diversity over much of the lake, would buffer the lake against the issues brought on by low water years and high water years.

Your assessment came to the same conclusion of those done in the past. That solidifies my belief that your plan states the obvious. It also backs the conclusion with exhaustive background information and cited sources. Well done.

This was one of the most difficult projects we have worked on, so it means a lot to have one of our clients say it was well done – thank you.

Matt Knoepke

Riparian 6:

Hello Mr. and Mrs. Moore,

Thank you for taking the time to review the draft plan and provide comments. I have provided answers to your questions to the best of my knowledge within the text of your two emails below.

Best Regards,

Tim

Tim Hoyman, CLM
Lead Aquatic Ecologist
Onterra, LLC

From: "Kathleen Moore" <ccjskb@yahoo.com>
To: info@lakepuckaway.com
Sent: Tuesday, April 4, 2017 10:23:47 AM
Subject: Revised Lake Report Comments

First of all I think it is very unfair that the Lake residents were told that the draft report would be available in October for our review and comments and it just was recently posted for comments which have to be submitted by April 7th. What was the hold up?

I made an error when I provided the estimate of having the first draft of the plan out by the end of October. At the time, I had forgotten the fact that the project included water quality testing yet in the fall and in the winter. We were also waiting for data to be supplied from agency partners that was provided in January. Our original schedule was to have the draft completed in spring 2017, as it was. The October timeframe was over optimistic and I regret even mentioning it.

Our questions and concerns are the following:

Since water level was one of the top concerns of the residents why is there no discussion of use of the Lake and detailed economic impact on the businesses and property owners other than a very generic statement on page 7.

Determining the economic impact of the water level management is well beyond the scope and need of this project. Recent research completed in Wisconsin, Minnesota, and other areas of the country have shown that lakes with higher water quality and general lake quality, such as habitat, fishing, and aesthetics, produce higher property values than lakes with poor water quality and general lake quality. Improving the health of Lake Puckaway will lead to higher property values and could very well increase business in the area.

Why a 2.5' drawdown when other areas were only drawn down 1-1.5'?

The 2.5’ drawdown called for in the Water Level Management Plan (WLMP) is referenced from the average water levels found during mid-June on Lake Puckaway. Due to the morphology of the lake, a

drawdown of that level would produce some exposed sediment for emergent plant development and would decrease depth in the open water portions of the lake to establish submergent plants. If we used July 4th as the reference date, in many years, the drawdown would be about 1.25 or 1.5 feet.

Explain economic hardship on page 15.

When we used the term hardship, we were not necessarily referring to economic hardship. We were using it as a general term meaning "difficulty" as in difficulty accessing the lake or utilizing it as the riparians have in the past. When it comes to the businesses, economic hardship may be implied with the use of the term, but as I mention above, determining that is not a part of a plan like this. And honestly Mr. and Mrs. Moore, I do not believe it is needed to understand that the lake is in very poor shape and needs to be managed differently to make it healthier. Everyone that has worked on this plan understands that reducing water levels will affect how people are able to use Lake Puckaway. But, in the long-run, the lake will be better.

It is still on unclear to us whether the drawdown is in coordination with the dam construction or if done before the dam is started?

Within the WLMP, there is a specific section addressing the reconstruction of the dam. Within that section is stated, "The best-case scenario would be to have the reductions associated with the reconstruction project meet the successful reduction requirements discussed above. If that is the case, the post reduction studies would be initiated." The section also discusses what would happen if the reductions associated with the construction do not meet the needs of the WLMP and what would happen if the dam reconstruction was put off for many years. The WLMP was very difficult to write because there are so many factors to take into account. As we allude to in the WLMP, it would be the best situation if the dam reconstruction project required a drawdown that would be long enough and low enough to produce the results the lake needs to be healthier. Really, that would be the best bang for the buck.

Is this Plan dependent upon approval for the dam?

No, the plan covers many aspects of managing Lake Puckaway beyond the WLMP and the dam reconstruction.

In the discussion on phosphorus and nutrient loading after the Grand River , what is being done to alleviate this problem upstream on the row crops and spreading of manure to eliminated the problem. There is know discussion or proposal in the Plan on this issue.

The total maximum daily load determination project being carried out by the WDNR and EPA will facilitate that work to be completed. The TMDL project is discussed several time in the document and near the end of the watershed section it is stated, " The TMDL being developed for the Upper Fox River Watershed will identify sources of pollutants such as phosphorus and sediments and determine actions to be taken to reduce these pollutants." In the final draft I will elaborate a bit more on this and discuss why there are no specific watershed actions with in this plan. However, it is very import to remember that even with drastic and actually unrealistic changes within the Lake Puckaway watershed, there will still be very high levels of phosphorus being delivered to the lake just because of the watersheds incredible size. Below is a portion of the text I supplied for the district's newsletter that will be going out in the next few days:

While agricultural lands do deliver a large portion of the phosphorus that enters the lake, studies completed as a part of this project indicate that even converting half of the agricultural land to forested land would still result in high phosphorus levels in the lake. High enough that the lake would still be considered overly productive and support high levels of algae. While work in the watershed is important and will be called for as a part of the TMDL for the Fox River Basin, it is not the silver-bullet to solve Lake Puckaway's water quality problems. In fact, during many of the years, phosphorus being recycled in Lake Puckaway is substantial and adds to Puckaway's water quality problems and those of the waterbodies downstream. Increased plant abundances in Lake Puckaway would do much to reduce the internal cycling of phosphorus while competing with algae for the phosphorus that is entering the lake from the watershed.

On page 52 is this the most updated regulations adopted by Green Lake County?

I am not sure, that information is included as general information and based upon state regulations, which are current. This would be a good question for Derek from Green Lake County Land and Water. I will see him at a meeting this week and ask that he look it over.

Why all the discussion on vegetative removal both manually and mechanically? Are we going to have issues like Buffalo Lake which is very costly to the Lake District? What was the intent of this discussion?

The sidebox included at the beginning of that section states that the information is presented to help the reader understand the whole picture and not all of the information is specific or applicable to Lake Puckaway. We include this type of information to round out the understanding of the reader and hopefully help them understand their lake as well as others a bit better. I am sorry if that part was confusing, but we do not expect Lake Puckaway to be like Buffalo Lake. As you likely know, Buffalo recently went through an extended drawdown as a part of their dam reconstruction and studies completed by our company before and after the action indicated that native plant diversity is up significantly while exotic species are down significantly – actually more than we expected. So, the Buffalo Lake reduction worked to make the plant population and the lake healthier.

We are confused on page 62 a drawdown every 2-3 years is discussed and then on page 102 it talks about a drawdown every 10 years. What is the real time limit.

The language in that section, as above, is not applicable to Lake Puckaway as that is discussion the use of winter drawdowns to control exotics. This was brought to our attention as being confusing by a staff member at the WDNR as well. We will make sure to add text to bring about a better understanding to the reader within the final version.

What is the possibility of a fish kill from lower water like a few years ago and what absolute guarantee do the Lake residents have that this will work and all the fish that have gone upstream and downstream will return to Puckaway and in what time frame?

There are no absolute guarantees in anything, especially when dealing with Mother Nature; however, significant fishkills are not expected as a part of the implementing the WLMP due to the large areas upstream and downstream that will provide suitable habitat for the fishery. As far as returning to the lake, that is impossible to predict, but with most drawdown actions, we would expect the fishery to return to normal and surpass it because of the increased in-lake habitat and water quality.

As owners who go south for the winter what is the plan to guarantee we can get our piers and boat lifts out in early October if water is to low. As older residents this whole time line is impossible to be taking equipment in and out with no guarantee of sufficient water.

Again, there can be no guarantees, but water levels would begin to rise at the end of September if the WLMP is initiated. That would be different if the levels were brought down as a part of the dam reconstruction project, of course. In either case, if you are concerned, maybe it would be better not to place your docks and boatlifts during a scheduled drawdown year.

We have many more issues but because of the short time limit for comments we hope all of these questions will be answered at a minimum at the May meetings.

Robert and Kathleen Moore
Marine Drive
Markesan

From: "Robert Moore" <ccjskb@yahoo.com>
To: "Lakepuckaway Info" <info@lakepuckaway.com>
Sent: Wednesday, April 5, 2017 7:37:39 AM
Subject: Lake Plan

Addtional comments and questions on Lake Plan:
1. The report should contain in detail a fish survey of sizes, amounts and types of fish in Puckaway before the fish ladder on Buffalo, after the fish ladder and prior to any drainage of the lake to establish a benchmark for improvement in the fishing on the lake and then a plan for peroidic updating on the fish.

The latest fish survey is occurring this spring, summer, and fall, so these data will not be ready for inclusion within the report; however, as you allude to, they will be important in understanding how water level management has affected the fishery, whether the affect is positive or negative.

2. Total cost of implementation of the Plan including construction, economic impact on businesses , decrease in property values if applicable and impact on total economy in Green Lake and Marquette counties.

This is answered above.

3. All other options should be discussed such as islands etc. And why these are not being tried first.

This is answered above.

4.What is the Plan for agricultural uses in the watersheds to prohibit sedimentation and nutrients from draining into the lake? The plan talks about lakeshore cover and

vegetation but doesnt discuss agricultural buffers, conservation practices and the impact of fertilzer and manure spreading on the lake water quality. Agriculture operations have been given great tax cuts (agricultural preservation tax credits and subsidies) and yet in this Plan the lake property owners are bearing all the burdens.

This is answered above.

4.Who votes and approves the final plan and is the vote binding. Are outsiders non lake owners allowed to vote or just the riparian owners who live on the lake who will bear all the burden of the lowering of the lake.

The district planning committee has been completely involved with the development of the draft management plan from the beginning, including attending all of last summer's meetings, extra board meetings, meetings of the Shallow Lake Management Workgroup, reading and commenting on all the reports, and providing comments on the draft implementation plan from last fall. The planning committee is reading all of the comments provided by folks like you and will be attending the information meetings. The LPPRD Board of Commissioners will also attend the informational meetings (much of the membership overlaps with the planning committee membership) and listen to comments. Following those meetings, changes may occur to the management plan, but I would not anticipate any of those changes to be significant. As of this draft, the planning committee approves of the plan and will be recommending to the board to accept it. The board will then vote on its approval.

As far as whether or not the vote is binding - I am not sure what you mean.

5. After these May meetings will the Plan be revised and when will we see the final document and how far in advance of the June meeting. When is the Plan in final form.

The final plan will not be completed until the board approves it.

Bob and Kathy Moore
W6710 Marine Dr.
Markesan Wisconsin

APPENDIX I

2017 Public Information Meeting

Project Contacts (not for publication)

Planning Consultant Contact:
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Lake Group Contact:
Paul Gettelman, Chair Person
Lake Puckaway Protection & Rehabilitation District
Voice: 608.792.8489
Email: paulgettelman@yahoo.com

Wisconsin DNR Contact:
Ted Johnson
WI. Dept. of Natural Resources
625 E. CTH Y Suite 700
Oshkosh, WI 54901
Voice: 920.424.2104
Email: tedm.johnson@wisconsin.gov

Press Release

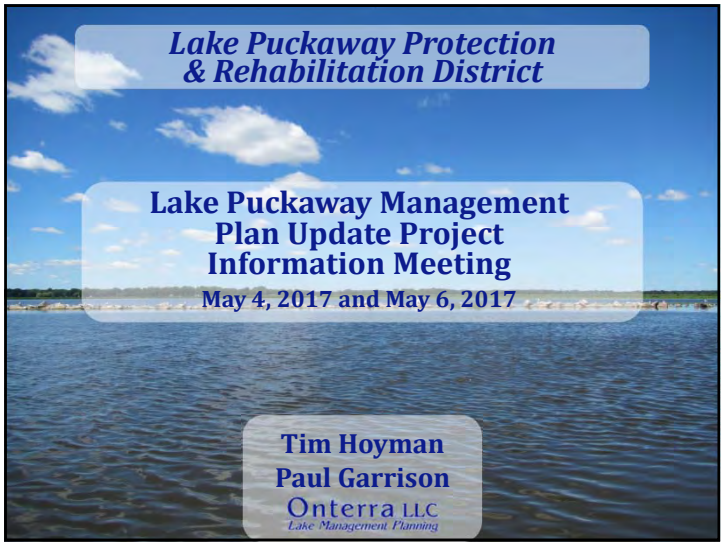
For Immediate Release

Lake Puckaway Draft Management Plan Available and Information Meetings Set for May

Green Lake & Marquette Counties, WI, March 20, 2017. The Lake Puckaway Protection and Rehabilitation District is pleased to announce that a draft of the Lake Puckaway Comprehensive Management Plan has been completed and is available on the district website (www.lakepuckaway.com). Additional information can be found at the Lake Puckaway Facebook page as well. Hardcopies of the management plan are also available for viewing at the public libraries located in Markesan, Montello, and Princeton. Each copy, whether electronic or hardcopy, contain specific information regarding the submittal of written comments via email and US Post. Only written comments can be accepted and must be provided on or before April 7, 2017.

"The Lake Puckaway project is one of the most complicated I have worked on in the past decade," said Tim Hoyman, Lead Aquatic Ecologist at Onterra, LLC, the lake management planning firm hired by the district to assist with the development of the plan. "An Executive Summary is included within the document and does a fine job of hitting the highlights, but to gain the best understanding of the Lake Puckaway ecosystem, the reader should also read over the main document and the implementation plan, he continued. Hoyman finished by saying, "It is a draft document, so written comments are welcomed."

The Lake Puckaway Protection and Rehabilitation District will host two identical information meetings regarding the draft management plan. Both meetings will be held at the Marquette Village Hall (127 E. 4th St, Marquette, WI) and include time to answer questions and accept comments from the general public. The first meeting will be on Thursday, May 4th, starting at 6:30pm and the second meeting will be held on Saturday, May 6th starting at 10:00am.



Presentation Outline

- Conclusions Review
- Management Goals & Actions
- Comments & Questions

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Lake Management Planning

Summary and Conclusions

Aquatic Plants

- Based upon a maximum depth of roughly 7.5 feet entire lake bottom should be available to plant growth
- Currently, only a small portion supports aquatic plant growth

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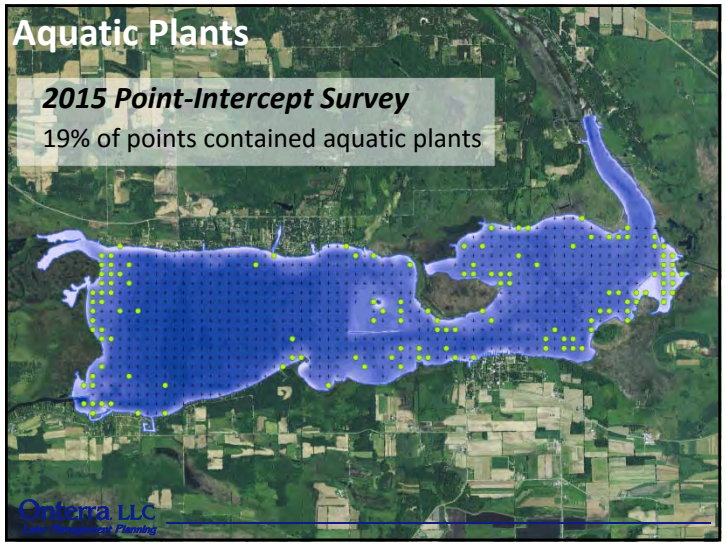

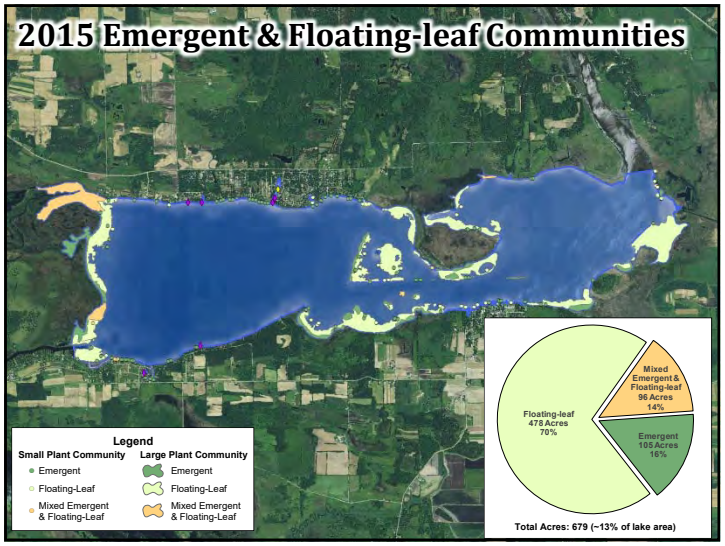

Summary and Conclusions

Aquatic Plants

- Based upon a maximum depth of roughly 7.5 feet entire lake bottom should be available to plant growth
- Currently, only a small portion supports aquatic plant growth
- Steady water levels, wave action, water quality, and carp are all responsible for minimal plant population
- Overall, Lake Puckaway could have a much healthier plant population of emergent, submergents, and floating-leaf species

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Lake Management Planning

Summary and Conclusions

Water Quality

- Lake Puckaway is considered impaired for sediment/suspended solids and for total phosphorus
- Lake Puckaway is a complex ecosystem because of shallow depth and inflowing river
- The lake experiences high annual variability for phosphorus and chlorophyll and thus water clarity
- The highest levels of phosphorus are the result of internal loading during years when summer flow is low
- During years with increased plant growth water quality is better (and visa versa)
- Wind, flow, & carp all add to water quality issues
- These issues travel downstream to other lakes

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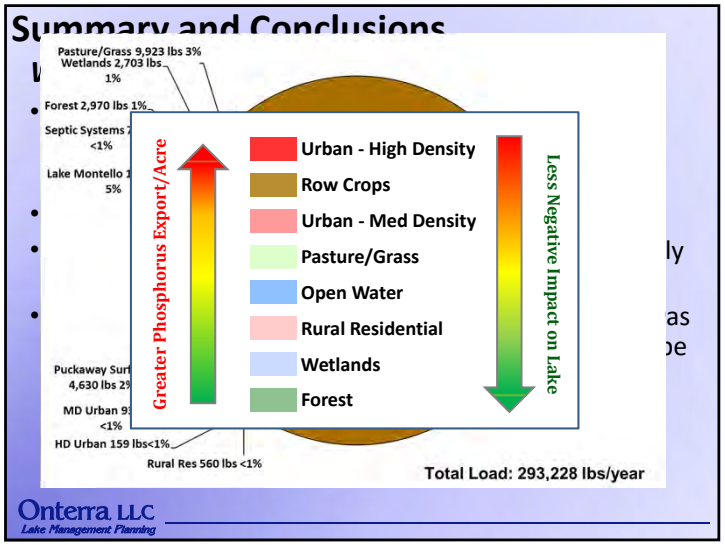

Summary and Conclusions

Fisheries

- Lake Puckaway has a strong fisheries
  - Pike and walleye populations are good now, but biologists believe their numbers and size can be greater with habitat improvements
  - Panfish and bass populations may be on the decline
- Increased aquatic plant habitat would benefit fisheries
  - Pike and perch use emergent plants as spawning substrate
  - Increased submergent plants would lead to increased panfish population
  - Increased panfish would likely lead to less carp

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Management Goal:
Enhance Lake Puckaway Fishery

Management Actions

1. **Continue annual harvesting of common carp from Lake Puckaway.**
   WDNR and District work together to complete actions.
2. **Continue annual operation of Lake Puckaway Walleye Hatchery.**
   Over 9.2 million walleye fry have been released in Lake Puckaway since the start of the hatchery.

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Management Goal:
Improve overall ecological health of Lake Puckaway

Management Actions

1. **Initiate volunteer-based annual water quality monitoring of Lake Puckaway through the WDNR Citizen Lake Monitoring Network.**
   Important for tracking long-term changes.
2. **Form Lake Puckaway Shallow Lake Management Workgroup**
   Made up of district members, agency staff, & ad-hoc members as needed.
3. **Implement Lake Puckaway Water Level Management Plan**
   Will work with other actions to increase aquatic plants and habitat within Lake Puckaway.

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Water Level Management Plan - Draft

Water Level Management Rationale

- Multiple studies on Mississippi pool waters and other lakes in the US and Europe have shown that reducing water levels to expose sediments and expose deeper areas to light penetration for two consecutive growing seasons can lead to aquatic plant establishment that will thrive for up to 7 years (no additional data collected)
  - First year – annual plants establish
  - Second year – perennial plants establish

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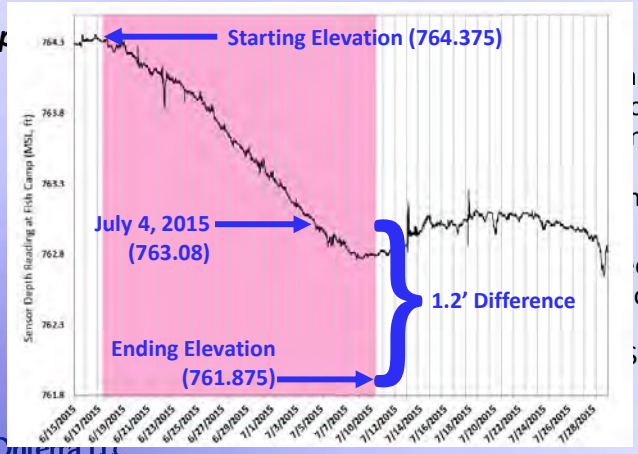
Water Level Management Plan - Draft



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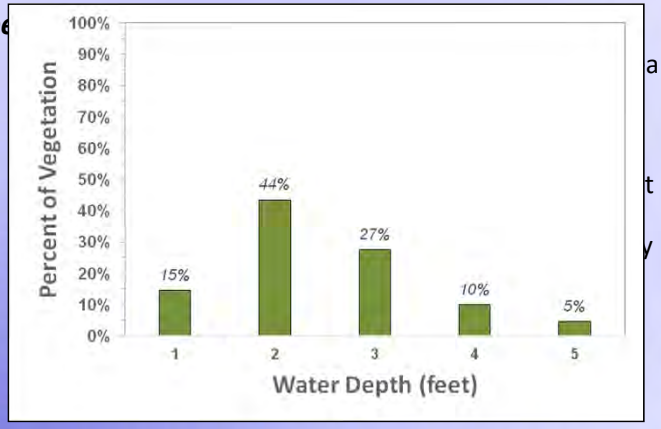
Water Level Management Plan - Draft



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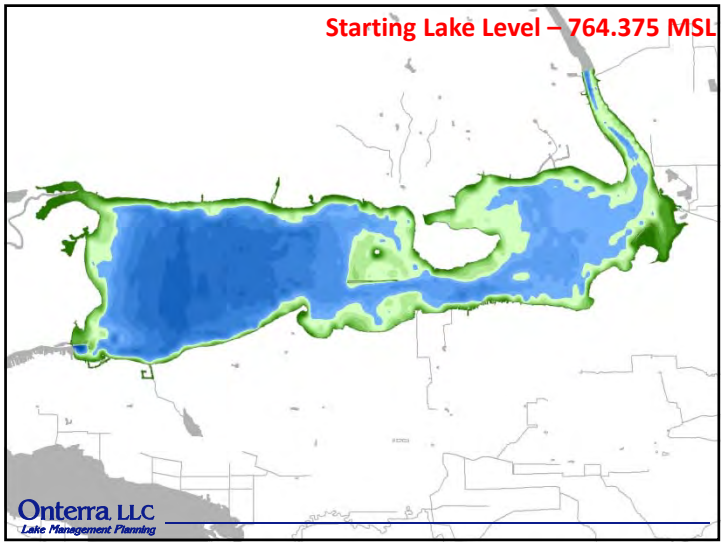

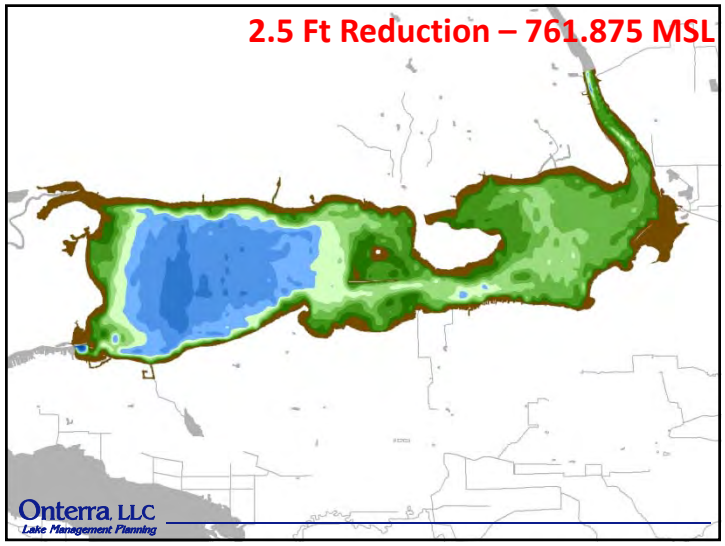

Water Level Management Plan - Draft

Specifications and Definitions

Suitable Water Level Reduction - would expand the area available to plant growth to 75% of the lake area and expose sediments in nearshore areas. To accomplish this, a water level reduction of 2.5 feet (761.875) or greater would be needed; however it is anticipated that the newly encompassed deeper depths would not maintain high occurrences of aquatic plants just as they do not now.

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Water Level Management Plan - Draft

Specifications and Definitions

Suitable Water Level Reduction - would expand the area available to plant growth to 75% of the lake area and expose sediments in nearshore areas. To accomplish this, a water level reduction of 2.5 feet (761.875) or greater would be needed; **however it is anticipated that the newly encompassed deeper depths would not maintain high occurrences of aquatic plants just as they do not now.**

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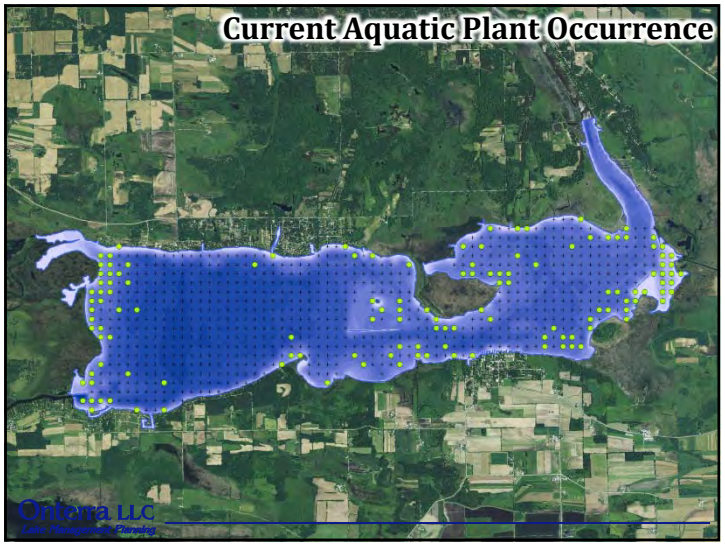

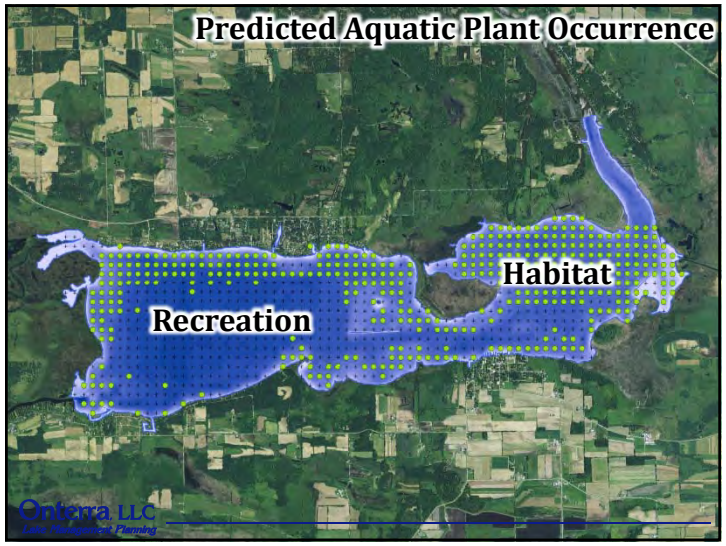

Water Level Management Plan - Draft

Specifications and Definitions

Successful Reduction Sequence - The probability of reducing water levels in Lake Puckaway by 2.5 feet in two consecutive growing seasons is low; however, if the first year does reach a reduction of 2 feet and the second only 1.5, some benefits would likely emerge. Therefore, a successful reduction sequence would include the first year's reduction reaching 2.0 feet or more and the second year's reduction reaching 1.5 feet or more.

Duration of Water Level Reduction - To meet the objective of the WLMP, the water levels would need to be reduced by early to mid-July and remain at the reduced level through September.

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Water Level Management Plan - Draft

Specifications and Definitions

Flow Rates - USGS stream site on the Fox River at Princeton, WI (USGS 04073365).

Lake Puckaway Water Level - staff gauge or water level sensor installed at Fish Camp on the west end of Lake Puckaway at the Fox River inlet.

Fish Camp Staff Gauge: Add 761.21 for Mean Sea Level

Fish Camp Level Sensor: Add 760.275 for Mean Sea Level

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Water Level Management Plan - Draft

Water Level Management Specifics

Year 1 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

Year 2 – begin reducing water levels on June 15th by opening lock gates
Lock gates remain open through September
2-3' reduction in water levels from June 15 level expected

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Reduction Attempts - Reductions will be attempted in two consecutive years. If a sufficient water level reduction is not anticipated to occur (see abandonment below) in either of those two years, than during the next two years, no reductions would be attempted. If during either of the two years in which a water level reduction is attempted, a reduction of 2.0 feet or more is achieved, on June 15 of the following year, the lock gates will be opened and remain open through September and the water levels reduced as far as possible.

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Specific Conditions on Attempts at Reductions

Abandonment - If discharge at the USGS Princeton site is greater than 1,200 cfs on June 15 OR greater than 1,000 cfs on June 30th of either the first attempt or second attempt year, the attempt will be abandoned.

Early Start of Water Level Reduction – During dry springs, water levels on Lake Puckaway may be naturally low causing navigation issues on the lake; therefore, during those low-flow springs that occur during a water level reduction attempt, the lock gates would be opened early to allow for the greatest benefit of reduction. If water flows at the USGS Princeton site are at 600 cfs or less on June 1, the lock gates would be opened immediately.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Frequency of Water Level Reductions - If a successful reduction sequence is achieved, a second set of reductions would not be attempted for 10 years. It is important that this specification remain flexible to assure that the ecological benefits gained by completing a successful reduction sequence are not lost. The frequency of reductions should be determined by the results of the studies completed as outlined in the monitoring plan.

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

WLMP Modification or Abandonment - Enhancements to the aquatic plant community will be the foundation and the greatest indicator of improving ecological health of the lake. However, implementing water level reductions, as mentioned above, will have negative impacts on recreation while water levels are low; therefore, if certain predetermined thresholds are not met by a successful reduction sequence, then the WLMP should be modified or abandoned all together.

- Reduction amounts/duration reconsidered
- Incorporations of additional actions
- Creation of entirely new plan

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Water Level Management Plan - Draft

Specific Conditions on Attempts at Reductions

Aquatic Plant Improvement Goals – The following thresholds would represent improvement goals being met:

- Increase of 50% in littoral frequency from 19.3% to 29%
- Increase of 25% acreage of floating-leaf and emergent plant communities from 679 acres (~13%) to 848 acres (~16%)
- These may need to be adjusted if pre-data is collected and significantly different than 2015 results.

Monitoring Plan – Pre-reduction data would be collected within 3 years of first reduction year. Post data collected for 3 years following second reduction year, and 5 years and 8 years after. Water quality would be collected throughout. Fishery surveys to be determined.

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Specific Conditions on Attempts at Reductions

Princeton Dam Reconstruction – It is not known when the project will begin (see following Goal/Action).

- Best case scenario: water level reductions over the two-year project meet Successful Reduction Sequence levels.
- If reconstruction water level reductions do not reach suitable reduction levels, then a reduction would not be attempted for 5 years.
- If reconstruction project is not funded in 2017-19 or 2019-21 biennial state budgets, then water level reductions would be attempted utilizing current dam following WLMP.

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Management Goal:
Improve Dam Operation Safety at Princeton Dam

Management Action

1. **Urge State of Wisconsin to reconstruct Princeton Dam as a fixed-crest dam.**

   Reconstruction project is in WDNR proposed budget request for 2017-19 biennial budget.

   For inclusion in state budget, it must make through:

   1. WDNR Budget Development
      a) Management & Budget (M & B)
      b) Natural Resources Board
   2. Department of Administration (DOA)
   3. Governor
   4. Joint Committee on Finance (JCF)
   5. House/Senate
   6. Senate/House
   7. Governor

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Management Goal:
Increase Communication Capacity of LPPRD

Management Action

1. **Create LPPRD Communication & Education Committee**
   - *Multiple newsletters per year*
   - *Use district website and Facebook page to full potential*
   - *Develop district-wide email list*
   - *Possible hiring of professionals for some of these tasks*

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Thank You

Many of the graphics used in this presentation were supplied by:

Wisconsin Lakes Partnership

UW Extension

Wisconsin Dept. of Natural Resources

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