

# 1.

## Lake de Neveu Water lake management plan (documents and file contents):

- <1> Cover letter description (this page)
- <2> Lake management description plan prepared by:  
Lake de Neveu water management committee
- <3> Lake de Neveu map:  
shows recreational use areas: swimming, fishing, hunting, boating, aesthetic
- <4> Large scale chemical – aquatic plant treatment form 3200-4A
- <5> Lake de Neveu overview map – shows watershed areas contributing to the  
algae issue
- <6> Water Chemistry and Aquatic Plant Survey



Smile

## 2.

May 5, 2017

TO: Mary Gansberg- DNR  
FROM: Fred Christ-Lake De Neveu Water Management Co-Chair  
RE: Lake De Neveu Form 3200-4A and additional information regarding Treatment

Hi Mary,

Thanks for your concern and reminder to complete the information that you had requested. Several of us were out of state for an extended period of time and were unable to complete the form. I will be expanding some of the descriptions in each area for a better understanding of our efforts.

SECTION II-see attached maps

### #1 Swimming

The lake has many areas for swimming. From shore and piers, in deeper areas people may only swim out 100' or so. In other areas where it stays shallow longer they could go out 400' or more. Many boats will park out on all areas of the lake and swim. As many as 15 boats will on occasion park on the shallow sandbars and swim in areas that may extend beyond 400'. Many pets also swim in the lake. It is possible that toxic algae could injure or kill them if consumed. At times the algae is so thick that no swimming, fishing, or allowing animals near the water occurs. We would prefer to treat before it the algae is really bad but current rules make that difficult.

### #2 Fishing

Lake De Neveu is only about 80 acres. Being so small, all areas of our lake are fished both from piers and boats. We treat only algae around the landowner's shorelines and swimming areas and no vegetation anywhere on the lake at any time.

### #3 Hunting

Hunting is minimal on the lake and in most cases, is only done in areas that are not treated for algae.

### #4 Boating/Navigation

We have many types of boating on the lake. This includes sailing, waterskiing, pontooning, fishing, pleasure boating, jets skiing, paddle boating, kayaking, canoeing, and paddle boarding.

### #5 Aesthetic

The smell of the algae is very offensive and triggers allergies in many people. In addition, in fall many geese migrate through and seagulls from feeding in fields create waste, which also smells and creates algae and vegetation growth.

### #6 Other

## SECTION III

### #1 Fisheries

We have worked with the DNR in the past and placed over 200 fish cribs in the lake to improve the structure for fish protection. We will be continuing to add additional fish cribs. Your records will indicate where most of them are located. We also do not treat for weeds, which gives fish much more protection in summer. We also stock fish and minnows and our Lake Association lake management and fish committee have studied the impact over many years. All at our own expense.

### #2 Wildlife

Wildlife is primarily present in designated areas that we do not treat for algae.

#3

We have and continue to worked with the DNR and Aquatic Biologists. I, along with many others have been on the lake for over 40 years.

#### Section IV-Cause of problem

##### A and B Runoff

We have worked with the local farms to change any livestock runoff from entering the lake, which they have done many years ago now. Over several years, the watershed in our area has been drastically changed. Water and runoff that flowed elsewhere is now funneled into our lake and destroying it. This was done as a result of the Township and County allowing the construction of roads and housing developments that dramatically altered the watershed. Pathways of waterflow were allowed to be filled in and stopped the natural runoff locations. At the time much of it was constructed, watershed evaluations and ramifications of such changes were not studied. On average, many times a year we have flooding and watershed runoff problems destroying the lake. This has all been confirmed by East Central Wisconsin Regional Planning commission which was hired by the township of Empire in 2015 and now has moved up to the County and State including the DNR to determine a correction.

##### C and D Sewage treatment/Septic

As a result of our constant efforts to maintain a clean lake, the landowners around the lake agreed to install a sewer systems. We now have our own Sanitary district and a very active Lake Association and Lake Board. Within our Board we have committees that dedicate themselves to water and fish management.

##### E Runoff from Fertilized lawns

Our lake Board and Lake Association is constantly educating the land owners to be aware of this and other problems. Most, if not all now do not fertilize anywhere near the lake. We have also promoted buffer zones and educated them to not blow grass into the water when cutting. Things such as dog waste, leaves and fire ashes near water is also discouraged.

##### F and G Sediments from past pollution and naturally fertile

During the installation of the sewer systems, a major rain event occurred. A great deal of dirt was washed into the lake. Worse yet, with the alteration of the watershed, every year we accumulate more nutrients from the massive runoffs. This year alone we have had at least 3 events with the first one around January 20<sup>th</sup>. Natural fertilization of dead leaves, weeds, fish, geese and other wildlife is always naturally present adding to the problems. We as an association do a great deal to remove old leaves and weeds and to assist in keeping the lake clean.

##### H Other

We have boats of all sizes on the lake. When boats get in by a shallow area, they stir up sediments from the bottom. If too close to shore their wakes disrupt shorelines washing in sediment and nutrients. We are constantly educating people on these issues to discourage these practices and prevent water problems.

#### SECTION V SOLUTIONS

##### #1 Level of short term control

We do not treat plants therefore less than 70% is applicable if at all. We only treat algae and

only when necessary. We use only chelated or complex copper when treatment is necessary.  
Click on the link below. (it may take some time to load)  
“Understanding the Fate and Effects of Copper Pesticides in Aquatic Systems”

[http://file.scirp.org/pdf/GEP\\_2016050616275441.pdf](http://file.scirp.org/pdf/GEP_2016050616275441.pdf)

## #2 Which Plants to remove

Again, we do not treat any plants and only manually remove plants that are a navigation or safety hazard around piers. We constantly monitor for nonnative species. We also hand harvest Purple Loosestrife and Phragmites.

## #3-How often

We do not chemically treat any weeds. Harvesting is used when weeds prevent navigation from around piers and swimming areas which creates safety problems. All other weeds remain in the lake for nutrient consumption and fish habitat. Harvesting is done 1-3 times a year as needed.

## #4 What long term control alternatives Implemented.

Our Association and Lake board has implemented a long-term plan to constantly monitor lake plant growth and types of weeds. Our lake water management committee has and continues this practice constantly. We use the DNR and aquatic biologists to assist us. If we suspect invasive species such as eurasian milfoil, we have it tested. We monitor and test for phosphorus from approximately 7 locations and all at our own expense. This year's budget will include testing for copper.

We also monitor the lake several times a year for oxygen levels, clarity etc. and report results on our lake association website. We are a participant in the Wisconsin DNR citizen's lake monitoring program. (for the last six years). We test Lake deNeveu water four times a year and enter the results on the DNR website.

Our association has formed a Sanitary District #1 of Empire. By installing and hooking up to a sewer system among other practices, we are again doing as much as possible to keep our lake in good condition.

## OTHER

Our primary problem is the watershed changes from past construction, creating massive flooding, Algae and weeds. This is why we need the algae treatment. We totally understand that this is just a bandage approach to the watershed problem but necessary for the ability to use the lake and allow the vegetation to do its job. We are very conservative on treatments and only treat 0-2 times a year. On average only once. Our lake management team monitors the lake to determine if and when it is necessary if at all. IMPORTANT- We determine when the algae are not just creating a blanket on top of the water but when the vegetation is so coated it can't grow or do its job to suck up the nutrients. So far in each case we treated, the timing was good, the plants returned to health and could then do their job. No additional treatment was then necessary as we only do this when truly needed. When we do treat, we use a chelated copper treatment for little or no copper buildup. In studies by many, most lakes that use this type of treatment have little or no copper buildups. (see attached)

Our primary problem is the change to the watershed area feeding into Lake De Neveu. For many years, our lake association and board have been working with many government agencies to resolve this issue.

LINKS below. (these links may take some time to load)

<1> Click below on the link to slide presentation: Hy 45 Runoff Lake De Neveu

NOTE: click on "Present" in the upper right corner to run the show which includes pictures and movies:

<https://docs.google.com/presentation/d/1wCPE2VLqLqrwCbmvA8OqsLF6qPq7euzxlOiprsX-w2Q/edit - slide=id.p>

<2> Click below on the link to Lake De Neveu Flood River:

<https://www.youtube.com/watch?v=0M8GlfujRfY>

Summary of contacted government agencies that have been on site and toured the problem areas over the last 8 years.

- State of Wisconsin senate and representatives
- Fond du Lac County
- Town of Empire
- DNR
- DOT
- Department of Agriculture
- County Highway Department
- East Central Wisconsin Planning Commission
- Dept. of Public Works
- Town of Empire Sanitary District

A project to resurface and construct new areas of Highway 45 by the lake really kicked this in gear. The plan is to put in new culverts with the project that will just make the watershed flooding problem worse.

After all of the above government agencies observed this problem, a study to confirm our findings by the town Of Empire was initiated. The Agency used was East Central Wisconsin Regional Planning Commission. The study was completed in July of 2015 and confirmed our findings. We then escalated this up to the Fond du lac County Executive Allen Buechel. July 28 2016 and subsequent meetings-Recognizing this as a major problem, Allen called a meeting together of all that may be involved for opinions and help. This included the State of Wisconsin along with all of the agencies listed above. **6 DNR representatives were present.** After a long discussion, it was determined that something must be done to prevent the lake from further destruction. A County budget item was added for engineering. A bid was created with help from the DNR and others above. It was then awarded. Tours were given to the engineering firm in November. They are currently working on solutions to help resolve the problems. There is much work to do yet.

We also incorporate retention ponds if and where it's possible.

A week ago, we had our Lake association annual meeting. Our full board meets at least 4 times a year and the water management committee almost weekly. We educate the lake owners on all of the issues listed in this document. We work hundreds of hours a year on the lake issues to accomplish all that you have read.

Thanks to you and your team for all of your concerns and assistance to help keep our lake clean.

**We very much appreciate your willingness to provide a plant study for the lake.**

Please feel free to contact us if you have any further questions

Thank You  
Fred Christ  
Water management Co-Chair  
920 923-3311



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NOTE: Completion of this form is required by the Department, pursuant to s. 144.025(2)(i), Wis. Stats., and Chapter NR 107, Wis. Adm. Code, once every five years for proposed treatments that would cover more than 10 acres on one lake, or more than 10 percent of that portion of the lake that is 10 feet or less in depth.

The purpose of this form is to identify the: (1) recreational needs of the property owners and visitors;  
(2) value of the proposed treatment area to fish and wildlife;  
(3) cause(s) of the excess plant growth problem; and  
(4) short and long-term solutions to the problem.

Please furnish a detailed map(s) of the lake and its watershed. Indicate the watershed boundaries on the map. If you do not have a watershed map for the lake you wish to treat, your DNR lake management coordinator can help you locate or prepare one.

**SECTION I. BACKGROUND**Name of Applicant  
**Lake deNeveu Property Owners Association**Date Completed  
**5/5/2017**Name of Lake  
**Lake deNeveu****SECTION II. RECREATIONAL USES**

Check those uses that apply and complete the information requested:

1. **SWIMMING:** Indicate on your lake map the portions of the proposed treatment area that are used for swimming.  
What distance from shore is needed to provide adequate swimming space? 300-400 feet  
What is the average depth at this distance? 3.5 feet
2. **FISHING:** Indicate on your lake map any fishing areas that are within the proposed treatment area.
3. **HUNTING:** Indicate on your lake map any hunting areas that are within or adjacent to the proposed treatment area.
4. **BOATING/NAVIGATION:** Indicate on your lake map where the following boating activities take place within the proposed treatment area:
- |                  |              |                             |
|------------------|--------------|-----------------------------|
| Sailing          | Water skiing | Fishing                     |
| Pleasure boating | Jet skiing   | Other <u>See Attachment</u> |
5. **AESTHETIC:** Indicate on your lake map any wildlife or nature observation areas within the proposed treatment area.  
Do you object to the aesthetic quality (appearance, odor) of the proposed treatment area?  Yes  No
6. **OTHER:** What other activities occur in the proposed treatment area? \_\_\_\_\_

**SECTION III. FISH AND WILDLIFE VALUE**

1. **Fisheries:** To maintain a quality fishery, a lake must provide good spawning, rearing and feeding habitat. Please indicate on your lake map the location of any quality fisheries habitat. (Contact your local DNR fish manager or your local fishing club for information about your lake's fishery.)
2. **Wildlife:** Indicate on your lake map any portions of the proposed treatment area or adjacent shoreline that are considered to be good wildlife habitat. (Contact your local DNR wildlife manager or your local wildlife or hunting club for additional information about the wildlife around (and in) your lake.)
3. Which organization(s) or individual(s) did you contact for your information? **See Attachment**

**SECTION IV. CAUSES OF THE PROBLEM**

What are perceived to be the local or regional causes of the problem? (Check all those that apply.)

- A. Agricultural runoff (from barnyards or croplands) that contributes sediment, nutrients and/or bacteria to the lake.
- B. Urban runoff (from stormwater) that contributes sediment, nutrients and other pollutants to the lake.
- C. Sewage treatment or industrial discharges upstream of the lake.
- D. Possible faulty septic systems in the area around the lake.
- E. Runoff from fertilized lawns near the lake.
- F. Sediments contaminated with nutrients from past pollution activities.
- G. Naturally fertile - no known human sources of excessive sediment, nutrients or other pollutants.
- H. Other: **See Attachment**

Please identify on your watershed map the locations of any land use practices that are perceived to be contributing to excess plant growth problems in the lake.



**SECTION V. SOLUTIONS**

Control of aquatic plant problems can be temporarily accomplished with short-term measures, but no strategy will be successful without long-term planning to address the source of the problem. A sound plant management program should combine both short-term and long-term control strategies.

1. What level of short-term control do you wish to achieve?

- Remove 100% of the plants in the treatment area.
- Remove 70-99% of the plants in the treatment area.
- Remove less than 70% of the plants in the treatment area.

2. Which plants do you wish to remove in the short term?

- Remove all plant species.
- Remove specific plant species only. (Name(s) of species: \_\_\_\_\_)

3. How often will it be necessary to:

- A. Chemically treat? 1-2 times per year for algae; \_\_\_\_\_ times per year for other plants
- B. Mechanically harvest? 1-3 times per year

4. What long-term control alternatives have you begun to implement?

- Developed a lake plant management plan.
- Developed a lake protection plan.
- Formed a Lake District, Lake Association or other organization. (Name: See Attachment)
- Established a monitoring program for the lake.
- Contacted the Soil Conservation Service or Land Conservation Commission to identify land use controls that are needed in the watershed.
- Conducted a septic survey with the county sanitarian.
- Other: See Attachment

Long-term planning can provide an organized approach to solving the problems that are affecting the water quality of your lake. Your DNR lake management coordinator, county extension agent, or regional planning commission can provide specific technical information and assistance.

**SECTION VI. PUBLIC INVOLVEMENT**

1. Before you conduct a large-scale chemical aquatic plant treatment, you are required to provide the public with formal notice of the planned treatment (s. NR 107.04(3), Wis. Adm. Code). Please attach evidence (e.g., newspaper clipping) that such notice has been made.

2. You are also required to conduct a public informational meeting on the proposed large-scale treatment if 5 or more individuals, organizations or local or special units of government request such a meeting within 5 days of the notice (s. NR 107.04(3), Wis. Adm. Code).

Was a public informational meeting required for the proposed treatment?  Yes  No

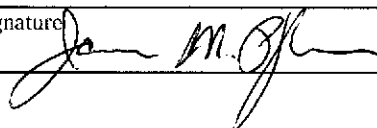
If yes, please attach evidence that such a meeting was held.

3. These public notice and public meeting provisions apply each year that a treatment is proposed.

NOTE: This form is to be updated once every 5 years to include new information. Modifications of the proposed treatment within the 5-year period also require re-submittal of this form if the location or target organisms are changed, or if the treatment area is expanded by more than 10 percent.

I hereby certify that the above information is true and correct and that copies of this application have been provided to the appropriate parties named in Section II of Form 3200-4, Application for Permit for Chemical Aquatic Plant Control.

Applicant's Signature



5/5/17

Please attach with map(s) to Form 3200-4, Application for Permit for Chemical Aquatic Plant Control.

Overview map of the area ..





Dear Mr. Christ,

This summer you requested information regarding a water chemistry and aquatic plant survey that Bureau of Water Quality staff from the Department of Natural Resources conducted on July 27<sup>th</sup>, 2017 on Lake DeNeveu in Fond du Lac County, WI. The water chemistry, sediment, and plant surveys were conducted as part of the National Lake Assessment, a nationwide survey of the ecological, water quality, and recreational health of America's lakes.

**Water Chemistry and Trophic State**

Although multiple measurements are necessary for a full assessment, the information provided in the table below (Table 1) can provide context on lake water transparency, chemistry, and trophic state, as well as the presence of *E. coli* bacteria and pesticides. Lake DeNeveu is deep seepage lake with hard water, high transparency, and high alkalinity (McGinley and Sisk, 2015). The high mineral content in the water makes the lake resistant to changes in pH and can promote greater fish and aquatic plant productivity. Moderate to high levels of Sodium, Potassium, Chloride, and Sulfate indicate that the lake may be impacted by road salts and fertilizer in the surrounding watershed.

**Table 1.** Summary of water quality results. Water samples were taken near the surface at the deepest point of the lake. Result of ND indicates that this variable was Not Detected.

<b>Secchi Depth</b>	5.9 M	<b>Depth at Sampling Station</b>	16.7 M
<b>Chemistry</b>		<b>Nutrients &amp; Algae</b>	
pH	8.5 SU	Dissolved Nitrate Nitrogen (mg/L as NO3)	0.427 mg/L
Alkalinity-Total CaCO3	207 mg/L	Nitrogen-NH3-N Dissolved	ND mg/L
Conductivity	580 uS/cm	Total Nitrogen	0.818 mg/L
Dissolved Organic Carbon	6.29 ppm C	Total Phosphorus	0.0107 mg/L
Chloride	51.4 mg/L	Chlorophyll- <i>a</i> , Fluorescence (Welschmayer 1994)	1.65 ug/L
Aluminum-Total Recoverable	ND ug/L	Microcystin via ELISA	ND ug/L
Calcium-Total Recoverable	33.2 mg/L	Cylindrospermopsin via ELISA	ND ug/L
Magnesium-Total Recoverable	45.2 mg/L		
Potassium-Total Recoverable	2.95 mg/L	<b>Bacteria</b>	
Sodium-Total Recoverable	20.6 mg/L	E. Coli Colilert Quantitray MPN	1 /100 mL
Hardness-Total Recoverable Calculation	269 mg/L		
Color	10 SU	<b>Pesticide</b>	
Dissolved Silica (mg/L SiO2)	2.3 mg/L	Triazine Screen	ND ppb
Dissolved Sulfate-As SO4	29.1 mg/L		
Turbidity-Lab Nephelometric NTU	0.894 NTU		

Lake DeNeveu has an oligotrophic trophic state based on chlorophyll *a* measurements, despite moderate amounts of dissolved nitrate nitrogen, total nitrogen, and total phosphorus (McGinley and Sisk, 2015). These nutrients enhance aquatic plant growth, but too many nutrients can cause excessive algal growth, leading to impairment of water bodies. Measured total nitrogen, total phosphorus, and chlorophyll *a* levels in Lake DeNeveu were below impairment thresholds (WisCALM, 2018). Microcystin and cylindrospermopsin are toxins produced by freshwater cyanobacteria that are commonly associated with harmful algal blooms in nutrient-rich lakes. In Lake DeNeveu, these toxins were Not Detected and thus did not attain levels that could cause high illness risk according to World Health Organization guidelines (WHO, 2003). Additionally, levels of *E. coli* bacteria were below the Environmental Protection Agency (EPA) standard of 235 cfu/100 mL for a single sample maximum (WisCALM, 2018).

Triazine is the name for a widely used group of agricultural herbicides consisting of atrazine, simazine, and propazine. In Lake DeNeveu, Triazine levels were Not Detected and thus below the threshold considered a risk in EPA Cumulative and Ecological Risk Assessments.

Lake profile measurements (Figure 1) were conducted for specific conductivity, dissolved oxygen, pH, and temperature. These profiles can reveal whether lakes are stratified, with a warmer layer of water near the lake surface, or mixed, with similar water conditions throughout the lake depth. Lake DeNeveu exhibited thermal stratification on the sampling date, with significant decreases in water temperature and dissolved oxygen starting at five meters depth (WisCALM, 2018). Water below seven meters is nearly anoxic (without oxygen) and cold, potentially supporting coldwater fish species.

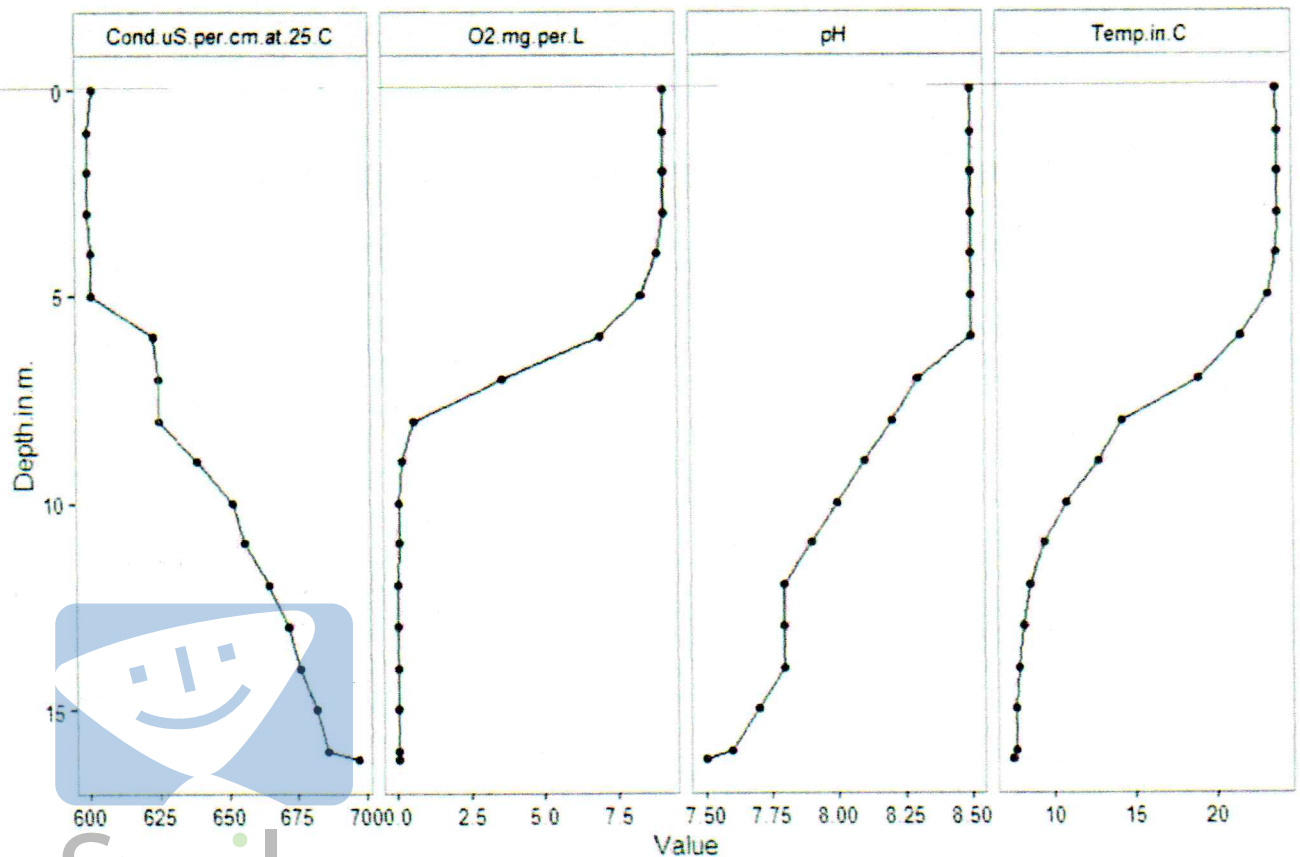


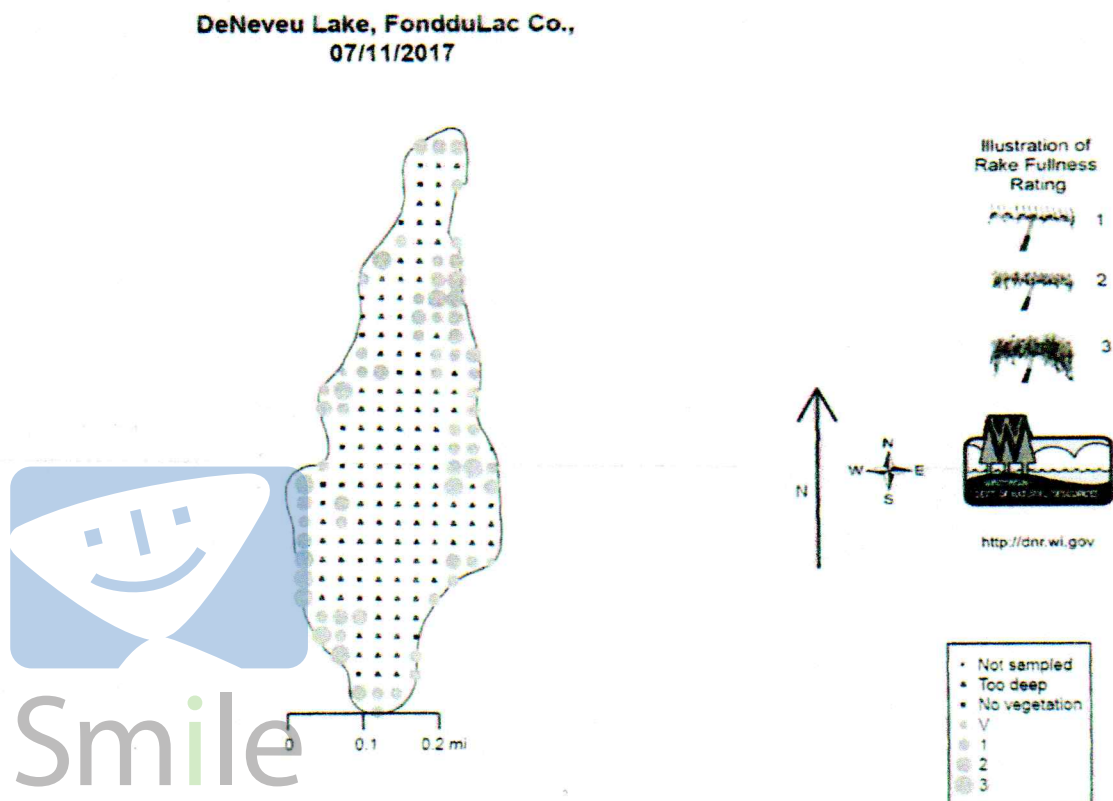
Figure 1. Lake depth (m) profiles for specific conductivity (Cond  $\mu\text{S cm}^{-1}$  at  $25\text{ }^\circ\text{C}$ ), dissolved oxygen ( $\text{mg O}_2\text{ L}^{-1}$ ), pH, and temperature (Temp in  $^\circ\text{C}$ ) in Lake DeNeveu.

## Importance of Aquatic Plants

Aquatic plants form the foundation of healthy lake ecosystems. They not only protect water quality, but also produce life-giving oxygen. Aquatic plants are a lake's own filtering system, helping to clarify the water by absorbing nutrients like phosphorus and nitrogen that could stimulate algal blooms. Plant beds stabilize soft lake bottoms and prevent shoreline erosion by reducing the effect of waves and currents. Aquatic plants provide important habitat for fish, invertebrates, and wildlife. By leaving or restoring a natural buffer area of emergent vegetation along the shoreline, property owners can reduce erosion, help maintain water quality, and provide habitat and travel corridors for wildlife.

## Point-Intercept Sampling Method

Based on area and depth specific to Lake DeNeveu, we mapped a 204-point sampling grid over the entire lake surface. Using a GPS, we navigated by boat to each of the pre-determined grid points. At each point we used a two-sided rake to sample aquatic plants from a small area. After pulling the plants to the surface, the overall rake as well as individual species on the rake were assigned a fullness rating of 1, 2 or 3 to estimate density of plant growth (see Figure 2 for descriptions of rake fullness ratings). We also recorded visual sightings of species within six feet of the sample point, as well as any additional species seen in the lake during a general boat survey. We include estimates of how rare or common each species was in the habitable area of the lake using the measure of % Frequency found in Table 2. This measure expresses the percentage of habitable points at which each species was observed. For more detailed information on the point-intercept sampling method and how data were collected please visit: <http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf>



**Figure 2.** A map of the approximate location and abundance of total aquatic vegetation in Lake DeNeveu. Sampling points labeled "Too deep" were deeper than the maximum colonization depth for aquatic plants in this lake. The size of the colored dot over each sampling point indicates the rake fullness (1, 2, or 3) of aquatic vegetation at that point.

**Table 2.** Species present in the aquatic plant survey. Frequency of occurrence is calculated by taking the total number of times a species is detected in a lake divided by the total number of points in a lake at which the growth of plants is possible. Voucher specimens have been sent to the UW-Madison Herbarium, therefore all species identifications are subject to change pending verification.

Common Name	Scientific Name	Growth Form	% Frequency of
Muskgrass <i>algae</i>	<i>Chara spp.</i> <i>algae</i>	Submerged	65.17
Filamentous algae	Various	Free-floating	25.84
Sago pondweed	<i>Stuckenia pectinata</i>	Submerged	11.24
Common waterweed	<i>Elodea canadensis</i>	Submerged	7.87
Stiff pondweed	<i>Potamogeton strictifolius</i>	Submerged	7.87
Northern water-milfoil	<i>Myriophyllum sibiricum</i>	Submerged	5.62
Coontail	<i>Ceratophyllum demersum</i>	Submerged	4.49
Water star-grass	<i>Heteranthera dubia</i>	Submerged	4.49
Slender naiad	<i>Najas flexilis</i>	Submerged	2.25
Wild celery	<i>Vallisneria americana</i>	Submerged	1.12

Bullrush



**Figure 3.** Images of the most common species found in Lake DeNeveu: muskgrass, sago pondweed, and common waterweed. Photos by Paul Skawinski (Skawinski, 2014).

We calculated lake-wide aquatic plant statistics to compare to region and statewide averages. Littoral zone percent vegetated (given in Table 3) indicates how often vegetation was observed considering only areas of the lake that are capable of supporting plant growth (known as the “littoral zone”). The maximum depth of plant growth is the deepest depth at which plants were found in the lake. Species richness is a count of the total number of different plant species found in a lake. The Floristic Quality Index (FQI) is a metric that evaluates the closeness of the flora in a lake to that of an undisturbed condition. The higher a FQI value, the closer that plant community is to an undisturbed ecosystem. Statewide and regional averages are calculated from a subset of approximately 735 lakes across Wisconsin.

**Table 3.** Summary metrics of the aquatic plant community in Lake DeNeveu compared to state and region by lake type averages.

	Lake	Statewide Average	Southern Seepage Average
Littoral Zone % Vegetated	75.3	74.0	82.0
Maximum Depth of Plant Growth (ft)	22.0	15.8	16.6
Species Richness	9.0	16.5	14.9
Floristic Quality Index (FQI)	16.3	26.0	21.7

## Invasive Aquatic Species

Invasive species are nonindigenous species whose introduction causes or is likely to cause economic or environmental harm or harm to human health as defined by Wisconsin Statute section 23.22. Ecological impacts of introduced aquatic invasive species can range in severity depending on differing ecosystem variables and are difficult to predict. Some industries such as sport and commercial fishing and raw water users (power companies and utilities) are also negatively affected by aquatic invasive species. Invasive aquatic plants are problematic because they can grow to nuisance levels. These dense populations of non-native plants often have a negative impact on native plant communities because they are able to out-compete them for available resources needed for survival. Changes in the native plant community have far-reaching effects on fish, birds and invertebrates that need native plants to survive. Nuisance levels of non-native aquatic plants may also inhibit recreational activities (such as fishing, swimming, boating, etc.), decrease aesthetic value, and negatively affect water quality. Many times aquatic invasive species are spread to new waters by hitching a ride on boats, trailers, and other recreational equipment. It is important that everyone utilizing Wisconsin's lake resources do their part to help prevent and stop the spread of aquatic invasive species.

**In Lake DeNeveu, the aquatic invasive species Zebra Mussel was identified.**



**Figure 4.** Image of the observed aquatic invasive species in Lake DeNeveu: Zebra Mussel. Photo by Amy Benson, USGS.

## References

- McGinley, P., and D. Sisk. 2015. *Interpreting your Wisconsin lake chemistry*. Water & Environmental Analysis Laboratory, University of Wisconsin-Stevens Point.
- Skawinski, P. M. 2014. *Aquatic Plants of the Upper Midwest, 2<sup>nd</sup> Edition*. Wausau, Wisconsin. 225pp.
- WDNR. 2018. Wisconsin 2018 Consolidated Assessment and Listing Methodology (WisCALM). April 17<sup>th</sup>, 2017.
- WHO. 2003. Atrazine in drinking water. World Health Organization, Geneva, Switzerland.

## Additional Resources

Wisconsin's Lakes  
<http://dnr.wi.gov/lakes/>