

# Bone Lake Zebra Mussel Pilot Study Report

June 17<sup>th</sup>, 2019 – June 26<sup>th</sup>, 2019

(Detailed account of the Bone Lake zebra mussel rapid response and treatment process)

Updated 12/18/2019



*Protecting Your Water Resources*

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# Introduction

## Purpose of this Report

This report serves to document the treatment process in as much detail as possible to provide a record of how the Bone Lake zebra mussel treatment was implemented by the Comfort Lake- Forest Lake Watershed District (CLFLWD) and partners. The Bone Lake treatment was successfully executed, and many lessons were learned along the way that may inform future Zebra Mussel treatments. This document is a collection of the opinions, experiences, and expertise of CLFLWD staff, Minnesota Department of Natural Resources (DNR), and experts from other involved organizations; its contents will hopefully help those that find themselves in a similar situation. Zebra mussel treatments are still classified as pilot projects by the DNR, as only a handful have ever been conducted in the state. Information gathered from this treatment adds to a growing body of knowledge that seeks to streamline this process and improve effectiveness.

## Background/ Summary of Report

The Washington Conservation District (WCD) operates an aquatic invasive species (AIS) prevention program that sends paid staff once a week to boat landings to conduct surveys for newly introduced AIS. On May 28<sup>th</sup>, a WCD employee found 6 juvenile zebra mussels (two clusters of three) attached to a broken stick beneath the public access dock on Bone Lake. Interestingly, this same survey was conducted the week prior with nothing found. Immediately after Matt Downing's (WCD Water Resource Specialist) call breaking the news, two CLFLWD staff members spent the afternoon surveying the northern shore for zebra mussels. In the days following, surveying efforts gained the support from Emmons and Oliver Resources (EOR) staff members, the Minnesota DNR dive team, and Blue Water Science, which together conducted over 70 hours of surveys on Bone Lake.

If at any time during the 70 plus hours of surveying another population of zebra mussels was found outside of the initial discovery area the treatment plans would likely have been called off as containment would no longer have been possible. Fortunately, no new populations of zebra mussels were discovered. Finding nothing provided hope that the zebra mussels found were a recently new introduction that were discovered quick enough to avoid spread and reproduction. It is for these reasons that a treatment option was pursued.

After much coordination between the MNDNR, WCD, Chisago County, PLM Lake and Land Management, Forest Lake and Scandia Public Works, Bone Lake Association (BLA) and various other organizations, a treatment plan was created and went into effect on June 17<sup>th</sup>, 2019. A floating barrier was borrowed from Carver County and installed around the treatment area in Bone Lake. Due to the initial discovery of zebra mussels being at the public access, the landing had to be closed for the treatment as the barrier would block boat traffic to and from the access. Patrick Selter from PLM was hired as the pesticide applicator because of his extensive background with treating zebra mussels. He initially dosed the treatment area with EarthTec copper sulfate on June 17<sup>th</sup> after the barrier's installation. Staff monitored concentration levels which dictated when Patrick needed to re-dose the area to maintain a lethal dose of at least .5ppm. The barrier was removed on June 26<sup>th</sup> and long-term monitoring began shortly after. Staff will continue surveying the lake as time permits throughout the open water season to look for any signs of zebra mussels.

# Summary- Steps of Action for Rapid Response to New AIS Introduction

Framework developed by the Minnesota Department of Natural Resources

## 1. Detection and Surveillance

### 1.1 Reporting AIS Discoveries- *Establish processes for reporting sightings/presence of infestations/populations and agency verification of these reports*

- **Map it-** Record where the specimen was found
- **Take photos or make a collection-** For invertebrates a collection is necessary to make a positive identification, photos alone will not be enough. For aquatic invertebrates, place specimen in a vial of rubbing alcohol that is labeled with date, location, and surveyor's name.
- **Identification-** Use online resources to try to identify the specimen for yourself. Verify that the specimen is in fact an aquatic invasive species.
- **Reporting-** Submit photos and/or specimen to your [local DNR AIS species specialist](#).

### 1.2 Observers- *Identify people and agencies that might observe invasive species*

- The Washington Conservation District (WCD) operates an early detection program which periodically sends paid staff to public lake accesses to survey for new AIS introductions. It was program which initially discovered the zebra mussels in Bone Lake.
- The CLFLWD's watercraft inspection program frequently stationed inspectors at the Bone Lake public access to survey watercrafts and spread AIS awareness and prevention information.
- The Bone Lake Association has remained a valuable partner with the CLFLWD for many years and has helped to keep a careful eye on the lake for any newly introduced AIS.

### 1.3 Reporting (Watch) information and Reporting Forms- *Raise awareness of priority species of concern as well as 'watch' species by developing and distributing information about how to recognize, collect, and report various invasive species.*

- WCD's early detection staff were given a surveying protocol which provided guidance on how to properly survey a public access with a throw rake and aquascope (*Attachment 1*). Furthermore, within the protocol new AIS discoveries were required to be documented using [EDDmapS](#).
- CLFLWD watercraft inspectors are provided with 'watch' species cards and other AIS informational handouts to educate visitors on species of concerns and how to report AIS sightings.
- If a new aquatic invasive species is found while inspecting watercrafts, CLFLWD inspectors are trained to answer the necessary questions within the DNR's watercraft inspection survey and report their findings to their supervisor.
- Several AIS educational signs are posted at the Bone Lake Public access

### 1.4 Field Surveying- *Conduct field surveys for priority invasive species and monitor invasive species populations*

- The Washington Conservation District (WCD) operates an early detection program which periodically sends paid staff to public lake accesses to survey for new AIS introductions.
- Each open water season volunteers are encouraged to pick up a sampler plate from the CLFLWD and hang it from the end of their docks. To date, no zebra mussels have been observed on the plates.

#### Post zebra mussel discovery

- CLFLWD staff perform periodic zebra mussel wading surveys on Bone Lake to search for viable populations following the eradication attempt at the site of discovery.
- Blue Water Science was hired to perform diving surveys and full lake boat surveys of Bone Lake following the initial discovery of zebra mussels.
- On several occasions, the Minnesota DNR conducted diving surveys at high priority areas within Bone Lake. In addition, they conducted two veliger tows.



- The Washington Conservation District helped conduct several zebra mussel surveys.

**1.5 Investigate Reports-** *Investigate reports of new nonnative species as soon as possible*

- Soon after report, DNR confirmed ID and posted a public notice of the findings.
- CLFLWD staff immediately began surveys following the WCD's call breaking the news that zebra mussels had been found at the public access.
- The WCD confirmed their employees report of zebra mussels in Bone Lake.

**1.6 Confirmation** – *Following the notification of a potential AIS sighting, the organism and geographic location of the discovery should be positively identified.*

- Matt Downing collected the specimens from the employee who made the discovery and confirmed that they were in fact zebra mussels. He accompanied this information with photographs and sent it to the DNR's local invasive species specialist who verified his identification.

**1.7 Databases of AIS Locations**

- The DNR added Bone Lake to its infested waters list for zebra mussels.
- The CLFLWD documented the location of initial discovery and all subsequent post-discovery surveys.

**2. Rapid Assessment of Species and Distribution-**

**2.1 Rapid Assessment-** *The rapid assessment is an information gathering step that involves concurrent biological and literature surveys to provide decision support for determining if a response action is warranted.*

- Over 70 hours of lake surveys were performed prior to treatment
- The CLFLWD held several meetings with experts in zebra mussel treatments

**2.2 Distribution-** *Perform a brief, but intensive field assessment, to confirm the introduction, delineate the extent of the introduced species' distribution, its potential for further distribution, and to quarantine the area if possible.*

- Over 70 hours of surveys were performed by CLFLWD, Washington Conservation District, EOR, Blue Water Science, and Minnesota DNR staff prior to treatment.
- Over the course of these surveys, no other zebra mussels were found outside of the initial discovery site. A proposed quarantine area around the public access was delineated.

**2.3 Potential Non-Target impacts**

- Due to the timing of the treatment, there were concerns with the pesticides impact on spawning fish. As a result, the Minnesota DNR reduced the original treatment area by near a 1/4.

**3. Decision for Action**

- CLFLWD held a meetings with representatives from Blue Water Science, Minnesota Aquatic Invasive Species Research Center, Minnesota DNR, Carp Solutions, Chisago County, Emmons and Oliver Resources Inc., and the WCD.
- Surveys found no other zebra mussels outside of the initial discovery site. Suggested a chance for containment and eradication.
- Referenced Blue Water Science's Bone Lake zebra mussels risk assessment which was drafted in 2015.
- Utilized Steve McComas's zebra mussel eradication index to help reinforce decision to treat ([Attachment 2](#)).
- Price. CLFLWD obtained several treatment quotes and found the estimated costs to be less expensive than expected. This was likely due to the relatively small size of the treatment area.

## 4. Implement Response Actions

### 4.11 Action 1 – Determine treatment method

- Based upon the expertise of involved parties, and working within the constrictions of the DNR’s permit, a copper sulfate treatment within a floating barrier was permitted as it is known to be effective and lethal to zebra mussels.

### 4.12 Action 2 – Obtain treatment permits

- Due to how closely the CLFLWD worked with the Minnesota DNR, the treatment permits were submitted through [MNDNR Permitting and Reporting System](#) (MPARS) and obtained in a very timely manner.

### 4.13 Action 3 – Arrange funding for treatment

- Majority of the treatment’s expenses were paid for by the Comfort Lake-Forest Lake Watershed District. Many hours of surveying and floating barrier installation were graciously provided at little to no cost to the CLFLWD by many of those listed in the ([Special Thanks](#)) section of this report.

### 4.14 Action 4 – Contract for treatment

- PLM Lake and Land Management Inc. was contracted to perform the treatment.

### 4.2 Post Response Actions and Containment – Monitor Effectiveness

- Throughout the summer, the WCD continued to send an early detection surveyor to the Bone Lake Public access.
- CLFLWD staff performed periodic zebra mussel surveys within the treatment area and around other high priority areas.
- The Minnesota DNR performed a veliger tow several months after the zebra mussel treatment. Results available in early 2020.

## 5. Public Awareness

- Frequent updates were given to the Bone Lake Association and other surrounding lake associations
- Prior to treatment, information regarding the zebra mussel’s discovery and planned treatment were mailed to all Bone Lake residents.
- CLFLWD published treatment notices in the Forest Lake Times and Chisago County Press to warn boaters of the upcoming treatment and public access closure.
- Signage was created and posted at the Bone Lake public access for the duration of the treatment.
- Details regarding the zebra mussel discovery and treatment were detailed in an article [by the Pioneer Press on June 14th](#) and two articles by the Forest Lake Times on [June 10th](#) and [17th](#). The Minnesota DNR also published a press release on June 6th, which can be found on their website

# Bone Lake Zebra Mussel Pilot Study Report

## Bone Lake General Information

At 221 acres in size, Bone Lake is the second largest lake in the Comfort Lake-Forest Lake Watershed District and is considered an “active recreation lake”. A watershed area of 5,586 acres (including Moody Lake and Third Lake) drains to Bone Lake which then outlets to an unnamed stream that flows northwest to Birch, School, and Little Comfort Lakes. Although considered a deep lake, Bone exhibits some shallow lake characteristics because 58% of its area is in the littoral zone where rooted plants can grow. Bone Lake has a public boat landing and is used recreationally for swimming, fishing, and motorized and non-motorized boating. In 2004, it was placed on the State’s Impaired Waters List due to high nutrients. It generally receives a lake grade of B- with monitoring data from the 1980s through 2011 suggesting that the water quality of the lake has been fairly consistent. In 2018, the lake received a water quality grade of B- again.

Bone Lake has been infested with curly-leaf pondweed, Eurasian watermilfoil, and common carp for many years but never have zebra mussels been report in the lake prior to 2019. However, due to the lake’s close proximity to Forest Lake and Comfort Lake (both of which were infested with zebra mussels in 2015 and 2017 respectively), the risk of introduction has only increased. This threat has long been acknowledged by CLFLWD staff, Bone Lake Association members, and community members, many of which have helped to educate the public and do their part to stop the spread of AIS. In anticipation for the worst, the CLFLWD contracted Blue Water Science to create the “Aquatic Invasive Species Action Plan for Bone Lake, Washington County, Minnesota” in 2015. This report detailed Bone Lake’s zebra mussel introduction risk, growth potential, and control options. Having such a report was invaluable throughout the rapid response process and is recommended for all lakes that are at risk of a zebra mussel infestation.

## Zebra Mussel Discovery

The Washington Conservation District (WCD) operates an aquatic invasive species (AIS) prevention program that sends paid staff once a week to boat landings to conduct surveys for newly introduced AIS. In collaboration with the Minnesota DNR, the WCD developed an early detection surveying protocol for staff to follow (*Attachment 1- Washington Conservation District Early Detection Survey Protocol*). This protocol has surveyors perform 15-minute wading surveys 50 feet on either side of the public dock. Surveyors use hands and feet to feel for zebra mussels attached to sticks, rocks, vegetation, and docks if present. Additionally, the WCD provides surveyors with AquaScopes, pvc tubes with a glass bottom that allows for underwater viewing without snorkeling or getting wet. The CLFLWD has adopted ideas from this early detection protocol and incorporated them in their own program.

On May 28<sup>th</sup>, a WCD employee performed the second search of the season at the Bone Lake public access. Equipped with an aquascope, they found 6 juvenile zebra mussels (two clusters of three) attached to a broken stick beneath the public access dock. Interestingly, this same survey was conducted the week prior with nothing found. In the days between the two surveys, the Minnesota DNR installed the public dock which may have disturbed lake sediment and exposed the mussels. If this were the case, it could suggest the possibility of an established reproductive population already present in the lake. Yet, if true we would have expected to find more evidence of zebra mussels in the lake after several dive searches and many hours of wading surveys. The alternative possibility has it own issues, as to many involved it has seemed unlikely that juvenile zebra mussels attached to a broken stick would have been transported by a watercraft to Bone Lake, especially that early in the year. Regardless of how they were introduced, the next major concern was if they were established in the lake and at how many locations.

Discovery of the zebra mussels in Bone Lake was reported to Matt Downing, Senior Water Resource Specialist for the Washington Conservation District, by the WCD staff member who discovered the mussels. Following this, the information was then uploaded to EDDMapS and sent to the Minnesota DNR's local aquatic species specialist, Keegan Lunnd. Within 20 minutes, Matt emailed the surveyors information to CLFLWD, WCD, and other DNR employees alerting them of their findings. It was from this moment that all involved parties began coordinating resources in preparation for a rapid response to this new infestation. As Bone Lake is within CLFLWD's boundaries, their staff were first to coordinate and execute a follow up survey.

## Initial Surveying

Hours after receiving Matt Downing's call on May 28<sup>th</sup> alerting CLFLWD of the new zebra mussel introduction on Bone Lake, surveying efforts began. Two CLFLWD staff members immediately began surveying around the initial discovery site, which happened to be beneath the public access dock. After a thorough inspection of the dock, staff members slowly worked their way up the bank on either side of the access point. Equipped with waders and rakes, they felt for submerged sticks and rocks, pulling any suitable zebra mussel substrate from the water for inspection. In the weeks following, the survey efforts gained the support of the Minnesota DNR, Blue Water Science, Washington Conservation District, Emmons & Oliver Resources, and other organizations. Each organization brought their own expertise and surveying techniques.

Emmons and Oliver Resources, Inc. is a water-centric engineering and environmental consulting firm specializing in biological surveying, amongst many other things. The CLFLWD contracted three of their scientists on May 29, 2019, to assist staff with surveying efforts. Not only were these scientist experienced field surveyors, but they also had access to equipment that the CLFLWD did not, such as a high precision Trimble GPS unit. While not completely necessary, it accurately documented the sections of lake surveyed. It is recommended that CLFLWD staff utilize GPS mapping for future surveying efforts – if even a less accurate GPS unit would be sufficient.

With coordination from CLFLWD, the Minnesota DNR investigated the new zebra mussel introduction using scuba gear on May 31, 2019. With limited scuba survey time available, they pin-pointed high priority areas in the lake to survey; those being the public dock, a pile of rocks near the lake outlet, and two shorelines south of the public access within the first large bay of the lake (*Figure 1 - Bone Lake Pre-Treatment Survey Map*). A very thorough survey resulted in no new populations located. On June 14, 2019, DNR staff returned to conduct three veliger tows, one near the public access (horizontal tow) and two tows in the deeper areas of the lake (vertical tows). Veligers are very small larval zebra mussels that free float throughout a lake until they grow large enough to sink and attach to a suitable substrate. Gary Montz, the Minnesota DNR's veliger expert, processed the samples and found no veligers near the access, but at the other sites one and two veligers were found. Gary stated that at this low of a count it is impossible to discern whether there is a reproductive population of zebra mussels in the lake or if these are incidental releases from boats. Following these results, it was communicated to the CLFLWD that future veliger tows would be performed to tease out the confusing results.

Blue Water Science (BWS) has been an invaluable service provider for many of CLFLWD's AIS treatments and lake surveys. On several occasions, they visited the lake and conducted surveys from a boat. Equipped with large rakes, they would pull up whatever rocks and logs that they could. Between two visits, they were able to survey the entire shoreline. Furthermore, during one of their visits they assisted with diving surveys around the public access and lake outlet, two of the lake's high priority areas.



In total, more than 70 hours of surveys were performed on Bone Lake prior to reaching a treatment decision. After so many hours spent on the lake with no more zebra mussels found, support in an eradication attempt was building. However, if at any time during the surveys more zebra mussels were found outside of the initial discovery site, treatment likely would not have been an option as it would have been nearly impossible to contain them for treatment. While there is no set number of survey hours required to properly assess the lake, the more that can be done the better. For permitting purposes, the DNR is also more likely to approve a treatment if many hours of surveying have yielded no new populations.

For a more objective decision-making approach, Steve McComas' eradication index (*Attachment 2 – Blue Water Science Zebra Mussel Eradication Index*) can be used prior to treatment. Information mainly gathered during surveys can be plugged into this table to calculate the probability of conducting a successful treatment.

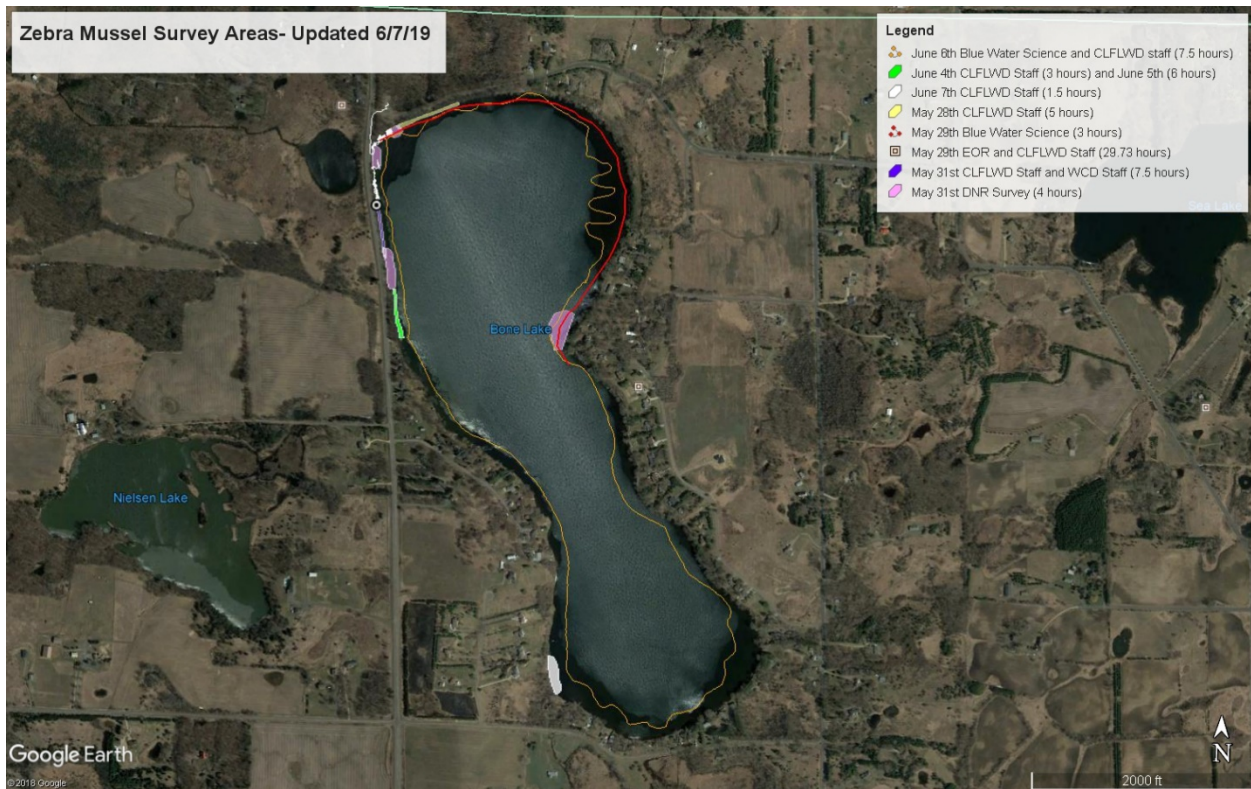


Figure 1 - Bone Lake Pre-Treatment Survey Map

### Decision Making

Before making a definitive decision about treatment, the CLFLWD believed it was necessary to host decision making meetings with as many involved parties as possible. These meetings were scheduled and held on June 11<sup>th</sup> and 13<sup>th</sup>, 14 days after the initial discovery. Ideally, these meetings would have taken place earlier to develop a strategic plan of action but the coordination of so many involved persons proved difficult. Regardless, these meetings were essential in coordinating the resources of individuals in attendance who represented such organizations as CLFLWD, WCD, Minnesota DNR, Blue Water Science, Minnesota Aquatic Invasive Species Research Center (MAISRC), Carp Solutions, EOR, and

Chisago County. To focus discussion and ensure time was used efficiently, meeting agendas were drafted and distributed at the beginning of each session.

Each representative brought to the discussion their own unique experiences, resources, and expertise. For example, Eric Fieldseth (Carp Solutions), Steve and Connor McComas (Blue Water Science), and Keegan Lund (Minnesota DNR) all were involved in the zebra mussel pilot study at Christmas Lake in 2015. Like Bone Lake, the Christmas Lake population was thought to have been discovered early enough to contain the infestation. After diving and surveying the lake, a floating barrier was deployed around the initial discovery site where the only zebra mussels were found. After a three-step treatment, surveys confirmed that all zebra mussels within the treatment area were eradicated. Unfortunately, later that same year zebra mussels were found in a different area of the lake meaning their window of opportunity for containment had closed. While unfortunate for Christmas Lake, the experiences gained by these individuals were instrumental in the CLFLWD's decision making process.

After presenting the reports of the initial discovery and the results of the subsequent surveys, the group collectively agreed upon moving forward with the proposed eradication attempt for a number of reasons. Firstly, after more than 70 hours of surveys no more zebra mussels were found in the lake. If at anytime zebra mussels were found outside of the initial discovery area, the treatment would likely not have been feasible. Secondly, due to the size of the treatment area, the pesticide application price was relatively inexpensive. It was for these reasons that despite the poor track record of zebra mussel treatments, the group could justify the treatments' time commitment and expenses.

Following the conclusion of the second meeting, an action assignment table was drafted which assigned tasks that needed to be completed prior to the treatment. These tasks were the following:

1. Pre-closure notification signs to be displayed at the public access and parking lot. Additionally, closure notification memos to be sent to homeowners, local newspapers, and social media.
2. Veliger monitoring to be conducted by the Minnesota DNR.
3. Acquisition of floating barriers and sandbags
4. Emergency road barrier to block access to the boat landing ramp. Prevent boaters from enter the lake on the morning of the treatment.
5. Properly install floating barrier prior to PLM's pesticide application
6. Last minute zebra mussel survey after barrier is installed

### Closing the Public Access for Treatment

Due to the location of the initial zebra mussel discovery being directly under the public access dock, the entire boat landing needed to be closed for the duration of the treatment. The Minnesota DNR was almost entirely responsible for coordinating with their staff and other organizations to get this authorization; whereas the watershed district was responsible for educating the public.

Bone Lake is a very popular fishing lake in the summer months and its closure needed to be advertised well. In combination with the DNR's public notices (*Attachment 3 – Minnesota DNR News Release*), CLFLWD published several articles on the matter in the local newspapers (*Attachment 4 – CLFLWD Press Release to Paper*). Additionally, notices were sent to the Bone Lake Association president for distribution to members and property owners (*Attachment 5 – CLFLWD Notice to Bone Lake Residents*). The CLFLWD operates several social media accounts, all of which had updates posted as necessary (*Attachment 6 – CLFLWD Social Media Notice - Closure*). At the landing, several large signs were created and placed near the water and in the parking lot to inform visitors of the closure (*Figure 2*). If the treatment area does not close the access to the lake, it is still recommended that published material be distributed, and signs created to inform visitors.

On the morning of the initial treatment day, CLFLWD sent a staff member out to the public access early to prevent boaters from launching their watercrafts into Bone Lake as they would be stuck after the floating barrier's installation. Having a worker stationed at the landing also helps to educate the public and answer any questions they may have. It was CLFLWD's experience that after explaining the situation to visitors, most were very understanding of the closure. In conjunction with signage and stationed staff, a road barricade, borrowed from the Scandia Public Works Facility, was placed at the bottom of the boat ramp for added security.



*Figure 2 – CLFLWD Watercraft Inspector Installing Public Notice Signs at Bone Lake Access*

### Installing/Removing Floating Barriers- Bone Lake Procedure and Experiences

The CLFLWD was permitted by the Minnesota DNR to treat 0.57 acres around the public access, which required approximately 400ft of Type 2 floating barriers. Obtaining floating barriers was one of the more difficult aspects of this treatment as they were not readily available. Many of CLFLWD's inquiries regarding who had possession of these materials were left unanswered. Eventually, the WCD and Minnesota DNR were able to coordinate with Andrew Dickhart, Aquatic Invasive Species Coordinator for Carver County, who had some to lend. Surprised by the scarce availability and access to these barriers prompted the CLFLWD to partner with the City of Forest Lake and purchase several floating barriers of their own. These barriers are available to other organizations who find themselves in a similar position.



Additionally, the CLFLWD put together a short contact list of other organizations that have floating barrier available. (*Attachment 7 – Floating Barrier Contacts*)

### Getting Barriers into the Water

*Caution- Depending on the length and height, the number of people needed to move barriers can vary greatly. The 50ft x 3ft barriers are fairly easy for 2-3 people to move into position on land. However, the 100ft x 8ft barriers require 6+ people to safely maneuver. Installing these barriers involves a lot of heavy lifting, therefore the more people that can help the better. While, there are many ways to install floating barriers, these were the steps that CLFLWD used during their installation.*

First, barriers were hauled by trailer to the landing and placed near the water's edge. Starting with the barrier that would be anchored to land, staff stretched it out so one end was touching the water with the other end pulled back up the road. The hanging curtains below the floats were rolled up and tied (*Figure 3*). The purpose of this was to prevent as much drag as possible as an unfurled curtain can make moving the barrier into position difficult. A boat that was already placed in the water was waiting with a tow rope. This tow rope was attached to the end of the barrier nearest the water. Slowly, the boat pulled the barrier into the water until only 5-10ft remained on land. Workers maneuvered the next barrier into position and zip tied the two sections together (*Figure 4*). Again, the curtain was rolled up to prevent drag before the boat pulled it into the water. Once all sections were attached and pulled into the lake, the boat pulled the curtain in a giant U-shape from the landing to the shoreline. Once near shore, the tow rope was removed and the free end of the barrier was tied to a tree, with several sandbags affixed to the bottom corner of the barrier to anchor it down. Next, the opposite free-floating end was tied to the tow rope and pulled near the other shoreline. Again, the end of the barrier was tied to the nearest tree and the curtain was weighted down with sandbags.



[https://www.google.com/search?q=floating+barriers&source=lnms&tbn=isch&sa=X&ved=0ahUKEwipwdD5xJiAhXOVs0KHx1CBcQ\\_AUIESgC&biw=1920&bih=920#imgrc=1vYnQkTmtSABWM:](https://www.google.com/search?q=floating+barriers&source=lnms&tbn=isch&sa=X&ved=0ahUKEwipwdD5xJiAhXOVs0KHx1CBcQ_AUIESgC&biw=1920&bih=920#imgrc=1vYnQkTmtSABWM:)

*Figure 3 – Floating Barrier with Curtain Rolled Up*



*Figure 4 – Zip Tying Sections of Barriers Together as They Are Pulled into the Water*

### Sandbagging

After pulling the barrier into the water and tying the two ends to the shoreline, the hanging curtain needed to be weighted down. Properly weighting down the barrier creates a good seal on the lake bottom that helps to hold concentration levels of the selected pesticide at lethal levels. On most floating barriers, there are holes or metal gromets at the bottom of the curtain to tie sandbags to. While you can simply drop the bags directly on top of the curtain, it is significantly harder to recover them during removal. A method not used during the Bone Lake treatment, but would have been useful in deeper water, is to tie a recovery rope to an empty plastic bottle. The bottle would act as a buoy that would float a rope to the surface that could then be used to pull the sandbags out of the water.

It is advised that the corners of the barrier be weighed down first. In the case of Bone Lake, a rectangle was created with the barrier. The two corners of the rectangle that were in the deep water were the first to be weighted down. To do this, a boat was needed to pull them into position. A rope was tied to the bottom of the curtain at the corner and 3- 60lb sandbags were attached. This rope was then held from the front of the boat while the driver reversed the watercraft. Once the corner was pulled into the position, the rope was let go and the momentum of the boat pulled the sandbags over the edge. This process was repeated for the other corner. (Figure 5)





*Figure 5 – Pulling the Barrier’s Corner into Position*

Once corners are pulled into position and weighted down, sandbags can be attached to the rest of the barrier. Rope that held the rolled curtain together can be cut/untied and reused for this purpose. Starting from the shore, the barrier was unrolled with the bottom being pulled out away from the treatment area. Every 20 feet, the curtain was lifted to find a gromet at the bottom to attach the sandbags. (Figure 6) Once tied on, the curtain was dropped and stepped on to ensure a tight seal against the lakebed. The tethered sandbag was then dropped on top. This process was repeated around the entire perimeter. Fortunately, the average depth of the treatment area was 4 feet, so most of the sandbags could be carried and dropped by hand. In deeper water, scuba divers may be necessary to move sandbags into position.



*Figure 6 – Weighting the Barrier with Sandbags*

## Removal

Removal was found to be much easier than installation. First, one end of the barrier was cut from the tree that held it to the shoreline. Feeling with feet, sandbags were located and untied/cut from the barrier. If possible, they were dragged to the shore, but in deeper water bags may need to be cut open. Once a section of the barrier is freed from the sandbags, it can be cut from the adjoining barrier and pulled to shore with a boat or by hand. A truck with a tow rope attached to the trailer hitch can be used to drag them from the water and to a nearby decontamination unit. While enough people can pull them out of the water by hand, a truck is highly recommended as some barriers fill with water and become significantly heavier. Once near the decontamination unit, they should be stretched out and laid flat (*Figure 7 – Decontaminating Barriers after Removal*). After a quick wash with high pressure hot water, they can air dry momentarily in the sun. Just like when they arrived, the curtains should be rolled up tight for storage. This makes the barriers much easier to maneuver as they are far more compact when rolled up. With the aid of several people, the barriers can be pulled onto a trailer for transport. These steps were repeated for each section of the barrier.



*Figure 7 – Decontaminating Barriers after Removal*

## Treatment- EarthTec QZ Application and Measurement

After the installation of the floating barrier, the selected licensed applicator can begin treatment. CLFLWD contracted Patrick Selter from PLM to treat the enclosed area with EarthTec QZ (a copper sulfate solution) due to his involvement with similar projects. Application is straight forward; he launches his boat into the treatment area and begins applying a calculated amount of pesticide into the water. Making small circles inside the barriers, he uses the motor to mix the pesticide into solution. He initially doses very high, around 1.16ppm, as the pesticide will react with vegetation and algae and lose potency quickly. Ideally, the EarthTec QZ should be held above a lethal dose of 0.5ppm, which is why a proper barrier installation is crucial as it helps to maintain this concentration.

Depending upon the licensed applicator selected, staff may be responsible for recording concentrations, as was the case for CLFLWD. Taking these measurements is very simple and it should be completed twice a day, once in the morning and once in the afternoon. Patrick Selter from PLM provided staff with a copper Colorimeter (*Figure 8*), which is the primary instrument needed to take these measurements. First, water was sampled from the lake using a pvc pipe with a valve at the top (*Figure 9*). Once the pipe was inserted



several feet into the water off the end of the public access dock, the valve was opened which forces water from lower in the water column into the pipe. This water was collected in a jar and used for the experiment. Combining 10ml of lake water with 5 drops of copper reagent, the colorimeter can calculate a concentration after zeroing the machine. These steps were repeated 3 times and the average was recorded.

*Figure 8 – Copper Sulfate Colorimeter*



*Figure 9 – PVC Water Sampling Tube*

Copper sulfate lake concentration information is important as it will inform the licensed applicator when concentrations drop below the lethal level. Furthermore, all data collected such as temperature, windspeed, wind direction, and precipitation should be recorded in a spreadsheet in addition to the concentration values. Because zebra mussel treatments are considered a DNR pilot study currently, all relative information should be documented (*Attachment 8 – Copper Sulfate Concentration Tracking Spreadsheet*). The DNR will use this information to draft a final report once the treatment is complete.

After the 10-day treatment and removal of the floating barrier, the boat landing was reopened to the public. The copper sulfate solution dissipated from wave action mixing the pesticide with fresh water, making the public access safe again for recreational activities. As a courtesy, some form of public notification should be sent out informing people of the access's reopening. In the case of CLFLWD, a simple social media post was sent out (*Attachment 9 – CLFLWD Social Media Update – Access Reopening*).

### Post Treatment Monitoring

The effectiveness of the treatment is only discernable after repeated surveys around the treatment area. When time permits, CLFLWD staff will perform quick zebra mussel surveys. These surveys are conducted in the same way as the pre-treatment surveys. However, the major difference between the pre and post treatment surveys is that the District will not be hiring extra help. With limited staff, it can be difficult to get good coverage of the lake. To increase the District's surveying efforts, staff created an outreach document that asked residents of the lake for help (*Attachment 10 - Post-Treatment Survey Protocol for Bone Lake Residents*). This document was presented at one of the lake associations meetings. Residents were instructed to submit their findings at the end of the open water season. If a resident was to find a zebra mussel near their property, staff asked that they contact the CLFLWD immediately. Only time will tell if the Bone Lake zebra mussel treatment was effective. Staff will continue monitoring the lake with the hope that the treatment was the first to successfully eradicate a zebra mussel introduction in Minnesota.

## Special Thanks

**The staff at the Comfort Lake- Forest Lake Watershed District would like to give a special thanks to the following people for all their hard work and dedication to helping stop the spread of aquatic invasive species.**

**Steve McComas** – Blue Water Science - [mccomas@pmlink.com](mailto:mccomas@pmlink.com) - (651) 690-9602

**Connor McComas** – Blue Water Science - [mccomas@pmlink.com](mailto:mccomas@pmlink.com) - (651) 690-9602

**Matt Downing** – Senior Water Resource Specialist - Washington Conservation District - [matt.downing@mnwcd.org](mailto:matt.downing@mnwcd.org) – (651) 330-8220 x 29

**Aaron DeRusha** - Water Monitoring Technician - Washington Conservation District - [ADeRusha@mnwcd.org](mailto:ADeRusha@mnwcd.org) – (651) 330-8220 x 45

**Jay Riggs** – District Manager & Wetland Conservation Act - Washington Conservation District - [jriggs@mnwcd.org](mailto:jriggs@mnwcd.org) – (651) 330-8220 x 20

**Amanda Herbrand** -Technician – Washington Conservation District

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**Dave Bakke** – President - Bone Lake Association

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**Jason Naber** – Ecology Practice Lead - Emmons and Oliver Resources, Inc. - [jnaber@eorinc.com](mailto:jnaber@eorinc.com)

**Jerry Spetzman** – Lakes Improvement District Administrator – Chisago County - [jpspetz@co.chisago.mn.us](mailto:jpspetz@co.chisago.mn.us) – (651) 213-8383

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**Julia J. Narow** – Aquatic Invasive Species Specialist – Chisago County

**Joseph Rogers** – Lead Watercraft Inspector - Chisago County

**Kayla M. Nelson** – Level 2 Watercraft Inspector – Chisago County

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**Rick Regnier** – Maintenance – City of Scandia - [r.regnier@ci.scandia.mn.us](mailto:r.regnier@ci.scandia.mn.us) – (651) 433-5223

**Brenda Eklund** – Office Assistant/ Park and Recreation Coordinator – City of Scandia - [b.stignani@ci.scandia.mn.us](mailto:b.stignani@ci.scandia.mn.us) – (651) 433-2274

**Eric Fieldseth** – Project Manager - Carp Solutions – (612) 275-3792

**Cori Mattke** – Associate Director - Minnesota Aquatic Invasive Species Research Center

**Angelique Dahlberg** – Researcher - Minnesota Aquatic Invasive Species Research Center

**Nicholas Phelps** – Director - Minnesota Aquatic Invasive Species Research Center - [pHELP083@umn.edu](mailto:pHELP083@umn.edu)

**Patrick Selter** – Vice President of Minnesota Operations - PLM Lake and Land Management Corp. - [patrick@plmcorp.net](mailto:patrick@plmcorp.net)

**Brent Alpert** – Brock White Company, LLC - [BAlpert@brockwhite.com](mailto:BAlpert@brockwhite.com) – (651) 289-1280

**Bone Lake Association Members**



# Attachments

## Attachment 1- Washington Conservation District Early Detection Survey Protocol



### Aquatic Invasive Species Early Detection: Shoreline Search



#### Introduction

Through the countywide AIS Prevention program funded by Washington County, The Washington Conservation District conducts weekly shoreline searches of all inland watercraft landings in the county (river access points and Forest Lake are excluded) from April to early September each year. The goal of these searches is that any new infestations in the county are found and reported as soon as possible, which allows for a rapid response treatment to prevent further spread and potential eradication of the invasive species in the lake.

#### Equipment

Searches are relatively easy to conduct. Equipment needed includes only **waders** and a **tablet or mobile phone** capable of downloading the **Great Lakes Early Detection Network (GLEDN)** application. Additional equipment that can be used includes **underwater viewing scopes, rakes, and nets.**

#### Conducting a Search

Searches are conducted 50 feet in each direction from the centerline of the landing and can be completed in 15 minutes. During the search, the employee will visually scan and feel the area for any invasive species not already reported on the lake. The best area to start the search is at the dock, if one is present. Zebra mussels prefer shaded areas, so the underside of the dock is the perfect place for them to attach. Using their hands, the employee should feel any dock surface in contact with the water and note any bumps or sharp shells. Following inspection of the dock, employees should search the area around the landing by picking up rocks, vegetation, floating debris, or feeling any solid substrate in the area. **Remember that zebra mussels can attach to vegetation, and even other mussels.** If an underwater viewing scope is available, this can be used to view the lake bottom without disturbing the sediment, which can improve the quality of the search. Employees should be confident in their identification of common invasive species, and any suspected invasive should be collected and brought to the office for further inspection. Additionally, when an infestation is found, a positive survey should be filled out on the GLEDN application.



Supervisors: Tim Behrens • Bob Rosenquist • Diane Blake • John Rheinberger • Jim Levitt

Attachment 2 – Blue Water Science Zebra Mussel Eradication Index

Eradication Index (McComas unpublished)

Criteria	Poor 0-30	Fair 30-60	Excellent 60-100
Minimum of 30 hours and 7,000 objects checked monthly in early detection surveys. Plate or tube samplers should be deployed and checked monthly			
Monthly early detection inspections indicate zebra mussels came into the lake within a month. Alternatively, there is specific knowledge of a recent introduction on an object (for example recent installation of a used boatlift with zebra mussels).			
Rapid response assessment involves up to 90 hours of additional searching and 20,000 objects should be checked.			
Zebra mussels are found at 1 or 2 sites. If three sites or more are found the probability of eradication decreases. Low numbers of zebra mussels should be present at the site of occurrence. If zebra mussel densities are high, the odds increase that they have detached and drifted to other locations.			
Zebra mussels should be immature. It has to be assumed immature zebra mussels were introduced on objects			
Individual mature zebra mussels should be separated by distance. If two or more mature zebra mussels are found in close proximity successful spawning is likely to have occurred and dispersal of veligers and juveniles may be widespread but undetected.			
Wave action on containment barriers along open stretches of shoreline causes leakage of treatment water and dilution by lake water reducing the chemical concentration of the toxic agent within the containment area. It is best if the containment area is in a secluded location such as a bay or a cove.			
Treatment area should be at least 3 times larger than known area of distribution at a site. A total area greater than 10 acres will be difficult to administer. Treatment should occur as soon as possible after the rapid response assessment.			
The probability of reintroduction should be low. Is the public access gated, are inspectors present from sunup to sundown, etc? Also do nearby lakes have zebra mussels?			
The smaller the lake the better. The odds of a successful eradication for lakes greater than 300 acres in size is low.			
<b>Total Score</b>			

3. Rapid Response Action

If only 1 or 2 zebra mussel sites are found after the rapid response assessment then eradication may be attempted. The feasibility of a successful eradication will be evaluated by comparing conditions to other lakes that have attempted eradication treatments. DNR, Chisago County, lake associations, and

## News Release

### Zebra mussels confirmed in Bone Lake in Washington County

June 6, 2019

The Minnesota Department of Natural Resources has confirmed reports of zebra mussels in Bone Lake, just east of Forest Lake, in Washington County.



A Washington Conservation District (WCD) watercraft inspector discovered six juvenile zebra mussels at the Bone Lake public water access while performing an early detection survey using an underwater viewing device called an aquascope. The cluster of zebra mussels was attached to sticks underneath the access dock.

The WCD conducts weekly access searches as part of a Washington County Prevention grant, with no zebra mussels found the week prior. No additional zebra

mussels were found during about 50 hours of shoreline searches by the local watershed district and other organizations and dive searches by the DNR. The watershed district and the conservation district will continue to monitor for zebra mussels and may pursue a DNR pilot project to treat the area near the public boat launch, depending on what is found during monitoring.

“Early detection of an isolated population can help prevent the spread of zebra mussels within a lake and to other lakes. It also creates the potential for pilot project treatment, which isn’t possible once a broader population is established,” DNR Invasive Species Unit Supervisor Heidi Wolf said.

Whether or not a lake is listed as infested, Minnesota law requires boaters and anglers to:

- **Clean** watercraft and trailers of aquatic plants and prohibited invasive species.
- **Drain** all water by removing drain plugs and keeping them out during transport.
- **Dispose** of unwanted bait in the trash.

Some invasive species are small and difficult to see at the access. To remove or kill them, take one or more of the following precautions before moving to another waterbody:

- Spray with high-pressure water.
- Rinse with very hot water (120 degrees for at least two minutes or 140 degrees for at least 10 seconds).
- Dry for at least five days.

Zebra mussels can compete with native species for food and habitat, cut the feet of swimmers, reduce the performance of boat motors, and cause expensive damage to water intake pipes.

People should [contact an area DNR aquatic invasive species specialist](#) if they think they have found zebra mussels or any other invasive species that has not already been confirmed in a lake.

More information is available at [mndnr.gov/ais](http://mndnr.gov/ais).

**Press Release**

**Bone Lake Boat Launch Closure and Zebra Mussel Treatment, Scandia, MN**

NOTICE: The public boat landing on Bone Lake in Scandia will be closed from Monday, June 17<sup>th</sup> through Wednesday, June 26<sup>th</sup> for a zebra mussel treatment pilot project to occur. Zebra mussels are an invasive species with no local natural predator. They can severely disrupt a lake's ecosystem once they become established in a waterbody such as Bone Lake.

At the end of May, six juvenile zebra mussels were discovered at the public launch. Since that time, local organizations have completed over 70 hours of zebra mussel survey time on the lake, finding no additional zebra mussels. A half-acre area around the public landing will be quarantined for at least 10 days while a copper sulfate treatment occurs. No boats will be allowed to launch into or out of the lake from the public landing during this time. The objective of this treatment is to eradicate any living zebra mussels or zebra mussel larvae around the area of discovery and prevent a population from establishing in Bone Lake.

Boaters are reminded to Clean, Drain, Dry and Dispose when moving between waterbodies in order to prevent the spread of aquatic invasive species such as zebra mussels. Please contact Comfort Lake-Forest Lake Watershed District at [info@clflwd.org](mailto:info@clflwd.org) or (651) 395-5850 with any questions.

###

Dated: June 14, 2019

/S/Mike Kinney

Mike Kinney, Administrator

**(Document 3.)**

June 14, 2019

TO: Residents of Bone Lake, Scandia, MN

FROM: Comfort Lake-Forest Lake Watershed District

RE: Bone Lake Boat Launch Closure and Zebra Mussel Treatment

Dear Resident,

This letter serves to inform you that the public boat landing on Bone Lake will be closed from Monday, June 17<sup>th</sup> through Wednesday, June 26<sup>th</sup> for a zebra mussel treatment pilot project to occur. Zebra mussels are an invasive species with no local natural predator. They can severely disrupt a lake's ecosystem once they become established in a waterbody such as Bone Lake.

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Boaters are reminded to Clean, Drain, Dry and Dispose when moving between waterbodies in order to prevent the spread of aquatic invasive species such as zebra mussels. Please contact Comfort Lake-Forest Lake Watershed District at [info@clflwd.org](mailto:info@clflwd.org) or (651) 395-5850 with any questions.

Sincerely,

Mike Kinney

District Administrator

Comfort Lake-Forest Lake Watershed District





**Comfort Lake Forest Lake Watershed District** is at Bone Lake.

June 14 · Scandia · 🌐

**NOTICE:** The public boat landing on Bone Lake in Scandia will be CLOSED from 6/17/ - 6/26 for a zebra mussel treatment pilot project to occur.

At the end of May, six juvenile zebra mussels were discovered at the public launch. Since that time, local organizations have completed over 70 hours of zebra mussel survey time on the lake, finding no additional zebra mussels. A half-acre area around the public landing will be quarantined for at least 10 days while a copper sulfate tr... See More



**\*\*\*Invasive Species & Access Closure Alert\*\*\*  
Zebra mussels found in Bone Lake**

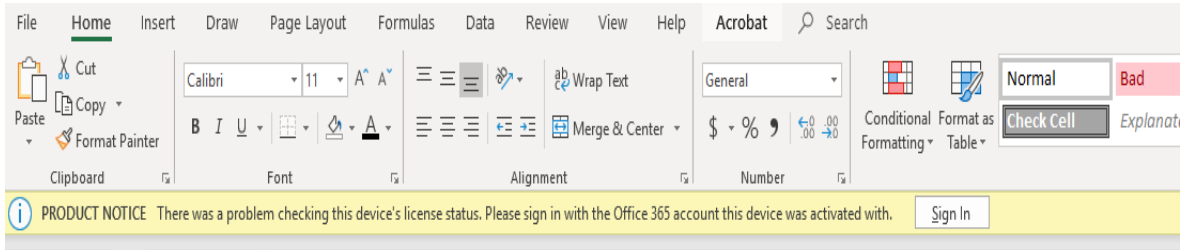


*Attachment 7 – Floating Barrier Contacts*

Floating Barrier Contacts

1. Brock and White – 651-647-0950 general phone number
  - a. You can only buy floating barriers from them- they do not rent
  - b. Brent Alpert (651-289-1280 work phone) is the most knowledgeable about these barriers
  - c. Rough estimates Type 1= \$7.50 linear foot Type 2= \$12.50 linear foot (rough estimates)
  - d. Shipping can take 1-2 days and roughly costs \$75
2. Andrew Dickhart – Aquatic Invasive Species Coordinator for Carver County
  - a. Phone= (952) 361-1871
  - b. They have +400ft of Type 2 floating barrier (selection of 5ft and 8ft tall barriers)
3. Tony Borough- AIS Prevention Program Coordinator for Hennepin County
  - a. Phone= (612)-348-4378
  - b. Has contracts with a construction company that provide them to him when needed
4. Bruce – Chisago County Public Works
  - a. 1-651-755-727
  - b. 3x50 Type 1 barrier- 150 ft total
5. Dave Adams- Forest Lake Public Works
  - a. 651-209-9736
  - b. Two 3x50 barriers and Two 5x50 barriers

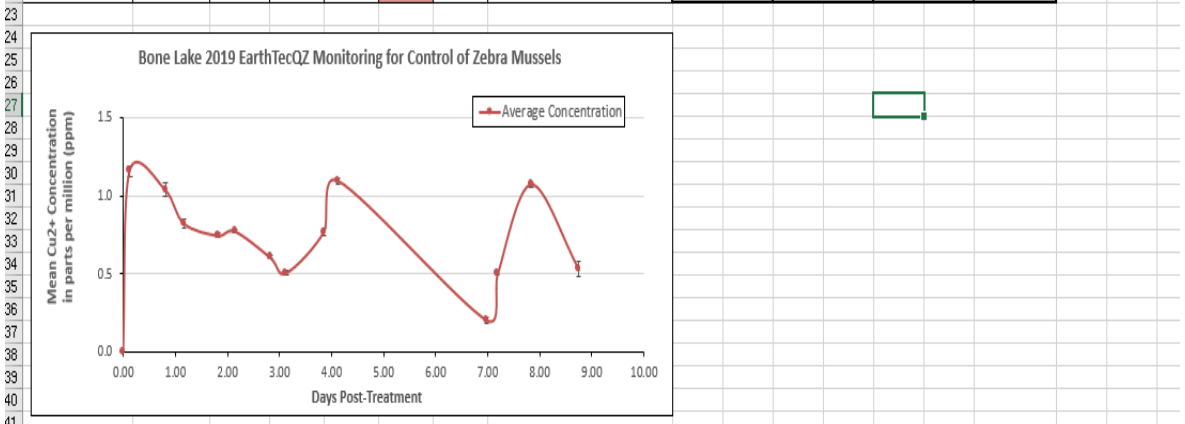
# Attachment 8 – Copper Sulfate Concentration Tracking Spreadsheet



PRODUCT NOTICE: There was a problem checking this device's license status. Please sign in with the Office 365 account this device was activated with. [Sign In](#)

1	Lake	Bone	County	Washingt	DOW	8.2E+07												
2	Target Species:	zebra mussel	Herbicide:	EarthTec QZ (copper)														
3	Treatment Size:	0.57	Target Concentration:	1 ppm + bump treatments as needed for up to 3 days														
4	Monitored By:	Barrett Miller, SCWAP	Contact Info:	651-395-5854														

Collection Date & Time	Days After Treatment	Sample Locations					Field Notes	Temperature	Wind Direction	Wind Speed	Precipitation
		1	2	3	AVG	SE					
6/17/19 12:00 PM	0.00	0	0	0	0.00	0.00	initial treatment	65 F	SSW	5 mph	0
6/17/19 3:00 PM	0.13	1.24	1.14	1.1	1.16	0.04		71 F	S	7 mph	0
6/18/19 7:20 AM	0.81	0.95	1.13	1.04	1.04	0.05	coontail & EWM defoliation observed at water surface	61 F	W	3 mph	0
6/18/19 4:00 PM	1.17	0.83	0.87	0.77	0.82	0.03		70 F	NW	4 mph	0
6/19/19 7:30 AM	1.81	0.73	0.73	0.78	0.75	0.01		58 F	NE	4 mph	0
6/19/19 3:30 PM	2.15	0.8	0.77	0.75	0.77	0.01		74 F	E	7 mph	0
6/20/19 7:45 AM	2.82	0.63	0.6	0.59	0.61	0.01		64 F	ESE	12 mph	0
6/20/19 3:00 PM	3.13	0.51	0.53	0.48	0.51	0.01		75 F	ESE	7 mph	0
6/21/19 8:30 AM	3.85	0.75	0.73	0.83	0.77	0.03	Patrick re-dosed this morning	64 F	ENE	7 mph	0
6/21/19 3:00 PM	4.13	1.1	1.05	1.14	1.10	0.02		76 F	ESE	15 mph	0
6/24/19 11:30 AM	6.98	0.24	0.22	0.16	0.21	0.02		64 F	WNW	7 mph	0.47in
6/24/19 4:30 PM	7.19	0.49	0.5	0.51	0.50	0.01	Patrick re-dosed this morning	68 F	WNW	10 mph	0
6/25/19 8:00 AM	7.83	1.04	1.08	1.1	1.07	0.02		65 F	WSW	7 mph	0
6/26/19 6:00 AM	8.75	0.59	0.58	0.42	0.53	0.05	Last Reading before barrier removal	54 F	WSW	3 mph	0





Attachment 9 – CLFLWD Social Media Update – Access Reopening



**Comfort Lake Forest Lake Watershed District** is at Bone Lake.

June 26 at 12:27 PM · Scandia · 🌐

Bone Lake Update: The zebra mussel treatment has been completed, the floating silt fence has been removed and decontaminated, and the public access is once again open for use 🙌🏻 Don't forget to #CleanDrainDryDispose



## Help Survey for Zebra Mussels in Bone Lake

Comfort Lake-Forest Lake Watershed District (CLFLWD)



[http://www.columbia.edu/fo/care/danoff-burg/invasion\\_blo/iv\\_top\\_summ/Dreissena\\_polymorpha.html](http://www.columbia.edu/fo/care/danoff-burg/invasion_blo/iv_top_summ/Dreissena_polymorpha.html)

**Background-** Zebra mussels were first discovered in Bone Lake on May 28, 2019 near the public access. Following this discovery, over 70 hours of surveys were conducted in search of other populations. To date, there have been no new populations of zebra mussels found in the lake. An attempt to eradicate any missed and remaining zebra mussels was performed from June 17<sup>th</sup> to June 26<sup>th</sup> around the initial discovery area. The effectiveness of this treatment will only be known after many hours of long-term monitoring. The Watershed District will send staff to periodically survey the lake. However, 221 acres is too great of an area for staff to cover alone. To properly survey the lake, the District needs assistance from property owners and interested community members like you. Join the effort today and help protect Bone Lake from nasty aquatic invaders.

**How You Can Help-** Surveying for zebra mussels is as simple as picking up sticks and rocks from the water and looking at them. Zebra mussels prefer to attach themselves to hard substrate such as rocks, logs, and shaded places on docks and boat lifts. By taking a few minutes every couple of weeks to inspect your property and water equipment, you can significantly improve the thoroughness of the District's surveying efforts. Even if you don't live on Bone Lake, you can assist the search efforts by inspecting any suitable substrate that you come across while out on the water. Surveying is a fun and easy way to help protect the lake, and in the process you may discover a whole new world of plants and animals that live on the rocks and logs that you pick up.

**Getting Started-** To get started, review the zebra mussel ID tips below and the attached survey chart. The survey chart can be filled out after every survey conducted to track important information such as date, location, time spent surveying, number of objects looked at, and if zebra mussels were found. This document can be submitted to CLFLWD in the fall or when you are done going out on the lake for the season. The CLFLWD's staff will compile this information and use it to coordinate surveying efforts in the spring. If you have any additional questions please feel free to contact Garrett Miller at 651-395-5854 or [garrett.miller@clflwd.org](mailto:garrett.miller@clflwd.org)

### Zebra mussel ID tips and information

from *"Invaders of the Great Lakes: Invasive Species and Their Impact on You"*

**Description-** Under 1 inch (up to 2); black to brownish "D"-shaped shell, generally with alternating dark and light stripes; usually in clusters of individuals.

**Habitat-** attaches to hard surfaces (rocks, logs, boats, docks, etc.); generally in shallow (6-30 feet) algae-rich water of lakes, rivers, canals, ponds.

**Origin-** Native to Eastern Europe; introduced to Great Lakes in late 1980s by ballast water; spread from the Mississippi River, its tributaries and inland lakes

**Spread By-** recreationists transporting mussels attached to aquatic plants, boats, nets, fishing equipment and in water; produces several hundred thousand microscopic eggs per season

**Impacts-** Disrupts aquatic food web; facilitates nuisance plant growth; sharp shells littering beaches can make a stroll hazardous; smothers native clams/mussels (many are rare) and crayfish



## Survey Chart

Date	Location	Time Spent Surveying	Estimated # of Objects Inspected	Zebra Mussels Found (If Yes, how many)

**Chart purpose** - This chart helps the Watershed District track when and where surveys have been conducted on the lake to prevent overlap. It also helps staff determine which areas of the lake are being missed and need greater attention. By filling this document out and submitting it to the Comfort Lake- Forest Lake Watershed District (CLFLWD) you are helping to maximize the efficiency of the survey efforts on Bone Lake. At the end of the season, you can either mail it to 44 Lake St. South, Ste. A Forest Lake, MN 55025, drop it off in person, or email it to [garrett.miller@clflwd.org](mailto:garrett.miller@clflwd.org)

**What to do if I find a Zebra Mussel in the lake?** – If you think that you have found a zebra mussel in the lake please call Garrett Miller at the Watershed District immediately at 651-395-5854. It is encouraged that you take pictures of where it was found before trying to remove them. You can either remove them by hand and store them in a plastic bag or leave them for a CLFLWD staff member to ID.

Comfort Lake-Forest Lake Watershed District  
www.clflwd.org | info@clflwd.org | 651-395-5850