

## IN THIS ISSUE:

2015 Lake Monitoring Results | Lake Challenges and Accomplishments  
GLSD In the News | Restoring the County K Estuary | Grants for our Lake Projects



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## CURRENT STATE OF BIG GREEN LAKE

As we continue to implement our Lake Management Plan (LMP) with contributions from our lake partners at the local, state and federal levels, it's important to share updated lake data with our stakeholders. Our most important stakeholders are you—the property owners in the Green Lake Sanitary District. We want to do our best to provide our property owners with a fair and balanced message as it relates to the ongoing health of Big Green Lake.

We ask you to be mindful of two important factors:

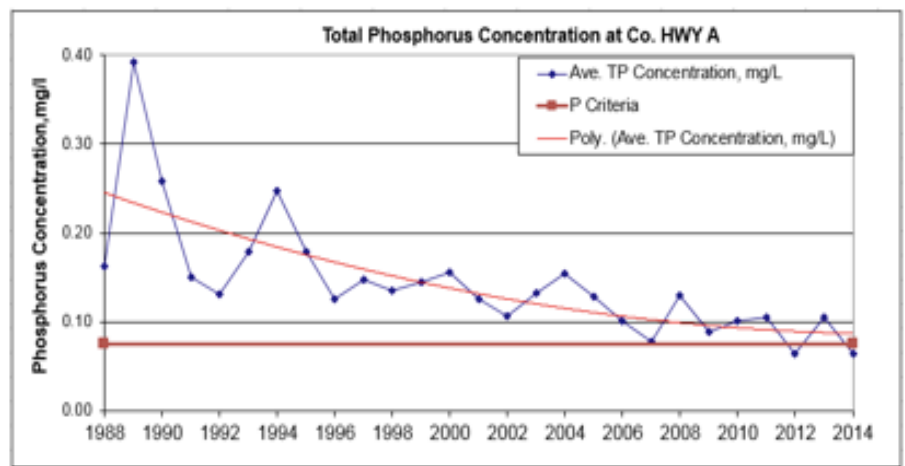
Big Green Lake's turnover rate or flushing rate is 20+ years. In other words, if we had to replace all of the water in Big Green Lake, it would take over 20 years to get the water back to its current level. The point is that changes—both good and bad—typically occur very slowly on our lake. Big Green Lake has the second largest volume of water in Wisconsin next to Lake Winnebago and most people are surprised to learn that you could fit two Lake Genevas into Big Green Lake.

Many stakeholders are very interested in Big Green Lake and as a result there are often multiple opinions on lake conditions and trends. Fortunately, we have decades of accumulated science available for guiding our management of the lake and watershed. You are encouraged to ask YOUR Green Lake management team about how the dots are being connected. Stakeholders informed with good science can only strengthen our collective partnership. The GLSD is enthusiastic for the future and fortunate to be partnered with so many talented and energetic partners on our Lake Management Planning (LMP) Team.

## 2015 LAKE MONITORING RESULTS

Roughly 20% of the GLSD's annual budget is spent on gathering water quality and water flow data for our lake and its seven main tributaries through partnering with United States Geological Survey (USGS). The USGS is the top tier water quality monitoring expert in the State of Wisconsin for most sizable and complex water bodies. Another benefit the USGS provides is an independent and objective scientific basis for our important work. Their expertise lies in consistent protocols for doing the monitoring and ensuring the final numbers are correct. This continuity built up with the USGS over the past several decades has allowed us to understand and measure our lake improvement projects as well as to qualify for State and Federal grants. Our confidence in the USGS data and their experience enables the LMP team to develop efficient strategies.

"I think there are two main conclusions from our monitoring this year (2015)," said USGS limnologist Dr. Dale Robertson. "The water quality of the lake, based on total phosphorus and algal populations, has been fairly stable over the past 20 years. However, the lake has become clearer since the mid-1980s; especially since the introduction of zebra mussels in 2005. Actions in the watershed are having an effect on nutrient loading to the lake, especially in Silver Creek. Phosphorus concentrations have decreased by about 50% in Silver Creek. However, increased precipitation over the past few years has resulted in only a small reduction in phosphorus loading to the lake."



The graph above illustrates the total phosphorus concentration in the primary tributary to Big Green Lake. Average total phosphorus concentrations have decreased from over 0.2 mg/L in 1988 to under 0.1 mg/L in 2014.



## GLSD IN THE NEWS

### NELSON INSTITUTE JOINS LMP TEAM

We are pleased to share that the Nelson Institute is joining forces with our LMP Team and will be working with us on various aspects of our LMP moving forward. The Nelson Institute is UW Madison's School of Environmental Studies, their mission statement reads, "We build partnerships to synergize and sustain excellence in the interdisciplinary research, teaching, and service that make the University of Wisconsin-Madison a world leader in addressing environmental challenges."

### LAKE TROUT STOCKING

On Wednesday, October 7, 2015, we received 31,000+ Lake Trout fingerlings to be reared over the next 8 months at our Fish Rearing Facility in Green Lake. These fingerlings will grow to a length of 9 to 11 inches before they are released into Big Green Lake in May of 2016. None of the Lake Trout stocking would be possible without the continued support of the Big Green Lake Fishing Partnership. It is very important to recognize all of the Partners who support the Big Green Lake Fish Rearing Facility. Besides the GLSD, our partners include: City of Green Lake, Green Lake Association, Green Lake County, Fishing Guide Mike Norton, Citizen Volunteer Steve Siders, Walleyes for Tomorrow and the Wisconsin DNR.

### AQWEED

During the Summer of 2015, our aquatic plant harvesting program removed 856 truckloads of aquatic plants from our lake. 213 of the 856 loads were land loads, meaning plants washed up on shore and were raked up and put at the roadside for pickup and disposal by our crew. It should also be noted that roughly one-third of our harvested loads from the lake are floating vegetation which wasn't cut by the harvesters, but was floating vegetation that was dislodged by other means (boat props, recreational users, wind, waves, etc) and gathered up by the harvesters for proper disposal.

## IS THE GLASS HALF-EMPTY OR HALF-FULL?

### CHALLENGES

We believe some of our biggest present and future challenges may come from threats presently outside of our control, namely: Aquatic Invasive Species (AIS) and Climate Change. Arguably, we believe we could make the case that Aquatic Invasive Species, especially Zebra Mussels (ZMs), have been the biggest single factor affecting our lake over the past 10 years. Clearer water (as a result of ZMs filtering lake water) enables plant growth in deeper water than before ZMs invaded the lake. Furthermore, AIS (carp, eurasian watermilfoil, ZMs) continue to disrupt the lake's ecological balance resulting in excessive plant growth and changes within the lake's overall biology.

Climate Change has already affected our lake as can be seen in a number of unwanted changes including more severe weather (increase in the size, severity and frequency of storm events), rising water temperatures, less ice cover, and more. We believe climate impacts are already in the early phases of disruption. Invading species (AIS) symptoms are somewhat manageable by comparison (chemical treatment of plants, carp controls).

Another challenge for the LMP team is understanding the low dissolved oxygen levels at the lake's thermocline (this is where the upper warm water layer of the lake meets the cold water layer of the lake, generally in an area about 30 feet below the lake's surface). This phenomenon generally occurs in late August when a relatively thin layer of water becomes low in oxygen for a period up to several weeks. We believe nutrients (phosphorus) and possibly climate change are contributing factors. A lake protection grant is currently being written to fund this research. The research is directed at causes as well as the identification of strategies and solutions to stabilize or reverse these low oxygen conditions.

Potential impacts of invasive species and climate change force us to be better prepared as we move forward. The Best management practices (BMPs) installed several years ago may not be robust enough to handle shifting climate events. The LMP team included objectives in the existing lake plan (LMP) to support further actions directed at understanding potential implications related to climate and invasive species.

### ACCOMPLISHMENTS

We have mobilized our local, state and federal resources and made real strides in reducing the primary problem nutrient to our lake—namely phosphorus (see the Silver Creek Phosphorus Concentration Graph on page 1). With a lake our size, most changes occur very gradually; however, the numbers support our assertion that we are moving in the right direction—phosphorus loading to the lake is decreasing.

Since the approval and initial implementation of our LMP in early 2013, we have spent millions of dollars on a complex menu of phosphorus reducing projects (BMPs, multitude of lake improvement projects) as well as research-based projects (Lake/Watershed Modeling) all directed at maintaining and improving our lake. As described above, our water quality has remained unchanged and may have slightly improved over the past two decades and our fisheries are doing well. We have restored (improved) one (Silver Creek) of the two 300 acre estuaries tied to our lake and we

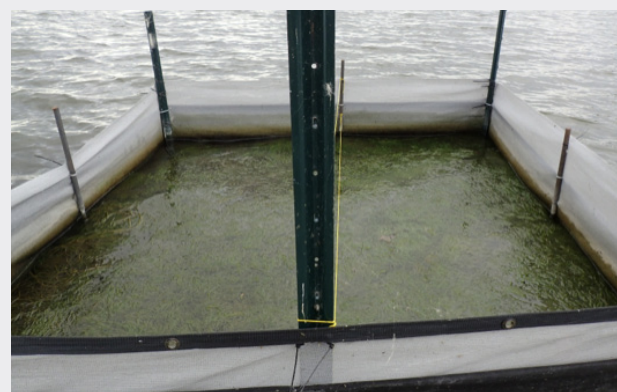
expect to restore (improve) the second estuary (County K) within the next couple years.

Today's solutions may not be enough to handle tomorrow's challenges; however, we have a dynamic LMP and we have the right people and organizations working together to have our LMP continuously evolve and meet new challenges. Yes, at times, we disagree on how to get the work done, but in the end, we are all working together to keep Big Green Lake on an improvement course for future generations.

It's important to recognize our LMP Partners: Green Lake Association, Green Lake County LCD, Fond du Lac County LCD, Green Lake and Fond du Lac NRCS, Cities of Green Lake and Ripon, Green Lake Conservancy, Wisconsin DNR, USGS and finally, the public with special recognition to the citizens of the Green Lake Community.



*The photo on the left shows a carp getting sutured after the implanting of a radio tag transmitter. The transmitters will help us understand the migration habits of carp in and out of the K Estuary.*



*Carp enclosure's were created at the estuary to demonstrate the native plant growth that would occur when carp are not allowed to disturb the bottom sediments. This enclosure uses a mesh fencing to keep carp out.*

## RESTORING THE COUNTY HIGHWAY K ESTUARY

Over the past several years, there have been numerous restoration activities performed at the Cty. Hwy. K Estuary with the goal of trying to remove carp and restore this waterbody back to its natural condition (native plants and game fish). Removing carp from this waterbody will provide many very positive benefits to Big Green Lake. More specifically, the water running continuously under the K bridge will transform from heavy in sediment and phosphorus to much clearer and cleaner water. The K estuary should return to a native fishery which acts as a fish nursery to the main lake. A restored estuary would act as a filtering mechanism instead of being a continuous source of higher-than-normal pollution runoff.

Native plants should grow, native game fish should prosper and water quality should dramatically improve if carp are not allowed to disturb the bottom sediments. A carp enclosure's purpose is to demonstrate what should happen to an area in a water body if carp are kept out of the smaller enclosed area.

We are currently performing an extensive number of environmental restoration activities designed to better understand how the K estuary responds to certain situations which may be unique to this water body. For example, this past October, we inserted radio tag transmitters into 14 adult carp to better understand their migration habits throughout the year. We will track these fish over the coming months. Where they go and when they go will help us to better understand how to remove them from the K estuary.

## RSVP AVAILABLE AGAIN IN 2015

RSVP and grant funding will once again be offered in 2015 for environmentally responsible shoreline restoration projects. Please keep in mind that RSVP funds are available on a first-come, first-serve basis so don't wait too long if you are considering a project. Shoreland restoration is a very important piece of our LMP. Also, in addition to using ZERO PHOSPHORUS fertilizer to help your lake, please refrain from burning and/or blowing leaves into your lake.

## SEWER RELATED WORK

If you are involved in or planning a building project in a sewered area, please contact the GLSD office 920-295-4488 for permit and inspection related information. New homes as well as newly created lots in sewered areas are assessed for sewer.

The GLSD completely cleans, televises and repairs breaks on its entire sewer collection system on a rotating schedule over a 7 to 10 year cycle. During the winter of 2015-2016, all of Area 2 (beginning at the ABA going west around the lake-Orchard Avenue, North Lakeshore Drive, etc) will be cleaned, televised and examined for possible problems.

The sewer collection system and wastewater treatment plant are owned by all property owners in the GLSD. Our efforts to maintain this infrastructure benefits all users and translates into LOWER MAINTENANCE COSTS. For example, bathroom wipes/toilettes are becoming increasingly more popular; however, these items are also responsible for causing sewer backups. Please do not use these wipes. Lastly, avoid dumping GREASE into your sewer, grease buildup is a major cause of sewer backup problems.

## NAME, ADDRESS, MARITAL STATUS CHANGES

As an ongoing reminder, please notify our office of changes in your property status (i.e. owner, address, marital status etc). Notification of changes should be e-mailed to pauulettej@glakesd.com or mailed to P.O. Box 417, Green Lake, WI 54941.

## GLSD WEBSITE

Please visit our website for more information on Sanitary District programs, activities, projects and general information. If you are interested in more details relating to our LMP, refer to our website which contains all of the information, programs and activities associated with the GLSD.



PO BOX 417  
GREEN LAKE WI 54941

## GLSD COMMISSIONERS

Jerry Specht | *President*  
Sara Mueller | *Treasurer*  
Nancy Hill | *Secretary*

## GLSD STAFF

Charlie Marks | *Administrator*  
Paulette Janssen | *Administrative Assistant*  
Paul Resop | *Plant Operator*  
Stuart Marks  
*Plant Operator/Aqweed Harvester Supervisor*

## CONTACT US

[www.glakesd.com](http://www.glakesd.com)  
(920) 295-4488

Physical Address:  
N5295 Cty Rd TT, Princeton

Mailing Address:  
PO Box 417, Green Lake

## OFFICE HOURS

7:30 am – 3:00 pm  
Monday – Friday

For sewer emergencies after hours, please contact Charlie Marks at 920-291-6688.

## GRANTS PAY FOR OUR LAKE PROJECTS

It's always encouraging to share information on our lake projects with our property owners and the public in general. We believe our LMP partnership does more with our lake and watershed than any other water body in the state of Wisconsin. Provided below is a snapshot of a number of our lake projects along with grant information which ultimately, allows us to fund the vast majority of our lake and watershed projects and activities:

Project Description	Grant Agency	Grant Status	Grant Amount	Local Cost-Share Amount/Organization
Lake Implementation Grant	State	Received 2013	\$200,000	\$66,667 - GLSD
Aquatic Invasive Species	State	Received 2013	\$145,899	\$78,561 - GLSD
Buckthorn/Invasive Removal	Federal	Received 2014	\$20,000	None Required
Invasive Removal/Conservancy	Federal	Received 2015	\$10,000	None Required
National Water Quality Incentive	Federal	Received 2012	\$1,500,000	None Required
Healthy Lakes	State	Received 2015	\$25,000	\$8,333 - GLSD & GLA
Stormwater City of Green Lake	State	Received 2015	\$20,000	\$20,000 - City of GL, GLA & GLSD
Farmer Survey	State	In Progress	\$10,000	
Low Dissolved Oxygen Research	State	In Progress	\$135,000	
FDL County BMPs, Cty. K Estuary Restoration	State	In Progress	\$200,00	

In addition to the \$2,265,000 outlined above, all of the LMP partners spend additional dollars over and above the grant dollars described above. Our LMP includes many needed projects and activities, without grant funding, most of our work efforts would be good ideas without the money for implementation. Fortunately for our LMP, we are currently able to fund all of the goals & objectives in our LMP.