

# Aquatics<sup>in</sup>Brief

SUMMER 2015



Volume 9, Issue 3

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## The Importance of Water Quality Testing

By **Marc Harris, Fisheries and Wildlife Biologist**

**W**hy is water quality testing so important in coming up with a true ecologically balanced management plan that is specific to each site?

In the same way that no two human bodies are alike, no two bodies of water are the same. Two ponds across the street from each other can often have drastically different physical and chemical characteristics even though they are separated by only a few feet. Much like tests performed at a doctor's office, professional lake managers can use water quality parameters to help gauge the health of a waterbody and determine what each specific waterbody may need, from aeration system installations to nutrient remediation applications to algae and aquatic weed prescriptions. Factors like dissolved oxygen (DO), alkalinity, pH, conductivity, nutrient levels, secchi depth, and bacteria counts all play a role in creating a site specific management plan based off of data collected and not just a lake manager's intuition.

Lakes and ponds are part of a complex and dynamic ecosystem that are in a constant state of change. Parameters such as alkalinity and conductivity can maintain relatively stable values over times, while DO and pH typically fluctuate throughout the day, but can stay constant from season to season. Factors such as nutrient load and secchi depths usually change with major physical events. A rain storm can introduce large amounts of nutrient rich sediment that can cause both parameters to go up, while a dry spell can allow sediment

to settle out causing the parameter values to improve. It is important to regularly have the water quality tested in order to maintain an ecological balanced approach to any site specific management plan created in these dynamic ecosystems.

Water quality sampling and testing allows managers and owners to establish baseline values, ultimately increasing the knowledge and understanding surrounding the specific issues of a waterbody. Parameters such as alkalinity and conductivity are analogous to the yearly "physical" each lake or pond is recommended to have. These values rarely change over time much like the height and weight of an adult human. They are typically established based on the chemistry of the source of the water for that specific lake or pond. Major swings in parameter values can signify that something may be imbalanced leading to an unhealthy lake or pond. Both factors can change if the health of the lake or pond is suffering and a treatment can be more effective as a result. Different aquatic products applied at different rates will not all work the same under varying water conditions, so the more information that can go into selecting a product, the better chances for its success.

*Continued on page 2*

**SOLITUDE**  
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# Pond Aeration and Avoiding Fish Kills

By **Derek Johnson, Lake Management Scientist, Fisheries & Wildlife Scientist, and Certified Lake Manager**

Lakes and ponds are a delicate balancing act made up of a variety of organisms fulfilling many different roles in the ecosystem. An issue will quickly arise in a waterbody when something is out of balance, inevitably throwing everything else off. When activity around the waterbody increases, especially during the warmer months, the potential for excess nutrients entering the system increases as well.

Increased amounts of nitrogen, entering a lake or pond from stormwater runoff and other sources like fertilization and grass clippings, can cause an imbalance in the entire lake system. Cyanobacteria, or blue green algae, are nitrogen fixing organisms and will definitely take advantage of the excess nitrogen. Nitrogen fixing organisms are able to take the available nitrogen from the atmosphere and water and convert it into new compounds that can be used by other organisms. The bacteria on the bottom of the lake or pond can use the newly available nitrogen compounds for decomposition. As bacteria are decomposing the organic matter on the bottom of the lake, ammonia is released as a byproduct.

During the warmer months, a waterbody will begin to thermally stratify. Stratification occurs when changes in water temperatures create distinct layers based on differences in water densities. Due to the high density of the lower layers of water, the ammonia that is being produced by the bacteria will not mix into the water column and may become very concentrated. Many lake and pond owners and managers have become proactive about this issue and seek to



prevent the ammonia buildup before it begins.

One approach to prevent a concentration of ammonia and encourage mixing of the water column is an underwater aeration system. These systems are made up of a compressor pumping air to diffusers within the waterbody. This creates artificial circulation and prevents thermal stratification. These systems are very effective when it comes to aeration; however, problems arise when the aeration system malfunctions, especially during the hottest months of the year.

When the system turns off, re-stratification will start to occur immediately and may lead to the ammonia building up again. Caution should be taken when the system restarts because it will push the concentrated ammonia back into the water column. Ammonia can pose an ecological threat to fish and other aquatic organisms with sensitive organ tissues. It can also burn fish gills and potentially result in a large fish kill.

Lake and pond owners and managers should use extreme caution when initially starting and restarting a submersed aerator, especially during hot weather, and should be prepared to take the necessary precautions to prevent a fish kill. Monthly system maintenance makes sure all the components are working correctly and is a proactive approach to prevent any future issues. An underwater aeration system can be a great addition to any body of water, and with proper maintenance, it can help to build fish populations and sustain a healthy lake and pond ecosystem year round. ■

## Water Quality Testing *Continued from front cover*

Water testing results can provide in-the-moment values and aid in determining the best course of action for a specific waterbody, whether a treatment is needed or an aeration system should be installed. The amount of dissolved oxygen helps to determine what species of fish, if any, can survive in the water. DO is influenced by water temperature as well as the amount of organic matter present. A lack of DO is the leading cause of fish kills, especially in summer months when water temperatures are high. pH can also affect what fish species are present as well as the effectiveness of certain algicides and herbicides.

Assessing nutrient levels and secchi depth measurements before and after a remediation strategy can give valuable insight to the effectiveness of a treatment or application. Nitrogen and phosphorus are the two nutrients of concern when talking about water quality. They become inflated in waterbodies that have been impacted by human activity such as fertilizing and waste runoff. These nutrients are readily taken in by algae and plants and used to fuel growth. This leads to what is known as eutrophication. Knowing these values gives us the ability to rate how healthy a waterbody is and anticipate potential future issues that may arise as a result of poor water quality.

Fecal coliform bacteria testing is important to determine whether



or not a person or pet can safely swim in the water. E. Coli is one type of fecal coliform that should be regularly monitored in any waterbody where people or pets swim and possibly ingest the water. Many public beaches are required to test E. Coli levels daily, while homeowners and

private beach owners may opt to test less frequently. The bacteria is introduced mainly by waterfowl and other bird feces as well as from larger animals in more rural settings.

The more information that can be gathered about a specific lake or pond, the more ecologically minded the management plan can be, and the better a lake or pond owner can plan and budget for the future. Taking time to sample and test water quality parameters can allow one to dive deeper into the unique characteristics of each lake and pond and provide us with the opportunity to develop a site specific management plan to more effectively help balance the complex and dynamic aquatic ecosystems found in lakes and ponds. The environment and your wallet will thank you! ■



# Stormwater Management Pond Parts

By J. Wesley Allen, Environmental Scientist

**S**tormwater management rules and regulations were formalized in the 1990's, developing from the Clean Water Act. While a lot of things have changed and continue to change in stormwater management, being informed on what your stormwater pond is designed to do and what its design elements, or parts, are, is key to understanding and implementing a sustainable maintenance and management program for your community, property, or commercial facility.

Today, more and more stormwater management is done with a variety of Best Management Practices (BMPs), such as infiltration basins, bio-infiltration areas, bio-swales, and rain gardens, but we still see a large number of stormwater management "wet" ponds or "dry" detention basins. These ponds are designed to hold water, capture sediment and pollutants, and then release the water slowly to mimic run-off from the site before development. These ponds not only function as stormwater management facilities, but are often designed as key features in communities. Most of these ponds have similar basic parts:

**Pond Embankment:** Typically, stormwater ponds have an embankment surrounding them. Part, or all, of the embankment acts as a dam to keep the water in the pond. The embankment is usually sloped and should be stabilized with herbaceous vegetation and grasses. Large trees, animal burrowing, and exposed soils can lead to erosion and failure of the embankment. A buffer can also be allowed to grow. Buffers can help reduce sediment and nutrient loading in the pond, while providing greater stabilization for the embankment. Buffers should be composed of herbaceous vegetation and be kept free of invasive species and trees.



**Outlet Structure:** These structures are designed to hold and release the water from the stormwater pond at different rates based on the amount of rainfall or run-off. They are mostly concrete structures now, but older ponds may also have galvanized steel structures or other types of pipe risers. Outlet structures may also have trash-racks on the low-flow (bottom orifice) and overflow (top of the structure). Trash racks need to be secured and kept in place. Outlets and the associated trash-racks should be kept free of trash, debris and vegetation. They also need to be checked for any structural weaknesses or leaks that could jeopardize the function of the system.



**Inlets:** An inlet is an area, often a pipe, that conveys run-off from surrounding paved areas and property to the stormwater pond. Inlet pipes are typically concrete, high strength plastics,



or galvanized steel. Where inlets enter the pond there are rip-rap (stone) dissipaters or aprons designed to reduce run-off velocity to prevent erosion and catch sediment and debris before it enters the pond. The inlet should be periodically checked for sediment build-up in the pipe. The rip-rap dissipater should also be kept free of vegetation and checked for erosion or sediment build-up. Sediment, invasive vegetation, or erosion at inlet areas can cause drainage issues and reduce the life-span of the pond.

**Forebay:** Forebays may be located at inlet areas. They are small zones segregated from the rest of the pond by rip-rap, stone gabions or earth embankments. The purpose of a forebay is to collect sediment before it enters the rest of the pond, making maintenance and sediment removal easier. Forebays need to be checked for sediment build-up to function properly. They should also be kept clear of trees and invasive vegetation.



**Emergency Spillway:** The emergency spillway is a cut-out in the top of the basin's embankment where water can leave the pond during an extreme storm or rain event. These areas can be stabilized with concrete, rip-rap or herbaceous vegetation. The emergency spillway should be kept clear of trees, sediment, and debris. They need to be checked for any erosion or structural weaknesses.



**Safety Bench:** Depending on the age and jurisdiction of your stormwater pond, it may have safety benches. There are normally two benches, one is one foot above and one is one foot below the permanent pool of the pond (normal water level). They are designed to prevent someone from falling into deep water if they fall near the edge of the pond. These areas should be kept free of trees and invasive vegetation and stabilized with grass and/or beneficial wetland plants.



It is important to note that design elements may differ in some ponds and stormwater BMPs, but by recognizing these basic pond parts, you can work with a stormwater management professional to develop an annual pond maintenance and management plan that keeps your stormwater area functioning properly and reduces long-term capital expenditures.

Design elements and regulations will also differ from jurisdiction to jurisdiction, so it is important to work with a certified stormwater BMP inspector when developing stormwater inspections and maintenance programs. Contact your local pond professional to discuss your pond or to schedule an inspection. ■



# Be Part of The SOLution with SOLitude

**J**oin the SOLitude team as we create a better world, starting in our local communities. Check out some of the fun and inspiring events and campaigns that we supported this spring as part of our commitment to environmental stewardship and community involvement:



**1.** The Delaware team participated in an annual beach grass planting event. Volunteers planted 2,600 stems of Cape American Beach Grass, throughout a 2 mile stretch of coastline, to help prevent beach erosion in **Delaware Seashore State Park**.



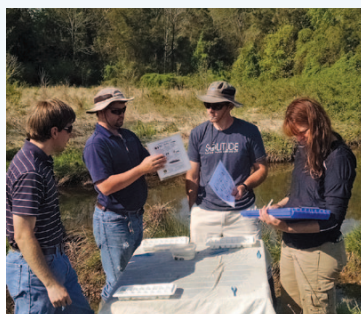
**5.** The Delaware Team celebrated Earth Day by participating in the **Brandywine Valley Association's Annual Creek Clean-up** in Downingtown, PA. 200 event participants gathered 2.8 tons of trash from 25 miles of the creek and 7 miles of nearby roads.



**2.** Lead Fisheries Biologist, David Beasley, volunteered at the **Graves Mountain Lodge Heritage Day** in Syria, VA. It was a fun-filled day helping to educate kids about fishing and the environment, and the importance of getting outdoors.



**6.** The Carolinas Team celebrated Earth Day by participating in an annual spring Clean-Up-A-Thon at Jordan Lake near Raleigh, NC. The group helped the **Haw River Assembly** to collect its 10,000th bag of trash since the clean-ups began in 2009.



**3.** The Northern Virginia Team volunteered with the **John Marshall Soil & Water Conservation District** performing water quality monitoring and sampling macroinvertebrates. The info gathered will be used to determine stream health in VA.



**7.** The Virginia Beach team participated in an Earth Day trash clean up with **Surfrider Foundation** at Lake Holly in Virginia Beach. The group worked to collect 242 pounds of trash from the banks of the lake and streets surrounding the area.



**4.** The Delaware, Hampton Roads and Charlottesville, VA teams volunteer regularly with their local **Food Banks** preparing meals and snacks for school programs and emergency food boxes that can sustain a family in crisis for a week.



**8.** In honor of Earth Day and Arbor Day, SOLitude partnered with the **National Forest Foundation** to plant two trees for every new social media follower in the month of April. Thanks to the support of our fans and followers, we planted 200 new pine trees!

Join the fun and help support your local community! We encourage our clients, vendor partners, family and friends to be part of The SOLution. If you would like to share a non-profit's goals or upcoming event, or join the SOLitude team at a future volunteer day in your area, visit [www.solitudelakemanagement.com/community](http://www.solitudelakemanagement.com/community) for more information. ■

**The SOLution**  
creating a better world

# New SOLs

In each issue, staff members from SOLitude are highlighted. It is our pleasure to introduce the incredibly talented members of our team and give you insight into the vast array of knowledge and experience they offer.

**Q Where did you grow up and how did you get to where you are today?**

**A** I grew up in Orrtanna, Pennsylvania, a rural area outside of Gettysburg, where I first found a love for the outdoors, splashing around in the creeks and exploring nature. I studied at the University of Delaware, then gained ten years of customer relations experience in the retail and service industries back in PA before getting into the construction industry, where I specialized in trim carpentry and building cabinets. My strong work ethic and versatility, combined with a true passion for the outdoors led me to SOLitude Lake Management in early 2015.



**Kirk McDannell**  
Aquatic Specialist

**Q What are your overall responsibilities and how do you bring value through your current role at SOLitude?**

**A** After completing an extensive lake and pond management training program, I am now servicing our clients' waterbodies throughout DE, PA and MD. I carefully articulate the needs of their lakes and ponds to allow for a beneficial and successful outcome for both our clients and the ecosystem. My past experiences have enabled effective communication and quick problem solving techniques.

**Q What excites you most about your work and what is your biggest challenge?**

**A** I am excited to be outside in nature, helping to make a positive impact on the environment. Being able to find the right balance between nature and waterbodies is a difficult challenge. My job evolves daily with new information and techniques that need to be incorporated to exceed my clients' expectations. I'm enjoying seeing the rewards that come with helping to fulfill our ecological mission.

**Q Where can we find you when you're not working?**

**A** I enjoy camping, biking, boating, and golfing. I'm an avid hockey fan and my ideal setting is a private log cabin nestled in the woods with a fireplace.

**Q Where did you grow up and how did you get to where you are today?**

**A** The majority of my formative years were spent in Virginia Beach and I bring over a dozen years of business and executive administration experience. Most recently, I worked directly for chief officers at a Fortune 500 company before coming to SOLitude. I truly enjoy being part of a team and helping a company reach their ultimate goals. My unending work ethic, love of family and a commitment to organizational success has helped me get where I am today.



**Sharon Delaney**  
Executive Assistant

**Q What are your overall responsibilities and how do you bring value through your current role at SOLitude?**

**A** I currently assist Kevin Tucker, SOLitude's President, with human resources, financial and legal/compliance administration, staff trainings and internal meetings. I take pride in my natural curiosity and enthusiasm for learning, and from these traits and my experience working with growing small businesses, I find efficiencies and create process improvements to help grow a business without shedding the essence of the company's culture.

**Q What excites you most about your work and what is your biggest challenge?**

**A** Learning a new industry is the most exciting, yet most challenging, aspect of my job. Being able to learn and work with every aspect of the business and with all my teammates comes with such rewarding experiences each day. Personally, I am most proud of achieving the proper balance between my work and need to be with family, which tends to be a challenge for many mothers.

**Q Where can we find you when you're not working?**

**A** You can find me walking my dogs, biking to the beach, or cheering at the soccer field. I like to stay active and spend quality time with my husband, three boys and close relatives.

## Congratulations to Volunteer of the 2nd Quarter, Ann Marie Dori

*Ann Marie Dori, Marketing and Special Projects Coordinator, is passionate about both the environment and helping animals. In the first quarter alone, she spent over 70 hours volunteering for organizations such as the Virginia Beach SPCA, Lynnhaven River NOW, Virginia Peninsula Foodbank, and FiXiT Foundation. In addition to coordinating and joining all of the Hampton Roads SOLitude team's community outreach events, Ann Marie continues to honor her personal goal and commitments by volunteering at least once a week at the Virginia Beach SPCA cat adoption center and conducting independent trash cleanups every weekend in the Ocean View beach area of Norfolk, Virginia.*

*Ann Marie's true passion naturally inspires friends, family and even strangers to join her in her cleanup efforts, and her dedication to volunteerism motivates each of us to help create a better world. Congrats Ann Marie and thank you for being part of The SOLution! ■*





# Enhance Your Fishing Experience With Tiger Muskies

By **David Beasley, Fisheries Biologist**

A unique aspect of lakes and ponds is the mystery of what is lurking beneath the water's surface. This level of uncertainty feeds a curiosity and excitement, motivating anglers to spend time on the water. Unfortunately, for the average angler, life is simply too busy to fine tune fishing skills and successfully catch big fish on a regular basis.

In an attempt to enhance the mystery and excitement of the fishing experience, and to increase the frequency at which big fish are caught, SOLitude has introduced 560 tiger muskies into ten ponds throughout the mid-Atlantic region over the last 18 months. Tiger muskies are a cross between a muskellunge and a northern pike and are a unique fish in that they are produced in fish hatcheries and rarely occur naturally in the wild. Although both of their parent species are known for their thriving populations in the northern cool water environments, tiger muskies' hybrid vigor allows them to tolerate warmer water, and as a result they can inhabit regions further south.

Although tiger muskies are not commonly found in ponds throughout the mid-Atlantic region, these fish should have what it takes to do well in this environment. The fall, winter and spring water temperatures are ideal and should provide the needed strength and energy to withstand the hot summer months.

Tiger muskies, along with one of their parents, the muskellunge, both have a reputation of being the "fish of ten-thousand casts." Generally speaking, muskies can be very difficult to catch since their populations are naturally low, but one of the benefits to smaller waterbodies is the ability to successfully manipulate the fish population to support higher numbers of fish than a waterbody

naturally could. This is done by encouraging the base of the food chain to thrive while ensuring that all aspects of the habitat are suitable for the fish species present.

Most of the 560 muskies we stocked were tagged to help track growth along with survival rates over the years. By collecting this information we are able to establish a scientific data set that can be used in the future to help biologists better manage small impoundments for these unique fish. After a year and a half of growth, the tiger muskies are showing great promise as they continue to grow at a respectable rate. Although we are unable to determine survival rates at this time, it is clear that the fish are growing. In the last 18 months, they have grown on average 11.5 inches and 2.4 pounds, meaning our now two year old tiger muskies are averaging 22 inches in length and 2.6 pounds.

With the quick growth experienced to date, these fish are on track to reach large sizes and bring an elevated level of mystery and excitement to small impoundments in this region. Although they are capable of reaching over four feet in length, these muskies will likely be 10 years old before they reach that size. Due to the amount of time it takes to grow big tiger muskies, it takes a level of foresight and patience to create a fishery of a lifetime. In many situations, it is an important goal for landowners to have good fishing in their lakes and ponds, but they don't often focus on fundamental fisheries improvements like enhancing water quality, establishing cover, maximizing productivity and perfecting predator-to-prey ratios. Due to the time it takes for fish to grow, it is wise to plan ahead and start making fisheries improvements years before you can achieve great fishing success. ■



**SOLitude is a founding member of the Society of Lake Management Professionals**, a society specifically for lake management professionals, originated, organized and run by lake management professionals. The organization's mission is to foster an appreciation for and enhance the management of lakes and ponds, managed by for-profit companies, with particular concern for the aesthetic and recreational uses and stewardship of such waters. Using tools such as innovation, education, representation, accreditation, and standardization of best management practices, the organization advocates wise stewardship of privately owned water, promotes and recruits fishing opportunities in private water environments, and protects our environment. Learn more at [www.lakeprofessionals.org](http://www.lakeprofessionals.org). ■

# Before and After Showcase



**Location:**  
Charlotte, North Carolina

**Surface Area:**  
0.15 acres

**Primary Target:**  
Azolla

**Restored By:**  
Marc Harris, Fisheries & Wildlife Biologist



**Location:**  
Richmond, Virginia

**Surface Area:**  
0.2 acres

**Primary Target:**  
Filamentous Algae

**Restored By:**  
Brent Weber, Environmental Scientist

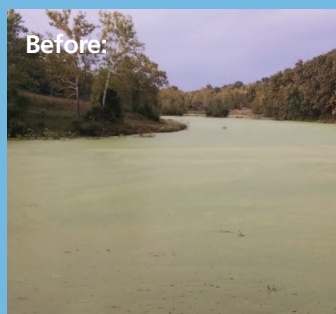


**Location:**  
Upper Marlboro, Maryland

**Surface Area:**  
0.5 acres

**Primary Target:**  
Filamentous Algae

**Restored By:**  
Doug Hawpe, Natural Resources Specialist



**Location:**  
Berryville, VA

**Surface Area:**  
7.2 acres

**Primary Targets:**  
Watermeal and curly-leaf pondweed

**Restored By:**  
Jeremy Haley and David Beasley, Fisheries Biologists

Visit [www.solitudelakemanagement.com/education](http://www.solitudelakemanagement.com/education) to download **Your Guide to Sustainable Pond Algae and Aquatic Weed Control** and **How to Restore Lake and Pond Water Quality Through Nutrient Management**. Learn from the experts at SOLitude and help ensure your lakes and ponds are healthy and looking good year round with a sustainable annual management plan.



## Check Us Out...

**S**OLitude Lake Management will be participating in the following events over the coming months. We encourage you to come see us! If you need information on attending any of these events, please call our office at 888-480-LAKE.

### July 30 - Aug 2

**Community Associations Institute (CAI) – Virginia Leadership Retreat**  
The Homestead, Hot Springs, VA,

### September 26

**New Jersey Chapter of CAI – Annual Conference and Expo**  
Garden State Exhibit Center, Somerset, NJ

### October 1 - 2

**South Carolina Chapter of CAI – Annual Conference and Tradeshow**  
Kingston Plantation, Myrtle Beach, SC

### October 27

**Chesapeake Chapter of CAI – Expo and Business Provider Showcase**  
Martin's West Caterers, Windsor Mill, MD



SOLitude was named to the Virginia Chamber of Commerce's Fantastic 50 List recognizing the fastest-growing companies headquartered in Virginia. Companies were judged on 4 year growth rates.

It is the combined effort and focus of our entire team, along with our committed vendor partners, that allows SOLitude to continue to grow and provide our clients with the high level of services that they deserve and have come to expect.





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- Ultrasonic Algae Control



# AquaticsinBrief

SUMMER 2015 | Volume 9, Issue 3

## Ponder These Thoughts

**S**OLitude Lake Management wants your pond to be prepared for warm weather. With this in mind, we recommend that you consider the following during the summer months:

- Warm summer weather seems to bring out the best and the worst in ponds. Although algae and aquatic weeds seem to be more abundant at this time of year, a year-round maintenance plan is the best way to ensure a healthy pond all year long.
- Summer is the perfect time to think about aeration. The warmer water temperatures can be detrimental to the overall health of your pond. Increase oxygen, reduce stagnation and stratification, and prevent algae, mosquito breeding, fish kills and many other water quality problems with a properly sized aeration system.
- Mosquitoes can ruin summer fun. Think about stocking your pond with juvenile bluegill, fathead minnows and other small fish that help to control the mosquito population. This, along with beneficial buffer plants and proper aeration, can help eliminate a potentially big problem.
- Remember to respect the natural buffer around the lake and never mow all the way to the water. Also, be sure to keep clippings and other debris out of the water as this adds nutrients and spurs algae growth.
- Summer months = Good fishing! Make sure you maintain your fish habitat with good water quality and cover. Consult our experts if you have questions about proper maintenance of your fishery.
- Plan a Labor Day fishing event in your community. Be sure your pond is stocked with easy-to-catch fish, like bluegill and largemouth bass, and have a fisheries biologist tag some fish to allow for special prizes.

