Sapphire Koi

The beginning of a new gem

p.20

Dead Zones p.23 | Give That Water Some Air p.29 | Bog Water Filtration p.45
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“Getting Better Together” is the perfect theme to describe the exciting format and venue of this year’s Pondemonium®, the water garden industry’s premier training event for contractors, retailers, and distributors. Held August 5th-8th at the beautiful Q Center in St. Charles, Illinois, you’ll learn how to transform yourself and your business to meet the ever-changing needs of today’s fast-paced society.

You’ll Learn How to …
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What’s more, you’ll learn about Aquascape’s newest products like the highly popular Automatic Dosing System, the Spillway Bowls, and more!

This year, we offer two tracks: one for owners and operational managers, the other for foremen and retail staff. Our venue at the Q Center provides ample opportunity to create experiences tailored to all aspects and learning requirements!

To register or for more information about Pondemonium and the Q Center, visit www.pondemonium.com today!
A Pond They Can Live With

It was every pond owner’s nightmare: 400,000 gallons of chocolate-brown water. Countless “disappearing pond pros” had tried to fix the problem with aeration, flocculants and dyes, and the customers’ hope for a crystal-clear koi pond was nearly gone. But that’s when Mike Gannon took on the project...

Testing the Waters

What’s in your water? Here’s a hint: it’s far more than just fish and plants. And the contaminants, chlorine, ammonia and other elements in your water can be the difference between a pond that teems with life and one that kills it off. On pg. 15, Andrew Roberts teaches you how to test your water and what to do with the results.

Sapphire Koi

They’re orange, white, silver, red — and blue! Thanks to Joe Pawlak and Blackwater Creek Koi Farms, your favorite fish are now available with a sapphire hue that’s a joy to behold. Turn to pg. 20 to feast your eyes on these blue beauties and learn how Joe transformed them from crazy suggestion to swimming reality!

Dead Zones

You know that humans can’t survive without oxygen. But did you know the same is true of your scaly pets? “Dead zones” are oxygen-depleted areas of a pond, and their name isn’t just for shock value. Fish that wander into a dead zone can die before they’re even able to flick a fin. Thankfully, Jamie Beyer has the information and tips you need to keep your water oxygenated and your fish in good health!

Unhappy Endings

It happens to the best of us: a customer who seemed so excited when he signed the contract later decides to cancel the job. Infuriating, yes … but don’t lose your cool! With Michael Stone’s advice, all is not lost. The author of multiple business books and blogs shares the customer service secrets that could help you salvage the relationship … and maybe even save the sale.

Give That Water Some Air!

Larger ponds benefit in several ways from aeration, which is not only about oxygen levels, but also mixing and gas exchange. But a 1-acre pond with an average depth of 6 feet contains almost 2 million gallons of water! How do you get enough of that pond moving and in contact with the atmosphere to aerate it? There are a plethora of ways, and Ken Rust shares them all!

Good Clean Fun!

Remember the good ol’ days of carefree swimming in a backyard pond or lake? David Duensing does — and he knows how to bring them back! What’s more, he knows how to turn that nostalgia into an exciting new business opportunity. Turn to pg. 35 to learn the ins and outs of building, filtering and maintaining swim ponds!

Fractal Plumbing

Proper plumbing is one of the most overlooked areas of pond design. When upgrading poorly or underbuilt ponds, the existing plumbing is usually the toughest obstacle to overcome. But with some basic math skills and Kent Wallace’s fractal plumbing know-how, you can get your pond’s water filtered, aerated and moving in the right direction.

Bog Gravel Filtration

In the wild, bacteria turn fish and plant waste into fertilizer, which in return feeds the plants and creates maintenance-free, clear water. But what if you could harness that same natural filtration in your pond? With bog gravel filtration, you can — and the result is happy customers!
Upcoming Events

July 10 - 12
Tri-State ZNA Koi Show
Kodama Koi Garden
Saddle River, New Jersey
www.tristatekoi.com

August 6 - 8
IGC East
Baltimore Convention Center
Baltimore, Maryland
www.igcshow.com/East2015/public/MainHall.aspx

August 5 - 8
PONDEMONIUM
Q Center
St. Charles, Illinois
www.aquascaperce.com/pondemonium

August 13 - 15
IGW Symposium
Water’s Edge
Lawrence, Kansas
www.igw.org

August 18 - 20
IGC Chicago
Navy Pier
Chicago, Illinois

August 26 - 27
Holmes Farm Pond and Pet Trade Show
Bear Creek Mountain Resort
Macungie, Pennsylvania
877/412-farm (3276)
www.holmesfarm.com

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www.hardscapena.com

Are you attending an event that you think others should know about? Are you hosting an event and want more people to come? Send event info to pr@pondtrademag.com.

September 11-13
ZNA Potomac Koi Show
Meadowlark Gardens, Virginia
www.znapotomac.org/show.htm

October 21 - 23
Hardscapes and GIE+EXPO
Kentucky Exhibition Center
Louisville, Kentucky
www.hardscapeusa.com

November 7 - 12
Pool | Spa | Patio Expo
Mandalay Bay Convention Center
Las Vegas, Nevada
www.poolspapatioexpo.com

November 11 - 12
Irrigation Show
Long Beach Convention Center
Long Beach, California
www.irrigation.org/IrrigationShow

2016
January 6 - 8
MANTS
Baltimore Convention Center
Baltimore, Maryland

January 11 - 13
CENTS
Greater Columbus Convention Center
Columbus, Ohio
www.centsmarketplace.com

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Only to see the pond version of an Internet celebrity? We posted the photo below on POND Trade’s Facebook page, and in one week we had the following stats:

785 Likes 146 Comments
709 Shares
376 New Facebook Followers
Did you see that last number? 376 new people checking us out, following our posts and jumping onto our website! To put that in perspective, we usually average about 15 New Followers a week. Our little pond just got a lot more crowded!

It goes to show that there’s a huge community of people who are interested in what we have to say — and what you, the experts, have to sell! Keep that in mind as you market online. Social media is alive and well. Use it!

Speaking of alive and well, do you know what a “dead zone” is? Jamie Beyer does, and on pg. 23 he shares the knowledge you need to keep these deadly, oxygen-depleted areas out of your pond. On pg. 15, Andrew Roberts details the other chemical elements that affect your water — and how to test for them. And filtration expert Anita Nelson gets “down and dirty” with natural “bog gravel filtration” on pg. 45.

Sometimes the only remedy for poor water quality is to “start fresh,” and Mike Gannon did just that … on a huge scale. Turn to pg. 8 to learn how he and his team renovated a 400,000-gallon pond! Industry veteran David Dunham offers a comprehensive overview of the “good, clean fun” to be had in naturally filtered swim ponds on pg. 45. Sometimes the only remedy for poor water quality is to “start fresh,” and Mike Gannon did just that … on a huge scale. Turn to pg. 8 to learn how he and his team renovated a 400,000-gallon pond!

It goes to show that there’s a huge community of people who are interested in what we have to say — and what you, the experts, have to sell! Keep that in mind as you market online. Social media is alive and well. Use it!

Instead of going to school, millions of young children must walk for miles, just to gather water for their families.

Give these children hope!
When we finally turned to the last page of my proposal, I figured the gig was up. It was now time to talk money, and this number would surely get me thrown out of the house. I’ve been dismissed from potential customers’ kitchen tables for less!

The response back at me was immediate, without even an uncomfortable shift in the chair. “When can you start this? I want my grandkids to enjoy this pond.”

The 4-year-old pond had never been clear and healthy. As my new client prepared the deposit I gazed out the kitchen window at 400,000 gallons of pond water looking an awful lot like the chocolate river at Wonkaland on St. Patrick’s Day. I promised to give them clean, clear pond water that could support “those colorful koi fish” my client wanted. I promised “a pond they can LIVE with,” and my plan was good.

As the deposit check was passed into my hand, I thought to myself, “Gannon, what the hell did you just do?” And the biggest pond project my company, Full Service Aquatics, has ever taken on was underway.

Starting From Scratch

A string of landscapers and pond guys had previously offered a string of solutions. “Drain it and fill,” one suggested, only to find that the clear, new water filling the pond was immediately turbid. “Aeration,” suggested another, which made the effect worse. Flocculants were used, added daily for months, with no effect. Dyes made the pond look unworldly. The “wetland filter” installed by the last “disappearing pond contractor” became impacted and useless within days. As the project began, the water quality looked like Yoo-hoo with a slight green-blue tint.

The pond is the main landscape feature of the large estate, made up of an upper and lower pond connected by a spillway. Both have very large moss rock boulders along their shorelines. The main pond had an exposed mud bottom and measured in at about 150 feet by 100 feet with an average depth of 4 feet and a maximum depth of 8 feet. The upper pond area was intended to be a “wetland filter” area measuring about 55 feet by 40 feet. The upper pond was fed by two large external pumps. Thoughtlessly displayed along the shoreline, the pumps sucked turbid water directly from the pond bottom without any prefilters, spilling back into the lower pond via an unimaginative, large, flat slab of bluestone.

There was no way I would take on attempting to correct the numerous issues created by several other contractors. The only option I offered was complete renovation; a fresh start to achieve 400,000 gallons of clean, clear, filtered, koi-quality water conditions.

The Plan

- Drain the upper and lower ponds completely and remove all existing equipment
- Install geotextile liner to lower pond; install 45-mil EPDM liner to upper pond
- Fabricate undergravel suction/backflow grid
- Cover liner of lower pond with mixed grades of gravel substrate from 3/4 inch to 8 inches
- Build two shoreline skimming zone intake bays in lower pond
- Install professional-grade aeration system with two diffusers in lower pond
- Convert upper pond into massive planted wetland filter with waterfall feature
- Create beautiful natural stone waterfall spillway from upper pond into lower pond
- Get some koi!
The Materials

- A bunch of wheelbarrows and a Case 510 backhoe
- 15-foot-wide rolls of geotextile, and lots of it
- A single 100-foot by 50-foot roll of EPDM liner
- Aquablocks, centipede modules and snorkel pump housings
- 4” Flex PVC pipe and fittings
- Three 15,000-gph submersible pumps
- Drilled drainage pipe
- Twin diffuser aeration system
- 250 tons of gravel and stone
- 400,000 gallons of water
- Lots of aquatic plants
- Koi

Pulling It Off

I planned for an 18-day project timeline. The first step was to drain the pond, and this took three days! While draining the pond, we staged the project site and received deliveries, and the crew broke down the existing “wetland filter.” The gravel in this “wetland filter” was so compacted that it bonded together like concrete; it was a tough process to jackhammer this solid block of gravel. Once we got down to bare liner we stripped it out and began reshaping, enlarging and deepening the shallow bowl we discovered. We excavated the interior of the upper pond for the construction of an effective wetland filter. The lower pond was dewatered now, and no excavation was necessary in the lower pond. The geotextile lining of the lower pond went the length first, then crossed the pond with edges overlapping each other about 3 feet. Along the shoreline we lifted the massive rocks, quickly tucking geotextile under and behind each boulder. The geotextile lining was not intended to hold water; instead, it was used to separate the pond’s mud bottom from the water column. The lining of the pond would create an instant clearing effect.

Once the ponds were lined my team broke into two crews. One crew focused on constructing the wetland filter and suction grid, while the other crew revved up their wheelbarrows and began the first of many days of hauling gravel over a boardwalk of plywood to begin the rocking in of the lower pond. Progress was made until the bottom of the pond was covered. The wetland filter was constructed with centipede modules and snorkels covered with a bed of Aquablocks. Once the main pond was rocked in, the gravel and stone team switched their focus to the newly assembled wetland filter. The equipment team jumped into the main pond for construction of the two skimming zones, installation of plumbing lines and aeration system.

Skimming and Clearing

The skimming zones allow for a complete circulation pattern on the surface of the pond, drawing floating debris away from the main shoreline of the pond. Large intake bays allow for easy collection of floating debris and maintenance access. The skimming zones would collectively draw in 45,000 gph by way of the three 15,000-gph submersible pumps. The series of 4” plumbing lines run from the skimming zones to the wetland filter and suction grid. The aeration system’s two powerful diffusers circulate water from the bottom of the pond to the surface, efficiently degassing and oxygenating the pond.

The wetland filter was turned into a thing of beauty. We created “raised beds” within the filter by framing out the edges of the wetland filter with boulders and backfilling with gravel. The beds rise 8 inches or so above water level, creating a pond in the middle of these beds to house water lilies and lotus. The raised areas were for varieties of nutrient-absorbing bog plants. A decorative, 10,000-gph waterfall within the wetland filter was added as well. The flow coming out of the wetland filter will cascade over a redesigned moss rock waterfall spillway into the lower pond. 20,000 gph will flow up through the wetland filter’s bed of gravel to be joined by the 10,000 gph flowing out of the waterfall display to create our new 30,000-gph naturalistic spillway into the main pond.

No Garden Hose Will Do

The construction phase of the project was coming to an end, and it was time to clean the pond. A large-scale koi pond is designed for complete relaxation.
worksite and fill the pond. A garden hose was not going to fill this pond! While the team picked up, cleaned, raked, mulched and detailed the project over the next several days, a steady stream of 6,000-gallon water tankers made their way to the site to unload their cargo.

When the pond was full, it looked amazing. The pristine water had a clear, Caribbean-blue quality to it, with glints of sunlight. I knew this Caribbean look was only a temporary effect that would change once the pond had circulated for a few days, and it was time to start circulating the pond and testing all the systems we had installed.

Testing

First we tested the aeration system. We plugged in the remotely located compressor, and a few seconds later we had two points of aeration happily bubbling away on the surface of the pond.

Next up were the skimming zones. Each zone’s pump was plugged in, one at a time, and each pump responded with a strong draw of water flowing into the new skimming zone intake bays and our under-gravel suction grid.

When the last pump was plugged in, the wetland waterfall display in the wetland filter roared to life with 10,000 gph of whitewater splashing down the face of the moss rock waterfall.

Everything was coming together nicely, sounding good and looking good. The wetland basin was filling, and soon water would be welling up between the grains of gravel and continuing to fill, creating the upper pond. 30,000 gallons were now making their way over the spillway. The clear water looked beautiful, and the waterfall sounded just as beautiful. Our client’s pond was now fully functional.

Waiting in Suspense

My clients are private people. Since I could not be there when my clients returned home, I was anxious for the call from them to come in. My mind ran with every possibility as to how they could react. Would it be a tearful “Thank you”? Or would I be brutally tossed into the very pond I created for them? Would the gig be up?

Luckily our clients were happy — very, very happy. For a pond professional, there is not a much better feeling than to well exceed your client’s expectations.

Continuing the Story

The next week they had 13 large, beautiful Japanese koi (some with certified bloodline birth certificates), and the following week those koi spawned! Now my clients have many hundreds of baby koi creating a moving swirl of living color in their pond — in addition to the 13 impressively large koi! My clients could not be happier, their grandkids love it, and their new koi pond is now “a pond they can LIVE with.”

About the Author

Mike Gannon is the owner of Full Service Aquatics based in Summit, New Jersey. Mike has been a lifelong pond enthusiast and fishkeeper. Mike began Full Service Aquatics after working as a fish dealer and a stint at the New York Aquarium. FSA has been specializing in pond and water feature design and services since 1995.

Mike is host of The Pond Hunter Radio Broadcast found on iTunes. His Pond Hunter videos can be found on youtube.com/thepondhunter, and he is the author of the LOVE YOUR POND blog found on fullserviceaquatics.com.
What’s in your water? Is it safe? Do you know? In most instances, a pond owner will fill up his pond with water that is readily accessible and cost-effective. The two typical types of water available are either municipal water (pretreated by the city) or well water (which is drawn from the ground and has had no pretreatment). This, unfortunately, brings unwanted chemicals and additives into the tank and varies significantly depending on the source.

Contaminants

The contaminants found in municipal water typically include things such as chlorine, chloramines and, in some instances, phosphates, metals and an artificially raised pH.

In most instances, well water, on the other hand, is going to carry a much higher hardness than a typical city water, along with metals and dissolved gases such as carbon dioxide. Another thing to keep in mind is that, regardless of whether a water source is from the city or a well, the water quality may not remain the same every time you use it. These situations show us that the source water will most likely need testing and must be remedied before it can be deemed a safe environment for fish to thrive.

pH

pH is the unit of measure used to determine just how acidic or alkaline a body of water is. Most freshwater fish thrive when the pH level is between 6.6 and 7.8. Bear in mind that rapid changes in pH can cause stress in fish and it is recommended to not alter pH more than 0.3 pH every 24 hours. As most source waters should fall well within this range, no initial editing of the water’s pH should be needed. However, it has been known that driftwood and rock will lower pH slightly, and aeration will raise pH. Keeping this in mind when adding aerators or water features can save some headaches in the future.

Chlorine

Chlorine is added to municipal drinking water as a way to ensure bacteria and other organisms are eliminated before reaching the consumer. Although this is
good for drinking water, any level of chlorine can be harmful to fish and should be removed by using a chlorine remover such as Sodium thiosulfate. Chlorine can also be in the water in its combined form, which is also known as chloramines. Chloramines are created by municipalities to increase the shelf life of chlorine and are made by mixing chlorine with ammonia. Both ammonia and chloramines are harmful to fish. However, ammonia at lower levels have the ability to poison a freshwater tank. It is recommended to test regularly for ammonia and dilute when ammonia reaches a maximum of 0.25ppm ... however, the ideal ammonia level is 0.0ppm. Another thing to keep in mind is that ammonia is more toxic the higher the pH of your water is. This is caused by the higher pH keeping the ammonia as pure ammonia, whereas the lower the pH, the more ammonia is converted to ammonium ions, which are less harmful to freshwater fish.

Ammonia

Ammonia is produced by decomposing fish waste, decaying plants and unconsumed food. Bacteria is used to convert ammonia to nitrates and eventually nitrates by binding ammonia with water. Both ammonia and nitrates are harmful to fish. However, ammonia at lower levels have the ability to poison a freshwater tank. It is recommended to test regularly for ammonia and dilute when ammonia reaches a maximum of 0.25ppm ... however, the ideal ammonia level is 0.0ppm. Another thing to keep in mind is that ammonia is more toxic the higher the pH of your water is. This is caused by the higher pH keeping the ammonia as pure ammonia, whereas the lower the pH, the more ammonia is converted to ammonium ions, which are less harmful to freshwater fish.

Nitrates

Nitrates used to be considered harmless to fish. However, recent studies suggest that high concentrations of nitrates can be harmful. In addition to causing unhealthy fish, an abundance of nitrates can also feed algae blooms, making the water cloudy and leading to a buildup of ammonia.

Total Alkalinity

Also referred to as Carbonate Hardness or KH, the total alkalinity of your water determines how well the pH is going to stay at its current reading. A lower total alkalinity will allow the pH to fluctuate easily, which can be stressful to fish and also stunt the growth of live plants in the tank. In the opposite instance, a higher total alkalinity can be difficult to adjust if the pH is too high. Typically the carbonate hardness is measured in dH, or degrees of hardness. To get dH from ppm, divide your ppm result by 17.8. To get a ppm reading from a dH result, simply multiply your dH result by 17.8.

Hardness

Hardness is also known as General Hardness, which is the amount of dissolved calcium and magnesium in water, typically measured in dH. The terms “soft” and “hard” water are used to generally describe the level of hardness. The lower the hardness, the softer the water. And the higher the hardness levels, the harder the water is. As most hardness is supplied from calcium carbonate levels in water, editing the hardness can lead to changes in the total alkalinity. It is typically recommended to only edit the hardness if absolutely necessary.
The parameters above are essential for aquarium testing. However, other parameters that might need observing include copper, phosphates, nitrates and salinity. Each type of fish will have its preferred environment, which must be understood before determining the correct levels in a pond. For example, some fish prefer a softer water, while others thrive best in harder water situations. Doing research before testing is very important to not only ensure the correct environment but to select the appropriate test kit. As the world moves toward a digital era, so too do testing devices. The benefits that a digital kit can offer include higher degrees of accuracy, easier test procedures, no color blocks to analyze, data management and storage.

In conclusion, it is extremely important to not only know what is in your water, but how each parameter can affect the livelihood of an aquatic ecosystem. Be mindful of where the source water is coming from, what the initial water balance is and where each parameter needs to be to ensure a healthy and productive environment needed to obtain the desired end result.

**About the Author**
Andrew Roberts is a native of London, England and grew up on the Caribbean island of Barbados. Currently the Assistant Sales Manager at Industrial Test Systems, he has been with the company since February 2010.

Andrew is one of the primary inventors/patent holders of ITS’ latest invention, the eXact iDip. Andrew studied at the Lodge School in Barbados, where he accomplished his A Level exams with distinction at the age of 16. Afterward, Andrew moved to the United States and studied Architectural Building Technology at The New England Institute of Technology.

In addition to his work at ITS, Andrew also owns a water quality distribution company in the Caribbean and is involved in a startup project based in Ontario, Canada. Andrew currently lives with his wife and two children in Tega Cay, South Carolina and can be contacted at aroberts@sensafe.com.

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- Top 5 submission will be awarded a minimum of $1000
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Andrew Roberts is a native of London, England and grew up on the Caribbean island of Barbados. Currently the Assistant Sales Manager at Industrial Test Systems, he has been with the company since February 2010.

Andrew is one of the primary inventors/patent holders of ITS’ latest invention, the eXact iDip. Andrew studied at the Lodge School in Barbados, where he accomplished his A Level exams with distinction at the age of 16. Afterward, Andrew moved to the United States and studied Architectural Building Technology at The New England Institute of Technology.

In addition to his work at ITS, Andrew also owns a water quality distribution company in the Caribbean and is involved in a startup project based in Ontario, Canada. Andrew currently lives with his wife and two children in Tega Cay, South Carolina and can be contacted at aroberts@sensafe.com.

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**Contest Information**
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Language of Koi

Sapphire Koi

The beginning of a new gem

by Joe Pawlak,
Blackwater Creek Koi Farms

WOW! That’s what I said after seeing the harvest of a special spawn we had been working on for quite some time. It was nice to finally see a glimpse of what we have worked so hard to create.

We’ve fielded numerous phone calls and in-person requests in the past few years for rare and unique koi. We’ve been asked for some out-of-the-ordinary fish, and frequently for blue fish. About three years ago we decided to take these requests seriously and start work on producing a new variety of koi. Although we were unsure what the outcome or our success would be, we just knew that we had to try.

Throughout the years I’ve been asked, “What makes koi farming appealing still after all this time?”

I’d say, “It’s the challenge; the successes and the disappointments of pursuing new varieties and looks!” We swing for the fences — and end up striking out a lot. But, it only takes a few home runs to really charge us up to continue the chase for new and unique fish.

Goal: Produce a bright blue koi that would show great colors at an early age and would be affordable and enjoyable to many people.

How: Start with a blue tint in koi from another variety and monitor outcomes, adjusting as needed.

Where: Blackwater Creek’s central Florida location with the longest growing season and good, hard water.

Blue Koi

There are variants of blue koi currently available throughout the world. These fish tend to either be a less vibrant blue/grey color, or a blue expressed only while the black coloration has not developed completely on the surface of the fish (such as the Kumonryu). With these blue fish, the hobbyist must typically wait for the fish to grow large to develop the blue coloration. My goal at Blackwater Creek was to have a vibrant blue color in koi at a young, affordable age.

Metrics of Success

Success: repeatable results with multiple spawns of different parents, with prevalence rates of 2 percent or higher. At least 2 percent of the offspring (or more) were of the desired look/outcome.

Color Fastness — Colors should be vivid and true in both warm pond water and cool tank/well water.

Metrics of Quality

1. Blue color should be as deep blue as possible. Blue colors tend to wash out when combined with other colors, so it’s a challenge. 2. Intensity of iridescence and bright, shiny, metallic sheen are important. We like to call it “hard chromium white.” This color tends to mask the blue intensity, so producing both together increases the value and rarity.

Current Status

Sapphire koi have continued to evolve with each generation. We are far from perfect and I am never satisfied. As I look forward, I think of all the other variants and phenotypes we should incorporate into this line. I am sure there will be some great success — along with some disappointment — in the search for the next bigger nugget, or the next bigger and brighter gem. Gosh, I love this profession!

About the Author

Joe Pawlak, president of Blackwater Creek Koi Farms Inc. and vice president of Aquatic Nutrition Inc., oversees the operation of three koi and goldfish farms in Florida. His past ventures include work and study in Michigan, Minnesota, California and Florida as well as Japan. Joe and his wife, Cheryl, were early staff members of Aquatic Eco-Systems in Apopka, Florida. Blackwater Creek has enjoyed many successes developing new fish varieties such as Sanke Gold and Black Opal goldfish. (You can see them in the May/June 2014 issue of POND Trade.)
What makes water gardens and fish ponds look beautiful and inviting? That’s easy: clear water and healthy fish and plants, combined with good design, all integrated into an attractive landscape!

While the question is easy to answer, creating such an environment is what makes the job of water gardeners challenging. There are many steps to this process, and one of the most basic is understanding what can cause toxic conditions that degrade the quality of the water. What are these toxic zones, and how can they be identified and addressed?
There is very low oxygen (O2) levels — where aquatic life either dies, or leaves if it can. I have referred to this topic in some of my previous articles (e.g. "A Hobby Not a Chore" in POND Trade July/August 2014), but in this article I want to expand on all aspects of this very important topic.

Dead Zones: Where, How and Why

A dead zone can develop in a small, quiet area in the pond that has a low circulation rate, or it can occupy the entire pond. This zone can be completely devoid of oxygen, but in most situations the oxygen level is just low. Fish and most aquatic life need around 8 mg/l of oxygen to be healthy. Fish can survive with slightly lower levels, but they will be stressed if the oxygen level is just low. This dead zone area behind the stepping stone path can become more of a living zone by adding aeration and/or underwater jets. This dead zone area behind the stepping stone path can become more of a living zone by adding aeration and/or underwater jets.

Other very toxic algae that can appear in our ponds are photosynthetic bacteria called blue-green algae. Another name for these algae is Cyanobacteria. It is most often blue-green in color, but can also be all-blue or all-green, and also reddish-purple or brown. This type of algae is usually mat-forming, shiny and slick feeling, but not always. It grows in our ponds in dead zones or where there is slow-moving water that has a lot of excess nutrients like nitrogen and phosphorus. This kind of algae is very toxic to life. It is present, take measures to reduce the inflow of nutrients and increase circulation to eliminate the dead zone. I normally only see this in ponds that have dead zones.

Other evidence of dead zones can be smelly water, such as the smell of “rotten eggs,” which is an indication of low oxygen. Water should smell “of the earth” — like healthy dirt, as I like to say. It should not be an offensive odor.

A buildup of organic matter and sediment in a pond can also create a dead zone by depleting the oxygen as it decays. These areas can be highly toxic, especially during the winter months when the cold temperature slows the fishes’ metabolism. Fish enter these zones and cannot swim out. I view these areas like humans view confined spaces, especially underground. Toxic gases can accumulate in these areas, and when we enter them we can succumb so quickly that we cannot get out fast enough. Fish can enter a dead zone area in the pond during a time when they can barely “buck a fin,” and before they realize the problem, they die. So removal of excess organic matter is essential — especially before the pond freezes.

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movement areas, whether created by a water pump or aeration, can dome over with ice. Adding plants is a huge dead zone eliminator. Plants can help keep the water fresh by utilizing fish waste and dissolved organics for growth. Plants are a natural filter that take up the waste as well as adding oxygen to the water.

The solution to a dead zone, or an entire pond that has a problem, is to simply add circulation and/or plants. So, do the detective work to determine if dead zones exist. Look at and smell the water. Gasping fish, especially in early morning, are a sure sign of low oxygen levels. Also, look for areas in the pond that are not getting much circulation — where the water is very calm. In these areas you could have a proliferation of blue-green algae, given the right nutrients. If you see a whitish cast to the patina or to the water itself, then there is a problem with low oxygen. The solution to a dead zone, or an entire pond that has a problem, is to simply add circulation and/or plants.

About the Author

Water gardening has been a passion of Jamie Beyer’s for over 50 years and he has worked on over 1,000 ponds. He personally has several very large ponds, which contain many kinds of water plants and fish. Jamie has a Master’s Degree in Fish and Wildlife Biology, is a lifetime Master Gardener and is founder and past president of the Central Iowa Water Garden Association. He has a broad background in fisheries, the dynamics of water, horticulture and aquatic and wildlife ecology. He owns a consulting/installation business, Midwest Waterscapes, in which he works as a water garden, fountain and pond consultant/installer.

I

If a client cancels a contract with you, how do you handle it? Cancellations happen even to the best of salespeople. Clients have all kinds of reasons to cancel an agreement, and you need to be prepared for that eventuality. Hopefully you’re using the Notice of Cancellation (Right of Rescission) required with every consumer contract you write. This is a federally required document and the consequences of not using it can be devastating if the client chooses to take legal action.

If you get a notice that the client wants to cancel, either by phone, email, fax or snail mail, there are things you should do that will give you an opportunity to resurrect the sale — or, at worst, end the relationship without hard feelings. When you speak with the clients, remember that they will likely be very nervous. They are in effect breaking their word to you, and most people have a hard time admitting they made a mistake. So be prepared accordingly. Don’t let yourself get drawn into any argument, but insist that you meet in person right away to pick up the paperwork. Keep in mind that when you see them, they will not be the same people you signed the contract with. Be nice. Be polite. Agree that they can cancel and do whatever they have in mind to do. Then — and only then — ask why they feel they need to cancel. If you have approached this carefully and treated them with kindness, they’ll open up and tell you what is wrong. Again, don’t get drawn into any kind of argument. Just listen and look for mistakes you might have made during your sales presentation. If you can find a way to correct those mistakes, normally by asking questions, you have a good chance of bringing the sale back to life and moving on with the project. If you can’t resurrect the sale, then let it go, thank them for their time and consideration and leave. Move on with your business and your life and clear your head from all the nasty stuff that might have caused the problem.

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be creeping into the recesses of your mind. Cancellations are devastating to any good salesperson and part of this business is learning how to get over them quickly. The quicker you do, the sooner you’ll make the next sale.  
See more at:  
http://www.markupandprofit.com/blog/contract-cancellations#sthash.btNVjYNr.dpuf

About the Author
Michael Stone has used his experience to help thousands of general contractors, new home builders, remodelers and specialty contractors build stronger, more profitable businesses. Michael is the author of “Markup & Profit; A Contractor’s Guide Revisited” and “Profitable Sales, A Contractor’s Guide” and has taught business management, sales and/or estimating classes. Michael also provides coaching and consulting services. Mark has an entire section of his blog focused on Employee Issues. You can find it at www.markupandprofit.com/blog/employee-issues.  
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Give That Water Some Air!

Efficiently aerating ponds of all sizes

by Ken Rust,
Louisiana Pond Management

Larger ponds benefit in several ways from aeration, which is not only about oxygen levels, but mixing and gas exchange. When aerating larger ponds, there are several approaches and different tools to use based on the pond’s use and the challenges that need to be addressed.

Why Aerate?
So why do we aerate?

1) Aging
Larger ponds are aging and aeration helps to arrest or reverse this process. God doesn’t make ponds; we do. Nature is trying to fill them with material and turn them back into land. Grass clippings, windblown debris, manure from livestock and waterfowl — not to mention the annual drop of fall leaves — all contribute organic material to ponds that is seldom digested completely in an annual cycle. Erosion small and large from rainstorms, un-grassed areas and unprotected shorelines contribute both organic and inorganic material to ponds. This results in filling, increased nutrients and declining water quality as this progresses. Of course,
aeration can’t do anything about inorganic soil that washes into a pond, but it stimulates the pond bacteria tremendously and they consume more of the organic, liquid compost at the bottom of the pond. This digested organic material physically leaves the pond as gas byproducts like carbon dioxide and nitrogen. As the higher oxygen content penetrates the top layer of the mud, the cycling of pond nutrients, specifically phosphorus, is buffered and that helps to avoid the overproduction of algae.

2) Natural Bad Behavior
Ponds have varying amounts of oxygen. This is a result of weather conditions, oxygen demand and photosynthesis. As it cycles from high to low, fish may experience stress and die. Low oxygen levels can affect the pond chemistry, rapidly cycling nutrient cycles from high to low, fish may experience stress and die. As the higher oxygen content penetrates the top layer of the mud, the cycling of pond nutrients, specifically phosphorus, is buffered and that helps to avoid the overproduction of algae.

3) Bigger, Healthier Fish
Enough of the nervy pond chemist. Aeration grows bigger, healthier fish — faster. The latest research on carthals suggests a 40 percent difference in growth rate from increased aeration. Aeration mixes the water as well as exchanging gases. The water quality in the entire pond becomes consistent, as well as more comfortable for fish. Temperatures, pH, oxygen content and other water chemistry are more uniform and change slowly throughout daily cycles.

result: fish thrive instead of just surviving.

The Challenge

I am not sure if everyone appreciates the fact that a 1-acre pond with an average depth of 6 feet contains almost 2 million gallons of water. So how do you get enough of that pond moving and in contact with the atmosphere to aerate it? There are several efficient tools to accomplish this — and some of them look great, too! Starting from the bottom:

Diffused Aeration

Diffused aeration uses an onshore compressor supplying air, self-weighted tubing delivering air, and diffusers to break up the air into small bubbles at the bottom of the pond. The small bubbles are not the source of the increased oxygen or much of the gas exchange. Instead, the source of the aeration is the bubbles rising through the water column at a foot per second, carrying large amounts of water to the surface and bringing it in contact with the atmosphere.

The deeper the pond, the more efficient this approach is, since the bubbles have more distance to travel through the water column and entrain the water flow upward. For instance, the most efficient types of diffusers can process approximately 2.5 million gallons of water per day when placed in 12 feet of water! There is nothing to see, as far as display is concerned, with diffused aeration — which may be a benefit for some who prefer a serene setting at their ponds. There is no electrical service in the pond and nothing floating on the surface.

You can enjoy fishing, swimming or boating while the system is fully operational. The compressors that supply the air for diffused air systems can be powered by grid electricity, solar or wind power.

Surface Evolution

The pond aeration industry has several submersible direct-drive motors that efficiently process water to drive high-volume aerators, aerating fountains and decorative fountains. Do fountains aerate? Yes, they do; however, it takes energy to make a display pattern, and this energy is not available to make additional volume for the process of aeration. It is like putting your finger over a water hose. It makes a high spray, but the volume is dramatically reduced. So in general, the more decorative an aeration fountain is, the more horsepower it will take to aerate the same size pond.

High-volume surface aerators have a large propeller, designed to efficiently work the motor and churn water at the surface, all as a self-contained, floating unit. As it violently mixes the water and air, an almost complete exchange of gases occurs and the water returns to the pond at equilibrium with the oxygen levels in the atmosphere after expelling carbon dioxide and other harmful gases. The display is a huge gush of water at the surface. It is a simple display, but many people prefer it and some even light them at night with lighting packages. Aerating fountains adapt a high-volume surface aeration into a simple, trumpet-shaped pattern. The flow is reduced, but the water display can easily reach 10 feet or higher, depending on the horsepower. This is the best compromise between aeration and display. Because of the high flow and large water droplets, this fountain type does a great job of screening noise. This can be a great benefit if you live a little too close to the highway or some other noisy, nearby distraction.

Last but not least are the decorative fountains, which, as we discussed, do aerate as well. These are available in any size, from one-quarter horsepower to 25 horsepower, with corresponding price tags and power consumption. When consulting with pond owners about the type of decorative fountain they are interested in for aeration, the conversation usually becomes a crossroads based on what power is available; what pattern are they interested in; what size, specifically height, they need for a good scale on their pond; and the size of pond that needs to be aerated. In general, 3 horsepower per acre seems to be a good fit. This can be in the form of one 3-horsepower fountain or three 1-horsepower fountains. Larger ponds have lots of options for aeration. Choose a high-quality aeration and do a safe, professional installation. The pond will benefit, and your enjoyment of the pond will as well.

About the Author

Ken Rust has managed ponds, lakes and water features for 21 years, specializing in design and installation of aeration equipment. His aquatic career began in 1994 after graduating in fisheries and aquaculture from LSU in Baton Rouge. He has been a part of the team at Kasco, manufacturers of quality aeration equipment, for the last five years. Ken is resuming direct sales and design of aeration equipment and maintaining ponds and lakes through his companies, Louisiana Pond Management and Water Feature Maintenance. He has a blog on ponds with Mother Earth News. Ken enjoys giving talks on pond management, cooking, playing the fiddle and gardening while raising five daughters with his wife, Brooke, in Baton Rouge. www.LouisianaPondManagement.com
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by David Duensing,
Aquatic Construction Services

What are your early memories of having fun in the water? Playing in the creek in your hometown park; fishing in the farm pond at a family reunion; swimming at a lake during a family vacation? For me, I grew up alongside a river and near gravel quarries in northern Illinois. I can’t even remember a swimming pool in our town until around age 10. My point is that there are many options and opportunities available to us to help our clients and prospects create unique and memorable water- and nature-related experiences for their families and friends. In today’s fast-paced, “processed” and “chemical” world, there is a strong desire and demand for activities that bring family and friends together; create long-lasting, quality memories; and offer relaxation and a focus on nature. Fortunately for those of us in the pond industry, this desire provides additional business and artistic opportunities. I’m talking about the resurgence of the “old swimming hole,” but in an enhanced state. Remember good, clean fun? It’s back ...

Stop to Smell the Roses (or Lotus)

My plunge into the “living water” industry started in August of 1989. At this time my clients were searching for viable ways to develop their personal space as a respite for renewal after a challenging day or week at work or at home raising children. There was a growing awareness that life was moving “fast and furious,” and there existed a need to restore oneself, relax and reconnect with family and friends. Fortunately for our industry, recreating a bit of nature for our clients — one that is reminiscent of enjoyable times and experiences they grew up with — fulfilled that need! Today, people are continuously pushed to incorporate technology and instant gratification as a way to expedite and simplify our work and our family lives. There is a growing population that is trying to slow down, smell the roses and look for natural and alternative ideas that help ground and restore them.

Opportunity Is Knocking

For years or even decades in some cases, water feature builders have enjoyed the opportunities and intense gratification of building beautiful water gardens, koi ponds, streams and waterfalls. These creations have been the perfect segue to the next level: naturally filtered swimming ponds and pools (NSPs). In Europe, naturally filtered swimming ponds and pools have been around for decades — actually, centuries, if you look back to the Roman times.

The concepts incorporated in naturally filtered ponds and pools are not new. Reinvented techniques, along with the new technology of today, have updated and perhaps educated people, offering better understanding of principles involved. Harbingers of our industry have created new business opportunities for naturally filtered swimming ponds without having to
reinvent the wheel. But, before plunging in, be warned and educated regarding the life-critical safety issues that you must incorporate when participating in this aspect of the water feature industry.

Enhancing “The Pond”

For the last 10 to 12 years, I have noticed a trend with my clients to further develop the concept of an ornamental water garden into something that is much more expansive, more interactive and easier to maintain. I have always been a believer in and promoter of interaction with the water, so it was a logical transition to provide easy, inviting and safe access to the water ... or at least to the water’s edge. Voilà — a beach!

As my clientele expanded to those with multiple residences, the properties became spacious and oftentimes wonderfully remote, allowing the ponds to increase in size. With larger ponds — from one-quarter acre to several acres — opportunities such as islands, peninsulas, expansive aquatic gardens, boardwalks, piers, fishing, boating, slides, jumping rocks, scuba diving and floating rafts became possible. Let the fun, the toys and the relaxation begin!

As with traditional swimming pools, it is nice to have at least 18 to 24 inches of water depth along the pond edge. Accomplishing that in a “pond” environment is also very beneficial, due to the fact that it not only increases the usable area of the pond but also dramatically increases the water volume. To provide a “hard edge” at the shoreline, we typically incorporate formations of weathered stone or use a dark-colored, engineered retaining wall block. The advantage of using concrete interlocking retaining wall block is that it allows the lawn to run all the way to the water’s edge, yet provides a substantial, unseen structure underneath. This “lawn-to-the-edge” finish is quite attractive and yet allows support all the way to the pond edge.

Water Clarity

Not every family will be interested in having a swimming pond over a swimming pool, because not everyone is going to be comfortable with water that is not absolutely crystal clear and completely free of algae. Having said that, there are ways to not only biologically, but also mechanically filter the pond water ... but the costs do increase as the water clarity demands increase. This is not to infer that swimming ponds are not clear. Swimming ponds are a “living” body of water with creatures and fine particles of free-floating algae, whereas traditional swimming pools are sterile of life. Together with my associate and good friend, Anthony Archer-Wills, we have designed and constructed swim ponds in excess of 12 feet deep, and the clarity is so good that one can see all the way to the bottom of the ponds.

One of the key elements to having a successful and clear pond is to establish a strong ecosystem that is able to thrive on and manage the nutrient load within the pond. As most pond builders know, algae can be an annoyance in the spring, but it is a normal occurrence.

The worst thing a pond owner can do to a properly constructed pond is to use an algaeicide to treat or “kill” a temporary algae situation. Since the algaecide does not remove the nutrients from the water, it becomes only a temporary visual solution, possibly upsetting the pond’s biological balance.

Filtration

When planning for a low-maintenance, naturally filtered swimming pond, there are many examples, both young and quite ancient, to look back on for ideas and techniques. One of the most commonly used techniques Anthony and I incorporate is a “downs-flow” gravel filter that is heavily planted with various aquatic plants, such as Iris, Arrow Arum, Blue Pickerel Rush, Common Rush and a few others. When considering the best aquatic plants for any particular climate and unique conditions that a project might have, I reach out to Kelly Billings of Maryland Aquatics for advice, recommendations and plant material. We prefer to minimize the number of varieties used in any one water feature, and plant in large masses for visual effect. If too many varieties are used it can appear visually confusing and “weedy.”

Typically the filter pond, or filtration portion of the swimming pond, will have a minimum of 50 percent of the surface area of the swimming portion of the pond. Based on the climate and “load” of the swimming pond, the filtration pond is structured to be at least 3 feet deep, with gravel of various sizes placed in layers on top of a perforated manifold, set on the filter pond floor. Usually the gravel in the center area of the filter pond is kept approximately 18 inches below the normal water level so as to allow for lilies (and hardy and tropical aquatics where possible) to be included in the planting and provide wonderful displays of color.

Circulation

For a swimming pond to function and filter properly (both biologically and mechanically), water should be circulated in such a manner so as to minimize “dead”
zones in the swim and filter area. The suction manifold on the bottom of the filter area should not only be sized properly but also laid out in such a manner so as to pull equally through the gravel media.

Since many of our swimming ponds, even those with streams and waterfalls, do not have extreme elevation changes, we are able to incorporate fractional horsepower pumps into the circulation system. As I mentioned earlier, be aware that there are different safety concerns with water features that are designed to be swim ponds, as opposed to aquatic water gardens. I will not be detailing those differences in this article.

Additional Offerings

Offering your clients new and exciting ideas to contemplate often increases not only their enthusiasm, but also their participation and backing of the project. Fire pits, fire rocks, Japanese garden themes, pizza ovens, outdoor kitchens, stonewalls, weeping walls, grottos, butterfly gardens, bird sanctuaries, night lighting and solar heating panels are just a few examples. Be creative, be brave and always reach out to associates for assistance in areas in which you are not an expert! Remember: this is about the clients and providing them with the best finished product!

Last but not least, every naturally filtered swimming pond and any additional offerings suggested must be compatible not only with your design and the location of the pond, but also the passions and desires of the client. This requires you to get to know the inherent nature of the area and the inherent nature of the client. I have found both to be very rewarding!

About the Author

David B. Duensing, a long-time industry expert and educator, specializes in combining natural stone, living water and his clients’ dreams to build unique and exceptional aquatic features throughout the Americas, the Caribbean and abroad. With the creation of David B. Duensing & Associates, Inc. in 1989, Duensing has focused his efforts on learning and perfecting the design and construction techniques required to perform at the top of the industry, internationally. In 2006 Duensing created David B. Duensing Aquatic Construction Services, LLC, which specializes only in the construction of natural rock formations and living water features, leaving David B. Duensing & Associates to focus strictly on providing design and consulting to professionals and landowners. In addition to having won the Master of Design Award for his work, Duensing also teaches accredited, college-level courses on the many aspects of water feature design and construction through the Genesis University. In 2013 Duensing, along with Anthony Archer-Wills, were sought out by Animal Planet to develop a new TV series called “Pool Master.” The show focuses on the blending of naturally filtered water, streams, ponds, waterfalls and swimming pools and is in its second season.

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Most experts agree that fluidized bed filtration can’t be beat for biological filtration as it never dyes and provides maximum usable surface area for bio-activity.

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About the Author

David B. Duensing, a long-time industry expert and educator, specializes in combining natural stone, living water and his clients’ dreams to build unique and exceptional aquatic features throughout the Americas, the Caribbean and abroad. With the creation of David B. Duensing & Associates, Inc. in 1989, Duensing has focused his efforts on learning and perfecting the design and construction techniques required to perform at the top of the industry, internationally. In 2006 Duensing created David B. Duensing Aquatic Construction Services, LLC, which specializes only in the construction of natural rock formations and living water features, leaving David B. Duensing & Associates to focus strictly on providing design and consulting to professionals and landowners. In addition to having won the Master of Design Award for his work, Duensing also teaches accredited, college-level courses on the many aspects of water feature design and construction through the Genesis University. In 2013 Duensing, along with Anthony Archer-Wills, were sought out by Animal Planet to develop a new TV series called “Pool Master.” The show focuses on the blending of naturally filtered water, streams, ponds, waterfalls and swimming pools and is in its second season.
Filtration, circulation, depth and dissolved oxygen content are the major factors that set a pond with fish in it apart from other water features. While these are all important, they cannot function properly without the connectivity created by the plumbing system. Proper plumbing is one of the most overlooked areas of pond design. Proper plumbing isn’t simply connecting the pieces; it involves proper pipe sizing, the efficient placement of components and determining how you will get the volume of water required out of and back into the pond. When upgrading poorly or underbuilt ponds, the existing plumbing is usually the most difficult obstacle to overcome.

Once a pond design has been agreed upon aesthetically, the volume can be calculated. With the volume determined, you can add 10 percent for filtration and use that number for the total volume and flow to get the desired turnover rate. Turnover rate is the volume of water pumped through filtration per hour. Filtration should be between 5 percent and 10 percent of pond volume. Better filtration with higher dissolved oxygen content allows you to build toward the 5 percent marker, while pressurized filtration, bog filtration and other types that are less efficient force the equation closer to the 10 percent range. This percentage includes all filtration, including prefiltration. Fish ponds need a turnover rate of at least once per hour, although slightly more is better. Smaller ponds require a higher turnover rate and larger ponds of 100,000 gallons or more can start the decline toward less than once per hour depending on circulation and dissolved oxygen content. All of this requires a large amount of plumbing and careful thought.

The first plumbing calculation to be determined is removing water from the pond. Outflow will be through skimmers, bottom drains and sometimes mid-water drains. Properly built under-gravel filtration with a grid system is considered a bottom drain. Outflow piping sizes from bottom drain circuits is almost always 3- or 4-inch, and skimmer returns can be in 2-inch when plumbed as direct suction to a pump. Return piping from garden ponds, however, usually requires the use of smaller piping to prevent excessive head loss. The second plumbing calculation is adding water back to the pond. The return piping size depends on the distance from the pond and the amount of loss through piping friction. Based on the amount of loss, a pump can be selected to add the correct amount of volume.

**Out and Back In**

The first plumbing calculation to be determined is removing water from the pond. The second plumbing calculation is adding water back to the pond.
with a waterfall usually has the majority of the water returning through the falls. One or two return lines in 1-inch, 1.25-inch, 1.5-inch or 2-inch is usually enough to create the necessary circulation or current flow required to prevent dead zones in many ponds.

Formal ponds and larger ponds with waterfalls, where up to half or more of the returning water is through pond returns or jets, is where the return plumbing gets complicated. These systems usually require multiple valves and manifolds with a large number of lines to regulate the flow evenly and circulate the water properly...but there is another way.

**Fractal Distribution**

Fractal distribution manifolds have been around for some time in other industries, and the concept of fractal distribution has been gaining popularity in the pond industry for some time. Fractal distribution has been gaining popularity in the pond industry for some time.

Doing the Math

The concept is simple once you understand the sizing system. A 4-inch pipe has a cross-sectional diameter of approximately 12.5 square inches, a 3-inch pipe is approximately 7 square inches, a 2-inch pipe is just over 3 square inches and a 1.5-inch pipe is approximately 1.75 square inches. Each pipe size is approximately 0.5 inch smaller than the previous, allowing you to divide any of the initial larger pipes into an approximate multiple equivalent of the smaller pipes. If two pond returns are needed originating from one 2-inch pipe, each return should not be 2-inch with two valves. The 2-inch can have one valve for isolation when servicing and then be split into two 1.5-inch returns. Pipe length will always have an effect on flow rates and is one of the concepts of fractal distribution that cannot be mimicked accurately in most pond designs. This is easily overcome by using a simple restrictor in any return that flows more than the others on a given circuit. Restrictors are easy to make and can be press-in bushings or thread-in bushings when the return used has threads. A restrictor in one return line at the outlet makes up for the increased pipe friction in others. The restrictor forces more flow to the other outlets without reducing the total flow.

A 3-inch return manifold can have two 2-inch returns or four 1.5-inch returns. A 4-inch manifold can have two 3-inch pipes going in opposite directions reduced to a total of four 2-inch or eight 1.5-inch returns into the pond. This works extremely well as a gravity-flow return manifold from the top of a biofilter. This can also be used when simplifying a return circuit by creating a loop manifold that surrounds a pond. A 3- or 4-inch loop manifold can have individual small returns right off the larger pipe as long as the total area of the outlet diameters doesn’t exceed the area of the diameter of the main loop.

The concept of fractal plumbing can also have an advantage when remote filtration is used. Instead of having a large number of 1.5-inch or 2-inch lines in a trench for a long distance from a filter or pump to the pond, one or two 3- or 4-inch lines can be buried and split up at the pond’s edge, simplifying the layout. This also reduces overall pipe friction, making the system more efficient.

On the bottom drain circuits, separate piping is always best and you should never plumb two 4-inch drains together. The flow will always favor the drain with the least resistance and there is no way to effectively balance them. You can consider two 5-inch drains into one 4-inch exit pipe as a way to simplify multiple drains into one pre-filter inlet or two 2-inch skimmer outlets into one 3-inch line traveling to the pump.

While combined drains cannot be balanced easily, skimmers can. Skimmers on a combined manifold flowing unevenly can be regulated with a slight restrictor in the skimmer that flows the most.

Start thinking about your plumbing as “fractal” and you can save money and time when plumbing your next project.

**About the Author**

Kent Wallace was born and raised in Las Vegas. Kent spent most of his adult life in the automobile industry at independent shops and dealerships, along with working at his own shop as a race car fabricator at age 24. Then, in 2001 a neighbor asked Kent if he could build her a koi pond like the one Kent’s father had.

From that point on pond building became his new passion. This first pond he built was submitted to Better Homes & Gardens Magazine and won Best Courtyard Nationwide in their special interest publication.

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I have always been intrigued by the idea of turning waste into a resource, and that is exactly what a bog gravel filter does for you. It turns fish and plant waste into fertilizer (plant food). This plant food is then consumed by the plants growing in the filter. The happy byproducts of this process are clear water and low maintenance. If a bog gravel filter had a mission statement, this is what it would be:

To create an environment that maximizes organic decomposition and nutrient absorption, starving the (always-present) algae in the pond and keeping the water looking gorgeous!

Happy Customers

Here at Nelson Water Gardens we are so sold on bog gravel filtration that we will not build a pond without one, and for one solid reason: there are virtually NO callbacks from unhappy clients. They don’t call back because, with fewer pieces of equipment needed, there is less chance for breakdown; secondly, a properly constructed bog gravel filter only requires seasonal maintenance. That means more enjoyment of the water garden and less work for your client.

The only drawback to a bog gravel filter is that there is no fancy filtration system (or, as Cla Allgood of Allgood Outdoors calls them, “The Big Uglies”) to sell to a client. The bog gravel filter is designed and constructed onsite. If a client insists on a “big ugly” filtration system, we install one in addition to the gravel bog filter. In my opinion the loss of monies from not selling a fancy filtration system are more than made up by the peace of mind provided by no callbacks and customers who will...
Green Water

Let’s be clear (pun intended) about why ponds turn green. The green water is comprised of billions of tiny, one-celled, plant-like organisms called algae. Like plants, algae needs sunlight, carbon dioxide, water and nutrients to grow. Eliminate any one of these elements and it will not grow. Bog filters are extremely efficient at removing nutrients from the pond water.

This mission is accomplished by pumping pond water evenly through a gravel bed via a grid of perforated PVC pipework. The gravel provides the surface area for nitrifying bacteria to colonize. The bacteria reduce fish and plant waste into plant food. Growing in the gravel are bog plants that take up the plant food. The water is returned to the pond stripped of all nutrients, thereby “starving” the algae, which cannot grow. Bog gravel filtration is not new. Mother Nature has been using this technique for eons, and in that context we call it an aquifer, swamp or marsh. NASA has experimented with the technique for waste treatment on space stations. Some Sanitation Facilities use it in wastewater treatment. In the pond industry, Dick Schuck presented this idea back in the early 1990s. Years ago I met a fish farmer who used this technique and ended up making more money from the plants he grew in the filter than the fish! Nelson Water Gardens has been building bog gravel filters for the past 18 years.

Learning From Our Mistakes

Eleanor Roosevelt once coined a saying that informs what we do: “Learn from the mistakes of others. You can’t live long enough to make them all yourself.”

Over the last 18 years of constructing bog gravel filters, we’ve made plenty of mistakes and have also refined the process. We’ve given countless lectures and workshops and have learned from the feedback from the audience. In a backward kind of way, I’m going to start with the mistakes we made in order to remove immediately any preconceived notions about the technique.

In some instances the right way to do it seems wrong. For example, removing the soil from plants before planting in the gravel substrate seems logical, but don’t do it! And if a little bit of gravel does the job, then a lot of gravel should be even better, right? Well … not when it comes to depth of the filter bed. Build deeper than 12 inches and the system can fail. Surface area is key; the greater the surface area, the more filtration! So here are the top 10 mistakes made constructing bog gravel filters:

1. Too deep a bed of gravel. This is the most common mistake made. You need no more than 12 inches of -inch gravel substrate. If you are adding a gravel bog to an existing pond area, construct a gravel. Period. End of story.
2. Starving the bog. This happens when a pre-filter* is placed on the intake of the pump. This not only stresses the pump but defeats the entire purpose of the bog by starving the plants of the nutrients that are being caught in the pre-filter.
3. Not taking the plants out of their pots. This severely limits the plants’ ability to absorb nutrients and defeats the purpose of the bog gravel filter.
4. Not capping the pipes. Water follows the path of least resistance and will simply shoot out the ends instead of through the slots.
5. Not enough plants. Initially you should plant one plant per square foot.
6. Wrong plants. There are many aggressive species which can clog the pipes and grow out of the filter.
7. Washing the soil off the roots of the plants before planting in the gravel. Don’t do this! There is not enough nutrition in a new bog to sustain new transplants. Just knock the pot off the plant and plant it — soil, roots and all — directly into the gravel. We promise the soil will not “contaminate” the bog or pond.
8. Not installing a clean-out pipe (or pipes).
10. Wrong gravel filtration is not new. Mother Nature has been using this technique for eons, and in that context we call it an aquifer, swamp or marsh.

Even Wrong Can Be Right

Even a bog gravel filter constructed all wrong works to a certain degree. Near our shop, our local county park installed a koi pond, but it soon turned green. The solution was to add a bog gravel filter, but the filter they installed was too deep and actually pulled all the nutrients out of the bog! Of course it was a huge mistake, but the results were astounding. The pond was clear within a few months and the fish population grew dramatically.

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Unfortunately, it was built without any filtration, and you couldn’t even see an inch into the water. Eventually the pond was retrofitted with their notion of a bog gravel filter using 3- to 5-inch rock instead of -inch gravel. (Why? I don’t know!) Additionally, the plants were left in their pots in the rock substrate. Despite these drawbacks, the pond did clear to a 12-inch depth! It has since been restored properly.

**Building a Bog Gravel Filter**

A bog gravel filter can be constructed in any number of ways. Examples of the most common configurations we have used in constructing water gardens include:

- **Partition:** The filter is within the pond, separated by a porous retaining wall.
- **Raised:** The filter is built next to and higher than the pond; water flows back via a stream or waterfall.
- **Border:** A ledge, 12 inches deep and as wide as it needs to be, is constructed around the perimeter of the pond. At the edge of the ledge a porous wall is built to retain the gravel.
- **Island:** Created by building a porous retaining wall on all sides in the middle of the pond.
- **Pottery Bog:** You can create a filter from decorative pottery! Pottery bog filters are great for small ponds or additional filtration for larger ponds.

### Directions for Creating a Partition Bog Gravel Filter

Follow the usual directions for building a liner pond. Size is determined by pond surface: 10 to 30 percent of the pond surface should make up the bog. If you plan to stock a lot of fish or koi, go with a larger size. Remember that you don’t have to dig deeper than 12 inches in the bog area. Ideally the entire area, pond and bog, should be constructed with one sheet of liner.

Using cinder block, stone, bricks or any other stable building material, construct a dry wall (no mortar used) to section off the bog filter from the rest of the pond. One technique we recommend is using cinder blocks (painted black with exterior latex paint) and then “capping off” the blocks with a decorative stone of your choice.

Figures 1 & 2 illustrate burying the pipe from the pump to the filter. However, where possible, we recommend laying a flexible tubing in the bottom of the pond. Just run the tubing through the lower portion of the wall connecting the pump to the distribution pipes in the bog filter. Put a PVC female adapter fitted with the appropriately sized hose barb fitting to receive...
Install the pump on the opposite side of the pond from where the bog filter is located. This is to facilitate good circulation of water throughout the pond. Select a pump that will turn the volume of the pond over every one to four hours. (You can go with a higher flow rate if you wish.)

### Piping Directions

In all but the smallest of bogs use 1.5” to 2” PVC pipe. The larger diameter pipe allows for better water distribution and easy maintenance of the piping over time. The outlet of the pump also factors in when determining the size of the pipes. Always bump up the pipes for efficient use of the pump. For example, use 2” pipe on pumps with 1.5” outlet.

The PVC pipe is cut with slots approximately 1 inch apart; the slots should be cut approximately 1/3 of the way through the pipe. (A Circular Saw or Grinder works great.)

Next, lay the distribution pipe on top of the pond liner in the area partitioned off for the bog filter. Be sure the slotted portion faces up. Gravel bogs 2 to 3 feet in width can be fed by a single line of pipe. Wider areas require additional lines, spaced 2 to 3 feet apart. This layout is similar to setting up a septic drain field.

The end of each line of pipe should have a “cleanout.” Cut this pipe (now referred to as the “cleanout pipe”) to discreetly rise just above the gravel bed.

To accomplish this, use a sweep elbow or double 45-degree elbow to join the distribution pipe to the vertical cleanout pipe. The cleanout pipe is capped with a female adapter and a threaded cap. Spray paint the cap black or brown and it will “disappear” from view.

Once you are satisfied with your piping layout and location of the cleanout pipe(s), glue all parts together. Hook up to the pump and turn it on to see if the water is evenly distributed.

Using tubing within the pond means less possible leakage, easier repairs, and less likelihood of damage.

**The under-gravel pipes can be cleaned out by simply removing the cap from the cleanout pipe; water pressure from the pump will help dislodge any debris that has collected in the pipes. You can thread a hose barb adapter to the female adapter and attach a piece of flexible tubing to recycle this nutrient-rich water into a flower bed! A reverse flow can be achieved by turning off the pump and putting a pressure washer down the stand pipe.**

---

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Planting

Now you are ready to shovel 3/8-inch pea gravel into the bog gravel filter area, but only fill halfway (the rest of the gravel will be added during the planting). Remember, stick with 3/8-inch pea gravel!

Most gravel is not very clean. Wash it as best you can before adding to the filter, but be aware it will muddy or cloud up the pond. Do not to worry; it will clear up. After all, that’s what the filter is designed to do! Now that the construction process is finished, it’s time to plant your bog.

Select your bog plants and arrange them in the bog area that has been filled halfway with gravel. Be sure you stay away from the plants in the middle list. It’s best to plant the tall plants towards the back of the filter, and lower growing plants in front. Create interest by contrasting plants with different foliage colors or textures.

Slip the plants out of their pots and place them with soil intact on top of the gravel. Do not wash the soil from the roots! There is not enough nutrition in a brand-new bog to sustain the plants. (Trust us, the soil will clean up.)

Suggested Plants:
- Arrowhead
- Assorted Taros
- Blue Celosia
- Blue Rush
- Bog Lily
- Cala
- Chinese Water Chestnut
- Corkscrew Rush
- Creeping Jenny
- Dwarf Horsetail
- Dwarf Papyrus
- Dwarf Sweetflag
- Japanese Iris
- Lizard’s Tail
- Louisiana Iris
- Mission Sword
- Red Stemmed Sagittaria
- Ribbon Grass
- Ruby Creeping
- Ruby Eye Arrowhead
- Sensitive Plant
- Siberian Iris
- Spider Lily
- Star Grass
- Variegated Spider Lily
- Variegated Water Celery

Plants that are invasive in a bog:
- All Cattails
- Aquatic Mint
- Chameleon Plant
- Chocolate Mint
- Gold Rush Reed
- Horsetail
- Mediterranean Reed
- Parrot’s Feather
- Pennywort
- Red Stemmed Thalia
- Umbrella Palm
- Yellow Iris

Non-bog plants that have worked for us:
- Leopard Plant
- Butterfly Gingers
- Day Lilies
- Caladiums
- Hibiscus
- Cala Lily
- Joe Pye Weed
- Hostas

**Figure 2. Planting the Bog Filter**
The gravel bog filter is located in the headwaters of this stream.

About the Author
Anita Nolan Nelson is a horticulturist and the cofounder of Nelson Water Gardens & Nursery Inc., a specialty garden center in Katy, Texas that she runs with her husband, Rolf Nelson. She earned a B.S. cum laude in Horticulture from the University of Maryland and is a founding member of the International Water Lily Society. She is a guest lecturer on various aspects of water gardening for Horticulture Magazine, the American Horticultural Society and the International Water Lily Society. Anita’s articles have been published in American Nurseryman, Horticulture, Fine Gardening, Water Gardening Magazine, Pondkeeper, North American Gardener, Texas Gardener, Neil Sperry’s Gardens n’ More, The Water Garden Journal and more.

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For more information or to request a full-color catalog, call 800/648-3873 or visit easypropondproducts.com.
Turtle Island Introduces New Professional Binary Fertilizer

Turtle Island Waterlilies is now offering its Professional Grade Aquatic Fertilizer. This is the special formula used to grow Mike Giles' spectacular waterlilies. The “Binary” technology speeds nutrients to your waterlilies and lotuses and will start your plants blooming quickly with less fertilizer. Your plants will “POP” with vibrant colors!


Eric Triplett Inducted Into the “Green Industry Hall of Fame”

Eric Triplett was inducted into the “Green Industry Hall of Fame” on May 2, 2015. While Eric is typically accustomed to rocking the pond world, this particular honor has rocked Eric’s world. And while many feel the honor is richly deserved, Eric humbly continues to question if he has really contributed enough to the field, frequently heard saying, “I thought you had to be older to win an award like this!”

Eric’s recent contribution to pond filtration, the Helix Life Support Filtration line, has helped dramatically reduce the annual water consumption of a pond while still maintaining the high water quality standards required by his water features’ aquatic inhabitants. This is an especially important achievement in California’s current water-starved climate.

Through his “Ponds For Schools” program, Eric helps kids around the Island Empire learn the benefits of water features in daily life. He has contributed dozens of water features to schools throughout the IE. Loaded with tips and tricks he has learned through years of installing, Triplett’s YouTube channel is a mecca for do-it-yourselfers hoping to build the ponds of their dreams. His new #askthepondguy show is getting great reviews, thanks in part to Eric’s levelheaded responses to serious questions.

On the horizon for Eric is his new TV show, “Pond Diggers.” More than just about building ponds, the show features Eric’s eclectic crew — and provides an education — in one entertaining program.

Blue Thumb Offers New Travertine Columns

Our unique collection of basalt fountains are a great way to introduce the sound of running water to your garden, no matter the size. These fountains have gained immense popularity among homeowners wanting to enhance the appeal of their garden spaces. While typically sold in sets of three of varying heights, single basalt fountains create beautiful focal points as well.

What are travertine columns? Travertine is a wonderfully unique rock that comes in a wide variety of colors and patterns with beautiful, unique striations and dimples. It not only provides an elegant, earthy and completely unique water feature for your landscape, but it’s carved from a hardy, sturdy rock that will stand the test of time. Bring an Italian flair to your front yard with a travertine fountain.

For additional information please visit www.bluethumbshows.com or call us toll-free at 888/619-3474.

GreenCleanFX Liquid Algaecide Eliminates Green Water Algae

GreenCleanFX Liquid Algaecide is ideal for green water algae and treating deeper waters, as it is able to sink to the bottom of ponds. This professional-strength, copper-free algaecide works immediately, will not affect pH levels and continues to work up to 48 hours after application. GreenCleanFX contains no harsh chemicals and is safe for ponds with fish as well as for use around pets and wildlife. With low application rates, GreenCleanFX is a highly effective and affordable solution.

GreenCleanFX meets the National Organic Program Standards for sustainability and is EPA registered and made in the USA. GreenCleanFX Liquid Algaecide is available in 16-fluid ounce and 52-fluid ounce Tip ‘n Pour containers as well as a 1-gallon size. The Tip ‘n Pour containers come with 1 ounce free!

Biosafe Systems
888/273-3088
www.biosafesystems.com
Airmax Inc. introduces a new, affordable way to remove muck from large natural ponds and lakes. PondLogic MuckAway Total Lake (TL), a new addition to the successful line of MuckAway shoreline cleaners, is a highly concentrated blend of bacteria and enzymes that will effectively remove 1 to 2 inches of muck each month from your pond or lake.

Available in 36-pound buckets, the easy-to-use tablet treats one acre for up to 1.5 months.

Fox Lake Case Study:
Concerned property owners on Fox Lake, a popular recreational lake in Oakland County Michigan, placed a call to Airmax Inc. to help solve its heavy muck, prolific plant growth and eutrophic water issues. After installing several aeration systems, beginning in late May 2014, Airmax began applying MuckAway TL to the entire lake to aggressively accelerate the muck reduction. To accurately measure success, a sampling method was established to quantify the changes in the lake bed.

After the late start, and less than six months of treatments at four-week intervals, almost 6.5 inches of Muck was gone from the lake bed. Property owners were ecstatic and are looking forward to a full season of MuckAway TL applications and seeing the results at the end of the summer.

Airmax Inc.
866-424-7629
contactus@airmaxeco.com
www.airmaxeco.com

Atlantic Announces New Professional Programs

Atlantic Water Gardens is pleased to announce a completely new concept: the Atlantic Professional Programs. The two programs are the Atlantic Distributor Consultant (ADC) and Atlantic Professional Contractor (APC) programs.

As an Atlantic Distributor Consultant, we at Atlantic will support the relationship with you and your customers (the contractors and dealers), allowing you, the distributor, to build meaningful long-term relationships with those customers.

In contrast to manufacturer-dominated programs that emphasize loyalty over education, the Atlantic Professional Contractor (APC) Program is distributor-driven, for a very simple reason: the distributors know their customers best.

They know which contractors would most benefit from such a program, they know which customers would prefer to be loyal to the distributor and to Atlantic, and they know how best to select and qualify those contractors.

For further information please contact:
Alyssa Schmidt
330/274-8317
alyssa@atlanticwatergardens.com
www.atlanticwatergardens.com

NEW! PondLogic MuckAway Total Lake

Aquascape Inc. Announces New Decorative Spillway Bowls

Aquascape is proud to announce a unique way to create beautiful fountain features and waterfalls with its new decorative Spillway Bowl, Basin and Stand. Hand-cast in glass fiber-reinforced concrete (GFRC), the Spillway Bowls have the appearance of a formal handcrafted stone fountain at a fraction of the weight, making the decorative water feature extremely easy to install.

“The Aquascape Spillway Bowl, Basin and Stand allow for an unlimited amount of installation possibilities,” explains Dave Kelly, Vice President of Product Development for Aquascape. “The Spillway Bowl and Basin can be installed as a standalone disappearing water feature, or several bowls can be linked together for an amazing display.”

Aquascape’s products and services, www.aquascapeinc.com

Attention Watergardeners Pros

Attention contractors, architects, salespeople, customer service and manufacturers’ representatives!

Join the IPPCA this fall for exciting new educational opportunities at both the GIE+EXPO/Hardscapes North America Show in Louisville Kentucky, October 22-23; and The Irrigation Association Show in Long Beach, California, November 11-12.

Focusing on the Five Fundamentals and taught by leading professionals, courses will go over everything from the basics to the latest cutting-edge technologies. The core curriculum covers all the key areas: The Basic Vocabulary of Waterscaping, Linear Technology, Pump Tech, Friction and Flow and Water Quality and Filtration, with electives like Water-Saving Water Features and Current Legislative Initiatives.

What’s more, it’s all free with your paid professional membership!
Visit www.ippca.wordpress.com for details today!

Blackwater Creek Koi Farms
www.koisale.com

Blackwater Creek Koi Farms Obtains Positive Growth With Addition to the Team

Jennifer Lynx has joined Blackwater Creek as marketing manager. Jennifer has a strong knowledge of wildlife biology and Conservation in a college degree in arboriculture.

Blackwater Creek is the leader in dryland fish production and care, bringing a lot of experience to the Blackwater Creek team. To date, Jennie’s videos have been seen over 4 million times. Jennie will help Blackwater Creek dealers improve their own marketing efforts through various avenues.

Blackwater Creek team as farm manager of Blackwater Creek’s largest farm. Ken is widely known in the tropical fish industry as an expert in his field and was formerly with Petland USA and owner of Southeast Exotics and Tropicals Inc. He holds a Bachelor of Science and Am degree in ornamental horticulture from the University of Georgia. Ken will be developing further production techniques and new markets.

Ken Davis joined the Blackwater Creek team as farm manager of Blackwater Creek’s largest farm. Ken is widely known in the tropical fish industry as an expert in his field and was formerly with Petland USA and owner of Southeast Exotics and Tropicals Inc. He holds a Bachelor of Science and Am degree in ornamental horticulture from the University of Georgia. Ken will be developing further production techniques and new markets.

To see full press releases and additional news items, go to www.pondtrademag.com/tradenews
HNA 2015 Highlights

Events, workshops and conference sessions have been finalized for the hardscape industry’s largest trade show, Hardscape North America 2015. This year’s show will take place Oct. 20-23 at the Kentucky Exposition Center in Louisville. HNA 2015 offers many favorite events from previous years, including the Installer Championship and HNA Awards Recognition Reception, as well as new workshops and hands-on hardscape demonstrations.

Highlights include:
- Eight conference sessions featuring the industry’s most sought-after presenters and speakers, including Jerry Gaeta leading Estimating Projects with Confidence, Monroe Porter discussing the topic of Building a More Profitable Business with Numbers and Efficiency, and Charles Van der Kooi providing advice on How to Evaluate, Motivate and Reward Your People.
- Best practice techniques from experts in the field during the six Hardscape Demonstrations that take place in the HNA Outdoor Arena. The live demonstrations are designed to meet a variety of skill levels starting with the Paver Installation Basics; Segmental Retaining Walls for Raised Patio Construction; and Fire Pit and Outdoor Fireplace Construction, Safety and Efficiency, and will be sought-after presenters and speakers, including Jerry Gaeta leading Estimating Projects with Confidence, Monroe Porter discussing the topic of Building a More Profitable Business with Numbers and Efficiency, and Charles Van der Kooi providing advice on How to Evaluate, Motivate and Reward Your People.
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Any more where that came from?

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