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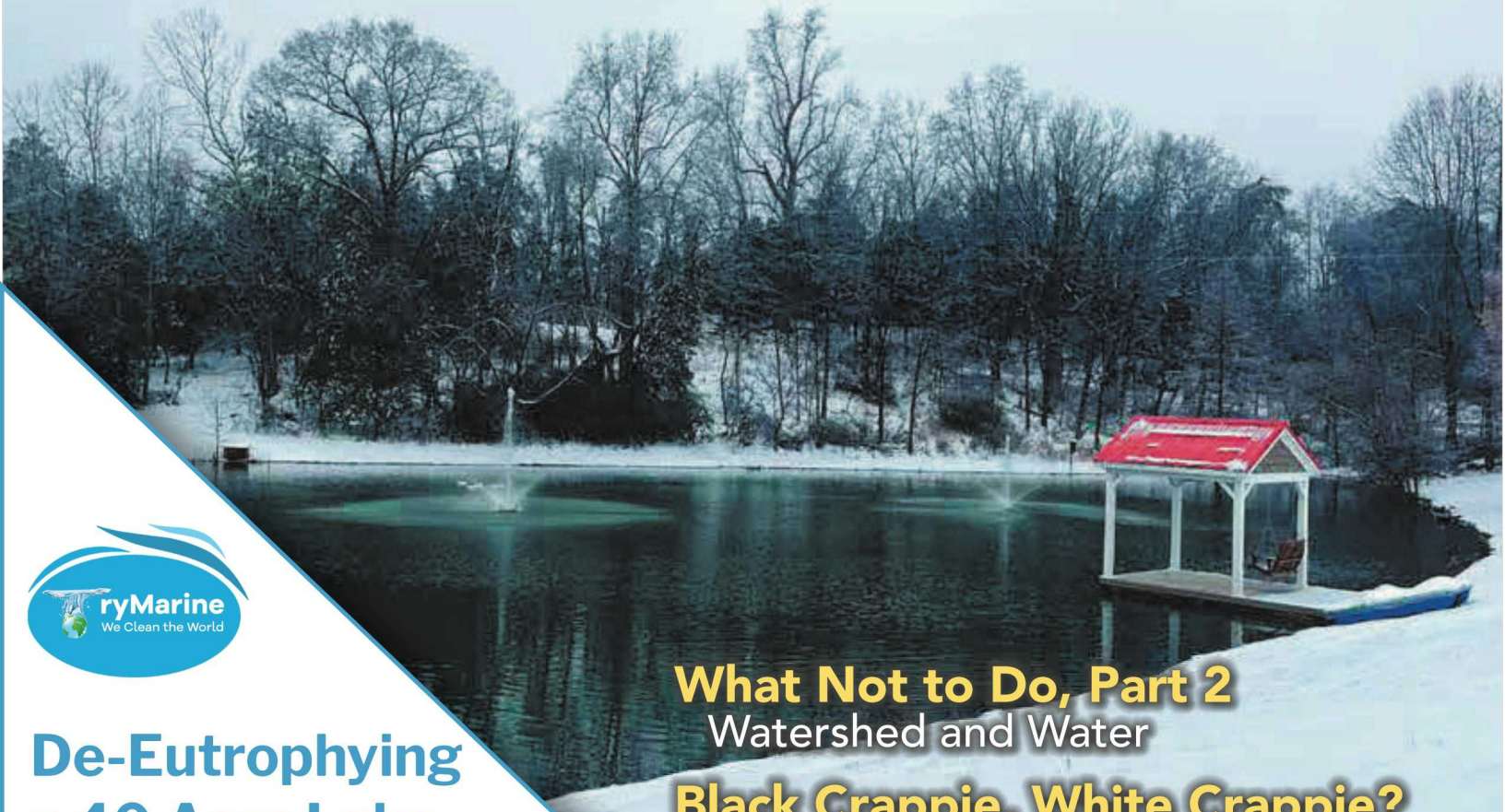
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De-Eutrophying a 40 Acre Lake

As Published in This Issue of Pond Boss

What Not to Do, Part 2

Watershed and Water

Black Crappie, White Crappie?

Yes, there is a difference

| by • Dave Beasley |

Rewinding The Hands of Time

De-Eutrophying A 40 Acre Lake

Brickhouse pond is a 40-acre coastal plain lake outside of Wilmington, North Carolina. Nestled near the center of a 600-acre farm, the lake was a key part of the owner's vision when a high-impact fishery with quality bass and bream—a place people could go and enjoy the outdoors with a high probability of catching a bunch of fish.

Although the vision was there, the lake was just a creek running through an old lake bottom, with a stream of water flowing through the eroded depression where a dam once stood. In September 2018, Hurricane Florence inundated the lake's 2,000-acre watershed with over 26 inches of rain, overwhelming the dam, and sending water, fish, and a big chunk of the dam downstream. The lake was reduced to a semi-aquatic environment with shallow pockets of water and a stream trickling through. For the next four years, the failed lake site sat idle, awaiting someone to come along and make necessary repairs to revitalize it.

In 2022, that moment came, and the property was purchased. At the time, the project seemed straightforward: fix the dam, catch some water, address potential poor water quality, and add fish. Fixing the dam was



Lake in 2023.

relatively simple, but the lake did not fill up into a pristine waterbody. Instead, upon filling, large sections of the lake bottom floated to the surface.

It was a strange sight, dashing hopes for a quick fix.

The lake bottom was mucky, with organic matter and had grown abundant lush vegetation. The roots of the vegetation held the muck together, trapping gases created by the now-flooded decaying peat-moss-looking gunk lying on the bottom of the lake. Gases accumulated in the substrate and large sections of the lake bottom rose to the surface. Mats were 12-24 inches thick, spanning 100x100 feet, in some cases. They were strong enough to support people. Wildlife took a liking, with rabbits running around and living their life, floating above 10-feet of water.

As intriguing as they were, these mats were a problem. First and foremost, it's difficult for the outflow structure of a lake to function when massive rafts of muck and vegetation are damming the outflow. And since a main goal was to make this a nice fishing lake, the mats were impeding that mission.

The mats were removed in two main phases. The first phase addressed the 10-15 acres of mats that were floating on the surface. Two Truxors were used—one with a cutting tool to break off chunks of the floating land mass and another to push the material to shore, where an excavator could place the material into a dump truck and haul it off. After two months, they had made significant progress working their way up the lake, but astonishingly, another 10-acres of lake bottom had floated to the surface. One of the Truxors had moved to a different job, and was replaced with a barge carrying a mini excavator, as well as two additional barges attached to Carolina skiffs used to ferry material back and forth to shore. In total, it took nearly three months to remove approximately 4,500 cubic yards of material!

Even with most of the floating material removed, the lake still suffered from excessive aquatic growth and poor water quality. Alligator weed and duckweed grew relentlessly, while blue-green algae thrived, giving the water a pea-soup look at times. Treating the growth with herbicides and algaecides knocked it back, but relief was short-lived, and was needed repeatedly. Water quality imbalances fueled the nuisance growth. Phosphorus levels were elevated and dissolved oxygen throughout the water column was critically low. To address the low oxygen levels, bottom diffused aeration and surface aerators were installed. Unfortunately, the oxygen levels remained poor and the nuisance growth continued.

With such poor water quality, it made no sense to stock a bunch of fish and try to create a thriving fishery. Although a few fish were stocked, the expectations were low and it was understood that failure was likely.

Knowing this, they pursued water quality restoration options.

Following a great deal of due diligence, SOLitude was hired in the spring of 2024 to drive water quality restoration. Solving for the poor water quality first and foremost required addressing the excessive organic material stuck in the thick mucky bottom.

Think of it like a compost pile in your backyard. Organics, moisture, and oxygen, plus warm temperatures, allow the organics to decompose. Now, when looking at the organics at the bottom of a lake, you realize they decompose much slower than in your backyard compost. This is primarily due to a lack of oxygen; poor decomposition leads to poor water quality, which leads to additional unprocessed organic matter accumulation.

Declining water quality and sediment decimate the food web. Collapsing biodiversity of bacteria, plankton, and invertebrates, hindering the food chain. .

Over time these issues compound, negatively affecting fish. Not only is the quality of available food for fish less favorable, but water quality is more stressful—dissolved oxygen (DO) and pH fluctuate wildly during




Image of the lake (July 2024)

the growing season, oxygen at the bottom drops, and in most cases surface pH rises too high. Low oxygen in deeper water forces fish towards the surface where DO levels are highest. Aside from the stress from fluctuating pH, summertime surface water is elevated in temperature, which is less favorable for metabolic functions. The end result is a higher chance of fish with weaker immune systems and poorer growth, all while the organic matter trapped at the bottom of the lake continues to stack up for lack of oxygen necessary for decomposition.

One solution to consider in this situation is binding phosphorus. This is a common strategy to help balance water quality. Unfortunately, it does not solve the food-web's problem with elevated chemical oxygen demand (COD) caused by excessive organic material. It simply suppresses the availability of phosphorus. For Brickhouse, binding phosphorus would be a short-term approach and an inefficient use of funds. We surmised that a long-term solution would be to address the organic matter in the dense and growing sediments.

Muck consists of elements such as carbon, oxygen, hydrogen, nitrogen, phosphorus, sulfur and more. Of the organic matter within the muck, around 95 percent of it is carbon and oxygen. Both of these are key building blocks for the food web, but unfortunately, when carbon and oxygen are locked up in muck in the form of complex organic compounds, they are unavailable to the food web. These biodegradable-resistant organic compounds are natural, but they typically accumulate faster than they break down, which is why lakes and ponds accumulate organic matter in the form of muck.

That process is part of eutrophication—aging of a lake.

The best long-term approach to addressing the issues at Brickhouse seemed to be a cutting-edge solution called TryMarine. TryMarine is a liquid formulation that is NSF60 certified; deemed safe for use in drinking water applications at rates of 500+ times the label dosage, when applied to restore waterbodies. It offers a unique opportunity to break down complex organic compounds within the muck into compounds that are more easily decomposed by the food web. This allows elements like carbon and oxygen to become more available for the organisms to consume, rather than remain inertly bound up in muck. The results I observed are compelling: organics decompose and fish grow.

The restoration of Brickhouse using TryMarine was established as a three-year project. This would allow enough of the organics within the sediments to decompose so that water quality would be healthy and a





Removing floating mats with Truxor boats.

fishery could thrive. In May of 2024, we collected water samples from the surface and bottom of the lake in six locations. Sediment core samples were also collected from all six of the sampling locations, as well as sediment depth measurements. Additionally, using a remote monitoring buoy, dissolved oxygen and temperature data was collected throughout the year in the deepest area of the lake. Water and sediment samples were sent to labs five times per year for analysis.

The initial sediment data showed a clear picture of what work was ahead. An average of 2.5 feet of soft sediment covered the lake's hard sandy bottom. Each sediment core sample was mixed into a composite prior to being sent to the lab. In-situ data was collected twice a month, as well throughout the growing season. In the summer and fall, benthic invertebrate samples were collected to better understand the species changes, quantities, and biomass. The same was done for plankton, using a plankton tow. The data collected has been key in the process of documenting how muck decomposition influenced water quality, sediment health, food web functionality and lake aesthetics.

In June 2024, we started the restoration. TryMarine was applied to the surface of the lake every two weeks throughout the growing season. The lake continued struggling with vegetation and algae throughout the 2024 season, although the food web showed promising signs of improvement. Routine monitoring indicated obvious changes fairly soon after each application. This started with the muck becoming fluffy and more watery (increased moisture content). The bottom of the lake in areas less than four feet deep, particularly at the upper reaches of the lake, were covered in leaf litter and detritus, but almost miraculously, within a couple of months of starting treatment, the leaf litter was noticeably breaking down.

Observations indicated the organics were decomposing, and sediment testing data supported the observations. Starting with an average of 477 parts per million (ppm) total phosphorus (which is very high) throughout the sediment core samples, it dropped to 222 ppm by November 2024, a reduction of 255 ppm (47 percent). The water quality was improving incredibly quickly as well, starting at 240 parts per billion (ppb) total phosphorus and dropping down to 77 ppb by November (68 percent improvement). The N:P ratio improved from 4 in June of 2024 to 28 in November. These improvements in water and sediment quality were incredible, and all lead to a healthier food web.

The plankton tow and benthic invertebrate data share a similar story. The zooplankton total biomass increased nearly sevenfold from July 2024 to November 2024. Additionally, the samples showed significant improvement in the presence of favorable, larger species, as well as greater diversity. The benthic data also showed a significant improvement in activity, with over a 30-times increase in abundance of aquatic worms within the sediments.

By the end of 2024, the data collected was all pointing in a highly favorable direction. The food web was kicking into high gear, biomass and diversity were improving, and water and sediment data were starting to look really good. With renewed confidence that the lake could support a thriving fish population, forage fish and predators were stocked in the spring of 2025.

The TryMarine applications resumed in April, and we adjusted the monitoring program, removing two of the six sampling locations from the program, since four locations were sufficient and allowed us to stretch our monitoring budget.

Water quality and sediment data picked up where it left off in the fall of 2024, and to our pleasant surprise, the nuisance blue-green algae and aquatic vegetation did not recur in 2025 except for a brief two week blue-green bloom in May. The rest of the year the water had a natural tannic color, holding a 22–28-inch Secchi reading throughout the growing season. The monitoring data continued to impress. The muck was decomposing. What was once leaves the year prior was now earthy mud. The food web worked in high gear all summer and fall, seemingly voraciously consuming the available organics.

Throughout 2025, water aesthetics exceeded expectations, maintaining a clean, natural look—a stark contrast to three years prior. Momentum is on the food web's side, and with another year of restoration ahead in 2026, the lake is in a great spot. The plan is in motion, and with one more growing season, the restoration will be a true success. Healthy water and a robust food web are helping the fishery thrive. Expectations are that by spring 2026, one year after stocking most of the fish, the fishery will begin exceeding the expectations of anglers, and the owner's vision for the lake will have been brought to life!

Was it expensive? Compared to draining and renovating, or dredging, the cost was a bargain. Using TryMarine was a revelation. With a little help from this treatment we were able to support Brickhouse lakes natural capacity to put organic matter to positive use and add new life to this old lake!

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