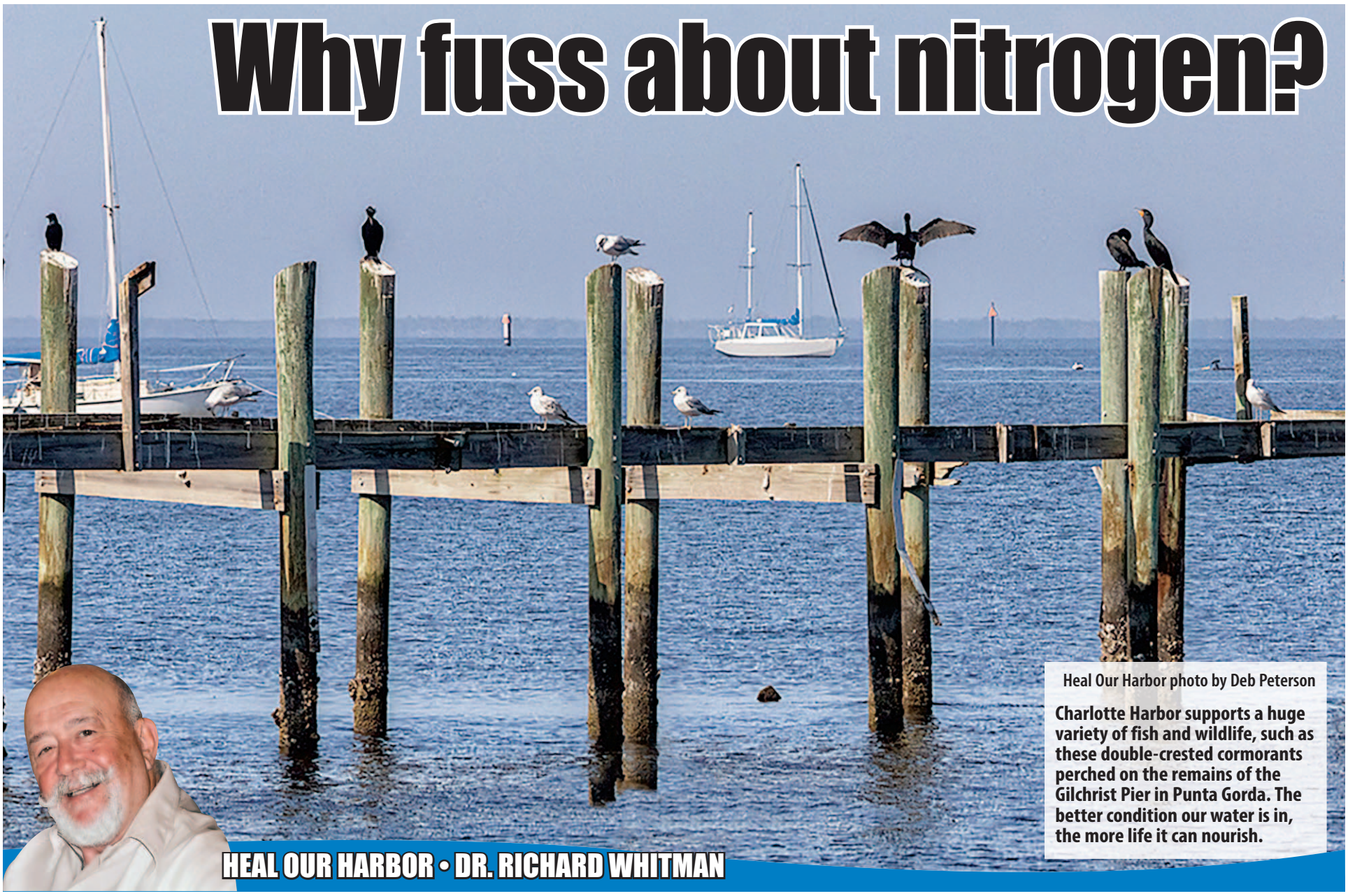
Why fuss about nitrogen?



Heal Our Harbor photo by Deb Peterson

Charlotte Harbor supports a huge variety of fish and wildlife, such as these double-crested cormorants perched on the remains of the Gilchrist Pier in Punta Gorda. The better condition our water is in, the more life it can nourish.

HEAL OUR HARBOR • DR. RICHARD WHITMAN

Carbon, hydrogen, oxygen, nitrogen, and phosphorus (C, H, O, N, and P) are the building blocks of life. Take nitrogen, for example — it's essential for making proteins, enzymes, hormones, and the very structure of cells and organisms. So, if a little nitrogen is good, more must be better, right?

Not exactly. In nature, balance is everything. Too much of any one element, such as nitrogen, can throw entire ecosystems out of whack.

In estuaries like Charlotte Harbor, nitrogen is often the main culprit behind ecological problems. The answer isn't simple, but the core principle of ecology is this: The availability of the rarest vital nutrient controls the growth of aquatic plants and algae. Everything plus some importation follows. Most often, that element is nitrogen, but phosphorus plays a role too.

"But wait," you might think, "nitrogen makes up 78 percent of the air we breathe — shouldn't there be plenty of it?" Yes, but there's a catch. Most organisms can't use nitrogen gas (N_2) directly. Only a few, like certain bacteria, can "fix" atmospheric nitrogen into forms that living things can use.

Some of these nitrogen-fixers are helpful. Rhizobium bacteria enrich soil and help crops grow. Others, not so much. A big problem comes from blue-green "algae," or more accurately, cyanobacteria. Yes, blue-greens are photosynthetic bacteria, not algae at all.

These ancient microorganisms can use N_2 directly, thrive in warm, nutrient-rich water, and outcompete beneficial species for nitrogen. They were some of the first organisms on earth and they have had hundreds of millions of years to figure out how to win the ecosystem war.

Cyanobacteria blooms are no small nuisance. When their populations explode — over one million cells per liter — we call it a blue-green algae bloom. These blooms can make water stink, produce toxins harmful to fish, animals, and humans, and even strip oxygen from the water, suffocating marine life. While other plants and algae struggle, cyanobacteria thrive, taking advantage of high nutrient levels to dominate the ecosystem.

So where does all this excess nitrogen come from? While some nitrogen enters waterways through natural processes like lightning and nitrogen-fixing bacteria, most of it comes from human activities. And we release it in several forms:

- Nitrate is the most readily usable form for plants and algae, and is the type of nitrogen used in most fertilizers. Water running off fertilized lawns and agricultural fields is a common source, but nitrate pollution also comes from septic systems, partially treated wastewater and many other sources.
- Ammonia is a type of nitrogen only certain specialist species can use. Most ammonia pollution entering the water comes from waste produced by humans and livestock, but some also comes from fertilizer and vehicles.
- Organic nitrogen, which takes time to break down into usable forms, comes from things like lawn clippings. You might think it's no big deal for your lawn clippings to end up in the canal, and it wouldn't be — if it were just you. Multiply it by the tens of thousands of canalfront residences in the area, and it can become a big deal indeed.

Whatever the form, too much nitrogen ends up feeding harmful algal blooms, killing seagrasses, choking aquatic life, and turning once-beautiful waters murky and foul.

Phosphorus pollution can also be a problem. Although it's more often the main issue in freshwater lakes and rivers, phosphorus can also limit growth in estuaries like Charlotte Harbor. In some cases, excess phosphorus is just as damaging. The good news? Efforts to reduce nitrogen often help reduce phosphorus too.

So, what can homeowners do to help Charlotte Harbor? Plenty. Here are some impactful, everyday actions that help reduce nitrogen and phosphorus pollution:

- Use fertilizers sparingly and responsibly.
- Compost yard waste; don't dump it into storm drains.
- Plant native vegetation to filter runoff and hold soil in place.
- Create rain gardens to slow and absorb rainwater.
- Install rain barrels to capture runoff from roofs, then use the water for irrigating plants.
- Maintain septic systems to prevent leaks and nutrient seepage.
- Pick up pet waste to keep bacteria and nutrients out of waterways.
- Minimize paved surfaces so water can soak into the ground instead of rushing into storm drains.

It takes a village. Government agencies, nonprofits and scientists can't restore Charlotte Harbor alone. But together, with informed and committed individuals like you, we can bring the Harbor back to health. Every action matters — and the first step begins right at home.

Dr. Richard Whitman is the CEO of Heal Our Harbor, a nonprofit organization that strives to provide scientific information, education and perspective on the environmental health of the Charlotte Harbor watershed. Contact him at Richard.Whitman@HealOurHarbor.org and visit HOH on Facebook https://bit.ly/HOHfla.