

Toxic Algae and Red Tide – The Steep Cost of Factory Farms

Analysis by [Dr. Joseph Mercola](#)

✓ Fact Checked

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STORY AT-A-GLANCE

- › Florida is well-known for its aquatic wildlife – a natural resource that is now being rapidly decimated by the influence of factory farms and chemical agriculture
- › Red tide, covering an estimated 100 miles of Florida coastline and stretching miles offshore, has persisted for 10 months and shows no signs of abating
- › Thousands of animals, including manatees, dolphins, turtles, eels, crabs and other marine animals have washed ashore, dead, killed by the toxic red tide organism *Karenia brevis*, which now covers the east and west coasts
- › Turtles are one of the hardest hit species, including Kemp’s Ridley sea turtles, which are on the critically endangered list
- › Aside from synthetic fertilizers, manure and glyphosate, biosolids (sewage sludge), which are often used as a “natural” fertilizer, also play a significant role in the creation of algal blooms

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Florida is well-known for its aquatic wildlife – a natural resource that is now being rapidly decimated by the influence of factory farms and chemical agriculture, combined with the unpredictable forces of nature.

Over 10 months in late 2017 and 2018, scores of manatees, dolphins, turtles, eels, crabs and other marine animals have washed ashore, dead, killed by toxic *Karenia brevis* algae – known as red tide – which now covers the east and west coasts.

Lake Okeechobee, which is the source of the problem, is also choked by another algal organism – blue-green cyanobacteria. Both the red tide organism and cyanobacteria are fed by excess nutrients such as phosphorus and nitrogen from agricultural fertilizers.

These toxic algae also pose a threat to human health. Exposure through inhalation may trigger respiratory distress; topically it may cause skin rashes, while accidental ingestion can lead to vomiting and kidney failure. As reported by One Green Planet:¹

"[T]oxic algae is spreading through the coastal waters of South Florida, causing what is known as a 'red tide' to form, and it is killing wildlife at alarming rates due to lack of oxygen. The explosion of wildlife-killing algae in the area is largely a result of agricultural runoff linked to the Big Sugar industry."

Largest, Longest Red Tide in Decades

Hundreds of dead manatees and even a massive whale shark have washed ashore since October 2017, when the red tide began. Turtles have been hardest hit, including Kemp's Ridley sea turtles, which are on the critically endangered list. As noted by Bob Wasno, a marine biologist with Florida Gulf Coast University:²

"Back in 1994 we had an outbreak and it killed 196 manatees. Everybody was just completely outraged. They yelled and jumped up and down and said 'This is not going to happen again.' Here we are 24 years later and this is worse than ever."

In 2016, the Florida algal bloom in Lake Okeechobee drew attention after persisting from May through midsummer, covering 33 square miles and spreading to the coasts.³ A state of emergency was declared in three of the hardest-hit counties on the Atlantic coast, as well as one county on the Gulf coast.

That was nothing, though, compared to what we're facing now. The red tide, which covers an estimated 100 miles of coastline and stretches miles offshore, has persisted for 10 months and still shows no signs of abating.

What's Happening in Lake Okeechobee?

As noted in the featured video, the waters of Lake Okeechobee originally drained south into the Everglades, "one of the most biologically diverse regions on Earth." Over time, however, swampland was transformed into farmland. Then, in 1928, a massive hurricane hit the area, causing Lake Okeechobee to overflow, with floodwaters spreading across hundreds of miles.

Some 2,500 residents were killed in the storm surge. To prevent a repeat of this deadly event, the Herbert Hoover dike was built around the lake. Instead of draining south, the lake now drains to the east and west coasts via man-made canals.

As Okeechobee no longer fed water into the Everglades, more swampland dried up, and the sugar industry moved in. Meanwhile, cattle ranches and dairy farms congregated to the north of the lake.⁴ Together, these industries have created a perfect storm in Lake Okeechobee.

Phosphorus-rich manure is leaching from the **factory farms** in the north, while fertilizer-rich water gets pumped into the lake from the south, and it is these fertilizer chemicals, primarily phosphorus but also nitrogen, that feed the toxic algae in the lake.

Another relatively surprising source of phosphorus is glyphosate, the active ingredient in Roundup, which is the most widely used herbicide in conventional farming.

According to University of Miami scientists Larry Brand and Angela Compton, *K. brevis* blooms were thirteenfold to eighteenfold more abundant along the southwest Florida coast between 1994 and 2002 compared to 1954 to 1963, and the reason for this was human-released nutrients such as fertilizer runoff.⁵

Lake Okeechobee Destroyed by Industrial Farming Practices

A major problem with the sugar cane fields is that they still use the old system of back-pumping excess water from the fields into Lake Okeechobee. According to Martin County district data, an estimated 8.7 billion gallons of nutrient-rich water from the sugar fields in the south were back-pumped last year.⁶

The back-pumping, combined with two serious storms, Harvey and Irma, created a situation where an unusual concentration of cyanobacteria formed in the lake, starting around October 2017. The water from Lake Okeechobee, thick with algae, then flows through the canals to the ocean on the east and west coasts, slowly spreading outward.

In the video above, you can clearly see it – the lake water looks like coffee compared to the clear blue ocean water. While red tide is a natural occurrence, it would typically occur much farther offshore. With the toxic runoff from Lake Okeechobee, however, the red tide hugs the shoreline, killing all marine life in its path.

As noted by Heather Barron, head veterinarian at Florida's Clinic for the Rehabilitation of Wildlife, "Anything that can leave has, and anything that couldn't has died."⁷ According to National Geographic:⁸

"Background K. brevis concentrations usually fall below 1,000 cells per liter. Yet in recent counts, many sites tip the scales at over 10 million cells per liter, says Richard Bartleson, a biologist at Sanibel-Captiva Conservation Foundation, who has been monitoring the bloom's intensity.

In select spots, he's seen counts up to 140 million cells per liter. Animals accidentally ingest the algae while feeding, which makes them 'almost comatose,' says Gretchen Lovewell, program manager for Mote Marine Laboratory's Stranding Investigations Program ... But most, she says, are already dead."

The concentration of nutrients in the water also allows the red tide to persist far longer than normal. It's been 10 months, and it still shows no signs of abating. Part of the

solution would be to reestablish water flow from Okeechobee to the Everglades.

For this to happen, the state would have to buy at least part of the land back from the sugar industry. As of yet, this has not happened, and environmental activists cite "lack of political will" as a primary reason for this failure.

Algae Blooms Traced Back to Sewage Sludge

Aside from synthetic fertilizers, manure and glyphosate, there's yet another nutrient source that appears to play a role in toxic algal blooms: sewage sludge, also known as biosolids. This human waste is frequently used as a "natural" fertilizer.

A July 15, 2018, article⁹ in the Florida Times-Union reported a breakout of algae bloom at the head of St. Johns River — a typically pristine area — may have been caused by the sludge runoff:

"We're seeing green algae throughout the headwaters," said St. Johns Riverkeeper Lisa Rinaman, who told state officials this spring that algae-feeding phosphorus and nitrogen might be seeping into the lake from a minimally cleaned variety of sewage sludge that's spread over nearby ranch land."

While the Florida Department of Environmental Protection has shied away from blaming sludge, it, along with St. Johns River Water Management District, has agreed to study the problem, and has placed a six-month temporary ban on the use of biosolids at a 3,000-acre ranch west of the lake.

According to the article, "County commissioners started discussing a six-month moratorium for the entire county last month, but have moved cautiously to avoid any legal landmines." According to researchers, there's been a significant increase in the use of sludge in the area, starting in 2013.

Since 2012, the amount of phosphorus added to the upper basin has more than doubled. In 2016 alone, 70,000 tons of sewer sludge were allowed to be disposed in the river's upper basin.

According to Edith Widder, biochemist and founder of the Ocean Research and Conservation Association, "there's pretty clear evidence of biosolids" in the St. Johns watershed. The problem with biosolids has been clearly detailed by David Lewis, Ph.D., whom I interviewed in 2015.

Chemicals known to be problematic in the part per billion or trillion in water and air are concentrated millions of times higher in sewage sludge which, when applied to farmland, deposit these toxins into the soil. Rain and irrigation runoff then transport the toxins into waterways and groundwater.

What's more, biosolids are not counted toward fertilizer use. This loophole can give the false appearance that agricultural fertilizers aren't as big a problem as you might think.

Farmers may proudly claim they've cut down on fertilizers, when in fact they've just switched to biosolids, which aren't counted, yet deposit even more toxins and result in the same kind of environmental devastation, including algal blooms in waterways.

Agricultural Changes Necessary to Stop Toxic Algal 'Plagues'

Florida is not alone in its struggle. Not only are many of the world's lakes at risk due to agricultural chemicals feeding harmful blue-green algae, but at the bottom of the Mississippi River lies the largest dead zone on the planet. As reported by MPR News:¹⁰

"This particular dead zone at the Mississippi's mouth is a swath of ocean, big as New Jersey at its peak, that's choked for oxygen. There, native plants die. Marine animals move away, or die ...

All Midwestern states drain into the Mississippi. Those states have intensive agriculture, too, which uses huge amounts of fertilizer ... Nitrogen and phosphorus wash into the watershed during rains ... Once in waterways, the nutrients become pollutants ...

At the bottom of the Mississippi, all the excess nutrients wind up in the same spot and dump into the Gulf of Mexico. There, they form algae blooms, which

demand oxygen from the Gulf's waters. The blooms grow and spread quickly, leaving native wildlife with less oxygen.

Climate change exacerbates the problem as warming ocean temps make it easier for algae to grow – and take up more oxygen in the water. What's left is a dead zone."

That our agriculture is causing such enormous environmental devastation is inexcusable. There's no reason for this insanity, as there are solid, proven ways to farm without synthetic fertilizers and other toxic chemicals, including glyphosate.

On an individual level, you can help by buying food from organic, or better yet biodynamic, farmers who rely on natural methods and soil-regenerative techniques, such as no-till, cover crops, composting and livestock integration.

This will naturally help you to eat better too, since typically only real whole foods are grown this way, while most processed foods are the product of destructive industrial nitrogen fertilizer-laden and glyphosate-heavy agriculture.

Biochar Bank Could Be an Important Part of the Solution

While we certainly need major industry changes, getting main offenders like Big Sugar to change its ways is not going to happen easily, or quickly. Still, there are things that could be implemented fairly rapidly that could make a big difference.

One such technology is described in the Virginia Tech paper "Denitrifying Bioreactors: An Emerging Best Management Practice to Improve Water Quality,"¹¹ which essentially involves installing biochar filtration to catch runoff from agricultural sites and catch excess nutrients before they're released from the lake.

If water were released more slowly over time instead of allowing for the rapid discharge of contaminated water into the canals that lead to the coastal waters, it could be treated with a biochar filtration system. Around the lake, the biochar would work as a water filter to recapture the fertilizers before the water enters the ocean. These biochar borders or

banks could also be set up around major agricultural sites to soak up runoff nutrients.

As noted in this paper:

"Research has shown that successful nitrogen removal can be obtained in these field scale systems for up to 15 years even with fluctuating in influent nitrate concentrations and flow rates.

This tolerance to variable in influent enables application of DNBRs [denitrifying bioreactors] to treat a wide range of non-point source pollution, such as that created by agriculture, where conventional wastewater treatment is cost-prohibitive. Some of the greatest potential for DNBR use is in agricultural settings, where nitrogen loss to groundwater is the dominant pathway."

Stay Out of the Water During Algae Bloom

It's important to note that if you see signs warning of harmful algae blooms, stay out of the water and keep your pets out too. Even if there are no signs present, avoid entering water that smells bad, looks discolored or has foam, scum or algae mats on the surface.

If you suspect there could be a problem, you're better off safe than sorry, and be aware that algae toxins can be present in the water even if there's no visible algae on the surface.

In addition, avoid consuming any water that could be contaminated with algae toxins, even if the water has been boiled. According to the U.S. Centers for Disease Control and Prevention (CDC),¹² "Boiling water does not remove algal toxins and can increase the amount of toxin in the water by concentrating it," so you'll need to find an alternative source of water if an advisory is issued in your area.

Lastly, if you live in Florida, either on a boat or near the water, you can volunteer to perform water testing to establish better data and monitoring. To learn more, see the [Florida Fish and Wildlife Conservation Commission's Volunteer Monitoring Program page](#).

Sources and References

- ¹ One Green Planet August 6, 2018
- ² Fox 43. August 10m 2018
- ³ The Conversation July 19, 2016
- ^{4, 6} TCPalm.com August 14, 2017
- ⁵ Harmful Algae 2007; 6(2): 232-252
- ^{7, 8} National Geographic August 8, 2018
- ⁹ Florida Times-Union July 15, 2018
- ¹⁰ MPR News July 19, 2018
- ¹¹ Virginia Tech, Denitrifying Bioreactors: An Emerging Best Management Practice to Improve Water Quality
- ¹² U.S. CDC, Harmful Algal Bloom-Associated Illnesses