Special Report

ROBERT HOLLAND

One of the worst algae blooms in memory fouled the St. Lucie River and Indian River Lagoon this summer, killing a variety of marine life, from fish to seagrass.

Troubled Waters

ALGAE BLOOMS RAVAGE SOUTH FLORIDA'S VULNERABLE ESTUARINE WATERS **BY**

A fine mist rises from the St. Lucie Lock and Dam

as Capt. Mike Conner peers down at a slimy green film of algae. It will be carried downstream in a 450-million-gallon-a-day torrent of fresh water tainted with fertilizers and manure.

The volume of water pouring through the lock and dam varies with the volume of the discharges from Lake Okeechobee that keep lake levels safe, and with the amount of runoff from the heavily agricultural St. Lucie drainage basin. "It was 10 times that — 4.5 billion gallons a day — earlier this year," says Conner, a fishing guide and director of angler outreach at *bullsugar.org,* a nonprofit that wants to stop lake discharges into the St. Lucie and Caloosahatchee estuaries.

Conner is an advocate for cleaning up this water and diverting much of it south to spare the St. Lucie estuary the freshwater deluges and algae blooms that have ravaged this area for 30 years. The fresh water is nutrient-rich, and when conditions are right it feeds massive blue-green algae blooms in the brackish St. Lucie River and Indian River Lagoon.

"It kills the system," says Conner, a former *Florida Sportsman* editor. "It stresses and kills seagrass and interferes with spawning." Shellfish die. The water turns cloudy. Over time, a blanket of what he calls "black mayonnaise" — fine particles of soil, clay and rotting organic material — replaces sand, seagrass and shells on the bottom. "Fishing suffers," he says. "Suffers greatly."

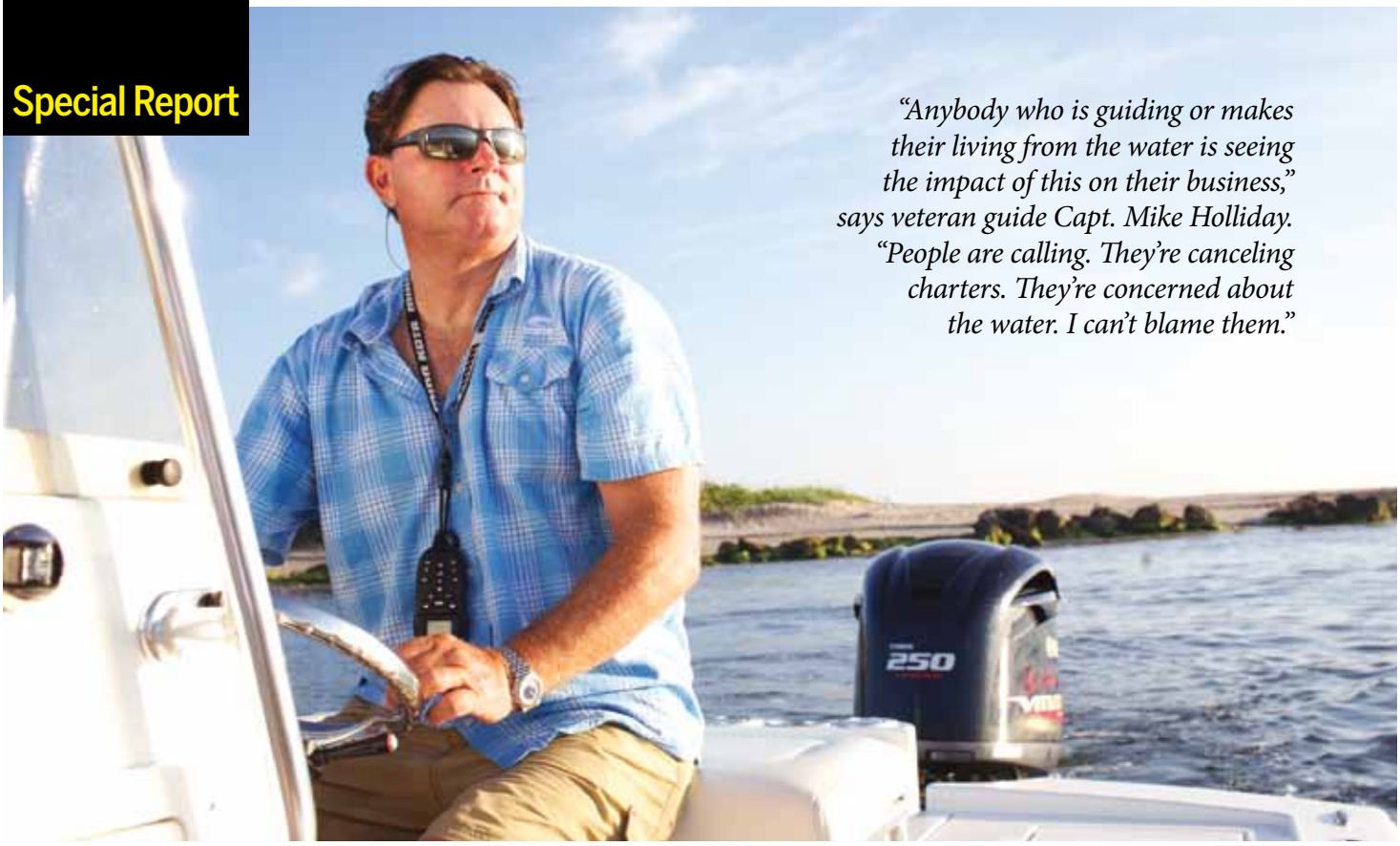
Tarpon and snook remain prize catches, he says, but sea trout have disappeared, and migratory species seldom return. Fish kills, though limited, are worrisome.

This past July, the St. Lucie River and lagoon were in the throes of the worst blue-green — toxic cyanobacteria — algae bloom in memory. The bloom began as slime green, turned bright blue, then brown and finally transmuted into a mass of black rot. The stench hanging over the St. Lucie River ripened from an odor of garbage to carcasses to feces.

"It was just disastrous," says fishing guide Capt. Rufus Wakeman, who owns River Palm Cottages and Fish Camp on Indian River Lagoon. Hit hard by the bloom this summer, the lagoon is a shallow 156-mile estuary along Florida's east coast fed by the St. Lucie and other nutrient-drenched waterways that drain inland agricultural lands and developments.

"An underwater 9/11" is how Mark Castlow, president of Dragonfly Boatworks in Vero Beach, Florida, describes it.

The noxious bloom ruined much of July for guides, charter boats, marinas, boatyards and other businesses. It closed beaches, curtailed



"Anybody who is guiding or makes their living from the water is seeing the impact of this on their business," says veteran guide Capt. Mike Holliday. "People are calling. They're canceling charters. They're concerned about the water. I can't blame them."

tourism during the Fourth of July holiday and drove riverfront homeowners to escape the stench by staying at hotels or going on vacation.

"Anybody who is guiding or makes their living from the water is seeing the impact of this on their business," says Mike Holliday, a Stuart guide in his 30th year of fishing South Florida. "People are calling. They're canceling charters. They're concerned about the water. I had a four-day trip cancel out. They just didn't come. I can't blame them."

In the "lost summer of 2013," when the last big bloom hit the river, "I lost $20,000 in night fly-fishing charters," Conner says. The toxic algae scares anglers away.

Marinas suffer, too. It took five weeks for the bloom to run its course at Central Marine in Stuart, and during much of that time business was at a near standstill, says manager Mary Radabaugh. Carried by wind and tide from the river into the marina basin, the algae piled up in a mat 4 to 8 inches thick from seawall to seawall.

The soggy mess clogged engine intakes on boats. Its toxic smell gave employees headaches, irritated their eyes and throats, and caused some to vomit. Boaters stayed away. "There were signs all over: 'Don't touch the water. Don't get near the water,' " Radabaugh says.

Florida Gov. Rick Scott declared a state of emergency in Martin, St. Lucie and Palm Beach counties on the east coast and Lee County on the west coast. The outbreaks unfolded during a perfect storm of unusually heavy El Niño-related rainfall last winter; big storm-water runoffs carrying nutrients from sugar fields, dairy farms and residential developments into Lake Okeechobee; and lake water warmed by another summer of near-record temperatures. Together the conditions generated a blue-green algae bloom that grew to 200 square miles on Lake Okeechobee.

The bloom migrated east on the St. Lucie River to the Indian River Lagoon estuary and west on the Caloosahatchee River to Pine Island Sound in billions of gallons of nutrient-laden fresh water discharged from Lake Okeechobee to reduce pressure on its old and weakened 143-mile earthen levee.

"When the lake gets to 14 or 15 feet, you've got to start lowering it, period," Wakeman says. "If you're going into hurricane season, you can't have that water too high."

The result: "Any time you deluge salt water with fresh, you have massive die-offs of seagrass, oysters and shrimp," Holliday says. "The stuff that can't get out of the way is dead."

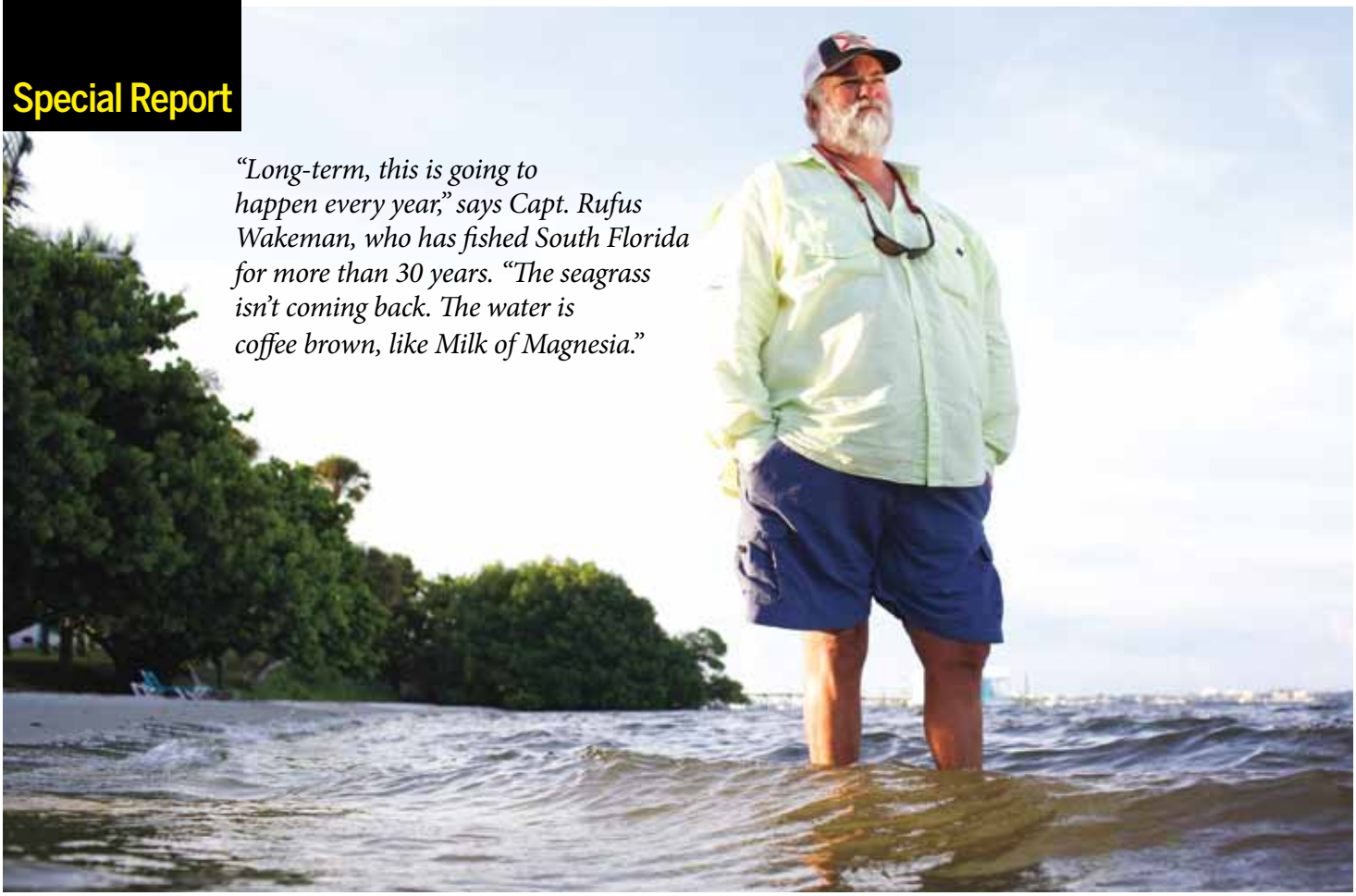
Seagrasses die as fresh water dilutes the brackish water. As the algae dies, bacteria eat it and suck the oxygen from the water. Then fish die from oxygen deprivation.

This is not the first time blooms have ravaged the lagoon, nor will it be the last. "Long-term, this is going to happen every year," says Wakeman, who has fished South Florida for more than 30 years.

Two green and blue-green algae blooms on the Indian River Lagoon in 2010-11 and a "super bloom" in 2013 together killed more than 60 percent of its seagrass, scientists say, and with repeated attacks it may not recover. "The seagrass isn't coming back," Wakeman says. "The water is coffee brown, like Milk of Magnesia."

Guides still can "scratch out a living" at certain times of year, he says, but the sea trout population is devastated, and other species are in decline. "The bait's not here," Wakeman says. "You can't compare it to 10 years ago, let alone 30 or 40." Unless something gives, he says, the lagoon will become a wasteland.

Compare that assessment with the reminiscences of Ernest Lyons, longtime editor of the *Stuart News,* in his 1976 memoir, *The Last Cracker Barrel:*



"Long-term, this is going to happen every year," says Capt. Rufus Wakeman, who has fished South Florida for more than 30 years. "The seagrass isn't coming back. The water is coffee brown, like Milk of Magnesia."

There never was a river to compare with Florida's St. Lucie when I was young. How marvelous it was, with pelicans diving into the water, bald eagles screaming as they forced ospreys to drop their prey in midair, teeming with sea trout, snook, sheepshead and dozens of other kinds — all good to eat. The river fed us. You could get all the big fat mullet you wanted with a cast net or a spear. If you were real lazy, you could leave a lantern burning in a tethered rowboat overnight and half a dozen mullet would jump in, ready to be picked up off the boat bottom next morning. Going up- or downstream by boat, you would scare the "golden platter" pompano, which would come skipping in the boat.

The river was full of good things to eat. Tasty oysters abounded, and water was just brackish enough to give them a salty flavor. We would hold oyster roasts and oyster fries down at Peck's Lake and along the Indian River, where big "singles" [oysters] up to a foot long were almost a meal in themselves. Down toward the Inlet there were legions of "squirt clams" to be dug out of the sand with our hands and steamed in tin buckets over a driftwood fire. That clam juice was sheer elixir. Our river was clean. Nobody had ever heard of pollution. How sad it is to see it change.

"The Indian River is one of a kind," Castlow says. Stretching from Ponce de Leon Inlet south of Daytona Beach to Jupiter Inlet, the Indian River Lagoon includes Mosquito Lagoon, the Banana River and the Indian River, none of which is a river but an estuary. Separated from the ocean by barrier islands, this finger of water spans 40 percent of Florida's east coast, averages just 3 feet deep and is a half-mile to six miles wide.

Biologically, the lagoon is one of the most diverse estuaries in North America. It has about 4,000 species, including more than 2,000 plant, 300 bird, 600 fish and 53 threatened or endangered species, according to the Indian River Lagoon National Estuary Program.

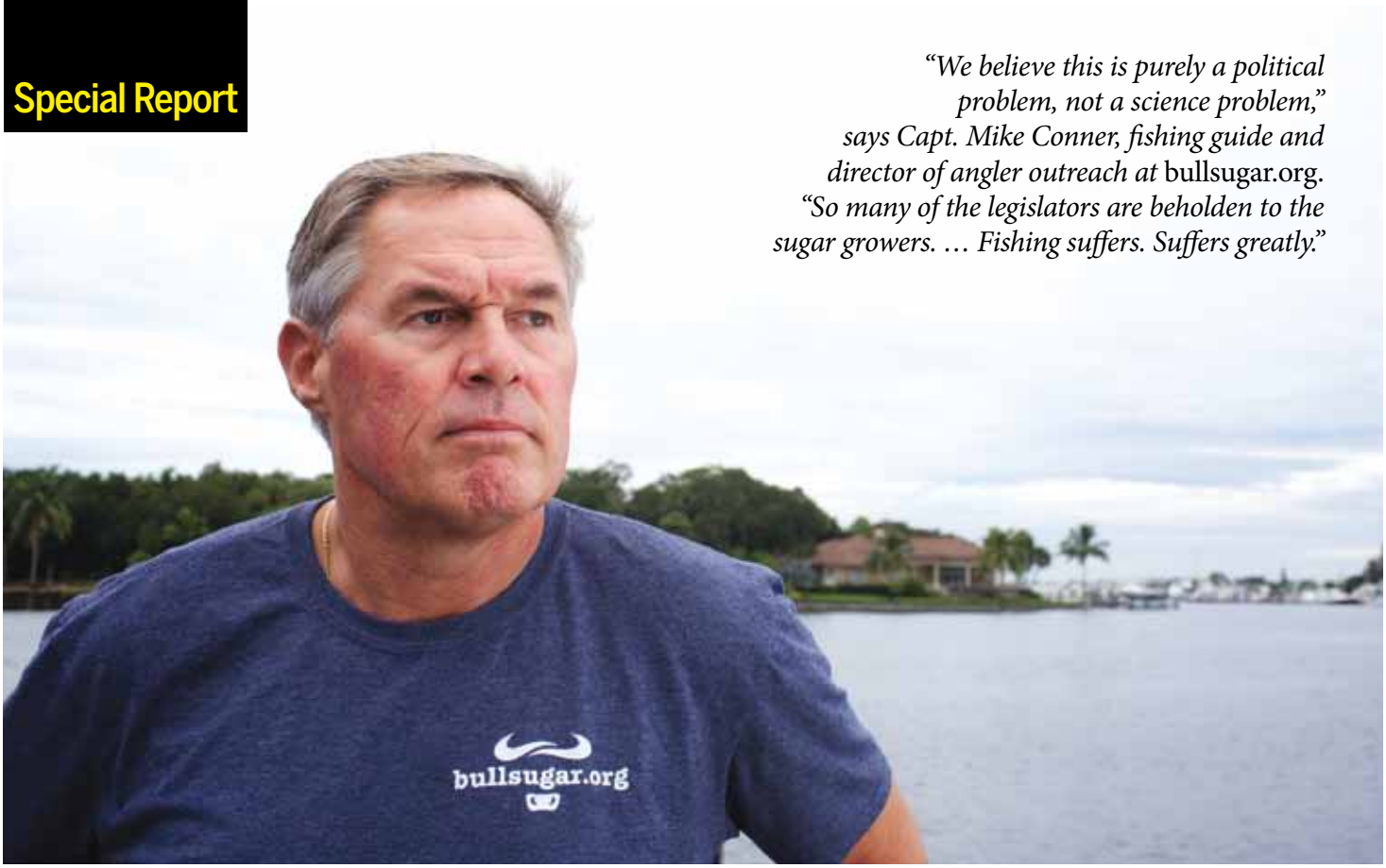
Cyanobacteria produce harmful toxins. Florida's Department of Health advises against direct contact with the algae because it can cause itchy eyes, sore throat and congestion, skin rashes and blistering. When ingested it can lead to diarrhea, nausea and vomiting.

"I'm around this stuff every single day," Holliday says, citing studies that suggest a link between toxins in algae blooms and symptoms similar to those of Alzheimer's disease, Parkinson's disease and amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease). "When I put my hand into the water and the algae touches my hand, is this going to give me neurological problems?" No one knows for sure, and that troubles him.

It troubles Castlow, too. "Never in my years of fishing down here have I heard people say, as they do now, 'I don't want to get into that water,' " he says.

Ann Hammer, an 87-year-old who has fished the Indian River since she was a child, is one of those people. "I've not fished the lagoon for five years," she says. "The water is bad. Fish are dying. People have gotten [flesh-eating bacterial] infections from it and died. It's too dangerous."

The decline in water quality and fishing is not just on the St. Lucie-fed estuary. The Caloosahatchee River and Pine Island Sound on the west coast also are suffering from the blight of algae blooms. "[The latest] freshwater discharges destroyed an alarming amount of seagrass beds and oyster bars in the lower Caloosahatchee estuary," says Capt. Daniel Andrews, a west coast guide and the founder of Captains for Clean Water. "These grass beds are the foundation of the fishery. They



"We believe this is purely a political problem, not a science problem," says Capt. Mike Conner, fishing guide and director of angler outreach at bullsugar.org. *"So many of the legislators are beholden to the sugar growers. … Fishing suffers. Suffers greatly."*

cannot withstand prolonged exposure to fresh water. Also, the turbidity of the water prevents the grass from photosynthesizing."

Andrews has seen and foresees a continued decline of the estuary and its resources if nothing is done. "The damages caused by the freshwater discharges take years, even decades, to recover from," he says. "Generally, before the area recovers from a discharge episode, we experience more discharges. It's a vicious cycle."

The prognosis bodes poorly for fish. Ernst B. Peebles, a biological oceanographer who studies the effects of blooms on fish, says his findings clearly indicate that blooms are bad for fish. "The more often you have these algae blooms, the fewer gamefish you have," he says. "If it gets bad enough, you won't have any."

Though poisoning from red tide toxins often is the cause of the most dramatic fish kills, where beaches are covered in a blanket of carcasses, most bloom-related fish kills are attributable to the depletion of oxygen in the water, he says. Peebles notes, too, that the number of algae blooms has been growing at an "exponential rate," not just in Florida but also around the world.

"As the world's population grows, and it becomes more industrialized and urbanized, and more land is used for agriculture and raising livestock, we have more nutrients — more fertilizers and sewage" — in storm-water runoff and untreated wastewater, which end up in rivers, lakes and seas, creating the rich soup that feeds blooms, he says.

Climate change — the National Oceanic and Atmospheric Administration reports that 2014 and 2015 were the hottest years on record — also may be contributing to the proliferation of blooms and fish die-offs because warmer water triggers blooms and holds less dissolved oxygen.

Blooms are making headlines around the country and the world:

- They were reported in lakes and rivers in North Dakota, Minnesota, Utah, Southern California and Ohio this past summer, which has been sizzling hot.
- In August 2014, Toledo, Ohio, issued a do-not-drink advisory to almost a half-million people after finding elevated levels of microcystins — a blue-green algae toxin — in the drinking water because of a bloom in Lake Erie that's almost an annual event.
- In the spring and summer of 2015, a coastal bloom from central California to British Columbia released dangerous levels of the toxin domoic acid, shutting down recreational and commercial shellfishing in Washington, Oregon and California, and temporarily closing the Dungeness crab fishery off Washington.
- Also during the summer of 2015, a bloom covering 7,500 square miles washed ashore on the resort beaches of Qingdao, China, prompting the mobilization of hundreds of boats and bulldozers to remove it. The bloom returned this summer.
- Chile declared a state of emergency in the Chiloe Archipelago after a red tide bloom killed 40,000 tons of salmon, millions of sardines and numerous whales.

As waters warm, it will mean more blooms and more dead fish, Peebles says. We can't control the weather, but we can adopt better land-use and water-management policies to reduce the nutrients that feed blooms, he says.

Peebles says that, in general, the nutrient overload in lakes and rivers that promotes blooms can be alleviated by wastewater treatment and the use of retention ponds to capture storm-water runoff and hold it while nutrients settle to the bottom to be absorbed by vegetation. He also recommends better water management to slow water flow so it

A comprehensive plan to fix the problem awaits the political will and funds to put it into action.

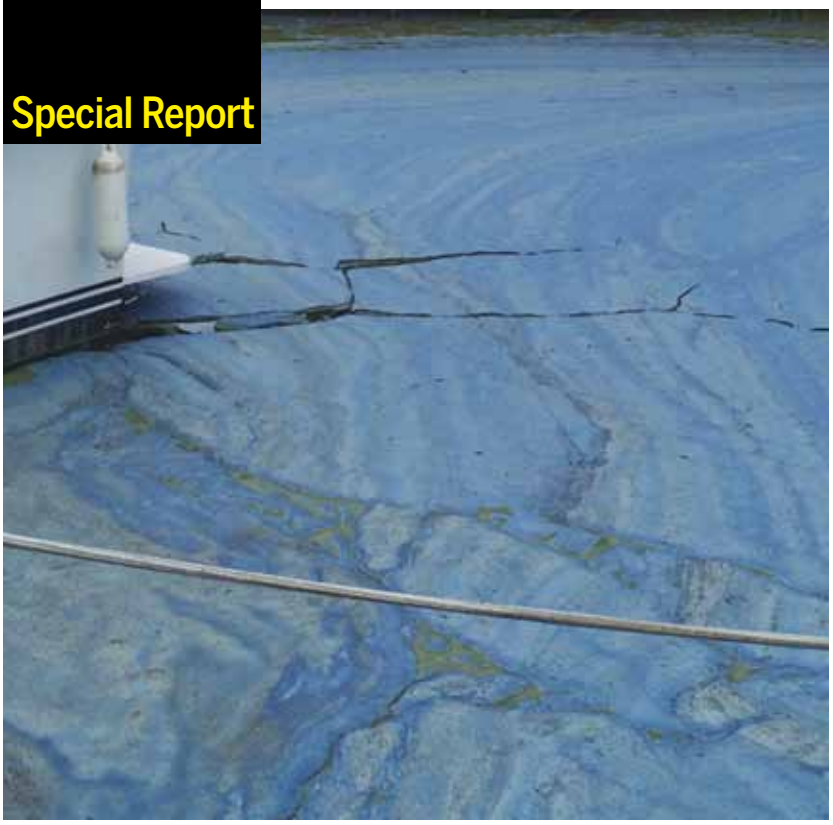
seeps sideways through the soil to its destination, rather than rushing down streams, rivers and canals.

Yet the long-term answer for stemming the flow of fresh water and nutrients into the St. Lucie and Caloosahatchee estuaries is the $16 billion Comprehensive Everglades Restoration Plan, says Stephen Davis, an ecologist for the Everglades Foundation.

"The Comprehensive Everglades Restoration Plan of 2000 is a collection of projects," Davis says. "No single project will solve the problem, but if we do it all we can ratchet down on the discharges." This should offer relief from the blooms. The plan is supposed to:

- restore the flow of water from the north part of the state to Florida Bay through the Everglades
- reduce the reliance on man-made canals and on the St. Lucie and Caloosahatchee rivers to carry water to the coasts
- reduce the amount of water impounded in Lake Okeechobee
- filter out bloom-causing nutrients in shallow impoundments north and south of the lake
- increase the flow of fresh water to Florida Bay, which has been dying because of hypersalinity

This "fix" has been poking along for 16 years, mostly for lack of money and political will to make it a high priority at the state and federal levels, advocates say. Conner, the director of angler outreach for *bullsugar.org,* which advocates the immediate acquisition of agricultural land around the Everglades, has called on citizens and politicians to sign a "Now or Neverglades Declaration." It would hasten



The blooms are killing the grass beds that are the foundation of the fisheries.

the purchase of 60,000 acres of sugarcane fields south of the lake to create marshes to store fresh water from Okeechobee, filter out the nutrients and send the water to Florida Bay.

"We're going to circulate this petition, get it to every incumbent and challenger [in the 2016 elections], ask them to sign it and make the results public," Conner says. "We think this land purchase is the answer." Two hundred scientists have signed on.

"We believe this is purely a political problem, not a science problem," he says. "So many of the legislators are beholden to the sugar growers."

Florida has the money to buy the acreage. In 2014 three of four Florida voters cast ballots in favor of an amendment raising $740 million a year from real estate stamp taxes to buy, acquire and protect wildlife habitat, water resources and parkland. So far, the state has not spent a dime of it on conservation lands, Conner says.

By mid-August the petition had garnered 24,550 signatures, and Florida Senate President-Designate Joe Negron (R-Stuart) had announced he will pursue $2.4 billion — half from state sources, half from federal — to acquire 60,000 acres providing 120 billion gallons of water storage south of Lake Okeechobee. He proposes using $100 million of the state documentary stamp tax revenue annually over 20 years to pay for it. "Permanent storage south of Lake Okeechobee is unquestionably needed as part of the overall plan to solve this catastrophic problem," he says.

It must be done soon, or, as Holliday says, "we're going to see the single largest ecological disaster in Florida history."