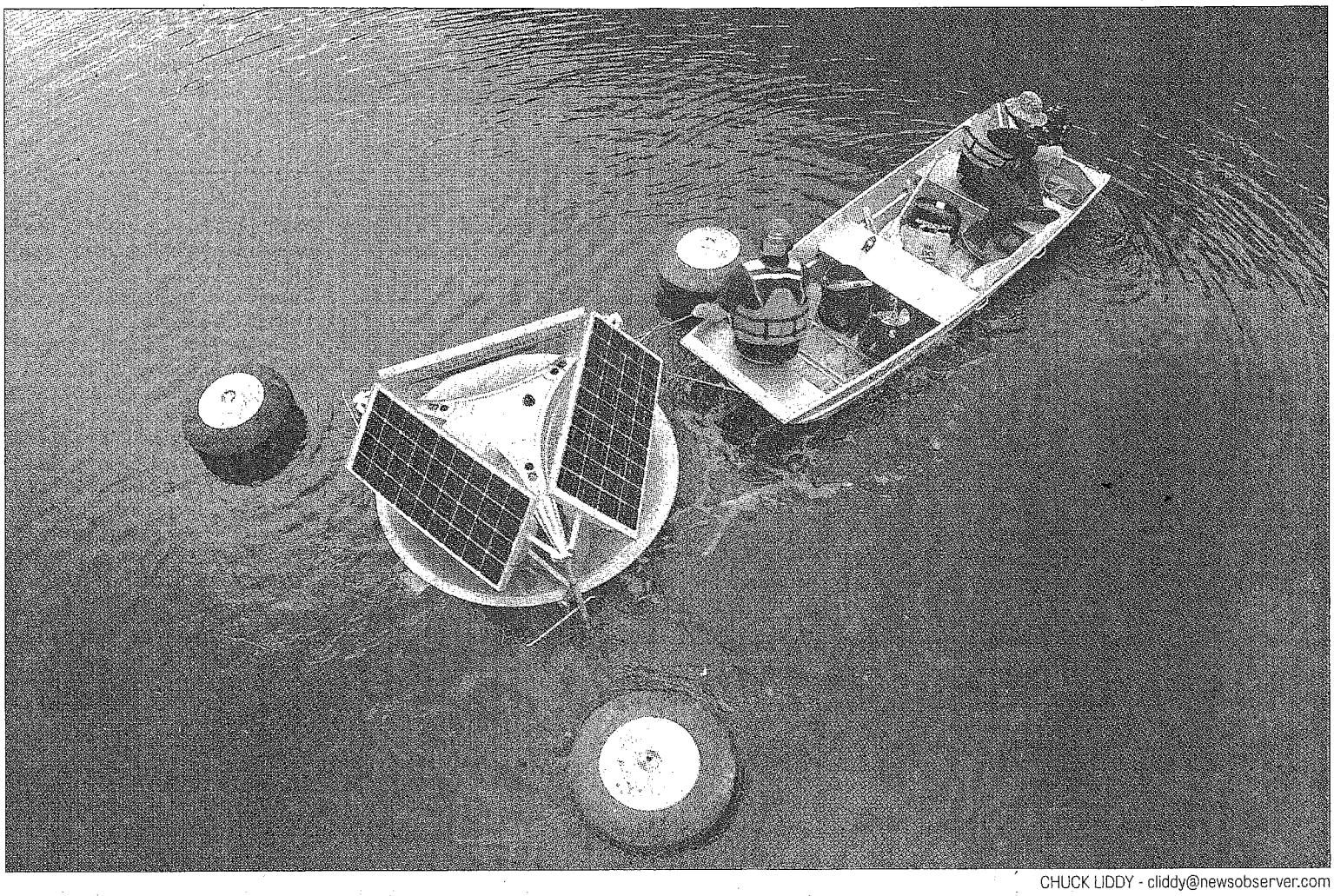
July 23, 2014
News and Observer

Jordan Lake experiment begins



CHUCK LIDDY - cliddy@newsobserver.com

Jonny Dilworth, left, and Jon Walter head out from the Robeson Creek boat ramp Tuesday with a SolarBee unit headed for Jordan Lake. Thirty-six of the SolarBee units will be placed over the next few days in the Morgan Creek and Haw River inlets. See map, Page 7A.

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SOLARBEE WATER CIRCULATORS PLACED IN LAKE IN HOPES OF KILLING ALGAE

By Andrew Kenney
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CHATHAM COUNTY Men lowered the bulky, spacecraft-looking machines into Jordan Lake one by one, first winching them from a truck, then dragging them slowly behind a johnboat to their positions on the huge reservoir.

Ken Hudnell, the suntanned scientist who engineered the controversial project, watched crossed from the dock.

This was the enactment on Tuesday of North Carolina's unprecedented experiment in water management – and, Hudnell hopes, the test case that will show water regulators' errors of omission of the past 20 years.

Over this week and the next, Medora Corp. and the state of North Carolina will deploy a $1.4 million fleet of 36 solar-powered water circulators across the lake that supplies water to roughly 300,000 people in the Triangle.

For decades, the EPA and many water-quality scientists have swept their focus and funding away from in-lake "technological" fixes, such as the SolarBee circulators, which try to physically kill off algae and other unwanted growths.

"It's a very big milestone to me," said Hudnell, a Medora vice president. "This is actually putting into action what I've been proselytizing and trying to make converts for, for years."

The project's skeptics argue that there's little proof that the SolarBee project will improve water quality or reduce the need for expensive upstream stormwater ponds and other pollution prevention. (Hudnell says both prevention and treat-

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ment are necessary.)

Underlying the criticism is a philosophical concern: If the Jordan Lake project works, some worry, it may tempt North Carolina to rely further on new technological fixes instead of proven pollution controls.

"The benefit of some technology ... is it can help reduce the problem and buy some time," said Ben Grumbles, president of the U.S. Water Alliance and a former federal water leader.

"But if it's used to indefinitely postpone the upstream (pollution) prevention strategies," he said, "then from an environmental and water-quality perspective, that's a slippery slope. That's a dangerous path to go down."

Objects of curiosity

The SolarBees won't finish their trial run for two years, but the beacon-lit buoys already are objects of curiosity.

From a distance, they look like angular silver mounds. Up close, they're whisper-quiet machines, a pulsing current gently but visibly spreading from their centers.

Each is marked by yellow signs with warnings in English, plus exclamation points and large triangles.

Four men are doing the bulk of the installation, anchoring the 850-pound, North Dakota-built machines along the Haw River's inlet and the Morgan Creek arm of the huge lake.

They were flanked Tuesday by kayak-paddling representatives of the N.C. Sierra Club and motorboat-driving employees of the state Department of Environment and Natural Resources.

The state employees were collecting a round of the baseline data that will show whether the SolarBees are cleaning the water, including measurements of the lake's clarity, oxygen content and temperature.

"The best we can tell you is we've got to collect the information," said Jason Green, a branch supervisor for DENR. He's been asked to take a boatload of legislators out on the lake, and perhaps even DENR Secretary John Skvarla.

It won't be easy for the untrained eye to spot any improvements in the lake, he said. Jordan Lake generally isn't home to the soupy green algae that swimmers know best, according to Hudnell.

"If you've never been out here, you might not (be able to) tell anything was happening," Green said.

Jason Green, left, of the N.C. Division of Water Resources speaks with Medora workers Tuesday as they deploy one of the SolarBee units on Jordan Lake.

The next debate

The way Hudnell tells it, this experiment was the result of a happy accident.

DENR had rebuffed the former EPA toxicologist's plans in earlier years. Hudnell decided he'd try again late last spring, after he read in The News & Observer that legislators in Greensboro and Burlington wanted to change the rules protecting Jordan Lake.

The upstream legislators first had moved to kill the long-debated environmental program. Then, led by the office of Senate President Pro Tem Phil Berger, they fast-tracked the SolarBee project while they delayed the watershed rules.

The debate pitted the Triangle legislators whose communities drink from the lake against the Triad legislators who live upstream from it.

It's not clear when the legislature will again take up the argument. A committee on Jordan Lake, stacked with upstream representatives, met four times this year, but no immediate plans have emerged.

Hudnell says that state officials have asked him to weigh in as they take up the rules again this fall, though legislative staffers couldn't immediately confirm that claim.

SolarBees have been deployed in hundreds of other lakes, though never on this scale. The results have been mixed. In Lake Houston, 20 circulators significantly lowered water-treatment costs by clearing water near an intake.

A smaller deployment in Cabarrus County's Lake Howell found "subtle" results with "minimal improvements," according to an assessment by the UNC Charlotte Environmental Assistance Office

That report led state Rep. Tom Murry, a Republican from Cary, to raised questions about the SolarBee earlier this year. "I don't like to waste taxpayers' money," he said.

The state's Sierra Club has been a frequent critic of the technology

"It's disappointing that this water mixing project will be moving forward, rather than reinstating the science-based Jordan Lake Rules that would stem pollution from entering the lake in the first place," said Cassie Gavin, director of government relations for the organization, in a written release.

Berger's office on Tuesday said that the senator would support an expansion of the project if it works.

"We are pleased to see the pilot project to help clean Jordan Lake begin this week. We look forward to reviewing the progress over the next 12 to 18 months, which will help us determine next steps," Berger said, according to a written release from his office.

Meanwhile, other technological experiments may come online across the state. The town of Cary has been preparing its own large water circulator to improve the quality of the water it draws from Jordan Lake, and the city of Durham has weighed a plan to remove polluting nutrients from Falls Lake.

Hudnell also has made strides in a push to restore federal funding for in-lake fixes – and as he fights to put his technique on the national agenda, it won't just be North Carolina watching Jordan Lake.

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The need for 'therapy' in water-quality plans

July 23, 2014

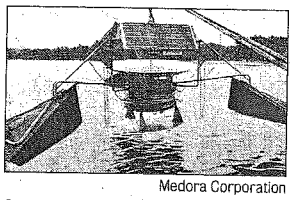
By H. Kenneth Hudnell

Point of View

Jordan Lake has always been impaired. As a reservoir built on low-lying, nutrient-rich farmland and filled with water that can take more than a year to traverse it, the lake has high nutrient levels and stagnant water that enable detrimental blue-green algae to dominate the beneficial algae at the base of the aquatic food web.

Reservoirs such as the 14,000-acre Jordan Lake are built to control water quantity, not quality. Developing a cost-effective plan to improve Jordan's water quality requires addressing these questions: What is federal policy? Is it working well? If not, how can we do better?

Federal freshwater policy requires implementing the Clean Water Act's watershed management programs, which reduce pollutants such as phosphorus that promote the algae "blooms" that stress water, reduce biodiversity and deplete dissolved oxygen during die-offs, causing fish kills. Current policy does not, however, require implementing the act's waterbody management program to improve quality by treating the reservoir itself. In fact, the EPA de-emphasized waterbody treatments – such as the use of SolarBees that began in Jordan Lake this week – to focus on watershed management without scientific and economic justification. Current policy prescribes "preventive medicine" but not "supportive therapy."



Medora Corporation

SolarBee circulators are being put into Jordan Lake this week

Nationally, 64 percent of lake and reservoir acres are impaired, and only 7.9 percent of about 55,000 freshwater bodies listed as impaired prior to 2003 are restored, mainly small waters fed by pipes (point source) rather than runoff (nonpoint source). And the problem is increasing. Whereas the EPA estimated in 1972 that 10 to 20 percent of lakes and reservoirs were eutrophic, the agency now estimates that about half are. EPA river-and-stream data indicate those with excessive phosphorus increased from 47 percent to 66 percent between 2004 and 2009.

No eutrophic waterbody of at least 1,000 acres and with 90 percent of its nutrient input from runoff has ever attained water quality standards. Jordan and other large, impaired waterbodies will stay impaired as long as policy focuses on watershed management only.

Current "preventive medicine" policy fails because it lacks a sound scientific and economic basis. Point-source pollutants are now only 5 to 10 percent of total inputs nationally, and runoff inputs are increasing. The "best management practices" for runoff are difficult and expensive to implement over large areas, and many are only marginally effective.

The Jordan Lake watershed is about 1,700 square miles, 77 times larger than the lake itself. The nutrient-strategy rules that the N.C. General Assembly recently suspended were designed to reduce phosphorus inputs by only 5 percent at a cost estimate of $2 billion. The rules do not address nutrient inputs from groundwater or atmospheric deposition or the huge internal nutrient load that will cycle between sediment and the water column, stimulating "blooms" for decades. No scientific assessment indicates that implementing the rules would restore Jordan Lake.

Current policy is not based on cost-benefit analyses, and accountability is lacking. Current policy also does not address the second factor that promotes algae blooms: quiescent, stagnant water. Scientific literature and more than 300 U.S. lake applications indicate that artificial circulation, such as with SolarBees, suppresses cyanobacteria and stimulates beneficial algae, channeling nutrients up the food web. Circulation also helps oxidize some pollutants, prevent mercury methylation, deactivate pathogens and boost other technologies that remove nutrients and degrade toxic substances in lakes and inlets where they are more accessible and concentrated. Like human bodies, waterbodies require continual circulation and viable biochemical processes to maintain good health.

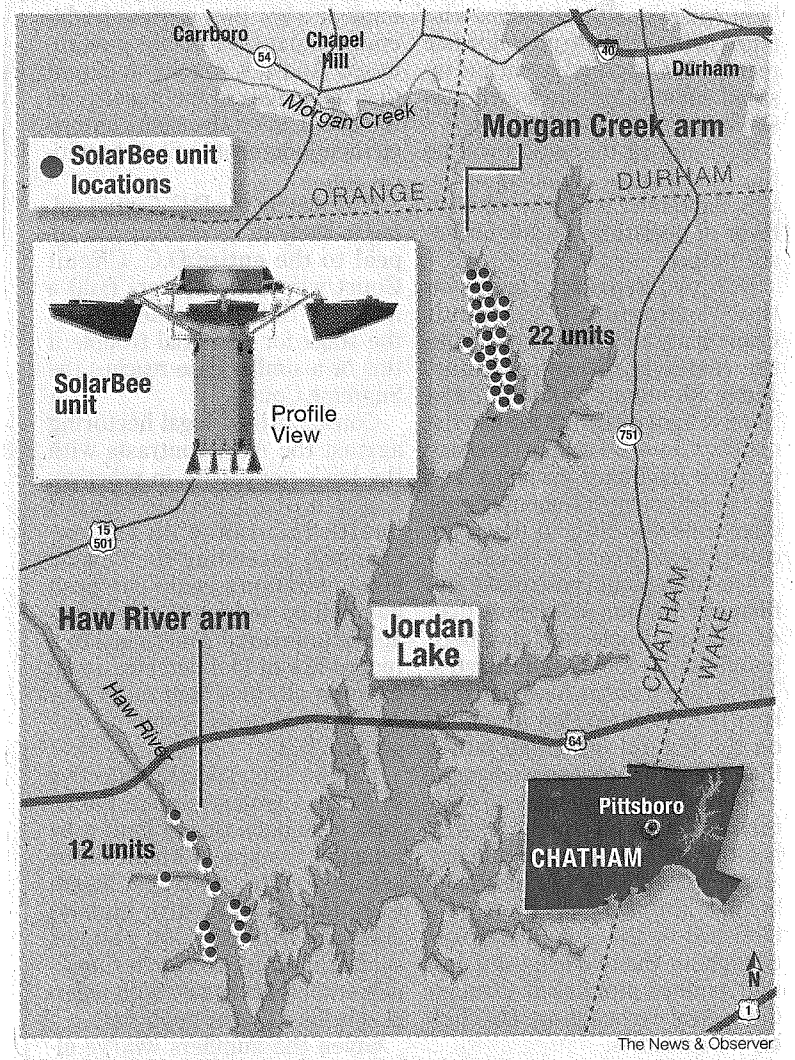
Cost-effective freshwater management requires an adaptive systems approach that identifies the optimal set of processes to create the functionality the system's users require. An optimal strategy for Jordan Lake would combine cost-effective watershed management with waterbody management to form an adaptive system that provides a relatively high likelihood of success, a short time to restoration and downstream protection. Deploying SolarBee circulators in Jordan Lake is a good first step, but implementation of a full adaptive systems approach is needed.

It's time we complement preventive medicine with supportive therapy to save reservoirs like Jordan.

H. Keith Hudnell, Ph.D., of New Bern is vice president and director of science for Medora Corp., maker of SolarBees.

On Jordan Lake, an experiment

After years of debate and planning, a $1.44 million fleet of SolarBee water circulators hit the waters of Jordan Lake this week. If they work, the state could deploy up to 130 more.



The News & Observer

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See how it works: Watch video and see more photos of the SolarBee devices in action with this article at **nando.com/local.**