

Protecting South Florida's “Liquid Heart”

In response to a steady decline in the water quality of Lake Okeechobee, the University of Florida's Institute of Food and Agricultural Sciences is working with a new partnership of state and federal agencies to protect one of the nation's largest freshwater lakes.

With a surface area of 730 square miles, Lake Okeechobee is often called the “liquid heart” of South Florida – providing a natural habitat for wildlife, attracting fishing and recreation enthusiasts, and supplying water for people, farms and the environment.

But all is not well with South Florida's liquid heart. In recent decades, the lake has been threatened by three environmental problems: excessive phosphorus loads that degrade water quality and cause algae blooms and other problems; harmful high and low water levels; and exotic vegetation such as melaleuca and torpedograss.

To help improve water quality and correct other problems in the lake, the Florida Legislature in 2000 authorized the Lake Okeechobee Protection Program. Supported by about \$42.5 million in state funding to date, the comprehensive program is being coordinated by the South Florida Water Management District, the Florida Department of Environmental Protection and the Florida Department of Agriculture and Consumer Services. Other participants include the U.S. Department of Agriculture's Natural Resources Conservation Services, the U.S. Army Corps of Engineers, the Florida Fish and Wildlife Conservation Commission and UF's Institute of Food and Agricultural Sciences.

“The lake has clearly suffered over the past 30 years,” said Susan Gray, who directs Lake Okeechobee restoration efforts for the water management district in West Palm Beach.

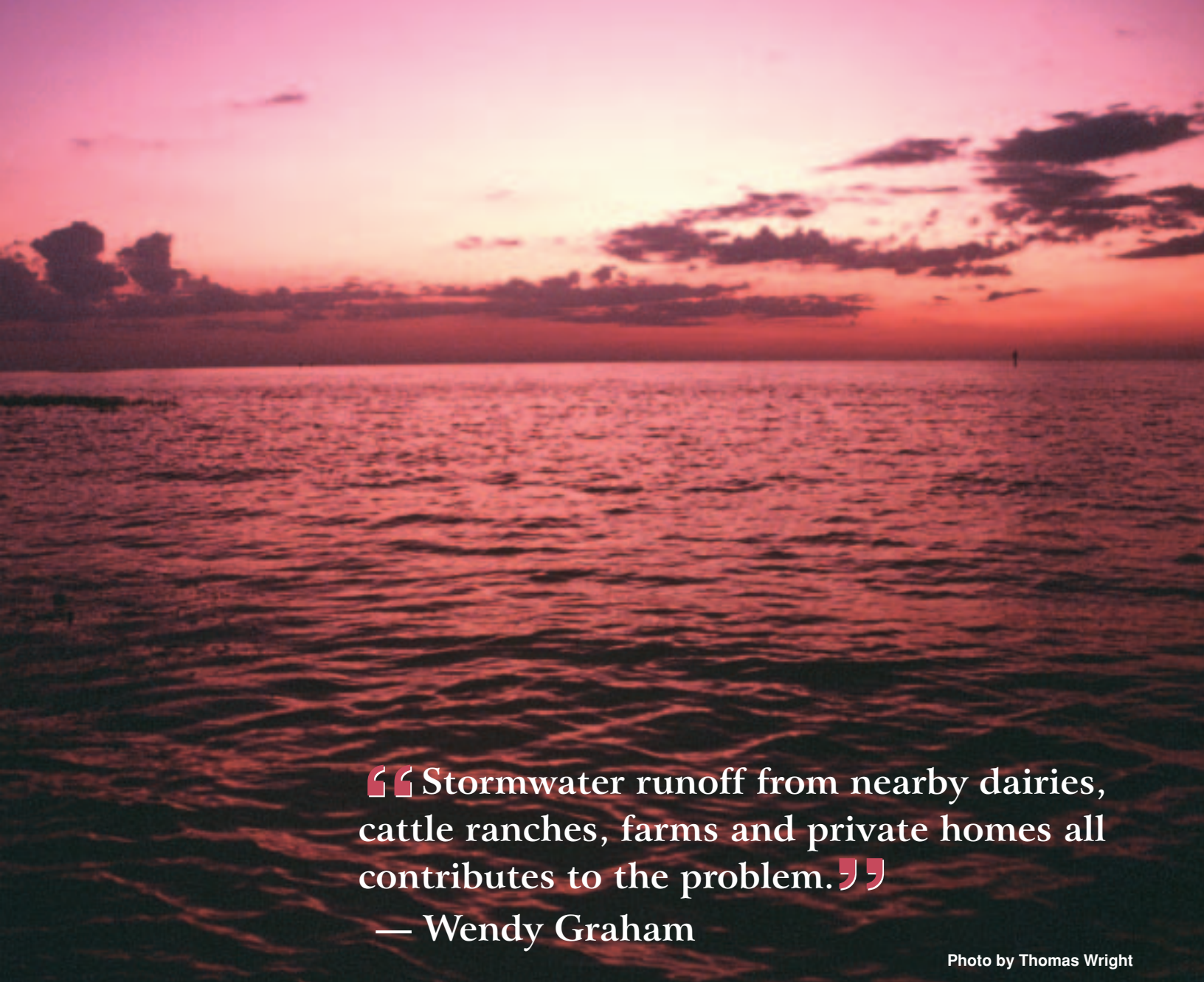
“High water levels during the late 1990s resulted in the loss of submerged plants, and past algae blooms have discouraged recreation, killed fish and caused taste and odor problems in drinking water pumped from the lake,” Gray said.

“Although there was recovery of submerged plants due to the drought and low water levels of 2000-2002, lake water level management continues to be a challenge with current facilities,” she said. “We also have the continuing problem of excess nutrients, primarily phosphorus, degrading the water quality of the lake.”

She said algae growth in Lake Okeechobee is stimulated by excessive phosphorus levels, a key issue in the restoration project.

“Given the extent of the problem and the size of the lake and its surrounding 31,000-acre watershed, the Florida Legislature recognized that it would take several



A photograph of a sunset over a large body of water, likely a lake. The sky is filled with soft, orange and pink clouds, and the sun is low on the horizon, creating a warm, golden glow. The water in the foreground is dark with gentle ripples. A quote is overlaid on the lower right portion of the image.

“ Stormwater runoff from nearby dairies, cattle ranches, farms and private homes all contributes to the problem.”

— Wendy Graham

Photo by Thomas Wright

years to meet the restoration goals,” she said. “Keeping the project on track and funded will require staying focused. We’ve got interagency cooperation, public concern and a state mandate to get the job done.”

Gray said the lake protection program will require a combination of best management practices (BMPs) and regional treatment as well as alternative technologies.

“We’re talking about a huge reduction in phosphorus levels, and our intention is not to put anyone out of business,” Gray said. “We want to sustain economic productivity while minimizing phosphorus runoff – it’s a difficult balancing act.”

Wendy Graham, a professor of hydrology and chair of UF’s agricultural and biological engineering department, said the program is aimed at reducing phosphorus levels in the lake to 40 parts per billion (ppb). Depending on weather and other conditions, phosphorus levels average 110 ppb and have reached upwards of 200 ppb at times.

Graham said the 40 ppb goal for the in-lake phosphorus concentration was selected by the Florida Department of Environmental Protection (DEP) as a safe and desirable level to protect water quality in the lake. To help achieve that standard, DEP requires the reduction of phosphorus entering Lake Okeechobee from the current average of 550 metric tons per year to approximately 140 metric tons by the year 2015.

Many sources have caused the problem over a period of decades. “Stormwater runoff from nearby dairies, cattle ranches, farms and private homes all contributes to the problem,” she said. “Soil in some areas is so saturated with phosphorus that it may continue to be released for years.”

Graham and Mitch Flinchum, a professor of forest and water resources at the Everglades Research and Education Center in Belle Glade, are co-directors of the UF research and extension education program.



Mark Clark, left, a research assistant professor in UF's soil and water science department, and Mitch Flinchum discuss a wetland elevation survey and placement of a water control structure near Lake Okeechobee. The red instrument on the yellow tripod is a laser leveling system that is used with a Global Positioning System to determine the elevation contour and water storage capacity of an isolated wetland near the lake. (Photo by Eric Zamora)

Graham said projects include developing remote sensing techniques to detect phosphorus hot spots on the landscape, investigating alternative phosphorus remediation processes, and demonstrating, evaluating and encouraging the adoption of agricultural, suburban and urban land management practices to reduce the loading of phosphorus into the lake. The research and education projects are being conducted by faculty in soil and water science, agricultural and biological engineering, agronomy, horticultural sciences and animal sciences.

For example, a demonstration project for cattle ranching will reduce phosphorus loads from cow-calf operations adopting BMPs in the Lake Okeechobee basin, she said.

"At this point, sites have been selected at working commercial ranches to demonstrate various water and nutrient management practices," Graham said. "We are currently installing instrumentation, and monitoring will begin in the summer of 2003."

Another key part of the UF research and education program involves phosphorus retention and storage in isolated and constructed wetlands in the Lake Okeechobee basin.

"Phosphorus discharged from various land use activities can be assimilated in farm ditches, isolated wetlands and riparian buffers," said Ramesh Reddy, a graduate research professor and chair of UF's soil and water science department. "Small isolated wetlands are a common feature throughout the basin and may provide a significant storage and retention capacity for phosphorus runoff within the landscape."

Reddy, who chairs this phase of the UF research project, said isolated wetlands cover about 17 percent of the basin, and understanding their role in phosphorus storage is critical to the long-term water quality efforts. In addition, constructed wetlands can be used to treat either on-farm discharges or basinwide runoff.

"The successful deployment of treatment wetlands in watersheds north of the lake will be challenging because phosphorus concentrations in dairy runoff are quite high," Reddy said.

Flinchum, who is working on the lake protection program with Pat Miller, Okeechobee County extension director, said there's a wide range of environmental and economic issues that must be addressed. Flinchum said



Mark Clark adjusts a device that detects a laser beam to determine the soil elevation of a wetland near Lake Okeechobee. (Photo by Eric Zamora)

success of the program will depend on cooperation from residents in seven counties around the lake.

“Lake Okeechobee is crucial to South Florida’s environment and water resources, and BMPs can help if we have the determination to use them,” he said. “This is the first time UF’s Institute of Food and Agricultural Sciences has made a committed institutional effort to work with these agencies on legislative priorities, and we hope the program will serve as a model for future efforts.”

Chuck Aller, who leads the Florida Department of Agriculture and Consumer Services’ efforts to implement BMPs and other phosphorus control strategies on farms and ranches in the watershed, said the high level of support from the agricultural community for the interagency effort is a good reason to be optimistic about restoring the lake.

“The Lake Okeechobee Protection Program legislation begins with the premise that there are ways to achieve environmental results for agricultural operations without resorting to traditional government regulatory approaches,” Aller said. “By involving producers from the very beginning in the design of BMPs that directly affect

their businesses and by providing incentives for farmers to participate, the program represents a voluntary partnership with government.”

He said producers have responded by indicating virtually a 100 percent interest in joining the program, and he expects the trend will continue throughout the watershed. – *Chuck Woods*

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