

# Everglades phosphorus limits on the right track, but more is needed

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State and federal standards for phosphorus releases into the Everglades seem sufficient to protect the huge wetland's resident plants and animals from damage, but pollutant levels still reach double or triple safe levels near some of the Everglades' outer edges.

A six-year study led by Duke University scientists tracked how various phosphorus levels affected natural communities in two research sites inside the Everglades.

In an Oct. 24, 2007 report in the online edition of the research journal *Environmental Science and Technology*, the study's authors conclude that current standards protect the wetland. But they warn high phosphorus levels persist in the outer edges of the Everglades despite the construction of nearly 40,000 acres of storm water treatment areas to reduce the harmful effects of nutrient runoff from development and agriculture.

"They've made significant strides in reducing the amount of phosphorus input," said Curtis Richardson, a professor of resource ecology at Duke's Nicholas School of the Environment and Earth Sciences and the study's first author. "But a lot of work remains to be done to meet the criteria that they set."

Phosphorus is the key ingredient in fertilizers applied by the agribusinesses and housing subdivisions that have spread in an arc around the Everglades. It is carried in rainwater runoff into the wetlands,

where scientists suspect it can harm organisms even in very small doses.

In response to this threat, regulators have begun massive efforts to reduce phosphorus levels by impounding and treating flood waters and encouraging best management practices on upstream farmlands.

Florida and U.S. Environmental Protection Agency guidelines limit phosphorus levels to 10 micrograms (millionths of a gram) per liter of water over a five-year period. Peaks as high as 15 micrograms over a year's time are allowed at individual measuring sites.

In a study supported by the EPA and the Everglades Area Agricultural Environmental Protection District of South Florida, Richardson's team conducted dosing experiments on the organisms living in two pristine test sites in the Everglades' northern region to demonstrate how various phosphorus concentrations would affect them. They then developed a risk-based phosphorus threshold for the Everglades.

Within those sites, known as mesocosms, the scientists were able to demonstrate a selected pollution level's impact on such key Everglades species as the bladderwort *Utricularia purpurea*, a waterplant that can stop photosynthesizing and die when phosphorus levels get too high, Richardson said.

The researchers found that levels in excess of 15 micrograms per liter -- the high end of the chosen government limits -- cause an imbalance in the algae, plant and small animal communities that make up the marshland environment.

To make sure their microcosm findings were not biased by the scale of the testing conditions, the researchers also assessed how real world levels of phosphorus changed along a 10-kilometer length of the Everglades and measured effects on small animal communities living there.

Results of the mesocosm and real-world analysis suggests that a rigid standard of 10 micrograms per liter may be over-protective for all parts of the Everglades the authors wrote. Instead, they suggest a "threshold protective" zone of 12 to 15 micrograms per liter would be adequate as well as more realistic for such a changeable system, especially at the edge of the northern Everglades.

"Most interior areas of the Everglades are currently at or below this threshold zone," they wrote and will be maintained if they can reduce inputs to the suggested protective threshold zone.

"The difficulty is setting rigorous standards for a system that is subject to massive hurricanes, droughts and fires, which greatly alter nutrient concentrations," said Richardson, who also directs the Duke Wetland Center.

Source: Duke University

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