



LAKE OKEECHOBEE RESTORATION INITIATIVE, INC.'S POSITION PAPER # 1.3 [07.05.23]

Lake Okeechobee Restoration Initiative, Inc. [LORI] is an educational and scientific 501 (c) (3) organization. Its overall objective is to design actions that will create lake conditions to grow and maintain areas of underwater meadows of submergent aquatic plants [SAV's] greater and more stable than the last decadal maximum 40,000 acres. Achieving expansive SAV "lawns" of native tapegrass [*Vallisneria americana*] and other native underwater plants rivaling pre-impact conditions means improving the lake's water clarity by reducing resuspended mud that blocks critical sunlight. SAV's need nitrogen, phosphorus and sunlight to grow and spread over the sediment through photosynthesis. The deeper that sunlight penetrates in the water column, the deeper SAV's can expand, thrive and stabilize that sediment. SAV's are one of nature's most productive eco-habitats for oxygen production, pollutant reduction, water quality, and enhanced fish and waterfowl populations.

LORI's work to date has determined a high degree of accuracy in the following water quality conditions for the respective 1972-2020 period of record in the lake's open waters.

- Total nitrogen [TN] has decreased by 22%.
- Total phosphorus [TP] has increased by 130%.
- Water clarity [Secchi disk depth] has decreased by 60%
- Phytoplankton [microscopic plants] production has decreased by 30%.
- TN/TP ratio has decreased from 18 to 5.

Documentation of this overall 48-yr. decrease in water quality of Lake Okeechobee means the lake's food web base to all higher levels of the food pyramid has decreased by 30%. Since 1972, that decrease reduces bass and crappie in size and numbers. This decrease in the food web is caused by that 60% decreased light penetration due to increased mud in the lake's water column. That mud is constantly stirred up by wind-generated events because the lake is now regulated shallower between 10 to 8 feet mean depth vs. a pre-impact average depth of about 16 feet. With decreased depth the littoral zone has migrated downhill to corresponding water depths. Okeechobee remains the 2nd largest freshwater lake in continental USA by area. Finally, the TN/TP decrease correlates with increased blue-green algae blooms [HAB] in the lake and worldwide. Correlation is not necessarily cause and effect, yet some correlations are in fact evidence of causes. We don't know yet if TP/TN at 10 or less is the cause of the toxic blooms, but Lake Okeechobee has almost annual HAB summer events since that TN/TP ratio reached 10 in 2003.

The causes of Lake Okeechobee's 48-yr. degradation are too much TP, too much mud in the water column and too little SAV acreage. TP is concentrated in the mud and high TP correlates with HAB's in hot, sunny periods. The logical solution is mud removal. It is about 1- 3 feet thick with the top 4 inches of easily restirred mud from surface waves labelled the thixotropic layer. Thixotropic layer removal presents several presently unknowns such as how much reforming of this layer would result upon removal from either underlying sediment mud and/ or continued Kissimmee River and other inputs. Other issues are dredge spoil placement and its possible toxicity. The sediment naturally contains arsenic but unknown is whether it also was introduced from long-ago cattle dipping vats in the Kissimmee River valley. **THESE UNKNOWNNS CAN BE SOLVED.**

Lake Okeechobee can never return to an acceptable ecological state until the mud bottom is addressed. LORI recommends research on these mud unknowns and determine its chemical composition, depth profile and volume. Removal will create conditions essential for existing small areas of SAV to greatly expand. SAV expansion will retain a clearer water column, create deeper sunlight penetration, maintain that greater SAV acreage, increase bass and crappie, lower TP and inhabit HAB's. A lower water column mud content and lower TP allows more water volumes to be sent south through the new EAA storage/ STA facility then into Everglades, Everglades Park, Florida Bay while also providing cleaner potable water for 8 million residents of SE Florida. This concept will reduce or eliminate lake discharges to the St. Lucie River and beneficial cleaner flows to the Caloosahatchee.

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