



CONSERVANCY
of Southwest Florida
OUR WATER, LAND, WILDLIFE, FUTURE.

FACTS ABOUT THE IMPACTS FROM LAKE OKEECHOBEE FLOWS AND THE NEED TO BUY EAA LANDS TO DIVERT FLOW SOUTH

Are the flows polluted or is the brown color just from natural tannins?

These discharges are filled with nutrient pollution, as recognized in the Caloosahatchee Total Maximum Daily Load and Basin Management Action Plan which attributes up to 61% of the nitrogen pollution reaching the estuary from Lake Okeechobee discharges, making the Caloosahatchee unsafe for swimming and fishing.¹

While natural tannins do color the water brownish from dissolved organic matter, the Caloosahatchee historically was sufficiently transparent for adequate light penetration to support healthy seagrass beds.² However, nutrient pollution as well as increased turbidity and suspended sediments from watershed runoff and Lake releases contribute to a darker murkier brown, which inhibit the light needed for seagrass survival.³

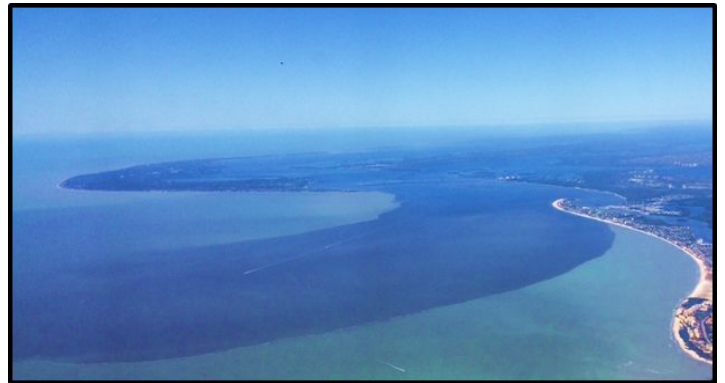


Photo taken of discharges to Caloosahatchee by Jennifer Huber on 2/11/16

¹ Final Basin Management Action Plan for the Implementation of Total Maximum Daily Loads for Nutrients Adopted by the Florida Department of Environmental Protection in the Caloosahatchee Estuary Basin. December 2012. Page 2. Available from

<http://www.dep.state.fl.us/water/watersheds/docs/bmap/caloosa-estuary-bmap-final-nov12.pdf>

² Catherine A. Corbett, Peter H. Doering, Kevin A. Madley, Judith A. Ott, and David A. Tomasko Using Seagrass Coverage as an Indicator of Ecosystem Condition ftp://75.151.72.21/aqr/SVMP/For%20Tom/Corbett_et_al_2005.pdf

³ Turbidity: Measuring Water Clarity. July 24, 2008. Available from <http://www.sccf.org/files/content/docs/turbidityrev.pdf>

EXISTING TN LOADING TO THE CALOOSAHATCHEE ESTUARY

¹ This is the total existing loading from Lake Okeechobee as defined by the TMDL (FDEP 2009). It has been estimated that the TN load from Lake Okeechobee once the adopted TMDL for Lake Okeechobee has been achieved will be 6,222,155 lbs/yr.

² The Nonpoint Source (NPS) Loading includes loads from MS4s, agricultural lands, and nonpoint sources.

³ The Domestic Wastewater Treatment Plant (WWTP) loads have been updated (2011) from the original TMDL report.

⁴ The NPS Loading below S-79 has been updated from the original TMDL report. This load includes loads from MS4s, agricultural lands, and nonpoint sources.

- = Empty cell/no data

SOURCES OF NITROGEN	LOADING (LBS/YR)	% OF TOTAL LOAD
Upstream of S-79	-	-
Lake Okeechobee ¹	7,004,379	61.0%
Nonpoint Source Loading ²	2,731,660	23.8%
Subtotal Upstream of S-79	9,736,039	84.7%
Downstream of S-79 (Estuarine Portion)	-	-
Domestic Wastewater Treatment Plant Loads ³	64,158	0.6%
Nonpoint Source Loading ⁴	1,690,084	14.7%
Subtotal Downstream of S-79	1,754,242	15.3%
Total Load	11,490,281	100.0%

Figure 1 Caloosahatchee Basin Management Action Plan table indicates 61% of Nitrogen pollution coming from Lake Okeechobee

Those nutrient pollutants are coming from man-made sources such as agricultural and residential runoff, wastewater and fertilizers - originating from the inland areas that drain into Lake Okeechobee as well as from within the Caloosahatchee watershed itself.⁴

Are these flows negatively impacting our estuary?

Yes, these flows are known to exceed the rate that causes significant harm to aquatic resources and water quality, which is 2,800 cubic feet per second (cfs).⁵ Flows have been at or above that rate for weeks.⁶ As of 3/17/16, Lake O discharges made up 89% of estuary discharges – comprising more than the 2,800 cfs harm threshold by themselves. Monitoring of seagrass and oyster die offs will occur after the discharges have subsided, so we won't know the total extent of loss until a few months from now.

⁴ Final Basin Management Action Plan for the Implementation of Total Maximum Daily Loads for Nutrients Adopted by the Florida Department of Environmental Protection in the Caloosahatchee Estuary Basin. December 2012. Available from

<http://www.dep.state.fl.us/water/watersheds/docs/bmap/caloosa-estuary-bmap-final-nov12.pdf>

⁵ Final Adaptive Protocols for Lake Okeechobee Operations. September 16, 2010. Page A-13. Available from http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/ap_lo_final_20100916.pdf

⁶ DEP'S Daily Update on Lake Okeechobee e-mails from February 18, 2016-March 16, 2016

Does nutrient pollution contribute to red tide?

Yes, scientific research indicates that though red tide (*Karenia brevis*) is a naturally occurring organism in the Gulf of Mexico, the intensity, frequency and duration of “bloom” events can increase with additional nutrient inputs. Therefore, the discharges which are bringing additional nutrient pollution into our estuary and the Gulf of Mexico have contributed to red tide events.⁷ Red tide and other harmful algae blooms can produce toxins that are not only harmful to aquatic life but can be lethal to marine life - resulting in fish kills or manatee deaths.⁸ These toxins are also known to cause human health effects with latest research linking them to respiratory and serious nervous system disorders.⁹

Will the Comprehensive Everglades Restoration Plan (aka CERP, including the C-43 Reservoir and the Central Everglades Project) stop the harmful high discharges?

No, while CERP is certainly an important part of reducing discharges, it in and of itself will not be sufficient to eliminate the discharges altogether. The C-43 Reservoir project will capture some of the runoff discharging to the Caloosahatchee during high flow times but it will be 10% at most – with the majority of the benefit coming from sending that water back to the river during dry season/low flow times when more water is needed. Likewise, the Central Everglades Project (CEP) project will help to establish a portion of the pathway needed to move more water south but will not be able to do so at the rate needed to stop the discharges to the Caloosahatchee until the bottleneck in the Everglades Agricultural Area that sits between Lake Okeechobee and CEP is fixed.¹⁰

Additionally, the water has to be sufficiently cleansed to move into Everglades National Park and Florida Bay to meet the Water Quality Based Effluent Limitation (WQBEL) and

⁷ Burkholder, J. M., Gilbert, P.M. Grazing by *Karenia brevis* on *Synechococcus* enhances its growth rate and may help to sustain blooms. (2011). *Aquatic Microbial Ecology* 55: 17–30. Available from <https://apprecautionaryprinciple.wordpress.com/2011/06/16/red-tide-blooms-influenced-by-urea-nitrogen-run-off-into-gulf-of-mexico-waters/>

⁸ Florida Fish and Wildlife Conservation Commission. Effects of Florida's Red Tide on Marine Animals. [Internet] Cited March 3, 2016. Available from <http://myfwc.com/research/redtide/general/marine-animals/>

⁹ Institute of Medicine. Stressors impacting coastal and ocean ecosystem services and human health. Understanding the Connections Between Coastal Waters and Ocean Ecosystem Services and Human Health: Workshop Summary. Washington, DC: The National Academies Press. (2014). Ch. 3 p. 27. Available from <http://www.nap.edu/read/18552/chapter/1>

¹⁰ Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 57. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

ensure that it does not destroy those last remaining natural areas of the Everglades we have left.¹¹ That will involve more pollution controls and projects above and beyond CERP.¹²

Will reinforcing the dike around Lake Okeechobee stop the discharges?

No, while reinforcing the dike is essential to protecting public health and safety, it will not greatly increase the capacity to store more water in Lake Okeechobee. The lake maximum level can only be temporarily raised in very limited instances over 15.5 feet before the lake vegetation begins to die, resulting in poorer water quality, algal blooms and ecological losses in that system, which in turn create poorer conditions in the Caloosahatchee.^{13,14}

The solution is not to use Lake O as a reservoir but to manage the lake as a lake and build a reservoir to the south in the EAA so that when the lake levels are high, the water can be shunted south rather than discharged to the Caloosahatchee and St. Lucie estuaries. Storage north of the lake is also needed to capture and store water to keep it from Lake O and reduce damaging discharges - however, storage south of the Lake is necessary to meet all restoration goals, including water conveyance and treatment to the Everglades and Florida Bay.¹⁵

¹¹ EPA 2010 Amended Determination to Restore Water Quality to the Everglades available from <https://www.epa.gov/sites/production/files/2014-01/documents/1-ad-final-version-09-03-10.pdf>

¹² Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 101. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

¹³ Final Adaptive Protocols for Lake Okeechobee Operations. September 16, 2010. Pages A-5 - A-8. Available from

http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/ap_lo_final_20100916.pdf

¹⁴ Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 115. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

¹⁵ Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 87. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

Is land in the EAA needed for stopping the discharges?

Yes, there has been multiple scientific studies that have highlighted the necessity to buy a significant amount of land (enough to store at least 1.2 million acre-feet of water, see graphic below) in order to provide the necessary storage, conveyance and treatment to divert the harmful discharges out the Caloosahatchee. Even with maximum storage north of the Lake, these studies show that land south of the lake in the EAA is absolutely essential to opening up the bottleneck to move the water south to CERP projects and then onto the Everglades and Florida Bay.

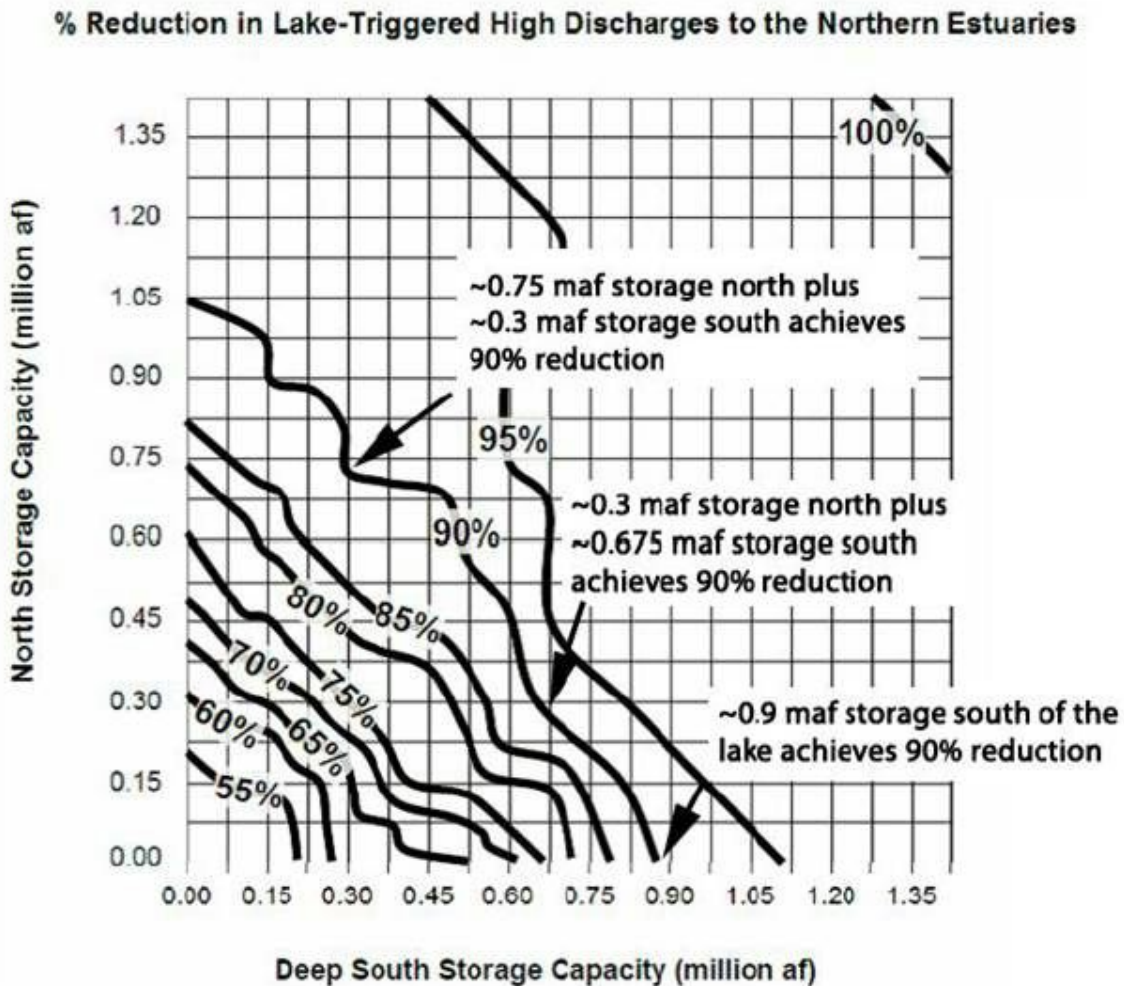


Figure 2 Percent Reduction in Lake Triggered High Discharges to the Estuaries by alternative storage configurations proposed as part of the River of Grass modeling efforts.¹⁶

¹⁶ UF Water Institute Report page 37 (which they adapted from SFWMD, 2009) <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

Additionally, several elements of the original CERP have been determined to be technically infeasible, warranting more surficial storage than originally contemplated in the plan. This includes the proposed 330 underground Aquifer Storage and Recovery wells which have been greatly reduced due to problems of using them for storage with the porous geology of the area.¹⁷ Moreover, the EAA Reservoir deeper storage project originally planned on Talisman Tract now needs to be located elsewhere, since Talisman has been used for a shallower Flow Equalization Basin.¹⁸



Figure 3 SFWMD Diagram of Additional EAA lands Needed for More Storage, Treatment and Conveyance¹⁹

¹⁷ Regional Model Production Scenario Report: Aquifer Storage and Recovery Regional Modeling Study. January 2014. Page 52.

http://141.232.10.32/pm/projects/project_docs/pdp_asr_combined/012014_asr_prod_scenario_report/asr_d13r_main_report.pdf

¹⁸ Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 53. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

¹⁹ 2008 SFWMD powerpoint available at

http://my.sfwmd.gov/portal/page/portal/common/news/rog_pres_gov_board_meeting_briefing_063008.pdf

Different configurations have been evaluated but generally it is understood that to convey the volume necessary, and flow to treatment marshes at a rate they can handle, that there would need to be a very large reservoir, wider flow paths and additional filtration areas within the EAA.²⁰ This is what prompted the South Florida Water Management District to initiate the Reviving the River of Grass EAA land purchase effort in 2008 and was reinforced in the 2015 University of Florida Water Institute Study.²¹

“The potential acquisition of vast tracts of long sought-after land in the Everglades Agricultural Area now offers the unprecedented opportunity to reestablish an historic connection between Lake Okeechobee and the remnant Everglades through a managed system of water storage and water quality treatment.”

- Reviving the River of Grass, SFWMD June 2008²²

Is the Cape Sable Seaside Sparrow an obstacle to moving the water south to stop these discharges?

No, acquiring sufficient lands in the EAA and completing CERP will allow the water to be captured and moved south at the rate needed for stopping the harmful high discharges to the Caloosahatchee while also protecting other key resources, such as the endangered Everglades Snail Kite and the Cape Sable Seaside Sparrow. It is a false choice to pit one resource or part of the system against another.

Additionally, there are constraints to moving more water south such as the existing bottleneck in the EAA, and the cultural and wildlife resources in Water Conservation Area 3. To optimize the system to keep water levels appropriate for the Caloosahatchee and the last remaining habitat for the endangered Cape Sable Seaside Sparrow require the same steps of acquiring EAA lands, completing CERP and completing the state/federal water quality plan²³. Then and only then can we restore our river while protecting other vital resources including Everglades' endangered species.

²⁰ Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades: An Independent Technical Review by the University of Florida Water Institute. Page 133. March 2015. Available from <http://waterinstitute.ufl.edu/research/downloads/contract95139/UF%20Water%20Institute%20Final%20Report%20March%202015.pdf>

²¹ Reviving the River of Grass Restoration Planning webpage available at http://my.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_koe/pg_sfwmd_koe_restoration_project_plan

²² Reviving the River of Grass fact sheet available at http://my.sfwmd.gov/portal/page/portal/common/newsr/rog_factsheet.pdf

²³ Cape Sable Seaside Sparrow, Multi-Species Recovery Plan for South Florida Page 4-356-4-357 <https://www.fws.gov/verobeach/MSRPPDFs/CapeSableSeasideSparrow.pdf>