

January 17, 2016

The Honorable Rob Bradley
State Senator, District No. 5
414 Senate Office Building
404 South Monroe Street
Tallahassee, FL 32399-1100

Subject: Appropriations Subcommittee on the Environment and Natural Resources

Dear Chairman Bradley:

I'm writing to express my appreciation for the opportunity to speak before your Subcommittee last Wednesday, January 11. I hope my presentation was helpful and want to let you know that I will be available in the future – perhaps by videoconference – if you or other Committee members have any follow-up questions.

I would also like to take this opportunity to amplify three points of my presentation that have been misunderstood by some members of the media since the hearing.

- 1. Several combinations of location, configuration, land area and water depth can achieve the objectives established by Senate President Negron for the EAA Storage Reservoir: 120-billion gallons of storage and restoration of flows to the Everglades.** I presented four combinations during my presentation which were taken from the EAA Storage Reservoir planning completed by the Corps of Engineers and Water Management District in 2006 (see below). As I understand it, all of these combinations are consistent with Senate President Negron's proposal to construct a 120-billion gallon reservoir on up to 60,000 acres. When I was asked by the Committee how much land I thought would be needed for the EAA Reservoir, I stated about 35,000 acres. This was a reference to the 2006 work which ultimately decided that roughly 34,000 acres was adequate for the A-1 and A-2 EAA Reservoirs with a storage depth of about 12 feet.

Alternative	Storage Depth (feet)	Land Area (acres)	Storage Volume (billion gallons)
1	6	60,000	120
2	10	36,000	120
3	12	30,000	120
4	14	25,715	120

Note: alternatives evaluated during planning process for initial EAA Storage Reservoir (2006)

Senator Bradley
January 17, 2017

Page 2

Subject: Appropriations Subcommittee on the Environment and Natural Resources

It appears there are at least three general options that might achieve Senate President Negron's goals.

Option 1. Use land already in State ownership upon which to construct the EAA Storage Reservoir. While I suggested the A-2 footprint could be considered, Mr. Antonacci indicated that the District could utilize the A-1 footprint by raising the levees encircling the current shallow water flow equalization basin. This would return the A-1 area back to the deep water reservoir that was under construction before being "abandoned" (his words) in 2008. This option may minimize land acquisition costs, minimize potential socioeconomic impacts and allow more of Amendment 1 funds to be used for the construction of the reservoir and associated treatment area (which would likely require additional land). This option would require close coordination with the federal government for the state to accelerate construction on the A-2 footprint with federal cost share and so as not to delay the other features of Central Everglades Project (CEP).

Option 2. Use a combination of newly acquired land and land already in State ownership upon which to construct the EAA Storage Reservoir. For example, if the A-2 footprint could be utilized as a deep water reservoir (consistent with the 2006 plan), then less new land would be needed for the reservoir and associated treatment works. This option would also require close coordination with the federal government for the state to accelerate construction on the A-2 footprint with federal cost share and so as not to delay the other features of CEP.

Option 3. Construct the EAA Storage Reservoir on up to 60,000 acres of newly acquired land. If the A-1 and A-2 footprints cannot be used as originally intended for the 120-billion gallon deep water reservoirs, then other lands will need to be acquired.

2. **If the EAA Storage Reservoir had been in place, the estuaries would not have suffered the same fate as they did in 2016.** Due to time constraints, I did not elaborate on my brief answer when asked by Senator Mayfield. If the 120-billion gallon reservoir had been in place, the following scenario may have occurred.
- a. Since the El Niño high rainfall weather pattern had been forecast several months before Lake discharges began, significantly greater volumes of lake water would likely have been sent south to the reservoir during the previous dry season when storage capacity was available in the downstream water conservation areas. This could have resulted in two benefits:
 - i. the lake level would likely have been lower when the high rainfall occurred in late January and early February 2016, and
 - ii. as much as 120 billion gallons of water would have been available from the reservoir to provide future EAA water supply. Without the reservoir, the District curtailed Lake discharges to the Everglades in mid-November 2015, partly in order to preserve water within the lake to meet potential future EAA water supply needs.
 - b. The EAA storage reservoir may have been filled and then drained one or more times before the heavy rains came in January/February, and as a result much more Lake water would have been sent south. For example, during 2016, the EAA flow equalization basin received and discharged more than six times its static volume of 20 billion gallons (because of its large size, the EAA Storage Reservoir would likely not have filled and drained six times as did the flow equalization basin).
 - c. The estuaries would likely have been in better ecologic health due to significantly reduced discharges in previous years, e.g., more seagrasses and oysters to help clean the polluted Lake water.

The presence of the reservoir would not have completely eliminated lake discharges to the estuaries. However, the volume would likely have been significantly reduced. I can't say if there would have been a toxic algae bloom, but previous years of moderate to high Lake discharges, e.g., 2013, did not result in toxic algae blooms in the St. Lucie Estuary. There would have been less polluted Lake water and associated algae biomass sent to estuaries, and less nutrients discharged to sustain the algae bloom, so the severity and duration of any algae bloom would probably have been reduced.

3. **During 2016, nutrient loading from septic tanks to the St. Lucie Estuary were about 2 percent of the total nutrient loading entering the estuary.** Using more than 1,800 data points obtained from SFWMD’s on-line database, I estimated the nitrogen load from tributary basins and from Lake Okeechobee discharges for 2016 as 10.1 million pounds. The SFWMD reports the average nitrogen load from the remaining areas draining to the St. Lucie Estuary as 0.67 million pounds (SFWMD 2016). Ming Ye and Huaiwei Sun of Florida State University in their 2013 report to Florida Department of Environmental Protection estimated the nitrogen load to the St. Lucie Estuary from septic tanks in Martin and St. Lucie Counties as 0.23 million pounds (Ye and Sun 2013). Therefore, the portion of septic tank loading for 2016 is estimated as $0.23/(10.1+0.67)$, or about 2 percent.

Summary of Calendar Year 2016 Total Nitrogen Loading to the St. Lucie Estuary

Source Basin	Total Nitrogen, lbs
C-23 Canal Basin	389,955
C-24 Canal Basin	403,196
C-44 Canal Basin	6,293,738
Ten Mile Creek Basin	251,705
Lake Okeechobee	2,759,742
Tidal Basin	669,537
Total Nitrogen Load	10,767,872
No. of septic tanks that drain to the estuary (Ye and Sun 2013)	35,439
Estimate of TN load from septic tanks to the estuary (Ye and Sun 2013)	230,936
Percent of total nitrogen load to St. Lucie Estuary from septic tanks	2%

Data and calculations are provisional and subject to refinement.

Martin County has spent more than \$28 million to date on septic-to-sewer conversions, and more conversions are underway. While not all septic tanks in Martin and St. Lucie Counties contribute significant nutrient load to the St. Lucie Estuary, addressing those remaining septic tanks that contribute significant nutrient load is critical.

In summary, I want to reiterate that in my opinion the single most important project that can be implemented to reduce damaging discharges to the estuaries and restore flow to the Everglades is completion of the EAA Storage Reservoir, as proposed by Senator Negron. The reservoir has been an integral component of Everglades restoration for more than 20 years.

Senator Bradley

January 17, 2017

Page 5

Subject: Appropriations Subcommittee on the Environment and Natural Resources

Most sincerely,



Gary Goforth, P.E., Ph.D.

Gary Goforth, LLC

(772) 223-8593

www.garygoforth.net

cc: Senate President Negrón
Senator Book, Vice-chair
Senator Braynon
cc: Senator Hukill
Senator Hutson
Senator Mayfield
Senator Stewart

References

SFWMD 2016. Draft South Florida Environmental Report, Chapter 8C: St. Lucie and Caloosahatchee River Watershed Research and Water Quality Monitoring Results and Activities.

Ye, Ming and Huaiwei Sun 2013. Estimation of Nitrogen Load from Removed Septic Systems to Surface Water Bodies in the City of Port St. Lucie, the City of Stuart, and Martin County. Prepared for the Florida Department of Environmental Protection. September 2013.