Arguments Against the EAA[1] Reservoir and Rebuttals

by Jay O'Laughlin, Ph.D.[2, 3]

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[1] The Everglades Agricultural Area (EAA) is approximately 700,000 acres of land immediately south of Lake Okeechobee in central Florida, and was officially designated as such in 1948. It is a highly productive agricultural resource of nearly one-half million acres of organic soils, mostly in the interior of Palm Beach County near the Lake, but sustained use of the resource is challenged by soil subsidence, water management issues and the extremely sensitive environment of the Greater Everglades Ecosystem (Barnhart & Hodges 2016).

[2] Two earlier drafts of this paper were dated February 10 and March 9, 2017. These versions have been updated as new legislative proposals and reactions to them have emerged.

[3] Dr. O'Laughlin is Professor Emeritus and Director Emeritus, Policy Analysis Group, College of Natural Resources, University of Idaho. His academic background is in resource economics and policy, and for 25 years his full-time responsibility was conducting objective policy analyses in a program created and funded by the Idaho Legislature. He retired in 2014 to Hobe Sound, Florida, where he serves on the Indian River Lagoon Council's STEM Advisory Committee (Science, Technology, Engineering, and Modeling); and on the Board of Directors of the Guardians of Martin County, a 501(c)(3) not-for-profit corporation with a mission "to educate the residents of Martin County on environmental issues which are impacting their quality of life" (http://theguardiansofmartincounty.com/). He was not remunerated for this work.

Contact information: 772-932-7112 (home), 208-669-1321 (cell), jayo@uidaho.edu

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Executive Summary

A reservoir in the Everglades Agricultural Area (EAA) is an unfinished 60-year old project, among the suite of projects approved in 2000 by the State of Florida and the U.S. Congress, acting as partners, to restore the Everglades by sending excess Lake Okeechobee (Lake O) water south, and reducing wasteful and harmful discharges to estuaries east and west of the lake. Sen. Joe Negron of Stuart announced in August 2016 that his top priority as incoming President of the Florida Senate would be to acquire 60,000 acres of private farmland on which to construct the EAA Reservoir to hold 120 billion gallons. This was fleshed out in Senate Bill 10 (SB10) filed in January 2017. It asks that reservoir planning be reinitiated now rather than forestalled to 2021.

Eight arguments against the EAA Reservoir have surfaced since last August and are rebutted herein. Most were likely quieted by subsequent amendments to SB10. The loss of jobs from taking farmlands out of production, however, remains a sticking point. On balance, this analysis shows that the EAA Reservoir is a job creator, and not, as some claim, a "job killer."

SB10 commits at least 14,000 acres of state-owned land to a reservoir capable of storing at least 78 billion gallons. When the current lease to farmers is terminated in 2019, and assuming that the mix of crops in this area is similar to the rest of Palm Beach County, there will be an estimated loss of 236 total jobs (107 directly in farming, 129 in indirect industries supporting agriculture and induced spending of direct and indirect employee earnings). SB10 includes provisions for retraining displaced workers and helping them find new jobs.

The agriculture-related jobs lost will be offset by new jobs. After the reservoir fills, for each and every job lost there will be an estimated 3.1 jobs associated with reservoir operations and maintenance and providing goods and services for new recreation/tourism activities opportunities the reservoir is expected to provide. Meanwhile, during reservoir construction, for each and every farm-related job lost there will be 84 construction-related jobs spread out over the time it will take to build the reservoir.

Jobs besides farming are also at stake. Marine industries in four counties (Lee, Martin, Palm Beach, and St. Lucie) were adversely affected by harmful algal blooms triggered by discharges in 2016. These industries have a $4 billion impact, and provide 37,000 jobs and $1.7 billion in employee earnings. Harmful algal blooms in 2013 reduced the value of homes in Lee and Martin counties by $969 million. Tourism spending across the state increased 1.3% from 2015 to 2016, but in Martin County it decreased by $5 million, in part because of nationwide publicity about reeking toxic algae, posted public health warnings, and beach closures.

When completed the EAA Reservoir will help provide water supplies for six million people in the greater Miami area, recharging the aquifer they depend on by protecting it from saltwater intrusion. Averaged over the past 35 years, the daily discharges from Lake Okeechobee would provide almost half of the average daily water needs in Miami-Dade, Broward and Palm Beach Counties, but this water is being wasted to tide and adversely affecting three estuaries.

Introduction

Florida's sugar industry spent more than $57 million in the state between 1984 and 2016 to influence the outcome of issues affecting them (Klas 2016). Sugar industry spokespersons and others have attempted to thwart construction of a reservoir south of Lake Okeechobee (Lake O) in the Everglades Agricultural Area (EAA), in large part because farmlands will be converted to water storage and treatment areas. Those opposing the reservoir have used a variety of arguments against a proposal offered in August 2016 by Senator Joe Negron of Stuart—and reaffirmed by him as President of the Senate in two memos to his Senate colleagues (see Negron 2017a, 2017b)—for the State of Florida to purchase 60,000 acres of land in the EAA on which to store water that would help reduce harmful discharges of excess water from Lake O to the estuaries east and west of the Lake and wasted to tide rather than sent south as happened historically.

The 60,000 acre EAA Reservoir was formally proposed to the Legislature on January 26, 2017 and amended twice before the Senate approved the bill on April 12 and sent it to the House. The primary change abandons the idea of purchasing 60,000 acres of private land and instead building the reservoir on state-owned lands. To mute sugar industry protests the bill foregoes the opportunity for the state to acquire lands for the reservoir via eminent domain, and it would cancel an option to purchase U.S. Sugar Corp. lands if other lands can be found for the reservoir. This document identifies and rebuts arguments against the reservoir, some of which have been dissipated by the rewrite of SB10, but others remain active, especially the loss of jobs from taking farmlands out of production regardless of who owns them.

A short **Background** section is provided, then **Eight Arguments** in the words of those speaking out against the EAA Reservoir proposal are listed and accompanied by **Rebuttals**. Following that is a **Postscript: Seven Questions Legislators Will Want Answers To**, with replies based on analysis herein. Throughout, **Source References** are indicated by Author (date) or (Author date) and listed at the end. The eight arguments are:

1) loss of jobs in Glades communities;
2) the state already has acquired too much sugarcane acreage, loss of more will create ghost towns;
3) state acquisition of private land reduces ad valorem property tax revenues for local governments;
4) the proposed EAA Reservoir lacks a science-based plan;
5) the proposed EAA Reservoir would be inadequate to reduce Lake O discharges;
6) water storage efforts should now be focused north of Lake O, not south;
7) the proposed EAA Reservoir is a new and distracting idea that should be set aside for now and considered in the future; and
8) instead of an EAA Reservoir the state should fund completion of the Lake Okeechobee dike.

These arguments present one side of an issue, rebuttals offer other perspectives. The author has graduate-level education in resource economics, and 25 years of experience as an academic policy analyst with a legislative mandate to do objective analysis, and has used information generated by

economic impact input-output models of inter-industry relationships for policy analysis purposes. Information derived from these widely-used models estimates job and revenue impacts. Information supporting rebuttal comments herein is derived from such studies, but focus only on job impacts

The proposed EAA Reservoir has energized camps of dueling experts. More than 200 Everglades scientists petitioned the South Florida Water Management District (SFWMD) in support of an EAA Reservoir (see Wickstrom 2015) and 60 water policy experts signed a letter to the governor in favor of other Everglades restoration projects instead of an EAA Reservoir (see Dean 2017). (The SFWMD is responsible for water resource policy and management and is governed by a board appointed by Governor Rick Scott.) A water resource Ph.D. engineer employed by the Everglades Foundation, and formerly employed by the SFWMD, has used the SFWMD reservoir operations model to demonstrate the benefits of an EAA Reservoir south of Lake O as compared to a reservoir north of the lake (Van Lent 2017, Van Lent and Paudel 2016); the results, favorable to an EAA Reservoir, have been challenged by a Ph.D. engineer employed by the SFWMD (Owosina 2017).

Until quite recently there was a lack of information about job impacts from an EAA Reservoir. During the last week in February 2017, economists from different camps weighed in, one in support of the EAA Reservoir proposal (the "Clemson" study for the Everglades Foundation, cited as Maloney et al. 2017) and one against it (the "JMI" study for the James Madison Institute, with undisclosed funding sources, cited as Villamil 2017). The "JMI" study report overstated job losses and ignored jobs created by constructing the EAA Reservoir. The "Clemson" study did not specifically report job loss, and its construction job estimate was overstated. Neither of these two studies mentioned the creation of new permanent jobs, either in operations and maintenance of new water resource management infrastructures, or recreation and tourism opportunities. Data from these two studies is not used herein.

Because of these dueling studies, people who have not already made up their mind whether to support the proposed EAA Reservoir are left guessing about what might be best in terms of economic costs and benefits for a 60,000 acre reservoir built on purchased farmland (see Rangel 2017b, Staletovich 2017b) or one with a smaller footprint on state-owned lands. In the end, how "best" is measured matters greatly. To consider what might be best for Florida, one must grapple with the environmental/ ecological, economic, and public health dimensions of EAA Reservoir issue. All are addressed herein.

Those who favor the EAA Reservoir are more interested in the ecological and economic health of the Everglades and the estuaries in the east, west, and southern coasts of the Florida Peninsula than in the EAA, which is detrimental to their interests. Those speaking out against the EAA Reservoir either care about maintaining a sugar industry south of Lake O in its current configuration, or think that the price tag for the EAA Reservoir is too high, given the many competing uses for public funds, including other Everglades restoration projects. This paper is designed to help people sort through the conflicting information and make an informed decision about the EAA Reservoir. For those with open minds, the reality of the situation, which stems from public policy decisions made in 1999 (see Treadway 2017b), was recently expressed by Senator Negron (2017b):

"The issue is not if we will have additional southern storage, it is when and where."

Background

Historically excess Lake O water flowed south to the Everglades and Florida Bay, and some of it recharged the Biscayne Aquifer that 6 million people in the greater Miami area depend on (i.e., Miami-Dade, Broward, and Palm Beach counties). Now in years with excessive rainfall Lake O water is discharged via canals east and west of the Lake, creating a serious public health problem as well as economic and ecological damage. Harmful algal blooms fed by nutrients drained from Lake O have plagued coastal communities by turning toxic and closing beaches, reducing home values, and diminishing recreation and tourism activities and the jobs and income such activities provide.

In 2014 the Florida Senate commissioned a study by the University of Florida's Water Institute (UFWI) to identify options for reducing the Lake O discharges and moving more water south. Study findings were published in March 2015 and based on them, on August 8, 2016 Sen. Negron proposed constructing a 60,000 acre reservoir in the Everglades Agricultural Area (EAA) south of Lake O with a capacity to store 120 billion gallons (360 thousand acre-feet) of water. Consistent with the UFWI study findings, Sen. Negron recognized that it would be necessary for the state to own enough land for the EAA Reservoir. As per the Comprehensive Everglades Restoration Plan (CERP) partnership arrangement, without state land ownership the federal portion of the 50-50 cost-share arrangement for the EAA Reservoir, or any of the other 68 CERP project components, would not be forthcoming.

On January 26, 2017, after his appropriations subcommittee had listened to four hours of hearings on the EAA Reservoir land acquisition and construction proposal, Sen. Rob Bradley of Orange Park filed Senate Bill 10, a water resource bill that if passed would authorize the state to fund up to $1.2 billion for the state to acquire land from willing sellers and begin construction of storage facilities in the EAA that would hold 360 thousand acre-feet of water, and another $1.2 billion from the federal government under the CERP partnership arrangement.

Also on January 26, 2017, Sen. Negron delivered a memo to his Senate colleagues explaining the EAA Reservoir proposal and asking for their help:

> These algal blooms have occurred before and will occur again unless high volume discharges from Lake Okeechobee are stopped and pollution in the Lake Okeechobee basin is abated. … Despite the sincere efforts of our state and federal government to plan and fund long-term solutions to address rising water levels and pollution in Lake Okeechobee, year after year as the Lake levels rise, the solution is to flood my community [i.e., Stuart] and many others across our state with billions of gallons of polluted water. … I have a personal mission to work with the agricultural community, to work with Florida's best scientists, and to work with every member of the Legislature, to protect our estuaries, to protect our lagoons, and to put the harmful discharges from Lake Okeechobee that destroy our environment and harm our economy into the past pages of history instead of the daily front pages of newspapers (Negron 2017a).

Chief among the opponents of Sen. Negron's proposal, now embodied in SB10, is the sugar industry that owns and farms most of the EAA. On February 6, 2017, the fourteen largest landowners and sugarcane

farmers in the EAA signed a letter to legislators stating that "We are not willing sellers of our property to the government" (EAA landowners 2017, as emphasized in original document; see also Rangel 2017a).

Facing such pushback from the sugar industry and its willingness to spend freely on lobbying efforts to get what it wants, SB 10 was amended several times. The Senate passed it on April 12, 2017. These changes in SB10 essentially rewrote the bill; features related to the EAA Reservoir are reflected in rebuttals below. The bill also involves the state in the C-51 Reservoir project that will provide water supplies for coastal communities in Broward and Palm Beach counties; this feature is not discussed.

The EAA Reservoir proposal in the amended bill now is very much like that made in 1999 when the state purchased 52,547 acres of land from the Talisman sugar company for creating water storage and treatment facilities to meet Everglades restoration goals (Treadway 2017b). Construction of the EAA Reservoir commenced in 2006 but was stopped in 2008, primarily due to concerns expressed by environmental groups in a lawsuit and a deal negotiated by former Governor Charlie Crist for the state to buy all of U.S. Sugar Corp.'s assets, including more than 200,000 acres of land (Buermann 2008, Elsken 2017a, Treadway 2017b, SFWMD 2017).

SB10 mandates that the SFWMD reinitiate the planning process for the EAA Reservoir in the very near future, rather than waiting until 2021 as the district has it scheduled. To comply with court-ordered pollution reduction requirements, water treatment areas will be needed to clean the water in the EAA before it can be sent further south to Everglades National Park and Florida Bay. SB10 insures that the amount and location of acres necessary to remove agricultural pollution from water moving south of the lake will be determined as part of the Everglades restoration planning process, and requires that the SFWMD use a mathematical model to determine the appropriate mix of water storage, treatment and conveyance infrastructure to accomplish CERP goals as well as reduce Lake O discharges.

Eight Arguments and Rebuttals

1) Loss of jobs in Glades communities

Glades communities are on or near the shores of Lake Okeechobee in Palm Beach County—Belle Glade, Canal Point, Pahokee, South Bay; Hendry County—LaBelle, Clewiston; and Glades County—Moore Haven. These are farming communities where the people who grow sugarcane, vegetables, and other crops in the EAA live. They are alarmed by the potential loss of jobs in their communities, and since February 3, 2017, when Governor Rick Scott described the 60,000 acre EAA Reservoir proposal as a "job-killing land grab" the farmers have repeated that mischaracterization.

The EAA Reservoir is a job creator, not a job killer. In the rebuttal section below it is clearly demonstrated that the EAA Reservoir will create more permanent jobs than farm-related jobs lost by taking land out of production. If farmers knew that, perhaps they would support the EAA Reservoir rather than oppose it. Following are the arguments put forward in their own words, then rebuttals, including analysis of job losses and gains from the EAA Reservoir.

● July 16, 2016: "Taking another 60,000 acres of productive and sustainable farmland out of the EAA will without a doubt close down our sugar mill and put us out of business," said Barbara Miedema, vice

president of Sugar Cane Growers Cooperative of Florida. "Sen. Negron's plan means losing a thousand or more jobs in the Glades communities, not to mention the impact to businesses in the community that provide services to us." (Stapleton 2016)

● August 24, 2016: "Sugar giant Florida Crystals and the Sugar Cane Growers Cooperative of Florida own most of the land Negron wants to buy. In a joint news statement, they said selling active farmland 'means losing (1,000) or more jobs in the Glades communities, not to mention the impact to businesses.' They said they will review details of the proposal. Negron said he's open to looking at other properties. Residents of communities south of the lake protested outside Negron's Palm City office, saying his plan will result in job losses." (Rangel 2016)

● February 3, 2017: "Gov. Rick Scott and farmers, however, see the reservoir as a ***job-killing*** land grab and say efforts should focus north of the lake, where water storage projects are already underway." (Staletovich 2017a, emphasis added)

● February 7, 2017: Four labor union representatives who work in the sugar industry wrote a letter to Sen. Rob Bradley, whose Senate Appropriations Subcommittee heard four hours of testimony about an EAA Reservoir before the senator filed SB10. About the proposed land acquisition, the union reps say: "Simply put, this bill is a ***job killer*** which would put hardworking men and women in our union on the unemployment line and is a serious threat to the economic health of the Glades-area communities where they live." (Schorsch 2017, emphasis added)

● February 16, 2017: Stephen Basore, of TKM Bengard Farms, grows lettuce which goes to schools, hospitals, grocery stores and restaurants. He said, "If you eat salad December through April, it comes from us. We deserve a voice before big government takes 60,000 acres of farm land out of production and puts us out of business. Florida is third in the country in production of fresh fruits and vegetables. Every year more farmland is taken out of production. Once our industry is gone, it will be gone forever. This land grab is not only a ***job killer***. It's a community killer and it's an industry killer." (Elsken 2017c, emphasis added)

● February 25, 2017: "…displacing 60K acres of productive agricultural land would have important and negative economic impacts on the State, and significantly so in Palm Beach and Hendry Counties." (Villamil undated, page 5).

● March 1, 2017: David Biddle, state committeeman for the Gilchrist County Republican Executive Committee, wrote on *The Gainesville Sun*'s blog, "Amendment 1 dollars should be used on projects across the state including North Florida, not tied up for the next 10 years on a single project near the Senate president's district. As an executive steering committee member of Stand Up for North Florida, I urge you to please call your legislators and help end this ***job killing***, fiscally irresponsible piece of legislation." (Biddel 2017, emphasis added)

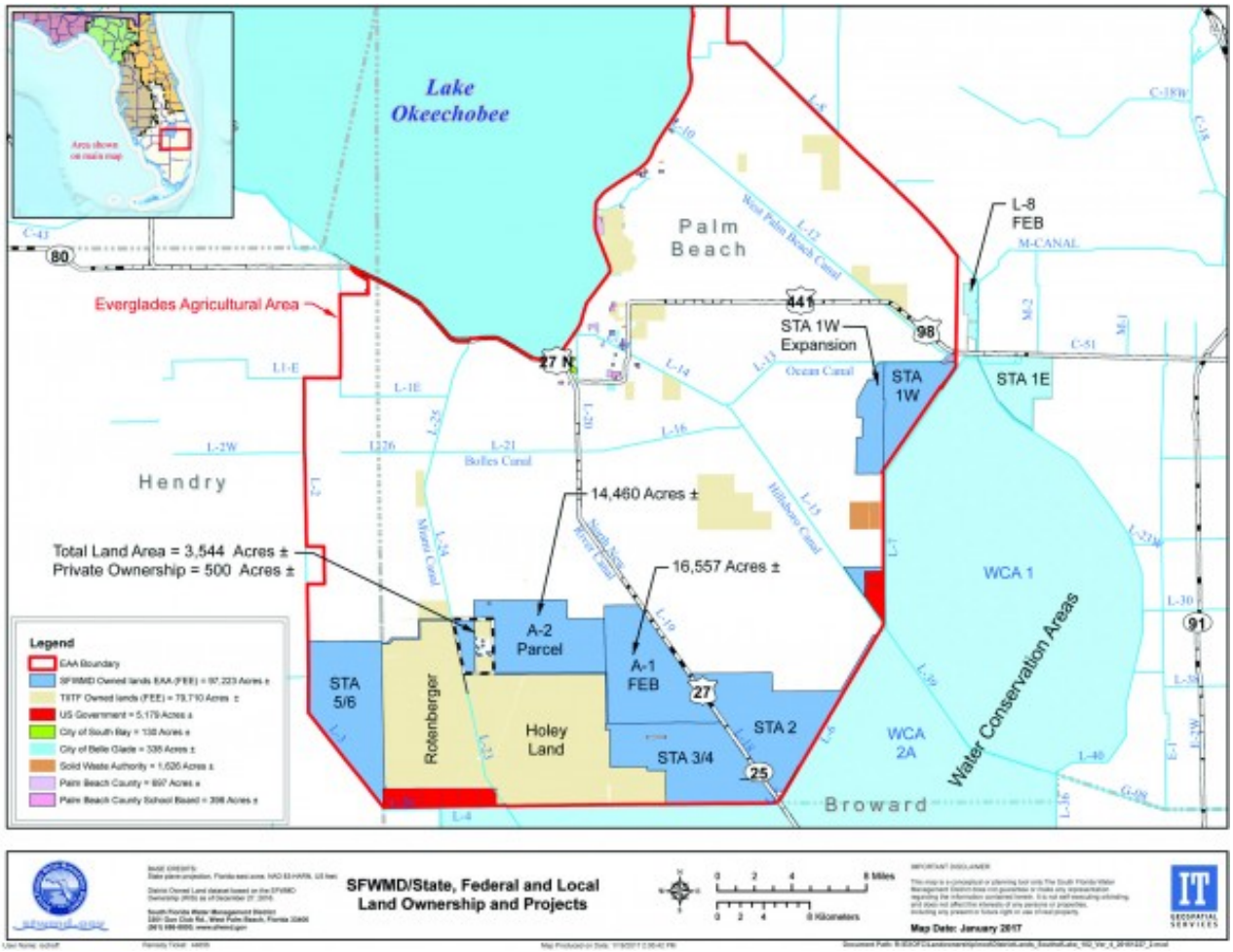
● March 9, 2017: Jim Turner (2017), a journalist, wrote on the *Orlando Weekly*'s blog, "…the bill {SB10] remains divisive as opponents argue it is a possible ***job killer*** for the agricultural industry south of the lake, could delay scheduled projects lined up for Everglades restoration and would put the state into long-term debt. Opponents also include the state's politically influential sugar industry." (Turner 2017, emphasis added)

● March 27, 2017: Tammy Jackson, of Guardians of the Glades, was interviewed during a group protest outside Sen. Joe Negron's Palm City office. She said, "We want to make certain that our communities remain whole. We feed the masses around the country and taking 60,000 acres would be a ***job killer*** for the Glades community." (Shainman 2017, emphasis added)

Rebuttal: The following points are addressed: (a) analysis of employment impacts from converting farmland to water storage and treatment, (b) language in the Everglades Forever Act of 1994, (c) Florida agency programs to assist people who are unemployed via retraining and related proposals, especially those in SB10 as amended, (d) sugarcane agriculture expansion outside the EAA, and (e) adverse employment effects outside the EAA resulting from Lake O discharges, specifically in the four counties Governor Rick Scott declared to be in a State of Emergency in June 2016 due to harmful algal blooms.

(a) Employment Impacts from Converting Farmland to Water Storage and Treatment

The number of acres of farmland to be converted to water storage reservoirs and water treatment areas is uncertain at this writing, but very likely will include at least the 14,000 acres on the A-2 parcel (see **Map 1**). As noted above, the SFWMD will determine the mix of storage and treatment areas to meet CERP goals by moving more clean water south and providing relief to the estuaries.



Map 1. State, federal and local land ownership and projects in the EAA

Table 1 presents the estimated employment impacts of the proposed EAA Reservoir. Findings are presented as jobs per thousand acres to facilitate application to different planning options. A summary paragraph describing the net effects of direct jobs follows. Then the findings are applied to a 14,000 acre EAA Reservoir on the A-2 parcel.

Table 1. Employment Impacts Associated with Proposed EAA Reservoir and Water Treatment Areas South of Lake Okeechobee (per 1,000 acres)

Economic Sector*	Employment Impacts** (per 1,000 acres)		
	Direct Jobs	Indirect and Induced Jobs	Total Jobs
Sugarcane farming	(5.5)	(4.0)	(9.5)
Vegetable & melon farming	(23.2)	(42.9)	(66.1)
Reservoir construction	593	829	1,422
Water treatment area construction	92	130	222
Reservoir operations & maintenance (O&M)	12	12	24
Water treatment area O&M	2	2	4
Reservoir recreation & tourism	14	14	28
Water treatment area recreation & tourism	14	14	28

***** Economic sector data sources, methods used to estimate jobs, and employment impact category descriptions are provided in **Appendix A**, which also provides bullet points summarizing this information.

******Direct jobs held by farmers, construction workers, and people employed to operate and maintain water resource infrastructure and provide goods and services for recreation/tourism opportunities created by new water storage and treatment areas. Indirect jobs are for purchases of goods and services needed by direct employees, such as motor vehicles and their maintenance. Induced jobs are from spending of income by those with direct and indirect jobs, such as restaurants and entertainment.

● ***Analysis of Employment Impacts from Constructing the EAA Reservoir on the A-2 Parcel***

Some agricultural jobs will be lost when the 14,000 acre A-2 parcel is converted from farmland to a water storage reservoir. The number of jobs at stake depends on what kind of agriculture is on the land. Information on the mix of crops farmed on the A-2 parcel was not found. In Palm Beach County, most of the agricultural land is in sugarcane (395,748 acres, Salisbury 2015). The second largest area of cropland in the county is vegetables (60,762 acres, Barnhart & Hodges 2016). If farmers working the A-2 parcel grow just these two crops, and if they were grown in the same proportion as in the rest of the county, then sugarcane is grown on 87% and vegetables on the other 13% of the A-2 parcel.

Applying the findings from **Table 1** to a 14,000 acre reservoir with the crop mix described above:

• ***Direct Jobs—***There will be 67 direct jobs lost in sugarcane farming and 42 direct jobs lost in vegetable farming . These 109 direct farming jobs will be offset temporarily by 8,302 direct construction jobs, which are spread out over the time it takes to build the reservoir, and after the reservoir fills, permanently with a total of 364 new direct jobs (168 in reservoir operations and maintenance, and 196 providing goods and services resulting from recreation and tourism opportunities).

For each and every direct farming job lost from converting farmlands to a water storage reservoir, there would be 78 direct construction jobs, which are temporary and spread over the time it takes to build the reservoir, and after the reservoir fills 3.4 new permanent direct jobs to operate and maintain the reservoir and provide goods and services for recreation and tourism opportunities.

• ***Indirect and Induced Jobs***—There will be 49 indirect/induced jobs lost due to loss of 67 direct jobs in sugarcane farming and 78 indirect/induced jobs lost due to the loss of 42 direct jobs in vegetable farming . These 127 indirect/induced jobs will be offset temporarily by 11,606 indirect and induced jobs because of 8,302 direct construction jobs, which are temporary jobs spread out over the time it takes to build the reservoir, and after the reservoir fills, permanently with a total of 364 indirect/induced jobs because of 364 new direct jobs in reservoir operations and maintenance and providing goods and services resulting from recreation and tourism opportunities.

For each and every indirect/induced job lost from converting farmlands to a water storage reservoir, there would be 91 indirect/induced jobs because of construction activities, which are temporary and spread over the time it takes to build the reservoir, and after the reservoir fills 2.9 new permanent indirect and induced jobs because new direct jobs to operate and maintain the reservoir and provide goods and services for recreation and tourism opportunities.

• ***Total Jobs***— There will be 116 total jobs lost as a result of less land in sugarcane farming and 120 total jobs lost as a result of less land in vegetable farming . These236 total jobs lost will be offset temporarily by 19,908 total jobs due to construction activities, which are temporary jobs spread out over the time it takes to build the reservoir, and after the reservoir fills, permanently with 728 total jobs in reservoir operations and maintenance and providing goods and services resulting from recreation and tourism opportunities.

For each and every total job lost due to converting farmlands to a water storage reservoir, there would be 84 jobs because of construction activities, which are temporary and spread over the time it takes to build the reservoir, and after the reservoir fills 3.1 permanent jobs as a result of reservoir operations and maintenance and providing goods and services for new recreation and tourism opportunities.

● ***Analysis of Employment Impacts from Other Potential Water Infrastructure Construction***

As noted above, the SFWMD will determine the mix of storage and treatment areas to meet CERP goals by moving more clean water south and providing relief to the estuaries. The findings in **Table 1** can be applied to such project proposals as was done for the EAA Reservoir on the A-2 parcel, above. First, the local nature of construction impacts is described. Then potential use of the 500 acres immediately west of the A-2 parcel is analyzed, followed by the potential buildout of the A-1 shallow flow equalization basin to a deep reservoir.

• ***Local impacts from construction activities on the A-1 parcel in 2006-2008—***History demonstrates that most of the economic activity from construction will be local. Between 2006 and 2008, $272 million was spent constructing what was to be the A-1 reservoir on 16,000 acres of sugarcane lands purchased by the state in 1999 (the A-1 parcel, see **Map 1** on page 9). For several reasons mentioned above, the project was not completed but instead converted to a shallow flow equalization basin to help clean up polluted runoff from farmlands south of Lake O. According to the contractor, more than 77 percent of the project's goods and services were purchased locally, and 80 percent of the employees came directly from the surrounding area, resulting in millions of dollars directly invested in the local communities (Barnard Construction, undated) .

• ***The 500-acre parcel west of the A-2 parcel—***For converting the 500 acres of private farmland immediately west of the A-2 parcel (see **Map 1** on page 9) to water storage or treatment, the SFWMD could either recommend purchasing these lands, or trading lands the agency already owns for them. The information in **Table 1** could be used to analyze employment impacts; e.g., if there are 400 acres of sugarcane farmlands and 100 acres of vegetable farmlands, then there would be a loss of 4 direct jobs and 10 total jobs. As with the A-2 employment impact analysis above, temporary construction jobs and permanent O&M and recreation/tourism jobs could be determined, depending on whether these lands would be used as part of either a water storage reservoir or a water treatment area.

• ***Buildout of the A-1 Flow Equalization Basin to a deep reservoir—***If after conducting modeling exercises the SFWMD recommends a buildout of the 16,000 acre shallow flow equalization basin on the A-1 parcel (see **Map 1** on page 9) to a water storage reservoir, there would be no agricultural jobs lost. Thousands of temporary construction jobs would be created, but likely there would be few if any new permanent jobs in operations and maintenance or recreation and tourism because it is assumed that such jobs have already been created when the A-1 basin was filled. Importantly, if the buildout is done, SB10 requires that "Any such recommendation must include sufficient water quality treatment capacity to meet state and federal water quality standards." Analysis of employment impacts of this and other potential water storage and treatment projects could be done using the information in **Table 1** after these potential projects have been identified.

(b) Language in the Everglades Forever Act of 1994

Following the precedent of Everglades Forever Act (EFA) of 1994 that authorized the Stormwater Treatment Areas (STAs), state legislation can include hiring provisions to ensure preference is given to jobs displaced by the EAA Reservoir project in the EAA (Goforth 2017a). Language from the EFA states that:

- The Legislature further recognizes that the EAA and adjacent areas provide a base for an agricultural industry, which in turn provides important products, jobs, and income regionally and nationally.
- It is the intent of the Legislature to preserve natural values in the Everglades while also maintaining the quality of life for all residents of South Florida, including those in agriculture, and to minimize the impact on South Florida jobs, including agricultural, tourism, and natural resource-related jobs, all of which contribute to a robust regional economy.
- The District shall give preferential consideration to the hiring of agricultural workers displaced as a result of the Everglades Construction Project, consistent with their qualifications and abilities, for the construction and operation of these STAs.

(c) Florida agency programs to assist people who are unemployed via retraining and related proposals

The State of Florida operates a Reemployment Assistance Program to help displaced workers find new employment and job training opportunities (see Florida Department of Economic Opportunity 2017). Each county operates their program independently.

Some of the testimony on SB10 focused on concern about the loss of jobs in Glades communities. In response, SB10 was amended as indicated by the following headings in the bill (additional language can be found in the bill's text):

> ... requiring the district [SFWMD] to give hiring preferences to certain displaced agricultural workers; requiring the Department of Economic Opportunity, in cooperation with CareerSource Florida, Inc., to establish the Everglades Restoration Agricultural Community Employment Training Program within the department; providing requirements for the program; providing a legislative finding; specifying award restrictions; requiring the department to adopt rules; amending s. 946.511, F.S.; prohibiting the use of inmates for correctional work programs in the agricultural industry in certain areas; providing a directive to the Division of Law Revision and Information; providing appropriations; providing an effective date.

(d) Sugarcane Agriculture Expansion Outside the EAA

Sugarcane production has already expanded outside the EAA. Martin County: No EAA lands are in Martin County. More than 10,000 acres of former citrus groves have been converted into sugarcane production, creating local sources of air pollution, water pollution and increased truck traffic on

roads, particularly State Road 76 (Kanner Highway), as cane is transported to mills in the EAA (Goforth 2017a). According to the Florida Department of Agriculture there were 11,400 acres of sugarcane harvested in Martin County in 2013, which increased from 9,700 acres in 2012, 5,400 acres in 2011, and 8,000 acres in 2010. Glades County: 24,100 acres harvested in 2013, up from 22,000 acres harvested in 2010. Hendry County: 66,000 acres harvested in 2013, up from 49,000 acres harvested in 2010 (Florida Dept. of Agriculture 2013, 2014). Although information could not be located to confirm this, it is likely that most of the sugarcane lands in Hendry County are in the EAA. Bear in mind that acres harvested represent about 70% of the total sugarcane acreage because seed stalk plantings and immature sugarcane fields that are not counted as acres harvested.

(e) Adverse Employment Effects Outside the EAA Resulting from Lake O Discharges

Outside the EAA jobs are lost, businesses are closed, and public health issues plague coastal communities because of polluted Lake O discharges to the estuaries on both the east and west coasts (Goforth 2017a). Due to heavy rainfall and anticipated Lake O discharges, in February 2016 Governor Rick Scott issued an executive order declaring a "State of Emergency" in Martin and St. Lucie counties. Due to algal blooms from the continued onslaught of the discharges, in June 2016 Governor Rick Scott issued an executive order declaring a "State of Emergency" in four counties (Lee, Martin, Palm Beach, and St. Lucie).

The Governor's declaration included a directive to the SFWMD to "Work with state and community partners to explore every opportunity to increase water flowing south from Lake Okeechobee" (Scott 2016). Many people feel that the best thing the state could do to increase flows south of the Lake is to complete the EAA Reservoir that was a high priority project when CERP was initiated in 2000.

Martin County tourism leaders say the county saw a loss of nearly $5 million tourism dollars in 2016 compared to the previous year. Statewide, tourism increased by 1.3 percent from 2015 to 2016. While it is difficult to attribute all of the Martin County loss directly to hazardous algal blooms, there is no doubt that the blooms were a factor, especially with indirect expenditures like restaurants and dry cleaners (*WPTV* 2017). Ted Astolfi, interim CEO of the Economic Council of Martin County, recognized that every aspect of the marine economy in Martin County is closely tied to the environment, and that the Lake O discharges and algal blooms have had a "severe impact on business … those that are directly on the water are significantly impacted." (Berzinski 2016).

The economic impact of the marine industries in the four counties that were adversely affected by harmful algal blooms in 2016—and declared to be in a "State of Emergency" by Governor Rick Scott— is more than the entire sugar industry in the state. In 2014 the total output of the marine industries in these four counties was $4 billion, and provided 37,000 jobs and $1.7 billion in employee earnings (**Table 2**). By comparison, in 2013 the entire sugar industry in the state had a $4 billion impact, and provided 20,837 jobs and $978 in employee earnings (Hodges et al. 2015).

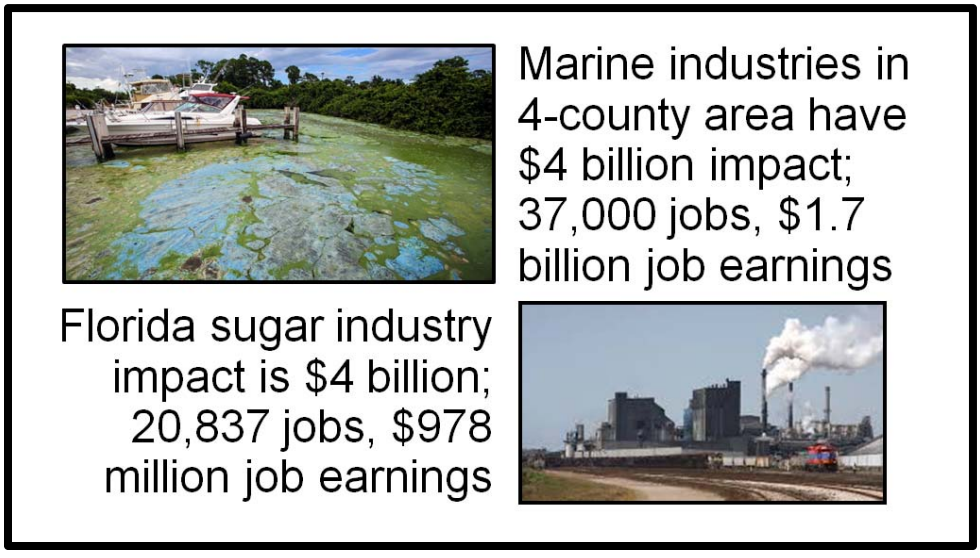
Table 2. Economic Contribution of Marine Industries* in Four Counties Affected by Harmful Algal Blooms in 2016

	Total Output**	Total Job Impact**	Labor Income
Lee County	$1,273 million	9,014	$486 million
Martin County	$324 million	3,290	$230 million
Palm Beach County	$1,884 million	18,220	$682 million
St. Lucie County	$549 million	6,390	$366 million
Total	$4.030 billion	36,914	$1.764 billion

***Marine industries include construction of marine-related infrastructure and facilities; living resources represented by fishing, aquaculture, seafood processing, and seafood markets; offshore minerals, consisting of limestone, sand, and gravel mining, as well as oil and gas exploration and production; ship and boat building, including repair; tourism and recreation, including accommodations and services associated with recreation in coastal areas, such as marinas, boat dealers, amusement and recreational facilities, hotels, restaurants, and sporting goods retailers, and; transportation, including marine passenger and cargo transportation services, and, search and navigation equipment (Hodges et al. 2015).

Total output and job impact includes direct, indirect, and induced effects as determined by economic impact input-output models used in the county source references below. A short explanation of input-output modeling and job impact categories is provided in **Appendix A.

Sources: County source data from economic impact input-output study reports: Martin & St. Lucie Counties – ECFRPC & TCRPC 2016; Lee County – Hodges et al. 2015; Palm Beach County – Thomas J. Murray & Associates 2015.



2) The state has already acquired too much sugarcane land, and the loss of more land will create ghost towns

● July 16, 2016: Barbara Miedema, vice president of public affairs and communications at the Sugar Cane Growers Cooperative of Florida, told the *Palm Beach Post* that the region already has lost more than 100,000 acres of farmland to Everglades restoration. The cooperative, whose members are small growers of sugar cane and vegetables, can't afford to lose more land. "It will turn our area into ghost towns," Miedema said (Stapleton 2016).

Rebuttal: Three items dispel this argument (a) sugarcane acreage trends, (b) creation of ghost towns is unlikely, and (c) amendments to SB10:

(a) Sugarcane acreage trends

How many acres of sugarcane have actually gone out of production? Less than 100,000 the acres claimed. Based on land actually in sugarcane production, at maximum the amount of productive sugarcane lands lost since 1980 is 49,000 acres, and using 5-year running total averages, it would be 40,000 acres. These estimates are determined as follows.

In addition to roughly 400,000 acres of sugarcane harvested and 20,000 acres in seed stalk production each year (see USDA ERS 2017) there are immature sugarcane fields less than one year old. Because it takes one year following the planting of seed stalks for sugarcane to mature and be harvested, and each planting yields an average of three annual crops before it is replaced (Baucum & Rice 2009), for every three acres harvested there is one more acre of planted but immature sugarcane. This analysis uses 130,000 of immature sugarcane. The largest amount of Florida sugarcane land harvested and in seed stalk production was 465,000 acres during the 2001/02 growing season; another 130,000 acres of immature sugarcane sums to a total of 595,000 acres. In the highest 5-year period (1998/89–2002/03) the annual average was 586,000 acres. In the past five years (2012/13–2016/17) sugarcane has been harvested and seed stalks grown on an annual average of 416,000 acres (USDA ERS 2017). Add acres of immature sugarcane for a total of 546,000 acres. Taking the difference between the most recent 5-year period and the highest year, the actual loss cannot be more than 49,000 acres of productive sugarcane lands, and the 5-year annual average difference would be lower than that, at 40,000 acres.

In summary, less than 7 percent of the sugar industry's land base of 586,000 acres has gone out of production since 1980. No doubt most of that loss is from land purchased in the EAA to improve water quality that is polluted by land use activities surrounding Lake Okeechobee, especially sugarcane farming in the EAA, and no doubt acquiring more sugarcane acreage outside the EAA by converting cattle range and citrus groves plagued with greening is a factor.

(b) Creation of ghost towns is unlikely

If the state purchased 60,000 acres of EAA sugarcane land it would be a loss of approximately 11 percent of the 546,000 acres in sugarcane production. Based on the analysis in 1(a) above, 1,012

total sugar-related jobs would be lost. But because the lost jobs will be more than replaced by other employment opportunities, as described in 1(a) above, it is difficult to see how or why a community in the EAA would disappear as a result of the land purchase. But a 60,000 acre land purchase is no longer in play.

(c) Amendments to SB10.

As amended, SB10 drops the original proposal to acquire 60,000 acres of private farmland and instead use land owned by the state. Sen. Rob Taylor, who filed the bill and shepherded it through the Senate Appropriations Subcommittee on Environment and Natural Resources that he chairs, was reported to have said he expects 3,000 to 6,000 acres will be taken out of production. It is not clear if he meant private lands or state lands. He did say, "I think that it's quite premature, until we understand the full footprint of this project, to suggest that one job is going to be lost as a result of agricultural land being taken out of commission" (Rangel 2017c). Using the analysis in 1(a) above, the result of 3,000 to 6,00 acres "taken out of commission" would be 51 to 102 total jobs lost from converting farmland to water storage or treatment. However, when the A-2 leases are cancelled in 2019, 14,000 acres will be taken out of production and jobs lost as a result.

3) Land acquisition will reduce ad valorem property tax revenues for local government

● February 10, 2017: Senator Joe Negron's plan for the state to buy another 60,000 acres south of Lake Okeechobee for more water storage continues to draw opposition from area officials who say the state already owns plenty of land, and they don't want more property taken off their tax rolls. (Elsken 2017b). Amendments to SB10 have reduced that acreage by 90 percent or more.

Because public agencies do not pay local property taxes on land they own, acquiring land for water storage will result in a reduction of property tax revenues for the relevant county. If the county has fewer than 150,000 residents (which would be the situation in Hendry and Glades counties), then it is eligible for payments in lieu of property taxes by the South Florida Water Management District for a period of 10 years, based on the average of taxes paid in the 3 years prior to the acquisition of the land (Florida State Statute 373.59, subparagraph 10B). Lands that would be acquired for an EAA Reservoir most likely would be in Palm Beach County, so this statute would not apply.

Rebuttal: SB10 amendments call for the EAA Reservoir to be constructed on lands the state already owns. State-owned lands do not pay property taxes to the county. Prior to the amendments, however, this was an issue and earlier versions of this paper made a first cut at analysis, which is refined below based on reviewer comments and discovery of new information.

A random sampling of property tax records in Palm Beach County shows that agricultural lands owned by organizations with "sugar" in their name have an appraised value for property tax purposes averaging about $900 per acre. This is much less than the fair market value of farmlands because of an agricultural exemption that is applied to the appraised value. The mill rate for agricultural production on unincorporated agricultural land in the county is 18 (or 0.018 percent of appraised value), so the

average ad valorem property tax averages $16.20 per acre. Multiply this times the 60,000 acres that would go off the tax rolls and the result is a loss to the county of $972,000 per year. Now consider that In 2013 Palm Beach County received $2.7 billion in ad valorem property tax revenues. The loss of $972,000 in property tax revenues is only a tiny fraction (about 1/3 of one percent) of the county's ad valorem property tax revenues. If the amount of farmland converted is 3,000 to 6,000 acres, then the loss to the county would be $48,600 to $97,200 and the percentage of county tax receipts lost by the conversion becomes 1/30 of one percent of total tax revenues.

Then consider that in an area where Everglades restoration projects are implemented, property values would increase due to improved water quality (see discussion and analysis in McCormick et al. 2010, p. 40-47). Throughout the 16 counties where Everglades restoration projects are to be implemented, water quality improvements would translate into an increase of 1.655 percent in property value, which is a total increase of more than $16 billion in real estate property values. That such an increase would occur is not only intuitive but also supported by economic theory.

Similarly, when water quality is diminished, property values decline. Studies conducted for the Florida Realtors (2015) concluded that a 1-foot increase in the clarity of water in the Caloosahatchee estuary would result in an increase of $541 million in home values in Lee County and an additional $9.2 million in property taxes for the county (Gillis 2015). Similarly, home values in Martin County would increase by $428 million in Martin County, with unknown property tax implications. To the extent that an EAA Reservoir would reduce the Lake Okeechobee discharges and increase water clarity, homes in Martin and Lee Counties would increase in value. Conversely, reduced water clarity as a result of discharges would reduce real estate values. Indeed, following massive algae blooms in 2013 that resulted from Lake Okeechobee discharges into the St. Lucie estuary and Indian River Lagoon, the Florida Realtors (2015) study estimated that the value of homes in Martin County was reduced by $488 million.

For each and every dollar of property tax revenue that would have been lost in Palm Beach County in 2013 due to state acquisition of 60,000 acres of land for a EAA Reservoir (a total of $972,000), home values in Martin County decreased $502 dollars due to water quality impairment associated with Lake Okeechobee discharges. For state acquisition of 6,000 acres, that would be more than $5,000 dollars of residential real property value loss in Martin County for each dollar of property tax lost in Palm Beach County, and a similar amount in Lee County.

4) The proposed EAA Reservoir lacks a science-based plan

● July 16, 2016: "Everyone is looking for solutions for the system," Florida Crystals said in a statement. "Our companies strongly support science-based plans that will provide measurable benefits to Lake Okeechobee and the coastal estuaries. Unfortunately, Sen. Negron's land buy does neither." (Stapleton 2016).

● February 6, 2017: "It's up to all of us to do our part to finish restoring the Everglades and fixing Lake Okeechobee. Plans to buy land with little to no benefit to environmental restoration only serve as a distraction. By staying focused on the science, we can ensure reaching the goal we started more than two decades ago can become a reality." (EAA landowners 2017).

● March 5, 2017: U.S. Sugar Corp. took a full-page ad in the *Stuart News* in part to characterize Mark Perry, executive director of the Florida Oceanographic Society, as one who "ignores facts to parrot fake science."

● March 6, 2017: 57 EAA farmers signed a letter to Sen. Negron stating that "The science on which your plan is based is fraudulent; the environmental special interests who supplied you with the data used in your plan cooked the books to reach conclusions unsupported by the actual science. This is not our conclusion; it is the public judgment of the South Florida Water Management District, whose data and predictive models your environmentalist advisors have intentionally manipulated and distorted." (EAA farmers 2017).

Rebuttal: The science-based plan is the University of Florida Water Institute study report conducted for the Florida State Senate (see Graham et. al 2015). It evaluated all existing plans and concluded that even if all planned projects were completed, water storage and treatment capability around Lake O would not be sufficient to provide relief by reducing discharges to the St. Lucie and Caloosahatchee estuaries east and west of the lake and moving more water south to Everglades National Park and Florida Bay.

The UF Water Institute study report stated that "The solution [for providing] relief to the estuaries and the ability to move more water south of Lake Okeechobee is enormous increases in storage and treatment of water both north and south of the lake." The report called for a total of 1.6 million acre-feet of new storage, identifying needs east and west of the lake (≈ 200,000 and 400,000 acre-feet, respectively) as well as north and south (≈ 1,000,000 acre-feet total north and south). The report also stated that "[the solution] will require additional land between the lake and the EPA" (Graham et al. 2015). The EPA is the Everglades Protective Area south of the EAA that includes Water Conservation Areas that treat polluted water and Everglades National Park. In other words additional water storage on land in the EAA is necessary to meet the objectives of reducing Lake O discharges to the estuaries east and west, and moving water south to the Everglades.

Congress requires a biennial review of CERP progress, which is conducted by the National Academy of Science. Regarding storage needs, the most recent report concluded that "New information, project designs, and revised lake management rules have reduced the storage capacity envisioned originally in the CERP by over 1 million acre-feet compared to the 1999 plan, which could have serious ecological consequences in both the northern estuaries and the Everglades ecosystem if this shortfall is not addressed." (NAS 2016, p. 6)

5) The proposed EAA Reservoir is inadequate to reduce Lake O discharges

● July 16, 2016: Judy Sanchez, a spokesperson for U.S. Sugar Corp., criticized the environmentalists' approach. "If activists had their way, billions of dollars would be diverted from existing approved and engineered projects … and instead be used to buy surplus land that would not yield enough storage capacity to handle more than 'a drop in the bucket' of Lake Okeechobee discharges." (Stapleton 2016).

● February 6, 2017: A letter to the legislature signed by 14 EAA landowners, including U.S. Sugar Corp. and Florida Crystals Corp., stated that "We are not willing sellers of our land to the government"; one of the given reasons was that "Water reservoirs south of Lake Okeechobee simply cannot store enough water to stop the dlscharges from lake Okeechobee when our region is inundated from heavy rains." (EAA landowners 2017, see also Rangel 2017a).

● March 5, 2017: U.S. Sugar Corp. took a full-page ad in the *Stuart News* so that Judy Sanchez could reassert the claim that the EAA Reservoir would be a "drop in the bucket" and "NOT the solution to stopping coastal discharges" (as emphasized in the ad). Her conclusion is that "Floridians cannot afford to borrow billions we don't have, to buy land we don't need, for a project that won't work."

● March 6, 2017: 57 EAA farmers signed a letter to Sen. Negron accusing him of conducting "… a war on your part against farmers south of Lake Okeechobee … because it is clear that your agenda as Senate President has been hijacked by out-of-state special interests who seek to do harm to the people in Florida who live on the land and help put food on our tables." They also state that the "… plan would have minimal effect. Only a fraction of the discharges into the coastal estuaries would be prevented ..." (EAA farmers 2017).

Facts: In 2016 discharges east and west of Lake O totaled 737.3 billion gallons, or 2.263 million acre-feet. El Niño weather events in 2016 triggered unusually excessive rainfall. In 2013, another year of excessive rainfall , discharges totaled 582.3 billion gallons, or 1.787 million acre feet (Goforth 2017b). The Lake O discharges in these two years were 3.0 and 2.4 times the annual average over the past 36 years (1980-2016) of 244 billion gallons per year (Goforth 2017a) or 749 million acre-feet per year. In summer the nutrients in Lake O feed harmful algal blooms that not only make people sick, but can kill animals that ingest it (see **Box 1**).

Rebuttal: If all 1.6 million acre-feet of additional storage around the lake that were called for in the UFWI report (Graham et al. 2015) were in place, then storing the average annual discharge over the past 36 years of 749,000 acre-feet or 244 billion gallons (Goforth 2017a) would not be a problem. However, instead of moving towards that goal, CERP implementation planning changes have reduced the storage goal by 1 million acre-feet, at a time when by all indications the original goal did not provide adequate storage to meet CERP goals (see NAS 2016).

What about discharges in years that are well above the 36-year average, such as 2013 (572.3 billion gallons) and 2016 (737.3 billion gallons)? According to a report by journalist Tyler Treadway (2017a), "[P]roponents of the Negron proposal stress that the project would provide 'dynamic' rather than 'static' storage: The reservoir would not just hold water, it would continuously send water south toward the Everglades. Over the course of a year, the reservoir would 'turn over' three to four times, sending 360 billion to 480 billion gallons of water to the Everglades, said Mark Perry, executive director of the Florida Oceanographic Society in Stuart. That gets a lot closer to the 2016 discharge total and in the range of the Lake O discharges during the 'Lost Summer' of 2013." (Treadway 2017a)

However, the amendments to SB10 call for a reservoir that holds a minimum of 240 thousand acre-feet (78 billion gallons) rather than the 360 thousand acre-feet (120 billion gallons) in the original bill and in the EAA Reservoir planned in CERP. The discussion in this section has been adjusted accordingly.

As noted in the **Facts** section above, discharges during 2016 and 2013 were 737.3 billion gallons and 572.3 billion gallons, respectively (Goforth 2017b). Yes, there would need to be some discharges east and west during years with extraordinarily high rainfall. How much? Assuming dynamic storage of 360 billion gallons per year (either a 120 billion gallon reservoir turning over three times per year or a 90 billion gallon reservoir turning over four times per year), the discharges would have been reduced by almost half in 2016 and almost two-thirds in 2013. Even though discharges would still be necessary, the EAA Reservoir would provide beneficial effects by withholding huge amounts of polluted water.

The issue of discharges is not just about the volume of water released from Lake O, but pollutants in the water that feed harmful algal blooms and modify salinity as well as dump sediment in estuaries, with adverse effects on humans and aquatic ecosystems. How harmful are the algal blooms? (See **Box 1**.) Harmful enough that in 2016, as had happened in 2013, local governments closed beaches. In June 2016 Governor Rick Scott declared a "State of Emergency" in four counties.

Had the EAA Reservoir as foreseen in CERP been in place in 2016, 120 billion gallons of Lake O water would have been kept out of the estuaries, preventing an estimated 1.4 million pounds of nitrogen, 110,000 pounds of phosphorus, and 12 million pounds of sediment from contaminating these critical coastal environments. (If the EAA Reservoir ends up storing less than that, downward adjustments are necessary.) With enhanced operation of Lake O and completion of other CERP projects, the benefits would be multiplied by the number of times the stored water could be turned over within a year (Goforth 2017a).

Box 1. Health Threats Posed by Florida's Harmful Algal Blooms

Common in most of Florida's aquatic environments, many blue-green algae species (a.k.a. cyano-bacteria) are capable of producing harmful toxins (cyanotoxins). Cyanobacteria can cause unsightly blooms; cause taste and odor problems in public water supplies and can kill domestic animals, pets, and fish and wildlife that drink or are exposed to untreated contaminated water or toxic biota.

Florida's freshwater systems have three main types of cyanotoxins: hepatotoxins (affecting the liver), neurotoxins (affecting the nervous system), or dermatotoxins (causing topical skin irritations). Recreational exposure by direct contact with a cyanobacteria bloom from activities such as jet-skiing, boating, and swimming have been reported to cause hay fever-like symptoms (itchy eyes, sore throat, congestion) and dermal reactions (skin rashes, blistering) at high concentrations. Ingesting contaminated water can cause gastrointestinal distress (diarrhea, abdominal pains, nausea, vomiting). Health problems may occur in animals if they are chronically exposed to fresh water with cyanotoxins . Livestock and domestic animals can be poisoned by drinking contaminated water, and fish and bird deaths have been reported in Florida water bodies with persistent cyanobacteria blooms. It is important to remember these toxins have no known antidotes and cannot be removed by boiling (FFWCC 2017).

"As the President and CEO of Martin Health System, I am deeply concerned about the health of our community and how these environmental issues impact public health – due to poor water quality, fish kills, and the increase in infections," said Rob Lord. "There are fundamental democratic and human decency issues involved here that demands all Floridians to voice their support. Without the passage of SB10, our health and quality of life are in great jeopardy." (Martin Health System 2017)

Research on links between cyanotoxins and human health raises concerns. Vegetables irrigated with water containing cyanotoxins are a concern and the Florida Health Department is not monitoring Lake Okeechobee water for cyanotoxins (Widder 2017). BMAA , a neurotoxin produced by almost all species of cyanobacteria, has been found in Florida shellfish. Field research has linked BMAA in food sources to high rates of ALS (Lou Gehrig's Disease) (Holtcamp 2012) and laboratory experiments link BMAA in food sources with Alzheimer's Disease (Cox et al. 2016, Pacenti 2016, Waycamp 2016).

6) Storage efforts should focus north of Lake O rather than south

● July 16, 2016: James Moran, a member of the SFWMD governing board, suggested that instead of continuing to focus on storage south of Lake Okeechobee , the district should consider water storage and treatment options north of the Lake. He said this was among the recommendations made in the UFWI study report (Graham et al. 2015, as described above) that was commissioned because of harmful algal blooms in 2013. Water north of the lake contains nutrients from dairy and cattle ranching along with stormwater runoff from lands south of Orlando. Storing and cleaning that water before it gets into the lake and then flushed into the estuaries make sense, Moran said. "If you want to clean up the lake, you've got to clean up the water going into the lake," Moran said. "Then you won't have algae blooms in the future." (Stapleton 2016).

● February 3, 2017: Matt Morrison, policy bureau chief for the SFWMD, was reported to have said that "Storage north of the lake would be more 'flexible' than a reservoir to the south. Stored water could be moved to Lake O when drought dries out the western marshes, to the Caloosahatchee when saltwater is moving up from the Gulf of Mexico, and to the Everglades and Florida Bay when they need freshwater." (Treadway 2017a).

Rebuttal: Although the SFWMD and others argue whether the EAA Reservoir should be built sooner than a northern reservoir, no one argues against the fact that providing additional water to the Everglades can only be accomplished by constructing additional storage south of the Lake (Goforth 2017a). In addition, the Florida Legacy Act of 2016 requires the Florida Department of Environmental Protection and the SFWMD "give preference to those Everglades restoration projects that reduce harmful discharges of water from Lake Okeechobee to the St. Lucie or Caloosahatchee estuaries in a timely manner." Arguments ensue whether a reservoir south or north of Lake O is more effective.

Mr. Moran was partially correct regarding the UF Water Institute study report, which stated that "The solution [for providing] relief to the estuaries and the ability to move more water south of Lake O is enormous increases in storage and treatment of water both north and south of the lake." But the report went on to say something Mr. Moran did not include in his argument. The solution "will require additional land between the lake and the EPA [Everglades Protection Area immediately south of the EAA]" (Graham et al. 2015)—i.e., land in the EAA is required to accomplish the objectives of providing relief to the estuaries and moving water south to the Everglades.

On Mr. Morrison's flexibility statement, Mark Perry, executive director of the Florida Oceanographic Society, said that Mr. Morrison is correct, "but once the northern reservoir and wells that the district is considering as an option fill up, the only place to send excess water is to Lake O; and once the lake fills up, the only place to send the water is to the estuaries." (Treadway 2017a).

According to Florida Audubon (2016), "A draft Project Implementation Report (PIR) completed for the EAA Reservoir project in February 2006 [see USACOE & SFWMD 2006] showed it was cheaper per acre to store water in the EAA than north of Lake Okeechobee or by using Aquifer Storage and Recovery (ASR). Storage south of Lake Okeechobee in the EAA was shown to cost less than half per acre than storing water north of Lake Okeechobee."

More recently, Tom Van Lent, Ph.D., a hydrologist/engineer employed by the Everglades Foundation, used the SFWMD's reservoir operations model to demonstrate that the EAA Reservoir is more effective in reducing harmful discharges to the estuaries than the proposed storage reservoir north of the Lake. The EAA Reservoir reduces discharges by approximately 50 percent, compared to approximately 6 percent reduction in discharges for a reservoir north of the lake (Van Lent 2017, Van Lent and Paudel 2016). Although those arguing against beginning to plan the EAA Reservoir now rather than later contest Dr. Van Lent's methods and findings (see, e.g., Owisino 2017) there has been no dispute regarding statements that providing additional water to the Everglades can only be accomplished by constructing additional storage south of the Lake (Goforth 2017a).

7) The proposed EAA Reservoir is a new and/or distracting idea

● August 4, 2016: Dan O'Keefe, Chairman of the South Florida Water Management District's Governing Board, said that the US Army Corps of Engineers' suggestion to accelerate the planning study to build the EAA Reservoir, scheduled to begin in 2021, "is a distraction ... and could prove harmful to ongoing restoration efforts." The Integrated Delivery Schedule [IDS], which sets out the timing for the myriad projects to fix the Everglades, is there for a reason, said O'Keefe. Several projects must be studied before an EAA reservoir is considered. The schedule provides budget certainty and predictability, he added (Stecker 2016).

● August 5, 2016: Barbara Miedema, vice president of public affairs and communications for the Sugar Cane Growers Cooperative of Florida, said, "The Corps wants to leapfrog the entire well-thought-out process in search of a shiny coin," she said, adding, "This is nothing more than a chorus of environmental groups that want to buy land in the EAA." (Stecker 2016)

● January 2017: Ted Astolfi, interim CEO of the Economic Council of Martin County, in a video posted to the council's Facebook page, articulated the group's opposition to the Negron Plan: "I don't want us to get distracted by the new or latest idea," Astolfi said, citing the council's support of the Comprehensive Everglades Restoration Plan and the Central Everglades Planning Project. "When it comes down to it, I have to be against (Negron's plan) because it distracts us from CERP ... it distracts us and delays us in implementing a 53-year project that we're just 17 years into." (Smart 2017)

● February 20, 2017: Associated Industries of Florida released a statement supporting the restoration schedule that calls for starting to plan water storage south of the lake in 2021 rather than this year as Negron proposes through SB10. Last week, the Florida Chamber of Commerce president Mark Wilson issued a similar statement (Ritchie 2017).

Rebuttal: The South Florida Water Management District's involvement is critical. Nonfederal partners are required to put up half of the cost share for Everglades projects, which can reach into the billions of dollars (Stecker 2016). This recognition is built into the Negron Plan, which would have the state as the nonfederal partner own the land on which to build the EAA Reservoir so that federal dollars could be used to construct it.

Regarding Mr. O'Keefe's above point that the talk an EAA Reservoir is distracting was echoed by Mr. Astolfi. However, Julie Hill-Gabriel, director of Everglades policy for the National Audubon Society, said the laws around restoration allow for flexibility in the planning process. "The district letter failed to recognize that that Integrated Delivery Schedule is always a living document," she said (Stecker 2016).

Sen. Joe Negron (2017b) wrote that "If the Florida Legislature approves and funds additional water storage south of Lake Okeechobee, the Army Corps of Engineers will reevaluate the order of priority in the 2016 Integrated Delivery Schedule (IDS). Florida is a partner in Everglades restoration and its decisions influence and impact federal participation in the 50-50 matching program. An example of this reality is the Corps' recent initiation of the Lake Okeechobee Watershed one year earlier than planned after adverse discharge events "(Negron 2017b).

Mr. Astolfi's contention, above, that the EAA Reservoir is a new idea is simply wrong (see **Box 2**). Although Barbara Miedema believes that the EAA Reservoir is a "shiny coin" that would do little to alleviate the algae problems of coastal Florida, she pointed out correctly that the idea of building a storage reservoir in the EAA is not a new concept. She said that the EAA Reservoir was studied by a state commission on sustainability in the late 1990s, and then again after two major hurricanes a year later (Stecker 2016).

8) The proposed EAA Reservoir should be replaced by state efforts to reconstruct the Lake O dike

● February 22, 2017: State Sen. David Simmons, a Republican from Altamonte Springs, proposed SB816 as an alternative to the Negron Plan. The bill would require the South Florida Water Management District to take over management of Lake O discharges with the goal of raising the Lake by two feet in order to reduce discharges, and get the work done by 2020, using state funds if necessary (Ritchie 2017).

Rebuttal: The US Army Corps of Engineers is working to strengthen the dike around Lake Okeechobee to reduce the risk of flooding. The federal government has spent more than half of the $1.6 billion cost of dike repairs and is scheduled to complete work in 2025 (Ritchie 2017).

According to Sen. Joe Negron (2017b), "Once the Herbert Hoover Dike rehabilitation is complete in 2024, the Army Corps of Engineers is not committed to storing one more gallon of water in Lake Okeechobee. The LORS [Lake O Release Schedule] must go through a multi-year review process, with the Corps predicting only negligible modifications to the release schedule. The Corps wants to avoid expected negative impacts it believes would result if the Lake is managed at higher levels than the present. … If Florida advances funds to complete the rehabilitation of the Herbert Hoover Dike around Lake Okeechobee, the federal government will not repay the money to Florida. We will have simply spent hundreds of millions of dollars of General Revenue funds on what is unquestionably a federal responsibility." (Negron 2017b)

Box 2. Chronology of the EAA Reservoir: The Unfinished 60-year-old Project

1923: first reported discharges from Lake Okeechobee (Lake O) to the St. Lucie Estuary

1930: Martin County Commission sends first of many requests to State requesting a stop to the discharges

1955: US Army Corps of Engineers evaluates new outlet and flow-way south of Lake O

1980s-early 1990s: concept of regional EAA reservoir storage formalized

1996: Governor's Commission for Sustainable South Florida: A Conceptual Plan for the C&SF Project Restudy — stakeholders unanimously agreed to storage reservoirs in the EAA

1999: C&SF Restudy — identified EAA storage reservoirs as Component G

- 120 billion gallons on 60,000 acres
- land to be acquired from willing sellers prior to planning and design completion

2000: EAA storage reservoir authorized by Congress as one of initial set of CERP projects

- A-1 Reservoir: 62 billion gallons, 12 feet deep on 17,000 acres
- A-2 Reservoir: 55 billion gallons, 12 feet deep on 16,000 acres

2006: A-1 Reservoir began; cost estimate $913 million; anticipated completion 2009-2011

2008: Construction of A-1 Reservoir stopped after expenditure of almost $300 million

2012: A-1 footprint converted to a shallow water surge basin to provide additional water quality treatment for predominately EAA runoff, and secondarily, Lake O releases (Restoration Strategies, SFWMD 2012)

2013: Central Everglades Project (CEP):

- A-1 Reservoir planning postponed (loss of 62 billion gallons of storage that should have been completed by now)
- A-2 Reservoir was reduced from 55 billion gallons to 18 billion gallons (loss of 37 billion gallons)

2016: Sen. Negron proposed acquisition of up to 60,000 acres and construction of EAA Storage Reservoir to hold 120 billion gallons

2017, January 25: SB10 and HB 761 filed in Florida Legislature

- acquisition of up to 60,000 acres
- expenditure of $1.2 billion; federal government to match that

2017, April 12: SB10 amended and passed in the Senate

- use the A-1 and A-2 parcels the state already owns to construct the EAA Reservoir (see **Map 1**)
- SFWMD to model water storage and treatment needs
- expenditure of $750 million; federal government to match that

Source: Goforth 2017a, through January 25, 2017.

Postscript: Seven Questions Legislators Will Want Answers To

In the end, as Smith (2017) put it, legislators likely will want the answers to seven questions to decide whether to support the acquisition of land for the construction of the EAA Reservoir. Those questions follow, as they were posed by Smith (2017), with replies based on the preceding analysis.

Q1) Will a 60,000-acre [120 billion gallon] reservoir south of Lake Okeechobee cancel the need for lake discharges and end the threat of algal blooms in the St. Lucie and Caloosahatchee estuaries?

A1) That's two separate questions. First, given historical discharge records dating back 36 years, in 3 of every 4 years there would be no need for any discharges if the 120 billion gallon reservoir was managed dynamically and 360 billion gallons coursed through it in a year. In those years with high rainfall, like 2016 and 2013, the EAA Reservoir would reduce the discharges by 48.5% and 62%, respectively. Second, during the warm summer months there is always a potential for algal blooms in the estuaries, but the algae and nutrients that feed them come every summer in Lake O discharges and guarantee an algal bloom that exacerbates the problem. The less the discharges from Lake O are, the less likely it is that there will be harmful algal blooms in the estuaries. There are other sources of nutrients entering the estuaries, but toxic blooms have not occurred without massive discharges.

Q2) Can the southern reservoir already in the CEPP plan, together with land the state already owns, be adapted to store the same amount of water?

A2) Amendments to SB10 have adapted to that premise and seek to place additional water storage and treatment capacity south of Lake O on lands the state already owns so as to minimize the need for the state to buy more land; i.e., the state will consider if existing state-owned lands south of Lake O can be used to meet the goal of an additional 120 billion gallons of storage. As Gary Goforth, P.E., Ph.D., testified, the desired goal of CERP is to create a reservoir in the EAA capable of storing 360 thousand acre-feet [120 billion gallons]. The amount of acreage needed to accomplish that goal is somewhere between 35,000–50,000 acres, depending on how high the reservoir walls are built (Goforth 2017 c). The state owns more land than that in the southern portion of the EAA; approximately 14,000 acres of that land in the A-2 parcel (see **Map 1**) is leased to two sugarcane growers, and the leases will be terminated in 2019. These lands were part of a 52,000 acre acquisition of the Talisman sugarcane lands in 1999 in order to build an EAA reservoir called for in CERP. The SFWMD (2017) says that a deep reservoir could be built there.

As noted in **Box 2** above, on the adjacent A-1 parcel a 16,000 acre shallow flow equalization basin was built to help clean polluted water from sugarcane lands to meet court=ordered water quality standards before that water can be sent south. In addition, the state owns two wildlife management areas in the southern part of the EAA (see **Map 1**) that could be either repurposed or, more likely, as mentioned in the UFWI report, managed to store more water (Graham et al. 2015, pages 103-106). But regardless of what the state does with its own lands, the UFWI report stated that it would still be necessary for the state to acquire additional acreage in the EAA for

water storage purposes. Sen. Rob Taylor, sponsor of SB10, said 3,000 to 6,000 acres might be sufficient (Rangel 2017c).

Q3) How much time will it take to complete and permit a new reservoir?

A3) This is two questions. First, regrading permitting, Sen. Negron wrote, "Under both the Comprehensive Everglades Restoration Plan (CERP) and the Central Everglades Planning Project (CEPP), redirecting damaging Lake Okeechobee discharges southward to improve the flow, timing, and distribution of water through the Everglades has already been authorized. " (Negron 2017b). Second, regarding construction, because the South Florida Water Management District was reported to have said that the 10,000 acre C-43 Reservoir would take 10 years to complete (Gillis 2016), it seems likely that the larger EAA Reservoir might take at least 10 years to complete.

Q4) How much delay will the process of land purchase and construction cause in completing projects just waiting for funding?

A5) All Everglades restoration projects identified in CERP are important, but some are more important than others and should be given priority. New direction for priority determination is codified in the Florida Legacy Act of 2016, which mandates that state agencies give preference to projects that reduce discharges to the St. Lucie and Caloosahatchee Estuaries. The EAA Reservoir project is not only consistent with the priority mandate in Florida Legacy Act, but also is necessary to meet CERP goals.

Q5) How will a 60,000-acre [120 billion gallon] reservoir affect the local economy—will it alter a way of life in the Glades, cost jobs, lose money from the county tax rolls and necessitate a tax hike?

A5) The EAA Reservoir is a job creator, not a "job killer" as some have claimed. Converting agricultural lands to water storage will cost some existing agricultural jobs but replace them with others (see discussion of **Table 1** above).The conversion will not necessitate a tax hike (see section 3 above). The conversion will alter a way of life in the Glades by providing new job opportunities for some of Florida's poorest communities.

Q6) Will this water really help Florida Bay and during very wet periods, what are the dangers to wildlife?

A6) According to Florida Audubon (2017), "CEPP, bridging Tamiami Trail and the C-111 projects are all critical to improving the health of Florida Bay. But these projects need an upstream source of freshwater to achieve their maximum benefits."

Q7) New reservoir or staying the course? Which gives Floridians the best bang for their buck?

A7) Staying the course means dumping hundreds of billions of gallons of polluted water into the St. Lucie and Caloosahatchee estuaries, creating environmental, economic and public health issues, and wasting water to tide when it is needed to maintain desirable ecological conditions in Everglades National Park (ENP), a designated World Heritage Site that is being adversely affected by

lack of water, and to the south of it, Florida Bay, which suffers from hypersalinity due to lack of fresh water. Staying the course means waiting for other Everglades restoration projects that will help the problem situation, but not as much as scientists (e.g., Graham et al. 2015) believe additional storage around Lake Okeechobee would help. Only the EAA Reservoir will provide additional water for ENP and Florida Bay. A North Reservoir is necessary, but it will not be as effective in reducing discharges as the EAA Reservoir (Van Lent and Paudel 2016), and it would not help ENP and Florida Bay at all.

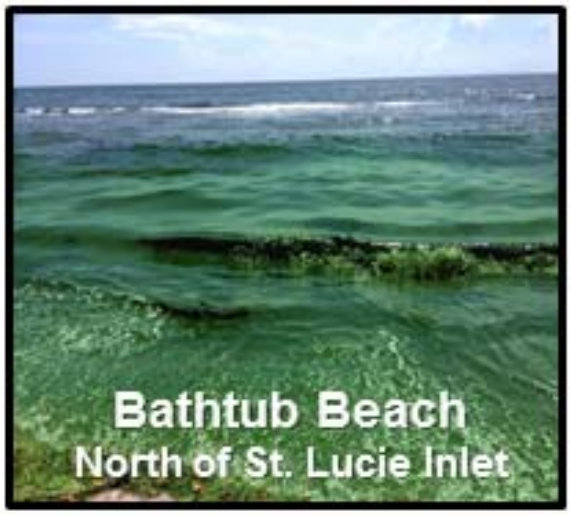
Which gives Floridians the best bang for their buck? That depends how one might measure bang. Environmental, economic and public health issues need to be considered. “Staying the course” postpones searching for ways to deal with these problems.

Will staying the course improve environmental conditions as much as the EAA Reservoir? No. Until the EAA Reservoir becomes operational the situations south of Lake O. will not improve. Everglades National Park and Florida Bay will continue to be adversely affected due to lack of fresh water, and millions of people dependent on the Biscayne Aquifer will need to search for other water sources and construct expensive desalination facilities.

Will staying the course improve the adverse economic consequences that people living near the St. Lucie and Caloosahatchee Estuaries suffer due to discharges and algal blooms? No, but it will protect jobs in the sugar industry and the communities where sugar workers live, but at the expense of marine industries in four counties and home values in two counties that taken together dwarf the adverse impacts from losing additional sugarcane lands.

Will the public health issues associated with algal blooms be improved by staying the course? No. If one disagrees with these three findings, it can only be because one is willing to wait until 2021 to revisit these issues, because, as Sen. Negron (2017b) put it,

“The issue is not if we will have additional southern storage, it is when and where."



Appendix A. Estimating Employment Impacts for the Proposed EAA Reservoir

Estimates of farming jobs lost, temporary construction jobs, and new permanent jobs are provided in **Table 1**, presented on page 9 in the body of the report and reproduced below with a note on source references. As noted in the body of the report, on balance the analysis illustrates that when these findings are applied to an appropriate mix of agricultural crops the estimated employment impacts clearly show that more permanent jobs will be created than lost, and when temporary construction jobs are considered the balance tips even more towards the EAA Reservoir and away for agriculture job losses. In two foot notes directly below the sources of employment data and definitions and descriptions of direct, indirect and induced impacts are provided. Following that, **Method**s are described, and a **Synopsis of Findings** is provided in a bullet point list.

Table 1. Employment Impacts Associated with Proposed EAA Reservoir and Water Treatment Areas South of Lake Okeechobee (per 1,000 acres)

Economic Sector*	Employment Impacts** (per 1,000 acres)		
	Direct Jobs	Indirect and Induced Jobs	Total Jobs
Sugarcane farming	(5.5)	(4.0)	(9.5)
Vegetable & melon farming	(23.2)	(42.9)	(66.1)
Reservoir construction	593	829	1,422
Water treatment area construction	92	130	222
Reservoir operations & maintenance (O&M)	12	12	24
Water treatment area O&M	2	2	4
Reservoir recreation & tourism	14	14	28
Water treatment area recreation & tourism	14	14	28

***Economic sector source data are primarily from economic impact studies using constructed input-output models based on inter-industry economic relationships. How these economic impact studies and other sources were used to create this information for each sector is described in the **Methods** section below.

****Effects from economic activity in the sugar sector "ripple" through the economy, creating a multiplier effect on jobs and income in other sectors. Herein only jobs are reported. The model calculates direct impacts (employment and spending), indirect impacts (secondary effects of spending via jobs and incomes generated in sectors from which goods and services are purchased to support the sugar industry) and induced impacts (expenditures of wages by direct and indirect employees). For example, a sugar field or factory worker draws wage income (direct impact), owns housing or rents it (indirect impact), operates a company vehicle (indirect impact), and spends money dining out, generating jobs and income for restaurant workers (induced impacts).

Methods

Although the SB10 proposal for an EAA reservoir likely will be constructed on the 14,000 acre A-2 parcel owned by the state (see **Map 1**) an additional amount of land is needed for water treatment areas and will not be identified until the SFWMD begins planning the EAA Reservoir. Also unknown is how much of the A-2 parcel is farmed for sugarcane and how much for vegetables or other crops. Due to these uncertainties the data in Table 1 are presented per 1,000 acres in order to simplify further analysis as more id learned.

● **Sugarcane farming job loss.** Information is developed primarily from economic impact analysis of agriculture in Palm Beach County by economists at Florida Atlantic University and the University of Florida (Barnhart & Hodges 2016). Sugarcane farming is the dominant use of lands in the EAA, and of the 500,000 acres of farmland in the EAA, 479,000 (85%) are in Palm Beach County (Palm Beach County 2017). In the county there were 2,176 full and part-time workers directly employed in sugarcane farming in 2012 and an additional 1,949 indirect and induced jobs from sugarcane farming for a total employment impact of 4,145 jobs. There were 285,304 acres of sugarcane harvested and 13,712 acres of land growing sugarcane seed stalks for later replanting (Barnett & Hodges 2016). Because it takes one year following the planting of seed stalks for sugarcane to mature and be harvested, and each planting yields an average of three annual crops before it is replaced (Baucum & Rice 2009), for every three acres harvested there is one more acre of planted sugarcane that is not yet mature, so in 2012 there were 95,101 acres of immature sugarcane. In total, then, there were 394,117 acres of sugarcane in Palm Beach County in 2012. This is confirmed by the 395,748 acres of sugarcane reported by the Palm Beach County Appraiser's Office (Salisbury 2015).

Thus each 1,000 acres of sugarcane farmlands in the county required 5.5 direct workers (total impact of 9.5 jobs), so each 1,000 acres of sugarcane farmlands converted to water storage and treatment will result in 5.5 lost jobs directly in sugarcane farming, and another 4.0 indirect and induced jobs, for a total job loss of 9.5 jobs per 1,000 acres of sugarcane farmlands.

● **Vegetable farming job loss.** Information is developed from economic impact analysis of agriculture in Palm Beach County by economists at Florida Atlantic University and the University of Florida (Barnhart & Hodges 2016). The second most extensive use of Palm Beach County agricultural land is for vegetable and melon farming. In 2012 there were 60,762 acres farmed, 1,408 direct farm jobs, and 2,604 indirect and induced jobs, for a total employment impact of 4,012 jobs. Each 1,000 acres of vegetable farmlands in the county required 23.2 direct jobs (total impact of 66.1 jobs), so each 1,000 acres of vegetable farmlands converted to water storage and treatment will result in 23.2 lost jobs directly in vegetable farming, and another 42.9 indirect and induced jobs, for a total job loss of 66.1 jobs per 1,000 acres.

● **Reservoir construction job gains.** Information is developed from economic impact analysis of C-43 Reservoir by University of Florida economists (Mulkey et al. 2005). The total of 1,422 construction jobs in **Table1** above is based on information reported for the 3,600 acre C-44 Reservoir project in Martin County currently under construction will store 16 billion gallons at a depth of 15 feet and is estimated to cost $334 million to construct (SFWMD 2015, Westlund 2017). It is then adjusted to the size of the EAA Reservoir, which as proposed for the 14,000 acre A-2 parcel has a footprint 3.9 times bigger than the C-44 Reservoir and will store 240 thousand acre-feet, or 78 billion gallons, which is 4.9 times the planned

capacity of the C-44 reservoir. It is therefore appropriate to approximate construction costs and jobs for the EAA Reservoir to be 4 times greater than for the C-44 Reservoir.

The U.S. Army Corps of Engineers uses a ratio of jobs per million dollars of construction expenditures to estimate employment effects. For the Central Everglades Planning Project, or CEPP, analysis in 2014 used a ratio of 15.3 total construction jobs per million dollars of construction costs USACOE & SFWMD 2014). According to changes in the CPI (Consumer Price Index, a widely used measure for expressing the change in the value of money) the value of a dollar today is 2.8% less than it was in 2014. Adjusting for inflation, today there would be 14.9 jobs per million dollars of construction costs.

The estimated cost of the 3,600 acre C-44 Reservoir is $334 million (SFWMD 2015). Applying the above jobs to dollars ratio, C-44 Reservoir construction will provide 4,977 total jobs. An economic impact study of the 10,000 acre C-43 Reservoir in Hendry County by University of Florida economists (Mulkey et al. 2005) determined that every 5 direct construction jobs resulted in 7 additional indirect and induced jobs. Applying that to the C-44 Reservoir information results in 2,074 direct construction jobs and 2,903 indirect and induced jobs. Multiplying that result by 4 to get to the 14,000 acre EAA Reservoir equivalent job impacts results in 8,296 direct construction jobs and 11,612 indirect and induced jobs, for a total of 19,908 total construction-related jobs for the EAA Reservoir. For every 1,000 acres, that works out to be 593 direct jobs, 829 indirect and induced jobs, and 1,422 total job impacts for the EAA Reservoir, as shown in **Table 1**.

● **Reservoir operations and maintenance job gains.** Information is developed from economic impact analysis of C-43 Reservoir by University of Florida economists (Mulkey et al. 2005). An estimate was provided to Mulkey et al. (2005) by the firm that designed the construction of the C-43 Reservoir. The firm estimated that operations and maintenance (O&M) costs would be about 2 percent of construction costs (Mulkey et al. 2005). This analysis assumes that jobs are proportionate to expenditures, and calculates O&M jobs to be 2 percent of construction jobs. Lacking any guidance as to indirect and induced multiplier effects, a conservative assumption is that there would be the same amount of combined indirect and induced job as direct jobs.

● **Water treatment area construction job gains.** Information is developed from a project status report by the South Florida Water Management District for the 6,300 acre C-44 Reservoir/Stormwater Treatment Area project currently under construction in Martin County. The 6,300 acre Stormwater Treatment Area portion of the C-44 project is estimated to cost $100.8 million and is expected to create 1,400 total jobs per year (SFWMD 2015), which works out to 222 total construction jobs per 1,000 acres. It is assumed that like the C-43 reservoir construction activities that for every 5 direct jobs there would be 7 indirect and induced jobs.

● **Water treatment area operations and maintenance job gains**. Lacking specific information that could be used to estimate this, the approach used to estimate reservoir operations and maintenance jobs is used as described above; i.e., it is assumed that 2 percent of the construction jobs would be needed for direct operations and maintenance jobs and there would be the same amount of indirect/induced jobs.

● **Recreation and tourism job gains.** Information is developed from CERP EAA Reservoir project implementation report and environmental Impact statement (USACOE & SFWMD 2006, p. 6-14) and an economic impact analysis of Florida's tourism industry (Parrish et al. 2013). The agencies estimated a

total of 36,500 visitor days per year to the 31,000 acre EAA Reservoir that was to be built on the A-1 and A-2 parcels in the southern EAA (see **Map 1**). According to an economic impact analysis of Florida's tourism industry, each 85 visitors to Florida results in one direct job in recreation & tourism industries, and the indirect and induced job impacts taken together would create one more job (data from Parrish et al. 2013). Using these data there would be 430 direct, and another 430 indirect and induced jobs, for a total of 860 recreation and tourism jobs expected for a 31,000 acre reservoir. That works out to 13.8 direct and 13.8 indirect and induced jobs per 1,000 acres, for a total impact of 27.6 recreation and tourism jobs per 1,000 acres, and rounded upward in **Table 1**.

Synopsis of Findings

Sugarcane Farming

● ***Job loss, farming***—For every 1,000 acres converted to either a water storage reservoir or a water treatment area, 5.5 direct jobs would be lost, plus 4.0 indirect and induced jobs for a total job impact of 9.5 jobs.

● ***Job gains, farmland converted to storage reservoir***—For farmland converted to a water storage reservoir, for every 1,000 acres converted there would be 593 direct jobs in construction, plus 829 indirect and induced jobs for a total job impact of 1,422 jobs. These are temporary jobs spread out over the construction phase; following completion of construction, 26 direct permanent jobs would be created to operate and maintain the reservoir (12 direct jobs, with total impact of 24 jobs), and service newly created recreation and tourism opportunities (14 direct jobs, with total impact of 28 jobs).

● ***Job gains, farmland converted to water treatment area***—For farmland converted to a water treatment area, for every 1,000 acres converted there would be 92 direct jobs in construction, plus 130 indirect and induced jobs for a total job impact of 222 jobs. These are temporary jobs spread out over the construction phase; following completion of construction, 16 direct permanent jobs would be created to operate and maintain the water treatment area (2 direct jobs, with total impact of 4 jobs) and service newly created recreation and tourism opportunities (14 direct jobs, with total impact of 28 jobs).

● ***Direct jobs, net effect***—For every direct job lost from farmland conversion to a storage reservoir, 4.7 permanent direct jobs would be created after the 107 temporary direct construction jobs for each farm job lost have moved on to other construction projects. For every direct job lost from farmland conversion to a water treatment area, 2.9 permanent direct jobs would be created after the 16.7 temporary direct construction jobs for each farm job lost have moved on to other construction projects.

● ***Indirect and induced jobs, net effect***— For every indirect and induced job lost from land conversion to a storage reservoir, 6.5 permanent indirect and induced jobs would be created during the construction phase when there were 207 temporary indirect and induced jobs for each farm job lost. For every indirect and induced job lost from land conversion to a water treatment area, 4.0 permanent indirect and induced jobs would be created during the construction phase when there were 32.5 temporary indirect and induced jobs for each farm job lost.

Vegetable Farming

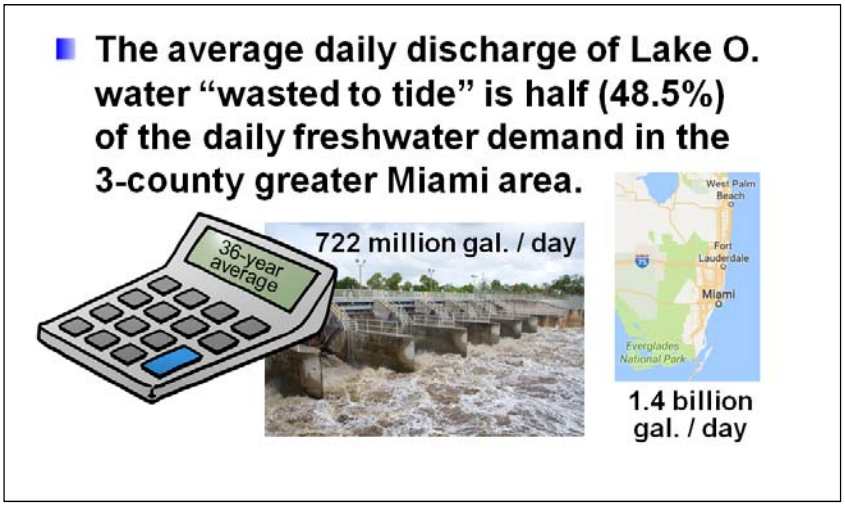
● ***Job loss, farming***—For every 1,000 acres converted to either a water storage reservoir or a water treatment area, 23.2 direct jobs would be lost, plus 42.9 indirect and induced jobs for a total job impact of 66.1 jobs.

● ***Job gains, farmland converted to storage reservoir***—For farmland converted to a water storage reservoir, for every 1,000 acres converted there would be 593 direct jobs in construction, plus 829 indirect and induced jobs for a total job impact of 1,422 jobs. These are temporary jobs spread out over the construction phase; following completion of construction, 26 direct permanent jobs would be created to operate and maintain the reservoir (12 direct jobs, with total impact of 24 jobs), and service newly created recreation and tourism opportunities (14 direct jobs, with total impact of 28 jobs).

● ***Job gains, farmland converted to water treatment area***—For farmland converted to a water treatment area, for every 1,000 acres converted there would be 92 direct jobs in construction, plus 130 indirect and induced jobs for a total job impact of 222 jobs. These are temporary jobs spread out over the construction phase; following completion of construction, 16 direct permanent jobs would be created to operate and maintain the reservoir (2 direct jobs, with total impact of 4 jobs) and service newly created recreation and tourism opportunities (14 direct jobs, with total impact of 28 jobs).

● ***Direct jobs, net effect***—For every direct job lost from farmland conversion to a storage reservoir, 4.7 permanent direct jobs would be created after the 107 temporary direct construction jobs for each farm job lost have moved on to other construction projects. For every direct job lost from farmland conversion to a water treatment area, 2.9 permanent direct jobs would be created after the 16.7 temporary direct construction jobs for each farm job lost have moved on to other construction projects.

● ***Indirect and induced jobs, net effect***— For every indirect and induced job lost from land conversion to a storage reservoir, 6.5 permanent indirect and induced jobs would be created during the construction phase when there were 207 temporary indirect and induced jobs for each farm job lost. For every indirect and induced job lost from land conversion to a water treatment area, 4.0 permanent indirect and induced jobs would be created during the construction phase when there were 32.5 temporary indirect and induced jobs for each farm job lost.



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