The Honorable Senator Joe Negron, Chairman
Select Committee on Indian River Lagoon and Lake Okeechobee Basin

October 8, 2013

c/o Katie Betta
Deputy Chief of Staff for Communications
Suite 409
The Capitol
404 South Monroe Street
Tallahassee, FL 32399-1100

Dear Chairman Negron:

Attached for consideration by the Select Committee on Indian River Lagoon and Lake Okeechobee Basin is a set of suggestions designed to reduce the damaging discharges from Lake Okeechobee to the St. Lucie River and Estuary, the Indian River Lagoon and the coastal reefs. I presented a portion of these at the August 22, 2013, special committee hearing in Stuart, and was asked to submit in writing the complete set of suggestions for your consideration. These suggestions may also provide benefits to the Caloosahatchee River and Estuary.

By way of brief background, my name is Gary Goforth. I am a Ph.D. environmental engineer with more than 25 years of hands-on experience in the restoration and protection of the Kissimmee-Okeechobee-Everglades ecosystem. I was one of the lead environmental engineers with the South Florida Water Management District during the planning, design, permitting, construction and operation of the Everglades Stormwater Treatment Areas (STAs) between 1988 and 2004. I left the District in January 2005 to start my own engineering firm based in Stuart, Florida, and the District is my primary client. I drafted these suggestions for your committee's consideration outside of all contractual relationships with the District and other organizations. This set of suggestions is not a final engineering document as defined in Chapter 471, Florida Statutes and Chapter 61G15, Florida Administrative Code.

Please contact me if I can be of any assistance.

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Suggestions for Consideration by the Select Committee on Indian River Lagoon and Lake Okeechobee Basin

Gary Goforth – 10 8 2013

Note: Several of these suggestions were made to the committee at the August 22 public hearing in Stuart. A few have already been implemented, and all parties are to be commended for their collaborative effort to reduce the damaging discharges to the estuaries. The full set of suggestions is compiled here for completeness.

1. Consider declaring a State of Emergency for the coastal regions being adversely affected by the discharge of Lake Okeechobee regulatory releases, and for the region south of the Lake potentially impacted by a failure of the Herbert Hoover Dike.
    a. The Florida Department of Health has issued numerous public health advisories for the St. Lucie River and Indian River Lagoon, and hopefully the declaration of an Emergency would increase support for improving public health and safety.
    b. In addition to potentially providing financial support to individuals and businesses adversely affected by the discharges, declaring a State of Emergency may give the State and regions additional flexibility to deal with this crisis.
    c. Consider requesting the South Florida Water Management District (District) to declare a State of Emergency with regard to their Works of the District permits (40E-61 and 40E-63), and their operation of the Stormwater Treatment Areas (STAs), the Water Conservation Areas (WCAs) and other public lands. This hopefully will give them more flexibility to manage water levels in the Kissimmee-Okeechobee-Everglades system and reduce discharges to the coastal estuaries.

2. Consider sponsoring an Emergency Management Workshop for staff of the U.S Army Corps of Engineers (Corps), District and stakeholders.
    a. Participants could be asked to develop an Operation Plan for the following scenario:

        "The U.S. Army Corps of Engineers has decided to close the gates at Port Mayaca (S-308), which will terminate discharges to the St. Lucie River and Indian River Lagoon. No additional discharges will occur to the C-43 canal (Caloosahatchee River) above the rates in the 2008 Lake Okeechobee Regulation Schedule"
    b. Workshop participants could be asked to develop an Operation Plan and a list of projects necessary to safely manage the waters of Lake Okeechobee, which

could include reducing inflows to the Lake and increasing the amount of water sent to the south.

c. Participants could be asked to identify physical, legal or discretionary operational constraints to moving more water to the south, and to identify courses of action necessary to resolve the constraints.

3. Consider asking the Corps to prepare an updated risk assessment on the potential risk of failure of the Herbert Hoover Dike, now that the initial 21.4 mile section of the dike has been rehabilitated.

   a. Issues regarding the structural integrity of the Herbert Hoover Dike led to lowering the upper limit of the Lake Okeechobee regulation schedule (2008 LORS) from 18.5 ft NGVD to 17.25 ft NGVD, resulting in increased pressure to send Lake releases to the estuaries. From a presentation by Lt. Col. Greco at the August 8, 2013 WRAC meeting in Stuart, it is my understanding that the Corps estimated the following annual risks of failure **before the rehabilitation**:

Lake Elevation (ft., NGVD)	Combined Probability of HHD Breach (%)
15	1
17	11
18	45
21	100

(Table H-10.2, 1998 HHD MRR & LORS FEIS, A-3)

   b. Documents available on the Corps website indicate the risks are much less after the present rehabilitation:

      i. "Since 2007, the Corps has made a significant investment, over $300 million, in projects designed to reduce the risk of catastrophic failure of the aging structure."

      ii. "The implementation of the 21.4 mile cutoff wall component in Reach 1 satisfies the majority of the risk reduction goals."

4. Consider requesting the Corps to re-evaluate the Lake Okeechobee regulation schedule with a goal to minimize Lake releases to the estuaries.
    a. As part of this re-evaluation, consider requesting the Corps to perform an ***updated cost benefit analysis*** of making regulatory releases to the estuaries.
        i. Costs would include the economic and environmental costs of discharging nutrient-laden freshwater to the estuaries, including
            1. Immediate loss of income and jobs for people who make their living on or in the water,
            2. Near-term loss of income as potential tourists and others decide not to visit the coastal regions, or buy homes in the area
            3. Loss of real estate value
            4. Ecological costs to the rivers, estuaries, lagoons and near-shore reef systems.
        ii. Benefits of releasing water from the Lake to the St. Lucie River and Indian River Lagoon could be quantified. These benefits have been described as two-fold:
            1. Reducing the risk of breach of the Herbert Hoover Dike, and
            2. Improved health of Lake Okeechobee
        iii. Request the Corps to examine the balance of potential economic costs of a dike breach with the certainty of economic and environmental costs of these Lake discharges to the St. Lucie River and Indian River Lagoon.
        iv. This analysis may indicate that the coastal regions are suffering the majority of the economic and environmental costs, while the region south of the Lake is receiving the majority of the benefits. If so, the Corps could be asked to determine how the Lake Okeechobee regulation schedule could be revised to more fairly align the majority of the costs to the region receiving the majority of the benefits.
    b. As part of this re-evaluation, consider requesting the Corps to evaluate raising the upper limit of the lake regulation schedule back to 18.5 ft, now that the present dike rehabilitation efforts have satisfied the majority of the risk reduction goals (as reported in a Corps news release).
    c. As part of this re-evaluation, consider requesting the Corps to eliminate the restriction of moving water south for treatment in the STAs.
        i. Additional treatment areas are operational that were not operational when the 2008 LORS was developed.
        ii. The 2008 LORS recommended a dramatic decrease in the amount of regulatory releases to be sent south to the STAs compared to the design of STA-3/4. In 1994, STA-3/4 was designed to capture and treat an

average of more than 250,000 acre feet per year (80 billion gallons per year) of Lake regulatory releases. The Florida Legislature directed the District to operate the STAs in accordance with the 1994 Conceptual Design (Ch. 373.4592, F.S.).

iii. The 2008 LORS assumed a limit on Lake Okeechobee releases to the STAs of 60,000 ac-ft per year. This limit was based on the high TP concentrations in Lake Okeechobee following the 2004-2005 hurricanes.

iv. Lake concentrations have declined to a current average of 63 ppb for releases to the Miami and North New River Canals. Using the updated TP concentrations will allow higher flows to the STAs and not exceed the TP loads from the Lake as assumed in the 2012 Restoration Strategies.

5. Consider requesting the District to move more water south during periods of Lake releases into and through the following areas, without sacrificing public health and safety.
    a. STAs. In light of the public health and safety issues surrounding Lake regulatory releases, normal STA operations might be suspended, e.g., Target depths, vegetation maintenance activities, and nesting bird constraints. The nutrient removal performance of the STAs will likely suffer a temporary decline, but the performance should return to normal over time.
        i. STA-1E – a 5,000-acre treatment area located north of WCA-1
        ii. STA-1W - a 6,500-acre treatment area located north of WCA-1
        iii. STA-2 - a 15,000-acre treatment area located between the EAA and WCA-2A
        iv. STA-3/4 – a 16,500-acre treatment area located between the EAA and WCA-3A. As mentioned above, the 1994 Conceptual Design for the STAs contemplated sending an annual average of more than 250,000 AF of Lake regulatory releases to STA-3/4. While some adjustments were made to reflect higher TP concentrations in Lake Okeechobee, since 2008 actual volumes of Lake water that have been sent to the STAs have averaged less than 75,000 AF/yr.
        v. STA-5/6 – a 15,000-acre treatment area located immediately west of the Rotenberger area; canals currently exist to convey Lake releases to STA-5/6 and existing water supply pumps can be supplemented with more pumps to increase the capability to store Lake water in STA-5/6.

    b. Other public lands

i. Holey Land Wildlife Management Area, a 35,350-acre area located between the EAA and WCA-3A. During the current event, there are no records of Lake water being sent to the Holey Land since releases to the estuaries began on May 8, 2013.
ii. Rotenberger Wildlife Management Area, a 28,760-acre area located between the EAA and WCA-3A. Pump station G-410 has historically been used to deliver Lake water to the Rotenberger Wildlife Management Area, but during the current event, less than 5 acre feet of Lake water has been sent to the Rotenberger. In contrast, over 9,000 acre feet of Lake water was sent to the Rotenberger for water supply purposes in the 12 months prior to May 2013. Phosphorus concentrations leaving the Rotenberger have averaged 13 parts per billion over the last year, better than any STA.
iii. The Water Conservation Areas, and
iv. Everglades National Park.

Normal operating schedules in the areas may need to be temporarily exceeded during these periods of emergency.

6. Consider requesting the District and Corps to evaluate ways to reduce inflows to Lake Okeechobee before and during periods when releases are being made to the estuaries.
    a. Alternatives could include
        i. temporarily raising the normal operating levels in canals adjacent to Lake Okeechobee.
        ii. temporarily reducing the use of pump stations S-2 and S-3 in the EAA, and instead sending this runoff to the south. During June 2013 as harmful Lake releases were being made to the St. Lucie River and Caloosahatchee River, the District pumped over 8 billion gallons of water from the EAA back into Lake Okeechobee through pump station S-2. The pumping capacity within the EAA to drain excess rainfall to the south is greater now than before the STAs were constructed. In addition, approximately 50,000 acres of land has been removed from the regional drainage area and have been converted to STAs and the soon-to-be-constructed EAA Flow Equalization Basin.
        iii. temporarily reducing the use of Culvert 10A in the L-8 Canal Basin, and instead sending this runoff to the south and southeast. During the summer of 2013 as harmful Lake releases were being made to the

estuaries, over 8 billion gallons of stormwater runoff from the L-8 Canal Basin was sent to the Lake through Culvert 10A.

iv. closing the gates at S-308 during rainfall events to prevent C-44 Basin runoff from flowing into the Lake.

b. Having the District declare a State of Emergency may provide additional flexibility to manage water levels in canals surrounding the Lake in order to minimize inflows to the Lake.

7. In light of the public health and safety risk associated with blue green algae, consider requesting the District to notify the public health departments when blue green algae are observed in waters discharged from Lake Okeechobee to the St. Lucie Canal and the C-43 Canal. According to the District's DBHYDRO database, blue green algae were observed in water samples collected by the District during many sampling events since regulatory releases began on May 8.

8. Consider requesting the Florida Department of Environmental Protection to provide a report to the Committee on the permit issued to the Corps to discharge water from Lake Okeechobee into the St. Lucie River and Indian River Lagoon, portions of which are classified as Outstanding Florida Waters. If a permit was not issued by the State that authorizes these discharges, then the committee should consider requesting follow-up action from the Department. Some of the Outstanding Florida Waters affected by the Lake discharges to the St. Lucie River and Indian River Lagoon include the following:

    1. Hobe Sound National Wildlife Refuge
    2. St. Lucie Inlet State Preserve
    3. Indian River State Aquatic Preserve
    4. Jenson Beach State Aquatic Preserve

    From Chapter 62.302-700, Florida Administrative Code:

    > (1) It shall be the Department policy to afford the highest protection to Outstanding Florida Waters and Outstanding National Resource Waters. No degradation of water quality, other than that allowed in subsections 62-4.242(2) and (3), F.A.C., is to be permitted in Outstanding Florida Waters and Outstanding National Resource Waters, respectively, notwithstanding any other Department rules that allow water quality lowering.

9. Consider requesting the Florida Department of Environmental Protection to provide a report on the environmental impacts of the lake releases on endangered and

threatened plant and animal species within the affected rivers, estuaries, lagoons and coastal reefs. The intent of the Florida Legislature to conserve and protect these species is described in the Florida Endangered and Threatened Species Act (Ch. 279.2291, F.S.).

10. Consider requesting the District to supplement their weekly charts reporting Lake releases and basin flows to the estuaries with
    a. charts documenting nutrient loads to the estuaries from Lake releases and basin flows (examples attached – see Figures 1 and 2), and
    b. charts documenting Lake releases and basin flows sent to the south, the STAs, the WCAs and other southern water bodies (example attached – see Figure 3).

11. Consider requesting the District to make available to the public provisional water quality data for discharges from Lake Okeechobee. Presently there is an approximate 2 month delay from the time some samples are collected to the time they are available for public review within the District's DBHYDRO database.

12. Consider requesting the District and Corps to prepare an "After Action" report covering the regulatory releases to the estuaries. The following components could be included in this report.
    a. An evaluation of the short-term and long-term ***environmental*** damages, and the risk to public health and safety, resulting from the discharge of millions of pounds of nitrogen and phosphorus from the Lake into the rivers, estuaries, lagoons and near-shore reef. Impacts from the following should be identified and methods to mitigate the damages should be suggested.
        i. Freshwater
        ii. Nitrogen (it is estimated that over 1.2 million pounds have been discharged from the Lake to the St. Lucie River between May 8 and September 17, 2013)
        iii. Phosphorus (it is estimated that over 120,000 pounds have been discharged from the Lake to the St. Lucie River between May 8 and September 17, 2013)
        iv. Sediment (it is estimated that over 14 million pounds have been discharged from the Lake to the St. Lucie River between May 8 and September 17, 2013)
        v. Blue green algae – present at many samples of water discharged from the Lake since May 8

b. An evaluation of the short-term and long-term ***economic*** damage resulting from the Lake discharges to the rivers, estuaries, lagoons and reef.
c. An analysis of the sediment transported from the Lake into the C-43 and C-44 canals, and subsequently into the St. Lucie and Caloosahatchee Estuaries.
    i. According to data obtained from the SFWMD database, over 14 million pounds of TSS (suspended sediment) has been discharged to the Lake into the C-44 Canal between May 8 and September 17, 2013. Where has this sediment gone? How much has gone into the River and estuary? How much has been deposited on the bottom of the C-44 Canal? What impact does this have on the flood conveyance capacity of the C-44 Canal? Can the Corps expedite the muck removal project recommended in the Indian River Lagoon – South project, with subsequent routine dredging to remove accumulated sediment?
d. A Lessons Learned document summarizing operational decisions, flow summaries, nutrient load summaries, etc. from the current event, along with identification of ways to reduce discharges to the estuaries in future events.

13. Consider asking the District and Corps to clarify what if any additional Congressional authorization is required to authorize the treatment of Lake releases in the C-44 reservoir/STA prior to discharge into the St. Lucie River and Estuary.
    a. Project documents indicate that the present objective for the C-44 Reservoir/STA is to capture and treat local basin runoff – and not Lake Okeechobee discharges.
    b. If additional Congressional authorization is required, consider asking Congress for this authorization.

14. Consider assisting the District obtain relief from STA operational restrictions due to the federal Migratory Bird Treaty Act of 1918. According to the District's August 2013 report on Lake releases, STA operations protecting certain ground nesting migratory birds limited the amount of Lake water that could be sent to the STAs (i.e., black necked stilts, which are neither threatened nor endangered).

15. The water quality problems Lake Okeechobee are at the heart of the water quality problems of the estuaries resulting from Lake regulatory releases.
    a. Consider requesting the FDEP and the District to project when the Lake will achieve its Total Maximum Daily Load (TMDL). In their 2005 South Florida

Environmental Report (SFER), the District anticipated that ***by 2015*** inflows nutrient loads to the Lake will achieve the TMDL of 105 metric tons of phosphorus per year. In the 2013 SFER, the District reported "The current five-year average (WY2008–WY2012) TP load was 387 mt, which is about 2.8 times greater than the 140 metric tons per year (mt/yr) Total Maximum Daily Load (TMDL) for the lake."

b. The Florida Legislature authorized the Northern Everglades and Estuary Protection Program in 2007 that required specific actions to improve the water quality in the Lake Okeechobee, St. Lucie and Caloosahatchee River Watersheds. Consider requesting annual reports from District, the FDEP and the Florida Department of Agriculture and Consumer Services documenting the effectiveness of source control programs to reduce nutrient loads into Lake Okeechobee and the river watersheds. The annual reports could require identification of the nutrient level targets for each source control program, and present results from monitoring the effectiveness of the various programs.

c. According to their website, the FDEP has no schedule for developing the Lake Okeechobee Basin Management Action Plan (BMAP). Consider requesting the FDEP to expedite the development a BMAP for the Lake Okeechobee watershed.

16. Consider requesting the Florida Department of Environmental Protection to add projects in their St. Lucie River BMAP to reduce the nutrient loads coming from Lake discharges so that they will achieve the TMDL. Presently I do not find any projects in the BMAP within St. Lucie River watershed designed to reduce nutrient loads specifically from Lake discharges to achieve the TMDL.

17. Consider requesting the District identify projects in their St. Lucie River Watershed Protection Plan to reduce the nutrient loads coming from Lake discharges so that they will achieve the TMDL. Presently I do not find any projects in the Watershed Protection Plan within St. Lucie River watershed designed to reduce nutrient loads specifically from Lake discharges to achieve the TMDL.

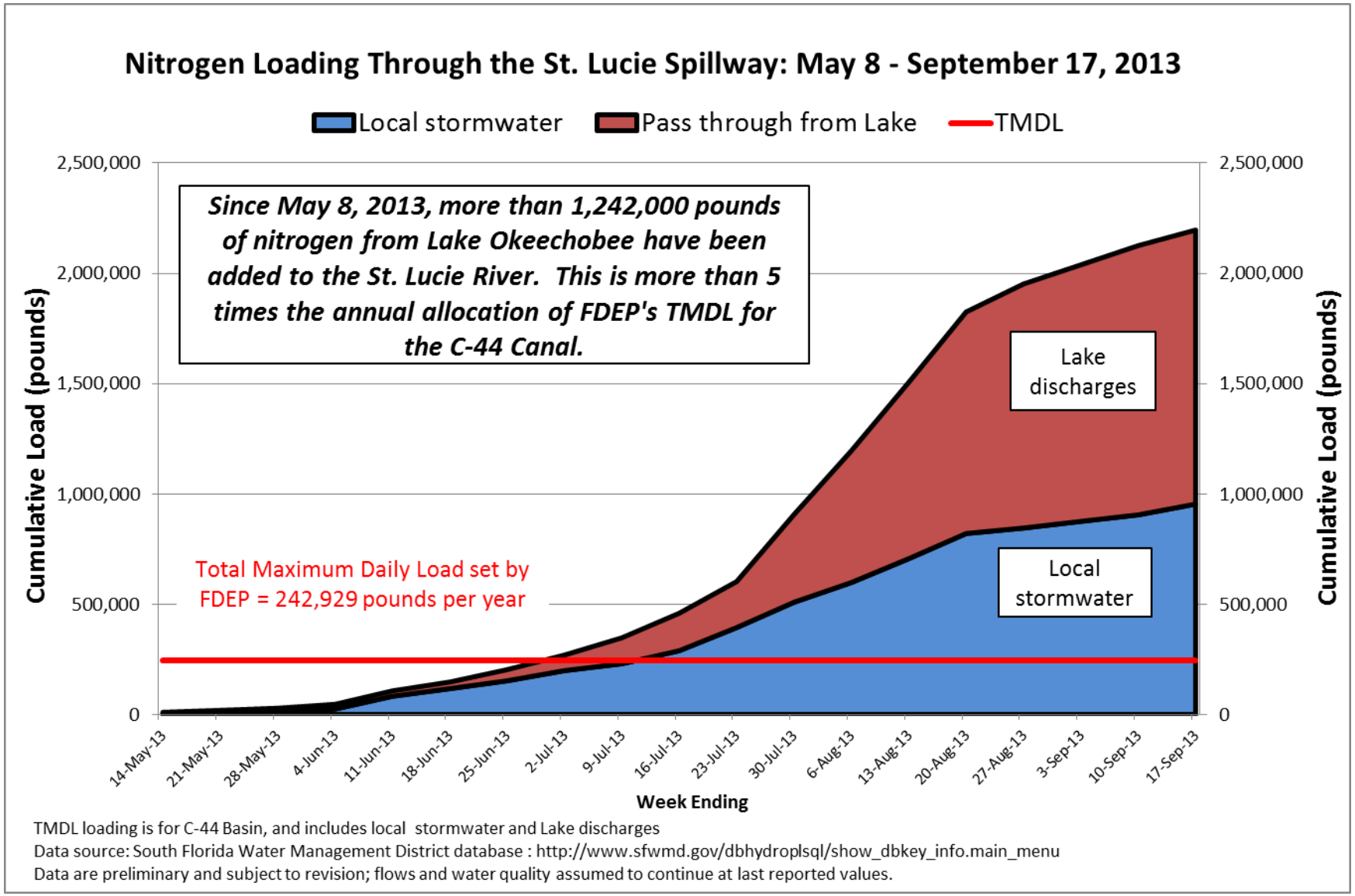
18. Ten Mile Creek Reservoir and Stormwater Treatment Area

    a. Consider requesting the Corps to prepare, if they haven't already done so, a Lessons Learned document on the design and construction of the Ten Mile Creek Reservoir and Stormwater Treatment Area. The Corps is currently building another Reservoir/STA – the C-44 project.

    b. Consider requesting the Corps to expedite the repair and full operation of the Ten Mile Creek Reservoir and Stormwater Treatment Area.

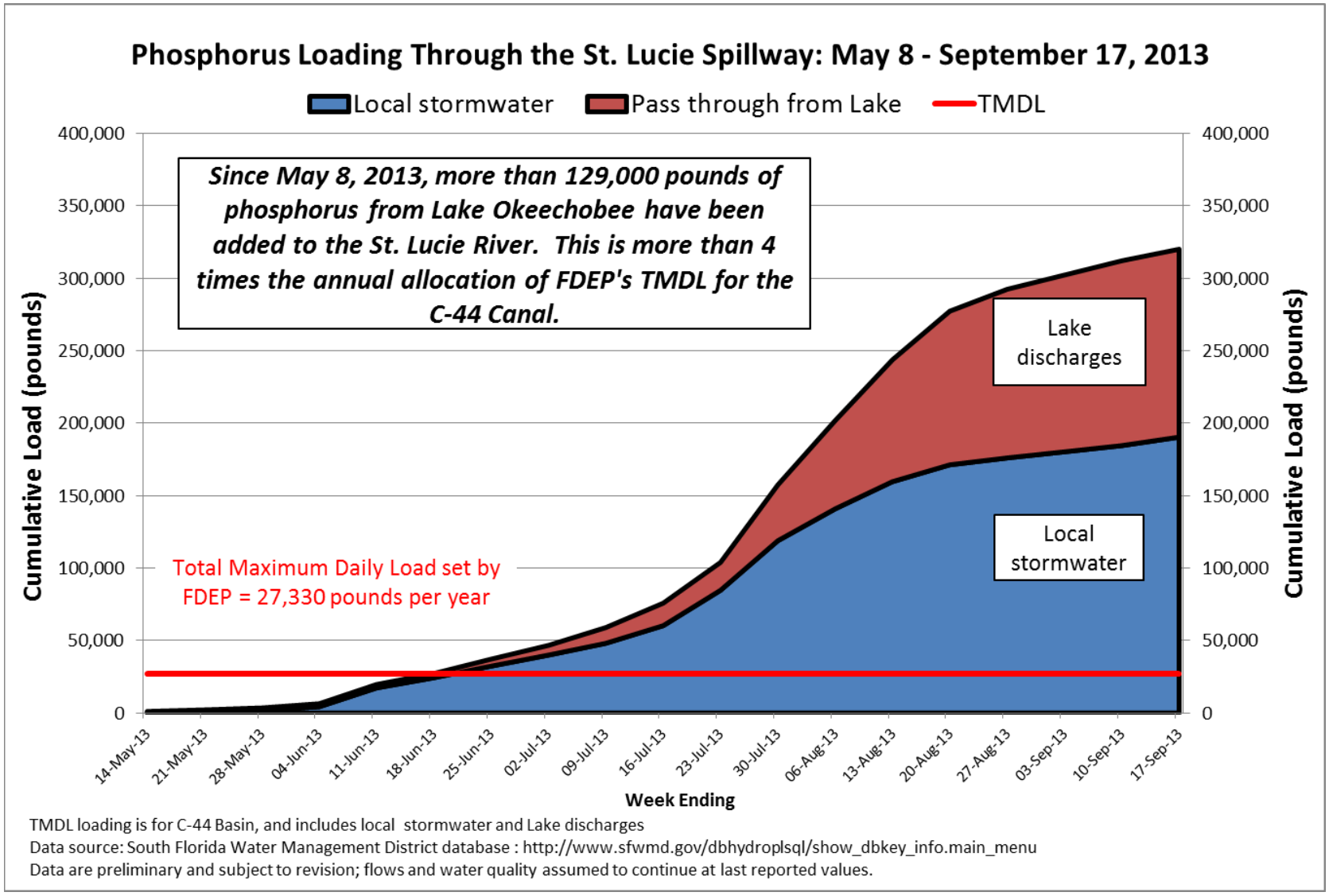
19. Consider requesting the Corps to begin the conceptual engineering design of new discharge structures along the south rim of Lake Okeechobee. A physical constraint to moving more water south is insufficient discharge capacity to the south, and new discharge structures along the south rim of Lake Okeechobee ideally would be large enough to increase the capacity to send water to the south up to the combined capacity of the structures that send Lake water to the east and west estuaries. This conceptual design could identify any necessary expansion of the EAA Canals and treatment areas necessary to convey and treat Lake regulatory releases that are currently sent to the St. Lucie and Caloosahatchee Rivers and estuaries.

Figure 1. DRAFT – Estimates are preliminary and subject to revision.



TMDL loading is for C-44 Basin, and includes local stormwater and Lake discharges
Data source: South Florida Water Management District database : http://www.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu
Data are preliminary and subject to revision; flows and water quality assumed to continue at last reported values.

Figure 2. DRAFT – Estimates are preliminary and subject to revision.



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Data are preliminary and subject to revision; flows and water quality assumed to continue at last reported values.

Figure 3. DRAFT – Estimates are preliminary and subject to revision.