# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

August 15, 2019

Mr. Thomas Frick
Director, Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399

**Subject: Lake Okeechobee Construction Project Update**

Dear Mr. Frick:

It's an exciting time for restoration in the Lake Okeechobee Watershed. As you're aware, the Lake Okeechobee Watershed Construction Project (LOWCP) Phase II Technical Plan was submitted to the Florida Legislature in 2008. It identifies phosphorus source control measures and construction projects needed for the improvement of the quality, quantity, timing, and distribution of water in the northern Everglades ecosystem, including the Lake Okeechobee watershed and the northern estuaries. The Lake Okeechobee Watershed Construction Project (LOWCP) Phase II Technical Plan also supports facilitating the achievement of adopted Total Maximum Daily Loads (TMDLs), an important component for advancing Governor DeSantis' Executive Order 19-12 to do more for Florida's environment now.

Beginning March 1, 2020, and every five years after, the South Florida Water Management District (District) will update the Lake Okeechobee Watershed Protection Plan (LOWPP) to ensure consistency with the Lake Okeechobee Basin Management Action Plan (BMAP). As part of the update, the District will also identify modifications to the LOWCP and submit them to the Florida Department of Environmental Protection (FDEP).

Please review the attached information provided that describe our most recent analyses conducted by the District and identify modifications and recommendations to the LOWCP. The analyses identify the water quality and quantity issues in each of the subwatersheds and basins within the Lake Okeechobee Watershed to assist in prioritizing resources and projects to meet the goals of the Northern Everglades and Estuaries Protection Program (NEEPP), and more specifically to assist in achieving the Lake Okeechobee Watershed TMDL.

While many recommendations are provided in this latest Lake Okeechobee Watershed Construction Project update, I'd like to call special attention to the following recommendations. These recommendations emphasize both Governor DeSantis' priorities for water quality and our collaboration efforts with the District's stakeholders:

- New regional projects/programs to support total nitrogen (TN) and additional total phosphorus (TP) loads needed to achieve Lake Okeechobee TMDL (e.g., Program for Agricultural Stormwater Quality and Quantity Projects);

- Explore opportunities to pursue an update to the Statewide Environmental Resource Program Rule to increase the level of treatment required for TP and TN; and

- Update the Works of the District Rule (40E-61, F.A.C.) to facilitate water quality improvements.

The District is committed to continuing to collaborate closely with the Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services, our stakeholders, and the public to further the restoration of Lake Okeechobee and its watershed. We look forward to our continued engagement with you and your agency.

Please let me know if you have any questions.

Sincerely,

Drew Bartlett
Executive Director

Enclosure

# Attachment 1
# Lake Okeechobee Watershed
# Construction Project (LOWCP) Evaluation

## 1. Background

Passed in 2000, the Lake Okeechobee Protection Act (LOPA) [Section 373.9535, Florida Statutes (F.S.)], established a restoration and protection program for the lake. A year later, the Florida Department of Environmental Protection (FDEP) established a total maximum daily load (TMDL) of 140 metric tons per year (mt/yr) of total phosphorus (TP) to Lake Okeechobee. This TMDL is the amount of TP that the lake can assimilate without causing significant ecological impacts within the lake. Of that limit, 35 mt/yr are estimated to naturally reach the lake directly through atmospheric deposition; therefore, a TP loading of no more than 105 mt/yr should enter the lake from watershed contribution.

In 2007, the Florida Legislature amended the LOPA, which is now known as the Northern Everglades and Estuaries Protection Program (NEEPP), to expand restoration efforts to include the Caloosahatchee and St. Lucie rivers and estuaries. Later, in 2016, the Florida legislature amended the NEEPP to strengthen provisions for implementing basin management action plans (BMAPs) and to further clarify the roles and responsibilities, coordination, implementation, and reporting efforts among the three coordinating agencies: FDEP, the South Florida Water Management District (SFWMD or District), and the Florida Department of Agriculture and Consumer Services (FDACS). Overall, the NEEPP legislative intent is to protect and restore surface water resources and achieve and maintain compliance with water quality standards in these watersheds and downstream receiving waters, through a phased, comprehensive, and innovative protection program that includes long-term solutions based upon the total maximum daily loads (TMDLs) established in accordance with s. 403.067.

To meet the NEEPP legislative intent, the District, in cooperation with FDEP, and FDACS developed the Lake Okeechobee Watershed Protection Plan (LOWPP). The LOWPP contains an integrated management strategy that is based on implementation of phosphorus source control programs, including best management practices (BMPs) at parcel, sub-basin and regional levels, flow attenuation projects, and in-lake remediation activities.

The LOWPP includes the Lake Okeechobee Watershed Construction Project (LOWCP) and the Lake Okeechobee Watershed Research and Water Quality Monitoring Program (RWQMP). The purpose of the LOWCP is to provide an overall strategy for improving quality, quantity, timing and distribution of water in the Northern Everglades ecosystem to achieve the TP TMDL for Lake Okeechobee. The RWQMP shall be used by FDEP and the coordinating agencies to focus future efforts in monitoring and research where gaps are identified by this plan, and to focus on modifications to the Lake Okeechobee BMAP using lessons learned from areas where monitoring results demonstrate improvements within the watershed.

To date, the LOWCP has evolved through two phases. Phase I (outlined in the 2007 LOWPP Update) was intended to bring immediate TP load reductions to the lake with a small set of very specific projects. Phase II (aka Phase II Technical Plan) expanded upon the Phase I identifying regional construction projects and onsite measures, practices, and regulations intended to prevent or reduce pollution at the source, such as agricultural or urban BMPs, and Environmental Resource Permitting needed to achieve the TMDL target established for Lake Okeechobee. Phase II also includes projects for increasing storage north of the lake to attenuate and reduce flows headed to Lake Okeechobee thereby reducing harmful discharges to the Caloosahatchee and St. Lucie estuaries.

## 2. Methodology

### a. LOWCP Goals

Based on the 1991 to 2000 period of record, the 2007 LOWPP update identified numerous projects and strategies under the Phase I to reduce the TP loading from the watershed by 370 mt/yr[1]. During this period, the average TP loading to the lake was reported to be 433 mt/yr from the watershed. This does not include atmospheric deposition and exceeds the TMDL mandated watershed TP loading limit of 105 mt/yr by 328 mt.

When Phase II of the LOWCP was developed, the period of record was expanded (1991 – 2005) raising the annual TP load to 514 mt/yr, thereby requiring projects to meet that new demand. This does not include the atmospheric deposition of 35 mt/yr and exceeds the TP load reduction required to achieve the TMDL by 409 mt/yr. Thus, the preferred LOWCP Phase II plan is predicted to reduce TP loads to Lake Okeechobee by 409 mt/yr. In addition, the preferred plan identified in the Phase II Technical Plan provides the capability to reduce in-lake TP loads by approximately 75 mt per year.

As to water quantity benefits, the preferred plan is designed to meet the storage goal of 900,000 – 1,300,000 acre-feet. It is important to note that this goal is not in addition to existing or planned projects. It is an overall goal that may be met through a combination of existing or future projects and through a combination of storage methods such as alternative water storage on public and private lands, large above ground reservoirs or aquifer storage and recovery facilities.

Table 1 provides a summary of average annual discharges and TP loads by subwatershed for the period used for the development of Phase II of the LOWCP (1991-2005) and for the most recent five (5) years (2014-2018).

[1] The difference between the total TP reduction needed to meet the TMDL and the projected LOWPP load reduction is expected to provide a contingency in case some of the recommended projects are not implemented or do not perform at the levels intended.

**Table 1.** Average Annual Discharges and TP Loads by Subwateshed

| Subwatershed | Annual Discharge (ac-ft) | | Annual TP Load (mt) | |
|---|---|---|---|---|
| | 1991-2005 | 2014-2018 | 1991-2005 | 2014-2018 |
| Upper Kissimmee (S-65) | 954,204 | 941,163 | 91 | 91 |
| Lower Kissimmee [(S-65E) - (S-65)] | 378,836 | 508,539 | 77 | 126 |
| Lake Istokpoga (S-68) | 299,656 | 408,073 | 23 | 48 |
| Indian Prairie | 249,175 | 379,160 | 89 | 103 |
| Fisheating Creek | 224,368 | 331,641 | 55 | 72 |
| East Lake Okeechobee Basins | 109,134 | 69,361 | 20 | 17 |
| South Lake Okeechobee | 149,488 | 88,317 | 33 | 29 |
| West Lake Okeechobee (S-77) | 5,835 | 132 | 1 | 0 |
| Taylor Creek/Nubbin Slough | 187,583 | 196,034 | 124 | 114 |
| **Total** | **2,558,279** | **2,922,420** | **514** | **598** |
| **Long Term Over Target Load[1]** | | | **409** | **493** |

[1]Does not include the atmospheric load of 35 mt/yr

### b. Statistical Analysis and Evaluation Process

As required by NEEPP, the District in cooperation with the coordinating agencies has implemented a research and water quality monitoring program to (1) collect data to establish long-term water quality trends in the Lake Okeechobee Watershed, (2) develop a water quality model for the lake, (3) continue to identify and quantify phosphorus sources in the watershed, (4) assess water management practices within the watershed, (5) evaluate the feasibility of alternative nutrient removal technologies, and (6) assess the relationship between water volumes and timing from the Lake Okeechobee Watershed, water level changes in Lake Okeechobee, and the timing and volume of water delivered to the estuaries (LOWPP, 2011).

Water quality and quantity are monitored to calculate nutrient loads for each of the nine (9) Lake Okeechobee subwatersheds (Figure 1). These subwatersheds are comprised of smaller hydrologic basins for which the District may also monitor to calculate TP loads at the basin level.

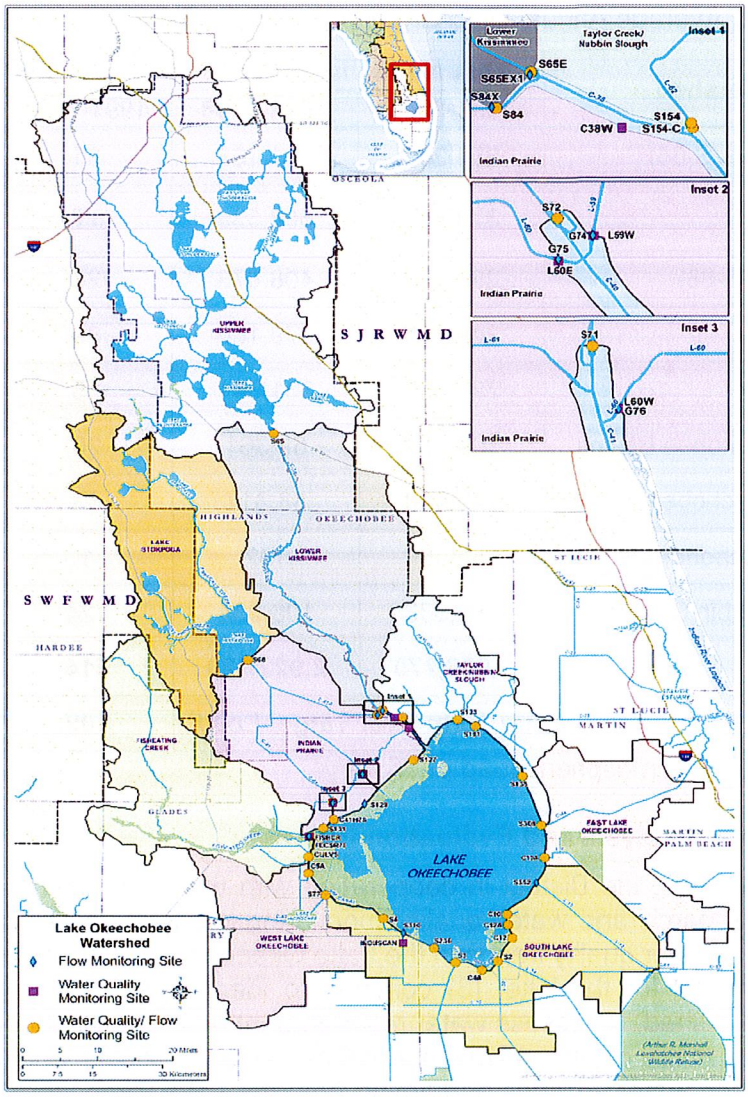


**Figure 1**. Lake Okeechobee Watershed

The SFWMD technical team evaluated the subwatersheds and basins with available monitoring data, network aligned with BMAP, to determine whether the nutrient load in discharges presented a water quality and/or flow issue (i.e. increases in runoff or large amount of runoff which contribute to increased loads), no issues, or if additional information was needed. The technical team consisted of about 20 members of District scientists and engineers knowledgeable in various areas of expertise such as Lake Okeechobee and its watershed, water quality monitoring, and data analysis.

Relative comparisons were made based on a period before restoration activities as described in the LOWPP were implemented and after those activities were initiated to date. Since the LOWPP was adopted in 2004, two periods were considered for the purpose of the evaluation. The pre-LOWPP period was water year (WY) 1991-WY2004

while the post-LOWPP period was WY2005-WY2018. Data were summarized for those two periods as well as the entire period of record (POR) which was defined as WY1991-WY2018 to discern potential long-term trends.

For each subwatershed and basin evaluated, the team considered the following:

i. Size, upstream inflows (in the case of Lower Kissimmee and Indian Prairie), monitoring structures, and any potential data gaps or changes in measurements;

ii. Percentages of flows and loads that the subwatersheds contributed to the lake or that the basins contributed to the subwatershed;

iii. Summary of statistics for each period evaluated including flows, loads, flow-weighted mean concentrations (FWMC), and unit area loads (UALs);

iv. Results of the Mann-Whitney non-parametric test. Non-parametric tests are the best types of statistical tests to use on data that are not normally distributed. The Mann-Whitney test results were used to compare flow, TP load, UALs and TP concentration data from the pre and post-LOWPP periods to determine if there was a statistically significant difference between periods. A significance level of ($\alpha$) of 0.05 was used to determine the statistical significance;

v. Results from the Seasonal Kendall Tau (SKT) test. The SKT test is also non-parametric test that factors out seasonality and is robust against outliers and large data gaps. It is used to detect statistically significant trends in data. The SKT test was used to see if there were trends for flow, TP loads, and TP concentrations for the POR, and pre- and post-LOWPP periods.

### c. Stakeholders' Input

To identify the proposed modifications to the LOWCP, the District conducted several activities that included:

- ✓ Coordination with the responsible entity (i.e., FDEP or FDACS) to obtain updates on each of the management measures (i.e., programs, projects, etc.) included in the LOWCP;
- ✓ A 2-day workshop with the Coordinating Agencies to determine if projects, also known as management measures (MM), are addressing (or not) the issues found during the water quality and quantity evaluation;
- ✓ Development of the LOWPP 2020 Update website. This website is dedicated to seeking feedback from the public on the LOWCP update and includes key information (e.g., water quality and quantity by subwatershed and basin, project status, performance, considerations, etc.) that will assist the stakeholders with their evaluation; and
- ✓ A public workshop to present the District's approach to evaluating the LOWCP. The meeting was held at SFWMD Okeechobee Service Center, on April 18, 2019, at 11:00 am. Public notices for the workshop were posted on the Florida Administrative Register (FAR) as well as the District's website, and also distributed to the Lake Okeechobee BMAP Stakeholder's group. During the meeting, the

District provided an overview of the NEEPP framework, discussed the interaction between the TMDL, BMAP, and LOWPP, and the goals, approach and path forward for the 2020 LOWPP update. It also discussed the mechanisms to provide feedback on the LOWCP evaluation via the LOWPP 2020 Update website.

The comments received from all interested parties can be found in Appendix 1.

## 3. Results

### a. Lake Okeechobee Conditions

Ecological assessment of in-Lake restoration projects is conducted primarily via a network of 17 water quality monthly monitoring stations (see Figure 2). Additionally, systematic grid sampling of submerged aquatic vegetation (SAV) provides estimates of plant coverage since WY2002 (Figure 3). These datasets, as well as concurrent lake stages, are summarized below for pre- and post-LOWPP periods.

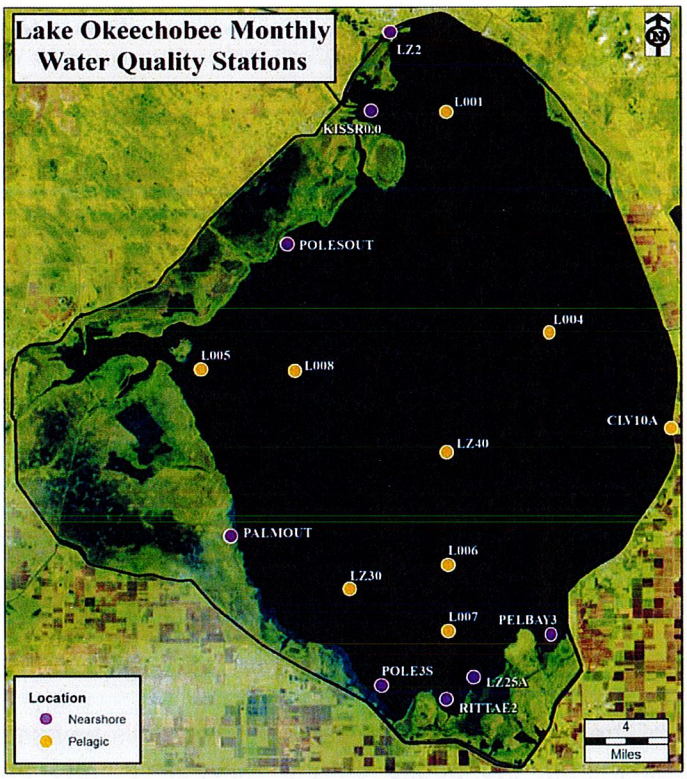


**Figure 2.** Lake Okeechobee Water Quality Stations Locations

Table 2 provides a summary of trend analyses and median comparisons for key water quality parameters driving lake ecology, including light penetration (turbidity, total suspended solids (TSS)), nutrients (TP, total nitrogen (TN), soluble reactive phosphorus (SRP) [$oPO_4$], dissolved inorganic nitrogen (DIN) [$NO_x$, $NH_3$], TN:TP ratios, DIN:SRP ratios), and phytoplankton or algal blooms (Chlorophyll *a* (Chla)). These parameters were grouped based on their proximity to shore (Nearshore vs Pelagic) due to known

distinctions in sediment and water quality between these regions (Phlips et al., 1993 and 1995).

**Table 2.** Lake Okeechobee Trend Analyses by Sampling Zone

| Parameter | Nearshore | | | | | | Pelagic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WY1991-WY2005 | WY2005-WY2018 | WY1991-WY2018 | Median | | | WY1991-WY2005 | WY2005-WY2018 | WY1991-WY2018 | Median | | |
| | Sen Slope | Sen Slope | Sen Slope | P1 | P2 | | Sen Slope | Sen Slope | Sen Slope | P1 | P2 | |
| TP (mg/L) | 0.002 ↑ | | 0.001 ↑ | 0.071 | 0.090 | ↑ | 0.004 ↑ | | 0.002 ↑ | 0.102 | 0.138 | ↑ |
| SRP (mg/L) | | | | 0.010 | 0.028 | ↑ | 0.001 ↑ | | 0.001 ↑ | 0.032 | 0.053 | ↑ |
| TN (mg/L) | | | | 1.40 | 1.33 | ↓ | | | | | | |
| DIN (mg/L) | 0.003 ↑ | | 0.005 ↑ | 0.026 | 0.208 | ↑ | 0.005 ↑ | | 0.004 ↑ | 0.131 | 0.274 | ↑ |
| NH3 (mg/L) | | | 0.000 ↑ | 0.005 | 0.012 | ↑ | | 0.000 ↑ | 0.000 ↑ | 0.005 | 0.010 | ↑ |
| NOx (mg/L) | | | | 0.011 | 0.042 | ↑ | 0.005 ↑ | | 0.003 ↑ | 0.118 | 0.216 | ↑ |
| TN:TP | -1.067 ↓ | | -0.475 ↓ | 19.0 | 13.9 | ↓ | -0.518 ↓ | | -0.275 ↓ | 13.8 | 10.3 | ↓ |
| Chla (mg/L) | | 0.875 ↑ | | 21.45 | 12.90 | ↓ | | | -0.335 ↓ | 16.60 | 9.90 | ↓ |
| TURB (mg/L) | | | | 8.2 | 11.7 | ↑ | 0.745 ↑ | | 0.500 ↑ | 21.7 | 33.5 | ↑ |

Notes:

1. Values denote statistically significant trends ($p<0.05$); arrows denote the direction of the trend (based on tau statistic (red), or comparison of medians (Wilcoxon/Kruskral-Wallis test, black)). No values denote that trends or comparisons were not statistically significant (p-values<0.05)
2. P1 – pre-LOWPP period
3. P2 – post-LOWPP period

SKT analyses were used to determine trends over time while Kruskal Wallis tests were used to compare medians between the periods. Several findings emerged from the analyses as described next:

- When comparing medians, water quality deteriorated in both the Nearshore and Pelagic regions in the post-LOWPP period for nearly every parameter, with the exception of Chla and TN. Chla was significantly lower in both regions while TN was significantly lower in the Nearshore region and did not significantly change in the Pelagic region. Much of this decline in water quality can likely be attributed to major hurricanes in water years (WYs) 2005-2006 and again in WY2018. These storms caused dramatic increases in runoff from the watershed as well as long-term disruptions and resuspension of sediment beds in the Pelagic region, leading to decreased water quality from both external and internal mechanisms. In fact, these large-scale perturbations of sediment and subsequent reduced water clarity (increased turbidity) were likely the cause of Chla reductions in P2, which would have been expected to increase along with nutrient levels, especially with increases in bioavailable forms (DIN, SRP).

  Prior research (Havens, 1994) found algal blooms were more limited by light in the Pelagic region than by nutrients, and the occurrence of multiple hurricanes since then has likely only strengthened this relationship. These results also help explain the occurrence of several widespread, intense algal blooms in Lake Okeechobee in the summers of 2013, 2016, and 2018. Increased turbidity levels may be suppressing algal growth through the windy winter and spring periods, which could intensify blooms during calm summer periods due to higher concentrations of

available nutrients. What is unclear is whether increases in bioavailable forms of nitrogen and phosphorus in the Pelagic region are due to suppressed phytoplankton uptake (light limitation) in portions of the year, increased runoff concentrations, or a combination of the two.

- *Decreasing trends in water quality over the POR.* Most parameters had worsening trends over the POR in the Pelagic region, likely a result of the higher medians from hurricanes in the post-LOWPP period. Light penetration declined over time (positive trends in TSS and turbidity) while nutrient levels increased (positive trends in $NO_x$, $NH_3$, SRP, TP, and decreasing trend in TN:TP ratio). $NH_3$ was also the only parameter that had a significant trend in the post-LOWPP in the Pelagic region, and it, too, was an increasing trend. Together, the results suggest worsening conditions in the Pelagic region, which should have resulted in higher Chla values, or more cyanobacterial blooms over time. However, Chla values had a statistically significant *decreasing* trend, likely due to increased turbidity, or decline in light limitation.

  While fewer parameters had significant trends in the Nearshore than the Pelagic regions, there were still increases in DIN, $NH_3$ (a component of DIW), and TP, and a decrease in the TN:TP ratio. While there were no trends in the Nearshore Chla over the POR, it was the only significant trend of all the Nearshore parameters in the post-LOWPP, suggesting that Chla may be recovering from reduced levels in WY2005-2006 after the hurricanes, concurrent with increasing nutrient levels. Prior research found that unlike the Pelagic region, algal blooms in the Nearshore region are primarily limited by nutrients, since turbidity and TSS are generally lower in this region. While the annual median values for Nearshore Chla were still lower in the post-LOWPP period than the pre-LOWPP period, there is evidence of more severe blooms in the post-LOWPP during the summer. There were several widespread algal blooms on the lake in the latter portion of the post-LOWPP period and high outlier values appear to be occurring more frequently at individual stations during the peak of the bloom season.

- *Lack of significant trends in the post-LOWPP period.* Overall, it was difficult to determine the presence or significance of trends in the post-LOWPP period due to major hurricane impacts in both the beginning and end of the dataset. Such events can have substantial impacts to water quality, both short-term (nutrient runoff) and long-term (internal sediment resuspension, loss of plant coverage). As a result, there were few statistically significant trends for parameters in the post-LOWPP period. The exceptions were Chla, which had a significant increasing trend in the Nearshore region during the post-LOWPP period, and NH3 which had a significant increasing trend in the Pelagic region. As mentioned above, however, the median Chla values were lower in the post-LOWPP period than in the pre-LOWPP period, and the increasing trend in Nearshore Chla may be a result of extremely light-limiting conditions at the beginning of the post-LOWPP period due to multiple hurricanes.

- *Declining SAV coverage.* The coverage of SAV over the POR changed dramatically along with dramatic variations in water level. Multiple hurricanes in WY2005-2006 nearly eliminated SAV for a time, while record low lake levels in WY2008-2009 might have allowed SAV to move farther down slope than it ever had historically. Overall, however, low lake stages were always followed by increases in SAV coverage, while high lake stages, particularly during the summer, were followed by decreases in coverage. The total acreage of vascular SAV, for example, declined fairly steadily from WY2013 to WY2018, concurrent with lake stages reaching or exceeding 16 ft every WY, and failing to reach lower portions of the ecological envelope during the summer growing season in several years (Figure 3). A lack of low lake stages in the summer reduces the ability of SAV to recover from even moderate high-water events, particularly when turbidity levels have increased in the lake during the post-LOWPP. In addition to reduced areal coverage of SAV in the last few years of the post-LOWPP period, the stature (height and biomass) of the plants also declined, meaning SAV communities were receiving less light and were less resilient than if they had been higher in the water column. As a result, the effects of Hurricane Irma on a less resilient SAV community were severe, leading to the lowest coverage since the last hurricane impacts in WY2005-2006 (Figure 4).

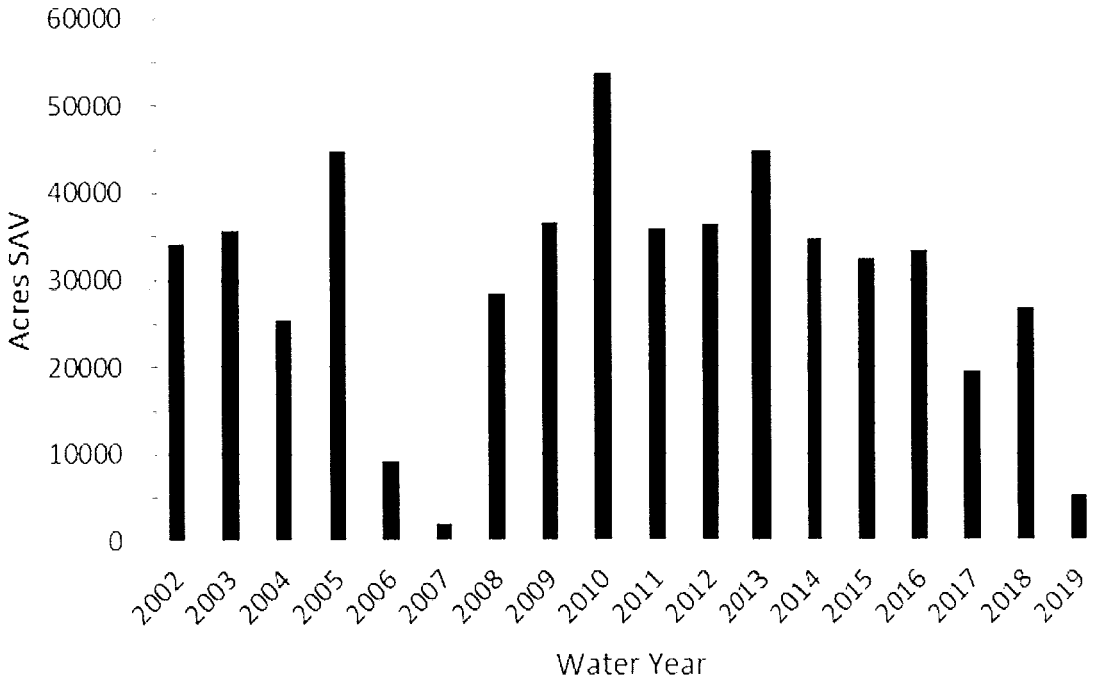


**Figure 3**. Estimated total SAV on Lake Okeechobee by Water Year

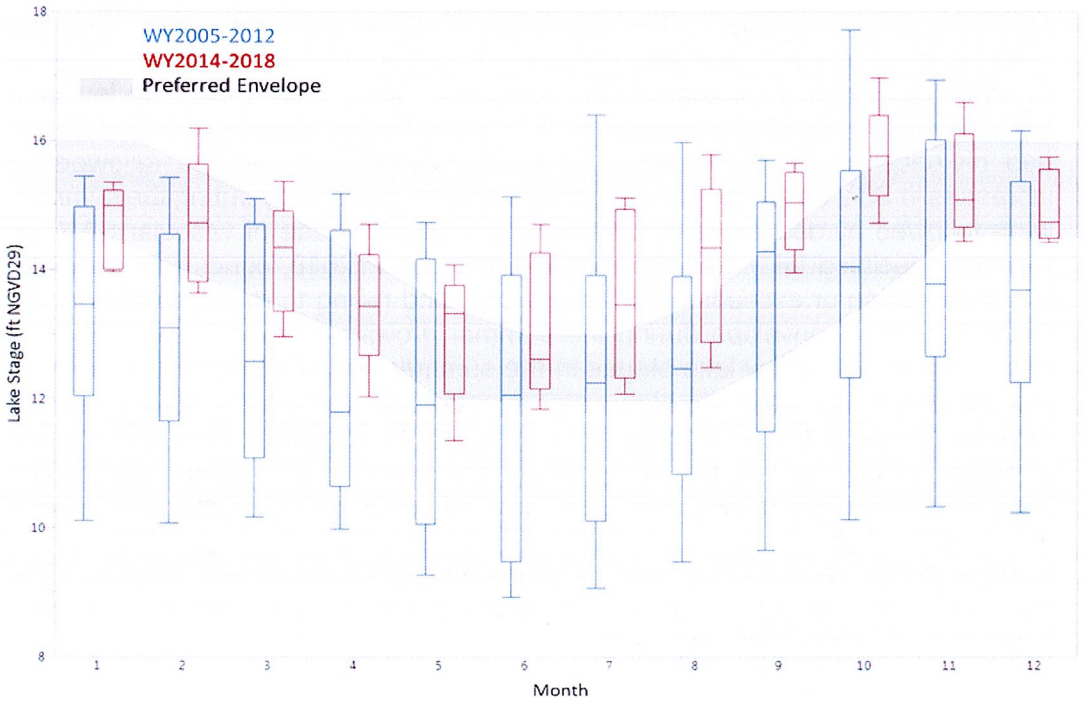


**Figure 4.** Recent 5-year Trends in Monthly Lake Stages vs Ecological Stage Envelope Used by RECOVER to Assess Potential Water Level Impacts

- *Moderate lake stages in the late post-LOWPP period but high summer values.* Lake stages varied dramatically in the early portions of the post-LOWPP period, leading to declines in water quality and collapses in SAV and fish communities by WY2009. However, lake stages were relatively stable and moderate in the latter portion of the post-LOWPP period, which should have led to increases in SAV and better water quality parameters. However, sediment resuspension in the Pelagic region appears to remain elevated compared to the pre-LOWPP period, leading to a myriad of effects; increased total and bioavailable forms of nutrients, suppression of phytoplankton and SAV growth due to light limitation, and increased frequency of intense summer algal blooms. As a result, elevated lake stages during the growing season (May through September) may have a larger impact on nearshore SAV and water quality than in the pre-LOWPP period.

### b. Water Quality & Quantity Analysis – Subwatersheds and Basins

Figure 5 shows the percent flow and TP load contributions for each of the subwatersheds. In addition, table 3 presents a summary of statistics (flow, loads, flow weighted mean concentration (FWMC), and unit area load (UAL)) for all subwatersheds. Additional information including detailed statistical analysis results is provided in Attachment 3.

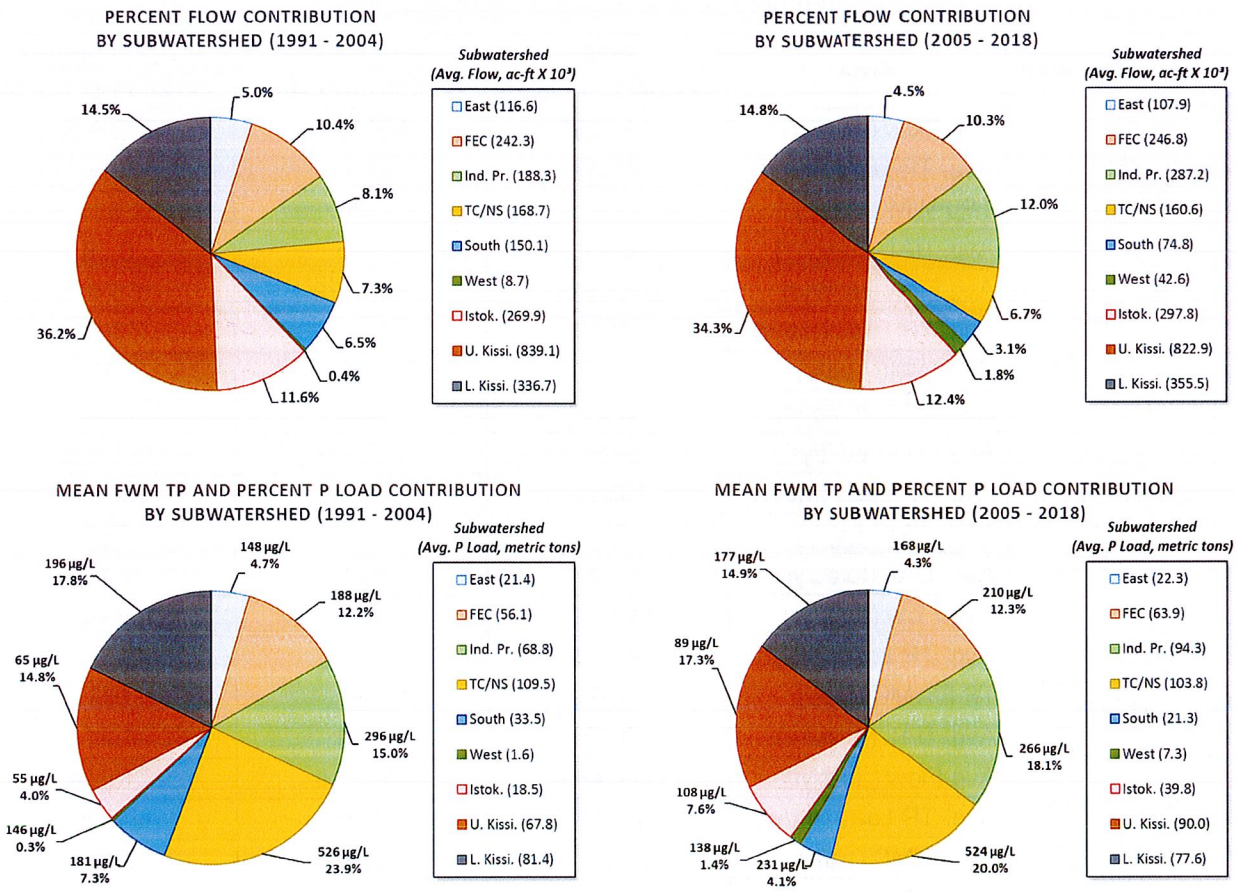


**Figure 5.** Percent Flows and TP Load Contributions per Subwatershed

**Table 3.** Summary of Statistics per Subwatershed

| Subwatershed | Area | POR WY1991-WY2018 | Pre-LOWPP WY1991-WY2004 | Post- LOWPP WY2005-WY2018 |
|---|---|---|---|---|
| Upper Kissimmee (UK) | Avg Flow (ac-ft/yr) | 831,000 | 839,081 | 822,919 |
| | Avg. TP Load (mt/yr) | 78.87 | 67.77 | 89.97 |
| | TP FWMC (µg/L) | 77 | 65 | 89 |
| | Avg. UAL (lb/ac/yr) | 0.17 | 0.15 | 0.19 |
| Lower Kissimmee (LK) | Avg Flow (ac-ft/yr) | 346,100 | 336,729 | 355,471 |
| | Avg. TP Load (mt/yr) | 79.49 | 81.38 | 77.59 |
| | TP FWMC (µg/L) | 186 | 196 | 177 |
| | Avg. UAL (lb/ac/yr) | 0.41 | 0.42 | 0.40 |
| Taylor Creek/Nubbin Slough (TC/NS) | Avg Flow (ac-ft/yr) | 164,668 | 168,717 | 160,618 |
| | Avg. TP Load (mt/yr) | 106.68 | 109.52 | 103.83 |
| | TP FWMC (µg/L) | 525 | 526 | 524 |
| | Avg. UAL (lb/ac/yr) | 1.19 | 1.22 | 1.16 |
| East Lake Okeechobee (ELO) | Avg Flow (ac-ft/yr) | 112,267 | 116,606 | 107,928 |
| | Avg. TP Load (mt/yr) | 21.80 | 21.36 | 22.30 |
| | TP FWMC (µg/L) | 157 | 148 | 168 |
| | Avg. UAL (lb/ac/yr) | 0.20 | 0.20 | 0.21 |
| South Lake Okeechobee (SLO) | Avg Flow (ac-ft/yr) | 112,496 | 150,148 | 74,844 |
| | Avg. TP Load (mt/yr) | 27.37 | 33.45 | 21.30 |
| | TP FWMC (µg/L) | 197 | 181 | 231 |
| | Avg. UAL (lb/ac/yr) | 0.17 | 0.20 | 0.13 |
| West Lake Okeechobee (WLO) | Avg Flow (ac-ft/yr) | 25,656 | 8,675 | 42,638 |
| | Avg. TP Load (mt/yr) | 4.42 | 1.56 | 7.28 |
| | TP FWMC (µg/L) | 140 | 146 | 138 |
| | Avg. UAL (lb/ac/yr) | 0.06 | 0.02 | 0.10 |
| Fisheating Creek (FEC) | Avg Flow (ac-ft/yr) | 244,535 | 242,289 | 246,781 |
| | Avg. TP Load (mt/yr) | 60.00 | 56.10 | 63.90 |
| | TP FWMC (µg/L) | 199 | 188 | 210 |
| | Avg. UAL (lb/ac/yr) | 0.42 | 0.39 | 0.44 |
| Indian Prairie (IP) | Avg Flow (ac-ft/yr) | 237,753 | 188,273 | 287,233 |
| | Avg. TP Load (mt/yr) | 81.54 | 68.81 | 94.28 |
| | TP FWMC (µg/L) | 278 | 296 | 266 |
| | Avg. UAL (lb/ac/yr) | 0.65 | 0.55 | 0.75 |
| Lake Istokpoga (LI) | Avg Flow (ac-ft/yr) | 283,811 | 269,852 | 297,771 |
| | Avg. TP Load (mt/yr) | 29.10 | 18.50 | 39.80 |
| | TP FWMC (µg/L) | 83 | 56 | 108 |
| | Avg. UAL (lb/ac/yr) | 0.16 | 0.10 | 0.22 |

The subwatersheds that were determined to have water quality issues were Taylor Creek/Nubbin Slough, Indian Prairie, Fisheating Creek, and Lake Istokpoga. It was determined that additional information was needed before a determination could be made regarding water quality in the Upper and Lower Kissimmee subwatersheds due to issues related to monitoring location and methodology used to calculate FWMC.

The Indian Prairie was the only subwatershed that was determined to have water quantity issues. However, the way flow is calculated throughout this subwatershed raises may questions and more information is needed to determine if flow measurements are reliable. It was also determined that additional investigations are needed for the Fisheating Creek and Lake Istokpoga subwatersheds. No water quantity issues were determined for the Taylor Creek/Nubbin Slough, Lower Kissimmee, and Upper Kissimmee subwatersheds as the flows remained consistent between the pre and post-LOWPP periods.

The East, South, and West Lake Okeechobee subwatersheds contributed only 4.3%, 4.1%, and 1.4% of the TP load to Lake Okeechobee, respectively, during the post-LOWPP period and were determined not to be an issue (water quality and/or quantity) at this time since other areas within the Lake Okeechobee watershed are greater contributors of phosphorus loads. It is important to note that for the East, South, and West subwatersheds, the flow and load evaluations were conducted only on the portion of flows that are being discharged into the lake.

Table 4 presents a summary of statistics (flow, loads, flow weighted mean concentration (FWMC), and unit area load (UAL)) for the evaluated basins. There were six basins that had water quality issues, six needed additional water quality information, one had water quality issues, ten needed additional water quality information, and five did not appear to have an immediate water quality or quantity issues.

The S-191, S-154, and S-154C basins in the Taylor Creek Nubbin Slough Subwatershed, the C-40 and C-41 basins in the Indian Prairie Subwatershed, and the Fisheating Creek Basin in the Fisheating Creek Subwatershed were all determined to have water quality issues due to the high TP FWMC observed. The C-41A Basin in the Indian Prairie Subwatershed was considered to have water quality issues since the TP FWMC remained the same but the TP load doubled between the pre and post-LOWPP period.

The six basins that need additional information before a determination could be made were the S-133 Basin in the Taylor Creek/Nubbin Slough Subwatershed and the L-59E, L-59W, L-60E, L-60W, and L-61E basins in the Indian Prairie Subwatershed.

The five basins with adequate data that do not appear to have immediate water quality or quantity issues are the S-135 Basin in the Taylor Creek/Nubbin Slough Subwatershed, the Nicodemus Slough Basin in the Fisheating Creek Subwatershed, and the L-48, L-49, and S-131 basins in the Indian Prairie Subwatershed.

**Table 4.** Summary of Statistics per Basin

| Basin | Area | POR WY1991-WY2018 | Pre-LOWPP WY1991-WY2004 | Post- LOWPP WY2005-WY2018 |
|---|---|---|---|---|
| S-191 (TC/NS) | Avg Flow (ac-ft/yr) | 94,416 | 99,147 | 89,685 |
| | Avg. TP Load (mt/yr) | 73.10 | 78.54 | 67.66 |
| | TP FWMC (µg/L) | 628 | 642 | 612 |
| | Avg. UAL (lb/ac/yr) | 1.34 | 1.44 | 1.24 |
| S-135 (TC/NS) | Avg Flow (ac-ft/yr) | 22,241 | 23,606 | 20,876 |
| | Avg. TP Load (mt/yr) | 3.44 | 2.90 | 3.98 |
| | TP FWMC (µg/L) | 125 | 100 | 154 |
| | Avg. UAL (lb/ac/yr) | 0.43 | 0.36 | 0.49 |
| S-133 (TC/NS) | Avg Flow (ac-ft/yr) | 21,223 | 22,477 | 19,969 |
| | Avg. TP Load (mt/yr) | 6.83 | 6.22 | 7.44 |
| | TP FWMC (µg/L) | 261 | 224 | 302 |
| | Avg. UAL (lb/ac/yr) | 0.66 | 0.58 | 0.75 |
| S-154(TC/NS) | Avg Flow (ac-ft/yr) | 2,677 | 1,115 | 3,569 |
| | Avg. TP Load (mt/yr) | 2.17 | 0.61 | 3.07 |
| | TP FWMC (µg/L) | 658 | 440 | 696 |
| | Avg. UAL (lb/ac/yr) | 2.47 | 0.83 | 3.17 |
| S-154 (TC/NS) | Avg Flow (ac-ft/yr) | 24,683 | 22,849 | 26,518 |
| | Avg. TP Load (mt/yr) | 21.60 | 21.52 | 21.68 |
| | TP FWMC (µg/L) | 710 | 764 | 663 |
| | Avg. UAL (lb/ac/yr) | 1.50 | 1.49 | 1.50 |
| Fisheating Creek (FEC) | Avg Flow (ac-ft/yr) | 242,870 | 241,464 | 244,276 |
| | Avg. TP Load (mt/yr) | 59.86 | 56.03 | 63.69 |
| | TP FWMC (µg/L) | 200 | 188 | 211 |
| | Avg. UAL (lb/ac/yr) | 0.44 | 0.41 | 0.47 |
| Nicodemus Slough North (FEC) | Avg Flow (ac-ft/yr) | 3,331 | 2,888 | 3,508 |
| | Avg. TP Load (mt/yr) | 0.3 | 0.19 | 0.35 |
| | TP FWMC (µg/L) | 73 | 52 | 80 |
| | Avg. UAL (lb/ac/yr) | 0.03 | 0.02 | 0.04 |
| C-40 (IP) | Avg Flow (ac-ft/yr) | 17,602 | 17,526 | 17,679 |
| | Avg. TP Load (mt/yr) | 10.71 | 10.67 | 10.74 |
| | TP FWMC (µg/L) | 493 | 494 | 493 |
| | Avg. UAL (lb/ac/yr) | 0.98 | 0.98 | 0.98 |
| C-41 (IP) | Avg Flow (ac-ft/yr) | 60,252 | 54,816 | 65,687 |
| | Avg. TP Load (mt/yr) | 35.51 | 34.33 | 36.69 |
| | TP FWMC (µg/L) | 478 | 508 | 453 |
| | Avg. UAL (lb/ac/yr) | 0.69 | 0.67 | 0.72 |
| C-41A | Avg Flow (ac-ft/yr) | 74,998 | 51,580 | 98,415 |

| Basin | Area | POR WY1991-WY2018 | Pre-LOWPP WY1991-WY2004 | Post- LOWPP WY2005-WY2018 |
|---|---|---|---|---|
| (IP) | Avg. TP Load (mt/yr) | 14.26 | 9.77 | 18.74 |
| | TP FWMC (µg/L) | 154 | 154 | 154 |
| | Avg. UAL (lb/ac/yr) | 0.54 | 0.37 | 0.72 |
| L-48 (IP) | Avg Flow (ac-ft/yr) | 16,172 | 17,516 | 14,828 |
| | Avg. TP Load (mt/yr) | 4.86 | 4.89 | 4.84 |
| | TP FWMC (µg/L) | 244 | 226 | 264 |
| | Avg. UAL (lb/ac/yr) | 0.58 | 0.60 | 0.55 |
| L-49 (IP) | Avg Flow (ac-ft/yr) | 11,811 | 12,562 | 11,060 |
| | Avg. TP Load (mt/yr) | 1.37 | 1.67 | 1.07 |
| | TP FWMC (µg/L) | 94 | 107 | 78 |
| | Avg. UAL (lb/ac/yr) | 0.25 | 0.33 | 0.2 |
| L-59E (IP) | Avg Flow (ac-ft/yr) | 22,986 | 35,489 | 16,734 |
| | Avg. TP Load (mt/yr) | 4.84 | 7.39 | 3.56 |
| | TP FWMC (µg/L) | 171 | 169 | 173 |
| | Avg. UAL (lb/ac/yr) | 0.89 | 1.29 | 0.67 |
| L-59W (IP) | Avg Flow (ac-ft/yr) | 21,156 | 13,328 | 23,951 |
| | Avg. TP Load (mt/yr) | 9.59 | 5.30 | 11.12 |
| | TP FWMC (µg/L) | 367 | 322 | 376 |
| | Avg. UAL (lb/ac/yr) | 3.20 | 1.77 | 3.72 |
| L-60E (IP) | Avg Flow (ac-ft/yr) | 5,822 | 2,003 | 7,459 |
| | Avg. TP Load (mt/yr) | 1.54 | 0.46 | 2.00 |
| | TP FWMC (µg/L) | 215 | 187 | 218 |
| | Avg. UAL (lb/ac/yr) | 0.69 | 0.20 | 0.89 |
| L-60W (IP) | Avg Flow (ac-ft/yr) | 2,075 | 377 | 2,924 |
| | Avg. TP Load (mt/yr) | 0.43 | 0.08 | 0.61 |
| | TP FWMC (µg/L) | 168 | 162 | 169 |
| | Avg. UAL (lb/ac/yr) | 0.28 | 0.05 | 0.39 |
| L-61E (IP) | Avg Flow (ac-ft/yr) | 20,403 | 5,510 | 25,819 |
| | Avg. TP Load (mt/yr) | 3.64 | 1.04 | 4.58 |
| | TP FWMC (µg/L) | 145 | 152 | 144 |
| | Avg. UAL (lb/ac/yr) | 0.56 | 0.16 | 0.70 |
| S-131 (IP) | Avg Flow (ac-ft/yr) | 8,678 | 9,147 | 8,209 |
| | Avg. TP Load (mt/yr) | 1.28 | 1.25 | 1.31 |
| | TP FWMC (µg/L) | 119 | 111 | 129 |
| | Avg. UAL (lb/ac/yr) | 0.43 | 0.45 | 0.40 |

Once the water quality and/or quantity issues were identified for each subwatershed and basin, the information was provided to the coordinating agency team so that the projects

within the LOWCP could be evaluated. That allowed the team to determine if the right type of projects were in the right locations or the type of additional projects needed for a subwatershed or basin.

## 4. References

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# Appendix 1 - Stakeholders' Comments

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 1 | Lake Okeechobee | 04/18/19 | N/A | N/A | - | | In Lake Strategies Low-stage, Muck Scraping and Tilling | Emergency Estuary Protection Wells offer the most immediate help for the coastal estuaries. These wells could be used to prevent harmful freshwater releases to the coastal estuaries while other storage projects are under construction. In extreme wet years, even after additional storage is complete, the wells could be a safety valve to prevent harmful releases to the estuaries as needed. The wells should not be considered an alterative to storage and treatment We need storage and treatment north of the lake, as well as east, west and south. But the wells could offer the fasted help for estuaries that are already at a critical stage. The estuaries can't wait the 12-15 years it will take to accomplish northern storage. The estuaries need help now. Emergency estuary protection wells are proven technology and offer the best chance for fast help for the estuaries. |
| 2 | Lake Okeechobee | 04/19/19 | N/A | N/A | - | | New Project | I humbly request the SFWMD prepare a Bill for the 2020 Florida Legislative Session that would require agricultural buffer zones. I am familiar with the Minnesota Buffer Law and it could be used as a model to minimize agricultural runoff into the Kissimmee River and into Lake O.<br>[ https://mn.gov/portal/buffer-law/ ]. |
| 3 | Lake Okeechobee | 04/19/19 | TCNS | N/A | - | | Alternative Water Storage and Disposal Interim (AWSDI) Projects Okeechobee (TIIFF) | I would like to suggest usage of the nubbin slough STA for water drainage from the Four Seasons subdivision from the North and the Berman Road subdivisions from the east. Sometime ago, the drainage support for Berman Road was proposed, but SFWMD had a problem with obtaining easements. It is the current belief, the Okeechobee County Board of County Commission could assist in this effort. These suggestions would certainly make use of a STA which has not be functional since its inception and could certainly resolve a flood problem Okeechobee County has in both of these areas. |
| 4 | Lake Okeechobee | 05/02/19 | N/A | N/A | - | | Lake Okeechobee Watershed Restoration Project | Audubon Florida supports projects and policies that save, preserve and clean freshwater and reject policies that throw away freshwater. We vigorously reject projects such as the Emergency Estuary Protection Well Project otherwise known as a Deep Injection Well (DIW). Deep Injection Wells are a water disposal technology that the District should not pursue. This is a waste of finite freshwater, a waste of taxpayer money, and bad water policy. The District should spend its limited resources advancing and accelerating Everglades restoration, restoring habitat as much as possible and making use of tools, such as dispersed water management projects, as part of a comprehensive water storage strategy. There is no need to invest in a technology, even on a test basis, that will leave us ill-prepared to meet future water demands. We urge the District to reject DIWs and keep the focus on ecosystem restoration and water storage projects that put water to good use. |
| 5 | Lake Okeechobee | 04/19/19 | N/A | N/A | | | In-Lake Strategies | We need a comprehensive review of what can be done to deal with the legacy nutrient loads in the sediments on the bottom of Lake O, both phosphorous and nitrogen.<br><br>https://lakeokeechobeenews.com/lake-okeechobee/muck-lake-bottom-complicates-phosphorus-loading-problem/ |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 6 | Lake Okeechobee | 04/22/19 | TCNS | S191 Basin | | | Nubbin Slough Stormwater Treatment Area (STA) | Nubbin Slough STA -<br><br>Work with Okeechobee County to bring additional stormwater in from subdivisions in the northeast portion of the County along Berman Road.<br><br>Work with Okeechobee County to bring in additional stormwater from the north along Center Street through the old Red Top Dairy. This would also relieve some flooding in the Four Seasons subdivision.<br><br>Consider adding a pump station along the L-63N canal to pump additional water into the STA during dry times. During extremely wet periods add ASR wells along the perimeter of the STA and utilize those wells to store excess stormwater from the STA as well as water from the L63N canal. This would reduce flows and nutrient loads to Lake Okeechobee at Structure S191. |
| 7 | Lake Okeechobee | 04/22/19 | N/A | N/A | | | Lake Okeechobee Watershed Restoration Project | Utilize state owned land along Taylor Creek. Do not purchase more land.<br><br>Construct a project on the available 4,000 acres of Taylor Creek... Grassy Island to develop a shallow STA or perhaps a dispersed water management project that would store excess stormwater in the Taylor Creek Watershed north of 441.<br><br>Utilize ASR to capture and treat excess stormwater in this area and along the L-63N Canal prior to discharging into Lake Okeechobee at S191. |
| 8 | | 04/26/19 | TCNS | S133 Basin | | | New Project | Treasure Island Septic to Sewer Project<br>The Okeechobee Utility Authority has completed a preliminary engineering study to provide a centralized wastewater collection system to serve up to 1,500 to 2,000 connections. It has been estimated that these connections will eliminate approximately 6.7 ton of nitrogen and 1.6 tons of phosphorus per year from the project area.<br><br>FGCU is finishing a water quality study sponsored by the OUA. The study sampled 13 sites over a twelve month period. The sites were split in to three groups: an area with a centralized wastewater collection system, Taylor Creek and the Treasure Island, area which is served by septic tanks. The preliminary results do show and elevated level of sucralose and soluble phosphorus and lowered levels of dissolved oxygen in the Treasure Island area. |
| 9 | Lake Okeechobee | 04/26/19 | TCNS | S133 Basin | | | New Project | The Okeechobee Utility Authority has a septic to sewer project in the early conceptual stages. This project, the Southwest Wastewater Service Area project, is being planned to serve upwards of 700-750 home sites. When constructed, this project will eliminate from the S-133 basin approximately 6.7 tons of nitrogen and 1.6 tons of phosphorus. In addition to nutrient removal, the project will also eliminate a potential public health risk originating from flooded septic tank drain fields.<br><br>The project area is centrally located near the intersection of SW 24th Avenue and SW 16th Street here in the Okeechobee area. Runoff from this project area is expected to flow in to Lemkin Creek. |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 10 | Lake Okeechobee | 04/26/19 | TCNS | S133 Basin | | | New Project | The Okeechobee Utility Authority "new project" submitted for Treasure Island Septic to Sewer project had the wrong values for nitrogen and phosphorus removal. The correct values for estimated removal should have been 21.9 tons per year for nitrogen and 5.3 tons per year for phosphorus. Theses values were calculated based upon 2,000 septic tanks systems and several small packaged treatment plants removed from service. |
| 11 | Lake Okeechobee | 04/26/19 | TCNS | S191 Basin | | | New Project | The Okeechobee Utility Authority (OUA) recently conducted a short term injection test of the deep well located at the Cemetery Road Wastewater Treatment facility (WWTF). The OUA WWTF flow requirements are 3 million gallons per day. The injection test indicated that the well capacity is in excess of 19 million gallons per day.<br><br>The WWTF site is located near Taylor Creek. The OUA could lease this excess capacity to the SFWMD whereby the SFWMD could discharge up to 15 MGD of water from Taylor Creek down the OUA injection well. |
| 12 | Lake Okeechobee | 04/26/19 | TCNS | S191 Basin | | | New Project | The Okeechobee Utility Authority at one time proposed to build an advanced wastewater treatment facility (WWTF) next to the Nubbin Slough STA. This new WWTF was proposed to provide wastewater treatment service for the removal of numerous septic tanks and package treatment plants in the area. The benefit to the Nubbin Slough STA is that it would receive the water from the plant to hydrate the STA year around. The effluent water quality from the WWTF would be better than the surface waters from Nubbin Slough.<br><br>This proposal was not acted on so it was not actively pursued.<br><br>In the big picture, septic tanks and small package treatment facilities are taken off line, a higher level of wastewater treatment is provided and the STA is hydrated. |
| 13 | Lake Okeechobee | 04/30/19 | N/A | N/A | | | New Project | Internal Lake Projects-Comment 1<br>The LOWPP acknowledges the phosphorus contribution from the in-lake sediments yet, concrete plans or projects directed to this issue are few. Addressing the internal flux or internal loading within the lake is critical to improving the water quality of the water column. Nutrients originating from the sediments create an internal loading of the same order of magnitude as loading from the external sources. (1) This internal loading varies over time, and by season. Researchers (2) have estimated flux rates ranging from 0.25 to 0.70 md/day/Sq.M. Our examination of the phosphorus material balance supports the findings of prior researchers and offers compelling evidence that the internal phosphorus flux is a major contributor to the water column TP concentration. |
| 14 | Lake Okeechobee | 04/30/19 | | | | | New Project | Comment 2 of 3<br>Previous research and independent analysis dictate that diligent efforts should be made to remove TP from the water column by removing neutrally buoyant particulates. These particulates are the ones that raise the overall TP the most, particularly following wind or storm events. Phosphorus Free will describe a progressive effort to address this aspect of overall TP reductions.<br>These projects are included in the comment section of the overall Lake Okeechobee Watershed, but they may ultimately be located in one or more subwatersheds or basins as further location analysis is conducted.<br><br>This discussion addresses internal loading within the lake by removal of water column suspended sediments and dissolved phosphorus. Based on estimates of TP flux from the sediments, the internal loading may contribute from 200 to 500 MT per year to the water column. |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 15 | Lake Okeechobee | 04/30/19 | | | | | New Project | Comment 3 of 4<br>This estimate is consistent with the generally accepted Ã¢Â€Âœinternal is approximately equal to external loadsÃ¢Â€Â rule of thumb. PFWS will begin demonstrating this removal method in August of 2019 for the SJRWMD. The treatment concept is to place multiple 50 CFS facilities located around the perimeter of the lake removing water and suspended sediment at approximately 1000 TSS. Projected reduction of internal Lake TP load is estimated to be approximately 130 MT per 50 CFS facility. The Lake Water Column concentration is projected to be reduced to approximately 0.075 mg/l in 5 years (with multiple projects, including NEEPP removal projects functional) or 50% of the current water column concentration. Total TP removed estimated at 130 MT TP per year per facility. It is envisioned that this would be a progressively implemented project with additional capacity or facilities added only after the initial TP removal facility demonstrated projected performance. |
| 16 | Lake Okeechobee | 04/30/19 | | | | | New Project | Comment 4 of 4<br><br>Total TP removed estimated at 130 MT TP per year per facility. It is envisioned that this would be a progressively implemented project with additional capacity or facilities added only after the initial TP removal facility demonstrated projected performance.<br>Pricing is estimated to be $150 or less per pound of removed P, depending on project logistics<br>References<br><br>(1) The Phosphorus Mass Balance of Lake Okeechobee, Florida: Implications for Eutrophication Management Karl E. Havens & R. Thomas James<br>(2) Phosphorus Flux between Sediment and Overlying Water in Lake Okeechobee, P.A. Moore, K.R. Reddy, and M.M. Fischer |
| 17 | Lake Okeechobee | 04/30/19 | TCNS | | | | New Project | See S191, S154 & 154C Comments<br><br>The TCNS Subwatershed represents the largest single contributor of phosphorus to Lake Okeechobee. S191 and S154 are FDEP designated priority Basins. Accordingly, and to make the largest and most meaningful impact on TP loads to Lake Okeechobee, these basins must be addressed.<br><br>PFWS proposes to locate two treatment facilities within the TCNS, specifically, one in the S191 Basin, and one in the S154/154C Basin. These projects are described more specifically in the comment section of each of those basins. The cumulative effect of these 2 facilities will be to remove approximately 92.41 MT of the 103.83 MT or 88.97% of the TCNS TP load to Lake Okeechobee representing approximately 31% of the TP excess load over the TP TMDL of 105MT. |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 18 | | 04/30/19 | TCNS | S191 Basin | | | New Project | The S191 Basin within the TCNS Subwatershed represents the single largest monitored TP load into Lake Okeechobee at 67.66MT. As such, this location represents the highest priority and greatest impact among potential TP removal locations. The average flow at this location is 118 CFS and PFWS proposes this location to be the initial TP removal location sized at 120 CFS and described more fully as follows:<br>Proposed Location Ã¢Â€" S191 Basin, Inbound water treatment located at the confluence of the L-63N and L-63S canals or along the C-59 Canal Ã¢Â€" Average Flow - 118CFS, 67.66 MT Removal.<br>Pricing structure is proposed as a Payment for Environmental Services, or Pay for Performance basis. PFWS will provide all construction and operating capital and assume 100% of the performance risk. Payment for removed TP will be based on a contractually agree price per pound and will be similar to that discussed in the 2019 Demonstration Report. |
| 19 | | 04/30/19 | TCNS | S154C Basin | | | New Project | Comment 1 of 2<br><br>The S154/154C Basin within the TCNS Subwatershed represents an additional large monitored TP load into Lake Okeechobee at 24.75MT. Accordingly, this location represents a high priority, high impact, among potential TP removal locations. The average flow at this location is 41 CFS and PFWS proposes this location as a single treatment site with the capability to treat water from both canals and to be the second (in addition to S191) TP removal location sized at 50 CFS and described more fully as follows:<br>Proposed Location Ã¢Â€" S154/154C Basin, Inbound water treatment located at the confluence of the L62 and smaller S154C Canal Ã¢Â€" Average Flow - 41CFS, 24.75 MT Removal.<br>Pricing structure is proposed as a Payment for Environmental Services, or Pay for Performance contractual basis. PFWS will provide all construction and operating capital. |
| 20 | | 04/30/19 | TCNS | S154C Basin | | | New Project | Comment 2 of 2<br><br>Proposed Location Ã¢Â€" S154/154C Basin, Inbound water treatment located at the confluence of the L62 and smaller S154C Canal Ã¢Â€" Average Flow - 41CFS, 24.75 MT Removal.<br>Pricing structure is proposed as a Payment for Environmental Services, or Pay for Performance contractual basis. PFWS will provide all construction and operating capital. Payment for removed TP will be based on a contractually agree price per pound and will be similar to that discussed in the 2019 Demonstration Report.<br><br>Single treatment Site located at the confluence of the S154 & S154C locations |
| 21 | | 04/30/19 | TCNS | S154C Basin | | | New Project | Comment ties for project described in the S154 Comments 1 of 2 and 2 of 2 - Co-located facility for both sub basins<br><br>Proposed Location Ã¢Â€" S154/154C Basin, Inbound water treatment located at the confluence of the L62 and smaller S154C Canal Ã¢Â€" Average Flow - 41CFS, 24.75 MT Removal.<br>Pricing structure is proposed as a Payment for Environmental Services, or Pay for Performance contractual basis. PFWS will provide all construction and operating capital. Payment for removed TP will be based on a contractually agree price per pound and will be similar to that discussed in the 2019 Demonstration Report.<br><br>Single treatment Site located at the confluence of the S154 & S154C locations |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 22 | | 04/30/19 | IP | C41 Basin | | | New Project | Phosphorus Free Water Solutions;<br><br>Proposed location: Istokpoga Canal downstream of s68 where Canal C41a and canal C41 split<br>Basins C40, C41, account for 17,700 AF (24 CFS) and 65,700AF (91 CFS) AF/yr respectively and 10.74 and 36, MT TP annually, respectively.<br><br>In total, this represents an opportunity to remove approximately 47MT TP annually at location treating flows from both the C40 and C41 Sub Basins. Proposed location would have a treatment capacity of about 120 CFS. |
| 23 | Lake Okeechobee | 05/08/19 | TC/NS | | One Florida Foundation - Nayla Pipes | | | Taylor Isles is in the TC/NS right adjacement to the Lake. We have a very serious septic tank problem. They do not have the funding to go ahead and get connected. They have room at the Okeechobee Utility Authority to go ahead and do that but they don't have the funding. So right there there is a project that will more than you realized. That's an immediate need that we could be doing. We can rally around and get funding. |
| 24 | Lake Okeechobee | 05/08/19 | Upper Kissimmee | | One Florida Foundation - Nayla Pipes | | | It all starts with Shingle Creek. Osceola County is the second fastest growing county in the state and it is the 10th fastest in the nation. So while we talk about agriculture, we have to keep in mind that constant amount of people moving into the wtershed every day and the fact that we do not have the infrastructure in place. Osceola County also has a huge septic tank problem on all of these upper chain of lakes along the water bodies.<br><br>Additionally, they have an entire waste water treatment plant that went under and stayed under during Irma because it was built in the flood plain in the 50s. So they have septic and sewage issues up there that are very real concerns as they are growing at a very fast speed. Let's not discount those things as we move forward. |
| 25 | Lake Okeechobee | 05/08/19 | TC/NS | | Bill Louda - FAU Environmental Science Program | | | I took some water samples up by the Nubbin Slough STA. 16 µg/L of Total Chlorophyll a down in Nubbin Slough in the road. It went down to 13 µg/L in Taylor Creek in the road and went up again to 63 µg/L. Something happened between the S-192 by the STA coming down through basically the town. Somebody mentioned a septic tank issue there. |
| 26 | Lake Okeechobee | 05/08/19 | TC/NS | | Mike Collins | | | The human population in that area is packed and worth to look at. They are all over the place and they all are on septic tanks. So the acre per acre usage of land is massively intense. Is that the whole question there? No but it's a piece. |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 27 | Lake Okeechobee | 05/09/19 | TC/NS | | Florida Farm Bureau - Gary Ritter | | | There are 5 distinct basins that are not hydrologically connected and have 4 independent outlows for monitoring points. As a follow-up, I would be interested to know how staff calculated the data and very insterested to know how they came up with a 10% increase in agriculture land in that basin.<br><br>There are options in this subwatershed to slow the flow and reduce the loads in addition to agriculture BMPs. The District has roughly 1,800 to 2,000 acres of completed regional facilities and other land holdings to provide you with additional project options.<br><br>The now 1,000+ acre Lakeside Ranch STA is almost complete and a basin to basin pump station to support this project is in construction as we talk. Next to this is the Brady Ranch, a roughly 1,200 acre area that could also be used for storage and treatment. Nubbin Sloug is 800 acres but comes with some design issues, one of which, is getting more water to it. There could be local partnership options with this facility which has currently remain idle for 18 years. There is also been a study that looked at grouping a series of ASR wells up with this project feature.<br><br>The District owns almost 4,000 acres of land leased in the Taylor Creek area that could be designed as a dispersed water management project. You also have 2 ASR facilities that could be put into operation.<br><br>Lastly, if you want to make a real move, the District could partner with the Okeechobee Utility Authority. Their deep injection well could keep excess stormwater and associated nutrients from gettin into Lake Okeechobee. Lease the well from them under estipulation that they use the money and convert septic to sewer in the Taylor Creek Treasure Island area.<br><br>Otherwise, my gut tells me, given the physical and water quality influences of the flood control system in that area, attempting to do yet another ratched down on ag. operation for nutrient reduction in this subbasin would likey squeeze the ag ball. The District is a major landowner in this area. Therefore, also needs to be a partner in the process by getting all of these facilities online. |
| 28 | | 02/12/19 | LK | | Coordinating Agencies | 43 | DWM NEPES Alternative Water Supply | 1. Endorse existing projects and recommend additional projects<br>2. Identify target first. Take Lake O. targets (i.e., V, TP, FWMC) and break down into subwatershed targets<br>3. Consider economic aspect to various projects regarding lifespan of project, benefits, capital/O&M costs and effectiveness (annualized $ per mt P and ac-ft volume).<br>4. Incorporate lessons learned regarding permitability and risks of project cancelation from landowner<br>5. Need basic information (e.g., status, measured data) about the projects being evaluated<br>6. Upstream monitoring - Consider locating some projects on high TP areas. Looks at performance trends, and not just the snap shot when assessing projects<br>7. If the project is cost-shared - additional information (e.g., performance metrics) needs to be required as part of project implementation<br>8. We see no statistical change in flows or water quality with these projects constructed. Maybe is an issue of scale, that these projects are performing as expected, but their scale is not large enough to see at the basin scale. Not enough information to make this determination |

| No. | Watershed | Date | Subwatershed | Basin | Entity | Management Measure | Project | Comments |
|---|---|---|---|---|---|---|---|---|
| 29 | | 02/12/19 | LK | | Coordinating Agencies | 45 | Alternative Water Storage and Disposal Interim (AWSDI) - Putnam Groves Property | 1. Endorse existing projects and recommend additional projects<br>2. Identify target first. Take Lake O. targets (i.e., V, TP, FWMC) and break down into subwatershed targets<br>3. Consider economic aspect to various projects regarding lifespan of project, benefits, capital/O&M costs and effectiveness (annualized $ per mt P and ac-ft volume).<br>4. Incorporate lessons learned regarding permitability and risks of project cancelation from landowner<br>5. Need basic information (e.g., status, measured data) about the projects being evaluated<br>6. Upstream monitoring - Consider locating some projects on high TP areas. Looks at performance trends, and not just the snap shot when assessing projects<br>7. If the project is cost-shared - additional information (e.g., performance metrics) needs to be required as part of project implementation<br>8. We see no statistical change in flows or water quality with these projects constructed. Maybe is an issue of scale, that these projects are performing as expected, but their scale is not large enough to see at the basin scale. Not enough information to make this determination |
| 30 | | 02/12/19 | LK | | Coordinating Agencies | 9 | Watershed P Source Control Projects | 1. Re-evaluate performance of existing P source control grant program projects before deciding to keep or add such projects<br>2. Find other active dairy sites that can implement "Best Available Technologies" and former dairy sites to perform "Former Dairy Remediation"<br>3. Need to know the capital, O&M, and re-capitalization rates of dairy BATs to get buy-in<br>4. Wetland restoration projects: Re-evaluate performance of existing projects before deciding to keep or add such projects |
| 31 | | 02/12/19 | UK | | Coordinating Agencies | - | General | Anything done along the Kissimmee River needs to be a flow-through systsem |
| 32 | | 02/12/19 | UK | | Coordinating Agencies | 48 | Kissimmee River Restoration (KRR) – Gardner-Cobb Marsh | Keep. We haven't had it operable to assess its performance |
| 33 | | 02/12/19 | UK | | Coordinating Agencies | 78 | Rolling Meadows | 1. Too early to know its performance<br>2. Update annual costs<br>3. Document benefits realized |
| 34 | | 02/12/19 | UK | | Coordinating Agencies | 47 | Three Lakes Wildlife Management Area | Do not move forward with this project. Description was vague, team wasn't sure even who owned this property |
| 35 | | 02/12/19 | ELO | | Coordinating Agencies | 59 | Dispersed Water Management Potential Site - Dupuis Reserve | This is low priority project. Reanalyze the old or new project. Under the capital improvements program, structures G261, G262, & G263 are already being replaced. Another option is to come up with a new, third, option, starting from scratch. |
| 36 | | 02/12/19 | ELO | | Coordinating Agencies | 54 | C-44 Reservoir/STA | Complete construction and evaluate after 5 years |
| 37 | | 02/12/19 | In-Lake | | Coordinating Agencies | 83 | In-Lake Strategies - Sediment Dredging | 1. Most costly option<br>2. Need to test materials for contaminants<br>3. Sump idea sounds promising but need to find where to place material. Possible pump from sump into the Boulder Zone<br>4. Create sediment trap fingers along the NE quadrant of the Lake to utilize the winter winds that blow clockwise Taylor Creek to Port Mayaca |

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| 38 | | 02/12/19 | In-Lake | | Coordinating Agencies | 35 | In-Lake Strategies - Lake Muck Scraping and Tiling | 1. Scraping: if contaminants are present, scrapings should stay within the levee and not go outside<br>2. Scraping material was previously used to make wildlife island system, but need to make sure resulting islands are sufficiently capped to avoid rerelease of muck organics<br>3. Flipping is the act of inverting/burying muck under sand to the fullest possible extent, which is preferred over disking/tilling which results in mixing which is also effective. However, materials limit the extent of flipping that can occur. If materials break apart, mixing results are obtained<br>4. When flipping/tilling, we recommend allowing the resulting uneven microtopography to remain for best vegetation recruitment. Previous experience demonstrates smoothing out the surface leads to undesirable vegetation. The smooth, raked areas had torpedo grass and exotics, eventually leading to cattail domination within 3 years. After flipping/tilling, allow Lake water to gradually (to the extent possible) increase for best vegetation response, and to allow terrestrial plants to stabilize the soil. Consider hay bales or an inexpensive way to protect plantings<br>5. Note: attempt was to invert/flip but the material didn't allow for that, but in reality a mixing/tilling was accomplished. This was done to about 36" depth, but Bob Taylor said machinery can now go to 48" depths. This may allow for tilling once to a shallower depth, then tilling deeper a second time many years later<br>6. Advantages: no extensive material handling/moving<br>7. Lake stage operations affects collection of muck and access and dry down muck for removal<br>8. LORS brought levels lower, allowed muck to oxidize and more easily be scraped/tilled (around elevation 9)<br>9. Need evaluations on where sites have accumulated and focus on those areas with most accumulation and accessibility<br>10. Scraping in the past (about 2009) was effective, and 2011 reassessment determined that additional scraping was not needed. Now, 8 years later, we should reassess if scraping is needed again<br>11. Look at technologies (i.e. ozone reduction of muck) done at smaller scales, and see if it's feasible at a larger scale<br>Low lake level condition and an anticipated duration of Lake level of at least 3 months is needed to get equipment mobilized and working |
| 39 | | 02/12/19 | FEC | | Coordinating Agencies | - | General | 1. Revisit Fisheating Creek Feasibility Study<br>2. Revisit LOWRP ASR findings<br>3. Projects reducing public access to the creek are problematic |
| 40 | | 02/12/19 | FEC | | Coordinating Agencies | 43 | DWM NEPES - XL Ranch La Hamaca | Maintain |
| 41 | | 02/12/19 | FEC | | Coordinating Agencies | 57 | Dispersed Water Management Potential Site - Fisheating Creek Marsh Watershed Project | No longer a viable option |
| 42 | | 02/12/19 | FEC | | Coordinating Agencies | - | New | 1. Add existing FDACS FAV treatment project (east of SR 78) - 265 acres/100 cfs<br>2. DOT Hwy 27 runoff treatment facility - look to see if this is working (water quality needed). May be ways to modify and store more water (FDEP)<br>3. Reduce flashiness/expand natural wetlands |
| 43 | | 02/12/19 | FEC | Nicodemus Slough North | Coordinating Agencies | 41 | Dispersed Water Management Lykes Nicodemus Slough | No issues |
| 44 | | 02/12/19 | IP | | Coordinating Agencies | 75 | Istokpoga/Kissimmee Reservoir and Stormwater Treatment Area (RSTA) | Keep it. |

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| 45 | | 02/12/19 | IP | | Coordinating Agencies | 44 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Pearce/Hartman Property | May overlap with MM 75. Under lease that can be terminated |
| 46 | | 02/12/19 | IP | C-41 | Coordinating Agencies | 42 | Dispersed Water Management Istokpoga Marsh Watershed Improvement District (IMWID) | Keep it and complete Phase 2. Nee to look to leverage water quality sites or shift sites to quantify performance |
| 47 | | 02/12/19 | IP | | Coordinating Agencies | 60 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Buckhead Ridge Property (TIIFF) | Very small but could be paired with a hybrid technology or other project that would accentuate a bigger project. Needs to be strategic. Investigate what the TIITF lands are currently being used for |
| 48 | | | IP | | Coordinating Agencies | 63 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Harney Pond (TIIFF) | Very small but could be paired with a hybrid technology or other project that would accentuate a bigger project. Needs to be strategic. Investigate what the TIITF lands are currently being used for |
| 49 | | | IP | | Coordinating Agencies | 64 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Harney Pond (TIIFF) | Very small but could be paired with a hybrid technology or other project that would accentuate a bigger project. Needs to be strategic. Investigate what the TIITF lands are currently being used for |
| 50 | | 02/12/19 | IP | C-41A | Coordinating Agencies | - | New Projects | Identify water quality and attenuation of flow projects |
| 51 | | 02/12/19 | IP | C-41 | Coordinating Agencies | 43 | DWM NE PES - Buck Island Ranch Projects | Maintain |
| 52 | | 02/12/19 | IP | C-40 | Coordinating Agencies | 25 | Florida Ranchland Environmental Service Project (FRESP) - Lykes Bros. West Waterhole Pilot | 1. Contract expires 2020. Recommend continue funding<br>2. FDACS contracted for additional study of water quality and hydrology of this project |
| 53 | | 02/12/19 | IP | C-40 | Coordinating Agencies | New | Brighton Valley NE PPP | Will have flow and water quality monitoring. |
| 54 | | 02/12/19 | LI | | Coordinating Agencies | 13 | Dispersed Water Management – Avon Park Air Force Range | Grant money awarded but no monitoring. Need to have some accountability. Suggest some reporting by landowner. Inspections recommended. |
| 55 | | 02/12/19 | LI | | Coordinating Agencies | 68 | S-68 Stormwater Treatment Area (STA) | Look into options to add to this project, explore items such as vegetation and consistent source of water |
| 56 | | 02/12/19 | All | | Coordinating Agencies | - | General | Required monitoring and performance information . Revisit projects that have no accountability |
| 57 | | 02/12/19 | TC/NS | S-191 | Coordinating Agencies | 11 | Taylor Creek Stormwater Treatment Area (STA) | 1. Continue existing project<br>2. Seek ways to improve TP performance which needs optimization (e.g., consider current operational measures and identify possible needs for future operational measures)<br>3. Investigate to determine how to increase flows to STA - specifically, look at both site-specific issues/considerations as well as successes/lessons learned from other regional STAs to help inform enhancements for this STA<br>4. Review this STA project in terms of a more holistic approach on planned improvements for the complete subwatershed |

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| 58 | | 02/12/19 | TC/NS | S-191 | Coordinating Agencies | 66 | Brady Ranch Stormwater Treatment Area (STA) | 1. The interim storage project alone may not be fully aligned with the projected needs of the basins<br>2. Following completion of LR STA Phase II (S-191 pump station), plan the Brady Ranch STA project as the "next succesive phase of the LR STA". This direction will help allow for a more holistic approach for regional projects.<br>3. For the planned BR STA, key considerations need to include sources of water from both, basin and Lake O to better define certainty of water availability<br>4. The passive BR DWM project has value in the interim until the complete BR STA project is implemented |
| 59 | | 02/12/19 | TC/NS | S-191 & S-135 | Coordinating Agencies | 51 & 55 | Lakeside Ranch Stormwater Treatment Area (STA) Phase I & II | 1. Operational adjustments will need to be reviewed for optimization once Phase 2 is completed<br>2. See Brady Ranch STA (MM 66) for additional recommendations |
| 60 | | 02/12/19 | TC/NS | S-191 | Coordinating Agencies | 12 | Nubbins Slough Stormwater Treatment Area (STA) | 1. Agree with considerations presented in project fact sheet<br>2. Once the Lakeside Ranch STA Phase 2 (pump station) is completed, then water supply augmentation should be evaluated for the Nubbin Slough STA<br>3. Pumping water back to NS has been previously explored (need to obtain documentation)<br>4. Consider moving the Taylor Creek STA smaller pump to the Nubbin Slough STA to help provide better flow conditions |
| 61 | | 02/12/19 | TC/NS | S-191 | Coordinating Agencies | | Mosquito Creek HWTT | 1. Need to determine flows out of this area<br>2. Investigate if nearby areas which flow into L-63N can also take runoff and be directed to the Nubbin Slough STA or the Lakeside Ranch STA<br>3. If expansion is of interest, note that this is privately-owned land (FDACS/landowner agreement in place) |
| 62 | | 02/12/19 | TC/NS | S-191 | Coordinating Agencies | - | General | 1. As part of next steps, review upstream sites that have previously shown relatively high TP concentrations; also, consider prioritization based on statistical analysis/trends<br>2. Review prior high TP concentrations near field station for possible future project(s) to be considered |
| 63 | | 02/12/19 | TC/NS | S-154 | Coordinating Agencies | 9 | Watershed P Source Control Projects | Need to confirm status of each of the projects listed in fact sheet |
| 64 | | 02/12/19 | TC/NS | S-154 | Coordinating Agencies | - | General | 1. Team supports the current ASR well technology which may have ancillary water quality benefits. However, water quality concerns still need to be addressed in this basin<br>2. Review of projects should be done in terms of a more holistic approach for the complete basin |
| 65 | | 02/12/19 | TC/NS | S-154C | Coordinating Agencies | - | General | Review of projects should be done in terms of a more holistic approach for the complete basin |
| 66 | | 02/12/19 | TC/NS | S-133 | Coordinating Agencies | 56 | Lemkin Creek Stormwater Improvement Project | Project has not started yet<br>1. Review the existing status of Lemkin Creek property to further evaluate the proposed alternatives of a shallow impoundment (Alt. 1 & 2) and a shallow wetland treatment system (Alt. 3)<br>2. This project needs to be further investigated in relation to the adjacent active Wolf Ditch HWTT<br>3. Local ASR well may also need to be considered as part of the project<br>4. Localize flow is flashy so water budgeting in this area needs to be further considered as part of project planning |
| 67 | | 02/12/19 | TC/NS | S-133 | Coordinating Agencies | 58 | Dispersed Water Management Potential Site - Okeechobee County East/West Stormwater Conveyance Project | Project has not started yet<br>1. Given its anticipated limited value, this project is not considered to be a priority at this time<br>2. Water budget evaluation should be completed for this basin to affirm future direction of this project<br>3. Interagency coordination, including the City of Okeechobee and Okeechobee County should be done as part of future planning efforts |
| 68 | | 02/12/19 | In-Lake | | Coordinating Agencies | 35 | In-Lake Strategies - Lake Muck Scraping and Tiling | 1. The SFWMD Low Water Level Habitat Enhancement Plan drafted for the lake in November 2015 may inform this initiative. The draft plan was submitted to FDEP in March 2016. Suggest expanding this MM to be consistent with the proposed projects/structure (e.g., scraping/tilling, exotic/vegetation treatment, prescribed burning, etc. ) outlined in the plan<br>2. Review completed work efforts and any associated data/reporting for low-level lake improvements (e.g., work completed during 2008-2009 drought conditions)<br>3. Review treatment technologies implemented to date/lessons learned to help inform future low-level lake management efforts |

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| 69 | | 02/12/19 | In-Lake | | Coordinating Agencies | 83 | In-Lake Strategies - Sediment Dredging | Sediment dredging: Consider opportunities to address deeper "hot spot" areas for feasibility of implementing possible future technologies as they become available<br>Other In-Lake Strategies: Consider opportunities for the feasibility of implementing possible future technologies ("tool box" items) as they become available. Feasibility also will need to consider Endangered Species Act (ESA) issues/permitting, cost-effectiveness and other key considerations |

Audubon | FLORIDA

4500 Biscayne Blvd., Suite 350
Miami, FL 33137
305-371-6399
fl.audubon.org

May 6, 2019

Ansley Marr, P.E.
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

Via E-Mail: amarr@sfwmd.gov

Subject: Lake Okeechobee Watershed Construction Project/Basin Management Action Plan

Dear Ms. Marr:

Audubon Florida submits the following comments to the South Florida Water Management District (the "District") in connection with its 5 year review and update to the Lake Okeechobee Watershed Protection Plan ("LOWPP") and, specifically, the Lake Okeechobee Watershed Construction Project ("LOWCP"). The 5 year LOWPP review is being conducted pursuant to Florida law to ensure that it is consistent with the Lake Okeechobee Basin Management Action Plan ("BMAP"). We look forward to participating in upcoming proceedings to review and update the BMAP and opportunities to submit more extensive written comments.

***Background***

The District is a coordinating agency along with Florida Department of Environmental Protection ("DEP") and Florida Department of Agriculture and Consumer Services ("FDACS") charged with meeting the total maximum daily load ("TMDL") for the Lake. DEP adopted a TMDL for total phosphorus ("TP") load to the Lake of 140 MT of which 105 can come from the watershed and 35 MT from atmospheric deposition.

One of the goals of the 5 year update is to identify challenges/needs in the sub-watersheds and basins within the Lake Okeechobee Watershed ("LOW") to help focus priorities and projects to meet water quality and water quantity goals of the Northern Everglades and Estuary Protection Plan (NEEPP) for the LOW. The ultimate challenge facing the coordinating agencies is the inability of programs and policies to date to meet the TMDL for TP for the Lake since adoption of the TMDL in 2001. In fact, TP loading to the Lake from the LOW has increased significantly since 2001. Chapter 8B of the 2019 South Florida Environmental Report ("SFER") states the fact succinctly – "Total phosphorus (TP) loads to the lake exceeded 1,080 metric tons (t) in WY2018, raising the most recent five-year average TP load to almost 500 t above the total maximum daily load (TMDL) target of 140 t." The SFER also states that "[t]he recent five-year average load was 633 t for the period of WY2014-WY 2018, which exceed the TMDL by 493 t . . . This most recent five- year average was 102 t more than the previous five-year average of 531 t

for WY2013-WY2017." Clearly, current programs and policies are not working. Total TP load is increasing overall, not decreasing.

As required by NEEPP, the District monitors water quality of inflows and outflows from the Lake at designated control structures and its water quality monitoring network. The District has requested public input on the effectiveness of specific projects within the LOW sub-watersheds in reducing nutrient loading to the Lake as part of the LOWCP. The website set up by the District to collect comments provides nutrient loading data for the entire LOW and for the 9 individual sub-watersheds for three periods of record (POR) – WY1991-WY2018, WY1991-WY2004 and WY2005-WY2018. The website also provides information on land use in each sub-watershed, and the percentage area, percentage TP load and (where applicable) estimated water quality and water quantity benefits. Our comments focus primarily on TP load and estimated water quality benefits to the Lake. Disappointingly, the Project Fact Sheets for projects in the LOW characterize many of the projects as TBD, not implemented/funded or no longer operational.

***Project Comments***

In Chapter 8A of the SFER, the District lists a number of projects it continues to implement to improve water storage and quality in the LOW, including construction of the southern section of the Lakeside Ranch Stormwater Treatment Area, construction activities for the Kissimmee River Restoration Project ("KRRP") (in partnership with the U.S. Army Corps of Engineers), continued operation of the Lakeside Ranch, Taylor Creek and Nubbin Slough STA projects, and the planning and design phase for emergency estuary protection wells contemplated as part of the LOWCP. The District should no longer pursue "estuary protection wells," more commonly known as Deep Injection Wells (DIWs) as part of the LOWCP. Whereas the primary purpose of the LOWCP is to reduce nutrient loading into the system, the primary purpose of DIWs is water disposal. This is in effect, trading one problem for another and fails to address predicted water shortages. The District should spend its limited resources in advancing and accelerating Everglades restoration and other types of water storage and treatment technologies that make this very finite resource available to meet the needs of the natural and built environments. We urge the District to remove this component from the LOWCP.

With regard to results, the summary of LOWCPs in Table 8A of the SFER concludes that for WY2018 rather than reduce TP load, the Lakeside Ranch STA resulted in net export of 0.9 t TP to the Lake. For the 70 days the Taylor Creek STA was in operation in WY2018, 0.5 t of TP was loaded into the STA of which 0.3 T was retained within the STA. For the Nubbin Slough STA in WY2018, TP load inflow to the STA was 146 kg or approximately 0.15 t and outflow was 587 kg or approximately 0.58 t. TP load reduction *estimates* for the KRRP range from 17.75 t/yr to 20.6 t/yr. The cumulative impact of the above referenced projects on TP load reduction – actual and estimated – are nowhere near the hundreds of tons needed to achieve the TMDL for the Lake.

***Sub-watershed Nutrient Contributions***

The results of LOWCPs for 5 of the 9 most problematic sub-watersheds are similar. For example, the Upper Kissimmee Sub-watershed (UKSW) represents approximately 29.8% of the LOW and contributed approximately 17.3% of the total TP load from the LOW. The Lower Kissimmee Sub-watershed (LKSW)

represents approximately 12.4% of the LOW and contributed approximately 14.9% of the total TP load from the LOW. The Taylor Creek/Nubbin Slough sub-watershed (TCNSSW) represents approximately 5.7% of the LOW and contributed approximately 20% of the total TP load from the LOW. The Fisheating Creek Sub-watershed (FCSW) represents approximately 9.2% of the LOW and contributed approximately 12.3% of the total TP load from the LOW. The Indian Prairie Sub-watershed (IPSW) represents approximately 8% of the LOW and contributed approximately 18.1% of the total TP load from the LOW. In each case we assume the percentage contributions refer to the entire POR from WY1991 – WY2018. This approach masks the full extent of the nutrient loading problem. We believe it is more instructive for purposes of evaluating the effectiveness of LOWCPs to compare the portion of the TP load contributed by these sub-watersheds to the target TMDL set by DEP for the LOW.

We understand the DEP has failed to set sub-watershed goals for TP loads thus far in the BMAP process, which leaves this plan without known goals. However, for a plan to make sense, it needs goals to evaluate success, or lack thereof. We recommend the District set provisional "goals" for watersheds that will not carry regulatory power but will help planners identify which watersheds are most important to target for remedial work. The goals could be set on percent of water flow to Lake Okeechobee or could be weighted to allow the most problematic watersheds somewhat higher goals and others somewhat lower to meet the TMDL.

With this background in mind, at least 5 of the sub-watersheds stand out as candidates for a "provisional goals" and targeting for remedial work. During the entire POR, WY1991-WY2018, the UKSW alone contributed an average annual TP load of 78.87 t or approximately 75% of the target TMDL attributable to the LOW. During the POR WY1991-WY2004, the UKSW contributed an average annual TP load of 67.77 t or approximately 65% of the target TMDL attributable to the LOW. And, during the POR WY2005-WY2018, the UKSW contributed an average annual TP load of 89.97 t or approximately 86% of the target TMDL attributable to the LOW. In contrast, LOWCPs located in the UKSW show minimal TP load reduction.

During the entire POR, the LKSW contributed an average annual TP load of 79.49 t or approximately 76% of the target TMDL attributable to the LOW. During the POR WY1991-WY2004, the LKSW contributed an average annual TP load of 81.38 t or approximately 77% of the target TMDL attributable to the LOW. And, during the POR WY2005-WY2018, the LKSW contributed an average annual TP load of 77.59 t or approximately 74% of the target TMDL attributable to the LOW. In contrast, LOWCPs located in the LKSW show minimal TP load reduction.

During the entire POR, the TCNSSW contributed an average annual TP load of 106.68 t which exceeds the target TMDL of 105 t attributable to the entire LOW. During the POR WY1991-WY2004, the TCNSSW contributed an average annual TP load of 109.52 t which exceeds the target TMDL attributable to the entire LOW. And, during the POR WY2005-WY2018, the TCNSSW contributed an average annual TP load of 103.83 t or approximately 99% of the target TMDL attributable to the LOW. In contrast, while the use of Hybrid Wetland Treatment Technology facilities has resulted in annual TP load reduction of 9.5 t, much more needs to be done to reduce the overwhelming level of nutrients entering the LOW from the TCNSSW.

During the entire POR, the FCSW contributed an average annual TP load of 60 t or approximately 57% of the target TMDL attributable to the LOW. During the POR WY1991-WY2004, the FCSW contributed an average annual TP load of 56.10 t or approximately 53% of the target TMDL attributable to the LOW. And, during the POR WY2005-WY2018, the FCSW contributed an average annual TP load of 63.90 t or approximately 61% of the target TMDL attributable to the LOW. In contrast, LOWCPs located in the LKSW show minimal TP load reduction.

Finally, during the entire POR, the IPSW contributed an average annual TP load of 81.54 t or approximately 78% of the target TMDL attributable to the LOW. During the POR WY1991-WY2004, the IPSW contributed an average annual TP load of 68.81 t or approximately 66% of the target TMDL attributable to the LOW. And, during the POR WY2005-WY2018, the IPSW contributed an average annual TP load of 94.28 t or approximately 90% of the target TMDL attributable to the LOW. In contrast, LOWCPs located in the IPSW show minimal TP load reduction.

When viewed in this context, having 5 of the 9 sub-watersheds each contribute on an individual basis a majority of, and in one instance exceed on its own, the TMDL for the entire LOW underscores Audubon's concerns regarding the effectiveness of TP load reduction programs and the need for more comprehensive, large scale projects in order to meet the TMDL of 105 t TP.

***Conclusion***

The agencies need to vastly expand the list of projects implemented throughout the watershed to ever hope to see meaningful reductions in TP flowing into Lake Okeechobee. Audubon encourages the District to develop new, large scale projects aimed at significantly reducing TP loads to the Lake. We further encourage the District to communicate, coordinate and cooperate with DEP and FDACS to identify and implement effective, verifiable and enforceable measures to reduce TP loads to the Lake, such as a comprehensive dispersed water management strategy, verifiable and enforceable best management practices, and effective water quality treatment projects. We thank you for your consideration of our comments and look forward to working with you throughout the development of the new BMAP for the Lake Okeechobee Watershed.

Sincerely,

Doug Gaston
Northern Everglades Policy Analyst

# SEMINOLE TRIBE OF FLORIDA

EXECUTIVE OPERATIONS OFFICE
ANDREW J. BOWERS
Executive Director of Operations
T (954) 966-6300 Ext. 11423
andrewjbowers@semtribe.com

STACY MYERS
Interim Director
Environmental Resource Management
6363 Taft Street, Suite 309
Hollywood, Florida 33024
T (954) 966-6300 Ext. 10424
F (954) 962-8727
stacymyers@semtribe.com



May 6, 2019

Ms. Ansley Marr, P.E., Office Chief (amarr@sfwmd.gov)
State Policy and Agricultural Coordination
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

SUBJECT: Seminole Tribe of Florida Comments on LOWCP

Dear Ms. Marr,

In accordance with discussions with Armando Ramirez, the Seminole Tribe of Florida ("Seminole Tribe") was granted an extension of time within which to submit comments on the Lake Okeechobee Watershed Construction Project ("LOWCP") through May 6, 2019. The Seminole Tribe respectfully submits the following comments on the LOWCP. The Seminole Tribe's comments focus on two components of the LOCWP, specifically the Lake Okeechobee Watershed Restoration Plan ("LOWRP"), and Dispersed Water Management ("DWM") Projects.

**BACKGROUND**

The Seminole Tribe's water rights for the Brighton Seminole Indian Reservation is supplied with water from the Indian Prairie Basin ("IPB") and Lake Okeechobee. The Seminole Tribe's water rights were created in 1987 pursuant to the *Water Rights Compact between the Seminole Tribe of Florida, the State of Florida, and the South Florida Water Management District* ("Compact") which was adopted pursuant to both state and federal law. (Pub. L. No. 100-228, 101 Stat. 1566 and Chapter 877-292 Laws of Florida as codified in section 285.165, Florida Statutes.) As such, the Seminole Tribe has a significant interest in the Lake Okeechobee Basin, including water quality and quantity within the Basin.

While the Seminole Tribe supports efforts to improve the quality of water within Lake Okeechobee, and efforts towards wetland restoration, we are becoming increasingly concerned about the potential for adverse impacts to our water rights and environmental, wildlife and cultural resources resulting from the cumulative impacts of implementation of the LOWCP, the

Lake Okeechobee Watershed Protection Plan (LOWPP), the LOWRP, Basin Management Action Plans ("BMAP") and Dispersed Water Management ("DWM") Projects as a whole.

**DISPERSED WATER MANAGEMENT PROJECTS**

As defined in the various documents discussing the LOWCP, DWM Projects include storage and retention projects on public and private lands, the Northern Everglades – Payment for Environmental Services ("NE-PES") Projects, Florida Ranchlands and Environmental Services Projects ("FRESP"), and Water Farming Payment for Environmental Services ("WF-PES"). This includes the USDA/NRCS Agricultural Conservation Easements Program ("ACEP"), including the WRE component[1]; the FDACS BMP Program, and agricultural landowners, agricultural organizations, non-governmental organizations, and local governments. As of the 2014 Lake Okeechobee Protection Plan Update, there were 38 such projects authorized within the Lake Okeechobee Basin, many of which are located within the IPB and therefore have the potential to adversely impact the Seminole Tribe from a water quantity, water quality, and threatened and endangered species perspective.

**Lack of Cumulative Impact Analysis**

The Seminole Tribe has a significant interest in the various DWM Programs as these programs encourage landowners to convert farm and other agricultural lands to wetlands and therefore have the potential to impact the Seminole Tribe's rights and interests. While the Seminole Tribe supports wetland restoration and conservation, we are also concerned with practices that will diminish, reduce or otherwise impact our ability to obtain our water rights under the Compact, have an adverse impact on water quality, and/or impact threatened and endangered species.

Each of the DWM Projects are permitted individually with the appropriate state water management district (for example projects may require an Environmental Resource Permit ("ERP") from the South Florida Water Management District ("SFWMD"), they may also require a Works of the District ("WOD") Permit, a Right-of-Way ("ROW") permit, and modifications to Consumptive Use Permits ("CUP")). Additionally, each project potentially requires permits from the United States Army Corps of Engineers ("USACE") (Section 404 and/or 408 permits), consultation with the United States Fish and Wildlife Service ("FWS"), and/or an Environmental Protection Agency (National Pollution Discharge Elimination System Permit ("NPDES"). Since so many different state and federal agencies are involved, there is the potential for these projects to be split up and looked at on an individual basis, and the program not looked at as a whole to determine the cumulative impacts.

We monitor and comment on individual permit applications as we become aware of them from the federal and state permitting agencies. However, the Seminole Tribe is unaware of any cumulative impact analysis by a state or federal agency of the cumulative impact of the LOWPP,

[1] Formerly the Wetland Reserve Program ("WRP"), which was repealed by the Agricultural Act of 2014 and replaced by the ACEP.

LOWCP, the BMAP Program, or the DWM program on water quantity, water quality or threatened and endangered species.

Water Quantity

In regards to DWM Projects, the Lake Okeechobee BMAP dated December 2014, states: "with the exception of the Lykes West Waterhole Project, the primary service that is contracted under the DWM projects included in the BMAP is *water storage*, while water quality may be an ancillary benefit." (emphasis added). The Lake Okeechobee BMAP further states that DWM Projects are intended to be temporary in nature, as an interim means to store water until larger regional projects come online." And that, because water storage is the primary focus of this program, limited water quality data are available to establish long-term nutrient reduction efficiencies for these projects. Monitoring of water quality parameters for DWM projects with the primary purpose of water storage is not required but may be investigated to understand better the water quality benefits associated with this type of BMP. It is further acknowledged that the water quality benefits of these projects are "provisional and temporary." (at p. 38).

The Seminole Tribe is concerned that the direct and cumulative impacts of the DWM activities will adversely affect its water rights. The Seminole Tribe has water rights for its Brighton reservation expressly set out in the Compact. The water rights for the Brighton Seminole Indian Reservation is supplied with water from Lake Istokpoga, the Indian Prairie Basin ("IPB") and Lake Okeechobee. Specifically, the Seminole Tribe is concerned that DWM Projects will impede or alter the natural drainage patterns within the IPB, including C-41A, and C-40, and Lake Okeechobee – all of which are sources of the Seminole Tribe's water rights guaranteed by the Compact. From a water quantity perspective, we are also concerned about the potential for additional flooding impacts on the Brighton Reservation caused by impeding or altering natural drainage patterns.

The Seminole Tribe is concerned with the characterization of water being diverted and stored as "excess", especially in light of the fact that the IPB frequently experiences drought conditions and is the Seminole Tribe's primary source of water supply.

Additionally, many DWM permits or other authorization documentation fail to require and/or consider specific operational plans for the storage and/or redirecting of water. This is of concern for several reasons:

- What assurances are there that DWM projects will be operated in a specific manner given the fact that they do not include or require any specific operational criteria as part of their review?

- The lack of operational plan criteria is a significant issue – potential impacts to species will vary based on the operational plan of each specific DWM project. For example, in some cases, the proposed operations of inundated water will be too deep to allow wading birds to forage.

- Without any analysis of specific operational criteria or requirement for certain criteria, it is impossible to know with any certainty whether DWM projects will be beneficial or not to species.

- Furthermore, the Seminole Tribe is concerned, in the long-term, that these areas will lose any wetland value they achieve in favor of increased water storage retention. This is based on the State's recent efforts to maximize water storage in all facilities north of Lake Okeechobee and concerns that it seems there are a number of these projects that may be repurposed.

- Certain DWM projects may also involve inter-basin transfer, and we are unaware of any analysis of DWM Projects from an inter-basin transfer perspective.

**Water Quality**

The Seminole Tribe is concerned about the potential for adverse water quality impacts of the proposed projects. The water management permits for DWM Projects expressly exempt the permittee from water quality standards – the Staff Reports/Permits state, "[t]he project represents a net improvement in water quality resulting from the change in land use and the restoration of Wetlands." However, there is no indication that state water quality certification has been obtained. Chapter 62-330.062(1)(c)3., Florida Administrative Code, waives state water quality criteria for activities that require net improvement of water quality under section 373.414(1)(b)3., which states, "if an applicant is unable to meet standards, the governing board or the department shall consider mitigation measures proposed by or acceptable to the applicant that cause net improvement of the water quality in the receiving body of water . . . " However, the Staff Reports/Permits are devoid of any information relative to water quality, and there are no mitigation measures proposed, or any reporting or monitoring requirements imposed. Therefore it is impossible to know the impacts on water quality of storing water on former agricultural property for extended periods of time and later redirecting and releasing that water into the environment. Since much of this water is being redirected (i.e. taken from one canal and returned to another that may be used by the Seminole Tribe to obtain is water rights), it is impossible to know the potential impacts to the Seminole Tribe caused by any flooding, or the water quality of water used for irrigation by the Seminole Tribe.

**Threatened and Endangered Species**

The Seminole Tribe is also concerned with the potential for the DWM Projects to affect the Northern crested caracara and its designated critical habitats, and potentially other threatened and endangered species. The potential for DWM projects to adversely affect endangered species, particularly the Northern Crested Caracara, and its habitats resulting in a displacement of the species has been cited in FWS BO performed for individual projects, however there has been no corresponding cumulative analysis of the impact this may have on the Seminole Tribe

from displacement of threatened and endangered species. The cumulative effects on threatened and endangered species and impacts of their distribution must be analyzed to ensure a disproportionate burden is not placed on the Seminole Tribe. A disproportionate burden could limit the Seminole Tribe's ability to utilize its tribal resources and would include, but is not limited to:

- Taking additional actions to protect these displaced species;
- Taking additional actions to protect existing caracara populations located on tribal lands;
- Requiring additional mitigation for any future impacts to the displaced species (e.g. the Seminole Tribe is concerned that additional species conservation measures will have to be put in place as a result of species displacement which may impact activities such as pasture burning.)
- Conserving additional areas to accommodate the displaced species;
- Making changes in land use practices or maintaining current land use practices to accommodate the displaced species; and/or
- Avoiding/taking additional actions to avoid increased human/panther interactions as a result of land use changes outside the Brighton Reservation.

Furthermore, the Seminole Tribe was taken back when the State proposed these large-scale habitat conversion projects that will forever alter the current landscape of this region.

**LAKE OKEECHOBEE WATERSHED RESTORATION PLAN**

The LOWRP, and specifically Alterative 1BW, the Tentatively Selected Plan ("TSP"), is a threat to the Seminole Tribal residents and the natural resources located at the Brighton Reservation. The SMART Planning process used in LOWRP, has resulted in no traditional analysis for feasibility level design for the TSP, no detailed flood routing and dam safety information, and little to no cultural resource and habitat surveys. In fact the independent peer review indicated the lack of feasibility of the TSP. The peer review report noted that there was no determination that the project is feasible or safe. How can one justify proceeding if feasibility cannot be determined? Further, the report states, "[the panel believes that the information used to date does not rise to the level of a conceptual design or feasibility assessment that would allow for a proper assessment of the adequacy and acceptability of the methods and analyses used." If they don't have enough information to justify a conceptual design, how can they proceed with the conceptual design presented? Lastly, the peer review report's authors don't see any significant differences among the three alternatives considered and the future without option, and don't believe the future without option was adequately considered. What is the basis, therefore, for the selected option (or any option)?

Due to the location and design of the Wetland Attenuation Feature ("WAF"), also called the K-05 Reservoir, there is a potential for flooding, impacts to the Reservation and cultural resources of importance to Tribal Members, and a potential for dispersal of threatened and endangered

species due to land use changes in correlation with the TSP. Additionally, the impacts to the delivery of the water rights during drought to both the Brighton and Big Cypress Reservations remains of great concern to the Seminole Tribe.

Lake Okeechobee is the back-up water supply for both the Brighton and Big Cypress Reservations, especially in drought conditions. LOWRP, as modeled, diverts water to wetland attenuation features, wetland restoration features and Aquifer, Storage and Recovery ("ASR") Wells prior to entering Lake Okeechobee with the primary goal to reduce discharges to the estuaries from the Lake. The United States Army Corps of Engineers' ("USACE") analysis of the amount of storage needed north of the Lake, as part of LOWRP, is based on the assumption that the current Interim 2008 Lake Okeechobee Regulation Schedule ("LORS 08") will still be in place at the time of the LOWRP project's operation. The USACE, however, is in the process of implementing a new lake schedule, known as the Lake Okeechobee System Operation Manual ("LOSOM") which will take the place of LORS 08. Therefore, the USACE's reliance on the interim LORS 08 as the assumed Schedule for project operations is misplaced, and many of the proposed benefits of the project may not be as great or even needed when LORS 08 is updated to take advantage of the benefit of the improvements to the Herbert Hoover Dike.

As noted above, the TSP's proximity to the Brighton Reservation is of great concern to the Seminole Tribe due to potential for seepage impacts and flood risks associated with the WAF. Although the depth of the WAF has been reduced, the Seminole Tribe's flooding concerns remain. This is especially true given that the USACE has taken a qualitative, as opposed to a quantitative approach to assess LORWP's risks, due to a lack of information that is currently available to them. While the USACE's risk analysis does not show a likelihood of flooding to the existing residential areas on the Brighton Reservation, the USACE's analysis shows that under two different scenarios there is an increased potential for flooding in other areas of the Reservation and of St. Thomas Ranch. Notwithstanding that residential areas do not currently exist in the northern portion of Brighton where the greatest aerial extent of flooding is shown to occur, the USACE failed to account for potential changes in land use in this area of the Reservation in the future.

The Seminole Tribe is also concerned about the cultural resources within the area of potential effect, as the USACE's cultural resource investigations for known archaeological sites have been limited to a literature search and records review. Despite the TSP being identified as having a higher probability of containing additional historic properties and/or cultural resources within the WAF than any of the other alternatives, Alterative 1BW has been selected as the LOWRP TSP. Few of the cultural resource surveys that have been conducted have focused on the area of the TSP. Additionally, the cost estimate for surveying and avoiding unknown sites is significant, and has not been included in the cost benefit analysis for the TSP.

The Mulberry Mound Site (8GL77) is of particular concern to the Seminole Tribe, as it has a high potential for containing burial resources, and is located within the TSP footprint. The Seminole Tribe opposes any impacts to sites that contain burial resources, thus the TSP should be

modified to avoid the Mulberry Mound site. The Seminole Tribe suspects that there are likely other unrecorded sites within the overall footprint that have not yet been identified.

Lastly, the Seminole Tribe is concerned that the proposed land use changes in the LOWRP, particularly the TSP footprint, will result in habitat loss of threatened and endangered species, such as the Northern Crested Caracara, surrounding the Brighton Reservation and ultimately displacement of these species onto tribal land. An assessment of displacement of these species is lacking from any analysis completed by the USACE of LOWRP. Due to the expedited timing of the project, costs and access issues, the planning process has not allowed for sufficient surveys to fully understand the scope of impacts to threatened and endangered species within the LOWRP footprint. Therefore, the LOWRP could potentially result in a disproportionate burden on the Seminole Tribe for additional conservation measures associated with these displaced endangered and threatened species, and possible restrictions on the use of Tribal lands, similar to those discussed above in relation to DWM Projects.

## CONCLUSION

Stakeholders have been asked to assess the current projects within the Lake Okeechobee Watershed and evaluate them to see if they are still appropriate today or if they should be dropped; including whether measurable progress has been made toward achieving the TMDL, how have the features within the watershed been performing, and are conditions measurably declining in the watershed and the lake. Additionally, stakeholders were invited to make new suggestions regarding projects as well.

Last year Lake Okeechobee exceeded its TMDL for phosphorus by more than 100%. This suggests that the strategies to address nutrient loading, of which this plan is a part, are not producing the expected results. Since the DWM Projects do not include a water quality monitoring component across the board, it is difficult if not impossible to analyze whether they are contributing any measurable progress or determine how they are performing. For that reason, we suggest adding at least two components to DWM Projects, water quality monitoring and the submittal of an operation plan. LOWRP has not yet been implemented. The Seminole Tribe is involved in consultation on that process and has included its comments and concerns regarding that project for your consideration as well.

To date, there has been no analysis of the cumulative impacts/effects of all of LOWPP, LOWCP, and the DWM/BMAP Programs and projects, or LOWRP, on:

- the Seminole Tribe's Brighton Reservation water rights;
- the overall water quantity impacts;
- the overall water quality impacts; or

- threatened and endangered species, including any disproportionate burden placed on the Seminole Tribe.

We understand some of these comments are more far-reaching than the jurisdiction of the SFWMD. However, the LOWPP, LOWCP, BMAP and DWM programs and projects necessarily involve numerous agencies and require each to work together. We have long been concerned that the piecemeal approach between agencies and projects will have potentially adverse, far-reaching, and long-term impacts that have not been analyzed. We have provided similar comments on various individual permits and aspects of numerous DWM projects to other state and federal agencies. We would respectfully request that you work together to perform a cumulative analysis of the potential ancillary adverse impacts of these programs as discussed above.

Thank you for your consideration of our comments.

Sincerely,

Stacy Myers, Interim Director
Environmental Resources Management Department

cc: Armando Ramirez, SFWMD
Stephen James, Director, Office of Water Policy, FDEP
Tom Frick, Director of Ecosystems Restoration, FDEP
Acting Director, Division of Environmental Assessment and Restoration, FDEP
Chris Petit, Director of Office of Agricultural Water Policy, FDACS
Colonel Andrew Kelly, District Commander, USACE
Larry Williams, State Supervisor, USFWS
Rodney Gutierrez, Asst. State Conservationist, USDA/NRCS
Dr. Thomas Reinert, Regional Director, South Region, FFWCC
Jim Shore, Seminole Tribe of Florida
Councilman Bowers, Seminole Tribe of Florida
Paul Backhouse, Seminole Tribe of Florida, THPO
Whitney Sapienza, Seminole Tribe of Florida
Steve Walker, LLW
Julia L. Jennison, LLW
Telsula Morgan, LLW

# Attachment 2
# Lake Okeechobee Watershed Construction Project (LOWCP) Update

This section provides updates on the management measures (i.e., phosphorus source control programs as well as projects) that are implemented to help address water quality and quantity issues affecting Lake Okeechobee. The updates include recommendations and modifications for continuing existing efforts and new opportunities to improve ecosystem performance to meet the Lake Okeechobee Watershed Total Maximum Daily Load (TMDL).

The document is divided into four (4) attachments as described next.

1. Attachment 2A provides recommendations for the Phosphorus Source Control Programs. These regulatory and incentive-based source control programs of the Coordinating agencies are essential for controlling phosphorus in the Lake Okeechobee Watershed. Several widely implemented regulatory programs affect water quality in discharges and reduce phosphorus loading to the lake. The programs collectively cover both, point and nonpoint sources of phosphorus in runoff (SFWMD et al., 2011).
2. Attachment 2B provides a list of completed and planned projects/management measures as well as recommendations/modifications based on water quality and quantity data analysis performed for the project, basin, and/or subwatershed level.
3. Attachment 2C - In cases where a project location and/or target goal has not been identified, Attachment C provides recommendations for project concepts that can help address the issues (i.e., water quality and/or quantity) identified in each of the subwatersheds.
4. Attachment 2D provides a list of new projects to be added to the LOWCP.

**References**

SFWMD, FDEP and FDACS. 2011. Lake Okeechobee Protection Plan Update. South Florida Water Management District. West Palm Beach, FL.; Florida Department of Environmental Protection, Tallahassee, FL; and Florida Department of Agriculture and Consumer Services, Tallahassee, FL.

## Attachment 2A - LOWCP Source Control Programs

| No. | 2011 LOWCP Management Measure ID | Source Control Program Name | Responsible Entity | 2011 LOWCP Expected TP Load Reduction (mt/yr) | Comments/Recommendations |
|---|---|---|---|---|---|
| 1 | 1 | ~~Agricultural BMPs – Owner-Implemented and Cost-Share~~ Propose Change title to: FDACS Best Management Practices Program | FDACS | 86.6 | Recommendations:<br>1. Ensure BMPs are implemented as decsribed on the conservation plan and/or Notice of Intent (NOI)<br>2. Evaluate existing agricultural BMPs for improvement of current practices and development of new agricultural nonpoint source interim measures and BMPs |
| 2 | 2 | Urban Turf Fertilizer (UTF) Rule | FDEP | TBD | Comments: Rule adopted in 2007<br>Recommendation: Adopt rule/statute requiring cities and counties to adopt an ordinance, which must be reviewed and approved by the State for consistency with rule/statute, to limit fertilizer applications in terms of timing and distribution. In addition, provide for additional code and enforcement officer training and certification on rule through the Florida Association of Code Enforcement to ensure local officers are knowledgeable on the issue and able to engage residents when needed |
| 3 | 3 | Biosolids Rule (formerly Land Application of Residuals Rule) | FDEP | - | Comments: Rule became effective on August 29, 2010. FDEP is currently going through rule development to consider phosphorus and groundwater impacts |
| 4 | 4 | Florida Yards and Neighborhoods | FDEP | - | Comments: Public outreach educational program<br>Recommendations: Provide program for IFAS Extension to more impactfully engage with urban residential communities and companies serving residential communities to avoid excess nutrient application by accurately assessing fertilization needs of urban turf |
| 5 | 5 | ERP Regulatory Program | SFWMD | - | Comments: After SWERP (see MM 37) became effective on 10/01/13, only minor changes were made to the SFWMD water quality rules. Effective June 2013. |
| 6 | 6 | NPDES Stormwater Program | FDEP | - | Comments -<br>1. Projected benefits will roll up under urban category<br>2. There are 16 Phase I MS4s and 12 Phase II MS4s in Lake Okeechobee Watershed<br>2. Phase I and II MS4 permits include a clause that compels a permittee to implement its stormwater pollutant load responsibilities in accordance with TMDL/BMAP requirements<br>Recommendation - Revisit expected reductions, monitoring requirements, and stormwater management programs to meet applicable TMDL allocations that are consistent with the assumptions and requirements of the adopted BMAP |
| 7 | 7 | Comprehensive Planning – Land Development Regulations | FDEP | - | Recommendation - Revisit growth management processes to further support restoration and the water quality objectives of the NEEPP legislation to ensure growth management aligns with capabilities of infrastructure at local and state level |
| 8 | 8, 34, 49 & 50 | Agricultural Conservation Easement Program (ACEP) | USDA NRCS | Unknown | Comments:<br>1. The 2014 Farm Bill streamlined and consolidated three former programs, the Wetlands Reserve Program (WRP), Grassland Reserve Program (GRP), and Farm and Ranch Land Protection Program (FRLPP)into the new Agricultural Conservation Easement Program (ACEP). Although these programs were repealed in the 2014 Farm Bill, all existing easements remain valid.<br>2. The Fisheating Creek Wetland Reserve Special Project (MM 50, Quality benefit: 3 mt/yr; Quantity benefit: 13,000 ac-ft/yr) has been included in this MM because in 2011, the USDA NRCS was identified as the partner providing the funding ($89M) for land acquisition through their WRP for implementation of this project. The Nature Conservancy and the SFWMD will assist USDA NRCS with easement acquisition and wetland restoration planning and monitoring. |
| 9 | 36 | Lake Okeechobee Works of the District Rule Regulatory Phosphorus Source Control Program | SFWMD | Unknown | Comments - The objective of the District's Regulatory Nutrient Source Control Program is to ensure that the uses of Works of the District within the watershed are compatible with the District's ability to implement Chapter 373, F.S.<br>Recommendation: To address mandated requirements by the 2016 NEEPP and support BMAP efforts, the rule needs to be amended. |
| 10 | 37 | Environmental Resource Permit Program (Water Quality) – Proposed Statewide Stormwater Rule | FDEP | - | Comments: Also known as the Statewide Environmental Resource Program (SWERP). Rule became effective October 1, 2013, without a requirement to include a unified statewide rule to increase the level of treatment required for total phosphorus (TP) and total nitrogen (TN) in storm water<br>Recommendation: Review opportunity to increase the level of treatment required for TP and TN in storm water |
| 11 | 38 | Environmental Resource Permit Program (Hydrology) - Northern Everglades Discharge Volume BMPs | SFWMD | - | Comment: The purpose of this measure was to ensure that activities do not increase average annual discharge volumes (no impact to hydrology) for new development. In August 2014, ERP Applicant's Handbook, Volume II, was amended to codify the pre-existing guidance memorandum on water quality evaluations for discharges to outstanding Florida waters and water bodies that do not meet the state water quality standards in regards to flow |

**General Recommendation**

Applicable to All Programs - The responsible entities need to ensure the programs are consistently implemented and an adaptive management approach is utilize to optimize their effectiveness as additional information becomes available through BMP implementation, demonstration and research projects, and watershed monitoring.

# Attachment 2B - LOWCP Completed and Planned Projects

| No. | 2011 LOWCP Management Measure ID | Project Name | Subwatershed | Basin | Subwatershed/ Basin Issue[1] | Project Type | Project Primary Objective | 2011 LOWCP Quality Benefit (mt/yr) | 2011 LOWCP Quantity Benefit (ac-ft/yr) | Project Status | Project Recommendation | Comments | Project Purpose |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9 | Watershed Phosphorus Control Projects | TC/NS | S-133 | Quality (maybe) Quantity (maybe) | Source Control | Quality | 0.34 | Incidental | Non Operational | Remove. All projects were completed and are no longer operational | Project: OUA Oasley, Lemkin Creek | Reduce phasphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 2 | 9 | Watershed Phosphorus Control Projects | ELO | - | None | Source Control | Quality | 7.67 | Incidental | Non Operational | Remove. Projects were completed and are no longer operational | Project: Tampa Farms - Indiantown | Reduce phasphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 3 | 9 | Watershed Phosphorus Control Projects | FEC | Fisheating Creek | Quality Quantity (maybe) | Source Control | Quality | 0.11 | Incidental | Non Operational | Remove. Projects were completed and are no longer operational | Project: Lazy S Ranch | Reduce phasphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 4 | 9 | Watershed Phosphorus Control Projects | LK | - | Quality (maybe) | Source Control | Quality | 4.59 | Incidental | Non Operational | Remove. Projects were completed and are no longer operational | Project: Smith Okeechobee Farms, Lofton Ranch, Buttler Oaks, Lamb Island | Reduce phasphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 5 | 9 | Watershed Phosphorus Control Projects | TC/NS | S-191 | Quality Quantity (maybe) | Source Control | Quality | 13.64 | Incidental | Non Operational | Remove. Projects were completed and are no longer operational | 1. Projects: QED-McArthur Farms 3, Evans Properties - Bassett Grove, McArthur 5, Candler Ranch, Eckerd Youth, Nubbin Slough Area A Restoration, Davie Dairy 1 & 2, Mattson Dairy, Solid Waste Authority, Kirton Ranch, Milking "R", Davie-Dairy Cooling Pond<br>2. Projects are no longer operational except for Davie Dairy 1 & 2 BAT which has been converted to an IWTT. However, no data are being reported. | Reduce phasphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 6 | 11 | Taylor Creek Stormwater Treatment Area (STA) | TC/NS | S-191 | Quality Quantity (maybe) | Regional | Quality | 2.0 | 8,674 | O&M | Keep. Current TP removal is 1.0 mt/yr (inflows < 6,000 ac-ft/yr) based on data collected for the period of 2008-2018. In order to achive performance goals, it is recommended to:<br>1. Add a flow equalization basin (FEB) to increase inflows needed to maintain wetland vegetation within the STA<br>2. Seek ways to improve/optimize TP performance (i.e., consider current operational measures and indentify possible needs for future operational measures) | 1. STA operation started in June 2008<br>2. Unable to maintain desirable vegetation for P updatake due to inconsistent availability of inflows to Cell 1<br>3. Current subwatershed conditions differ from thosed used for design purposes. | Retain stormwater runoff and reduce phosphorus from the Taylor Creek Subwatershed. This STA is divided into two cells in series and is expected to treat about 10% of the water flow in Taylor Creek. |
| 7 | 12 | Nubbins Slough Stormwater Treatment Area (STA) | TC/NS | S-191 | Quality Quantity (maybe) | Regional | Quality | 5.3 | 8,838 | O&M | Keep. Current average TP removal is 0.186 mt/yr (inflows < 702 ac-ft/yr) based on data collected for the period of 2008-2018. In order to achieve performance goals, it is recommended to:<br>1. Retrofit inflow pump station to operate within actual inflow and stage conditions<br>2. Complete levee repairs to remove stage restrictions. Funds are available in FY19 to cover these repairs.<br>3. Continue treating exotics and promoting wetland vegetation<br>4. Add a flow equalization basin (FEB) to increase inflows needed to maintain wetland vegetation within the STA<br>5. Public comment - Use the STA for water drainage from the Four Seasons subdivision from the north and the Berman Road subdivisions from the east. It is the current belief, the Okeechobee County Commission could assist in this effort. These suggestions would certainly make use of a STA which has not been functional since its inception and could certainly resolve a flood problem Okeechobee County has in both of these areas<br>6. Public Comment - Consider adding a pump station along the L-63N canal to pump additional water into the STA during dry times. During extreme wet periods add ASR wells along the perimeter of the STA and utlize those wells to store excess stormwater from the STA as well as water from the L-63N canal. | 1. STA operation started in September 2006<br>2. Low basin runoff has limited STA inflows which resulted in dry out and impeded establishment of wetland vegetation.<br>3. Inflow pump is oversized and cannot efficiently operate for current flow conditions.<br>4. Defects in levees required stage restrictions since start up. | The purpose of this STA is to divert and treat runoff from Nubbin Slough. This will be accomplished by pumping water from Nubbin Slough into the STA. Water will then discharge back to the slough through three outlet structures on the west side of Cell 2. |
| 8 | 13 | Dispersed Water Management – Avon Park Air Force Range | LI | - | Quality Quantity (maybe) | Source Control | Quantity | 1.361 | 10,000 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | Construction of this project was funded with a 90/10 cost share with the District and was completed in 2009. Data submittal was not required as part of cost share agreement. It is assumed that the benefits have been realized | Includes restoration of existing levee and water control structures. Will reduce flows and nutrient loading to Arbuckle Marsh. |
| 9 | 14 | Dispersed Water Management – Indian town Citrus Growers Association | ELO | - | None | Source Control | Quantity | 0.8 | 3,550 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | Construction of this project was funded with a 75/25 cost share with the District. Data submittal was not required as part of cost share agreement. It is assumed that the benefits have been realized | Includes rehabilitation and relocation of pump stations and widening ditches to reduce surface water volume discharged to St. Lucie Estuary. |
| 10 | 15 | Dispersed Water Management – Barron Water Control District | WLO | - | None | Source Control | Quantity | 0.8 | 5,000 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | Construction of this project was funded with a 50/50 cost share with the District. Data submittal was not required as part of cost share agreement. It is assumed that the benefits have been realized | Includes weir construction and ditch retention to enable water quality improvements and reuse by growers. |
| 11 | 16 | Dispersed Water Management – Lykes Basinger Grove | IP | C-41A | Quantity | Source Control | Quantity | 2.9 | 7,500 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | SFWMD provided $200,000 for construction of this project. Data submittal was not required as part of cost share agreement. It is assumed that the benefits have been realized | Includes construction of a 50,000 gpm pump station onsite and revamping the existing system of internal ditches. |
| 12 | 17 | Dispersed Water Management – Sumica | UK | - | Quality (maybe) | Source Control | Quantity | 0.032 | 290 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | SFWMD agreed to provide $35,350 for construction of this project. Data submittal was not required as part of the agreement. It is assumed that the benefits have been realized | Restore the hydroperiod in the central marsh system by constructing a rock riprap berm in front of the outfall structure at S-R60. |
| 13 | 18 | Alternative Water Supply Projects – Joe Hall, Raulerson & Sons Ranch Stormwater Recycling Project | LK | - | Quality (maybe) | Source Control | Quantity | 0.033 | 300 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Assess, plan, design, and construct water storage/disposal projects on public, private, and tribal lands |
| 14 | 19 | Alternative Water Supply Projects – David H. Williams Sod & Cattle Stormwater Irrigation | LK | - | Quality (maybe) | Source Control | Quantity | 0.015 | 134 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Assess, plan, design, and construct water storage/disposal projects on public, private, and tribal lands |
| 15 | 20 | Alternative Water Supply Projects – Four K Ranch, Inc., Lippincott Farm Stormwater Recycling System | LK | - | Quality (maybe) | Source Control | Quantity | 0.003 | 25 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Assess, plan, design, and construct water storage/disposal projects on public, private, and tribal lands |
| 16 | 21 | Alternative Water Supply Projects - Haynes & Susan Williams, 101 Ranch 17.2 Acre Reservoir & 44 Acre Reservoir | LK | - | Quality (maybe) | Source Control | Quantity | 0.003 | 25 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Assess, plan, design, and construct water storage/disposal projects on public, private, and tribal lands |
| 17 | 22 | FRESP – Alderman- Delaney Ranch Pilot Project | C-25 | - | - | Source Control | Quantity | 0.018 | 43 | Completed | Closed. Project is not in the Lake Okeechobee Watershed | Implementation of this project is done under MM 43 | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 18 | 23 | FRESP – Williamson Cattle Company Pilot Project | TC/NS | S-191 | Quality Quantity (maybe) | Source Control | Quantity | 0.063 | 150 | Completed | Closed. Implementation captured under Management Measure ID 43 | See LOWCP MM 43. | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 19 | 24 | FRESP – Buck Island Ranch Pilot Project | IP | C-41 | Quality | Source Control | Quantity | 1.56 | 967 | Completed | Closed. Implementation captured under Management Measure ID 44 | See LOWCP MM 43 | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 20 | 25 | Florida Ranchland Environmental Service Project (FRESP) - Lykes Bros. West Waterhole Pilot | IP | C-40 | Quality | Regional | Quality | 0.20 | 5,000 | O&M | Keep. Actual benefits are: water quality - 7.0 mt/yr and quantity - 13,400 ac-ft based on data collected during 2008-2018. Contract with service provider expires in September 2020. Provide funding to continue project implementation until construction of larger, long term capital projects is completed<br>2. Expand current project by adding 500 acres for a total project acreage of 3,000 acres. This will likely result in additional nutrients being removed. | Project operation started in November 2006 | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 21 | 26 | FRESP – C.M. Payne and Sons Pilot Project | FEC | Fisheating Creek | Quality Quantity (maybe) | Source Control | Quantity | 0.13 | 932 | Non Operational | Closed. Implementation captured under Management Measure ID 45 | | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 22 | 27 | FRESP – Lightsey XL Ranch Pilot Project | FEC | Fisheating Creek | Quality Quantity (maybe) | Source Control | Quantity | 0.13 | 135 | Completed | Closed. Implementation captured under Management Measure ID 46 | See LOWCP MM 43 | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 23 | 28 | FRESP – Syfrett Ranch West (C-41A) Pilot Project | IP | C-41A | Quantity | Source Control | Quantity | 0.40 | 140 | Non Operational | Closed. Implementation captured under Management Measure ID 47 | | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 24 | 29 | FRESP – Rafter T Ranch Pilot Project | LI | - | Quality Quantity (maybe) | Source Control | Quantity | 0.36 | 1,145 | Completed | Closed. Implementation captured under Management Measure ID 48 | See LOWCP MM 43 | Develop a payment program for working ranches that provide water management and/or water quality improvement services |
| 25 | 30 | Kissimmee River Restoration (KRR) – Lykes Basinger Grove and Boat ramp Nursery | LK | - | Quality (maybe) | Source Control | Quantity | 0.021 | 50 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Modify the existing surface water management system and to consruct protective levees around the existing nursery and the existing grove to provide additional flood protection for the Lykes Basinger Grove and Boatramp Nursery Food Protection project property and surrounding areas |
| 26 | 33 | KRR – Lake Wales Ridge Wildlife and Environmental Area Restoration (Royce Unit) | LI | - | Quality Quantity (maybe) | Source Control | Quantity | 0.003 | 20 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Restore natural sheet flow within an area along the west side of Lake Istokpoga by filing four existing ditches at the north end of the property that currently flow freely into Josephine Creek and Lake Isokpoga |

## Attachment 2B - LOWCP Completed and Planned Projects

| No. | 2011 LOWCP Management Measure ID | Project Name | Subwatershed | Basin | Subwatershed/ Basin Issue[1] | Project Type | Project Primary Objective | 2011 LOWCP Quality Benefit (mt/yr) | 2011 LOWCP Quantity Benefit (ac-ft/yr) | Project Status | Project Recommendation | Comments | Project Purpose |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | 35 | In-Lake Strategies - Low-stage, Muck Scraping and Tilling | - | - | - | Regional | Quality | 237.0 | N/A | Planning | Keep. In order to implement these projects, low lake level conditions for at least 3 months are needed to get equipment mobilized and working. In addition,<br>1. For muck scraping:<br>- Need to reassess if scrapping is needed. Scrapping was done in the past (around 2009) and was found effective. When reassessed in 2011, it was determined that additional scrapping was not needed. This may have changed in the last 8 years.<br>- If contaminants are present, scrapings should stay within the levee and not go outside<br>- Scraping materials was previously used to make wildlife island systems, however, when doing so, need to make sure the resulting islands are sufficiently capped to avoid release of muck organics<br>2. For tilling:<br>- When flipping (inverting/burying muck under sand to the fullest possible extent), allow resulting uneven microtopography to remain for best vegetation recruitment. Previous experience demonstrates smoothing out the surface leads to undesirable vegetation. After flipping/tilling, allow lake water to gradually (to the extent possible) increase for best vegetation response and to allow terrestrial plants to stabilize the soil. Consider hay bales or inexpensive ways to protect plantings<br>3. Focus on areas with most sediment accumulation and accesibility<br>4. Look at technologies (i.e., ozone reduction of muck) done at smaller scales and see if it is feasible at a larger scale<br>5. The SFWMD Low Water Level Habitat Enhancement Plan draft for the lake in November 2015 may inform this initiative. The draft plan was submitted to FDEP in March 2016. Suggest expanding this MM to be consistent with the proposed projects/structure (e.g., scraping/tilling, exotic/vegetation treatment, prescribed burning, etc.) outlined in the plan<br>6. Review completed work efforts including data for low-level lake improvements (e.g., work completed during 2008-2009 drought conditions)<br>7. Review treatment technologies implemented to date as well as lessons learned to help inform future low-level lake management efforts | Littoral zone muck and deep lake muck are two different things. Scraping is for marsh health, dredging is for open water areas | Muck Scraping: Remove P-laden sediments from the marsh and expose the native lake bottom to improve the flora and fauna habitat.<br>Tilling: Evaluate the effectiveness of tilling the surface organic layer into the underlying sand substrate as a mechanism for reducing the surficial total and extractable phosphorus (P) levels and reducing internal P loading. |
| 28 | 40 | Dispersed Water Management – Clewiston Site | SLO | - | None | Regional | Quantity | 0.273 | 1,456 | Planning | Remove. No water quality and/or quantity issues have been identified for this area | This 728-acre project is loacted in the EAA Basin | Utilize the existing perimeter levee at the project site for water storage and treatment. Inflow pump stations will be constructed and the existing levee will be enhanced in order to facilitate this project's purpose |
| 29 | 41 | Dispersed Water Management Lykes Nicodemus Slough | FEC | Nicodemus Slough North | None | Regional | Quantity | 9.2 | 33,860 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | 1. Project operation started in 2015<br>2. On average the project is storing approximately 43,600 ac-ft/yr based on data collected between 2015-2019<br>3. Current agreement expires in January 2023 | Capture/detain surface water from Lake Okeechobee when excess discharges from Lake Okeechobee flow to tide or may cause harm to the Caloosahatchee Estuary and/or Saint Lucie Estuary |
| 30 | 42 | Dispersed Water Management Istokpoga Marsh Watershed Improvement District (IMWID) | IP | C-41 | Quality | Source Control | Both | 4.5 | 7,800 | Construction | Keep. Continue project implementation until construction of larger, long term capital projects is completed | 1. Estimates ("most likely") are the result of implementing phase I and II. Benefits for each phase are unknown.<br>2. Operation of phase I should commence in 2019. | Reduce stormwater flows and total phosphorus load entering Lake Okeechobee coming off of the IMWID secondary conveyance system by storing water in above ground impoundments (AGI). Water collected in the impoundments would be made available to IMWID for normal water supply. |
| 31 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | FEC | Fisheating Creek | Quality<br>Quantity (maybe) | Source Control | Quantity | TBD | 4,349 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Projects: XL Ranch (NEPES-1) and La Hamaca (NEPES-2). This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 32 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | IP | C-41 | Quality | Source Control | Quantity | TBD | 2,193 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Projects: Buck Island Ranch (NEPES-1) and Buck Island Ranch (NEPES-2). This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 33 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | LI | - | Quality<br>Quantity (maybe) | Source Control | Quantity | TBD | 1,298 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Rafter T Ranch (NEPES-2). This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 34 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | LK | - | Quality (maybe) | Source Control | Quantity | TBD | 941 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Projects: Dixie West (NEPES-1), Triple A Ranch (NEPES-1), and Willaway Cattle & Sod (NEPES-1). This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 35 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | TC/NS | S-154 | Quality | Source Control | Quantity | TBD | 856 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Dixie Ranch (NEPES-1). This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 36 | 43 | Northern Everglades Payment for Environmental Service Program (NE-PES) Solicitation | UK | - | Quality (maybe) | Source Control | Quantity | TBD | 374 | O&M | Keep. Continue project implementation until construction of larger, long term capital projects is completed | Lost Oak Ranch (NEPES-1).This project has an ancillary water quality benefit provided by never releasing the water it captures. This water is a nutrient reduction to the system. The quantification of this may be estimated by FDEP and added to the BMAP. However, this would be a temporary reduction should funds not continue to be made available to pay for these environmental services or should other more regional permanent projects come online thereby reducing the need for public private partnership environmental services. | Provide shallow storage, retention and detention to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities. |
| 37 | 44 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Pearce/Hartman Property | IP | L-48, L-59E | Quality (maybe)<br>Quantity (maybe) | Source Control | Quantity | 0.74 | 1,786 | Planning | Re-evaluate | The parcels are currently being leased. The lease agreement expires in 2022. However, the lease can be terminated with a 6-month notice. The parcels were initially removed from consideration due to the lessee's interest in pursuing additional compensation/improvements associated with USDA-NRCS assistance program | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 38 | 45 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Putnam Groves Property | LK | - | Quality (maybe) | Source Control | Quantity | 0.18 | 1,595 | Planning | Remove. Project primary objective does not align with subwatershed issue | This parcel was removed from consideration in 2011 due to specific lease conditions and potential impact to adjacent citrus groves. Currently, this parcel is a cattle reservation that only ends if the District sells the property. | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 39 | 46 | Old: ~~Alternative Water Storage and Disposal Interim (AWSDI) Projects – Taylor Creek (Grassy Island) Interim Project~~<br>New: Grassy Island Flow Equalization Basin (FEB) | TC/NS | S-191 | Quality<br>Quantity (maybe) | Regional | Quantity | 1.00 | 1,729 | Planning | Modify project scope. A flow equalization basin (FEB) is being proposed to provide the inflows needed to maintain the wetland vegetation at the the Taylor Creek STA | The property is currently leased for cattle grazing and the lease expires in September 2019. The project proposes installation of ditch plugs and control structures with flashboard risers to retain surface water and reduce flows to Taylor Creek. | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 40 | 47 | Kissimmee River Restoration (KRR) – Three Lakes Wildlife management Area Hydrologic Restoration | UK | - | Quality (maybe) | Source Control | Restoration | 0.068 | 600 | Completed | Closed. It is assumed that the benefits associated with this project have been realized | | Restore hydrology to impacted wetlands associated with the Upper Kissimmee Chain of Lakes |
| 41 | 48 | Kissimmee River Restoration (KRR) – Gardner-Cobb Marsh | UK | - | Quality (maybe) | Source Control | Restoration | 0.283 | 2,500 | Planning | Keep | The majority of Gardner Cobb Marsh remains under lease for light cattle grazing until 12/31/20 | Restore hydrology to impacted wetlands associated with the Upper Kissimmee Chain of Lakes |

## Attachment 2B - LOWCP Completed and Planned Projects

| No. | 2011 LOWCP Management Measure ID | Project Name | Subwatershed | Basin | Subwatershed/ Basin Issue[1] | Project Type | Project Primary Objective | 2011 LOWCP Quality Benefit (mt/yr) | 2011 LOWCP Quantity Benefit (ac-ft/yr) | Project Status | Project Recommendation | Comments | Project Purpose |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 54 | C-44 Reservoir and Stormwater Treatment Area (RSTA) | CLO | C-44 | None | Regional | Both | 6.8 | 63,505 | Construction | Keep | USACE is constructing the reservoir with an estimated completion date of 2021. The District is constructing the STA with an estimated completion date of summer 2019 | Capture local runoff from the C-44 Basin, treat some or all of it via sedimentation and natural transformation of nutrients, and return it to the C-44 Canal when there is a need. The components are designed for flow attenuation to the St. Lucie Estuary, water quality benefits from reduced loading of nutrients, pesticides, herbicides, and other pollutants contained in runoff presently discharged to the estuary, and water supply benefits. |
| 43 | 56 | Lemkin Creek Urban Stormwater Facility | TC/NS | S-133 | Quality (maybe) Quantity (maybe) | Regional | Both | 1.1 | 320 | Planning | Keep. An updated review of these alternatives would be necessary to assess which alternative provide the most cost effective solution based on basin needs. Also, since basin flow is flashy, additional water supply alternatives (e.g., reservoir, ASR, FEB) should be considered | In 2009 and 2010, the SFWMD in cooperation with Okeechobee County and the City of Okeechobee, conducted an analysis of 3 potential project alternatives for this area. The alternatives consisted of a shallow impoundment (alternatives 1 and 2) and a shallow wetland treatment system (alternative 3). TP removal estimates ranged from 13 to 62 lb/yr (alt. 1 and 2) and from 666 to 734 lb/yr for alternative 3. Cost estimates ranges from $3.7M (alt. 1) to $4.4 (alt. 3) | The impoundment/wetland treatment area will increase storage and treat water to remove phosphorus before it enters Lake Okeechobee |
| 44 | 57 | Dispersed Water Management Potential Site - Fisheating Creek Marsh Watershed Project | FEC | Fisheating Creek | Quality Quantity (maybe) | Source Control | Quantity | 4.6 | 16,500 | Planning | Keep. More detailed planning and design will define the facility that is needed to meet phosphorus reductions as well as storage needs | No updates at this time | Evaluate, engineer, and rehabilitate the PL-566 water control structures in the Fisheating Creek Marsh Watershed project area to more effectively store and manage water and reduce phosphorus runoff from more than 50,000 acres in the headwaters of Fisheating Creek. |
| 45 | 58 | Dispersed Water Management Potential Site - Okeechobee County East/West Stormwater Conveyance Project | TC/NS | - | Quality | Regional | Both | 0.3 | 500 | Planning | Keep. More detailed planning and design will define the facility that is needed to meet phosphorus reductions as well as storage needs | No updates at this time | Acquire 1,000 acres of land to implement a stormwater conveyance system with retention and treatment components from east to west through the City of Okeechobee and Okeechobee County. Following water quality treatment and storage, the water will be conveyed into SFWMD Lemkin Creek urban water storage and treatment facility before making its way into the Rim Canal and ultimately Lake O. |
| 46 | 59 | Dispersed Water Management Potential Site - Dupuis Reserve | ELO | - | None | Source Control | Quantity | 1.0 | 4,500 | Planning | Remove. No water quality and/or quantity issues have been identified for this area | Two project concepts have been proposed for this site. The original project concept included infrastructure and operational modifications to restore pre-drainage and enhance hydrologic conditions. The second project concept is a passive DWM project. However, to fully vet and refined the DWM project concept, a topographic survey, a threathened and endangered species survey, as well as hydrology and hydraulics study need to be performed | Restore the pre-drainage water budget and enhance hydrologic conditions (improve hydroperiods) for approximately 21,858 acres of flatwoods and wetlands. |
| 47 | 60 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Buckhead Ridge Property (TIIFF) | IP | - | Both | Source Control | Quantity | 0.011 | 27 | Planning | Keep. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands. ould be paired with a nutrient removal technology to address subwatershed issues | No updates at this time | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 48 | 61 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Caloosahatchee East & West Property (TIIFF) | WLO | - | None | Source Control | Quantity | 0.005 | 30 | Planning | Remove. No water quality and/or quantity issues have been identified for this area | No updates at this time. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 49 | 62 | Alternative Water Supply and Disposal Interim (AWSDI) Projects - Fisheating Creek (TIIFF) | FEC | Fisheating Creek | Quality Quantity (maybe) | Source Control | Quantity | 0.242 | 867 | Planning | Keep. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands. ould be paired with a nutrient removal technology to address subwatershed issues | No updates at this time | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 50 | 63 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Harney Pond (TIIFF) | IP | - | Both | Source Control | Quantity | 0.013 | 30 | Planning | Keep. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands. ould be paired with a nutrient removal technology to address subwatershed issues | No updates at this time | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 51 | 64 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Indian Prairie (TIIFF) | IP | - | Both | Source Control | Quantity | 0.022 | 52 | Planning | Keep. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands. Could be paired with a nutrient removal technology to address subwatershed issues | No updates at this time | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 52 | 65 | Alternative Water Storage and Disposal Interim (AWSDI) Projects – Okeechobee (TIIFF) | TC/NS | - | Quality | Source Control | Quantity | 0.003 | 5 | Planning | Remove. Project primary objective does not align with subwatershed issue | No updates at this time. The proposed project land should be evaluated to determine the feasibility of constructing a AWSDI on TIIFF lands | Utilize interim facilities for water storage by employing a range of site alternative measures at a number of project sites. Alternatives include construction of on-site measures such as temporary ditch blocks, minor berms, minimal earthwork, wetland restoration, and potential water diversions to the project site using temporary pump facilities. |
| 53 | 66 | Brady Ranch Stormwater Treatment Area (STA) | TC/NS | S-191 | Quality Quantity (maybe) | Regional | Quality | 5.0 | 2,430 | Planning | Keep. However, it is recommended to add a flow equalization basin (FEB) to the Brady Ranch STA to ensure inflows needed to ensure healthy wetland vegetation is maintained | No planning for the Brady Ranch site as a STA has been performed. Property is currenlty under lease agreement for cattle grazing with a hunting preserve. Lease agreement expires in May 2029. However, SFWMD may elect to terminate the lease by providing a 3-year notification to the lessee. | Treat water and remove phosphorus before it enters Lake Okeechobee. The 1,800-acre STA will receive flows from L-63 and will discharge to Lake Okeechobee. |
| 54 | 67 | Clewiston Stormwater Treatment Area (STA) | SLO | S-4 | None | Regional | Quality | 2.5 | 1,013 | Planning | Remove. No water quality and/or quantity issues have been identified for this area | No updates at this time. The proposed project land should be evaluated to determine the feasibility of constructing a STA on TIIFF lands. The evaluation would need to consider site condition for design and constructability of the proposed STA. The adjacent property includes both sugarcane cultivation and residential lands. Impacts to these lands would need to be considered as part of the design | Treat stormwater from the S4 Basin and surrounding area that is currently sent either to Lake Okeechobee (via Culvert 2, S-310 lock structure and/or S-4 Pump Station) or to the Caloosahatchee River (via S-235). |
| 55 | 68 | S-68 Stormwater Treatment Area (STA) | IP | - | Both | Regional | Quality | 8.0 | 6,750 | Planning | Keep. More detailed planning and design will define the facility that is needed to meet phosphorus reductions as well as storage needs for this subwatershed | No updates at this time | Provide additional water quality improvements in the Indian Prairie subwatershed |
| 56 | 75 | Istokpoga/Kissimmee Reservoir and Stormwater Treatment Area (RSTA) | IP | - | Both | Regional | Both | 9.0 | 273,600 | Planning | Keep. More detailed planning and design will define the facility that is needed to meet phosphorus reductions as well as storage needs for these subwatersheds (LI, IP, and LK) | No updates at this time | To enhance existing storage and capacity and provide additional water quality improvements in the Lake Okeechobee Watershed. |
| 57 | 76 | Northern Everglades Chemical Treatment Pilot Project Parcel Level | - | - | - | Source Control | Quality | TBD | N/A | Planning | Keep. Conduct a feasibility analysis for a full-scale treatment system using most promising technologies | To date, SFWMD has evaluated 10 technologies. The data collected provides a simplified approach to cross-compare each technology's treatment performance, based on before/ versus after-application changes in constituent levels. Assessment was limited to the vendors who approached the SFWMD. Thus, the technologies evaluated represent only a small subsample of all available water treatment technologies<br><br>An annual benefit is not assigned to this MM as it is programatic and the benefit is subject to site-specific conditions. Benefits can be applied on a small parcel level up to a large full scale regional level but may required proprietary/service contract level efforts. | Implement chemical treatment at the parcel level across the Lake Okeechobee Watershed |
| 58 | 77 | Northern Everglades Chemical Treatment Regional - Reservoirs | - | - | - | Regional | Quality | 14.3 | N/A | Planning | Keep | No updates at this time | Addition of chemical treatment in CERP Lake Okeechobee reservoirs (Istokpoga Reservoir and Kissimmee Reservoir) |
| 59 | 78 | Rolling Meadows/Catfish Creek Wetland Restoration (Phase 1) | UK | - | Quality (maybe) | Source Control | Restoration | Unknown | 1456 | O&M | Keep. Continue monitoring to document project benefits | Project operation started in April 2017. The extreme rainfall conditions in WY2018 and the first season of flow-through operation likely affected initial water quality benefits. Annual TP concentration went from 479 µg/L to 102 µg/L. | Restore a sod farm back to historic lake littoral wetlands connected to Lake Hatchineha. |
| 60 | 82 | Deep Injection Well (S-154 Basin Deep Injection Well) | TC/NS | S-154 | Quality Quantity (maybe) | Regional | Quantity | 9.5 | 19,000 | Planning | Remove | | |
| 61 | 83 | In-Lake Strategies | - | - | - | Regional | Quality | TBD | N/A | Planning | Keep. It is recommended to conduct an in-lake phosphorus management study. This study shall review the recommendations from the 2003 feasibility study. New concepts and technologies shall be evaluated and then compared against those from the previous report. Permitting requirements and potential limitations associated witht these options will also be evaluated. Finally, new recommendations shall be made for implementation | 1. The following has been considered: Sediment dredging, creation of sediment traps and in-lake islands or littoral zones near outlets, creation of break-water barriers to reduce pelagic and nearshore exchange, nutrient removal technologies<br>2. Ability to investigate these ideas is limited at this time due to funding contraints | Reduce phosphorus loading from sediment beds in Lake Okeechobee. |

## Attachment 2B - LOWCP Completed and Planned Projects

| No. | 2011 LOWCP Management Measure ID | Project Name | Subwatershed | Basin | Subwatershed/ Basin Issue[1] | Project Type | Project Primary Objective | 2011 LOWCP Quality Benefit (mt/yr) | 2011 LOWCP Quantity Benefit (ac-ft/yr) | Project Status | Project Recommendation | Comments | Project Purpose |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | 10 & 39 | Hybrid Wetland Treatment Technology (HWTT) | TC/NS | S-191, S-133 | Quality Quantity (maybe) | Regional | Quality | 4.0 | N/A | O&M | Keep. However, when implementing this technology is important to note that:<br>1. This technology is well suited for the treatment of point sources where high nutrient concentrations and flows can be predicted to mitigate elevated concentrations prior to discharge to an off-site water body.<br>2. The cost effectiveness of this technology is variable and dependent on accurately determining the flow, nutrient concentrations and background water quality<br>3. Utilizing HWTT for large-scale application poses a more complicated process that requires a review of site-specific conditions, a comprehensive design, and an analysis of the potential cost per pound of nutrient removed | 1. Currently, there are 5 operational facilities: Nubbin Slough, Mosquito Creek, Lemkin Creek, Grassy Island and Wolf Ditch<br>2. These facilities have removed between 6.53 mt/yr (partial capacity) and 22.2 mt/yr (full capacity)<br>3. All HWTT systems continued to provide effective removal of TP. | Reduce phosphorus exports to Lake Okeechobee in the four priority basins (S-65D, S-65E, S-154, and S-191). |
| 63 | 51, 55 | Lakeside Ranch Stormwater Treatment Area (STA) Phase I & II | TC/NS | S-135, **S-191** | Quality Quantity (maybe) | Regional | Quality | 19.0 | 8,674 | O&M | Keep. It is expected that operation of the S-191A pump station will help to regulate water levels in the cells which should result in healthy vegetative communities. | 1. Phase I - Operational since 2013<br>2. Phase II - Start-up monitoring in preparation for operation<br>3. Phase III - Construction of S-191A pump station is currently scheduled to be completed in April 2021<br>4. Average annual TP load reduction for Phase I is 7 mt/yr (designed is 9 mt/yr) based on data collected for the period of 2013-2018<br>5. Reduced water levels, the increase in wildlife disturbances and the significant loss in vegetation have most likely contributed to the recent poor performance of Phase I | Capture and reduce the amount of total phosphorus from the S-191 and S-135 basins prior to discharge back into the L-47 rim canal and eventually into Lake Okeechobee. |
| 64 | 52-53, 69-74, 79-81 | Lake Okeechobee Watershed Restoration Project | - | - | - | Regional | Quantity | N/A | 648,000 | Planning | Keep. The LOWRP is a *tentatively selected* plan in conceptual design phase. Project features and/or configurations may be subject to change | 1. The LOWRP replaces the Kissimmee River Pilot ASR (MM 52), Taylor Creek ASR Reactivation (MM 53), Taylor Creek Reservoir (MM 69), Paradise Run Wetland Restoration (MM 70), Kissimmee Reservoir (MM 71), Istokpoga Reservoir (MM 72), Istokpoga STA (MM 73), Kissimmee Reservoir STA (MM 74), Port Mayaca ASR Pilot (MM 79), Ten-Well ASR System (Paradise Run) (MM 80), and Seminole Brighton Reservation ASR Pilot (MM 81).<br>2. The water quality and quantity benefits of these MM were estimated to be 68.62 mt/yr and 516,418 ac-ft/yr, respectively<br>3. The LOWRP study recommends 3 components of CERP: (1) Wetland Attenuation Feature (WAF) north of Lake Okeechobee; (2) ASR wells; and (3) Water Storage Reservoir. The estimated storage benefits include 5,200 acres of restored wetlands, 448,000 ac-ft/yr from the combination of ASR wells, and 200,000ac-ft/yr stored in the reservoir. | The major goals of the Lake Okeechobee Watershed Restoration Project (LOWRP) - part of the Comprehensive Everglades Restoration Plan - are to improve the quantity, timing, and distribution of water entering Lake Okeechobee. LOWRP will improve management of lake water levels, reduce excessive releases to the St. Lucie and Caloosahatchee estuaries, and increase operational flexibility. These goals will be achieved through storage of water in surface reservoirs and underground in aquifer storage and recovery wells. Additional wetland areas also will be restored to enhance habitat utilization in the subwatersheds that are the focus of this project. |

[1] 2019 Data analysis

| | |
|---|---|
| Lake Okeechobee TMDL (mt/yr) | 140 |
| Atmospheric Deposition (mt/yr) | 35 |
| Target TP Load from the Watershed (mt/yr) | 105 |
| LOWCP Annual TP Load (1991 - 2005) from the Watershed (mt/yr) | 514 |
| TP Target Load for LOWCP (mt/yr) | 409 |
| 5-Year Average Annual TP Load from the Watershed (2014-2018) (mt/yr) | 598 |
| New TP Target Load (mt/yr) | 493 |

# Attachment 2C - LOWCP Recommendations for Project Concepts by Subwatershed

| No. | Subwatershed | Annual Discharge (ac-ft) | | Annual TP Load (mt) | | Subwatershed Issue | Recommendations |
|---|---|---|---|---|---|---|---|
| | | 1991-2005[1] | 2014-2018 | 1991-2005[1] | 2014-2018 | | |
| 1 | Upper Kissimmee (S-65) | 954,204 | 941,163 | 91 | 91 | Quality (maybe) | 1. Flow-through systems, chemical treatment, hybrid wetland treatment technology (HWTT), additional short- and long-term public private partnership projects (treatment); implementation/optimization of BMP with emphasis in nutrient management.<br>2. Before implementing any projects in this area, an evaluation of the potential impact of the proposed project on the Kissimmee River Restoration (KRR) project should be conducted |
| 2 | Lower Kissimmee [(S-65E) - (S-65)] | 378,836 | 508,539 | 77 | 126 | Quality (maybe) | Flow-through systems, chemical treatment, HWTT, additional short- and long-term public private partnership projects (treatment); implementation/optimization of BMP with emphasis in nutrient management |
| 3 | Taylor Creek/Nubbin Slough | 187,583 | 196,034 | 124 | 114 | Quality<br>Quantity (maybe) | Flow-through systems, aquifer storage and recovery (ASR) wells, reservoir assisted stormwater treatment areas (RASTAs), reservoir assisted HWTT, implementation/optimization of BMPs with emphasis in nutrient management, flow equalization basin (FEB) to existing STAs to improve performance, additional short- and/or long-term public private partnerships (storage, treatment), septic to sewer conversion, verification of NPDES and MS4 permits, tailwater recovery systems |
| 4 | East Lake Okeechobee Basins | 109,134 | 69,361 | 20 | 17 | None | Continue implementation of protective measures |
| 5 | South Lake Okeechobee | 149,488 | 88,317 | 33 | 29 | None | Continue implementation of protective measures |
| 6 | West Lake Okeechobee (S-77) | 5,835 | 132 | 1 | 0 | None | Continue implementation of protective measures |
| 7 | Fisheating Creek | 224,368 | 331,641 | 55 | 72 | Quality<br>Quantity (maybe) | 1. Flow-through systems, aquifer storage and recovery (ASR) wells, reservoir assisted stormwater treatment areas (RASTAs), reservoir assisted HWTT, implementation/optimization of BMPs with emphasis in nutrient management, additional short- and/or long-term public private partnerships (storage, treatment), tailwater recovery systems<br>2. Proposed projects should not reduce public access to the creek |
| 8 | Indian Prairie | 249,175 | 379,160 | 89 | 103 | Quality (maybe)<br>Quantity (maybe) | Aquifer storage and recovery (ASR) wells, reservoir assisted stormwater treatment areas (RASTAs), reservoir assisted HWTT, septic to sewer conversion, implementation/optimization of BMPs with emphasis in nutrient management, additional short- and/or long-term public private partnerships (storage, treatment), tailwater recovery systems |
| 9 | Lake Istokpoga (S-68) | 299,656 | 408,073 | 23 | 48 | Quality<br>Quantity (maybe) | Aquifer storage and recovery (ASR) wells, reservoir assisted stormwater treatment areas (RASTAs), reservoir assisted HWTT, septic to sewer conversion, implementation/optimization of BMPs with emphasis in nutrient management, additional short- and/or long-term public private partnerships (storage, treatment), tailwater recovery systems |
| | **Total** | **2,258,623** | **2,514,347** | **514** | **598** | | |

[1] Estimated under the Phase II Technical Plan

General Recommendation

Future cost share projects need to include requirements related to monitoring to evaluate performance and annual reporting by the landowner/operator

# Attachment 2D - LOWCP New Projects

| No. | Project | Subwatershed | Basin | Subwatershed/ Basin Issue | Project Type | Project Primary Objective | Water Quality Benefit (mt/yr) | Water Quantity Benefit (mt/yr) | Project Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Septic - Sewage Conversion | TC/NS | - | Quality<br>Quantity (maybe) | Source Control | Quality | TBD | N/A | Public comment - Treasure Island Septic to Sewer project. The Okeechobee Utility Authority (OUA) has completed a preliminary engineering study to provide a centralized wastewater collection system to serve up to 1,500 to 2,000 connections. It has been estimated that these connections will eliminate approximately 21.9 tons of nitrogen and 5.3 tons of phosphorus per year from the project area |
| 2 | Program forAgricultural Stormwater Quality and Quantity Projects | TBD | TBD | TBD | Source Control | Quantity | TBD | TBD | Construction of infrastructure to reduce nutrient loads of agricultural stormwater |
| 3 | Floating Aquatic Vegetative Tiling (FAVT) (FDACS) | FEC | Fisheating Creek | Quality<br>Quantity (maybe) | Source Control | Quality | TBD | TBD | 1. This technology uses the direct assimilation of nutrients from the water column using floating plant roots (as compared to plants rooted in the soil), and all the biomass is rapidly incorporated directly into the soil through tiling<br>2. FEC facility is comprised of 250 acres of FAV and submerged aquatic vegetation (FAV) communities with a treatment capacity of 100 cfs<br>3. Status: FEC facility became operational in 2016. The facility is currently in an optimization phase |
| 4 | Brighton Valley NE PPP | IP | C-41 | Both | Regional | Quality | 3.2 | 3.2 | 1. This Northern Everglades Public Private Partnership (NEPPP) project will detain onsite rainfall and pump water from the C-41A Canal and will treat it on approximately 8,142 acres of private agricultural lands. The total cost of the project is $42M of which $11.5 were appropriated under State Appropriation 1590A and the reminder is subject to receiving funds from the Florida Legislature<br>2. Status: Construction is expected to be completed in September 2019 |
| 5 | El Maximo Ranch NE PPP | LK | - | Quality (maybe) | Regional | Quality | 2 | 2 | 1. This Northern Everglades Public Private Partnership (NEPPP) project will detain onsite rainfall and pump water from the C-38 Canal (aka Kissimmee River) and Blanket Bay Slough and will treat it on the 7,030-acre ranchland. The total cost of the project is $49.2M of which $10.6 were appropriated under State Appropriation 1590A and the reminder is subject to receiving funds from the Florida Legislature<br>2. Status: Permitting |
| 6 | Lake Hicpochee Hydrologic & Water Quality Enhancement Project Expansion (Phase II) | WLO | - | None | Regional | Quantity | 1.1 | 12,100 | The goal of the Phase I of Lake Hicopochee Hydrologic Enhancement is to re-direct or capture excess surface water from the C-19 Canal, which discharges directly into the Caloosahatchee River, divert it to a shallow water storage area (flow equalization basin), and distribute it via a spreader canal to the northwestern portion of Lake Hicpochee.<br>Phase II of the project will increase the operational capacity of the flow equalization basin and spreader swale currently constructed under Phase I.<br>This project is located in the West Lake Okeechobee subwatershed. However, it primarily benefits the Caloosahatchee River Watershed<br>Cost Estimate: $88M (includes feasibility study) |
| 7 | Grassy Island Interim Storage | TC/NS | S-191 | Quality<br>Quantity (maybe) | Regional | Quantity | 0.4 | 1,240 | The project's objective is to increase regional surface water storage capacity and operational flexibility of the primary stormwater conveyance system<br>Cost Estimate: $5.3K (design/engineering/construction) |
| 8 | Brady Ranch Interim Storage | TC/NS | S-191 | Quality<br>Quantity (maybe) | Regional | Quantity | 1.7 | 5,900 | The project's objective is to expand regional surface water storage and reduce the volume of flow that is lost to tide or otherwise results in harmful discharging to receiving waters.<br>Cost Estimate: $12M |
| 9 | L-59 Interim Storage | IP | L-59W | Quality (maybe)<br>Quantity (maybe) | Regional | Quantity | 1.7 | 7,900 | The project's objective is to expand regional surface water storage and reduce the volume of flow that is lost to tide or otherwise results in harmful discharging to receiving waters.<br>Cost Estimate: $9.9M (design/engineering/construction) |
| 10 | Long-term Water Quality Improvement Projects Solicitation | TBD | TBD | TBD | Regional | TBD | TBD | TBD | Provide shallow storage, retention/detention, or treatment to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities in BMAP priority subwatershed/basins. Cost Estimate: Varies |
| 11 | Short-term Water Quality Improvement Projects Solicitation | TBD | TBD | TBD | Regional | TBD | TBD | TBD | Provide shallow storage, retention/detention, or treatment to enhance Lake Okeechobee and estuary health by reducing discharge volumes, reducing nutrient loading to downstream receiving waters, and expanding groundwater recharge opportunities in BMAP priority subwatersheds/basins. Cost Estimate: Varies |
| 12 | C-38 Reservoir Assisted Stormwater Treatment Area | TC/NS | S-154C<br>S-133 | Quality<br>Quantity (maybe) | Regional | Quality | TBD | TBD | The project's goal is to treat water from three (3) priority basins (S-154, S-154C and S-133) in the Taylor Creek/Nubbin Slough Subwatershed and/or Lake Okeechobee |
| 13 | Turkey Branch | WLO<br>In-Lake | - | None | Regional | Quality | TBD | TBD | This public private partnership project will expand existing Management Measure ID 41 - Dispersed Water Management Lykes Nicodemus Slough across US Highway 27 by approximately 18,000 acres (storage: 15,000 acres; treatment: 3,000 acres) to allow for storage, treatment and release of beneficial base flow water to the Caloosahatchee River. The project will also have the capacity to cycle back to Nicodemus and Lake Okeechobee.<br><br>Estimated Capacity: 40,000 acre-feet<br>Estimated Average Annual TP Reduction: 2 - 3 mt/yr<br>Estimated Average TN Reduction: 10 - 14 mt/yr |
| 14 | West Water Hole Expansion | IP | C-40 | Quality | Regional | Quality | 1 | TBD | This public private partnership project will treat and remove phosphorus and nitrogen from the regional system by adding 500 acres to the existing Management Measure ID 25 - Florida Ranchland Environmental Service Project (FRESP) - Lykes Bros. West Waterhole Project for a total project area of 3,000 acres and estimated nutrient reductions of TP: 7.6 mt/yr and TN: 33.6 mt/yr |
| 15 | Conservation Easement Program | TBD | TBD | TBD | TBD | TBD | TBD | TBD | Program for protection, restoration, and enhancement of lands in BMAP priority subwatersheds/basins through conservation easements |