C

MFLs and Prevention and Recovery Strategies

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MINIMUM FLOWS AND MINIMUM WATER LEVELS

The South Florida Water Management District (SFWMD or District) adopts minimum flows and minimum water levels (MFLs) to establish the point at which water resources, or the ecology of the area, will experience significant harm from further withdrawals. Additionally, the SFWMD adopts prevention and recovery strategies with MFLs to prevent the MFL from being violated in the future or to recover the waterbody to meet the MFL as soon as practicable. In the Lower East Coast (LEC) Planning Area, the SFWMD has adopted MFLs and prevention/recovery strategies for six water bodies (**Table C-1** and **Figure C-1**).

Table C-1. MFL waterbodies in the LEC Planning Area.

MFL Waterbody	MFL Status	Reference
Lake Okeechobee	Recovery	Subsection 40E-8.221(1), F.A.C. Subsection 40E-8.421(2), F.A.C.
Everglades	Recovery	Subsection 40E-8.221(3), F.A.C. Subsection 40E-8.421(2), F.A.C.
Northwest Fork of the Loxahatchee River	Recovery	Subsection 40E-8.221(4), F.A.C. Subsection 40E-8.421(6), F.A.C.
Florida Bay	Prevention	Subsection 40E-8.221(5), F.A.C. Subsection 40E-8.421(8), F.A.C.
Biscayne aquifer	Prevention	Section 40E-8.231, F.A.C. Subsection 40E-8.421(3), F.A.C.
Lower West Coast aquifers	Prevention	Section 40E-8.331, F.A.C. Subsection 40E-8.421(4), F.A.C.

F.A.C. = Florida Administrative Code; MFL = minimum flow and minimum water level.

The MFL criteria and prevention and recovery strategies adopted for all but one of these MFLs are discussed in this appendix. The MFL and prevention strategy for the Lower West Coast aquifers affect a portion of the LEC Planning Area but are included in the Lower West Coast water supply plan updates. Further information on MFLs and prevention and recovery strategies can be found in the *2021–2024 Support Document for Water Supply Plan Updates* (2021–2024 Support Document; SFWMD 2021) and on the District's webpage (http://www.sfwmd.gov/lecplan).

All criteria for the six MFLs listed in **Table C-1** remain unchanged. However, the Lake Okeechobee MFL recovery strategy has been updated due to completion of Herbert Hoover Dike (HHD) repairs and updated operational schedule for Lake Okeechobee, which necessitated analyses and updates to only the capital projects component. Capital projects that provide support for MFL water bodies in the LEC Planning Area are listed in **Table C-2**.

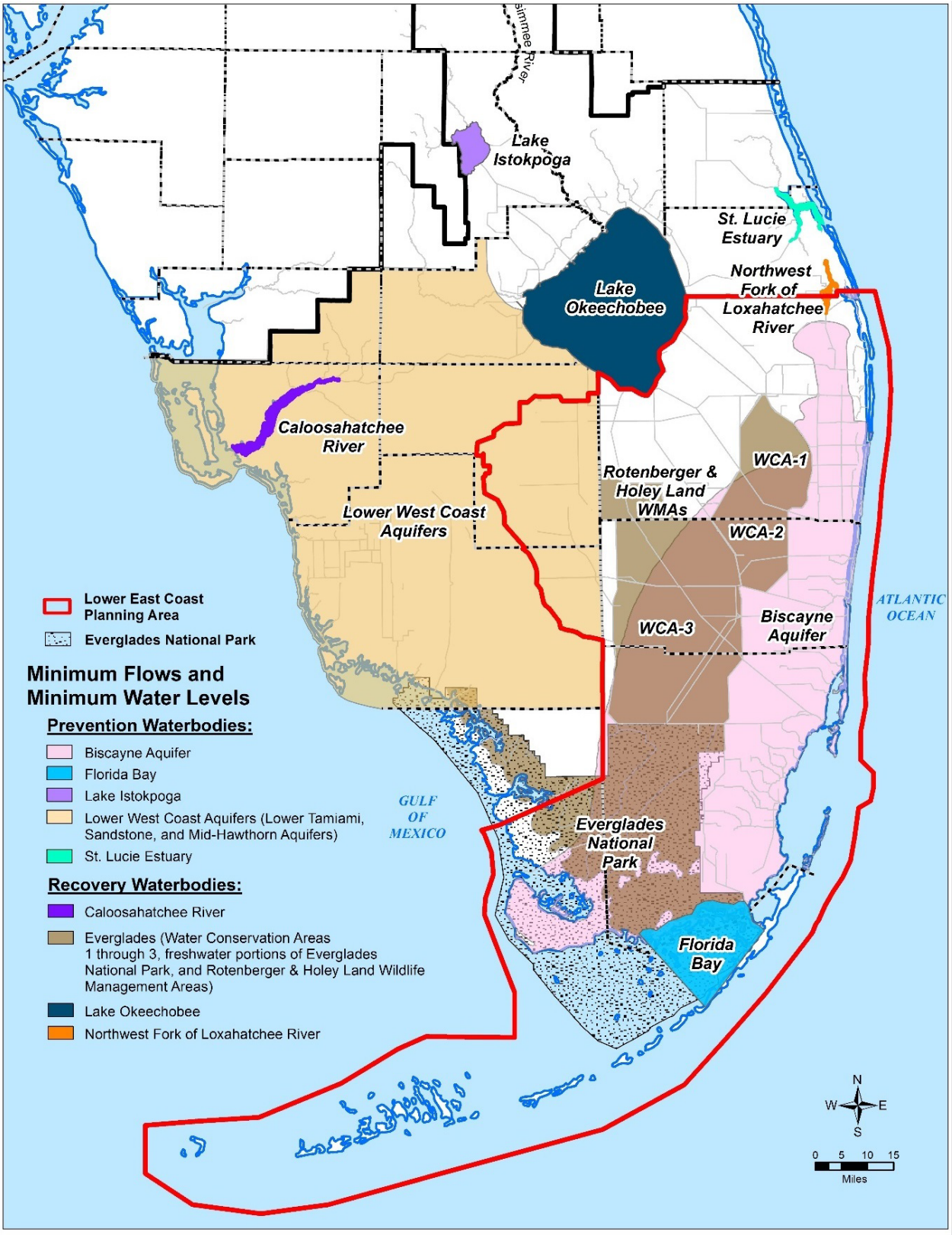

Figure C-1. Adopted MFLs in the South Florida Water Management District.

Table C-2. Capital projects that provide water supplies supporting minimum flow and minimum water level water bodies in the LEC Planning Area.

MFL Water Body	Capital Project	Project Objectives and Description	Lead Agency	Lead Program	Project Partners	2023–2024 Status
Biscayne Aquifer	Broward County Secondary Canal System	Reduce water shortages in local wellfields and stabilize the saltwater interface by pumping excess water from the C-9, C-12, and C-13 canal basins into the coastal canal systems to maintain canal stages at optimum levels. Includes drawing water from other sources such as the North Lake Belt Storage Area, Lake Okeechobee, and the WCAs when basin water is insufficient. Also includes a series of water control structures, pumps, and canal improvements in the C-9, C-12, and C-13 canal basins and the east basin of the North New River Canal in central and southern Broward County.	SFWMD	CERP	USACE; Broward County	Project inactive.
Everglades	Western Everglades Restoration Project	Improve the quantity, quality, timing, and distribution of water in the western Everglades. Includes active and passive features and alterations to existing canals and levees to re-establish connectivity of wetland and upland habitats in the western Everglades with restored freshwater flow paths, flow volumes and timing, seasonal hydroperiods, and historical distributions of sheetflow across a portion of the Seminole Tribe of Florida Big Cypress Reservation and into Big Cypress National Preserve.	USACE	CERP	SFWMD	Planning design complete. Final PIR is anticipated to be completed in 2024.
Everglades and Biscayne Aquifer	Broward County Water Preserve Areas: C-11 Impoundment, C-9 Impoundment, and WCA-3A/3B Seepage Management Projects	Capture and store rainwater; reduce phosphorus and other nutrients entering the Everglades; reduce seepage out of the Everglades; increase urban drinking water supplies; reduce saltwater intrusion, and increase the spatial extent of wetlands in South Florida. Project area is in Broward County, at the eastern extent of WCA-3A/3B, and within the limits of Weston, Pembroke Pines, Miramar, and Southwest Ranches.	USACE	CERP	SFWMD; Broward County	The C-11 Impoundment design is anticipated to be completed and a construction contract awarded in 2024. The C-11 Impoundment construction will be completed in 2027. The C-9 Impoundment design is expected in 2024, and construction is expected to begin in 2030. WCA-3A/3B Seepage Management Area construction is anticipated to begin in 2027.

Table C-2. Continued.

MFL Water Body	Capital Project	Project Objectives and Description	Lead Agency	Lead Program	Project Partners	2023–2024 Status
Everglades and Florida Bay	C-111 South Dade Project	Improve hydrologic conditions in Taylor Slough, its headwaters (Rocky Glades), and the eastern panhandle of ENP and increase freshwater flows to northeastern Florida Bay. Includes construction of a detention and buffer system with three pump stations (S-332B, S-332C, and S-332D) and three detention areas, and acquisition of required land in the Rocky Glades, Frog Pond, and Southern Glades areas.	USACE	South Florida Ecosystem Restoration Program	SFWMD	Construction of detention areas and buffer system complete and S-332B and S-332C pump replacement ongoing.
Everglades and Florida Bay	C-111 Spreader Canal Project – Phase 1 (Western)	Improve the quantity, timing, and distribution of freshwater flows to Florida Bay and restore wetland habitat functions to freshwater wetlands and estuaries adjoining Florida Bay by reducing seepage from Taylor Slough. Includes a 530-acre infiltrating detention area in the Frog Pond area, a 225-cfs pump station (S-200) downstream of S-176, a second linear infiltration feature, a 225-cfs pump station (S-199) immediately upstream of S-177, a plug in the L-31E Canal near S-20A, 10 plugs in the C-110 Canal, weirs in the Aerojet Road Canal, and potential operational modifications at the S-18C and S-20 structures.	USACE	CERP	SFWMD	Requires Project Partnership Agreement (PPA) to be reconciled with BBSEER.
Everglades, Florida Bay, and Biscayne Aquifer	C-111 Spreader Canal Project – Phase 2 (Eastern)	Rehydrate and improve ecological conditions in the Southern Glades and Model Lands at shallow depth and low velocity; improve sheetflow to ENP, northeastern Florida Bay, and the Biscayne Bay Aquatic Preserve; and maintain a barrier to saltwater intrusion into the Biscayne aquifer. Alternatives include backfilling the lower C-111 Canal and/or replacing existing portions of the lower C-111 Canal with a spreader canal.	USACE	CERP	SFWMD	In planning and land acquisition; pending additional congressional authorization.
Everglades, Lake Okeechobee, and Florida Bay	Central Everglades Planning Project (CEPP)[a]	Capture water lost to tide and improve the quantity, quality, timing, and distribution of water flows south to the central Everglades (WCA-3A/3B), ENP, and Florida Bay. Includes water storage, treatment, and conveyance south of Lake Okeechobee; removal of canals and levees; and construction of seepage management features to protect developed areas from the increased flow of water through the central portion of the system.	USACE	CERP	SFWMD	Anticipated completion of A-2 Reservoir construction is 2034. Construction of the A-2 STA is ongoing and initial hydration date is scheduled for December of 2024. North New River Canal Conveyance improvements will be completed by November 2025 and Miami Canal improvements by 2027.

Table C-2. Continued.

MFL Water Body	Capital Project	Project Objectives and Description	Lead Agency	Lead Program	Project Partners	2023–2024 Status
Everglades and Florida Bay	Modified Water Deliveries to ENP	Deliver more water to Northeast Shark River Slough in ENP from WCA-3. Includes conveyance and seepage control features, Tamiami Trail modifications, and an 8.5-square-mile flood mitigation plan.	USACE	N/A	USDOI	Constructed and operational.
Lake Okeechobee	Lake Okeechobee Watershed Restoration Project	Capture, store, and redistribute water entering the northern part of Lake Okeechobee to improve lake levels and the quantity and timing of discharges to the Caloosahatchee and St. Lucie estuaries; restore wetlands and re-establish connections among natural areas that have become spatially and/or hydrologically fragmented; increase the quantity and quality of native wildlife habitat and vegetation; and improve existing and future water supply. The project benefits five sub-basins (approximately 950,000 acres) within the Lake Okeechobee watershed, Lake Okeechobee, and the Caloosahatchee and St. Lucie estuaries in Okeechobee, Glades, Highlands, and Martin counties.	USACE	CERP	SFWMD	Paradise Run Wetland Feature is in Planning Status. Ongoing technical review of scientific testing and analyses to support ASR systems.
Lake Okeechobee	Lake Okeechobee Component A Storage Reservoir (LOCAR)	Identify storage north of Lake Okeechobee. Includes construction of a 200,000-acre-foot reservoir to store water north of Lake Okeechobee for later use during dry periods. Provide for better management of lake water levels; reduce high flows to the estuaries and improve operational flexibility.	SFWMD	N/A	SFWMD	Section 203 Final Feasibility Study and Report complete. Final EIS was prepared by USACE and posted in Federal Register in January of 2024.
Northwest Fork of Loxahatchee River	G-160 and G-161 Structure Projects	Restore the natural hydroperiod and provide additional water to Loxahatchee Slough. Includes construction of the G-160 and G-161 structures.	USACE	CERP	SFWMD	Constructed and operational.

Table C-2. Continued.

MFL Water Body	Capital Project	Project Objectives and Description	Lead Agency	Lead Program	Project Partners	2023–2024 Status
Northwest Fork of Loxahatchee River	Loxahatchee River Watershed Restoration Project	Restore connectivity of the headwaters and provide restoration flows to the Northwest Fork of the Loxahatchee River. Includes the Pal Mar and J.W. Corbett Wildlife Management Area Hydropattern Restoration project; L-8 Basin modifications; the C-51 Reservoir and L-8 flow equalization basin; flow-way features in the L-8, C-18, and Loxahatchee tributary basins (Cypress, Kitching, and Moonshine creeks); and ASR technology. The L-8 Reservoir has been repurposed to address water quality issues and though it may be made available on an interim basis to provide deliveries to the river, permanent storage solutions such as the designated C-18 Impoundment replacement feature and/or Alternative L-8 Basin storage will be considered.	USACE	CERP	SFWMD	Loxahatchee Slough Natural Area hydrological restoration is ongoing. Additional restoration activities are expected to occur at Culpepper and Nine Gems sites.

ASR = aquifer storage and recovery; BBSEER = Biscayne Bay and Southeastern Everglades Ecosystem Restoration; CEPP = Central Everglades Planning Project; CERP = Comprehensive Everglades Restoration Plan; cfs = cubic feet per second; EIS = Environmental Impact Statement; ENP = Everglades National Park; LOCAR = Lake Okeechobee Component A Storage Reservoir; MFL = minimum flow and minimum water level; N/A = not applicable; PIR = Project Implementation Report; PPA = Project Partnership Agreement; SFWMD = South Florida Water Management District; STA = stormwater treatment area; USACE = United States Army Corps of Engineers; USDOI = United States Department of the Interior; WCA = water conservation area.

[a] CEPP includes four phases each requiring its own PPA: CEPP PPA Everglades Agricultural Area stores, treats, and sends new water to the Everglades. CEPP PPA North provides inflow needed to restore northern WCA-3A and move additional water south. CEPP PPA South removes water flow barriers in the southern portion of the project's footprint to allow natural flow of water south into ENP. CEPP PPA New Water (Seepage Barrier) eliminates losses due to levee seepage to the East Coast. Specific CEPP projects within these phases can be found in the CEPP Project Fact Sheet (USACE 2023).

LAKE OKEECHOBEE

MFL Criteria

In 2001, the SFWMD adopted an MFL of 11 feet National Geodetic Vertical Datum of 1929 (NGVD29) for Lake Okeechobee as set forth in Subsection 40E-8.221(1), Florida Administrative Code (F.A.C.). The MFL criteria were based on the relationship between water levels in the lake and the lake's ability to 1) protect the coastal portion of the surficial aquifer system against saltwater intrusion, 2) supply water to Everglades National Park, 3) provide littoral zone habitat for fish and wildlife, and 4) ensure navigational and recreational access (SFWMD 2000a). Consideration was given to the lake's function as a storage area for supplying water to adjacent areas such as the Everglades Agricultural Area (EAA), the Seminole Tribe of Florida reservations, and the Lake Okeechobee Service Area (LOSA).

Lake Okeechobee

An MFL exceedance occurs when the water level in Lake Okeechobee falls below 11 feet NGVD29 for more than 80 consecutive or nonconsecutive days during an 18-month period. The MFL compliance assessment period starts after the lake level falls below 11 feet NGVD29 or once an existing exceedance period ends while still below 11 feet and cannot include more than one wet season (May 31 through October 31) of any given calendar year. An MFL violation occurs when an exceedance occurs more than once every 6 years.

MFL History

An analysis was conducted in 2000 by the United States Army Corps of Engineers (USACE) and the SFWMD to determine whether the proposed Lake Okeechobee MFL criteria could be expected to be violated over the next 20 years. This information was needed to assess whether a prevention or recovery strategy would be needed for Lake Okeechobee. The South Florida Water Management Model (SFWMM or 2X2 Model) was used to evaluate the proposed MFL criteria in 5-year increments through 2020. The analysis considered projected growth in water use demands on the lake, the scheduled delivery and performance of the Central and Southern Florida (C&SF) Project components (USACE and SFWMD 1999), and the Water Supply and Environment (WSE) regulation schedule proposed for the lake. Details regarding the modeling analysis are available in the *2000 Lower East Coast Regional Water Supply Plan* (SFWMD 2000b).

Under these assumptions, the SFWMD determined the proposed Lake Okeechobee MFL criteria would not be violated despite the water shortage trigger line for Lake Okeechobee that existed in 2000 (Chapter 40E-22, F.A.C.) was lowered 0.50 feet. The proposed WSE regulation schedule was approved by the USACE in July 2000. A prevention strategy for Lake Okeechobee was approved simultaneously with MFL adoption in 2001.

However, in response to a series of hurricanes, high lake level events, and resulting high discharges to the Caloosahatchee and St. Lucie estuaries in 2004 and 2005, the USACE initiated a process to revise the WSE regulation schedule to improve management of Lake Okeechobee during high water conditions. In July 2007, after extensive public participation, the USACE published the *Final Environmental Impact Statement Including Appendices A through G: Lake Okeechobee Regulation Schedule* (USACE 2007). The goals of the Lake Okeechobee Regulation Schedule were later amended to address public health and safety concerns related to the structural integrity of the HHD. The USACE approved the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) on April 28, 2008.

As a result of the 2008 LORS, water levels within Lake Okeechobee were being managed at a lower overall elevation. Accordingly, MFL violations were projected to occur, and it became necessary to change the prevention strategy for the lake to a recovery strategy. See Order No. SFWMD 2008 – 364-DAO-WU (SFWMD 2008) for background information. **Figure C-2** shows the number of MFL exceedances and violations since the inception of the MFL in 2001.

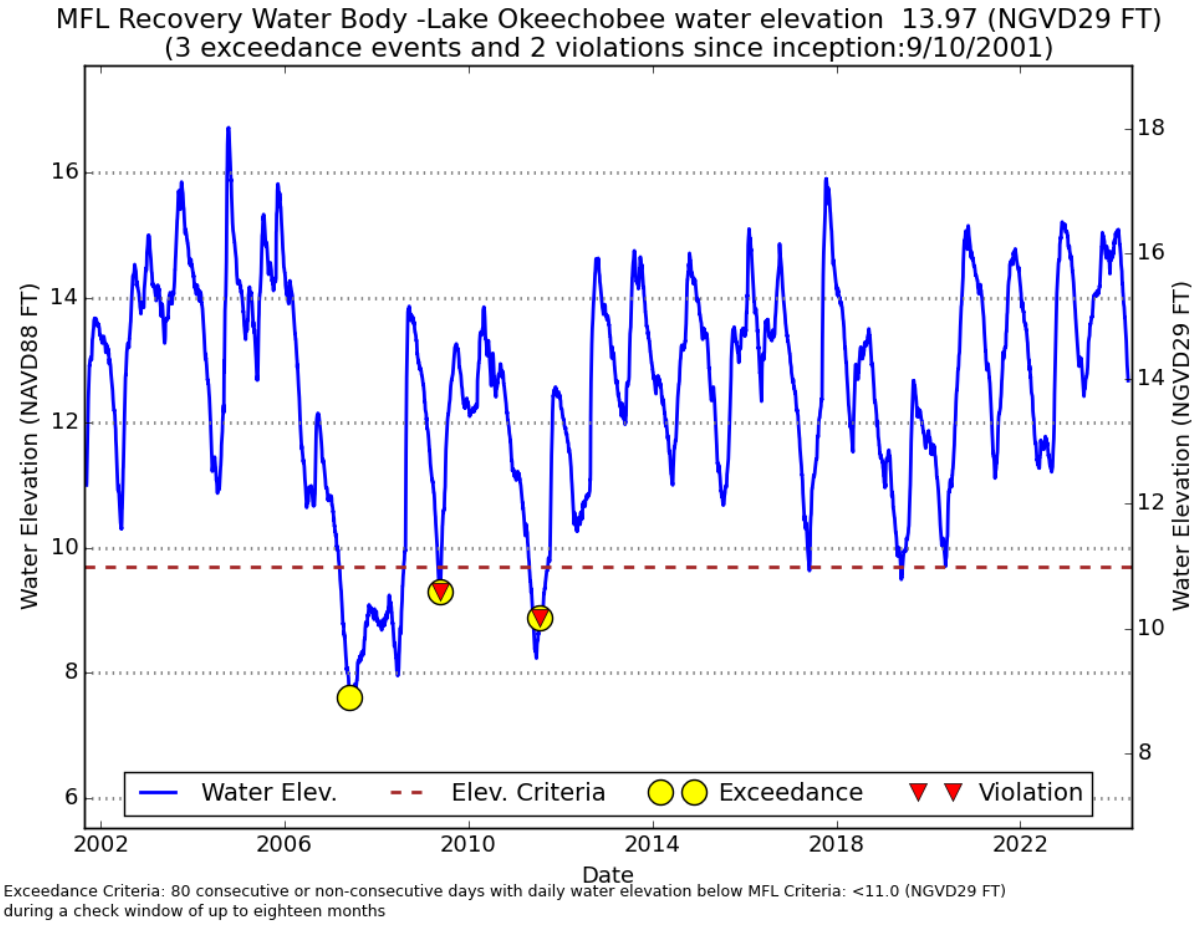

Figure C-2. Lake Okeechobee MFL exceedances and violations since the inception of the MFL in 2001.

The rehabilitation of the HHD was completed in 2023. In anticipation of the completion of the HHD repairs, the USACE initiated a re-evaluation of the regulation schedule for Lake Okeechobee in 2019, referred to as the Lake Okeechobee System Operating Manual (LOSOM) effort. The purpose of the LOSOM effort was to re-examine the opportunities to better balance the Congressionally authorized project purposes.

The USACE made available the Final Draft LOSOM Water Control Plan in 2023, and a final Record of Decision is anticipated by the end of 2024. The goals of the revised lake schedule are to send more water south, reduce damaging discharges to the Caloosahatchee and St. Lucie estuaries, and improve water supply performance. The USACE's mandate for LOSOM to balance multiple federal objectives for the lake resulted in only modest improvement in Lake Okeechobee MFL performance. The SFWMD's analyses indicate that this improvement was insufficient to return the lake to prevention status; therefore, the lake will remain in recovery status.

The environmental enhancement, regulatory criteria, and water shortage components of the previously approved MFL recovery strategy will not change. The SFWMD will continue to allocate water for existing and future reasonable-beneficial uses pursuant to its regulatory rules and criteria. The capital projects component has been revised. Capital projects contemplated in the Comprehensive Everglades Restoration Plan (CERP) are still being planned and constructed within the lake's watershed. The analyses conducted to support this conclusion and an updated Lake Okeechobee MFL recovery strategy are presented below.

Summary of Analyses Supporting Revised MFL Recovery Strategy

Regional Modeling of Past Climactic Conditions

The Lake Okeechobee stage, subject to rainfall and other stresses between 1965 to 2016 (52 years), was modeled under four scenarios using the Regional Simulation Model Basin (RSMBN). The RSMBN is a specific application of the Regional Simulation Model (RSM) that covers the spatial extent of the Lake Okeechobee watershed, including the EAA and Northern Estuaries (Caloosahatchee and St Lucie). The four scenarios represent four incremental components of restoration applied during the 1965 to 2016 climactic conditions beginning with the LOSOM regulation schedule, then adding the Central Everglades Planning Project (CEPP) EAA A-2 Reservoir and Stormwater Treatment Area (STA), the Lake Okeechobee Component A Storage Reservoir (LOCAR), and finally, the Lake Okeechobee Watershed Restoration Project (LOWRP) consisting of 55 aquifer storage and recovery (ASR) wells. The RSMBN modeling scenarios were reviewed from the perspective of ensuring that localized effects of project implementations were observed as expected and that regional performance was considered reasonable. Specific checks on RSMBN outputs included the following:

- Lake Okeechobee performance relative to LOSOM baseline is shown in **Figure C-3**. The figure shows Lake Okeechobee stage duration, illustrating that the added water management features help to maintain more desirable stages within Lake Okeechobee.
- Lake Okeechobee MFL exceedances for the specific simulated 1965 to 2016 hydrology (deterministic method) are shown in **Figure C-4**. This shows that added water management features would have reduced the potential number of MFL exceedances within Lake Okeechobee.

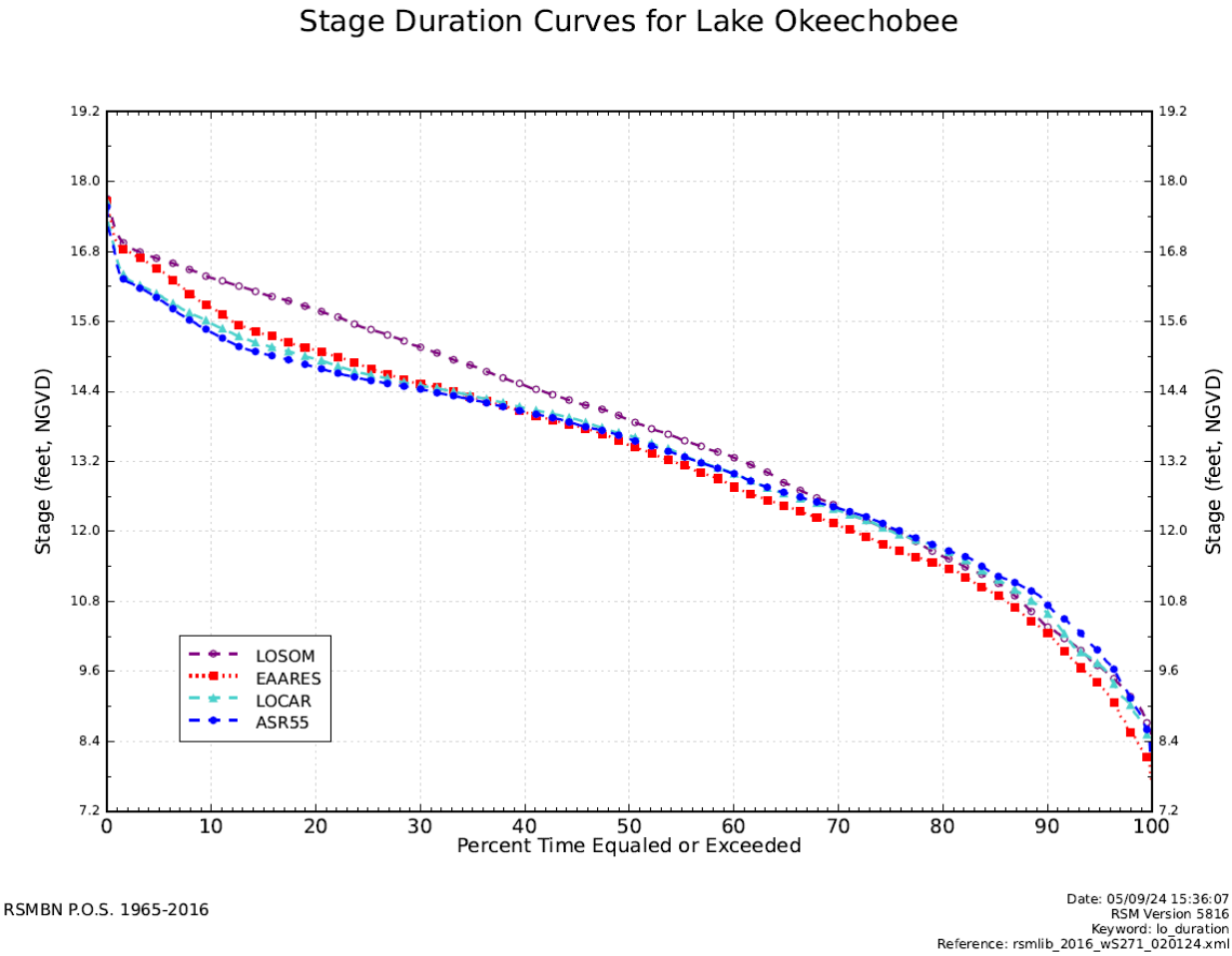

Figure C-3. Lake Okeechobee stage duration curve comparing all scenarios (EAARES is LOSOM + EAA Reservoir; LOCAR is LOSOM + EAA Reservoir + LOCAR; ASR55 is LOSOM + EAA Reservoir + LOCAR + ASR55).

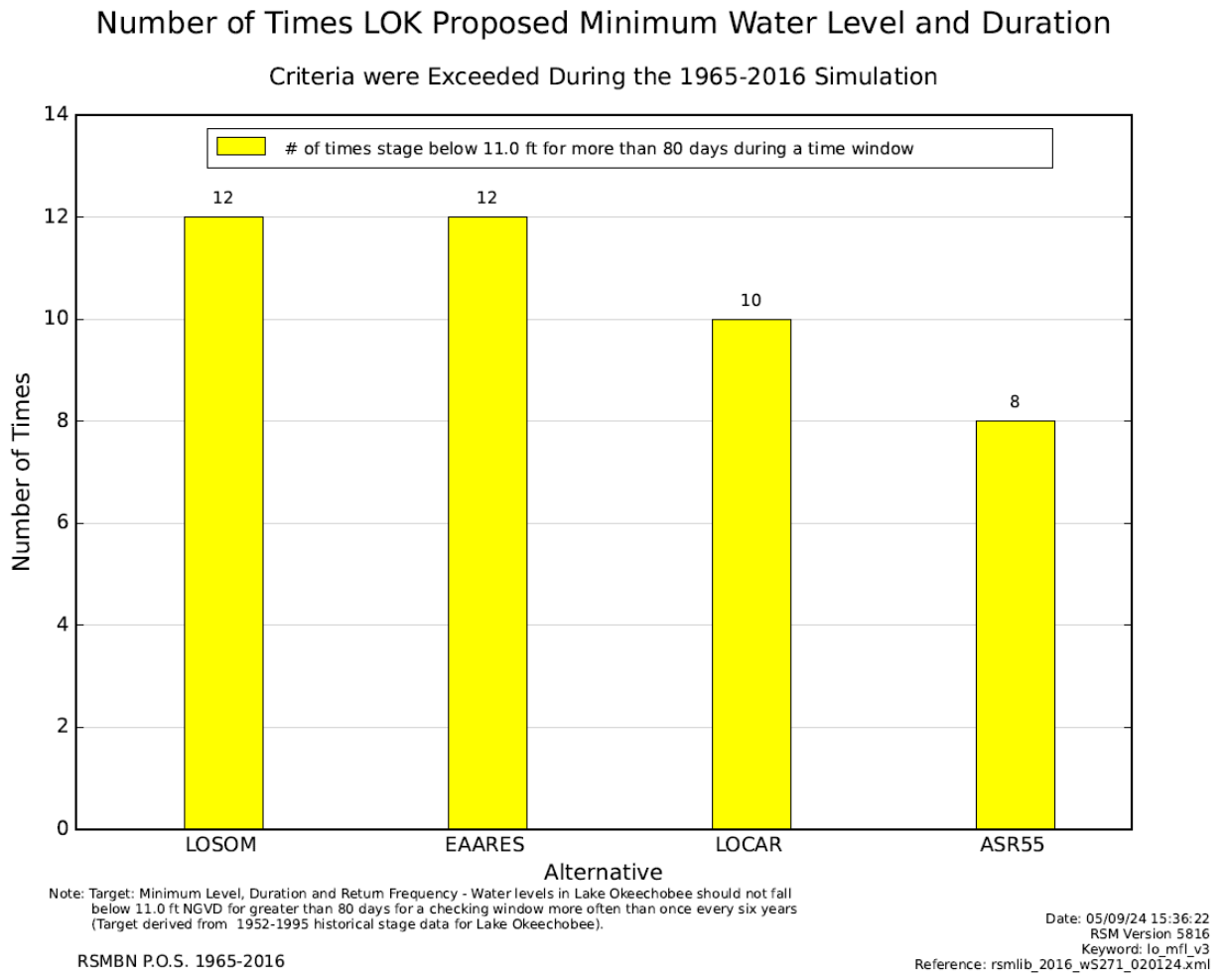

Figure C-4. Lake Okeechobee MFL exceedance comparison for all scenarios (EAARES is LOSOM + EAA Reservoir; LOCAR is LOSOM + EAA Reservoir + LOCAR; ASR55 is LOSOM + EAA Reservoir + LOCAR + ASR55).

The model, subject to historical climatic data for each scenario, resulted in a single, stage time series for each simulation. The model simulation results are summarized below and were evaluated using two analytical methods: deterministic and probabilistic. Additional details on the analyses are available in the modeling technical document (SFWMD 2024a) and the analytical methods document (SFWMD 2024b).

Analyses of Simulated MFL Exceedances and Violations

Deterministic Modeling Analysis

The traditional (deterministic) approach applied the MFL exceedance and violation criteria from the MFL rule to the single, stage time series for each simulation that was subjected to historical climatic data. The sum of MFL criteria for exceedances and violations of each scenario was then calculated to evaluate MFL performance across the proposed set of projects.

Using the LOSOM regulation schedule and adding the EAA Reservoir (**Figure C-5**) component to the model resulted in a modeled output of 12 exceedances and 7 violations over the 52-year period of simulation (POS). The scenario with LOCAR implementation (**Figure C-6**) resulted in a modeled output of 10 exceedances and 5 violations over the 52-year POS (a 29% reduction). With the addition of the ASR component to the model (**Figure C-7**), modeled violations were further reduced to 3 (57%) and indicated no violation for the years 2009 and 2011 when violations actually did occur. Several sensitivity runs were conducted, and model results indicated more storage would be required beyond the proposed storage projects to eliminate violations over the 52-year POS.

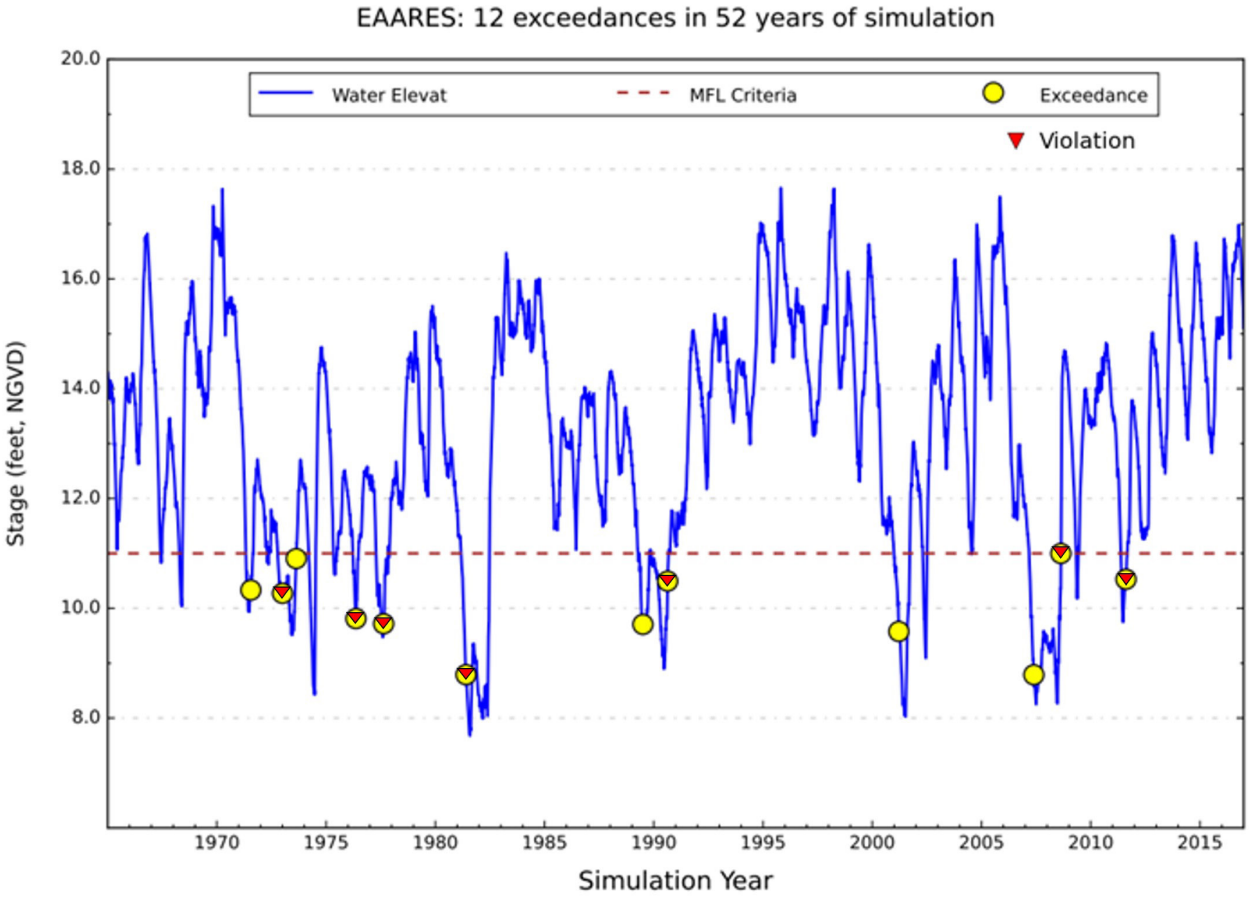

Figure C-5. MFL simulated exceedances and violations under LOSOM + EAA Reservoir (1965 to 2016).

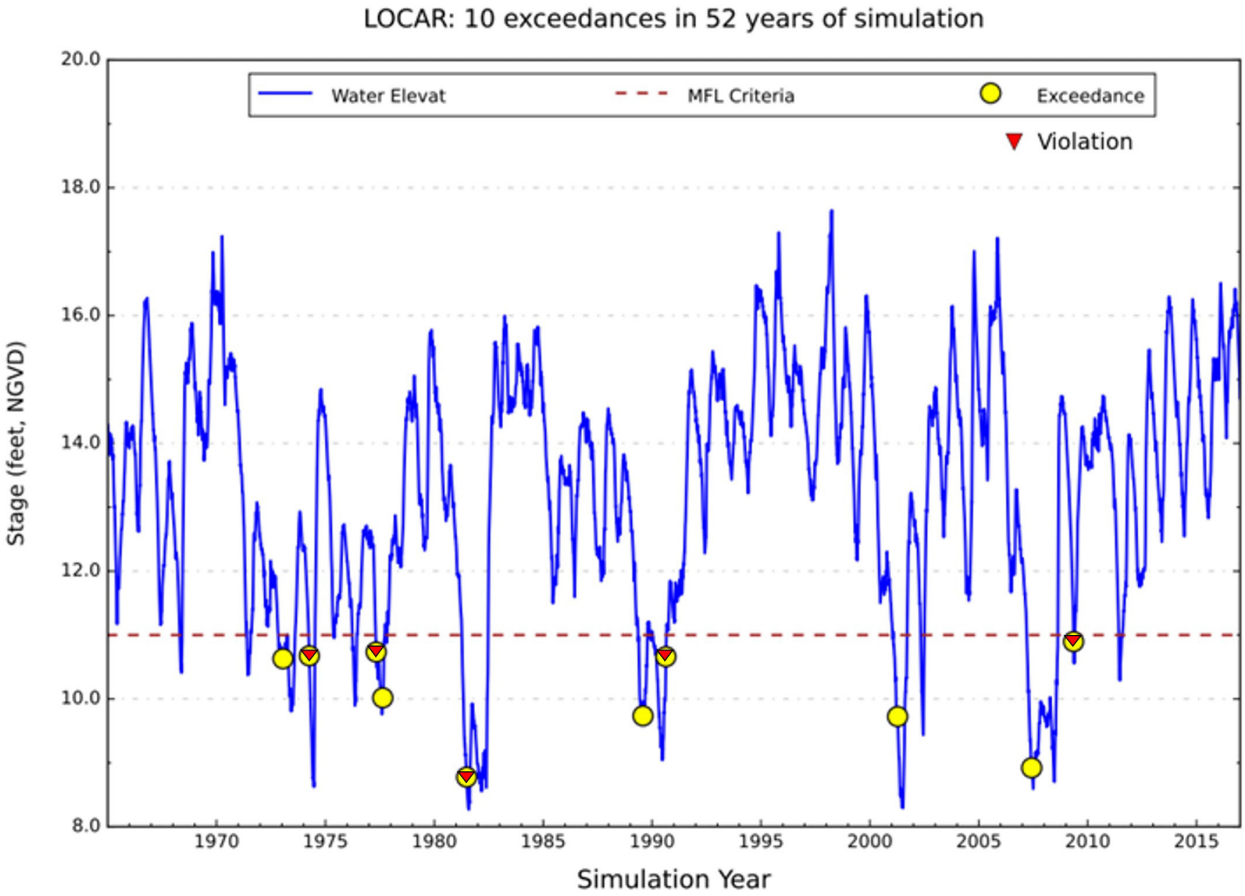

Figure C-6. MFL simulated exceedances and violations under LOSOM + EAA Reservoir + LOCAR (1965 to 2016).

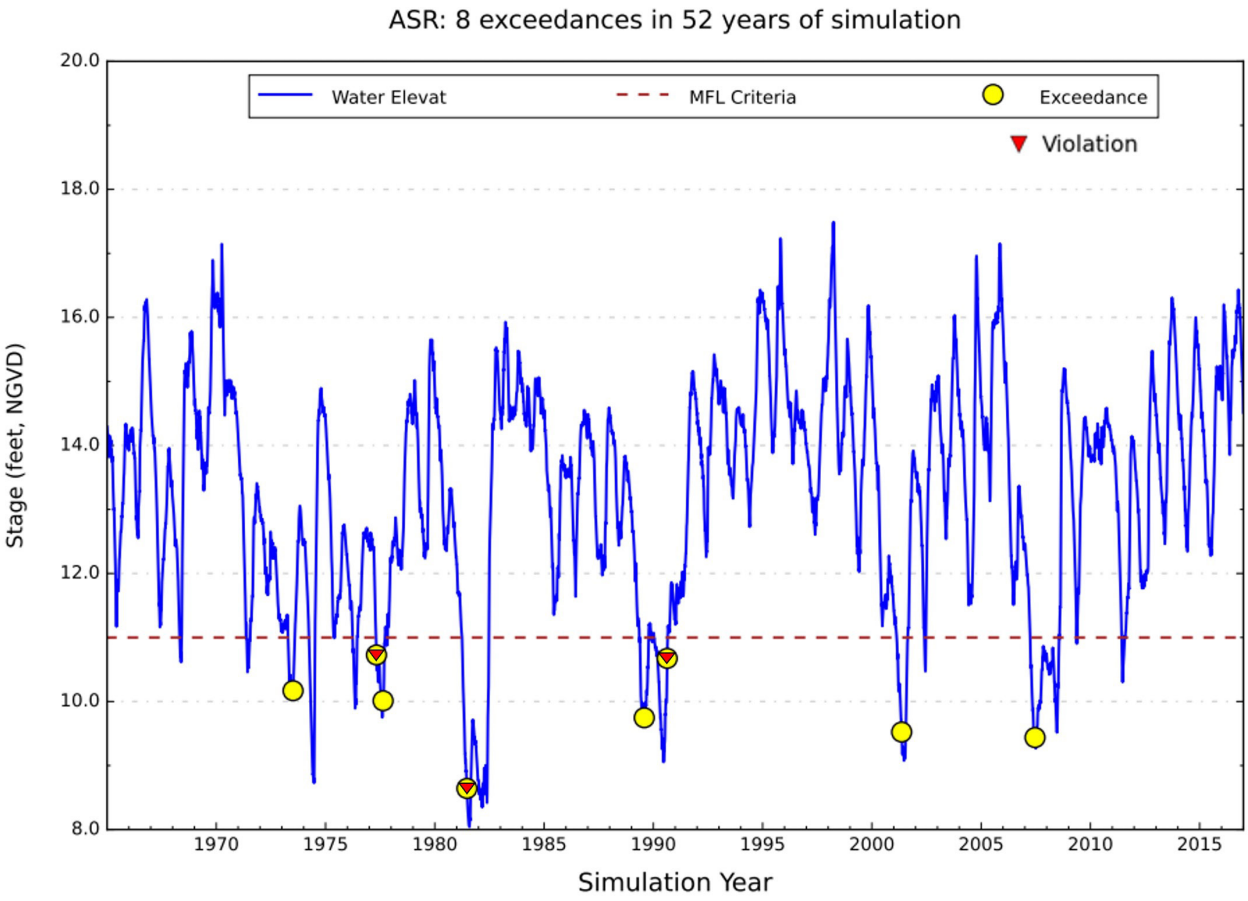

Figure C-7. MFL simulated exceedances and violations under LOSOM + EAA Reservoir + LOCAR + ASR (1965 to 2016).

Probabilistic Modeling Analysis

The deterministic approach, as applied above, bases the likelihood of experiencing a violation in the next 20 years on one simulation using historical rainfall conditions. A probabilistic approach, however, uses the characteristics of historical rainfall but introduces a randomization of the sequence of the rainfall time series, that when simulated a large number of times, can generate a risk profile of a violation occurring into the future. Section 373.0421, Florida Statutes (F.S.), Establishment and Implementation of Minimum Flows and Minimum Water Levels, specifies that evaluation of an MFL waterbody should be prospective, meaning that analysis is conducted into the future, in this case 20 years. The probabilistic approach complies with statutory requirements of the 20-year prospective evaluation and incorporates uncertainty in rainfall conditions.

Figure C-8 represents the Atlantic Multidecadal Oscillation (AMO) index and global average temperature of the North Atlantic Ocean. The positive numbers represent the warm phases, and the negative numbers are the cool phases. Since the mid-1990s, the AMO has been in the warm phase, which historically has meant more plentiful rainfall in Central and South Florida when the North Atlantic Ocean is in its warm phase and conversely more persistent droughts and wildfires than in the cool phase. Climate scientists at the National Oceanic and Atmospheric Administration (NOAA) have noted that the 20-year switch back to the cool phase is overdue (2015); however, climate change may extend the duration of the warm phase indefinitely due to the warmer global ocean waters (Mann et al. 2020). For the 20-year projection of the probabilistic method, it has been assumed that the AMO warm phase will continue during this period.

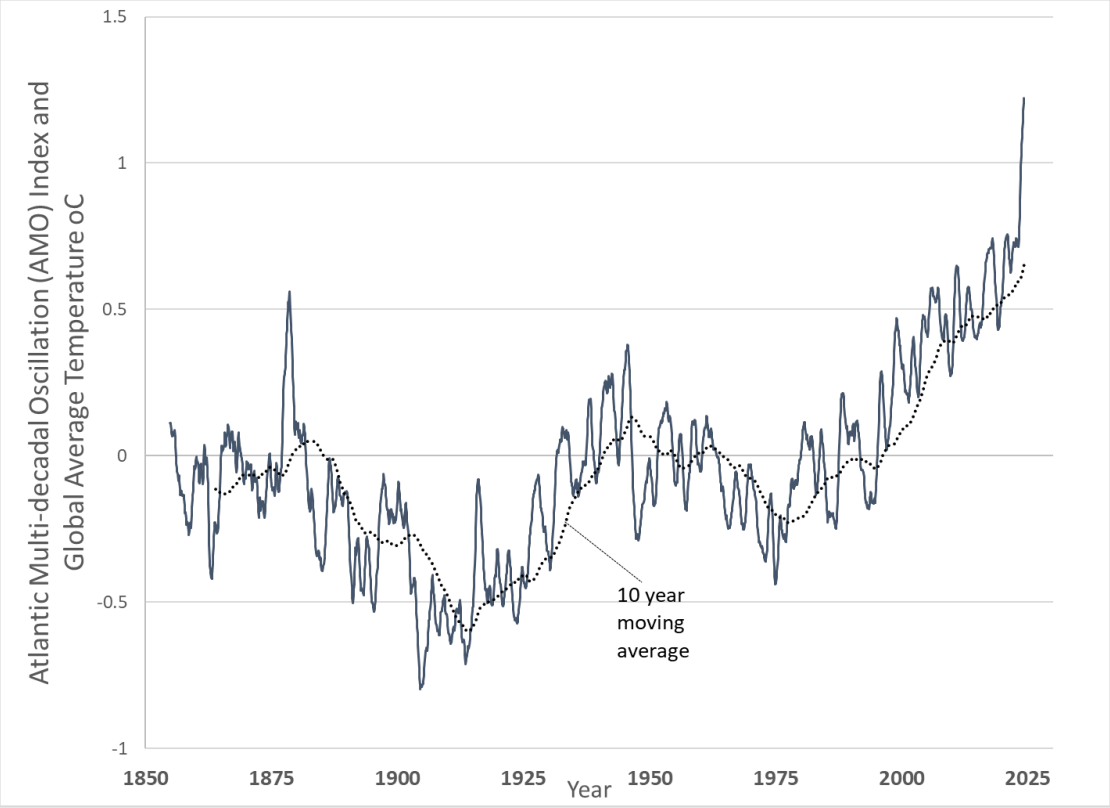

Figure C-8. Atlantic Multidecadal Oscillation phases from the mid-1800s to present.

Using the same input, assumptions, and scenarios as the deterministic method (i.e., the 52--year POS), the probabilistic method defined exceedance and violation events distributed via a Monte Carlo routine to generate 1,000 simulated event sequences over the next 20 years by sampling the waiting time between events. The results (**Figure C-9**) indicated comparable statistics between the probabilistic and deterministic methods.

Using the complete model record and ignoring the changing climate (**Figure C-9a**), there is a 6% chance of zero violations under LOCAR, and a 12% chance of zero violations (>50% probability of having at least 2 violations) with the addition of ASR. Under the assumption of an AMO warm phase continuation using just the 1995 to 2016 period of record (**Figure C-9b**), the probability of zero violations is increased to 43% and 67% with the LOCAR and ASR scenarios, respectively.

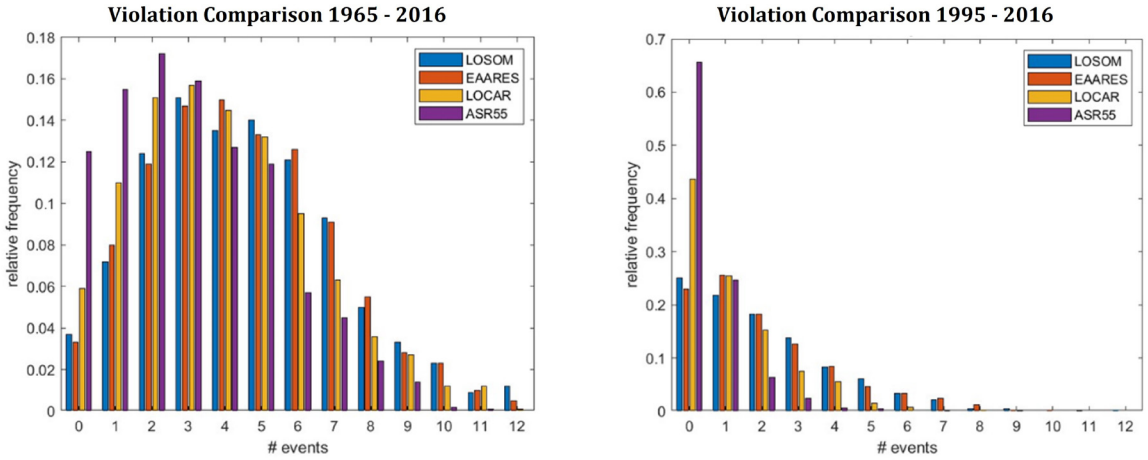

Figure C-9. Summary of simulated MFL violations for the (a) 52-year period of simulation (1965 to 2016) and (b) Atlantic Multidecadal Oscillation warm phase (1995 to 2016) using the probabilistic method.

All these lines of evidence inform the overall approach to a recovery strategy for the Lake Okeechobee MFL. During the 20-year planning horizon of the *2023–2024 Lower East Coast Water Supply Plan Update* (2023–2024 LEC Plan Update), meaningful projects will be constructed under CERP and state law ultimately leading to the adoption of Component F in CERP. Component F of CERP changes the Lake Okeechobee regulation schedule with consideration of additional storage components, which will improve MFL performance. While there is growing evidence that rainfall conditions under the foreseeable warm phase of the AMO will result in fewer MFL violations, including the possibility of zero violations after CERP, it remains prudent to maintain the restricted allocation area (RAA) within LOSA. This means that the District will not grant additional allocations in LOSA above the established base condition. Absent any offsets, existing legal users will continue to be able to meet the conditions for permit issuance for only their existing allocations.

Additional Considerations

- Additional projects are being constructed and operated as part of the Northern Everglades and Estuaries Protection Program in the Lake Okeechobee watershed that provide approximately 80,000 acre-feet of storage in the basin.

- The USACE has the authority for development and implementation of the Lake Okeechobee Regulation Schedule; therefore, the SFWMD does not have the exclusive authority to implement operational changes to lake stage management that might optimize the lake's MFL performance.
- Climate uncertainty affects the ability to accurately develop projections of the potential for MFL violations.
- Chapter 40E-8, F.A.C., Minimum Flows and Levels, is not intended to drought-proof a water body, so there is an expectation that MFLs may still be violated during extreme drought or water shortage events despite the best efforts contained in the recovery strategy.
- Most MFL waterbodies in the State of Florida have been established with the intent of limiting the negative effects of water withdrawals on the established threshold MFL water levels or flows. The LOSA RAA Rule has been in place since 2008 and serves a similar function—to limit additional allocations to a maximum base condition amount established in 2008.
- The RSMBN model has been peer reviewed and certified for use in CERP planning projects by the USACE. The model for the CERP LOWRP simulates similar storage features, and uncertainties have been analyzed and documented.

Recovery Strategy

The Lake Okeechobee MFL recovery strategy consists of four components as set forth in Subsection 40E-8.421(2), F.A.C.:

1. Environmental enhancement projects to be implemented during extreme low lake stages
2. Regulatory criteria for consumptive uses of lake water (i.e., LOSA RAA Rule)
3. Water shortage restrictions as described in Chapter 40E-21, F.A.C.
4. Capital projects that improve storage capacity both within and adjacent to the lake

For this updated version of the recovery strategy, there are no changes to the first three components. Several large-scale CERP storage projects are included in the capital projects component and will be constructed and implemented during the 20-year planning horizon (**Table C-3**).

Table C-3. Large-scale CERP storage projects that are components of the Lake Okeechobee MFL recovery strategy.

Name	Storage Capacity
CEPP EAA A-2 Reservoir and STA	240,000 ac-ft
Lake Okeechobee Component A Storage Reservoir (LOCAR)	200,000 ac-ft
Lake Okeechobee Watershed Restoration Project (LOWRP, 55 ASR Wells)	308,000 ac-ft*

ac-ft = acre-feet; ASR = aquifer storage and recovery; CEPP = Central Everglades Planning Project; EAA = Everglades Agricultural Area; LOCAR = Lake Okeechobee Component A Storage Reservoir; LOWRP = Lake Okeechobee Watershed Restoration Project; STA = stormwater treatment area.
* Note: Assuming year-round operation.

These projects represent a significant capital investment that, among other things, will incrementally improve MFL performance. Once construction is completed, each of these projects will require development of project-specific operating manuals that will describe operational protocols. These protocols will need to be recognized and incorporated into the RSMBN model to best reflect how these operations affect Lake Okeechobee stages and, therefore, their effect on MFL performance. In addition, CERP Component F, described above, recognizes that as CERP project components are implemented, the Lake Okeechobee Regulation Schedule would be updated. Changes in the Lake Okeechobee Regulation Schedule will have an effect on reducing the potential for Lake Okeechobee MFL violations.

Environmental Enhancement Component

Environmental enhancements (**Table C-4**) in and around the lake, such as native vegetation planting, controlled burns, and sediment scraping, are conducted during low water conditions.

Table C-4. Environmental enhancement components of the Lake Okeechobee MFL recovery strategy.

Lake Level	Activity	Benefits
At 11 feet NGVD29 and stage is falling	Conduct sediment scraping and other habitat enhancements, including removal of tussocks and other aggregations of organic material.	Promote natural compaction, removal, and/or oxidation of accumulated organic muck sediments. Remove barriers to fish migration in and out of the western littoral zone.
At or below 11 feet NGVD29	Conduct controlled burns if fuel load and weather conditions permit.	Facilitate removal of exotic species, such as torpedograss (*Panicum repens*).
Below 11 feet NGVD29	Allow maintenance and repair work on public boat ramps and docking as well as marina facilities.	Restore original design depth of the waterways and provide navigable access.
At 10.5 feet NGVD29 and stage is falling	Plant native terrestrial and emergent vegetation, such as bulrush (*Scirpus* spp.) (if a method for re-establishment proves to be feasible), native pond apples (*Annona glabra*), and cypress trees (*Taxodium distichum*) on the southern shore islands and rim canal spoil islands.	Re-establish native trees on the islands to prevent expansion of exotic and invasive vegetation; provide essential habitat for wading birds, raptors, and endangered species, such as the snail kite (*Rostrhamus sociabilis*) and Okeechobee gourd (*Cucurbita okeechobeensis*).
Between 10 and 11 feet NGVD29 and stage is rising	Plant native submerged and emergent vegetation species, such as bulrush.	Re-establish native plant species, which can prevent the expansion of exotic and invasive vegetation; assist in restoring fish and wildlife habitats; prevent uprooting of emergent and submerged plants; and reduce turbidity, which promotes and maintains submerged aquatic vegetation growth.
At 11 feet NGVD29 and stage is rising	Assess the feasibility of introducing apple snail (*Pomacea paludosa*) populations via an apple snail hatchery or other techniques.	Supplement native apple snail populations for the endangered Everglades snail kite.
Lake stage independent components	Investigate sediment management strategies in the tributaries and pelagic zone of the lake.	Remove phosphorus-laden sediment that could be resuspended; reduce light transparency, which discourages submerged vegetation growth and encourages phytoplankton bloom activity.

NGVD29 = National Geodetic Vertical Datum of 1929.

Regulatory Criteria Component

The regulatory criteria component of the Lake Okeechobee MFL recovery strategy is twofold and consists of the LOSA RAA and the SFWMD's Water Shortage Rules. The establishment of the LOSA RAA in 2008 was designed to protect existing legal users and prevent additional allocations of surface water from the regional system. Accordingly, while the base condition allocations are maintained for existing legal users, net increases in the volume of surface water withdrawn from the LOSA RAA are prohibited over that resulting from base condition water uses occurring from April 1, 2001 to January 1, 2008. Increased demands over the base condition water use within LOSA may be accommodated through reallocation of retired permits, use of alternative sources (e.g., groundwater), and implementation of offsets to recharge volumes equal to increased withdrawals in accordance with the rule's provisions in Subsection 3.2.1F of the *Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District* (Applicant's Handbook; SFWMD 2022).

Water Shortage Component

Implementation of the 2008 LORS was anticipated to result in more frequent and severe lake-based water shortages. To address this, the SFWMD changed the water shortage rules pertaining to Lake Okeechobee (Chapter 40E-21, F.A.C.) in November 2007 to clarify how water deliveries would be calculated and applied to agricultural uses within the Lake Okeechobee basin. Water shortage restrictions, Phases I through III or greater, may be imposed by the District Governing Board based on water shortage trigger levels for Lake Okeechobee (Subsection 40E-22.332, F.A.C.). These water shortage restrictions apply to withdrawals of surface water from 1) the Lake Okeechobee region as described in Subsection 40E-21.691(3), F.A.C. and 2) the Brighton and Big Cypress reservations, in accordance with the terms of the 1987 Water Rights Compact among the Seminole Tribe of Florida, the State of Florida, and the SFWMD ("Seminole Compact") per Subsections 40E-22.312 and 40E-22.322, F.A.C.

Capital Projects Component

The CERP capital projects that support the Lake Okeechobee MFL recovery strategy are described below and summarized in **Table C-2**. Once construction is completed, each of these projects will require development of project-specific operating manuals that will describe operational protocols. These protocols will need to be recognized and incorporated into the RSMBN model to best reflect how these operations affect Lake Okeechobee stages and, therefore, their effect on MFL performance. CERP Component F recognizes that as CERP project components come online, the Lake Okeechobee Regulation Schedule would be updated. Capital projects that support the Lake Okeechobee MFL recovery strategy include the following and their status is described below:

1. Lake Okeechobee Watershed Restoration Project (LOWRP)

2. Lake Okeechobee Component A Storage Reservoir (LOCAR)

3. Central Everglades Planning Project (CEPP) A-2 Reservoir and STA

Project Status

CERP Lake Okeechobee Watershed Restoration Project

In 2016, the USACE and SFWMD began planning efforts for the LOWRP to increase storage north of Lake Okeechobee with a reservoir and ASR well systems with the following goals and objectives:

- Improve the quantity, timing, and distribution of flows into Lake Okeechobee to maintain ecologically desirable lake stages more often.
- Improve the quantity and timing of discharges to the Caloosahatchee and St. Lucie estuaries.
- Restore wetlands.
- Improve water supply for existing legal users.

The Florida Legislature appropriated more than $150 million to the SFWMD for the design, engineering and construction of specific LOWRP components. The recommended plan consists of underground storage via 55 ASR wells and wetland restoration of 5,900 acres including Paradise Run and the Kissimmee River Center. Planning is ongoing to increase storage and to design and construct exploratory ASR wells. Design of a demonstration facility with a capacity of 10 million gallons per day at the C-38S location is under way. The USACE Chief of Engineers Report for the first phase of the LOWRP, including only the wetland restoration components, is expected to be considered in the Water Resources Development Act (WRDA) of 2024.

Lake Okeechobee Component A Storage Reservoir

In 2023, SFWMD began a feasibility study pursuant to Section 203 of the WRDA of 1986, as amended, for the LOCAR project to explore opportunities for aboveground storage north of Lake Okeechobee. After evaluating various project options, the LOCAR team identified a Tentatively Selected Plan that includes a reservoir with a storage capacity of 200,000 acre-feet. The LOCAR Section 203 Feasibility Study Report and the final Environmental Impact Statement were finalized and submitted in February 2024 to the Assistant Secretary of the Army Civil Works for consideration by Congress in the WRDA of 2024.

CERP Central Everglades Planning Project

Authorized by Congress in 2016, CEPP combines a series of CERP components into one Project Implementation Report (PIR). The purpose of CEPP is to improve the quantity, quality, timing, and distribution of water flows to the northern estuaries, central Everglades (Water Conservation Area [WCA]-3A, WCA-3B, and Everglades National Park), and Florida Bay while increasing water supply for municipal, industrial, and agricultural users.

The authorized project is divided into four phases: CEPP EAA, CEPP North, CEPP South, and CEPP New Water, which are all currently under construction. Due to the size and complexity of the project, the overall CEPP will occur over multiple years with various completion dates for each phase.

Completion of the EAA A-2 STA and A-2 Reservoir construction is anticipated in December 2024 and 2034, respectively. The North New River Conveyance and Miami Canal improvements will be completed by November of 2025 and 2027. Other components are in the final planning (validation report for CEPP North), design (CEPP South S-356E Pump Station/S-334E Gated Spillway and S-355W Gated Spillway) and construction phases (L-6 Diversion Structure for CEPP North and Seepage Barrier Wall for CEPP New Water).

EVERGLADES

MFL Criteria

In 2001, the SFWMD adopted an MFL rule for the Everglades as set forth in Subsection 40E-8.221(3), F.A.C. The Everglades MFL covers the lands and waters of the WCAs, Holey Land and Rotenberger wildlife management areas, and the freshwater portions of Everglades National Park pursuant to Subsection 40E-8.021(7), F.A.C., (**Figure C-2**). The MFL criteria for the Everglades are a set of minimum levels that 1) are based on changes and structural alterations to the pre-drainage conditions of the Everglades that existed at the time of MFL adoption; 2) are specific to the peat- and marl-forming wetlands of the WCAs, Holey Land and Rotenberger wildlife management areas, Shark River Slough, wetlands east and west of Shark River Slough, Rocky Glades, and Taylor Slough; and 3) specify limits on the decline of water levels below ground, under specific conditions and at specific return frequencies, as measured at the locations shown in **Figure C-10** interpreted from Subsection 40E-8.221(3), F.A.C., and listed in **Table C-5**.

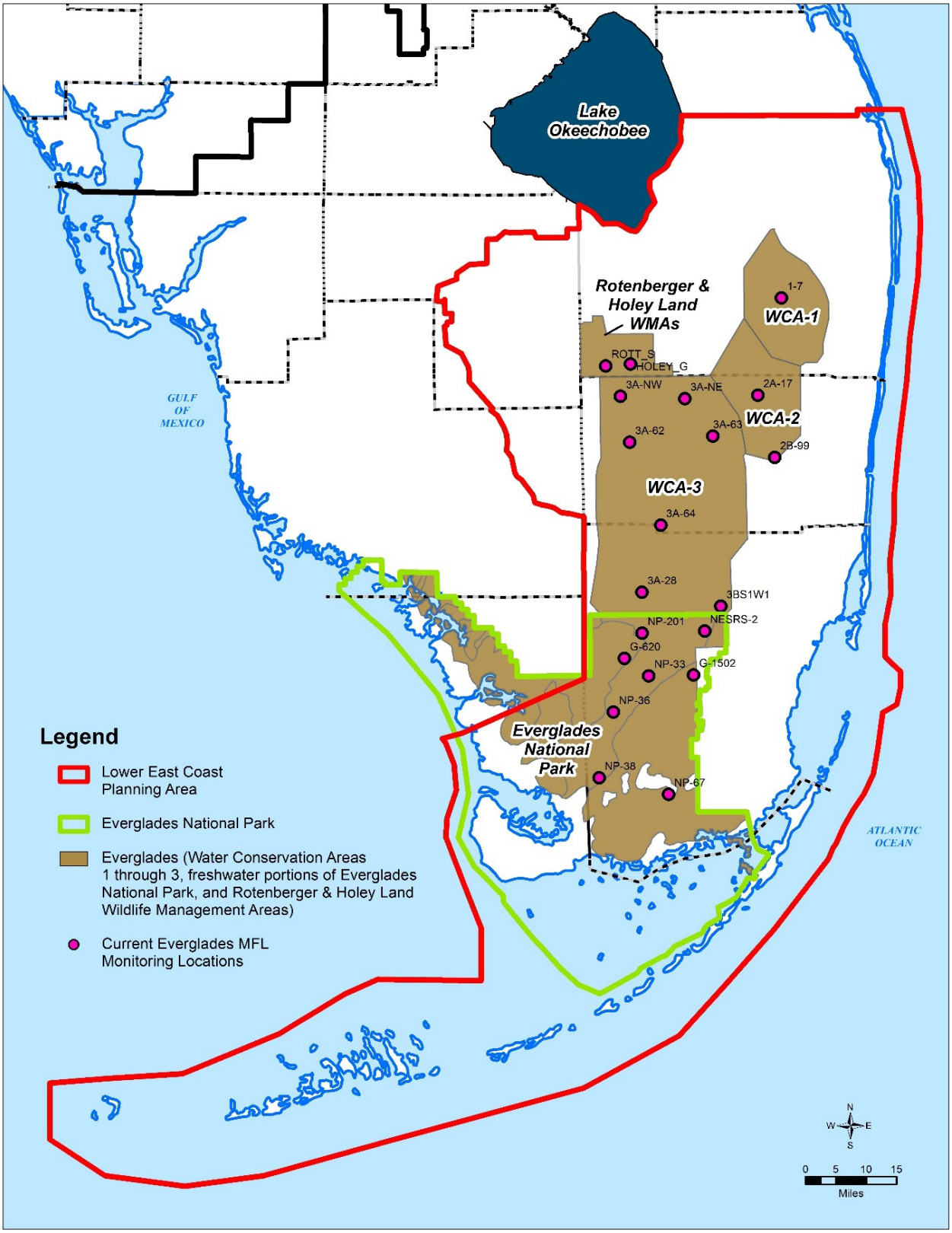

Figure C-10. Everglades MFL monitoring locations (current key gauges).

Table C-5. Minimum water levels, duration, and return frequencies for key water management gauges within the Everglades (Adapted from Table 1 of Chapter 40E-8, F.A.C.).

Area	Current Key Gauge	Original Key Gauge	Soil Type	Minimum Depth and Duration	Return Frequency
WCA-1	1-7	1-7	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-2A	2A-17	2A-17	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-2B	2B-99a	2B-21	Peat	-1.0 foot > 30 days	1-in-3 years
WCA-3A North	3A-NE	3A-NE	Peat	-1.0 foot > 30 days	1-in-2 years
WCA-3A North	3A-NW	3A-NW	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-3A North	3A-62a	3A-2	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-3A North	3A-63a	3A-3	Peat	-1.0 foot > 30 days	1-in-3 years
WCA-3A Central	3A-64a	3A-4	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-3A South	3A-28	3A-28	Peat	-1.0 foot > 30 days	1-in-4 years
WCA-3B	3BS1W1a	3B-SE	Peat	-1.0 foot > 30 days	1-in-7 years
Rotenberger Wildlife Management Area	Rotts	Rotts	Peat	-1.0 foot > 30 days	1-in-2 years
Holey Land Wildlife Management Area	HoleyG	HoleyG	Peat	-1.0 foot > 30 days	1-in-3 years
Northeast Shark River Slough	NESRS-2	NESRS-2	Peat	-1.0 foot > 30 days	1-in-10 years
Central Shark Slough	NP-33	NP-33	Peat	-1.0 foot > 30 days	1-in-10 years
Central Shark Slough	NP-36	NP-36	Peat	-1.0 foot > 30 days	1-in-7 years
Marl wetlands east of Shark River Slough	NP-38	NP-38	Marl	-1.5 foot > 90 days	1-in-3 years
Marl wetlands west of Shark River Slough	NP-201	NP-201	Marl	-1.5 foot > 90 days	1-in-5 years
Marl wetlands west of Shark River Slough	G-620	G-620	Marl	-1.5 foot > 90 days	1-in-5 years
Rockland marl marsh	G-1502	G-1502	Marl	-1.5 foot > 90 days	1-in-2 years
Taylor Slough	NP-67	NP-67	Marl	-1.5 foot > 90 days	1-in-2 years

WCA = water conservation area.

[a] Monitoring locations have been updated to alternative gauges since rule adoption due to changed conditions at the original gauge or location making continued monitoring impossible there.

MFL exceedances (**Table C-5**, Minimum Depth and Duration) and violations (**Table C-5**, Return Frequency) occur when the MFL criteria, regarding water levels below ground at the monitoring locations depicted in **Table C-5** and **Figure C-10**, are not met. Pursuant to Subsection 40E-8.221(3), F.A.C, the SFWMD is implementing measures contained in the LEC water supply plan updates and CERP to achieve minimum hydropattern return frequencies that approximate CERP-compatible pre-drainage conditions in the Everglades.

Recovery Strategy

At the time of MFL adoption, the Everglades did not meet the MFL criteria due to the regulation schedule, a lack of regional water storage, and ineffective water drainage and distribution infrastructure in the watershed. Although not all locations within the Everglades were in violation of the MFL, a recovery strategy was adopted simultaneously with the MFL in accordance with Subsection 40E-8.421(2), F.A.C.

The Everglades MFL recovery strategy includes the following components as described in Subsection 40E-8.421(2), F.A.C., as follows:

1. Capital projects, including CERP projects, to restore more natural water movement within the ecosystem

2. The Lower East Coast Everglades Waterbodies RAA

Capital Projects Component

Since 2001 and the initiation of CERP, many structural and nonstructural remedies necessary for the recovery of the Everglades have been completed, are ongoing, or are planned. CERP has a critical relationship with water supply planning and includes capital projects needed for the restoration and recovery of the Everglades (**Table C-2**). CEPP includes projects on publicly owned land, which direct more water south to WCA-3, Everglades National Park, and Florida Bay, while providing for other water-related needs of the region. **Chapter 7** of this 2023–2024 LEC Plan Update describes capital (structural) projects supporting the Everglades recovery strategy. Capital projects include the following:

1. Western Everglades Restoration Project

2. Broward County Water Preserve Areas: C 11 Impoundment, C 9 Impoundment, and WCA 3A/3B Seepage Management Projects

3. C-111 South Dade Project

4. C-111 Spreader Canal Project – Phase 1 (Western)

5. C-111 Spreader Canal Project – Phase 2 (Eastern)

6. Central Everglades Planning Project (CEPP)

7. Modified Water Deliveries to Everglades National Park

Lower East Coast Everglades Waterbodies RAA

An RAA can serve as a nonstructural component of an MFL prevention or recovery strategy. An RAA was established in 2007 for the Lower East Coast Everglades Waterbodies (**Chapter 4** of this 2023–2024 LEC Plan Update) and is a component of the Everglades recovery strategy. Net increases in the volume or changes in timing on a monthly basis of direct surface water and indirect groundwater withdrawals from the RAA are prohibited over that resulting from base condition uses permitted as of April 1, 2006.

NORTHWEST FORK OF THE LOXAHATCHEE RIVER

MFL Criteria

In 2003, an MFL was adopted for the Northwest Fork of the Loxahatchee River (Northwest Fork) (**Figure C-11**) as set forth in Subsection 40E-8.221(4), F.A.C. The MFL criteria are a minimum flow of 35 cubic feet per second (cfs) over Lainhart Dam and an average daily salinity of less than 2 at river mile 9.2. An MFL exceedance occurs when 1) flows decline below 35 cfs for more than 20 consecutive days; or 2) salinity, expressed as a 20-day rolling average, is greater than 2 at river mile 9.2. An MFL violation occurs when an exceedance occurs more than once in a 6-year period.

The MFL criteria protect the freshwater floodplain swamp of the Northwest Fork. The designation of the Northwest Fork as a National Wild and Scenic River identified the floodplain swamp and its associated cypress forest as a resource of outstanding value that needs to be protected. Because cypress trees tolerate a wide range of salinity conditions and are slow to respond to salinity stress, an assemblage of six freshwater tree species that, as a group, are a more sensitive indicator of adverse salinity conditions was identified as characterizing the floodplain swamp (SFWMD 2002).

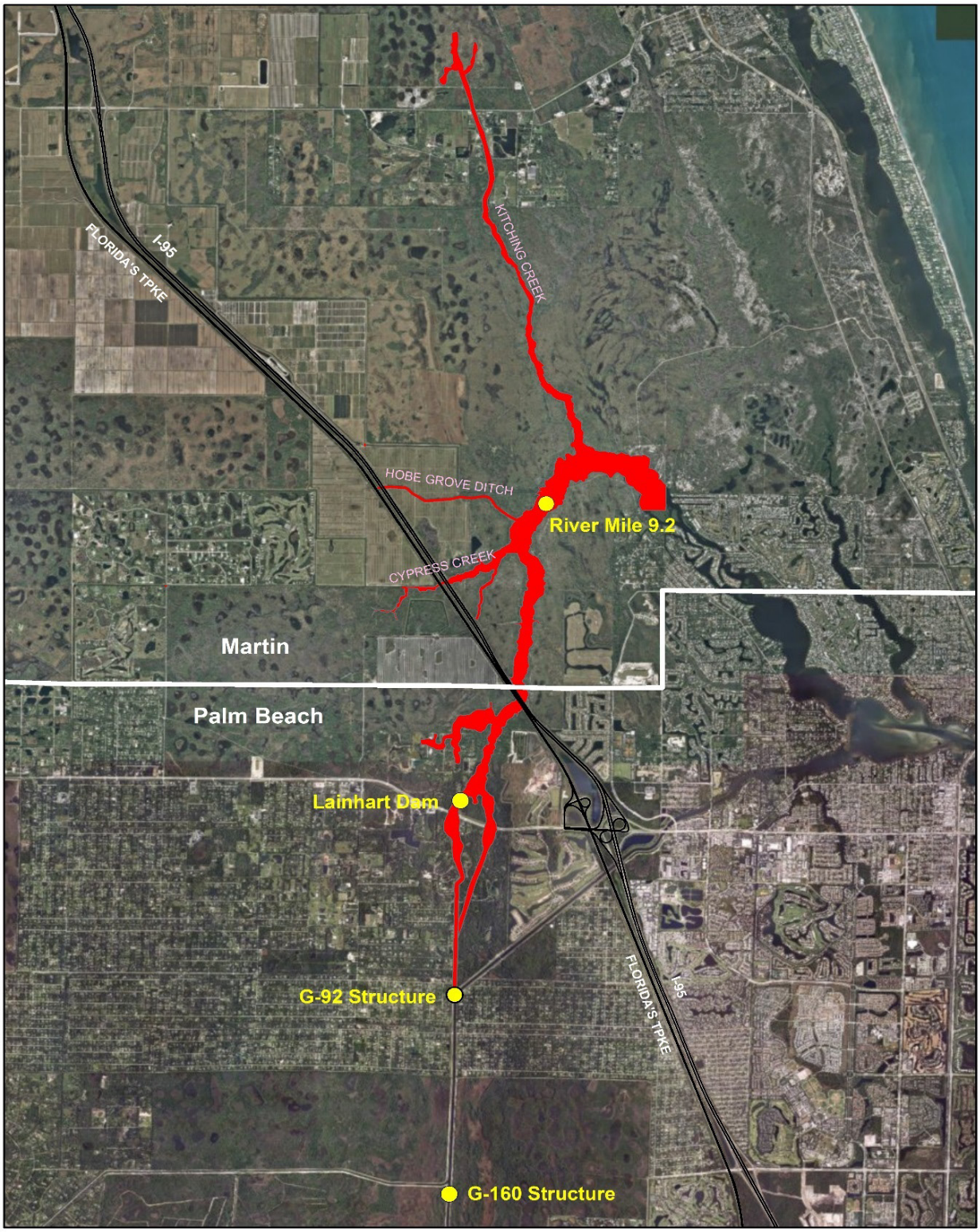

Figure C-11. Northwest Fork of the Loxahatchee River MFL area (shown in red).

Recovery Strategy

The Northwest Fork of the Loxahatchee River was not meeting the MFL criteria at the time of adoption. Therefore, an MFL recovery strategy in accordance with Subsection 40E-8.421(6), F.A.C., was adopted simultaneously with the MFL adoption. The recovery strategy includes the following components:

1. Structural Improvements – Construction of projects and facilities to increase water storage and delivery capabilities

2. Operational Protocols – Providing flows from Lainhart Dam and other sources to meet the MFL (35 cfs) as well as restorative flows greater than 50 cfs

3. Regulatory Activities – SFWMD regulatory program and water shortage plans to ameliorate low flow conditions

Structural Improvements and Operational Protocols

Structural and operational features of the recovery strategy are implemented through ongoing water resource development projects. Current projects that support the Northwest Fork MFL are listed in **Table C-2**. The Northwest Fork MFL criteria are anticipated to be met when these projects are completed and fully operational (**Chapter 7**). The capital projects include the following:

1. G 160 and G-161 Structure Projects

2. Loxahatchee River Watershed Restoration Project

Key components for managing the Loxahatchee River are continuous salinity monitoring at river mile 9.2 (**Figure C-11**), measuring flow across Lainhart Dam, and assessing vegetative communities in the floodplain. This information is used in the operation of water control facilities to deliver a flow of 50 cfs to the river when sufficient water is available from the regional system. This operational strategy is meant to reduce the upstream migration of salt water into the Northwest Fork of the river.

A major step towards restoration of the Northwest Fork, the Loxahatchee River Watershed Restoration Project is a CERP project jointly conducted by the USACE and SFWMD through a project partnership agreement (**Figure C-12**). The project is expected to help 1) restore more natural water deliveries; 2) promote improved health and functionality of wetland and upland areas; and 3) increase the quantity and quality of habitat available for native wildlife and vegetation by improving water distribution and timing, rehydrating hydrologically impacted natural areas, and re-establishing connections among natural areas that have become fragmented. The project area encompasses approximately 481,920 acres of central and northern Palm Beach County and southern Martin County, including Jonathan Dickinson State Park, Pal Mar East/Cypress Creek, Dupuis Wildlife and Environmental Management Areas, J.W. Corbett Wildlife Management Area, Grassy Waters Preserve, Loxahatchee Slough (the last remaining riverine cypress stands in southeastern Florida), and the Loxahatchee River Estuary.

Regulatory Criteria Component

To ensure the water needed for restoration of the Loxahatchee River is available, an RAA was established in 2007 and updated in 2022 for the North Palm Beach County/Loxahatchee River Watershed Waterbodies (**Chapter 4**). Net increases in the volume or changes in timing on a monthly basis of direct surface water and indirect groundwater withdrawals from the RAA are prohibited over that resulting from base condition uses permitted as of April 1, 2006 or April 1, 2022, whichever is applicable. In addition to amending this RAA, a new RAA was established to protect the project water stored via ASR wells at the C-18W Reservoir (**Chapter 4**). Additional regulatory measures include permit duration criteria in Subsection 1.5.2.B of the Applicant's Handbook (SFWMD 2022) for applications that request allocations of water from sources of limited availability.

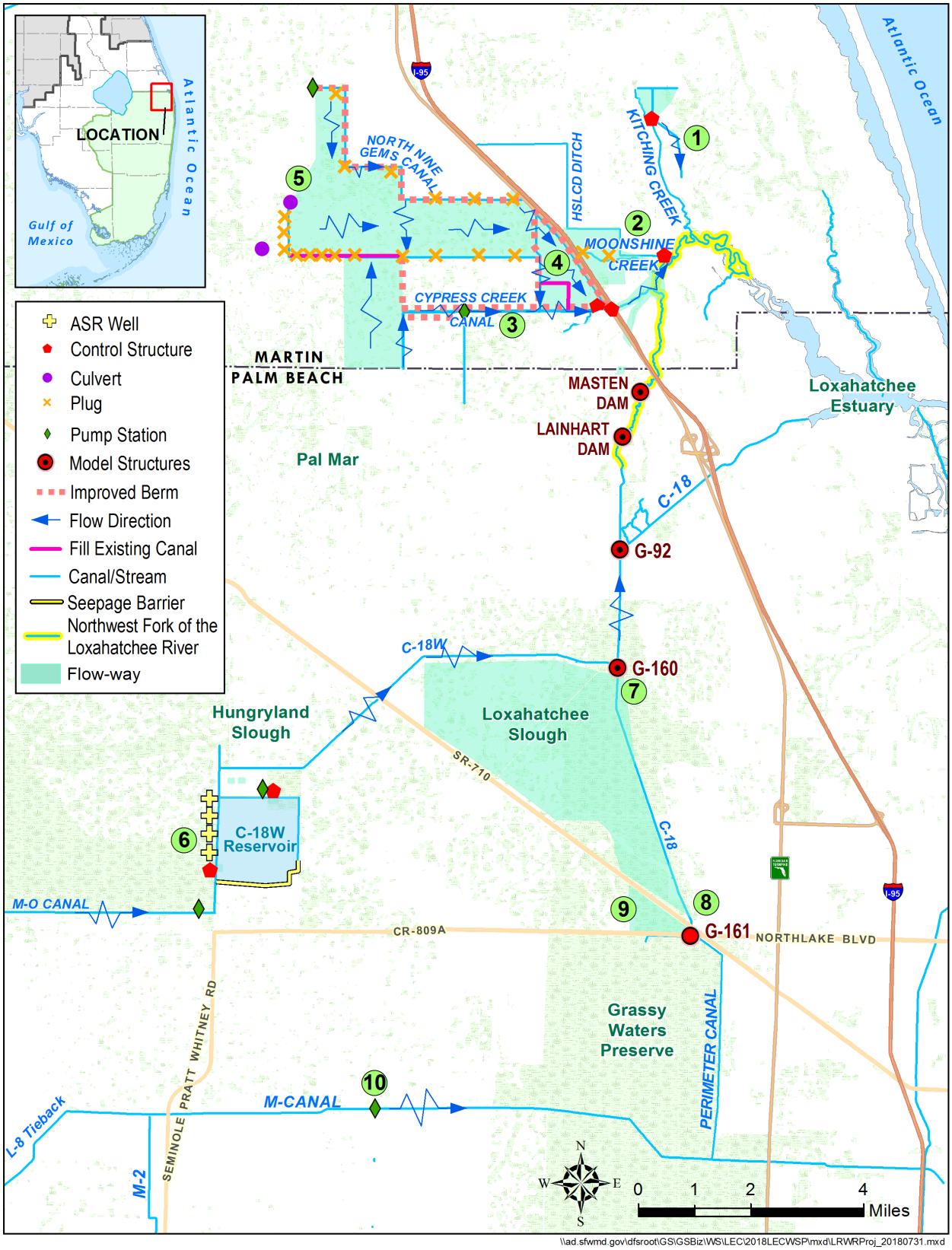

Figure C-12. Loxahatchee River Watershed Restoration Project authorized plan components.

FLORIDA BAY

MFL Criteria

Florida Bay

In 2006, the SFWMD adopted an MFL for Florida Bay in accordance with Subsection 40E-8.221(5), F.A.C., to protect this unique water body and the salinity regimes needed for its flora and fauna. The Florida Bay MFL applies to the bays, basins, and sounds within Taylor Slough and the C-111 Canal basin watersheds, including Long Sound, Little Blackwater Sound, Blackwater Sound, Buttonwood Sound, Joe Bay, Little Madeira Bay, Madeira Bay, Terrapin Bay, Eagle Key Basin, and other open waters of Florida Bay northeast of a boundary line between Terrapin Bay and Plantation Key as described in Subsection 40E-8.021(8), F.A.C., (**Figure C-1**). The resulting footprint encompasses the area most directly affected by freshwater inflow, or lack thereof, from upstream regional canals. The boundary encompasses the southern Everglades freshwater marsh, the mangrove transition zone between the marsh and Florida Bay, and the northern and central sections of open water Florida Bay influenced by Taylor Slough and the C-111 Canal basin.

Submerged aquatic vegetation is a critical component of the Florida Bay ecosystem. The MFL criteria were based on the flow needs and salinity tolerances of submerged aquatic vegetation in the Taylor River/Little Madeira Bay/Eagle Key gradient. Freshwater discharges from the regional water management system directly affect salinity conditions in the Everglades–Florida Bay Transition Zone and influence adjacent waters in northeastern Florida Bay. The proper salinity regime is important to the function of the estuarine ecosystem. Freshwater inflow is a potentially controllable parameter that could maintain the salinity regime, both spatially and temporally.

The MFL is a flow criteria that includes a net minimum flow of 105,000 acre-feet into Florida Bay over a 365-day period with a salinity performance indicator. Analysis determined the minimum flow is necessary to maintain a salinity of no greater than 30 at the Taylor River salinity monitoring station (**Figure C-13**).

An MFL exceedance occurs when the average salinity over 30 or more consecutive days exceeds 30 at the Taylor River salinity monitoring station. Multiple events of 30-day or more periods with salinity greater than 30, occurring within a single calendar year, are considered a single exceedance. An MFL violation occurs when an exceedance occurs during each of 2 consecutive years, more often than once in a 10-year period. By this definition, 3 consecutive years of exceedances constitute a violation.

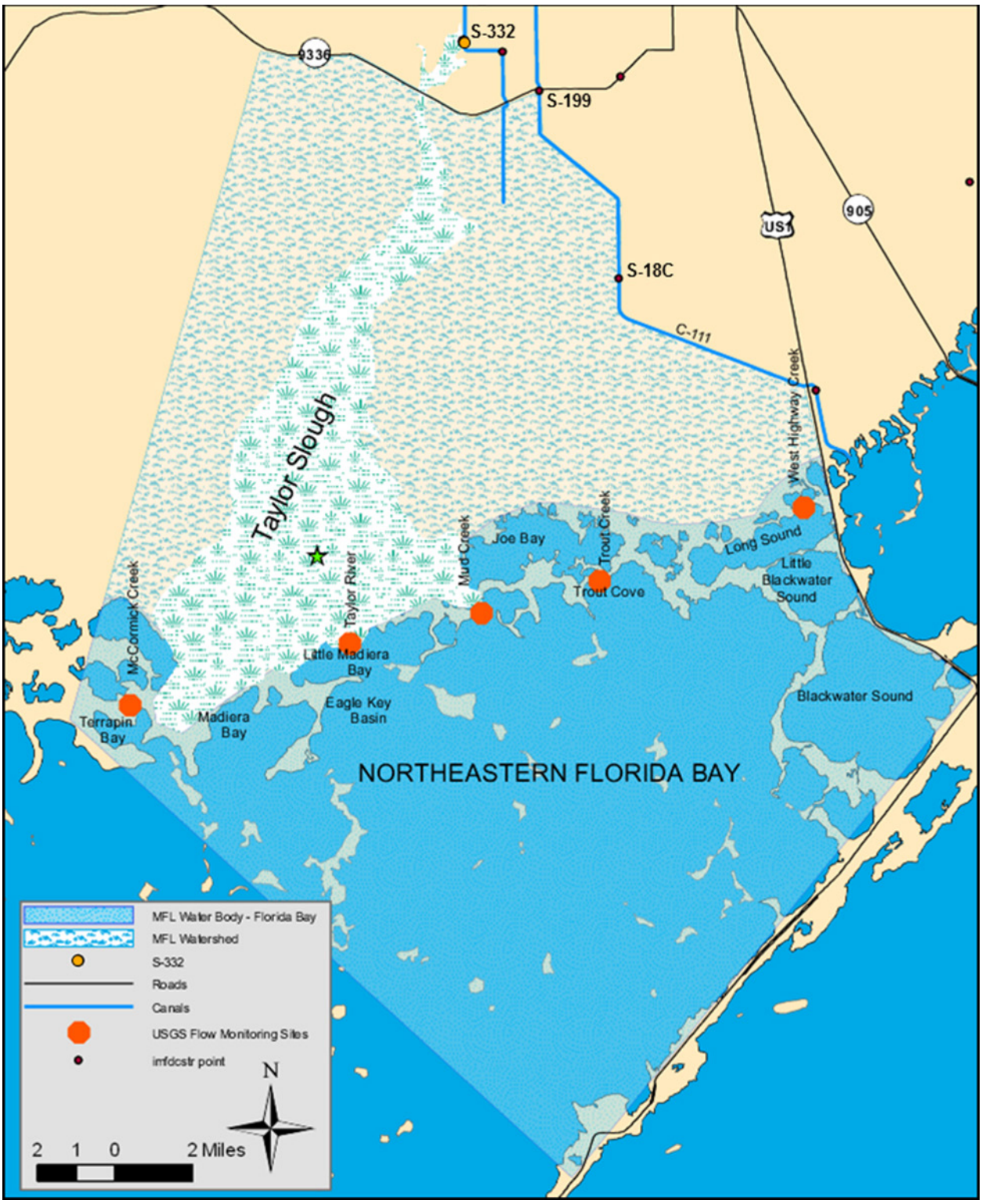

Figure C-13. Florida Bay MFL water body and watershed. (Note: Green star marks the location of the Taylor River salinity monitoring station.)

The Florida Bay MFL was re-evaluated in 2014 based on additional research, modeling, and monitoring (SFWMD 2014). Results of the re-evaluation indicated the existing MFL criteria were an adequate threshold of significant harm to Florida Bay.

Prevention Strategy

At the time of MFL adoption, Florida Bay was meeting the MFL and no violations were anticipated to occur in the next 20 years. Therefore, a prevention strategy according to Subsection 40E-8.421(8), F.A.C., was adopted for it simultaneously with MFL adoption. The prevention strategy for Florida Bay includes two main components:

1. Current projects for delivering more water to Florida Bay are listed in **Table C-2**, and described in **Chapter 7**, as follows:
    a. C-111 South Dade Project
    b. C-111 Spreader Canal Project – Phase 1 (Western)
    c. C-111 Spreader Canal Project – Phase 2 (Eastern)
    d. Central Everglades Planning Project (CEPP)
    e. Modified Water Deliveries to Everglades National Park

2. Continued field monitoring and research to assess salinity, water level, flow conditions, and biological resource response in the region

Portions of the aforementioned projects have been completed and are operational, while other portions are still under construction.

BISCAYNE AQUIFER

MFL Criteria

The Biscayne aquifer extends beneath Monroe, Miami-Dade, Broward, and Palm Beach, counties, across an area of approximately 2.56 million acres (**Figure C-14**). It is a highly permeable, wedge-shaped, unconfined aquifer more than 200 feet thick in coastal Broward County, thinning to an edge 35 to 40 miles inland in the Everglades (Klein and Hull 1978). The Biscayne aquifer supplies all, or a large portion of, municipal water supply systems from southern Palm Beach County southward, including the system for the Florida Keys, which is primarily supplied via pipeline from mainland Miami-Dade County.

Due to its widespread use, protecting the Biscayne aquifer from saltwater intrusion is important. An MFL and a prevention strategy were adopted for the Biscayne aquifer in 2001 pursuant to Subsection 40E-8.231, F.A.C., based on analysis of the relationships between groundwater and canal water levels, and the potential for saltwater intrusion (SFWMD 2000a). The MFL criterion is the water level in the aquifer that results in movement of the saltwater interface landward to the extent that groundwater quality at an established withdrawal point is insufficient to serve as a water supply source. An MFL violation occurs when water levels within the aquifer produce this degree of saltwater movement at any point in time. The MFL criterion does not address the groundwater base flows to Biscayne Bay.

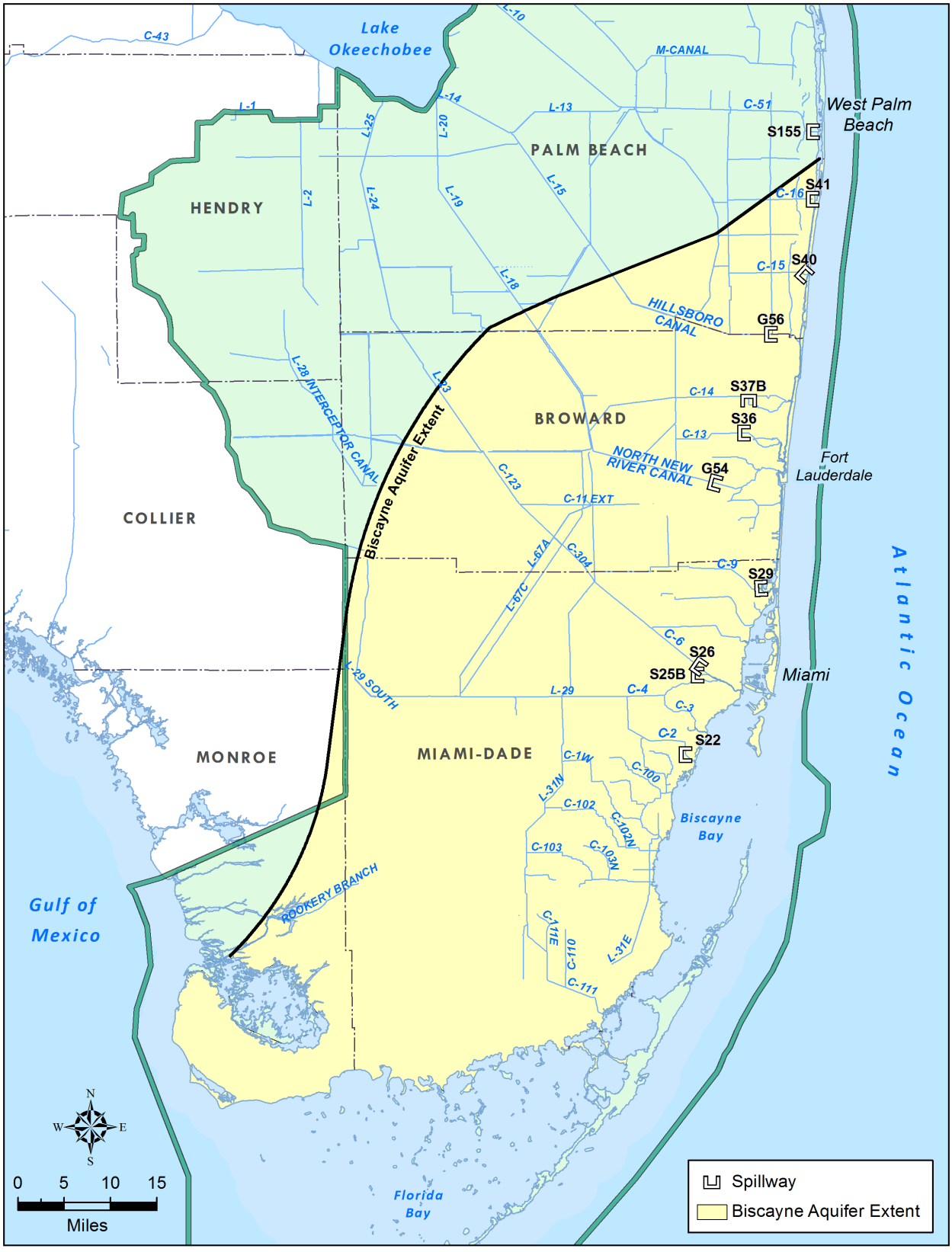

Figure C-14. Biscayne aquifer MFL water management structures.

Prevention Strategy

Maintaining sufficient water levels (stages) in coastal canals is crucial for recharging the Biscayne aquifer and maintaining the water level in the aquifer needed to meet the MFL. An MFL prevention strategy following Subsection 40E-8.421(3), F.A.C., was adopted for the aquifer simultaneously with the MFL adoption. The prevention strategy includes specific canal stages, which are specified in the *2000 Lower East Coast Regional Water Supply Plan* (SFWMD 2000b), for meeting the MFL criterion.

According to Subsection 40E-8.421, F.A.C, the LEC Plan contains an approved prevention strategy for the Biscayne Aquifer pursuant to Section 373.0421, F.S., which consists of the following:

a. Maintain coastal canal stages at the minimum operation levels shown in Table J-2 of the LEC Plan.

b. Apply conditions for permit issuance in Chapter 40E-2, F.A.C., to prevent the harmful movement of saltwater intrusion up to a 1-in-10-year level of certainty.

c. Maintain a groundwater monitoring network and utilize data to initiate water shortage actions pursuant to Rule 40E-8.441, F.A.C. and Chapters 40E-21 and 40E-22, F.A.C.

d. Construct and operate water resource and water supply development projects.

e. Conduct research in high-risk areas to identify where the portions of the saltwater front is adjacent to existing and future potable water sources.

Table C-6 provides the minimum water levels at 11 primary water management structures maintained by the SFWMD in canals that overlie the Biscayne aquifer (**Figure C-7**). To meet the MFL, canal stages cannot fall below the levels shown in Table J-2 of the *2000 Lower East Coast Regional Water Supply Plan* for more than 180 days, and the average annual stage must be sufficient to allow water levels and chloride concentrations in the aquifer to recover to levels that existed before a drought or discharge event occurred (SFWMD 2000b).

The SFWMD is conducting projects and studies as well as providing incentives to local water users to develop alternative water supplies, including the use of reclaimed water, to maintain optimum water levels in coastal canals, provide aquifer recharge, combat saltwater intrusion, and thereby reduce the potential for MFL violations in the Biscayne aquifer. More information on these additional measures is provided in **Table C-2**, which includes the C-111 Spreader Canal Project – Phase 2 (Eastern) project.

Table C-6. Minimum canal operation levels of coastal canals (From SFWMD 2000b, Volume II, Appendix J).

Canal/Structure	Minimum Canal Operation Levels to Protect Against MFL Violations (feet NGVD29)
C-51/S-155	7.80
C-16/S-41	7.80
C-15/S-40	7.80
Hillsboro/G-56	6.75
C-14/S-37B	6.50
C-13/S-36	4.00
North New River/G-54	3.50
C-9/S-29	2.00
C-6/S-26	2.50
C-4/S-25B	2.50
C-2/S-22	2.50

MFL = minimum flow and minimum water level; NGVD29 = National Geodetic Vertical Datum of 1929; SFWMD = South Florida Water Management District.

Further information about the MFLs and prevention and recovery strategies adopted for water bodies in the LEC Planning Area can be found in Chapter 40E-8, F.A.C., and on the SFWMD webpage (http://www.sfwmd.gov/mfls). More information on the RAAs mentioned in this appendix is provided in **Chapter 4** and in Subsection 3.2.1 of the Applicant's Handbook (SFWMD 2022).

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