Appendix 2A-5: Area Maps and Major Hydrologic Components

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This appendix summarizes descriptions of selected hydrologic components as background information, while the main chapter provides specific hydrology and structure flow information for each water body.

UPPER KISSIMMEE BASIN

The Upper Kissimmee Basin comprises the Kissimmee Chain of Lakes with a drainage area of 1 million acres and includes more than two dozen lakes with interconnecting canals and water control structures (**Figure 1**). The lakes include Lake Myrtle, Alligator Lake, Lake Mary Jane, Lake Gentry, East Lake Tohopekaliga, Lake Tohopekaliga, Lake Kissimmee, Lake Cypress, and Lake Hatchineha. All lakes in the Kissimmee Chain of Lakes are shallow, with mean depths varying from 5 to 10 feet. The Kissimmee Chain of Lakes is hydraulically connected to the Kissimmee River; water discharged from the S-65 water control structure at the outlet of Lake Kissimmee flows through S-65A to a section of the C-38 canal, then into reconstructed sections of the Kissimmee River Restoration Project. At the south end of the restoration project near S-65D, water flows through another extant section of the C-38 canal, entering Lake Okeechobee via the S-65E water control structure. Chapter 9 of this volume offers more details of the Upper Kissimmee Basin.

LOWER KISSIMMEE BASIN

The Lower Kissimmee Basin, which includes Lake Istokpoga, has a drainage area of about 1 million acres (**Figure 1**). Lake Istokpoga is a shallow lake with an average depth of roughly 4 feet and a surface area of approximately 28,000 acres. Outflows from Lake Istokpoga are directed either to the Kissimmee River or Lake Okeechobee through a system of canals and water control structures. The primary discharge route passes water into the Kissimmee River through S-68 and S-68X, as well as S-67 and S-67X. The S-68 and S-68X spillways, located at the south end of the Lake Istokpoga, send discharge south to the C-41A canal (Slough Canal), where water flows into the Kissimmee River. S-67 and S-67X send discharge eastward to the Istokpoga Canal, which flows into the Kissimmee River. The C-41 canal (Harney Pond Canal) and C-40 canal (Indian Prairie Canal; in connection to the C-39A canal) provide secondary conveyance capacity for flood control and pass flows directly into Lake Okeechobee. Chapter 9 of this volume offers more details of the Lower Kissimmee Basin.

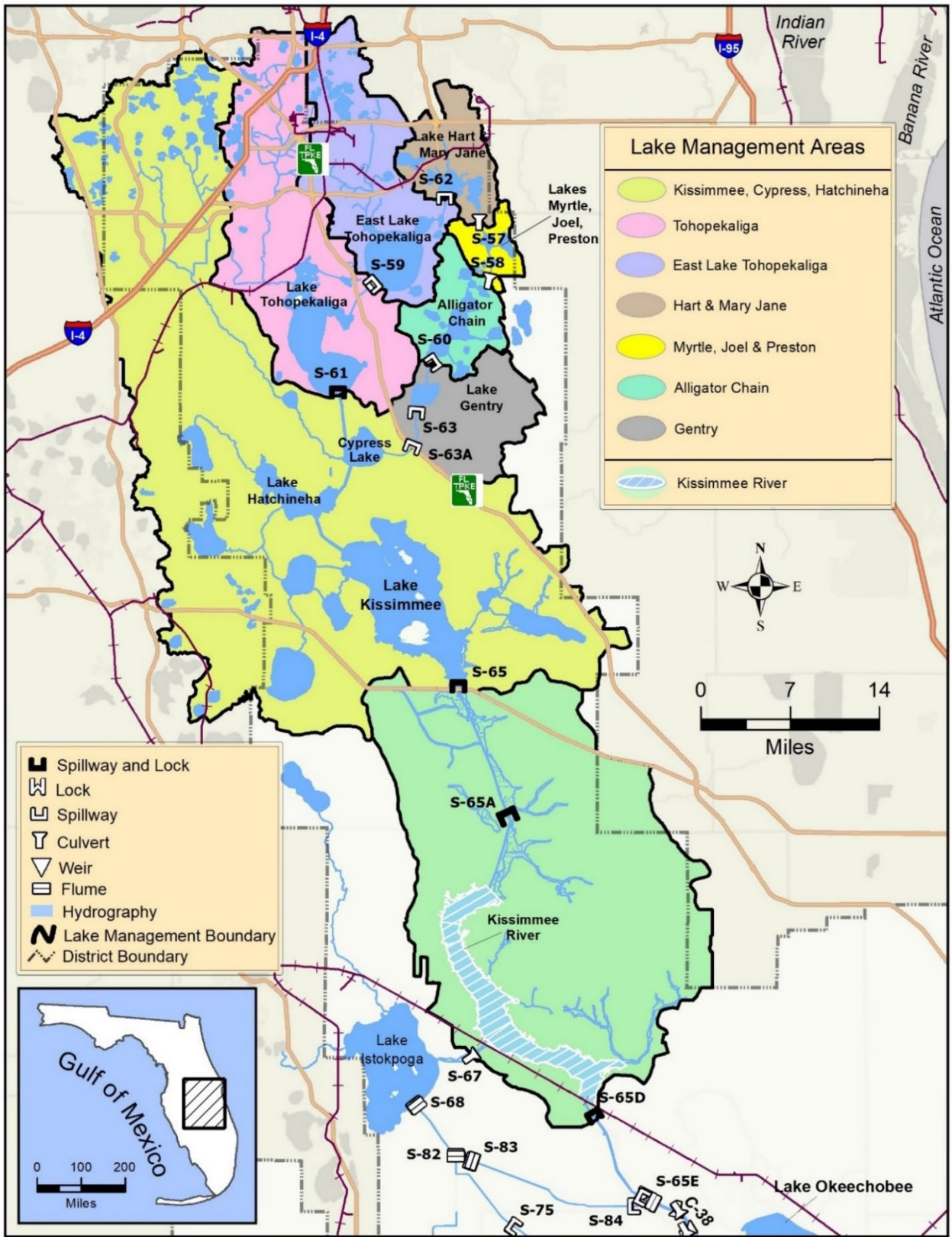


Figure 1. Lake groups and control structures in the Upper and Lower Kissimmee basins.

LAKE OKEECHOBEE

Lake Okeechobee, a shallow lake with an average depth of 9 feet, is the central part of the Central & Southern Florida Flood Control Project (C&SF Project) and the largest hydrologic feature in South Florida. Surface inflow mainly comes from the Kissimmee River, Lake Istokpoga, Fisheating Creek, and Taylor Creek/Nubbin Slough (**Figure 2**). The surface outflow enters the St. Lucie River (C-44 canal), Caloosahatchee River (C-43 canal), Everglades Agricultural Area (EAA), and Lower East Coast water supply region. The EAA outflows to the Everglades Stormwater Treatment Areas (STAs), which in turn outflows to the Everglades Protection Area (EPA; includes the Everglades Water Conservation Areas [WCAs] and Everglades National Park [ENP]). The lake serves multiple functions including flood control, water supply, navigation, recreation, and environmental restoration. Its operation regulates stages through numerous water control structures. The *Central and Southern Florida Project – Water Control Plan for Lake Okeechobee and the Everglades Agricultural Area* (USACE 2008) includes a seasonally varying regulation schedule (see the main chapter). Chapter 8B of this Volume provides an in-depth discussion of the Lake Okeechobee and its watershed.

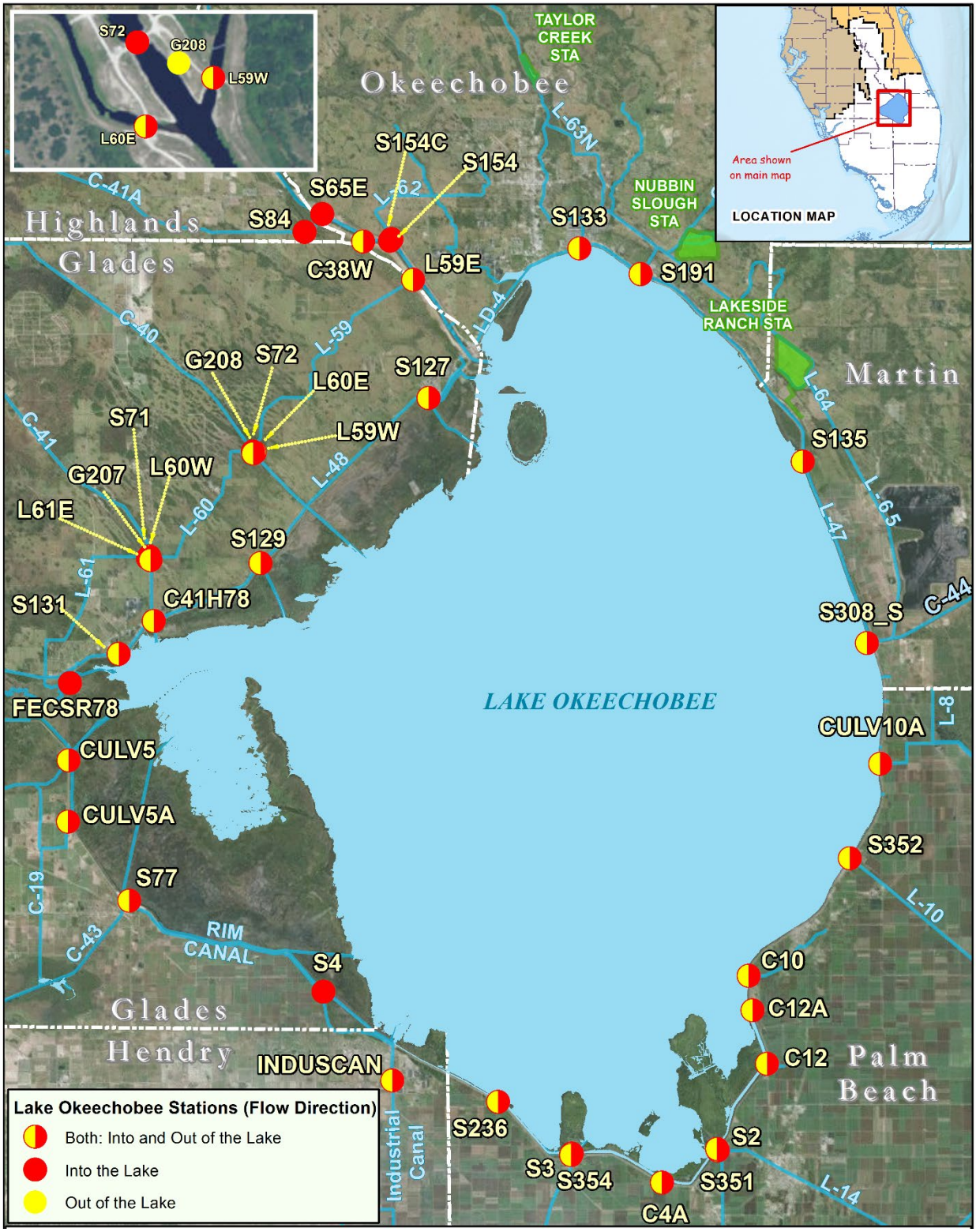
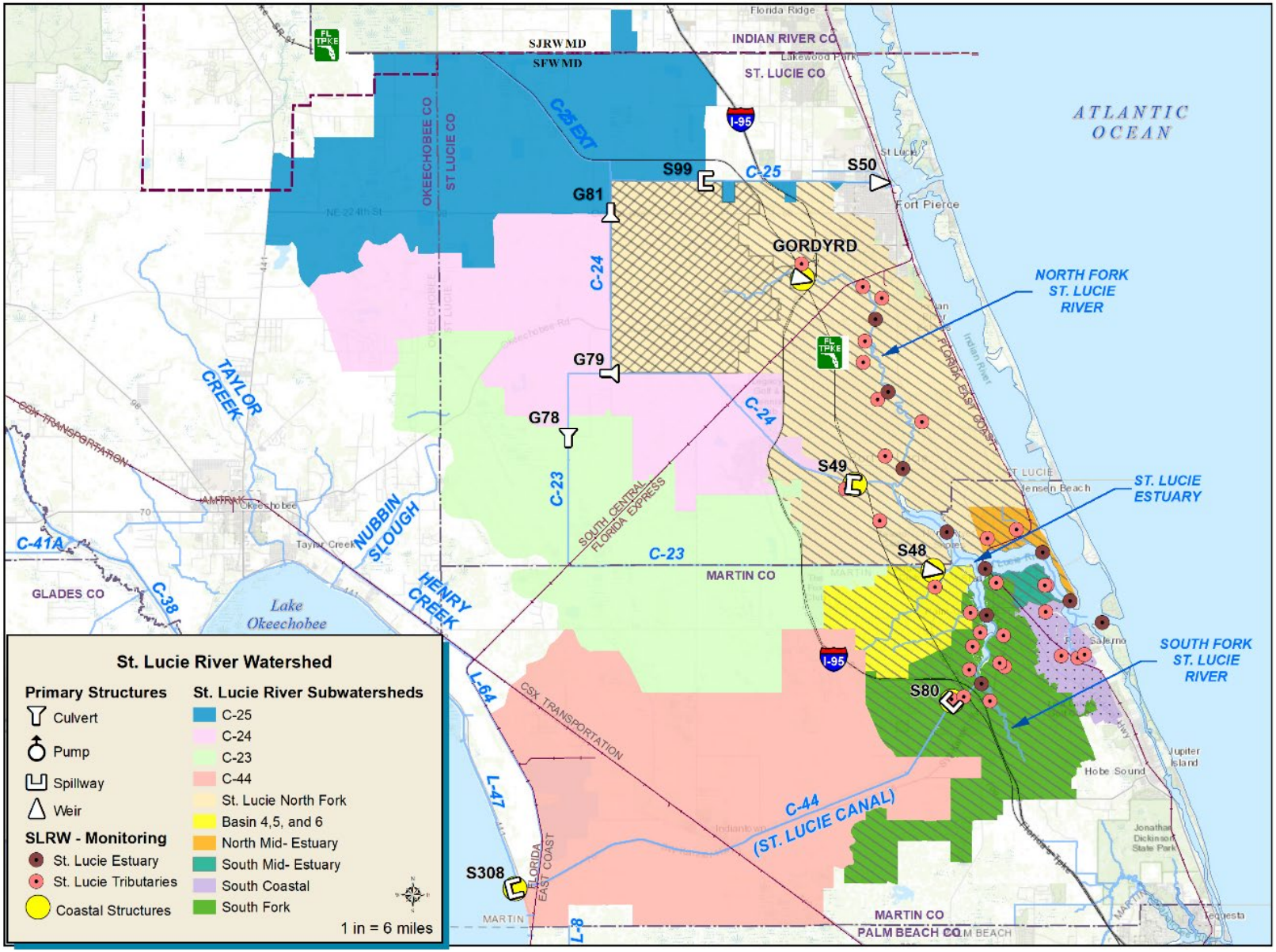


Figure 2. Inflow and outflow control structures in Lake Okeechobee.

UPPER EAST COAST

In the Upper East Coast water supply planning region, the St. Lucie River (C-44 Canal) links Lake Okeechobee to the South Fork of the St. Lucie Estuary, which is located east of the lake (**Figure 3**). Inflows into the St. Lucie River include releases from Lake Okeechobee via the S-308 structure and runoff from the St. Lucie River Watershed. S-80, a gated spillway at the east end of the St. Lucie River, discharges the lake releases and basin runoff to the South Fork of the St. Lucie Estuary. The basin runoff can also flow back to Lake Okeechobee through S-308 when the lake stage is lower than the St. Lucie River. The United States Army Corps of Engineers (USACE) operates the S-308 and S-80 structures. The North Fork of the St. Lucie Estuary receives flows from the C-23 Canal at structure S-48, C-24 Canal at structure S-49, Ten Mile Creek at Gordy Road, and its tidal watershed. The C-25 Canal flows into the southern part of the Indian River Lagoon at structure S-50. Chapter 8C of this volume presents details on the St. Lucie River Watershed and St. Lucie Estuary.


St. Lucie River Watershed
Primary Structures
Culvert
Pump
Spillway
Weir
SLRW - Monitoring
St. Lucie Estuary
St. Lucie Tributaries
Coastal Structures
St. Lucie River Subwatersheds
C-25
C-24
C-23
C-44
St. Lucie North Fork
Basin 4,5, and 6
North Mid- Estuary
South Mid- Estuary
South Coastal
South Fork
1 in = 6 miles
SJRWMD
SFWMD
INDIAN RIVER CO
ST. LUCIE CO
OKEECHOBEE CO
ATLANTIC OCEAN
C-25 EXT
C-25
C-24
C-23
C-44
C-41A
C-38
L-64
L-47
L-8
S99
S50
G81
G79
G78
S49
S48
S80
S308
GORDYRD
NORTH FORK ST. LUCIE RIVER
ST. LUCIE ESTUARY
SOUTH FORK ST. LUCIE RIVER
TAYLOR CREEK
NUBBIN SLOUGH
HENRY CREEK
Lake Okeechobee
GLADES CO
MARTIN CO
PALM BEACH CO
Fort Pierce
Hobe Sound
Jensen Beach
Okeechobee
I-95
FL TPKE
CSX TRANSPORTATION
SOUTH CENTRAL FLORIDA EXPRESS
FLORIDA EAST COAST
C-44 (ST. LUCIE CANAL)

LOWER WEST COAST

In the Lower West Coast water supply planning region, the Caloosahatchee River (C-43 Canal) links Lake Okeechobee to the Caloosahatchee River and Estuary, which is located west of the lake (**Figure 4**). Inflows into the Caloosahatchee River include releases from Lake Okeechobee via the S-77 gated spillway and lock structure and runoff from the river watershed. Downstream of S-77 is S-78, the second gated spillway and lock, which also passes runoff from the local watershed. Finally, the outflow from the Caloosahatchee River (downstream of S-78) flows into the Caloosahatchee Estuary via S-79, another gated spillway and lock. USACE operates all water control structures along the Caloosahatchee River. The Lower West Coast region also covers large areas outside of the Caloosahatchee River Watershed. Chapter 8D of this volume presents more details on the Caloosahatchee River Watershed and Caloosahatchee Estuary.

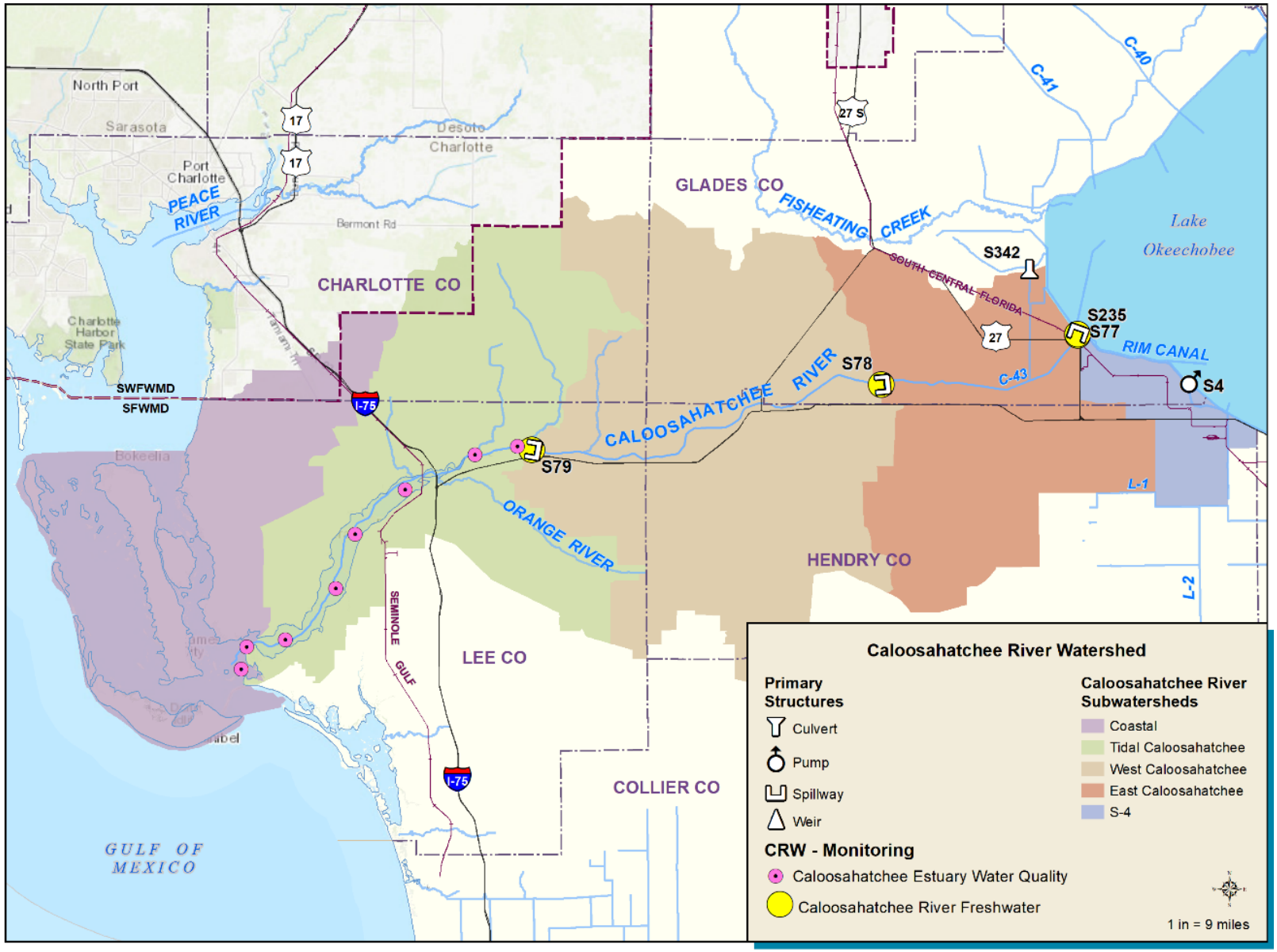


Figure 4. Major water control structures in the Caloosahatchee River within the Lower West Coast area.

LOWER EAST COAST

The Lower East Coast (LEC) water supply planning region includes urban areas in Palm Beach, Broward, and Miami-Dade counties located to the east of the EPA and ENP (**Figure 5**). Major canals serve multiple functions, including flood control, groundwater recharge, water supply, and preventing over drainage of and saltwater intrusion into groundwater. Lake Okeechobee is connected to the LEC region through major canals. During wet periods, the canal network moves runoff to the ocean following established guidelines within the *Master Water Control Manual – East Coast Canals* (USACE 1995). During dry periods, the canal network conveys releases from Lake Okeechobee and the Everglades WCAs to maintain groundwater levels within the LEC region.

EVERGLADES AGRICULTURAL AREA

The EAA Basin is an agricultural irrigation and drainage area where, generally, the ground elevation is lower than the surrounding areas. During excess rainfall, runoff must be pumped out of the region; during dry times, irrigation water supply is needed. Irrigation water source during dry seasons comes mainly from Lake Okeechobee, with the Everglades WCAs as a secondary source. Four primary canals—West Palm Beach, Hillsboro, North New River, and Miami—and three connecting canals—Bolles, Cross, and Ocean—facilitate the removal of runoff and provide supply for irrigation (**Figure 5**). Historically, water from and through the EAA entered directly into the EPA. Over the last two decades, the EAA runoff and drainage have been sent to Everglades STAs for treatment before being discharged. Chapters 4 and 5B of this volume present details on the EAA and Everglades STAs, respectively.

WATER CONSERVATION AREAS

The C&SF Project led to establishing Everglades WCAs (Sklar et al. 1999), which are considered a part of the EPA. The primary objectives of the WCAs are to provide (1) flood control; (2) water supply for agricultural irrigation, municipalities, industry, and ENP; (3) regional groundwater control and prevention of saltwater intrusion; (4) enhancement of fish and wildlife; and (5) recreation. A secondary objective is to maintain marsh vegetation in the WCAs, providing a dampening effect on hurricane-induced wind tides (USACE 2012). **Figure 5** shows the location and structures of the WCAs and Chapters 3 and 6 of this volume present more details about the WCAs.

WATER CONSERVATION AREA 1

WCA-1 is the Arthur R. Marshall Loxahatchee National Wildlife Refuge, a 150,000-acre natural area surrounded by levees in western Palm Beach County (**Figure 5**), which is managed by the United States Fish and Wildlife Service. It receives surface water from direct rainfall and discharges from STA-1 East (STA-1E) via pump station S-362 and STA-1 West (STA-1W) via the G-251 and G-310 pump stations. The surface outflow moves north to the L-8 and C-51 canals using STA-1E and STA-1W diversion structures G-301 and G-300, respectively, east to the Hillsboro Canal via the S-39 structure, and south to WCA-2A through the S-10 structures (S-10A, S-10C, and S-10D). Water supply releases pass through S-39, G-94A, G-94C, and G-94D to the eastern urban area, and through the G-338 diversion structure to STA-2.

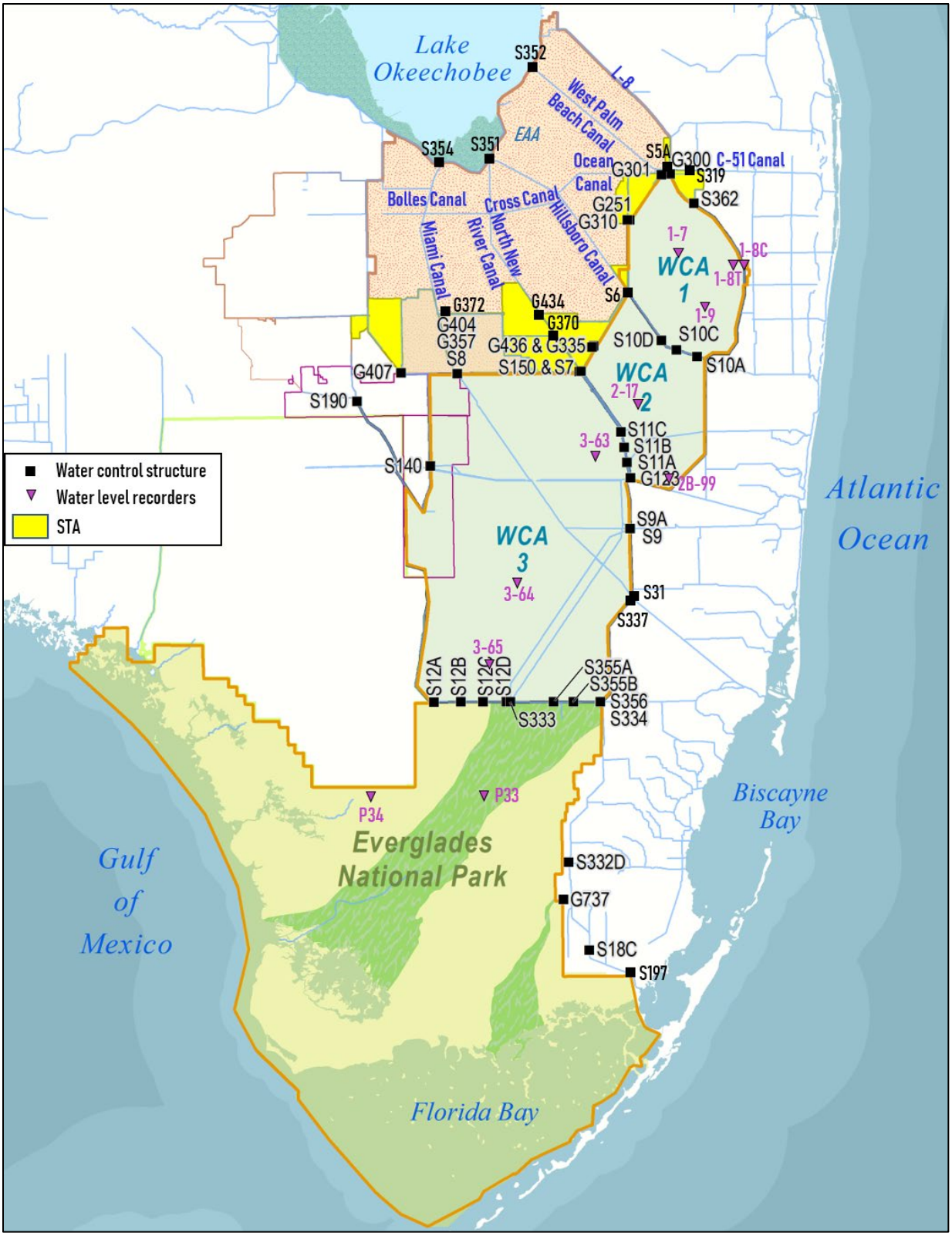


Figure 5. Canals, major water control structures, and water level recorders in the Everglades Agricultural Area (EAA), Everglades Water Conservation Areas (WCAs), and Everglades National Park.

WATER CONSERVATION AREA 2

WCA-2 is a sawgrass wetland covering about 133,400 acres making it the smallest of the three WCAs (**Figure 5**). In 1961, the L-35B levee was built along the southeastern portion of WCA-2, dividing it into WCA-2A (83% of the area) and WCA-2B (17% of the area) to reduce seepage due to the extremely pervious underlying aquifer. It receives most of its water from surface inflows, which includes discharges from STA-2 and a portion of STA-3/4, and outflows from WCA-1 via the S-10 structures. The surface outflow moves south to the North New River Canal via S-143 and west to WCA-3A through the S-11 structures (S11A, S-11B, and S-11C). Water supply releases pass through the S-38 structure to the east.

WATER CONSERVATION AREA 3

WCA-3, the largest of the WCAs, is located southwest of WCA-2 and encompasses about 720,000 acres of sawgrass marsh dotted with tree islands (**Figure 5**). In 1962, two interior levees across the southeastern portion of the area subdivided it into WCA-3A (83% of the area) and WCA-3B (17% of the area) to reduce seepage to the east. WCA-3 receives most of its surface water from direct rainfall. Surface inflows include discharges from STA-3/4 and STA-5/6 in the north, outflows from WCA-2 in the east, and discharges from agricultural lands in the west. Main surface water outflows are through the S-12 structures (S-12A, S12B, S12C, and S-12D) and S-333 to south into ENP; S-343A, S-343B, and S-344 to the southwest and west; and S-31 and S-337 to the east.

EVERGLADES NATIONAL PARK

ENP is located south of WCA-3 and encompasses 1.4 million acres (2,200 square miles) of freshwater sloughs, sawgrass marshes, marl-forming wet prairies, mangrove forests, and saline tidal flats (**Figure 5**). The topography is extremely low and flat, with large areas below 4 feet National Geodetic Vertical Datum of 1929 (Sklar et al. 1999). Chapters 3 and 6 of this volume present more details about ENP.

To provide a system of water deliveries to ENP via Shark River Slough, the United States Congress authorized the Modified Water Deliveries to Everglades National Park (MWD) Project in 1994. It includes modifications to the C&SF Project with conveyance and seepage control features, modifications to Tamiami Trail to facilitate flow under the road, and flood mitigation to the east. The C-111 South Dade Project is another part of the C&SF Project authorized by the United States Congress in 1994 to hold water in Taylor Slough. It includes construction of pump stations and levee-bounded detention areas to control seepage out of ENP and reduce damaging freshwater discharges to Manatee Bay/Barnes Sound while maintaining flood protection to agricultural lands east of the C-111 Canal. Much of the MWD and C-111 South Dade projects have been completed (USACE 2018).

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