DRAFT

Draft Report by the Select Committee on Indian River Lagoon and Lake Okeechobee Basin October 31, 2013

The St. Lucie River and Estuary is located to the east of Lake Okeechobee along Florida's Treasure Coast and is part of the larger Indian River Lagoon system, which is the most diverse estuarine environment in North America. The lagoon is home to more than 4,000 plant and animal species including manatees, oysters, dolphins, sea turtles, and sea grasses.[1] The Caloosahatchee River, located to the west of Lake Okeechobee, drains into the Caloosahatchee River Estuary and into Pine Island Sound along the west coast of Florida. Both are vital to the residents and economy of South Florida.[2]

Flood protection projects in South Florida have extensively altered the hydrology of the entire region and disrupted the historical flow patterns necessary to support a healthy ecosystem. The rivers, estuaries, and coastal environments along both the east and west coasts have been severely impacted by a combination of factors including:

- development,
- flood protection projects,
- increased rainfall and stormwater runoff,
- increased quantities of water released from Lake Okeechobee into the C-43 and C-44 canals, and
- increased nutrient loading.[3]

In early 2011, two massive phytoplankton blooms occurred along the entire Indian River Lagoon and resulted in extensive loss of seagrass throughout much of the area. The phytoplankton bloom exceeded any other documented bloom in terms of size, intensity, duration, and magnitude of seagrass loss. By early 2013, a significant number of dolphins, manatees, and pelican deaths were reported in the lagoon. At the same time, South Florida experienced an increase in rainfall, leading to an increase in nutrient pollution, stormwater runoff, and the quantity of water released into the canal systems. There is no single factor that has caused the decline in the health of the ecosystem along the east and west coasts. Rather it has been a combination of factors that have resulted in what some scientists have referred to as "the perfect storm."[4]

In response to the impacts to the coastal estuaries, Senate President Gaetz announced the creation of the Select Committee on Indian River Lagoon and Lake Okeechobee Basin (IRLLOB) on July 10, 2013. The goal of the committee was to investigate the policies, funding, and other governmental activities affecting water management in the Lake Okeechobee Basin.

On August 22, 2013, the IRLLOB committee held a public meeting to address the recent impacts of discharges from Lake Okeechobee to the St. Lucie River and Indian River Lagoon and the

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[1] South Florida Water Management District, *St. Lucie River and Estuary*, http://www.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/stlucie (last visited Oct. 17, 2013).
[2] South Florida Water Management District, *Caloosahatchee River and Estuary*, http://www.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/caloosahatchee%20strategics (last visited Oct. 17, 2013).
[3] *Supra* note 1.
[4] St. Johns River Water Management District, *The 2011 Superbloom* (May 16, 2013), http://www.sjrwmd.com/itsyourlagoon/2011superbloom.html (last visited Oct. 17, 2013).

Caloosahatchee River (C-43)[5] and Estuary. The meeting consisted of multiple panels with representatives from the South Florida Water Management District (SFWMD), the U.S. Army Corps of Engineers (Corps), local governments, state agencies, the scientific community, the agricultural industry, and environmental interest groups. In addition, the committee heard over three hours of public testimony and has received nearly 200 comments via the website.

Following the public meeting in Stuart, Florida, the committee held a meeting in Tallahassee on September 24, 2013. The committee heard presentations from Ernie Barnett, Executive Director of the SFWMD, and Jim David, Director of the St. Lucie County Mosquito Control and Coastal Management Services Department, on short-term solutions to the discharges from Lake Okeechobee. The committee also heard public testimony concerning the environmental and economic problems resulting from the excessive discharges from Lake Okeechobee.

This report highlights historical and recent events along Florida's east and west coasts that have led to the degradation of the ecosystems and economies and provides recommendations to restore the rivers, estuaries, and coastlines that are vital to Florida's environment and economy. The report also outlines many of the state's current water projects and restoration efforts, as well as the impact the federal government's actions and inaction have on the region.

Lake Okeechobee and the Everglades Overview

The historical landscape of South Florida allowed water to flow in an uninterrupted sheetflow from the Kissimmee River into Lake Okeechobee, south through the Everglades and into Florida Bay. The rivers, lakes and estuaries of the Everglades that depend on the southward flow of water support a wide variety of flora and fauna not found anywhere else in the world. Prior to the draining of the Everglades and urbanization of South Florida, the Everglades covered 7 million acres. It is commonly referred to as the "River of Grass." Today, it encompasses approximately half of its historical area.[6]

Lake Okeechobee, known as the "Liquid Heart of Florida," formed approximately 6,000 years ago when ocean waters receded and water was left standing in the shallow depression that formed the bed of the lake. The name "Okeechobee" comes from the Seminole Tribe word meaning "big water."[7] At over 467,000 acres, Lake Okeechobee is the second largest lake located entirely within the lower 48 states[8] and has a maximum storage capacity of 1.05 trillion gallons at a depth of 19 feet.[9] Prior to the 20th century, the lake often overflowed the low peat banks along the southern rim, which created a vast area with fertile soil now known as the Everglades Agricultural Area (EAA).

The Lake Okeechobee watershed includes the Upper Kissimmee Chain of Lakes, the Kissimmee River, Taylor Creek, Nubbin Slough, Lake Istokpoga, Indian Prairie, Fisheating Creek, portions of the EAA, and

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[5] The Caloosahatchee River and C-43, though they are distinct, are generally used interchangeably. C-44 refers to the St. Lucie Canal.

[6] South Florida Water Management District, *America's Everglades*, http://www.sfwmd.gov/portal/page/portal/xweb%20protecting%20and%20restoring/americas%20everglades (last visited Oct. 4, 2013).

[7] Seminole Tribe of Florida, *Seminole Tribe of Florida, Culture and Language* (2013), http://www.semtribe.com/Culture/Language.aspx (last visited Oct. 17, 2013).

[8] Florida Department of Environmental Protection, *Brief History of Lake Okeechobee* (Feb. 11, 2009), http://www.dep.state.fl.us/evergladesforever/about/lakeo_history.htm (last visited Oct. 3, 2013).

[9] Florida Department of Environmental Protection, *Total Maximum Daily Load for Total Phosphorus Lake Okeechobee, Florida*, 2 (Aug. 2001), *available at* http://www.dep.state.fl.us/water/tmdl/docs/tmdls/final/gp1/Lake_O_TMDL_Final.pdf (last visited Oct. 17, 2013).

other smaller basins east and west of the lake.[10] Major hydrologic inputs into Lake Okeechobee include rainfall, the Kissimmee River, Fisheating Creek, Taylor Creek, Nubbin Slough, and numerous smaller inflows such as discharges from the EAA, and the Harney Pond and Indian Creek basins.[11] Major hydrologic outputs from the lake include evapotranspiration, discharges to the Caloosahatchee and St. Lucie Canals, and relatively smaller discharges to the Miami, North New River, Hillsboro, and West Palm Beach Canals. The maximum flow capacity to through the C-43 is 9,300 cubic feet per second (cfs). The maximum capacity through the C-44 is 7,300 cfs. For a sense of perspective, 9,300 cfs over 24 hours is equal to approximately 18,446 acre feet or 6.01 billion gallons per day. Put another way, the U.S. Geological Survey preliminary data for 2010 water use in Florida estimates that total fresh water withdrawals in the state amounted to 6.34 billion gallons per day.[12]

Water Flow Alterations

One of the first attempts to alter the flow of water in South Florida began in 1882 when Philadelphia businessman, Hamilton Disston, began the channelization of the Caloosahatchee River and the upper Kissimmee River basin after purchasing 4 million acres from Florida for 25 cents an acre.[13]

In the 1890s, Disston constructed a canal connecting Lake Okeechobee to Lake Hicpochee, which is the headwater of the Caloosahatchee River, thus creating the lake's first connection to tidewater.[14] In the early 1900s, the St. Lucie, Hillsboro, North New River, West Palm Beach, and Miami Canals were constructed, connecting Lake Okeechobee to the Atlantic Ocean.

In 1904, Napoleon Bonaparte Broward was elected on the promise to drain the Everglades in order to create rich farmland.[15] Between 1905 and 1937, several major drainage projects were constructed in South Florida and a five foot levee was built along the southern shore of Lake Okeechobee. The levee and the drainage projects significantly altered the landscape and flow of water through the Everglades ecosystem and encouraged settlement and agricultural activities along the lake.

The drainage facilities and the levee constructed along the southern shore of the lake proved inadequate for protecting the land and people around the lake from a series of major hurricanes in 1922, 1924, 1926, and 1928. The latter two hurricanes were particularly devastating, resulting in more than 3,000 fatalities and widespread destruction of property south of the lake.[16]

Central and Southern Florida Project for Flood Control and Other Purposes

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[10] South Florida Water Management District, et al., *2011 Lake Okeechobee Protection Plan Update* (March 2011), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/lopp_update_2011.pdf (last visited Oct. 3, 2013).

[11] *Supra* note 9, at 6.

[12] U.S. Geological Survey, *Freshwater Withdrawals by Category in Florida, 1970-2010*, 2 (Mar. 6, 2013), *available at* http://fl.water.usgs.gov/infodata/data/2010/Total%20historical%20water%20withdrawals%20by%20category%20in%20Florida,1970-2010.pdf (last visited Oct. 23, 2013).

[13] Edward A. Fernald and Elizabeth D. Purdum, eds., Water Resources Atlas of Florida, 156-158 (Institute of Science and Public Affairs, Florida State University 1998).

[14] *Supra* note 8.

[15] Donald J. Mabry, *Florida's Napoleon*, http://www.historicaltextarchive.com/sections.php?action=read&artid=771%20target=blank (last visited Oct. 17, 2013).

[16] National Weather Service Regional Office Central Region Headquarters, *Famous Hurricanes of the 20th and 21st Century in the United States*, 3-4, http://www.crh.noaa.gov/images/mkx/pdf/handouts/famous-hurricanes.pdf (last visited Oct. 17, 2013).

After the 1928 hurricane, Congress passed the 1930 Rivers and Harbors Act, authorizing the Corps to construct 67.8 miles of levee along the southern shore and 15.7 miles of levee along the northern shore of Lake Okeechobee.[17] After a major hurricane caused extensive flooding in 1947, Congress passed the Flood Control Act of 1948, authorizing the first phase of the comprehensive water resource project known as the Central and Southern Florida Project for Flood Control and Other Purposes (C&SF). The C&SF Project was authorized to provide flood control; water supply for municipal, industrial and agricultural uses; to prevent salt water intrusion; and to protect fish and wildlife in the Everglades. The project included 1,000 miles of levees, 720 miles of canals, and approximately 200 water control structures. A portion of the area drained was designated the EAA, which spans approximately 700,000 acres.[18] The C&SF Project also included extending and raising the Herbert Hoover Dike to its present day elevation of 32 to 46 feet, which was accomplished in the 1960s.[19]

The C&SF Project also authorized the channelization of the Kissimmee River in order to provide flood protection for the surrounding agricultural areas.[20] The channelization began in 1962 and lasted until 1971. It consisted of the excavation of the central canal and the installation of six water control structures that created five impoundment basins. The 103-mile meandering shallow river was transformed into a 56-mile long, 30-foot deep and 90 to 300-foot wide canal called the C-38. Prior to the channelization of the river and under normal conditions, the flow of the river inundated much of the flood plain four to eleven months out of the year. Following the channelization, nearly all of the flow from the river and the floodplain was captured by the canal.[21]

The channelization of the Kissimmee River was effective at controlling flooding, but it had a devastating impact on the ecology of the river and its surrounding floodplain. The elimination of the continuous flow of the river and the seasonal inundation of the floodplain resulted in the loss of over 19,500 acres of wetlands, which led to water quality degradation and a dramatic decline in wildlife populations dependent on the wetland habitat. In 1972, one year after the completion of the Kissimmee River project, there were calls to restore the river, prompting the Central and Southern Florida Flood Control District (predecessor to the SFWMD) to hold the first public hearing on the potential restoration of the river.[22]

State and Federal Efforts to Restore the Everglades Watershed

The state and federal governments have enacted a number of plans designed to address pollution and water flow in the Everglades watershed. Many of the plans that have been enacted are long term and, when completed, will result in more continuous sheetflow south of Lake Okeechobee that mimics the historic flow of water through the Everglades. They are also designed to restore the ecology and wildlife habitats for plants and animals living there. Restoration efforts must also provide for the water supply and flood control needs of South Florida. Providing a path southward for water in Lake Okeechobee is a key component to fully managing discharges east and west from the lake.

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[17] U.S. Army Corps of Engineers Jacksonville District, *HHD Dam Safety Modication* [sic] *Study Information*, http://www.saj.usace.army.mil/Missions/CivilWorks/LakeOkeechobee/HerbertHooverDike.aspx (last visited Oct. 17, 2013).
[18] *Id.*
[19] Leslie G. Bromwell et al., *Report of Expert Review Panel Technical Evaluation of Herbert Hoover Dike Lake Okeechobee, Florida,* 3, 7 (Apr. 2006), *available at* http://my.sfwmd.gov/portal/page/portal/common/newsr/hhd_report.pdf, (last visited Oct. 23, 2013).
[20] SFWMD, *Kissimmee River Restoration Studies, Executive Summary*, 1 (Sep. 2006), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/krr_exec_summary.pdf (last visited Oct. 7, 2013).
[21] *Id.*
[22] *Id.*

In 1988, the federal government filed suit against the SFWMD and the State of Florida alleging that state water quality standards on federal lands were being violated as a result of the high nutrient concentrations being discharged into the Everglades from urban and agricultural areas. In 1992, the parties to the lawsuit entered into a settlement agreement.[23] The 1992 agreement established interim and long-term phosphorus concentration limits for the Everglades National Park (ENP) and the Loxahatchee National Wildlife Refuge. The agreement also required the state to build and operate a minimum of 32,000 acres of storm water treatment areas (STAs).[24]

A year before the settlement, in 1991, the Legislature passed the Marjorie Stoneman Douglas Everglades Protection Act (Act) to restore the Everglades. The Act directed the SFWMD to adopt the Everglades Surface Water Improvement and Management (SWIM) Plan, which included strategies to bring facilities into compliance with water quality standards. The Act also directed the SFWMD to identify and acquire lands for the purpose of water management, create a permitting system, and develop funding mechanisms. The Act also provided the SFWMD the ability to adopt stormwater management utility fees.[25]

Everglades Forever Act

In 1994, the Legislature passed the Everglades Forever Act (EFA), which outlines the state's commitment to restore the Everglades by improving water quality and quantity. The primary goals of the EFA are to improve water quality by reducing phosphorus levels, restore the hydrology of the ecosystem, and restore and protect native plant and animal species by reducing invasive, exotic species in the Everglades.[26]

The EFA requires the SFWMD and the Florida Department of Environmental Protection (DEP) to numerically interpret the Class III phosphorus criterion necessary to meet water quality standards in the Everglades Protection Area[27] and does not cause an imbalance in the natural populations of aquatic flora and fauna. The EFA required that a 10 part per billion default phosphorus criterion go into effect until a rule was adopted.[28] In 2003, the DEP adopted the rule to establish a long-term geometric numeric phosphorus criterion of 10 parts per billion for Class III waters in the Everglades Protection Area.[29]

In 2003, the Legislature passed SB 626 to amend the EFA and implement the "Everglades Protection Area Tributary Basins Conceptual Plan for Achieving Long-term Water Quality Goals" (Long-Term Plan). The Long-Term Plan is to be implemented in two phases. The initial phase is from 2003 to 2016, and is followed by a second 10-year phase. The SFWMD is responsible for implementing the Long-Term Plan and the subsequently approved amendments. The Long-Term Plan identifies the best available phosphorus reduction technology to be used in combination with Best Management Practices (BMPs) and STAs to achieve the phosphorus criterion in the Everglades Protection Area.[30]

On September 12, 2012, Governor Scott announced that the DEP had issued final permits and consent orders to the SFWMD for the implementation of the "Restoration Strategies Regional Water Quality

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[23] Keith Rizzardi, *Translating Science into Law: Phosphorus Standards in the Everglades*, 17:1 Fla. St. U. J. Land Use & Envtl. L. 149, 150-52 (Fall 2001).
[24] *United States v. South Florida Water Management District*, 847 F. Supp. 1567 (S.D. Fla. 1992).
[25] *See* Chapter 91-80, Laws of Fla.
[26] *See* s. 373.4592, F.S.
[27] The Everglades Protection Area includes Water Conservation Areas 1, 2A and 2B, 3A and 3B, and Everglades National Park.
[28] *Supra* note 26.
[29] *See* Chapter 62-302, F.A.C.
[30] *Id.*

Plan."[31] The second 12-year phase of the Long-Term Plan identifies a combination of STA expansions, internal construction, conveyance and structure improvements, and features known as "Flow Equalization Basins," or "FEBs." Specifically, the plan includes milestones for project completion and enforcement mechanisms to ensure the milestones are achieved. The plan includes 6,500 acres of STAs and approximately 110,000 acre-feet of water storage. The implementation of the Restoration Strategies plan would be consistent with the schedules identified in the consent orders issued in conjunction with the National Pollutant Discharge Elimination System (NPDES) and EFA permits.[32]

Comprehensive Everglades Restoration Plan

The 1992 and 1996 Water Resource Development Acts (WRDAs) authorized the Corps to re-evaluate the performance and impacts of the C&SF Project and to provide recommended improvements and/or modifications to the project to restore the south Florida ecosystem.[33] The Comprehensive Everglades Restoration Plan (CERP) was approved in WRDA 2000 and provides the framework for Everglades restoration. It has been described as the world's largest ecosystem restoration effort and focuses on improving water delivery and timing within the Everglades by increasing the size of the natural areas, improving water quality, releasing water in a manner that mimics historical flow patterns, and storing and distributing water for urban, agricultural, and ecological uses.[34]

CERP includes more than 60 elements, covering 16 counties in more than 18,000 square miles. CERP was estimated to take at least 30 years to complete with original cost estimates of $7.8 billion. Major components of CERP are:

- surface water storage reservoirs,
- water preserve areas,
- management of Lake Okeechobee as an ecological resource,
- improved water deliveries to the estuaries,
- underground water storage,
- treatment wetlands,
- improved water deliveries to the Everglades,
- removal of barriers to sheetflow,
- storage of water in existing quarries,
- reuse of wastewater,
- improved water conservation, and
- additional feasibility studies.[35]

Picayune Strand Restoration Project is the first CERP project under construction and includes 55,000 acres of native Florida wetlands and uplands between Alligator Alley (I-75) and the Tamiami Trail (U.S. 41). Elements of the project include constructing three spreader canals, constructing three pump stations, plugging 48 miles of canals, removing and degrading 260 miles of crumbling roads, managing non-native

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[31] Press Release, DEP, *Governor Scott and DEP Announce Everglades Restoration Projects Will Move Forward* (Sep. 11, 2012), *available at* http://content.govdelivery.com/bulletins/gd/FLDEP-516d48 (last visited Oct. 20, 2013).
[32] DEP, *Senate Bill 768 Agency Analysis* (Mar. 2013) (on file with the Senate Committee on Environmental Preservation and Conservation).
[33] Evergladesplan.org, *CERP: The Plan in Depth – Part 4*, http://evergladesplan.org/about/rest_plan_pt_01.aspx, (last accessed Oct. 14, 2013).
[34] *Id.*
[35] *Id.*

vegetation, adding features to maintain current levels of flood protection, and adding features to mitigate the effects of the manatee refuge at the Port of the Islands Marina.[36]

CERP includes the Central Everglades Planning Project (CEPP), which incorporates updated science and technical information gained over the last decade to identify a recommended plan and prepare a Project Implementation Report (PIR) for congressional authorization. Congress has not yet authorized the PIR. CEPP will develop the next set of project components that focus on restoring more natural water flow, depth and duration into and within the central Everglades by:

- increasing storage, treatment and conveyance of water south of Lake Okeechobee,
- removing canals and levees within the central Everglades,
- retaining water within the ENP, and
- providing flood protection for urban and agricultural areas to the east.[37]

CERP components that are part of CEPP include the Everglades Agricultural Storage Reservoirs, Water Conservation Area 3 Decompartmentalization and Sheetflow Enhancement, S-356 Pump Station Modifications, L-31 Levee Seepage Management, Flow to Northwest and Central WCA-3A, and Everglades Rain-Driven Operations.[38]

Kissimmee River Restoration

WRDA 1992 also provided federal authorization for the restoration of the Kissimmee River and the surrounding areas. Construction for the restoration began in June 1999 and three phases are now complete. As of March 2013, flow to 24 miles of river channel has been be reestablished and seasonal rains and flows intermittently inundate 7,700 acres of restored floodplain habitat.[39] The final phase of construction began in 2011 and will be complete in 2015. Efforts to increase storage capacity in the Kissimmee Chain of Lakes (the headwaters of the river system) are currently underway and will provide continuous water flows necessary for river restoration. The acquisition of more than 100,000 acres of land needed for the Kissimmee River Restoration and Headwaters Revitalization is also substantially complete.[40]

Restoration efforts to the Kissimmee River have proved successful, particularly in terms of reducing total phosphorus loads. Water quality analyses of the river indicate the restored floodplain can retain large amounts of nutrients during flood events, which is vital to reducing nutrient inputs into Lake Okeechobee. Additional investigations into this finding are ongoing in soil studies and the results are expected to be released in 2013.[41]

Northern Everglades and Estuaries Protection Program

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[36] U.S. Army Corps of Engineers, *Picayune Strand – Restoration Project* (July 2013), *available at* http://www.evergladesplan.org/docs/fs_picayune_july_2013_508.pdf (last visited Oct. 20, 2013).
[37] Evergladesplan.org, *Central Everglades Planning Project – Facts & Information,* 1 (Sep. 2013), *available at* http://www.evergladesplan.org/docs/fs_cepp_sept_2013.pdf (last visited Oct. 20, 2013).
[38] *Id.* at 2.
[39] SFWMD, *South Florida Environmental Report 2013 Executive Summary,* 12 (March 1, 2013), *available at* http://my.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_sfer/portlet_prevreport/2013_sfer/2013_sfer_executive_summary.pdf, (last accessed Oct. 7, 2013).
[40] SFWMD, *Just the Facts: Kissimmee River Restoration Project,* 1 (Nov. 2012), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/jtf_krr_progress.pdf, (last accessed Oct. 7, 2013).
[41] *Supra* note 39.

The Florida Legislature passed the Northern Everglades and Estuaries Protection Program (NEEPP) in 2007, which expanded the Lake Okeechobee Protection Act (passed by the Florida legislature in 2000) to include the Caloosahatchee and the St. Lucie Rivers and estuaries. The program led to the creation of the Phase II Technical Plan which provided the measures of the quality, quantity, timing, and distribution of water in the northern Everglades ecosystem necessary for restoration.[42] The St. Lucie River and Caloosahatchee River Watershed Protection Plans were developed under NEEPP. The plans:

- include a construction project, pollution control program, and research and water quality monitoring programs,
- identify the best combination of watershed storage projects and water treatment projects needed to help improve the quality, timing, and distribution of water in the system,
- incorporate agricultural and urban BMPs to improve water quality, and
- build upon existing and planned programs and projects and consolidates previous restoration efforts.[43]

Problems in Lake Okeechobee

Herbert Hoover Dike

The Herbert Hoover Dike was constructed to act as a levee around Lake Okeechobee and provide flood protection to the surrounding agricultural areas. The dike extends approximately 140 miles around the lake with an elevation ranging from 32 to 46 feet.[44] The structural deficiencies of the dike are well known and have been studied extensively by the Corps over the last twenty years. The dike was originally constructed using the material from the surrounding area, primarily organic matter from the lake and porous limestone.[45]

The lake receives water from the Kissimmee and Okeechobee basins, which span 5600 square miles. During periods of heavy rain in the basins, water levels rise rapidly within the lake, even when the lake is discharging at maximum capacity. The dike has a limited capability to discharge water in relation to the amount it can hold. Every inch of water that discharges from the basin raises the lake level by four inches, and water can drain into the lake six times faster than it can be discharged. This leads to difficulty maintaining water levels which have magnified concerns over the stability of the dike.[46]

The dike is susceptible to damage from the storm surge that can be created by powerful weather events and hurricanes. The high water levels and surge can produce destructive waves capable of damaging the dike through wave run-up, erosion, and elevated water pressures.[47] The integrity of the dike is also compromised as a result of seepage within and under the dike, which leads to internal erosion. As lake levels increase, the pressure on the porous sections of the dike increases causing seepage. The seepage transports silt and sand through cavities and deposits material in concentrated areas forming sand boils. Seepage, piping transport, and the formation of sinkholes led to the near failure of the dike in nine locations during the late summer and early fall of 1995, when lake levels rose to a maximum of 18.8 feet.

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[42] DEP, *Northern Everglades and Estuaries Protection Program*, http://www.dep.state.fl.us/everglades/neepp.htm (last visited Oct. 20, 2013).
[43] SFWMD, *Quick Facts on Northern Everglades and Estuaries Protection Program*, 2 (Mar. 2009), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/spl_northern_everglades.pdf (last visited Oct. 20, 2013).
[44] *Supra* note 19, at 3.
[45] *Supra* note 19, at 3.
[46] *Supra* note 19, at 3.
[47] *Supra* note 19, at 22.

The dike was saved by emergency repairs consisting mainly of sandbagging to counter the excessive seepage.[48]

In an effort to stabilize the dike, the Corps completed construction of a 21-mile cut-off wall between Port Mayaca and Belle Glade in 2013. The Corps has also taken actions to address 16 of 32 water control structures around the dike and expects work to be completed by 2018. The Corps estimates rehabilitation to cost $2 billion and has invested more than $400 million since 2007.

Phosphorus

Phosphorus and nitrogen are essential nutrients for plants and animals and are the limiting nutrients in aquatic environments. The correct balance of both nutrients is necessary for a healthy ecosystem; however, excessive nitrogen and phosphorus, defined as "nutrient pollution," can cause significant water quality issues. Typically in freshwater systems phosphorus is the limiting nutrient. Therefore, even modest increases in phosphorus above optimum levels can accelerate algae growth, plant growth, and deplete oxygen levels.[49]

Lake Okeechobee is a phosphorus limited aquatic system. As more phosphorus is put into the system than the lake is capable of assimilating, it feeds the growth of plants and phytoplankton leading to algae blooms that cause further damage to the system. These blooms can inhibit the growth of native plant species and result in the death of native aquatic animal species. Extreme algal blooms in the lake have caused die-offs of certain species due to a toxic by-product of algal decay and the dense blooms can also create taste and odor problems in drinking water.[50]

Phosphorus within the Okeechobee watershed comes from a variety of sources via several different mechanisms. Natural sources of phosphorus in aquatic environments include the atmosphere as well as phosphorus that leaches from weathered rocks and minerals. Unnatural sources of phosphorus that cause nutrient pollution are often the direct result of human activities including agricultural activities, stormwater runoff, and wastewater.

In 2001, the DEP established a Total Maximum Daily Load (TMDL) of 140 metric tons per year of total phosphorus for Lake Okeechobee. The TMDL establishes the amount of total phosphorus the lake can assimilate without causing significant ecological impacts within the lake.[51] The limit includes 35 metric tons per year of phosphorus that is estimated to naturally reach the lake through atmospheric deposition. The balance, or 105 metric tons per year, is the goal for total phosphorus loading from the Kissimmee River and Lake Okeechobee watersheds; however, total phosphorus concentrations have been steadily rising over the last two decades.[52]

Ongoing challenges to controlling phosphorus in the watershed and lake include external loading from upstream activities and legacy phosphorus, which is bound in the soils and sediments. The legacy phosphorus accumulates in the sediment during drought conditions and is flushed out in excess during a

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[48] *Supra* note 19, at 39.
[49] Utah State University Water Quality Extension, *Understanding Your Watershed: Phosphorus*, 2 (Reviewed Dec. 2010), *available at* http://extension.usu.edu/files/publications/publication/NR_WQ_2005-18.pdf (last visited Oct. 22, 2013).
[50] *Supra* note 9, at 8-9.
[51] SFWMD, *Lake Okeechobee Protection Plan Update, Executive Summary*, 9 (March 2011), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/lopp_update_2011_ex_sum.pdf (last accessed Oct. 7, 2013).
[52] *Id.* Note – The TMDL is based on a five-year rolling average and the load reduction required to achieve it will vary annually.

rainy season following a drought. The flushing causes a spike in phosphorus concentrations and can lead to algal blooms. Based on 2011 data, it would take 23 to 57 years to flush the stored phosphorus from the system, assuming the input of phosphorus was immediately balanced with the uptake of phosphorus.[53] Efforts to control phosphorus north of the lake are focused on agricultural BMPs. The lands north of the lake are major contributors to phosphorus loading in the lake, and agriculture makes up a majority of the land use in those areas.[54]

Water Levels and the 2008 Lake Okeechobee Regulation Schedule

Lake Okeechobee is an essential feature of the regional aquatic ecosystem and a vital component of the C&SF Project. Adjusting lake levels through regulatory releases has a direct effect on the Caloosahatchee Estuary and Indian River Lagoon, as well as significant impacts on the local environment and economy. The Corps regulates lake levels with the goal of balancing flood control, public safety, navigation, water supply, and ecological health.[55] No other federal, state, or local agency has authority to adjust regulatory releases.

From the early 1900s through 2000, lake levels were determined using calendar-based regulation schedules. In consultation with the SFWMD, the Corps released the Water Supply and Environment (WSE) regulation schedule in July 2000. The WSE replaced the calendar based schedule with an operating schedule that considered many factors including current meteorological and hydrologic conditions, seasonal and multi-seasonal hydrologic forecasting, and ecological and environmental conditions.[56]

From 2002 to 2006, Lake Okeechobee experienced prolonged high water levels, prompting the Corps to reevaluate the WSE regulation schedule. Following a two-year study on water management and lake levels, with input from the state agencies and the public, the Corps released the Lake Okeechobee Regulation Schedule (commonly referred to as LORS 2008), which is now used to manage lake levels.

One of the primary goals of LORS 2008 is to maintain lake levels between 12.5 and 15.5 feet and includes a seasonally-adjusted schedule to aid in water management decisions. LORS 2008 also considers the structural constraints of the Herbert Hoover Dike and area water control structures, meteorological conditions, hydrological conditions, and water quality.[57] However, minimizing the risk of dike failure to ensure public safety is the primary concern when lake levels increase. This concern trumps all other considerations, including the environmental harm.

LORS 2008 operates in three bands levels: the high lake management band, the operations band, and the water shortage management band. The high lake management band includes lake levels above 16 feet in advance of the wet season, or levels above 17.25 feet during the dry season. When water levels are in the

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[53] *Id.* at 8.

[54] SFWMD, *2012 south Florida Environmental Report – Chapter 8*, 8-31 (Mar. 1, 2013), *available at* http://www.sfwmd.gov/portal/page/portal/pg_grp_sfwmd_sfer/portlet_prevreport/2012_sfer/v1/chapters/v1_ch8.pdf (last visited Oct. 23, 2013).

[55] SFWMD, *Lake Okeechobee Operations: Goals, roles and responsibilities Fact Sheet,* 1 (March 2012), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/jtf_lakeo_responsiblities.pdf (last visited Oct. 17, 2013).

[56] L. Cadavid, et al., *Lake Okeechobee Operations by Means of the Water Supply and Environment (WSE) Regulation Schedule, Abstract,* (2006), http://ascelibrary.org/doi/abs/10.1061/40875(212)17 (last visited Oct. 17, 2013).

[57] U.S. Army Corps of Engineers, *Lake Okeechobee/Water Management Fact Sheet,* http://www.saj.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/6106/Article/3874/lake-okeechobee-water-management.aspx (last visited Oct. 17, 2013).

high lake management band operations are focused on reducing the lake level to free additional capacity for future rain events. Maximum water releases typically occur in this band with devastating consequences for the east and west estuaries.[58]

The operations band consists of five sub-bands that maintain lake levels in the preferred range of 12.5 and 15.5 feet. Once the water levels reach the lower end of this band, the Corps relies on the SFWMD to assist with water allocations.[59]

The water shortage band includes lake levels below 10.5 feet in advance of the wet season, or below 13 feet at the start of the dry season. Once water levels are in the shortage band, the Corps generally defers on all water release decisions to the SFWMD.[60]

Many of the constraints of LORS 2008 have been apparent as the rate of water input to the lake has far exceeded its discharge capabilities. This has resulted in large, continuous discharges of water from the lake (sometimes up to the maximum capacity of the canals) into the C-43 and C-44.

Army Corps of Engineers Authority over Basin Structures

The Corps has authority over the structures that release water into the C-43 and C-44 canals. The evolution of how the Corps obtained operational control over the control structures regulating lake levels begins with the Rivers and Harbors Act of 1930.

All of the project works constructed as a result of the Rivers and Harbors Act of 1930 were operated and maintained by the Corps. Some channels, such as the St. Lucie Canal, were built by the State of Florida but as a result of the Rivers and Harbors Act of 1930, they were taken over by the Corps. The Flood Control Act of 1948 approved the creation of the C&SF Project. The features of the old Caloosahatchee River and Lake Okeechobee Drainage Areas Project (CR&LODA) were retained by the Federal Government for operation and maintenance. Flood control features of the CR&LODA were improved in some cases and incorporated into the C&SF Project. The existing channels and locks were included in the Okeechobee Waterway Project. Locks and channels improved under the new project were included in the C&SF Project.

Both the Flood Control Acts of 1948 and 1968 contained language spelling out the features of the project that would be operated and maintained by the Corps. Those are the levees, channels, locks, and control works of the St. Lucie Canal, Lake Okeechobee, Caloosahatchee River, and the main spillways of the conservation areas.[61] The C&SF Project features not operated and maintained by the Corps are the responsibility of the SFWMD.[62]

Criticisms of Corps Operations and Planning

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[58] *Id.*
[59] *Id.*
[60] *Id.*
[61] University of Miami Law School, *Letter from the Secretary of the Army: Comprehensive Report on Central and Southern Florida For Flood Control And Other Purposes*, (1949) http://www.law.miami.edu/library/everglades/secretary_army_letter.htm (last visited Oct. 10, 2013).
[62] Army Corps of Engineers, *Central and Southern Florida Comprehensive Review Study: Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, Appendix L*, L-58 (April 1999), *available at* http://www.evergladesplan.org/docs/comp_plan_apr99/app_l.pdf, (last visited Oct. 17, 2013)

The Corps has been criticized over the past decade for underperforming or failed civil works projects, and for its disregard for the environmental damage some water resource projects have caused. Some examples shed light on pervasive and persistent problems that have plagued the Corps' decision making.

In 2006, the Government Accountability Office (GAO) studied four Corps projects as part of a five-part review of the Corps' Civil Works Program and examined the cost-benefit analyses performed to justify moving forward with the projects. Those projects were the Delaware River Deepening Project, the Oregon Inlet Jetty Project, the Sacramento Flood Protection Project, and a recommendation to put one of the Corps' dredges in reserve status. One common theme the GAO found was that the Corps' cost-benefit analyses were inadequate and did not provide a reasonable basis for deciding to move forward with the project or action. For example, in the GAO's review of the Delaware River Deepening Project, the Corps claimed that the benefits of the project were $40.1 million per year while the GAO could only find support for benefits totaling $13.3 million per year.[63]

In another example, the House Committee on Appropriations reported in 2006 that the Corps' Civil Works projects were, "an agglomeration of individual projects," that showed "little or no systematic approach to the Nation's water and coastal infrastructure underlying the selection of which projects received funding."[64]

Further, a $220 million plan, the "Yazoo Backwater Pump Project," was designed to drain 67,000 acres of Mississippi wetlands, about 200 miles northwest of New Orleans. The purpose of the project was to benefit local soybean farmers but it would have done widespread damage to the area's wetlands. In 2008, the U.S. Environmental Protection Agency (EPA) issued a rare veto of the project under provisions of the Clean Water Act (CWA). At the time, it was one of only 12 vetoes handed down by the EPA under the CWA since 1972.[65]

Lastly, a 2012 study by the National Academies of Science found that the Corps faces an unsustainable situation driven by budgetary considerations. The study found that under the current system of funding, the Corps may not meet all its obligations. This has led to an "unsustainable situation for maintenance of existing infrastructure."[66] Keeping the status quo means accepting, "degraded performance, and the consequences of gradual or sudden failure of infrastructure components."[67] In addition, NAS states that neither Congress nor the Corps have clear guiding principles that allow the Corps to prioritize operations, maintenance and rehabilitation needs.[68]

Corps Immunity to Suit for Violations of State and Federal Water Standards

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[63] GAO, *Corps of Engineers: Observations on Planning and Project Management Processes for the Civil Works Program*, GAO-06-529T, (March 15, 2006) *available at* http://www.gao.gov/assets/120/113080.pdf (last visited Oct. 22, 2013).

[64] U.S. Congress, House of Representatives, Committee on Appropriations (May 19, 2006), *Report on the Energy and Water Development Appropriations Bill, 2007*, 109th Cong., 2nd sess., H. Rept. 109-474, http://www.gpo.gov/fdsys/pkg/CRPT-109hrpt474/html/CRPT-109hrpt474.htm (last visited Oct. 22, 2013).

[65] U.S. EPA, *EPA Decision Protects 67,000 Acres of Mississippi Wetlands, Press Release*, (Sep. 02, 2008) *available at* http://yosemite.epa.gov/opa/admpress.nsf/0/8166182ff7d19b15852574b8005ffae1?OpenDocument (last visited Oct. 21, 2013).

[66] National Research Council, *Corps of Engineers – Water Resources Infrastructure: Deterioration, Investment, or Divestment*, 9 (2012), *available at* http://www.nap.edu/catalog.php?record_id=13508 (last visited Oct. 23, 2013).

[67] *Id.* at 8.

[68] National Academies, *Business As Usual No Longer Viable for Managing U.S. Army Corps Water Infrastructure*, (Oct. 4 2012), http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=13508 (last visited Oct. 23, 2013).

The Water Transfers Rule, promulgated by the Environmental Protection Agency in 2008, protects the Corps from suit under the CWA for failure to acquire an NPDES permit. The rule states that discharges having the effect of transferring water while not adding pollution to the water that is transferred do not require NPDES permits. Specifically, the rule states:

> [w]ater transfer means an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use. This exclusion does not apply to pollutants introduced by the water transfer activity itself to the water being transferred.[69]

Several environmental groups filed suit against the Corps in the U.S. District Court for the Northern District of Florida alleging violations of state water quality standards by the Corps' operation of the three water-control structures on the Caloosahatchee River. The court issued a preliminary ruling on September 27, 2013, stating an intent to dismiss the case when a ruling is made on a procedural issue, which is currently on appeal by the SFWMD.

In its discussion of the case, the court agreed that state law allowed the plaintiffs to sue for violations of state water quality standards but that federal law gave the Corps immunity from suits for violations of state pollution standards when the violations occur as a result of actions taken by the Corps to maintain navigation. Since LORS 2008 helps determine the releases into the Caloosahatchee River and navigation is a major aspect of the regulation schedule, based on this ruling, the Corps may not be sued for violating state water quality standards for discharges from the lake guided by LORS 2008. Separately, the court also indicated it would dismiss the case on procedural issues.[70]

Problems in the Caloosahatchee River/Estuary and Indian River Lagoon

Estuaries are partially enclosed bodies of water along coastlines at the interface between oceans and freshwater sources, such as rivers and streams. Estuaries are tidally influenced, but protected from ocean waves, winds, and storms by land.[71]

The exchange of salt and freshwater in an estuary make it a unique and productive community of plants and animals that have adapted to living in brackish waters.[72] Estuarine organisms have unique salt level tolerances and when the salinity of the water is altered, the growth, reproduction, and survival of the organisms may be threatened.[73]

The large regulatory releases from Lake Okeechobee, as well as significant basin runoff during periods of heavy rain, introduce massive amounts of fresh water into both the Caloosahatchee and Indian River Lagoon Estuaries, lowering salinity levels and significantly altering the water chemistry, causing harm to native species. The freshwater releases also introduce a tremendous amount of silt into the systems, affecting the growth of plants by inhibiting photosynthesis. During drought conditions low discharges lead to elevated salinity levels, resulting in further harm to the ecosystem.

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[69] EPA Water Transfers Rule, 40 C.F.R. s. 122.3 (2008), aff'd, 570 F.3d 1210 (11th Cir. 2009).
[70] *Fla. Wildlife Federation, Inc. v. U. S. Army Corps of Engineers*, No. 4:12cv355-RH/CAS, 2013 WL5436707 (N.D. Fla. Sep. 27, 2013).
[71] U.S. Environmental Protection Agency, *Basic Information about Estuaries*, http://water.epa.gov/type/occb/nep/about.cfm (last accessed Oct. 14, 2013).
[72] *Id.*
[73] National Oceanic and Atmospheric Administration, *Ocean Service Education – Salinity*, http://oceanservice.noaa.gov/education/kits/estuaries/media/supp_estuar10c_salinity.html (last visited Oct. 22, 2013).

Estuarine ecosystems depend on the balanced cycling of nutrients, particularly nitrogen and phosphorus. Both plants and animals require nutrients for growth. However, excessive nutrients in estuarine environments can lead to significant degradation.[74]

The estuaries receive nutrients from point sources such as industrial activities and wastewater treatment facilities, as well as from non-point sources, such as from septic systems and unmanaged stormwater and agricultural runoff. Areas with high concentrations of septic systems result in elevated levels of nitrates and bacteria in the surrounding water bodies.[75] Stormwater runoff introduces pollutants into the watershed when water runs off of impervious surfaces such as roads and parking lots. Stormwater treatment systems capture and treat some runoff, but they are incapable of capturing all the water that flows into surface waters. Consequently, much of the local stormwater runoff drains directly into surface water bodies without treatment. Excessive and improper application of fertilizer leads to increased nutrient concentrations in surrounding water bodies.[76]

The input of excess nitrogen and phosphorus into the estuaries promotes algae growth, including toxic blue-green algae, which depletes oxygen concentrations and is detrimental to humans and wildlife.[77] The increased algae blooms also inhibit sunlight from reaching aquatic vegetation that is crucial for health of the ecosystem.[78]

Current and Planned Water Projects

The SFWMD is responsible for managing water supplies for residents, businesses, agriculture, and the sensitive ecosystems of South Florida. Reservoirs are one of the primary methods used to ensure sustainable water supplies for current needs and future demands. Historically, reservoirs were typically constructed in-stream by building a dam across a creek or river. Now, many systems are built above ground and off-stream in order to preserve natural systems.[79]

Seasonal variations in rainfall tend to place constraints on the use of surface water. Approximately 60 percent of Florida's yearly rainfall occurs from June to September. During the dry season water stored in the reservoirs can be treated and utilized, reducing stressors to the natural system.[80]

Water storage on public and private land has become an important factor in controlling excess water that would otherwise flow into Lake Okeechobee and into the coastal estuaries. The SFWMD is actively pursuing opportunities to work with property owners to accept regional runoff on their land and to store

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[74] St. Johns River Water Management District, *Indian River Lagoon, An Introduction to a Natural Treasure*, http://www.sjrwmd.com/itsyourlagoon/pdfs/IRL_Natural_Treasure_book.pdf (last visited Oct. 23, 2013).
[75] South Florida Water Management District, *St. Lucie River Watershed Protection Plan Update*, App. 10-1-1 (2012), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/slrwpp_2012update_sfer_voli_app10_1.pdf (last visited Oct. 18, 2013).
[76] *Id.*
[77] St. Johns River Water Management District, *Blue-Green Algae (Cyanobacteria) in Florida Waters,* http://www.sjrwmd.com/algae/bluegreen.html (last visited Oct. 23, 2013).
[78] EPA, *Health and Environmental Effects Research,* http://www.epa.gov/nheerl/research/aquatic_stressors/nutrient_loading.html#deereased_o2 (last visited Oct. 23, 2013).
[79] SFWMD, *Water Supply: Developing Sustainable Water Supplies to Meet Current and Future Demands, available at* http://www.swfwmd.state.fl.us/publications/files/watersupply.pdf (last visited Oct. 17, 2013).
[80] *Id.*

water rather than allow it to drain off. Storing water in this manner is a critical component to reducing the amount of water that flows into Lake Okeechobee and the surrounding estuaries.[81]

There are a number of water projects, both proposed and underway that, once completed, will significantly increase the water storage capacity in South Florida. The Indian River Lagoon-South Restoration Project consists of multiple water storage and water treatment projects including the construction and operation of four new above ground reservoirs (including connecting canals, control structures, and levees) as well as four new STAs. The reservoirs will capture water from the C-44, C-23, C-24, and C-25 canals and will provide approximately 135,000 acre-feet of total combined water storage.[82]

The total cost of the Indian River Lagoon-South project is approximately $1.1 billion with an annual operation and maintenance cost of $3.8 million. The Corps is responsible for funding and administering the construction contracts, while the SFWMD is responsible for providing the land needed for the project. CERP contains 50-50 cost-share provisions that apply over all projects under CERP. Early phases of construction of the C-44 reservoir have already begun.[83]

The Caloosahatchee River (C-43) West Basin Storage Reservoir and the Caloosahatchee Watershed project is part of the Comprehensive Everglades Restoration Plan. The proposed reservoir will store excess surface water runoff from the Caloosahatchee River and excess releases from Lake Okeechobee and will improve the ecological functions of the Caloosahatchee Estuary by a providing a consistent flow of fresh water to the estuary. The proposed reservoir is located at the Barry Groves site within the C-43 basin and spans 10,700 acres with a storage capacity of approximately 170,000 acre-feet and a pump capacity of 1,500 cfs. During the dry season, stored water will be slowly released into the Caloosahatchee to aid in stabilizing salinity levels in the estuary and improve its overall health.[84]

The planning, design, land acquisition, and construction costs for the C-43 reservoir are estimated at approximately $576.6 million, which will be shared equally between the state and federal governments. The SFWMD is the local sponsor for the project and will also be responsible for the additional $2.9 million recreational component.[85] Construction of the project is dependent on congressional authorization, which is still pending. Once the project is authorized and funded it is expected to take three to four years to complete.[86]

The SFWMD is currently constructing the L-8 Reservoir Project in Palm Beach County. The reservoir is a 950-acre former rock mine capable of storing 46,000 acre-feet of water. The SFWMD also recently approved the contract to start construction on the A-1 shallow water reservoir, which will provide 110,000 acre-feet of storage capacity.

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[81] *Id.*

[82] U.S. Army Corps of Engineers, *Indian River Lagoon – South,* (August 2013), *available at* http://www.evergladesplan.org/docs/fs_irls_aug_2013.pdf (last visited Oct. 17, 2013).

[83] Evergladesplan.org, *Indian River Lagoon – South: Facts and Information*, (Aug., 2013), *available at* http://www.evergladesplan.org/docs/fs_irls_aug_2013.pdf (last visited Oct. 22, 2013).

[84] U.S. Army Corps of Engineers, *CERP Project: Caloosahatchee River (C-43) West Basin Storage Reservoir and Caloosahatchee Watershed*, http://www.evergladesplan.org/pm/projects/proj_04_c43_basin_1.aspx (last visited Oct. 17, 2013).

[85] *Id.*

[86] Evergladesplan.org, *Central and Southern Florida Project, Project Management Plan, C-43 Basin Storage Reservoir*, 12 (Feb. 2002), *available at* http://www.evergladesplan.org/pm/pmp/pmp_docs/pmp_04_c43/pmp_04_main.pdf (last visited Oct. 22, 2013).

The Dispersed Water Management Program is designed to encourage water storage on private lands. Since 2005, the SFWMD has worked with a coalition of agencies, environmental organizations, ranchers, and researchers to develop ways to store excess surface water on public and private lands. The program also encourages private property owners to retain water on their land as opposed to draining it and to store regional runoff. Landowners typically get involved in the program via cost-share cooperative projects, easements, or payment for environmental services.[87]

Aquifer Storage and Recovery (ASR) provides a way to store water and later withdraw it as necessary. ASR facilities inject and recover treated and untreated groundwater, partially treated surface water, and reclaimed wastewater. It can store more water than typical above-ground reservoirs and can provide large volumes of water over longer periods of time thus increasing water supplies during seasonal and multi-year droughts. ASR injection can also displace salt water that has encroached in aquifers serving water supply needs.[88] The original CERP plan anticipated construction of as many as 333 ASR wells to line the northern rim of the Lake.[89] Current pilot projects will determine the feasibility of ASR wells in various locations and aquifer conditions.

Modified Waters Project

The Modified Waters Project (mod waters project) was authorized in 1989. The purpose of the mod waters project is to provide a southern outlet to the ENP through the Northeast Shark River Slough and to rehydrate the area, a key part of the effort to restore certain areas in the Everglades to their natural state. The project will offset the adverse effects of the flow diversions largely as a result of the construction of the WCAs in the 1960s, which redirected water through the West Shark River Slough and away from what is now the northeastern portion of the ENP.[90] The project is a precursor to implementation of CEPP (once it is authorized) and a number of CERP projects and will provide 4,000 cfs into ENP.

Mod Waters includes three major components:

1. bridging of the Tamiami Trail to allow sheetflow of water south under the bridge,
2. flood mitigation in the eastern Everglades residential area, an 8 ½ square mile area that would otherwise be negatively affected by the flow of water, and
3. conveyance and seepage controls to move water from WCA-3A to WCA-3B and then into Northeast Shark River Slough, which will control seepage and remove barriers to natural flow patterns between Northeast and West Shark River Slough.

Federal funds pay for all the land and construction and the SFWMD will be responsible for performing operations and maintenance with a 75% federal cost-share.[91]

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[87] SFWMD, *Dispersed Water Management Program*, 1 (October 2013), *available at* http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/jtf_dispersed_water_mgmt.pdf (last visited Oct. 23, 2013).

[88] SFWMD, *Aquifer Storage and Recovery*, http://www.sfwmd.gov/portal/page/portal/xweb%20-%20release%203%20water%20supply/aquifer%20storage%20and%20recovery (last visited Oct. 20, 2013).

[89] U.S. Army Corps of Engineers, *Lake Okeechobee – Aquifer Storage and Recovery Pilot Project*, (July 2013), *available at* http://www.evergladesplan.org/docs/fs_asr_july_2013.pdf (last visited Oct. 23, 2013).

[90] National Research Council of the National Academies, *PROGRESS TOWARD RESTORING THE EVERGLADES: THE SECOND BIENNIAL REVIEW – 2008*, pp. 110-111, (National Academies Press 2008), *available at* http://www.nap.edu/openbook.php?record_id=12469&page=R1 (last visited Oct. 17, 2013).

[91] Ernie Barnett, SFWMD and Kim Taplin, U.S. Army Corps of Engineers, Presentation to SFWMD Governing Board on progress of Modified Waters Project in Miami, FL, Jun. 13, 2013, http://sfwmd.iqm2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=1203&MediaPosition=11037.729&ID=1307&CssClass= (follow "Video" link) (last visited Oct. 16, 2013).

Construction of the mod waters project is nearly complete with some key elements remaining including:

- completion of Contract 8, which concerns the northernmost construction features of the C-111 South Dade Project,
- operational testing for several structures associated with the project, and
- development of a combined operational plan for the operation of Mod Waters and the C-111 project.[92]

Plan 6

A proposed solution to the harmful discharges of water through the C-43 and C-44 canals is a plan called "Plan 6." It was first proposed by environmental advocate Art Marshall in 1982. It would reestablish historic sheetflow in the Kissimmee-Lake Okeechobee-Everglades hydrologic system by creating a flow-way through the EAA. The plan has been studied and rejected three times. It was first studied in 1994 during the development of the Central and Southern Florida Project Comprehensive Review Study Reconnaissance Report. It was studied again in 1999 and rejected in a scientific analysis as part of the CERP Feasibility Report. Lastly, it was evaluated in 2008-2009 by the SFWMD. The SFWMD concluded that Plan 6, among other projects that were part of the evaluation, was not the most cost-effective or viable means to increase flows south from Lake Okeechobee into the Everglades due to the altered landscape and the extensive network of pumps necessary to overcome physical constraints.

Requests for Assistance from Washington D.C.

The agreement with the federal government under CERP was to share the costs of restoration efforts equally. There have been long delays in authorizing and funding projects that would alleviate some of the problems currently faced by the state and particularly by the people who live near the Indian River Lagoon and the Caloosahatchee River and Estuary. Florida has consistently outspent the federal government in Everglades restoration activities. Funds the state has spent have not been credited to the state due to Congress' failure to pass a WRDA bill since 2007.

Recently, a delegation from Florida, including members of the Florida Senate Select Committee, and members from the Florida House of Representatives, the DEP, the SFWMD, and technical experts testified at a congressional hearing on the issues affecting the Caloosahatchee River and Indian River Lagoon and St. Lucie River estuaries, and the communities that depend on them. The hearing was attended by members of Florida's congressional delegation and leadership from the U.S. House of Representatives. Testimonies by the Florida delegation and Congressional members highlighted the Corps' failure to control lake levels without any regard for the damages the discharges were causing the estuaries and the federal government's failure to lead on the issue. The testimonies also highlighted the failure of Congress to pass the recently proposed WRDA bill, which is necessary to proceed on many projects designed to help restore the Everglades and south Florida.

In a letter to President Obama, Governor Scott extended an invitation to the President to visit south Florida and see first-hand the damage being done to the estuaries and made four specific requests to the President:

- take steps necessary to enhance the Herbert Hoover Dike system,
- fulfill the cost-match obligations by investing in environmental projects with the state,
- provide authorization and federal funding to projects ready for implementation, and
- provide flexibility to the state and local partners to pursue critical projects by providing block grants for the design and construction of the projects.

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[92] *Id.*

Recommendations of the Select Committee on Indian River Lagoon and Lake Okeechobee Basin

Short-Term Recommendations

1. The final phase of the Kissimmee River Restoration Project is designed to complete restoration of 20,000 acres of wetlands and 44 miles of the historic Kissimmee River to its natural state. The project will reduce the amount of pollutants flowing down the Kissimmee River into Lake Okeechobee. It will also provide for more water storage on 40 square miles of the Kissimmee River floodplain. The Corps estimates the project will be completed by 2017. The Committee recommends appropriating $5 million to support the project.

2. The C-111 South Dade Project will aid the restoration of Taylor Slough, which experienced ecological damage when water was directed away from the slough due to the construction of the C-111 canal. It will also help improve sheetflow into the Everglades by preventing groundwater seepage to the east. The Committee recommends appropriating $5 million for the project.

3. Land/Ocean Biogeochemical Observatory (LOBO) monitoring units are being used in the Caloosahatchee River and Estuary and the St. Lucie River and Indian River Lagoon to monitor water quality at several sites. Similarly, the Ocean Research and Conservation Association's (ORCA) Kilroy monitoring devices are deployed in the Indian River Lagoon to monitor water quality. The Committee recommends appropriating $2 million for Kilroy devices and an additional $2 million for LOBO devices to support research in areas not currently covered by monitoring units, for a total of $4 million.

4. Water stored during Florida's wet season reduce flows sent to the estuaries. The Dispersed Water Management Program is designed to manage water retained on public and private lands. Private landowner involvement typically includes cost-share cooperative projects, easements, or payment for environmental services. Private ranchlands provide more than 60,000 acre-feet of storage. The Committee recommends appropriating $3 million to support the Dispersed Water Management Program under the Northern Everglades and Estuaries Protection Program.

5. BMPs are the most effective methods to limit the release of nutrient pollution into groundwater and surface water from agricultural lands. The Committee recommends appropriating $3 million to DACS to support the BMP program.

6. At the September 12, 2013, Legislative Budget Commission meeting, the DEP requested $2.7 million in funding authority to provide operational and structural changes to existing pump stations in order to move excess water in the WCAs south to Everglades National Park and to tide. These pumps are typically only used for flood protection. The request also provided for funding to cut a gap in Old Tamiami Trial and vegetation clearing to remove barriers to the southward flow of water. The Committee recommends continued funding of these and similar short-term projects, as determined by the DEP and SFWMD, to provide continued short-term relief from excessive lake discharges.

7. The Picayune Strand Restoration Project is designed to restore 55,000 acres of wetlands and uplands between Tamiami Trail and Alligator Alley in southwest Florida. Construction responsibilities are shared between the Corps and the SFWMD. The Committee recommends appropriating $2 million to support the SFWMD's construction efforts in order to complete the project.

8. Healthy oyster populations and seagrass beds are vital to the health of estuarine ecosystems. The Northern Estuaries Resource Recovery pilot program seeks to re-establish oyster populations and seagrass beds in the St. Lucie and Caloosahatchee Estuaries. The Committee recommends appropriating $500,000 for each estuary to support the program, for a total of $1 million.

9. A significant portion of the water flowing into Lake Okeechobee from the north comes from Lake Kissimmee via the Kissimmee River. Holding more water in Lake Kissimmee would aid in reducing the flow of water down the Kissimmee River. Lake Kissimmee water level is controlled by its own regulation schedule that allows the lake to reach is full capacity on November 1, after the wet season has ended. The Committee recommends evaluating a deviation from the schedule, allowing it to reach full capacity on October 1, rather than in November.

10. LORS 2008 was designed to regulate levels in Lake Okeechobee based on the condition of the dike as it existed in its degraded state. A 21-mile cutoff wall was completed in the most vulnerable area and replacement or removal of 7 of 32 water control structures is ongoing. Work on all 32 structures will be completed by 2018. The risk assessment used to develop LORS 2008 did not account for future reductions in risk due to completed and ongoing projects. The Committee recommends that Florida's Congressional representatives support legislation or rulemaking in order to revisit the regulation schedule to update the risk assessment used to manage risk at certain lake level management bands.

11. The Committee has received numerous innovative solutions to reduce nutrient pollution, increase salinity and mixing zones, and reduce or eliminate toxic algal blooms in the estuaries. The Committee recommends establishing an advisory board at a state university to evaluate technologies and proposals that address one or more of the problems affecting the estuaries.

12. During public testimony and in written comments, the Committee heard many concerns about septic systems. Poorly maintained septic systems and areas where there is a high concentration of septic systems can be sources of pollutants in groundwater and surface water. The Committee recommends further evaluation of methods to reduce the impact of septic systems on ecologically sensitive areas.

Long-Term Recommendations

1. Tamiami Trail, completed in 1928, created a dam-like effect preventing water from moving south into what is now Everglades National Park. The first phase of the Tamiami Trail Modifications project to bridge one mile of the existing road has been completed. The second phase, a 2.6-mile bridge, will lead to greater and more disbursed water flow south of the bridge into the park. The Committee recommends appropriating $90 million to the Florida Department of Transportation to expedite the next phase of the project.

2. The C-44 reservoir and associated stormwater treatment area, critical components of the Indian River Lagoon – South Restoration Project, will provide water storage and treatment during the rainy season and discharge water during the dry season. The completion of the project will reduce the large fluctuations of water flow from Lake Okeechobee and the C-44 basin to the St. Lucie River and Estuary. The Committee recommends appropriating $40 million to expedite construction of the state's portion of the project.

3. Water storage in the Caloosahatchee basin is critical to capture wet season runoff from the basin and regulatory releases from Lake Okeechobee. The Caloosahatchee (C-43) West Basin Storage Reservoir project will improve timing, quantity, and quality of freshwater flows to the river and estuary. The project is included in the proposed WRDA bills of each house of Congress. The Committee recommends appropriating $5 million to support construction of the C-43 basin project.

Additionally, in anticipation of final passage of a WRDA bill, the state should include the C-43 reservoir project in Florida's Long-Range Financial Outlook to reduce any delay in funding this critical project once it is authorized and receives federal funding. Florida's share of the project cost is estimated at $289 million.

4. Water Quality Restoration Strategies, the second phase of the Long Term Plan for Achieving Water Quality Goals, are designed to ensure that all surface water discharges into the Everglades Protection Area meet water quality standards. The Committee recommends appropriating $32 million for Water Quality Restoration Strategies.

5. Many of the projects necessary for Everglades restoration, including the Central Everglades Planning Project, are awaiting authorization by a federal WRDA bill. Two bills have passed their respective houses of Congress. The differences between the House and Senate versions will be negotiated in a conference committee and will be presented to the president. The Committee recommends that Florida's Congressional representatives support passage of a fiscally responsible bill.

6. The committee concludes that the Corps has not adequately considered the widespread damage done to the estuaries when it releases large amounts of water from Lake Okeechobee. The Committee recommends amending the operational jurisdiction of the Army Corps of Engineers to give the State of Florida, specifically the Department of Environmental Protection, authority over regulatory releases when the risk of dike failure is less than 10 percent. Procedures should be established for when the risk of failure exceeds this threshold, including federal notification that would provide the state 24-hours notice to assess liability and decide whether to maintain control, or to temporarily release authority to the federal government.

APPENDIX

Factors Guiding Implementation of LORS 2008

LORS 2008 provides guidance for the SFWMD and the Corps for regulatory releases of water in Lake Okeechobee. Generally, the factors that constrain the operation of the lake are structural, meteorological, environmental, and hydrologic conditions.[93]

Structural constraints include:

- Integrity of the Herbert Hoover Dike,
- Florida Power and Light Company Martin Plant Reservoir,
- The discharge capacity at the S-77 spillway,
- The discharge capacity at the S-78 spillway and Ortona Lock,
- Structural stability at low lake stages, particularly for several structures that control flows into the lake that could be at risk of failure when upstream levels are high and lake levels are low. This situation could result in overturning and/or sliding, and
- Concerns about providing water supplies at lake stages below 10.2 and 10.0.[94]

Meteorologic constraints include:

- Potential spillway gate debris caused by the flooding and destruction of temporary and permanent structures and/or facilities within the lake, such as the Belle Glade Marina;
- Storm surge during high tide at S-79, which could overtop the structure;
- Extreme weather events that may affect water quality in the lake;
- Flooding at the St. Lucie Settlement subdivision on the South Fork of the St. Lucie River.[95]

Environmental constraints, which include water quality in Lake Okeechobee.[96]

Hydrologic constraints include:

- S-77 tailwater restrictions, in consideration of impeding local drainage around the town of Moore Haven;
- At the S-80 spillway/lock, high levels could flood the machinery that operates the lock;
- Minimum canal levels at the St. Lucie Canal;
- Algal blooms in the St. Lucie Canal, Caloosahatchee River and associated waterways;
- St. Lucie and Caloosahatchee estuarine salinity levels;
- STA capacity limitations which could then restrain releases to the WCAs;
- Salinity intrusion up the Caloosahatchee River, affecting drinking supplies;
- Moorage problems during low levels at the Indiantown Marina at S-80; and
- Fish and wildlife resources that include extreme levels that affect the littoral zone within the lake, salinity levels that affect estuarine resources, and various considerations related to endangered and threatened species throughout the Central and Southern Florida Project area.[97]

As mentioned in LORS 2008, many of these constraints become issues of significant concern during high lake levels since the lake fills with water at rates that far exceed the ability of the structures to discharge

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[93] Army Corps of Engineers, *Central & Southern Florida Project – Water Control Plan for Lake Okeechobee and Everglades Agricultural Area*, 7-1 (Mar. 2008).
[94] *Id.* at 7-1 to 7-3.
[95] *Id.* at 7-3 to 7-4.
[96] *Id.* at 7-4 to 7-5.
[97] *Id.* at 7-5 to 7-8.

water. The inability to effectively manage inputs can result in large discharges of water, sometimes up to the maximum capacity of the canals to move water, into the Indian River and Caloosahatchee lagoons.

Lake Okeechobee structures within the C&SF Project system are operated pursuant to the federal Water Control Plan, which contains LORS 2008. As the local sponsor of the C&SF Project, the SFWMD is subject to and bound by federal regulations and law including the Water Control Plan.[98]

Comprehensive List of CERP projects (with Sponsor)

1. Acme Basin B Discharge (SFWMD)
2. Aquifer Storage and Recovery Regional Study (SFWMD)
3. Big Cypress – L-28 Interceptor Modifications (SFWMD)
4. Biscayne Bay Coastal Wetlands (SFWMD)
5. Broward County Secondary Canal System (SFWMD)
6. Broward County Water Preserve Areas (SFWMD)
7. C-111 Spreader Canal (SFWMD)
8. C-4 Control Structures (SFWMD)
9. C-43 Aquifer Storage and Recovery Pilot (SFWMD)
10. C-43 Basin Aquifer Storage and Recovery (SFWMD)
11. Caloosahatchee Back-pumping with Stormwater Treatment (SFWMD)
12. Caloosahatchee River (C-43) West Basin Storage Reservoir Project (SFWMD)
13. Central Everglades Planning Project (SFWMD)
14. Central Lake Belt Storage Area (SFWMD)
15. Everglades Agricultural Area Storage Reservoirs (SFWMD)
16. Everglades National Park Seepage Management (SFWMD)
17. Florida Keys Tidal Restoration (SFWMD)
18. Flows to Northwest and Central Water Conservation Areas 3A (SFWMD)
19. Henderson Creek-Belle Meade Restoration (DEP)
20. Hillsboro Aquifer Storage and Recovery (SFWMD)
21. Hillsboro Aquifer Storage and Recovery Pilot (SFWMD)
22. Indian River Lagoon - South (SFWMD)
23. L-31N (L-30) Seepage Management Pilot (SFWMD)
24. Lake Belt In-Ground Reservoir Technology Pilot (SFWMD)
25. Lake Okeechobee Aquifer Storage and Recovery (SFWMD)
26. Lake Okeechobee Aquifer Storage and Recovery Pilot (SFWMD)
27. Lake Okeechobee Watershed (SFWMD)
28. Lakes Park Restoration (Lee County)
29. Loxahatchee National Wildlife Refuge Internal Canal Structures (SFWMD)
30. Loxahatchee River Watershed Restoration Project (SFWMD)
31. Loxahatchee River Watershed Restoration Aquifer Storage and Recovery (SFWMD)
32. Melaleuca Eradication and Other Exotic Plants (SFWMD)
33. Miccosukee Tribe Water Management Plan (Miccosukee Tribe)
34. Modify Holey Land Wildlife Management Area Operation Plan (SFWMD)
35. Modify Rotenberger Wildlife Management Area Operation Plan (SFWMD)
36. North Lake Belt Storage Area (SFWMD)
37. PBC Agriculture Reserve Aquifer Storage and Recovery (SFWMD)
38. PBC Agriculture Reserve Reservoir (SFWMD)
39. Picayune Strand Restoration (SFWMD)
40. Restoration of Pineland and Hardwood Hammocks in C-111 Basin (Miami-Dade County)
41. Site 1 Impoundment (SFWMD)

[98] SFWMD, *Final Adaptive Protocols for Lake Okeechobee Operations*, 7, (Sep. 16, 2010).

42. South Miami-Dade Reuse (Miami-Dade County)
43. Strazzulla Wetlands (SFWMD)
44. Wastewater Reuse Technology Pilot (SFWMD)
45. Water Conservation Area 3 Decompartmentalization & Sheetflow Enhancement – Part 1 (SFWMD)
46. Water Conservation Areas 2B Flows to the ENP (SFWMD)
47. West Miami-Dade Reuse (Miami-Dade County)
48. Winsberg Farm Wetlands Restoration (Palm Beach County)
49. WPA Conveyance (SFWMD)[99]

Several Non-CERP Restoration Projects

This list contains non-CERP projects that are interrelated to the overall efforts to restore the South Florida ecosystem:

1. C-111 South Dade Project
2. Everglades Construction Project
3. Florida Keys Water Quality Improvements Program
4. Herbert Hoover Dike Rehabilitation (part of the C&SF Project)
5. Kissimmee River Restoration Project
6. Lakeside Ranch Stormwater Treatment Area – Part of the Taylor Creek/Nubbin Slough Storage and Treatment Area
7. Long Term Plan for Achieving Water Quality Goals in the Everglades Protection Area Projects
8. Miami-Dade County Regional Canal Study
9. Modified Water Deliveries to ENP
10. Seminole Big Cypress Reservation Water Conservation Plan
11. West Palm Beach Canal/Stormwater Treatment Area 1-E[100]

[99] Evergladesplan.org, *CERP Projects*, http://evergladesplan.org/pm/projects/project_list.aspx (last visited Oct. 20, 2013).

[100] Evergladesplan.org, *Non-CERP South Florida Ecosystem Restoration Projects*, http://www.evergladesplan.org/pm/projects/non_cerp_sf_projects.aspx (last visited Oct. 21, 2013).