The Florida Senate

BILL ANALYSIS AND FISCAL IMPACT STATEMENT

(This document is based on the provisions contained in the legislation as of the latest date listed below.)

Prepared By: The Professional Staff of the Committee on Environment and Natural Resources

BILL:	SB 94
INTRODUCER:	Senator Brodeur
SUBJECT:	Water Storage North of Lake Okeechobee
DATE:	March 2, 2021 REVISED:

	ANALYST	STAFF DIRECTOR	REFERENCE	ACTION
1.	Schreiber	Rogers	EN	**Pre-meeting**
2.			AP	

I. Summary:

SB 94 requires the South Florida Water Management District (SFWMD), in partnership with the U.S. Army Corps of Engineers (USACE), to expedite implementation of the Lake Okeechobee Watershed Restoration Project (LOWRP). The LOWRP is a project in the Comprehensive Everglades Restoration Plan that provides water storage north of Lake Okeechobee. The bill requires the SFWMD to:

- Request that the USACE seek expedited congressional approval of the LOWRP.
- Execute a project partnership agreement with the USACE immediately following approval.
- Expedite implementation of the aquifer storage and recovery (ASR) Science Plan developed by the SFWMD and the USACE.
- Expedite implementation of the watershed ASR feature of the LOWRP:
  - By August 1, 2021, construct or contract for exploratory and monitoring wells to evaluate site suitability for ASR in the Kissimmee River and Taylor Creek/Nubbin Slough Basins.
  - By January 30, 2022, reactivate the existing ASR system in the Kissimmee River Basin.
  - By December 31, 2022, contract for exploratory and monitoring wells to evaluate site suitability for ASR on all other feasible LOWRP watershed ASR sites.
  - By March 30, 2027, ensure that, on all currently or subsequently proposed sites determined to be suitable for LOWRP ASR, all feasible ASR systems are operational.
- Pursue expeditious implementation of the LOWRP wetland restoration features.
- By November 1, 2021, submit a report to the Legislature describing the SFWMD's compliance with the bill, including steps taken, plans for ongoing compliance, and specified updates related to LOWRP implementation.

To ensure health and safety, technical feasibility, and achievement of environmental benefits, the bill requires that the implementation of LOWRP ASR wells use a phased approach that confirms feasibility and site suitability and addresses uncertainties identified in the ASR Science Plan.

II. Present Situation:

Everglades Restoration

The Everglades is a diverse and geographically extensive ecosystem, stretching from just south of Orlando down to the Florida Keys.[1] Historically, the Everglades covered almost 11,000 square miles of South Florida, and water generally flowed down the Kissimmee River into Lake Okeechobee, then overflowed the southern rim of the lake and flowed south in sheet flow through the vast Everglades down to Florida Bay at the southern tip of the peninsula.[2] The Everglades includes sawgrass marshes, freshwater ponds, prairies, and forested uplands supporting a high diversity of plant and animal habitats.[3] Development of the Everglades wilderness began in the 1800s, and, following devastating flooding from hurricanes in the 1920s and 1940s, the public demanded improved agricultural production and improved flood management for expanding population centers on Florida's southeastern coast.[4]

Central and Southern Florida Project (C&SF Project)

In 1948, Congress authorized the Central and Southern Florida Project (C&SF Project).[5] The purposes of the project included flood control, regional water supply, prevention of saltwater intrusion, water supply to Everglades National Park, wildlife preservation, recreation, and navigation.[6] To achieve these purposes, in a partnership between the U.S. Army Corps of Engineers (USACE) and the state, the C&SF Project initially involved the following actions: channelizing the meandering Kissimmee River, diking the lake to prevent uncontrolled overflows, constructing a drainage system in the lower east coast to support development, establishing the 700,000-acre Everglades Agricultural Area south of Lake Okeechobee, and diking portions of the central Everglades to create a series of Water Conservation Areas[7] for water supply storage for human and ecological needs.[8] Decades of related water management projects ensued. Today, the C&SF Project is operated by the South Florida Water Management District (SFWMD) and the USACE.[9] It includes 1,000 miles of canals, 720 miles of levees, and

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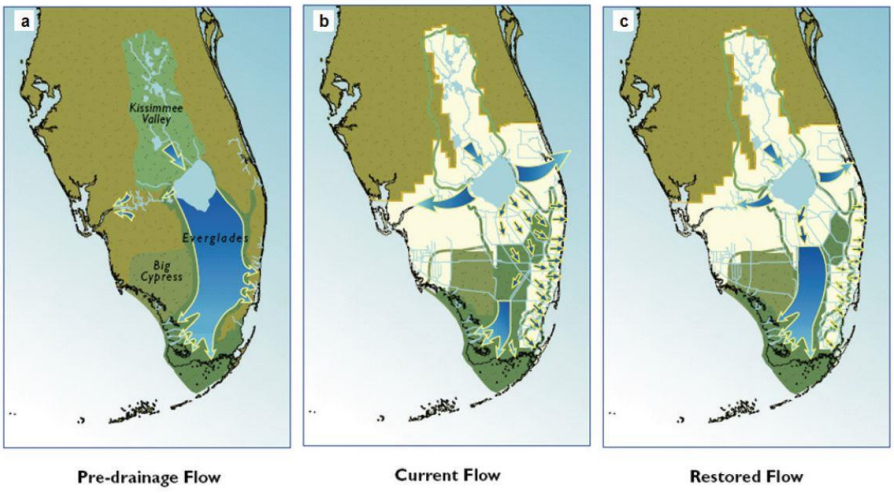
[1] National Academies of Sciences, Engineering, and Medicine, *Progress Toward Restoring the Everglades: The Seventh Biennial Review*, xi, 13 (2018)[hereinafter *Seventh Biennial Review*], *available at* https://www.nap.edu/catalog/25198/progress-toward-restoring-the-everglades-the-seventh-biennial-review-2018 (last visited Jan. 18, 2021).
[2] SFWMD, *Everglades*, https://www.sfwmd.gov/our-work/everglades (last visited Jan. 17, 2021).
[3] *Id.*; *Seventh Biennial Review*, at 13.
[4] *Seventh Biennial Review*, at 21-22; SFWMD, *History*, https://www.sfwmd.gov/who-we-are/history (last visited Jan. 18, 2021).
[5] The Flood Control Act of 1948 (Pub. L. No. 858, s. 203, 62 Stat. 1176).
[6] USACE and SFWMD, *Central and Southern Florida Project Comprehensive Review Study, Final Integrated Feasibility Report and Programmatic Environmental Impact Statement*, 1-1 (April 1999) [hereinafter *Restudy*], *available at* https://www.sfwmd.gov/sites/default/files/documents/CENTRAL_AND_SOUTHERN_FLORIDA_PROJECT_COMPREHENSIVE_REVIEW_STUDY.pdf (last visited Jan. 18, 2020).
[7] USACE and DOI, *2015-2020 Momentum, Report to Congress, Comprehensive Everglades Restoration Plan, Central and Southern Florida Project*, 4 (Dec. 2020)[hereinafter *2020 Report to Congress*], *available at* https://issuu.com/usace_saj/docs/final_2020_report_to_congress_on_cerp_progress_hig (last visited Jan. 18, 2021). Water Conservation Areas are described as "vast tracts of remnant Everglades sawgrass that serve multiple water resource and environmental purposes including flood control, water supply, and deliveries of water to Everglades National Park."
[8] *Seventh Biennial Review*, at 22; *Restudy*, at 1-1.
[9] *Restudy*, at 1-28.

several hundred water control structures providing a wide range of services to south Florida's growing population.[10]

The Comprehensive Everglades Restoration Plan (CERP)

While the C&SF Project performed its intended flood control purposes well for around 50 years, the project had unintended adverse effects on the unique natural environment of the Everglades and South Florida system.[11] Beginning in the 1970's, concerns began to mount about environmental impacts in the region, including: significant reduction of natural water storage capacity, water quality degradation, extreme fluctuations in high and low lake levels, excessive or inadequate fresh water discharged to the estuaries, substantial impacts to wildlife habitat and biodiversity, and unsuitable freshwater flows within the system.[12] The resulting lack of water storage leads to ecological damage to Lake Okeechobee and damaging regulatory releases to the St. Lucie and Caloosahatchee estuaries during wet periods, and water supply shortages for both humans and the natural environment during dry periods.[13]



In the federal Water Resources Development Acts (WRDAs) of 1992 and 1996, Congress directed the USACE to conduct a comprehensive review study of the C&SF Project (known as the "Restudy").[14] In 1999, the Restudy recommended a comprehensive restoration plan.[15]

In WRDA 2000, Congress authorized the Comprehensive Everglades Restoration Plan (CERP).[16] CERP is a framework for modifications and operational changes to the C&SF Project necessary to restore, preserve, and protect the south Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection.[17] CERP contains over 68 individual components comprising more than 50 projects.[18] These components improve

[10] *2020 Report to Congress*, at xviii, 4-6.
[11] *Restudy*, at 1-1, *available at* https://www.sfwmd.gov/sites/default/files/documents/CENTRAL_AND_SOUTHERN_FLORIDA_PROJECT_COMPREHENSIVE_REVIEW_STUDY.pdf (last visited Feb. 21, 2021).
[12] *Id*. at iii, 1-2; *2020 Report to Congress*, at 5-6; *Seventh Biennial Review*, at 23.
[13] *Restudy*, at 1-2.
[14] *Id*. at 1-3–1-7; *see* Pub. L. No. 102-580, s. 309(l), (1992) and Pub. L. No. 104-303, s. 528 (1996).
[15] *Restudy*, at i-ii.
[16] Water Resources Development Act of 2000, Pub. L. No. 106-541, s. 601, 114 Stat. 2680 (2000).
[17] *2020 Report to Congress*, at 6.
[18] *Id*. at 6-7; *see generally Restudy*. The April 1999 "Central and Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement," commonly known as the "Yellow

Book," contains the original CERP plan authorized by Congress. The plan identifies CERP components using a code of letters.

delivery and timing within the Everglades system by increasing the size of natural areas, improving water quality, releasing water to mimic historical flow patterns, and storing and distributing water for urban, agricultural, and ecological uses.[19] CERP covers around 18,000 square miles, including all or part of 16 counties in central and southern Florida.[20]

For a CERP project to receive federal authorization for implementation, and to receive federal appropriations, it must be included in a "project implementation report" that has received congressional approval.[21] The USACE has developed Programmatic Regulations for CERP to ensure that the Plan's goals and purposes are achieved.[22] The federal regulations specify the requirements for developing project implementation reports, involving public review and comment and detailed technical analyses necessary for project planning and implementation.[23] The reports formulate and evaluate alternative plans for the CERP project, and then identify a selected plan.

The federal legislation provides the framework for CERP as a 50/50 cost-share program between the state and federal government.[24] The USACE is the federal sponsor for the partnership and the SFWMD is the lead non-federal sponsor.[25] The agencies track the cost-sharing based on their total respective spending on CERP initiatives. In 2009, the USACE and the SFWMD executed a Master Agreement, an umbrella agreement for CERP projects that established conditions for cost-sharing and for project partnership agreements.[26] Project partnership agreements establish project-specific responsibilities for the implementing agencies, and provide project-specific credit to the SFWMD for its land acquisition and project construction efforts completed prior to the agreement.[27]

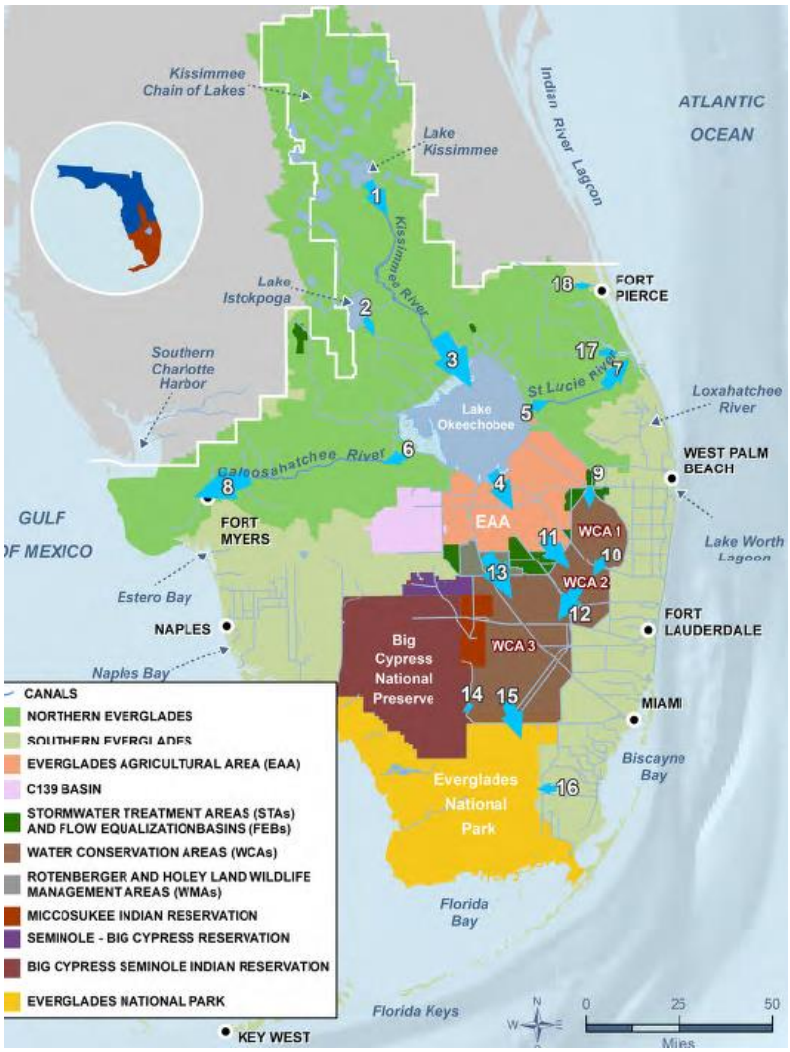
Lake Okeechobee

Lake Okeechobee is the largest freshwater lake in the southeastern United States, with a surface area of 730 square miles and a volume in excess of 4 million acre-feet.[28] It is the largest component of water storage in the South Florida ecosystem: one foot of water in Lake

[19] *Restudy*, at vii-x.
[20] U.S. House of Representatives, Committee on Transportation and Infrastructure, *Subcommittee Hearing on "The Comprehensive Everglades Restoration Plan and Water Management in Florida"* (Sept. 21, 2020), *available at* https://www.congress.gov/116/meeting/house/111019/documents/HHRG-116-PW02-20200924-SD001.pdf (last visited Jan. 19, 2021).
[21] Water Resources Development Act of 2000, Pub. L. No. 106-541, s. 601(a)(2)(D)(i), (f), (h), 114 Stat. 2683 (2000).
[22] 33 C.F.R. pt. 385.
[23] 33 C.F.R. s. 385.26; *see Restudy*, at 10-17–10-20.
[24] Water Resources Development Act of 2000, Pub. L. No. 106-541, s. 601(e), 114 Stat. 2684 (2000).
[25] *2020 Report to Congress*, at 3.
[26] *See* SFWMD, *News Release: Momentum for Everglades Restoration Continues with Historic State-Federal Agreements* (August 13, 2009), *available at* https://www.sfwmd.gov/sites/default/files/documents/nr_2009_0813_master_agreement.pdf (last visited Feb. 21, 2021).
[27] *Id*.
[28] *Seventh Biennial Review*, at 133; SFWMD, *How Much is an Acre-Foot of Water?*, *available at* https://www.sfwmd.gov/sites/default/files/documents/graphic_acrefoot.pdf (last visited Jan. 25, 2021). An acre-foot is the volume of water needed to cover 1 acre of land with 1 foot of water. It is equal to 325,851 gallons.

Okeechobee equals around 450,000 acre-feet of storage.[29] The lake is managed as a multi-purpose reservoir for navigation, water supply, flood control, and recreation.[30]

Around 40 percent of the water that comes into the lake is from direct rainfall, and of the surface water that flows into the lake the largest source is the Kissimmee River, contributing about 60 percent of inflows.[31] About 95 percent of the surface water inflows into the lake come from the six subwatersheds north (or northwest) of the lake.[32] Lake Okeechobee and its watershed have been subjected to hydrologic, land use, and other anthropogenic modifications over the past century that have degraded its water quality and affected the water quality of the connected Caloosahatchee and St. Lucie Rivers and Estuaries.[33]



[29] *Seventh Biennial Review*, at 133; SFWMD, *News Release, South Florida Water Managers Take Steps to Increase Water Storage* (Oct. 14, 2011), https://www.sfwmd.gov/sites/default/files/documents/nr_2011_1014_dispersed_water_storage.pdf (last visited Jan. 19, 2021).
[30] *Restudy*, at 1-13.
[31] Karl E. havens & Alan D. Steinman, *Ecological Responses of a Large Shallow Lake (Okeechobee, Florida) to Climate Change and Potential Future Hydrologic Regimes*, ENVIRONMENTAL MANAGEMENT, Vol. 52, No. 5 (2013), *available at* https://pubmed.ncbi.nlm.nih.gov/24178125/ (last visited Jan. 19, 2021); USACE, *Lake Okeechobee: Following the Flow*, https://www.saj.usace.army.mil/Media/News-Stories/Article/479659/lake-okeechobee-following-the-flow/ (last visited Jan. 19, 2021).
[32] SFWMD, *South Florida Environmental Report, Chapter 8B: Lake Okeechobee Watershed Annual Report*, 8B-21 (2020), *available at* https://apps.sfwmd.gov/sfwmd/SFER/2020_sfer_final/v1/chapters/v1_ch8b.pdf (last visited Jan. 19, 2021).
[33] DEP, *Lake Okeechobee Basin Management Action Plan*, 14 (Jan. 2020), *available at* http://publicfiles.dep.state.fl.us/DEAR/DEARweb/BMAP/NEEP_2020_Updates/Lake%20Okeechobee%20BMAP_01-31-20.pdf (last visited Jan. 19, 2021).

(C-43) to the Gulf of Mexico.[34] Additionally, when storage and discharge capacity are available, water flows out of the lake through the four agricultural canals.[35] See the map above for lake inflows and outflows.[36]

The Herbert Hoover Dike is a 143-mile earthen dam surrounding Lake Okeechobee, which was completed in the 1960s.[37] Internal erosion of earthen dams occurs when water seeps through the embankment and erodes the soil.[38] Past scientific studies led the USACE to rank the dike as being at high levels of risk for failure.[39] The erosion and the likelihood of failure of the structure are dependent on lake levels.[40] The capacity of water to flow out into the lake greatly exceeds the capacity to flow out, so if lake levels exceed certain boundaries water must be released to reduce the risk of dike failure.[41] Due to the safety concerns, major rehabilitation efforts on the dike are currently underway, with work expected to be complete by 2022.[42]

The USACE regulates water levels in Lake Okeechobee based on a regulation schedule that guides lake operations. The 2008 Lake Okeechobee Regulation Schedule (LORS) is the current regulation schedule.[43] This revised schedule lowered the maximum stage of the lake as a protective measure during dike rehabilitation, and which can remove between 460,000 and 800,000 acre-feet from the regional system at any given time compared to the previous lake regulation schedule.[44] The USACE is currently developing the Lake Okeechobee System Operating Manual (LOSOM) to replace the LORS as the operating criteria for the lake.[45]

In WRDA 2018, Congress required the USACE to expedite completion of the LOSOM to coincide with the completion of the Herbert Hoover Dike rehabilitation project, and so the LOSOM is expected to be completed in 2022.[46] WRDA 2020 requires the USACE, in carrying

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[34] *Restudy*, at 1-13; USACE, *Moore Haven Lock & Dam*, https://www.saj.usace.army.mil/Missions/Civil-Works/Navigation/Navigation-Locks/Moore-Haven-Lock/ (last visited Jan. 19, 2021); USACE, *Port Mayaca Lock & Dam*, https://www.saj.usace.army.mil/Missions/Civil-Works/Navigation/Navigation-Locks/Port-Mayaca-Lock/ (last visited Jan. 19, 2021).
[35] *Restudy*, at 1-13.
[36] SFWMD, *South Florida Environmental Report, Highlights*, 19-20 (2020), *available at* https://www.sfwmd.gov/sites/default/files/documents/2020_SFER_highlights.pdf (last visited Feb. 24, 2021).
[37] USACE, *About Herbert Hoover Dike*, https://www.saj.usace.army.mil/HHD/ (last visited Jan. 19, 2021).
[38] USACE, *Herbert Hoover Dike Dam Safety Modification Study, Environmental Impact Statement*, 1-1 (June 2016), *available at* http://www.saj.usace.army.mil/Portals/44/docs/Planning/EnvironmentalBranch/EnvironmentalDocs/Multiple%20Counties/Herbert_Hoover_Dike_Dam_Safety_Modification%20Study_FEIS_Main_Report.pdf?ver=2016-05-31-131919-377 (last visited Jan. 19, 2021).
[39] *Id*. at 1-5.
[40] *Id*. at 1-1.
[41] *Seventh Biennial Review*, at 137-138; USACE, *Integrated Delivery Schedule*, https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/4831 (last visited Feb. 24, 2021).
[42] *2020 Report to Congress*, at 32-33.
[43] *See* Central and Southern Florida Project, *Water Control Plan for Lake Okeechobee and Everglades Agricultural Area* (2008), *available at* https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/8423 (last visited Jan. 19, 2021).
[44] *Seventh Biennial Review*, at 139-141.
[45] USACE, *Lake Okeechobee System Operating Manual (LOSOM), A Component of the Central & Southern Florida (C&SF) System Operating Plan*, https://www.saj.usace.army.mil/LOSOM/ (last visited Jan. 19, 2021); *see Seventh Biennial Review*, at 173. It is unknown how much, if any, of the lost lake storage will be regained under the new schedule, which will also consider the adverse effects of increased water levels on the lake ecosystem.
[46] The Water Resources Development Act of 2018 (Pub. L. No. 115-270, s. 1106, 114 Stat. 2680).

out the review of the regulation schedule, to evaluate prohibiting certain releases from Lake Okeechobee.[47] The USACE also must provide a monthly report disclosing discharge volumes.[48]

Damaging Discharges from Lake Okeechobee to the Estuaries

Due to the lack of operational flexibility within the system, the LORS requires lake levels to be kept low before the wet season, to account for additional inflow and ensure that lake levels do not rise to dangerous levels where the dike could be breached.[49] During rainfall events, water entering the lake from direct rainfall, large basins, and other sources can cause water levels in the lake to rise six times faster than can be discharged from the lake.[50] The only outlets with adequate capacity to quickly release the necessary volumes of water from the lake are the C-44 and C-43 canals that discharge east and west, respectively, to the St. Lucie and Caloosahatchee estuaries.[51]

High volume freshwater discharges have significant effects on the estuaries. The releases from the lake along with other local basin inflows cause large fluctuations in salinity, which can expose animal and plant life in the estuaries to salinities outside of their tolerance ranges.[52] When the duration of high flow events increases substantially, impacts can be more severe.[53] Species such as oysters and seagrasses, which serve as indicator species for estuary health, become more susceptible to disease and predation as the duration of high volume discharge events increase.[54]

Harmful algal blooms in Lake Okeechobee exacerbate the damage of regulatory releases from the lake.[55] In 2016 and 2018, cyanobacteria (blue-green algae) blooms in Lake Okeechobee, followed by regulatory releases from the lake, resulted in emergency situations with algae-laden waters that harm the environment and create ecological and human health concerns.[56] Cyanobacteria produce toxins presenting health risks to wildlife, pets, and humans.[57]

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[47] The Water Resources Development Act of 2020 (Pub. L. No. 116-260, Div. AA, s. 210 (2020)).
[48] *Id*.
[49] The National Academies of Sciences, Engineering, and Medicine, *Progress Toward Restoring the Everglades: The Sixth Biennial Review*, 161 (2016)[hereinafter *Sixth Biennial Review*], *available at* https://www.nap.edu/catalog/23672/progress-toward-restoring-the-everglades-the-sixth-biennial-review-2016 (last visited Jan. 20, 2021).
[50] USACE, *Lake Okeechobee: Following the Flow*, http://www.saj.usace.army.mil/Media/News-Stories/Article/479659/lake-okeechobee-following-the-flow/ (last visited Feb. 25, 2021).
[51] University of Florida Water Institute, *Options to Reduce High Volume Freshwater Flows to the St. Lucie and Caloosahatchee Estuaries and Move More Water from Lake Okeechobee to the Southern Everglades*, 17 (2015) [hereinafter *UF Study*], *available at* https://waterinstitute.ufl.edu/faculty/graham/wp-content/uploads/UF-Water-Institute-Final-Report-March-2015.pdf (last visited Feb. 22, 2021).
[52] USACE, *Lake Okeechobee Regulation Schedule, Final Supplemental Environmental Impact Statement*, 147 (Nov. 2007), *available at* http://www.saj.usace.army.mil/Portals/44/docs/h2omgmt/LORSdocs/ACOE_STATEMENT_APPENDICES_A-G.pdf (last visited Feb. 24, 2021).
[53] *Id*. at 149.
[54] *Id*. at 147-151.
[55] *See generally* DEP, *Freshwater Algal Blooms, Frequently Asked Questions*, https://floridadep.gov/sites/default/files/freshwater-algal-bloom-faqs_2019.pdf (last visited Feb. 22, 2021).
[56] *The Sixth Biennial Review*, at 39-40; DEP, *Emergency Authorizations Implement Measures To Address South Florida Algal Blooms*, https://floridadep.gov/dear/algal-bloom/content/emergency-authorizations-implement-measures-address-south-florida-algal (last visited Feb. 22, 2021).
[57] *See generally* FWC, *Cyanobacteria (Blue-Green Algae)*, https://myfwc.com/research/wildlife/health/other-wildlife/cyanobacteria/ (last visited Feb. 22, 2021).

In addition to ecological and health issues, regulatory releases from Lake Okeechobee impact life in the communities around the northern Everglades ecosystems. The excessive discharges can impact the quality of life for residents, regional property values, revenues of area businesses, and local economies in general.[58]

In 2017, the Florida Legislature declared that an emergency exists regarding the St. Lucie and Caloosahatchee estuaries due to the high-volume freshwater discharges to the east and west of the lake, and that such discharges have manifested in widespread algae blooms, public health impacts, and extensive environmental harm.[59] WRDA 2020 requires the USACE to carry out a demonstration program to determine the causes of, and implement measures to effectively detect and eliminate, harmful algal blooms associated with water resources development projects, with Lake Okeechobee as a focus area.[60]

Identifying the Need for Additional Storage

The original CERP plan involved increasing regional storage capacity and flexibility through water storage components north, south, east, and west of Lake Okeechobee; underground storage; using natural areas for storage; and storing water in the lake itself.[61] Since the original CERP plan was authorized, certain projects were substantially reduced in magnitude, representing substantial reductions in storage compared to what was originally proposed.[62]

In 2015, a University of Florida Water Institute report concluded that existing and authorized projects were insufficient to provide relief to the estuaries and send water south.[63] To achieve these goals, the study stated that enormous increases in storage and treatment of water are necessary both north and south of Lake Okeechobee.[64] The regional storage estimated to be necessary for reducing discharges to the estuaries included approximately 1,000,000 acre-feet distributed north and south of the lake.[65] The study discussed two configurations that would provide a 90% reduction in lake-triggered discharges, with one scenario requiring 750,000 acre-feet of northern storage and 132,000 acre-feet of southern storage, and the other requiring 300,000 acre-feet of northern storage and 507,000 acre-feet of southern storage.[66]

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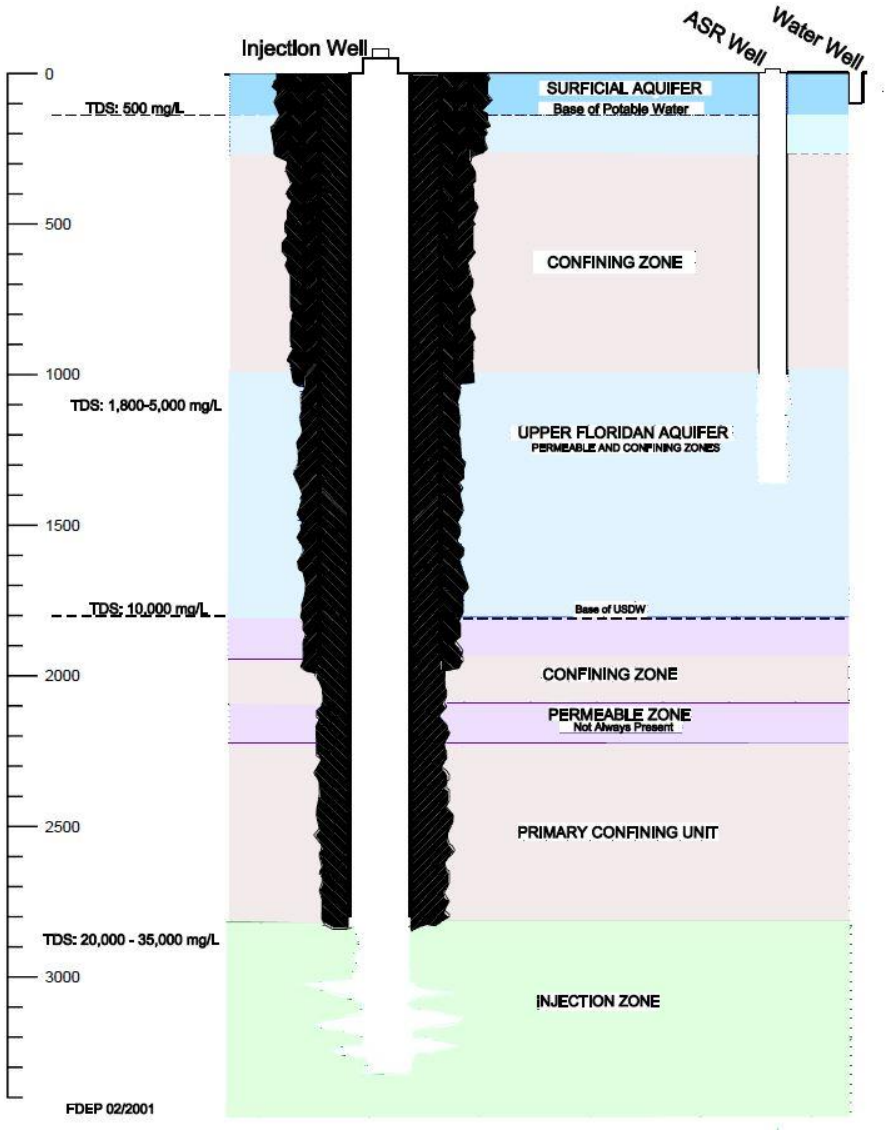
[58] *See* Caloosahatchee Watershed Regional Management Issues, *Storage and Treatment Progress Summary*, 1 (July 1, 2016), *available at* https://chnep.wateratlas.usf.edu/upload/documents/CaloosahatcheeWatershedRegionalWaterManagementIssuesJune2016.pdf (last visited Feb. 24, 2021).
[59] Section 373.4598(1), F.S.
[60] The Water Resources Development Act of 2020 (Pub. L. No. 116-260, Div. AA, s. 128 (2020)).
[61] *Restudy*, at vii-x, 9-1–9-34.
[62] *Seventh Biennial Review*, at 173-175, *available at* https://www.nap.edu/catalog/25198/progress-toward-restoring-the-everglades-the-seventh-biennial-review-2018 (last visited Feb. 25, 2021).
[63] *UF Study*, at 6, 85, *available at* https://waterinstitute.ufl.edu/faculty/graham/wp-content/uploads/UF-Water-Institute-Final-Report-March-2015.pdf (last visited Feb. 22, 2021).
[64] *Id*. at 130.
[65] *Id*.
[66] *Id*. at 85-86, 101.

Aquifer Storage and Recovery (ASR)



Aquifer Storage and Recovery (ASR) is a process of collecting surplus fresh surface water (typically during the wet season), treating it to meet water quality standards, and pumping it through a dual-purpose well underground into the aquifer for storage and subsequent withdrawal.[67] ASR technology offers the potential to store and supply large volumes of water beneath a relatively small surface footprint without loss to evaporation.[68]

ASR technology has been successfully utilized in Florida since 1983.[69] Currently, there are over 30 ASR systems operating in Florida utilizing around 100 wells for recharge, storage, and recovery.[70] ASR wells are permitted by the Department of Environmental Protection (DEP), under DEP's

[67] SFWMD, *Aquifer Storage and Recovery*, https://www.sfwmd.gov/our-work/alternative-water-supply/asr (Jan. 30, 2021).
[68] *Id*.; USACE, *Aquifer Storage and Recovery (ASR) Regional Study*, https://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/Aquifer-Storage-and-Recovery-ASR-Regional-Study/ (last visited Jan. 20, 2021).
[69] SFWMD and USACE, *Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, Final Technical Data Report, Aquifer Storage and Recovery Regional Study*, 1-2–1-3 (May 2015)[hereinafter *2015 ASR Regional Study*], *available at* https://www.sfwmd.gov/sites/default/files/documents/ASR_Regional_Study_Main_Report_Final_2015.pdf (last visited Jan. 20, 2021).
[70] SFWMD, *Aquifer Storage and Recovery*, https://www.sfwmd.gov/our-work/alternative-water-supply/asr (Jan. 30, 2021); *see* DEP, *Underground Injection Control Monitoring Wells*, https://ca.dep.state.fl.us/mapdirect/?focus=uic (last visited Jan. 20, 2021). Select the layer with Class V ASR wells.

underground injection control program, which maintains applicable federal standards.[71] As opposed to deep well injection of waste (see image above),[72] water injected into ASR wells must meet Florida's water quality standards, and the level of treatment required after storage depends on the use of the water.[73]

Of CERP's original 68 components, seven involved ASR wells, combining for up to 333 ASR wells originally contemplated for storage in CERP.[74] Since use of ASR technology on this scale is unprecedented, the original CERP plan recommended pilot demonstration projects and a regional evaluation of the effects of large-scale use of ASR in south Florida.[75] Accordingly, the USACE and SFWMD spent more than a decade collaborating on in-depth scientific analyses regarding ASR in south Florida. In 2013, the final report was published for the CERP ASR pilot project, which included two ASR systems that successfully confirmed the feasibility of large capacity (5 million gallons per day (MGD)) ASR system operation in south Florida.[76]

In 2015, the final report was published for the CERP ASR Regional Study, an 11-year, multidisciplinary effort to assess the regional feasibility of ASR wells in south Florida as a CERP component, including analyses focusing on hydrogeology, water quality, ecology, and regional capacity.[77] The Regional Study generally found that large-capacity ASR can be built and operated in south Florida, and that no "fatal flaws" have been uncovered that might hinder the implementation of CERP ASR.[78] However, the study suggested the overall number of CERP ASR wells should be reduced from 333, and a scenario with 131 ASR wells (including 80 constructed in the vicinity of Lake Okeechobee) met performance criteria satisfactorily.[79]

Also in 2015, at the request of the USACE, the National Academy of Sciences' National Research Council convened a committee to review the Regional Study and assess progress

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[71] Fla. Admin. Code R. 62-610.466; Fla. Admin. Code Ch. 62-528; *see* U.S. Environmental Protection Agency, *Underground Injection Control Regulations and Safe Drinking Water Act Provisions*, https://www.epa.gov/uic/underground-injection-control-regulations-and-safe-drinking-water-act-provisions (last visited Feb. 18, 2021).

[72] DEP, *UIC Wells Classification*, https://floridadep.gov/water/aquifer-protection/content/uic-wells-classification (last visited Jan. 20, 2021). There are six classes of underground injection wells. Class I wells are used to inject waste below the lowest drinking water source, and this is commonly referred to as "deep well injection." Class V wells are a broad group which includes ASR wells, and these are generally used for injection of nonhazardous fluids into or above a drinking water source; *see* Fla. Admin. Code Rules 62-528.300 and 62-528.600.

[73] DEP, *UIC Wells Classification*, https://floridadep.gov/water/aquifer-protection/content/uic-wells-classification (last visited Jan. 20, 2021).

[74] SFWMD, *Aquifer Storage and Recovery Program, Interim Report 2008*, 4 (2008), *available at* https://www.sfwmd.gov/sites/default/files/documents/ASR_Interim_Report_2008.pdf (last visited Jan. 20, 2021).

[75] SFWMD, *Final Draft 2021 Aquifer Storage and Recovery Science Plan*, 5 (2021)[hereinafter *ASR Science Plan*], *available at* https://www.sfwmd.gov/sites/default/files/2021_draft_asr_science_report_main.pdf (last visited Feb. 17, 2021); *see Restudy*, at 9-6, 9-32, 10-50.

[76] USACE and SFWMD, *Comprehensive Everglades Restoration Plan Aquifer Storage and Recovery Pilot Project, Final Technical Data Report*, 2-1 (Dec. 2013), *available at* https://www.sfwmd.gov/sites/default/files/documents/Main%20Report_Final_2013.pdf (last visited Feb. 17, 2021).

[77] *See 2015 ASR Regional Study*, *available at* https://www.sfwmd.gov/sites/default/files/documents/ASR_Regional_Study_Main_Report_Final_2015.pdf (last visited Feb. 25, 2021).

[78] *Id*. at xx.

[79] *Id*.; *ASR Science Plan*, at 1.

towards reducing uncertainties related to full-scale CERP ASR implementation.[80] The committee agreed with the findings of the Regional Study that no "fatal flaws" exist, but stated that uncertainties remain that merit additional study before large-scale ASR implementation.[81]

The committee concluded that phased implementation of ASR would provide opportunities to address uncertainties while providing early restoration benefits.[82] The 2015 review listed the highest-priority remaining uncertainties, involving recommended steps to address them:

- Develop operations to maximize recovery and reduce water quality impacts;
- Conduct longer-term ecotoxicological studies and develop an updated quantitative ecological risk assessment;
- Understand the mechanisms of phosphorus reduction;
- Evaluate treatment technologies for optimal water quality during recharge, storage, and recovery; and
- Compare costs with other water storage alternatives.[83]

To address the uncertainties identified by the National Research Council's 2015 review of the Regional Study, the SFWMD and the USACE have developed an ASR Science Plan.[84] The intent of the Science Plan, first published in February of 2021, is to identify potential studies to address remaining uncertainties as ASR wells are constructed in a phased approach.[85] An independent peer-review panel of scientists was assembled to provide review and guidance during the development of the Science Plan, and the panel will convene annually throughout implementation of the ASR program to review the progress of the scientific investigations and recommend future tasks.[86] The plan is subject to change as the ASR program progresses.[87] The plan may be used for CERP and also more broadly wherever ASR wells are proposed.[88]

The 2021 Science Plan includes a schedule of many scientific investigations to address uncertainties for ASR implementation.[89] The current plan involves reactivation and utilization of existing systems.[90] During 2021 and 2022, the plan includes constructing continuous cores, where boreholes are drilled down into the aquifer to produce 3.5 inch-diameter core samples for scientific study.[91] Also during 2021 and 2022, the plan includes constructing 24-inch exploratory test wells at two potential ASR cluster locations just north of the lake along the C-38 Canal

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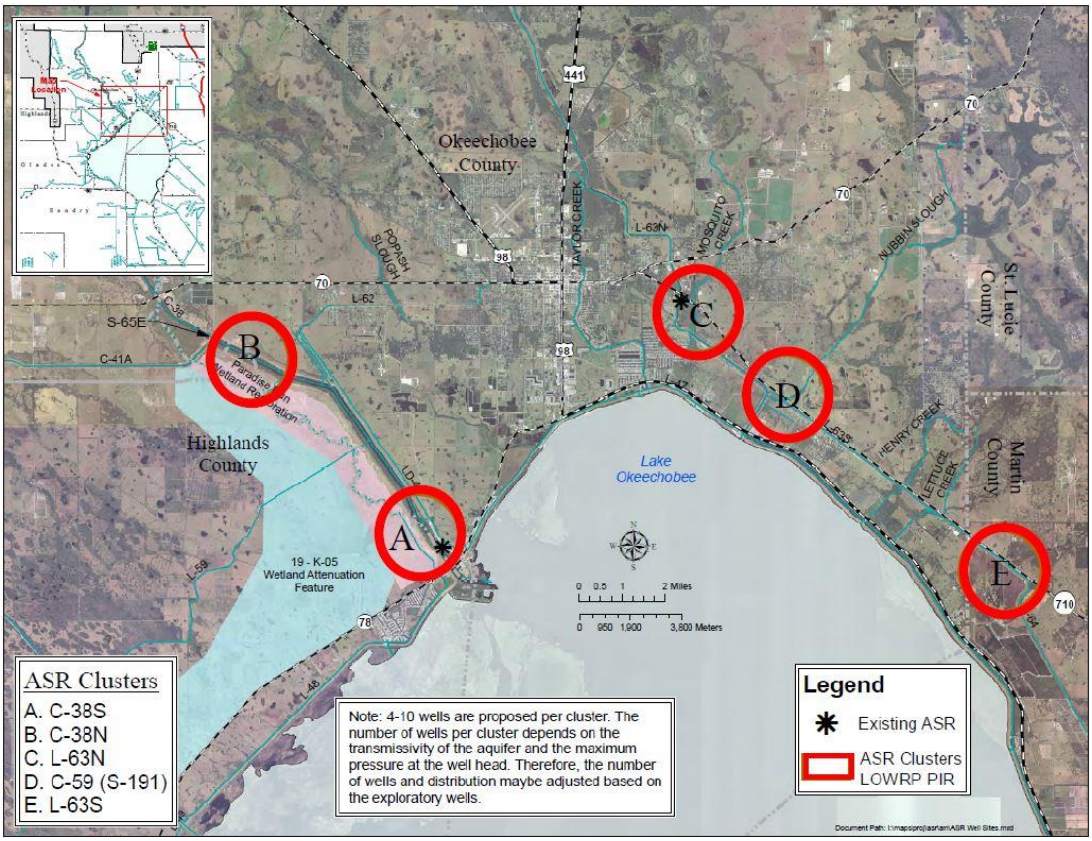
[80] *See* National Research Council of the National Academies, *Review of the Everglades Aquifer Storage and Regional Study*, 1 (2015), *available at* https://www.sfwmd.gov/sites/default/files/documents/National_Academies_Of_Science_Review_2015.pdf (last visited Jan. 20, 2021).
[81] *Id*. at 2.
[82] *Id*. at 3, 44.
[83] *Id*. at 2-3; *ASR Science Plan*, at 2.
[84] *See* SFWMD, *Aquifer Storage and Recovery*, https://www.sfwmd.gov/our-work/alternative-water-supply/asr (Jan. 30, 2021).
[85] *ASR Science Plan*, at 2.
[86] *Id*. at ES-1, 4.
[87] *Id*. at 5.
[88] *Id*. at 5-6.
[89] *Id*. at 7-10.
[90] *Id*. at 6.
[91] *Id*. at 5, 15-16. Boreholes can be widened and turned into monitoring wells.

(designated as sites "A" and "B" on the map below), and these test wells would be used for studying a broad range of scientific topics regarding ASR implementation.[92]



The Lake Okeechobee Watershed Restoration Project (LOWRP)

The Lake Okeechobee Watershed Restoration Project (LOWRP) is a CERP project that is generally located immediately north of Lake Okeechobee.[93] In August of 2020, the USACE published a final project implementation report for the LOWRP.[94] The project implementation report is awaiting congressional approval and may be subject to change. The report contains a "Recommended Plan" that constitutes the current version of the project.[95]

The Recommended Plan consists of the three following features:

- A Wetland Attenuation Feature: a flow-through wetland used for surface water storage. Although a wetland attenuation feature provides aboveground storage like a reservoir, water levels may be suitable for growth of wetland vegetation. The footprint would be approximately 13,600 acres, with a storage capacity of approximately 46,000 acre-feet.

[92] *Id*. at 18.
[93] USACE, *Lake Okeechobee Watershed Restoration Project Final Integrated EIS and PIR*, https://www.saj.usace.army.mil/LOWRP/ (last visited Feb. 18, 2021).
[94] USACE and SFWMD, *Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project, Final Integrated Project Implementation Report and Environmental Impact Statement* (Aug. 2020)[hereinafter *LOWRP PIR*], *available at* https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/15175 (last visited Feb. 18, 2021).
[95] *See id*., at 6-1–6-84.

- 80 Total ASR Wells: 5 MGD wells are proposed in various clusters.[96] Proposed cluster locations are based on the 2015 Regional Study, although the locations are conceptual and may be adjusted based on the results of exploratory testing. The theoretical maximum storage capacity of the 80 wells continuously recharging year-round would be 448,000 acre-feet per year. The LOWRP ASR wells are separated into two categories:
  - 55 "Watershed" ASR Wells: These wells will be located throughout the watershed in clusters around the lake.
  - 25 "Co-located" ASR Wells: These wells will be co-located with the wetland attenuation feature, withdrawing water from it when it is full to provide additional storage capacity and combining with it to provide dynamic aboveground and belowground storage.
- Wetland Restoration: two projects on the west bank of the Kissimmee River, working in conjunction with the Kissimmee River Restoration Project,[97] that restore the hydrology of riverine wetlands and increase the functionality of aquatic and wildlife habitat:
  - The Paradise Run wetland restoration site is approximately 3,600 acres.
  - The Kissimmee River-Center wetland restoration site is approximately 1,200 acres.[98]

[96] *Id.* at 3-4, 3-22. The LOWRP ASR wells will be a combination of wells using either of two layers of the Floridan Aquifer System for storage and recovery: the Upper Floridan Aquifer (UFA) composed of porous limestone lying 900-1,200 feet below land surface, or the Avon Park Permeable Zone (APPZ) composed of porous dolomite found 1,600-2,000 feet below land surface.

[97] USACE, *Kissimmee River Restoration Project*, https://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/Kissimmee-River-Restoration/ (last visited Jan. 18, 2021); *2020 Report to Congress*, at 33-34.

[98] *LOWRP PIR*, at ES-2, ES-6, 6-1–6-4. These three components are known, respectively, in the Yellow Book as CERP components A, GG, and OPE. The LOWRP also includes recreational sites on the levee top around the wetland attenuation feature and around the wetland restoration sites.

The project area covers a portion of the Lake Okeechobee watershed, including four major drainage basins, totaling approximately 920,000 acres.[99] The objectives of the LOWRP are to: improve quantity, timing, and distribution of flows into the lake to benefit ecology; reduce large freshwater flows from the lake to benefit the estuaries; increase the spatial extent and functionality of aquatic and wildlife habitat within the lake and surrounding watershed; and increase water supply while improving lake ecology.[100]

By creating additional water storage north of Lake Okeechobee, the Recommended Plan would improve flexibility in the timing and distribution of water into the lake, to the northern estuaries, and throughout the watershed.[101] Water could be stored during wet times to reduce damaging high lake stages, and later be released into the lake to reduce the impacts of low stages during dry times.[102] The LOWRP would increase the amount of time that lake levels are in the range of elevations most beneficial to lake ecology: 12.5–15.5 feet.[103] It would provide a 30% reduction in total flows from Lake Okeechobee to the northern estuaries, and may also reduce phosphorus loadings to the lake by 8-11%.[104]

The total estimated cost of the LOWRP is $1.96 billion.[105] The total estimated cost for real estate acquisition necessary for project implementation is around $139 million, and the SFWMD will perform the land acquisition as the non-federal sponsor.[106] Generally, it is anticipated that land acquisition will not be necessary for the LOWRP watershed ASR wells because those wells will be located within existing SFWMD-owned rights-of-way.[107] However, fee title will be required for the project footprint of the wetland attenuation feature, Paradise Run wetland, and Kissimmee River-Center wetland.[108] The 13,600-acre wetland attenuation feature project footprint includes around 73 privately-owned parcels encompassing approximately 9,3000 acres.[109] Of the 4,800 total acres for the two wetland restoration projects, private landowners own around 33 parcels encompassing approximately 2,600 acres.[110]

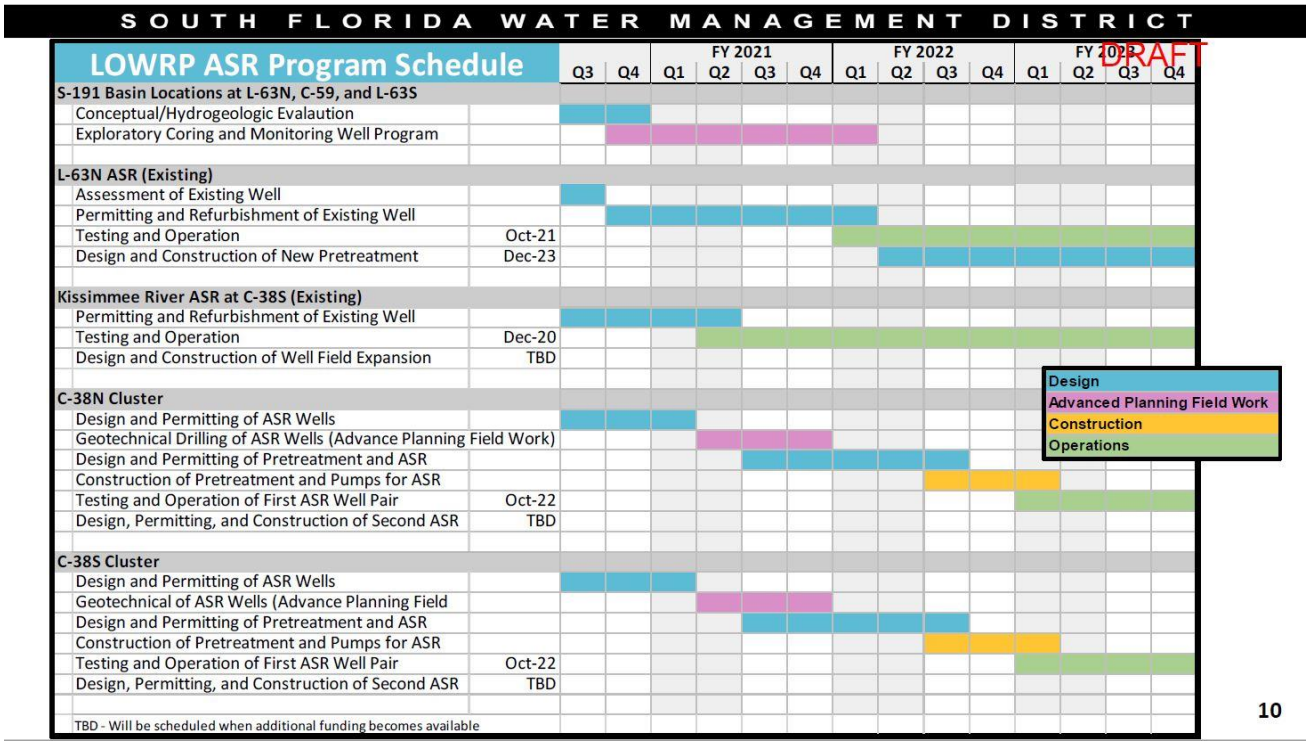
The LOWRP project implementation report includes a proposed, but not mandatory, sequencing that begins with the 55 watershed ASR features, based on the conceptual locations for well clusters.[111] Design and construction would begin with the Kissimmee River Basin ASR and

[99] *Id*. at 1-6.
[100] *Id*. at ES-3.
[101] *Id*. at 3-3, 6-33. Analyses performed by the LOWRP team confirmed that storage is needed both north and south of the lake to achieve the restoration purposes of CERP.
[102] *Id*.
[103] *Id*. at ES-8, 2-6, 6-24.
[104] *Id*. at ES-9, 6-21, 6-68.
[105] *Id*. at ES-13.
[106] *Id*. at 6-47–6-48; USACE and SFWMD, *Comprehensive Everglades Restoration Plan, Lake Okeechobee Watershed Restoration Project, Final Integrated Project Implementation Report and Environmental Impact Statement, Appendix D: Real Estate*, D-8–D-10 (Aug. 2020)[hereinafter *LOWRP PIR Real Estate*], *available at* https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/15182 (last visited Feb. 19, 2021).
[107] *LOWRP PIR*, at ES-14, 6-44. Co-located ASR wells are anticipated to be located on lands adjacent and internal to the wetland attenuation feature; *LOWRP PIR Real Estate*, at D-5. It is estimated that the watershed ASR wells will require 1.5 acres of land per well.
[108] *LOWRP PIR*, at 6-44.
[109] *LOWRP PIR Real Estate*, at D-5.
[110] *Id*. at D-6.
[111] *Id*. at 6-51–6-53.

Taylor Creek/Nubbin Slough ASR, initially with sites which have existing infrastructure that can be utilized.[112] Generally, this is followed by design and construction of ASR systems at Port Mayaca, Moore Haven, and Indian Prairie.[113] Each ASR system in the Recommended Plan is independent, and final siting will be determined during preconstruction engineering and design.[114] The proposed sequence ends with the wetland restoration features and the wetland attenuation feature. The design and construction of the 25 co-located wells may be done concurrently with the construction of the wetland attenuation feature, but may not be constructed before then.[115]

In both the 2019 and 2020 legislative sessions, the Florida Legislature appropriated $50 million to the SFWMD to design and construct the LOWRP components designed to achieve the greatest reductions in harmful discharges to the Caloosahatchee and St. Lucie estuaries.[116] In 2019, the SFWMD and the USACE determined that the watershed ASR component of the LOWRP would provide the greatest benefits to the estuaries.[117] In August of 2020, the Governing Board of the SFWMD authorized a contract for drilling as part of the Florida Aquifer System Exploratory Coring and Monitoring Well Construction Program.[118] The sites under evaluation through that program include five of the six sites in the Kissimmee River and Taylor Creek/Nubbin Slough Basins shown in the LOWRP project implementation report.[119] Below is a schedule, from the presentation to the Governing Board, for implementing LOWRP ASR on those sites.[120]

[112] *Id*. at 6-53.
[113] *Id*.
[114] *Id.* at 6-2, 6-53.
[115] *Id*. at 6-58.
[116] Chapter 2019-115, Specific Appropriation 1642A, Laws of Fla.; ch. 2020-111, Specific Appropriation 1622A, Laws of Fla.
[117] SFWMD, Governing Board Meeting Presentation, *Floridan Aquifer System Exploratory Coring and Monitoring Well Construction Program*, begins at around 5:09:00 (Aug. 13, 2020), http://sfwmd.iqm2.com/Citizens/SplitView.aspx?Mode=Video&MeetingID=2014&Format=Agenda (last visited Feb. 20, 2021).
[118] SFWMD, *Governing Board Monthly Meeting Agenda, Final - Revised*, Packet Pg. 122-126 (Aug. 13, 2020), *available at* https://apps.sfwmd.gov/ci/publicmeetings/viewFile/26661 (last visited Feb. 21, 2021).
[119] SFWMD, Governing Board Meeting Presentation, *Floridan Aquifer System Exploratory Coring and Monitoring Well Construction Program*, begins at around 5:09:00 (Aug. 13, 2020), http://sfwmd.iqm2.com/Citizens/SplitView.aspx?Mode=Video&MeetingID=2014&Format=Agenda (last visited Feb. 20, 2021); *LOWRP PIR*, at 6-52.
[120] SFWMD, Governing Board Meeting Presentation Slides, *Floridan Aquifer System Exploratory Coring and Monitoring Well Construction Program*, slide 10 (Aug. 13, 2020), *available at* https://apps.sfwmd.gov/ci/publicmeetings/viewFile/26666 (last visited Feb. 20, 2021).



On January 27, 2021, the USACE and SFWMD executed a pre-partnership credit agreement for the LOWRP.[121] This agreement makes the costs of the SFWMD's work on the LOWRP, occurring prior to congressional authorization and execution of a project partnership agreement, eligible for credit towards CERP cost-sharing following authorization.[122] Under the agreement, the SFWMD proposes to carry out construction of no more than 55 watershed ASR systems and wetland restoration for the Paradise Run and Kissimmee River-Center sites.[123] The pre-partnership credit agreement states that ASR system construction will be phased based on certain factors, including findings of exploratory testing, cluster feasibility, and realizing benefits at the earliest opportunity.[124]

On February 24, 2021, the USACE sent a letter to the SFWMD stating that the USACE would like to evaluate the potential benefits of the LOWRP Recommended Plan without the wetland attenuation feature.[125] In the letter, the USACE requested the SFWMD's technical assistance with the process of updating the project implementation report.[126]

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[121] USACE and SFWMD, *Comprehensive Everglades Restoration Plan, Pre-Partnership Credit Agreement Between the Department of the Army and the South Florida Water Management District For Work Carried Out For the Lake Okeechobee Watershed Restoration Project*, 6 (Jan. 27, 2021)(on file with the Florida Senate Environment and Natural Resources Committee).

[122] *Id*. at 1. For the costs of the SFWMD's proposed work to be eligible for cost-sharing credit following project authorization, the USACE must determine that the proposed work is integral to the authorized project, including any modifications to the project.

[123] *Id*. at 1-3.

[124] *Id*. at 2.

[125] USACE, Programs and Project Management, *Letter to Drew Bartlett, Executive Director of the South Florida Water Management District*, 1 (Feb. 24, 2021)(on file with the Florida Senate Environment and Natural Resources Committee).

[126] *Id*.

III. Effect of Proposed Changes:

Section 1 creates s. 373.4599, F.S., entitled "Water storage north of Lake Okeechobee." The bill provides a definition section. The U.S. Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) are defined as the "corps" and the "district," respectively. The bill defines the Lake Okeechobee Watershed Restoration Project (LOWRP) as the recommended plan contained within the LOWRP project implementation report. This definition applies to the existing project implementation report dated August 2020 or any amended project implementation report in the future, any of which will require congressional authorization.

Upon the effective date of the bill, the SFWMD must request that the USACE seek congressional approval of a project implementation report for the LOWRP before passage of the Water Resources Development Act of 2022. Immediately following congressional approval of the LOWRP, the SFWMD is directed to execute with the USACE a project partnership agreement for the LOWRP that is consistent with the bill.

The SFWMD is directed to expedite the development and implementation of the LOWRP aquifer storage and recovery (ASR) wells, in partnership with the USACE, pursuant to the following schedule:

- By August 1, 2021: for all feasible cluster sites in the Kissimmee River Basin and Taylor Creek/Nubbin Slough Basin that are not the site of the existing Kissimmee River ASR system – construct or execute contracts for any necessary exploratory and monitoring wells on each site, in addition to any other necessary evaluations, to evaluate or confirm site suitability for well clusters.
- By November 1, 2021: submit to the Legislature a report describing the SFWMD's compliance with the bill, including steps taken and any plans necessary for ongoing compliance. The report must include updates on congressional approval for the LOWRP project implementation report; the ASR Science Plan; any scientific investigations; and designs, construction, and operations.
- By January 30, 2022: reactivate the existing ASR system on the site of the Kissimmee River Aquifer Storage and Recovery pilot project.
- By December 31, 2022: for any other currently or subsequently proposed sites for LOWRP watershed ASR that are not in the Kissimmee River Basin or Taylor Creek/Nubbin Slough Basin and that are not co-located with the wetland attenuation feature – execute contracts for the construction of any necessary exploratory and monitoring wells on each site, in addition to any other necessary evaluations, to evaluate site suitability for well clusters.
- By March 30, 2027: ensure that all feasible or existing ASR systems on those currently or subsequently proposed LOWRP watershed ASR sites with suitable locations are operational.

The bill requires the SFWMD to perform any necessary scientific investigation and monitoring concurrently with the implementation of the LOWRP ASR wells. To ensure public health and safety, technical feasibility, and achievement of environmental benefits, LOWRP ASR must use a phased approach that confirms feasibility and site suitability, and that addresses uncertainties identified in the ASR Science Plan. The bill requires the SFWMD to expedite implementation of the ASR Science Plan.

The bill requires the SFWMD to pursue, in partnership with the USACE, expeditious implementation of the Paradise Run wetland restoration project and Kissimmee River-Center wetland restoration project.

The bill requires that LOWRP implementation under the bill must comply with all applicable federal and state laws and rules, including the Department of Environmental Protection's underground injection control program. It also specifies that all projects, locations, or structures referred to in the bill's subsection on project implementation mean those described in the LOWRP project implementation report, dated August 2020 or as subsequently amended.

Section 2 requires the Division of Law Revision to replace the phrase "the effective date of this act," wherever it occurs in the bill, with the date the bill becomes a law.

Section 3 states that the bill shall take effect upon becoming a law.

IV. Constitutional Issues:

A. Municipality/County Mandates Restrictions:

None.

B. Public Records/Open Meetings Issues:

None.

C. Trust Funds Restrictions:

None.

D. State Tax or Fee Increases:

None.

E. Other Constitutional Issues:

None.

V. Fiscal Impact Statement:

A. Tax/Fee Issues:

None.

B. Private Sector Impact:

None.

C. Government Sector Impact:

The bill requires the SFWMD to expedite a number of projects, including scientific investigation, planning, design, and construction. Compliance with the bill may increase costs for the SFWMD during the timeline specified in the bill.

VI. Technical Deficiencies:

None.

VII. Related Issues:

None.

VIII. Statutes Affected:

This bill creates section 373.4599 of the Florida Statutes.

IX. Additional Information:

A. Committee Substitute – Statement of Changes:
(Summarizing differences between the Committee Substitute and the prior version of the bill.)

None.

B. Amendments:

None.