
# Annual Assessment of Florida's Water Resources and Conservation Lands

*2019 Edition*

# Acknowledgements

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Florida Department of Agriculture and Consumer Services

Florida Department of Environmental Protection

Florida Fish and Wildlife Conservation Commission

Florida Natural Areas Inventory

Florida Public Service Commission

Food and Resource Economics Department, University of Florida

Northwest Florida Water Management District

South Florida Water Management District

Southwest Florida Water Management District

St. Johns River Water Management District

Suwannee River Water Management District

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# Executive Summary

The Office of Economic and Demographic Research (EDR) has completed the third annual assessment of Florida's water resources and conservation lands pursuant to section 403.928, Florida Statutes. Due to the magnitude of the assessment and the fundamental intent of EDR to produce accurate and methodologically sound results, the 2019 Edition of this report is still an intermediate step to full compliance with section 403.928, Florida Statutes. However, this edition makes substantial progress over the previous edition and may allow some components of the timeline to be advanced.[1]

Lands can be acquired for conservation by public or private entities and can be obtained in fee or less-than-fee simple ownership.[2] Once acquired, the lands are typically managed to maintain their conservation purposes. As such, expenditures on conservation lands can be categorized into acquisition expenditures and management expenditures. In Fiscal Year 2017-18, the State of Florida expended $72.6 million on conservation land acquisition[3] and $205.4 million on conservation land management.[4] Regarding the impact on ad valorem taxation, roughly 2.91 percent of the statewide county tax base and 2.59 percent of the statewide school tax base have been removed from the tax roll. As a result, on net, approximately $419 million in county taxes and $314 million in school taxes were shifted to other property owners or lost due to lands being held in conservation in 2018.[5]

Approximately 30 percent of all land in the State of Florida is currently managed for conservation purposes, with eight counties already over 50 percent.[6] If all lands identified in plans set forth by state agencies and water management districts are acquired, this share will jump to nearly 44 percent.[7] If federal, local, and private plans were accounted for, this share would be even greater. Summing the projected total acquisition costs for the additional conservation lands identified in the plans developed by the state and water management districts produces a preliminary cost estimate of just under $12.3 billion, of which the analysis suggests that nearly 75 percent would be a state responsibility. At the current rate of annual state conservation land acquisition expenditures, it would take about 172 years to generate the state's share; within the next five years, less than three percent of the total state cost would be generated. Any future conservation lands that are acquired will entail additional costs for management as well as the acquisition cost. Currently, a dedicated revenue source for managing the state's lands does not exist. Assuming the current level of expenditures per acre, the additional cost to the state to manage its potential land acquisitions is projected to be $128.4 million, annually.

With just under one-third of the land in the State of Florida already acquired for conservation purposes and approaching one-half after accounting for potential conservation land acquisition in

[1] *See* section titled "1. Introduction and Purpose" for an expected timeline of future analyses.
[2] *See* subsection titled "Costs of Acquisition and Maintenance under Fee and Less-than-fee Simple Ownership" for further details on ownership types.
[3] *See* Tables 2.2.3, 2.2.4, and 2.2.5.
[4] *See* Table 2.2.6.
[5] *See* Table 2.1.2.
[6] *See* Tables 2.1.2 (Part 3) and 2.1.4 (Part 3). The eight counties are: Broward, Collier, Miami-Dade, Monroe, Okaloosa, Franklin, Liberty, and Wakulla.
[7] *See* Table 2.3.6. This projection does not include any additions to current federal, local, or private conservation lands.

the future, significant policy questions arise. For example, how much conservation land is needed and for what purpose? Where should it be located? Should the current pace of the state's conservation land acquisition efforts be accelerated? At what point does the volume of conservation land acreage alter the pattern of economic growth as expanding metropolitan areas are forced upward instead of outward? Is this change acceptable to policy makers? Should there be a greater focus on selling non-essential conservation lands as surplus? Is primarily owning conservation land in fee simple the most efficient strategy for Florida? Would encouraging less-than-fee simple ownership help to alleviate economic concerns associated with government ownership of conservation land? Are adequate funds available for managing current and future acquisitions? It is EDR's objective that this ongoing report will assist policy makers in developing the answers to these types of questions.

Regarding water resources, according to the water management districts, water demand is projected to increase by 17 percent in the next 20 years and reach 7,515.9 millions of gallons daily by 2035 (assuming average annual rainfall and not accounting for potential new water conservation activities). The two largest drivers of water demand are and will continue to be population growth and agriculture. The projected water demand may grow even higher if drought conditions occur, with 1-in-10 year droughts potentially increasing demand by an additional 24 percent over the same 20-year period. On the other hand, the increases in demand can be partially offset if effective water conservation strategies are implemented. According to the districts' regional water supply plans and water supply assessments, the water needs of the state can be met through the 2035 planning horizon with a combination of traditional and alternative water sources, appropriate management, conservation, and implementation of the projects identified in the applicable regional water supply plans. Because no district can meet its future demand solely with existing source capacity,[8] these extra efforts (and the funding for them) are critical over the period from now through 2035.

The costs associated with ensuring that future water supplies are available to meet the increasing water demands are estimated to be between $1.6 and $2.2 billion over the 2015 through 2035 planning horizon[9]. This estimate is based on an analysis of projects identified by water management districts through the water supply planning process and may change significantly in the future as the methodologies, both of EDR and the water management districts, are refined. This cost estimate only captures water conservation initiatives and the costs of developing alternative water supplies. An estimate of the costs associated with maintaining the existing water infrastructure and the costs specific to protecting natural systems are not yet included. The future demand not met with existing supply assumes average weather conditions and that the demand which has been met in the past will continue to be met in the future. The risk inherent in these assumptions needs to be explored.

EDR has additionally begun the process of evaluating the data and methodology to be used in forecasting expenditures necessary to comply with federal and state laws and regulations governing water quality. As a first step, EDR has identified the federal Clean Water Act and the Florida Watershed Restoration Act as having specific requirements for water quality protection and restoration. Within these laws, the costs associated with establishing Total Maximum Daily

[8] *See* Table 3.2.2.
[9] *See* Chapter 3 and specifically Tables 3.3.11, 3.3.12, 3.3.13, and 3.3.14.

Loads and implementing them through Basin Management Action Plans are necessary for compliance with these laws and therefore must be included in EDR's forecasts.[10] Basin Management Action Plans continue to be developed for impaired waterbodies and are generally implemented in phases. At best, the total estimated costs of completed, planned, and underway projects of $6.6 billion (plus $57.08 million annually in operation and maintenance)[11] provides the minimum floor of what is currently known.

In the 2017-18 fiscal year, the State of Florida expended approximately $59 million on water supply[12] projects and an additional $908 million on water quality and other water resource-related programs.[13] In the most recent three fiscal years, expenditures for water resources have increased significantly, leading to questions about financial sustainability. EDR's forecasts indicate that the recent levels of increases in expenditures cannot be sustained into the future using only the implied revenue shares historically allocated to water resources. In this regard, a gap exists in every future year, growing to $383.6 million[14] by the end of the ten-year forecast period—and this does not include any specific adjustments for new or expanding initiatives. Potential options to close the projected gap include the use of statutorily uncommitted Documentary Stamp Taxes, additional General Revenue funds, or bonding. As a result, substantial policy questions arise. What is the total amount of funding that should be committed to these initiatives? What are the appropriate levels of funding and shares among public and private stakeholders? To what extent should land acquisition programs be required to identify quantifiable water resource benefits? It is EDR's objective that this annual report will assist policy makers in developing the answers to these types of questions.

Subsequent editions of this report will further analyze the future expenditures necessary to comply with laws governing water supply and water quality as well as achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems, while avoiding the adverse effects of competition for water supplies. EDR is currently working to improve the integrated water supply and demand model necessary to address this analysis. EDR intends to rely primarily on the districts for water supply and water source data, focusing instead on the development and timing of water demand, as well as the economic ramifications of the interaction between demand and supply. Recommendations for a statutorily-created workgroup to improve the data used by the integrated supply and demand model are contained in subsection 3.4.

[10] *See* subsection 4.2.
[11] *See* Table 4.2.3.
[12] *See* Table 4.1.1.
[13] *See* Table 4.1.8.
[14] *See* Table 4.4.1.

# 1. Introduction and Purpose

Section 403.928, Florida Statutes, directs the Office of Economic and Demographic Research (EDR) to conduct an annual assessment of Florida's water resources and conservation lands. Florida's natural resources are abundant and include 825 miles of sandy beaches;[15] 27,561 miles of streams and rivers; more than 7,700 lakes larger than 10 acres in size covering a surface area of 1.6 million acres, 11.3 million acres of freshwater and tidal wetlands,[16] 33 first magnitude springs,[17] and habitat for 528 endangered or threatened plant species and 55 endangered or threatened animal species.[18] In addition, Florida has fresh groundwater in underlying aquifers which has provided drinking water through public supply or private residential wells to approximately 90 percent of Florida's population.[19] It is the intent of this report to assist policy makers with the information needed to effectively and efficiently manage Florida's natural resources.

Regarding water resources, EDR is required to:

A. Expenditure Forecasts
   - Compile historic and forecast future expenditures by federal, state, regional, and local forms of government as well as public and private utilities pertaining to water supply and demand and water quality protection and restoration.
   - Provide additional forecasts indicating the expenditures by said entities that are necessary to comply with federal and state laws and regulations governing water supply and demand and water quality protection and restoration.
   - Develop estimates and forecasts that enable an assessment of the Legislature's intent that sufficient water be available for all existing and future reasonable beneficial uses and the natural systems while avoiding any adverse effects of competition for water supplies. This assessment necessarily requires an in-depth exploration of water supply and demand.

B. Revenue Forecasts
   - Forecast revenues dedicated in current law or historically allocated to water supply and demand and water quality protection and restoration for federal, state, regional and local forms of government. Forecasts of public and private utility revenues must also be included.

C. Gap Analysis
   - Identify any gaps between projected revenues and projected expenditures.

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[15] https://floridadep.gov/water/beaches. (Accessed December 2018).
[16] June 2016, *Integrated Water Quality Assessment for Florida: 2016 Sections 303(d), 305(b), and 314 Report and Listing Update*. Florida Department of Environmental Protection. https://floridadep.gov/dear/dear/content/integrated-water-quality-assessment-florida. (Accessed December 2018).
[17] *Id.*
[18] http://www.fnai.org/FieldGuide/plant_intro.cfm. (Accessed December 2018).
[19] Marella, R.L., 2015, *Water withdrawals in Florida*, 2012: U.S. Geological Survey Open-File Report 2015–1156, 10 p., http://dx.doi.org/10.3133/ofr20151156. (Accessed December 2018).

Among the various available data sources, EDR must analyze the projected water supply and demand data developed by each of the five water management districts pursuant to sections 373.036 and 373.709, Florida Statutes, with notations of any significant differences in methodology between the districts.

Regarding conservation lands, EDR is required to:

A. Expenditure Forecasts
    - Compile historic and forecast future expenditures by federal, state, regional, and local forms of government pertaining to real property interests eligible for funding under Florida Forever, section 259.105, Florida Statutes.
    - Provide additional forecasts indicating the expenditures by said entities that are necessary to purchase lands identified by plans of state agencies or water management districts.

B. Revenue Forecasts
    - Forecast revenues that are dedicated in current law to maintain conservation lands for federal, state, regional, and local forms of government.

C. Gap Analysis
    - Identify any gaps between projected revenues and projected expenditures related to maintaining conservation lands.

Moreover, the by-county ad valorem tax impacts resulting from public ownership must be identified, along with the total share of Florida real property that is publicly owned for conservation purposes. EDR must also compare the cost of acquiring and maintaining conservation lands under fee simple and less-than-fee simple ownership. Finally, any overlap in expenditures on water resources and conservation land must be identified.

Because this annual report may play a role in future law making regarding Florida's natural resources, EDR has focused on a structure that will facilitate the measurement of changes over time. By keeping the underlying methodologies consistent, the different editions can be directly compared. To accomplish this goal, EDR has chosen to exclude or delay any analysis that is indefensible in methodology or incomplete. As a result, some required components of the report are being deferred until future years to allow full development.

Taking all of this into consideration, the anticipated timeline for introducing the major components is shown below, with each subsequent report building on the prior reports.

- January 1, 2017 – Initial assessment of conservation land acquisition programs.

- January 1, 2018 – Analysis of water supply and demand data and methodologies developed by the water management districts. Assessment of projects and initiatives related to water supply and demand as well as quality protection and restoration, including a review of financial assistance programs for various water projects such as potable water, wastewater,

and surface water projects, and an assessment of regulatory programs and initiatives designed to protect water resources.

- January 1, 2019 – Continuation of the assessment in the 2018 report with a status update and initial results from the integrated water supply and demand model. Initial evaluation of the data and methodology to be used in forecasting expenditures necessary to comply with federal and state laws and regulations governing water quality.

- January 1, 2020 – Deployment of an integrated water supply and demand model. This includes a review of regulatory and non-regulatory programs designed to ensure that sufficient water is available for the various consuming sectors while protecting natural systems.

- January 1, 2021 – Initial water resource analysis addressing the needs of the natural systems, infrastructure maintenance and replacement cost estimates, water quality for tap and well water, and the increased costs necessary to meet drought conditions.

Finally, some parts of this edition provided for background and context may not be included in future editions, although references may be made back to it. Other areas will be further developed and replacement tables and figures will be generated. In these cases, any significant differences will be noted. All tables and figures used in this edition supersede those reported in previous editions.

# 2. Assessment of Florida's Conservation Lands

Florida has a long tradition of acquiring land and water areas to conserve and protect natural and cultural resources and to provide for resource-based recreation. Prior to the 1960s, Florida did not have any formal land acquisition programs and no dedicated funding sources for land acquisition for conservation and outdoor, resource-based recreation. Instead, land acquisition was ad hoc and the result of either specific appropriations to purchase particular parcels of land or donations from private landowners and the federal government.[20]

In 1963, the Land Acquisition Trust Fund (LATF) was created to fund the newly-established Outdoor Recreation and Conservation Program for the purchase of land for parks and recreation areas. The program was funded by a 5 percent tax collected on outdoor clothing and equipment. In 1968, the LATF was funded for the first time with bond proceeds: debt service on the $20 million bond issuance was paid from Documentary Stamp Tax receipts collected from deeds and notes. In the 1970s, Florida voters approved a ballot referendum authorizing a $200 million bond program to fund the Environmentally Endangered Lands (EEL) program and authorized an additional $40 million in recreation bonds. Debt service on these bonds continued to be paid from a portion of the Documentary Stamp Tax.[21]

In 1979, the Conservation and Recreation Lands (CARL) program was created to replace and expand the former EEL program. Under the CARL program, funds were allocated for the acquisition of lands to protect and conserve natural resources and, for the first time, archeological and historical resources. However, unlike its predecessor, the CARL program was initially funded by proceeds collected from taxes levied on the severance of phosphate and other minerals. Later on, it received funding from the Documentary Stamp Tax. From 1979 through 1990, the CARL program protected approximately 181,000 acres of conservation and recreation lands at a cost of nearly $356 million.[22]

In 1981, the Legislature authorized the sale of $275 million in bonds to purchase lands along Florida's coastline. Known as the Save Our Coast program, this coastal land acquisition program was implemented as part of the LATF-funded programs and resulted in the purchase of more than 73 miles of coast line or 73,000 acres of coastal land.[23]

Also, in 1981, the Save Our Rivers program was created for the acquisition and restoration of water resources by encouraging the acquisition of buffer areas alongside surface waters. The program was funded from Documentary Stamp Tax revenues, and the funds were distributed to the five water management districts roughly in proportion to the population within their districts. Through the Save Our Rivers program, the water management districts acquired more than 1.7 million acres of land, including land acquired by the South Florida Water Management District as part of the restoration efforts of the Florida Everglades.[24]

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[20] Farr, James A., *Florida's Landmark Programs for Conservation and Recreation Land Acquisition* (2006), available at: https://floridadep.gov/file/1299/download?token=NX1ec5U5. (Accessed December 2017).
[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] *Id.*

The Preservation 2000 program (P2000) was created in 1990 as an aggressive public land acquisition program aimed at preserving the quality of life in Florida. Under the P2000 program, $3 billion in bonds was authorized over a ten-year period running from 1991 to 2000. The debt service was paid from Documentary Stamp Tax revenues. Each year, in an effort to counteract the alteration and development of natural areas resulting from Florida's rapidly growing population, bond proceeds were distributed to land acquisition programs such as the CARL program, the water management districts' Save Our Rivers programs, Florida Communities Trust, and the recreational trails program. Under the P2000 program, over 1.7 million acres of land was acquired at a cost of nearly $3.3 billion.[25]

Florida's current blueprint for public land acquisition is the Florida Forever program, which was created in 1999 as the successor to the P2000 program.[26] To date, the Florida Forever program has been responsible for the acquisition of 770,279 acres of land at a cost of over $3 billion dollars.[27] The Florida Forever program is discussed in greater detail in subsection 2.2 of this report.

Except as otherwise provided in law, the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), comprised of the Governor, Attorney General, Chief Financial Officer, and Commissioner of Agriculture, holds title to state-owned lands and is charged with "acquisition, administration, management, control, supervision, conservation, protection, and disposition" of state lands.[28] Accordingly, under the Florida Forever program and the previous acquisition programs, title to state land acquired for conservation purposes is held by the Board of Trustees.[29] Lands acquired by the water management districts (WMDs) and local governments with funding from the Florida Forever program are held in the name of the acquiring governmental entity.

The Board of Trustees and a WMD also have authority to sell real property or interests in real property determined to be surplus in accordance with applicable procedures prescribed in law. The process of selling lands determined to be surplus may ultimately result in a sale or exchange of real property or interests in real property. In general, the procedures under which the Board of Trustees may surplus state-owned lands is set forth in section 253.0341, Florida Statutes. The WMDs' must follow the requirements set forth in sections 373.056, 373.089, and 373.139, Florida Statutes. Additionally, for any conservation lands acquired under the Preservation 2000 program, the Board of Trustees and the WMDs must also comply with additional requirements set forth in section 259.101(6), Florida Statutes.

The Board of Trustees may surplus state-owned conservation lands upon a recommendation by the Acquisition and Restoration Council (ARC), a determination by the Board of Trustees that such lands are no longer needed for conservation purposes, and an affirmative vote by the Board of Trustees to dispose of such lands by three of its members.[30] If an exchange of lands is proposed,

[25] Source: Florida Department of Environmental Protection, Statistical Abstract of Land Conservation as of September 30, 2016. This data excludes payments for debt service.
[26] Ch. 99-247, Laws of Fla. (codified as amended at § 259.105, Fla. Stat.).
[27] Florida Department of Environmental Protection, Florida Forever webpage available at https://floridadep.gov/lands/environmental-services/content/florida-forever. (Accessed December 2018).
[28] § 253.03(1), Fla. Stat.
[29] § 259.105(7)(c), Fla. Stat.
[30] § 253.0341(1), Fla. Stat.

an affirmative vote by at least three Board of Trustees members that the exchange will result in a net positive benefit is required.[31]

As indicated above, ARC must make a recommendation to the Board of Trustees to surplus state-owned conservation lands in order to initiate the process. In its review, ARC must consider whether each request to surplus is compatible with the resource values and management objectives of the subject lands.[32] In addition to reviewing requests made by private and public entities,[33] ARC must also review conservation lands that are not actively managed by a state agency, lands that do not have a land management plan, or lands not being used for the purpose for which they were originally leased to a land manager (as part of an evaluation by land managers conducted at least once every ten years).[34] Further, if a local government requests the state to surplus lands for purchase or exchange, the request must be expedited through the surplus lands process.[35]

Similarly, a WMD may sell lands or interests in lands that its governing board determines to be surplus for the highest price obtainable, but no less than appraised value.[36] For lands designated as acquired for conservation purposes, the governing board must make a determination that the lands are no longer needed for its purposes and may surplus the lands by two-thirds vote.[37] Except under certain specific circumstances, the governing board of a WMD must first offer title to land purchased with Florida Forever funds to the Board of Trustees.[38]

Once conservation lands determined to be surplus are sold, proceeds from the sale of conservation lands purchased before July 1, 2015, must be deposited into the Florida Forever Trust Fund.[39] Proceeds from the sale of conservation lands purchased after July 1, 2015, must be deposited into the Land Acquisition Trust Fund (LATF) unless the lands were purchased with funds from a trust fund other than LATF or a trust fund created to implement section 28, article X of the Florida Constitution.[40] In that instance, those proceeds must be deposited in the trust fund from which the conservation lands were purchased.[41] For the WMDs, revenues derived from the sale of surplus lands may only be used for payment of debt service on revenue bonds or notes, or to purchase other WMD lands for flood control, water storage, water management, conservation and protection of water resources, aquifer recharge, water resource and water supply development.[42]

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[31] *Id.*
[32] § 253.0341(6), Fla. Stat.
[33] § 253.0341(11), Fla. Stat.
[34] §§ 253.0341(4)-(5), Fla. Stat.
[35] § 253.0341(1), Fla. Stat.
[36] § 373.089(1)(a), Fla. Stat.
[37] § 373.089(6), Fla. Stat. *See also* § 373.089(6)(c)-(d), Fla. Stat. (providing that all lands vested in the governing board of a WMD prior to July 1, 1999, are designated as having been acquired for conservation purposes, while lands acquired after July 1, 1999, require the governing board to designate which parcels have been acquired for conservation purposes).
[38] § 373.089(7), Fla. Stat. (A WMD is not required to first offer title of lands purchased with Florida Forever funds to the Board of Trustees if the disposition of such lands meets the following purposes: "(a) Linear facilities, including electric transmission and distribution facilities, telecommunication transmission and distribution facilities, pipeline transmission and distribution facilities, public transportation corridors, and related appurtenances. (b) The disposition of the fee interest in the land where a conservation easement is retained by the district to fulfill the conservation objectives for which the land was acquired. (c) An exchange of the land for other lands that meet or exceed the conservation objectives for which the original land was acquired in accordance with subsection (4). (d) To be used by a governmental entity for a public purpose. (e) The portion of an overall purchase deemed surplus at the time of the acquisition.")
[39] § 253.0341(12), Fla. Stat.
[40] § 253.0341(13), Fla. Stat.
[41] *Id.*
[42] § 373.139(6), Fla. Stat.

A summary of conservation land sales reported by each WMD and DEP (on behalf of the Board of Trustees) is provided in Table 2.0.1.

**Table 2.0.1 Summary of Recent Surplus Conservation Land Sales and Available Surplus**

| WMD/State | FY 2015 Revenue ($millions) | FY 2016 Revenue ($millions) | FY 2017 Revenue ($millions) | FY 2015 Acres | FY 2016 Acres | FY 2017 Acres | Acres for Surplus |
|---|---|---|---|---|---|---|---|
| NWFWMD | $0.01 | $- | $- | 1,179.62 | - | - | 161.39 |
| SJRWMD | $1.32 | $0.21 | $0.01 | 1,892.94 | 652.10 | 948.35 | - |
| SFWMD | $- | $0.12 | $- | - | 11.55 | - | - |
| SWFWMD | $0.02 | $0.03 | $0.57 | 3.00 | 6.89 | 333.50 | 1,555.36 |
| SRWMD | $0.00 | $- | $- | 118.32 | - | - | 208.76 |
| BOT | $0.01 | $0.00 | $0.40 | 5.00 | 2.85 | 204.76 | 7.66 |
| **Total:** | **$1.36** | **$0.36** | **$0.98** | **3,198.88** | **673.39** | **1,486.61** | **1,933.17** |

Note: "$-" indicates a zero, whereas "$0.00" indicates an amount less than $5,000.
Source: Disposition of State Lands and Facilities Annual Reports for the 2015, 2016, and 2017 fiscal years, produced by the Florida Department of Environmental Protection and the Florida Department of Management Services.

## 2.1 Percentage of Publicly-owned Real Property for Conservation Purposes

EDR is directed to analyze the percentage of Florida real property that is publicly owned for conservation purposes. The share of conservation lands can be measured and analyzed in various ways, and this report provides analyses in terms of shares of land acreage, land values, market values, and property values represented by conservation lands. While lands held in conservation by public entities provide no ad valorem taxes, they protect valuable natural resources and may induce tourism as an integral portion of the state's brand.

The Florida Natural Areas Inventory (FNAI), a non-profit organization administered by the Florida State University, is one of the most complete repositories for geo-information on conservation land areas in Florida.[43] FNAI's primary contract is with the Florida Department of Environmental Protection (DEP) through which FNAI provides various services such as natural resource assessments in aid of assessing and setting priorities for the Florida Forever program.[44] Through its funding from DEP, FNAI also compiles the "Summary of Florida Conservation Lands," which provides a summary of conservation land acreages managed by federal, state, local, and private entities in Florida.[45] In order to be considered conservation lands for the purpose of FNAI's database:

> *"...a significant portion of the property must be undeveloped and retain most of the attributes one could expect it to have in its natural condition. In addition, the managing agency or organization must demonstrate a formal commitment to the conservation of the land in its natural condition."*[46]

[43] Florida Natural Areas Inventory, Conservation Lands, http://www.fnai.org/conservationlands.cfm. (Accessed December 2018).
[44] Florida Natural Areas Inventory, Partnerships, http://www.fnai.org/partnerships.cfm. (Accessed December 2018).
[45] *See* Florida Natural Areas Inventory, Summary of Florida Conservation Lands Acreages (Including Less-than-Fee) February 2018, available at: http://www.fnai.org/PDF/Maacres_201802_FCL_plus_LTF.pdf. (Accessed December 2018).
[46] Florida Natural Areas Inventory, Conservation lands, Frequently Asked Questions about Florida Conservation Lands, http://www.fnai.org/conlands_faq.cfm. (Accessed December 2018).

For this report, EDR used FNAI data in identifying conservation lands in Florida as it appeared to provide the most comprehensive information on lands managed for conservation purposes by federal, state, local, and private entities.[47] While the FNAI data does provide rich data in terms of boundaries and statistics, the data does not provide any economic information regarding the conservation lands. To acquire this information, EDR used the parcel-based ad valorem dataset. In order to conduct this analysis, EDR, with the assistance of both FNAI and the Department of Revenue (DOR), built a new dataset that translates conservation land areas into their associated parcel IDs, with the relevant ad valorem tax information provided by the property appraisers for the state's 67 counties.

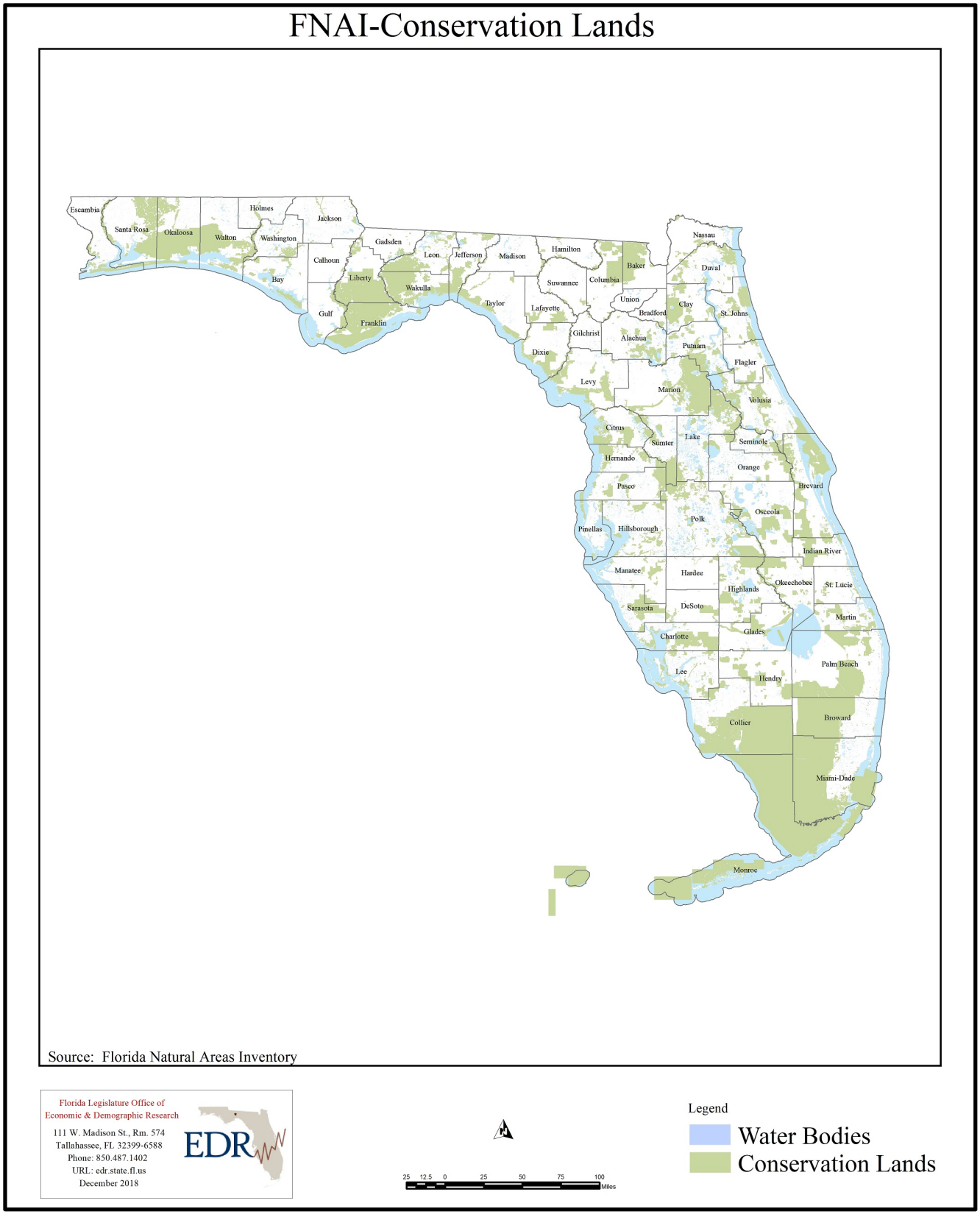
As of February 2018, all non-submerged conservation lands in Florida cover 10.28 million acres, comprising 30.09 percent of the total state land area (34.16 million acres).[48] Figure 2.1.1 provides a map of all conservation lands in Florida.

[See figure on following page]

[47] It is important to note that with regard to state-owned lands, section 253.034, Florida Statutes, broadly defines the term "conservation lands" to mean: "[L]ands that are currently managed for conservation, outdoor resource-based recreation, or archaeological or historic preservation, except those lands that were acquired solely to facilitate the acquisition of other conservation lands. Lands acquired for uses other than conservation, outdoor resource-based recreation, or archaeological or historic preservation may not be designated conservation lands except as otherwise authorized under this section." The most notable differences in the definition of conservation lands observed thus far are with respect to historical or archaeological sites and certain less than fee interests. While the state's definition includes lands managed for historical or archaeological preservation (*e.g.,* lands managed by the Florida Department of State's Division of Historical Resources), according to FNAI, such lands would only be included in the FNAI database if the property is preserved in its natural state, and not for the purpose of preserving or restoring historic buildings or other land improvements. However, the FNAI data does include less than fee interests, such as conservation easements as defined in section 704.06, Florida Statutes, which are conveyed in perpetuity and are regularly monitored by an agency or other organization. This may include, for example, conservation easements that are held by the State or water management districts for the purpose of mitigating adverse impacts to wetlands and other surface waters caused by a permitted activity under part IV of chapter 373, Florida Statutes.

[48] Florida's total land area has diminished over time. This may be the result of better measurement techniques, including GIS and aerial photography; land loss through erosion, natural disasters, hurricanes, climate change and global warming; or varying definitions that delineate land versus water areas. After reviewing different data sources, the study employs land area measured through the intersection of FNAI conservation land areas and parcel-based GIS polys (excluding subsurface rights, submerged lands, rivers and lakes, as much as possible).

**Figure 2.1.1 Map of All Conservation Lands in Florida**



Conservation lands in Florida are owned[49] by federal, state, and local governments, or by private entities.[50] Of the total 10.28 million acres of conservation lands in Florida in 2018, 97.44 percent is publicly-owned (10.02 million acres). [51] Among the publicly-owned conservation lands, 53.96 percent is owned by the state government, 41.19 percent is owned by the federal government, and 4.84 percent is owned by local governments. At this time, every county in Florida has publicly-owned lands dedicated to conservation purposes; the smallest public share occurs in Union County where it is just 0.16 percent of its county land.

Florida's 67 counties are divided into two groups—coastal and inland—to facilitate the presentation of conservation land ownership shares in Table 2.1.1 (Part I and Part II). The distribution of the conservation land ownership type is uneven across the state. More than 90 percent of conservation lands in Florida are owned by the federal and state government, and their respective ownership shares are highly concentrated in a few counties. Sixty-six percent of the 4.13 million acres of conservation lands owned by the federal government are located in seven counties: Collier, Miami-Dade, Monroe, Okaloosa, and Wakulla in the coastal areas, and Liberty and Marion in the inland areas. Each of these seven counties has more than 200,000 federal acres. For instance, in Monroe County, 95.29 percent of the county land is used for conservation purposes, and the federal government owns 97.50 percent of its total public conservation acreage. Slightly less polarized, uneven patterns across counties can also be found in Table 2.1.1 for conservation lands owned by the state or regional governments. Fifty-seven percent of the 5.41 million acres of conservation lands owned by the state or regional governments is located in sixteen counties: Brevard, Broward, Charlotte, Citrus, Collier, Miami-Dade, Franklin, Levy, Palm Beach, Santa Rosa, and Volusia in the coastal areas, and Clay, Hendry, Osceola, Polk, and Sumter in the inland areas. Each of these counties has more than 100,000 state or regionally owned acres. In Broward, more than 62.49 percent of its land is used for conservation purposes, and 98.96 percent of its public conservation acreage is owned by state or regional governments.[52]

[See table on following page]

[49] Due to the lack of ownership data at the county level, the FNAI managed area data is used as a proxy to calculate ownership shares. For the purposes of this report, ownership reflects the primary managing entity.

[50] Some of the state-owned conservation lands are managed across regions in the state (*e.g.*, the conservation lands managed by the five water management districts). In Table 2.1.1, such regional conservation lands are included in the State/Regional category.

[51] In the total amount of conservation lands (10.28 million acres), only 2.56 percent is owned by private entities. Note that EDR and FNAI have respectively continued to refine the methodologies used to measure conservation land acreage.

[52] Conservation lands owned by local governments and private entities in Florida are dominated by their federal and state counterparts in most counties, although exceptions can be found in Hillsborough and Pinellas counties. Overall, the share of privately held conservation lands is higher in the inland counties than in the coastal counties, and the share held by local governments is lower.

**Table 2.1.1 Part 1 - Conservation Lands by Public Ownership in Coastal Counties**

| County | Local | | State/Regional | | Federal | | Total |
|---|---|---|---|---|---|---|---|
| | Acres | % | Acres | % | Acres | % | Acres |
| Bay | 2,940 | 4.66% | 31,267 | 49.51% | 28,942 | 45.83% | 63,150 |
| Brevard | 16,959 | 6.42% | 153,242 | 58.03% | 93,868 | 35.55% | 264,068 |
| Broward | 4,997 | 1.04% | 477,385 | 98.96% | 0 | 0.00% | 482,382 |
| Charlotte | 4,482 | 2.61% | 166,740 | 97.06% | 566 | 0.33% | 171,788 |
| Citrus | 297 | 0.27% | 102,924 | 94.56% | 5,620 | 5.16% | 108,840 |
| Collier | 4,381 | 0.52% | 209,564 | 24.64% | 636,535 | 74.84% | 850,480 |
| Miami-Dade | 9,911 | 1.21% | 274,899 | 33.68% | 531,484 | 65.11% | 816,294 |
| Dixie | 0 | 0.00% | 90,257 | 76.47% | 27,777 | 23.53% | 118,034 |
| Duval | 22,951 | 26.26% | 29,412 | 33.66% | 35,024 | 40.08% | 87,387 |
| Escambia | 1,773 | 4.16% | 28,466 | 66.83% | 12,356 | 29.01% | 42,595 |
| Flagler | 6,871 | 17.68% | 31,983 | 82.32% | 0 | 0.00% | 38,854 |
| Franklin | 294 | 0.10% | 246,069 | 87.92% | 33,504 | 11.97% | 279,867 |
| Gulf | 93 | 0.20% | 46,143 | 98.11% | 795 | 1.69% | 47,031 |
| Hernando | 1,055 | 1.24% | 78,940 | 92.66% | 5,198 | 6.10% | 85,193 |
| Hillsborough | 58,836 | 55.49% | 41,989 | 39.60% | 5,197 | 4.90% | 106,022 |
| Indian River | 4,834 | 5.08% | 88,932 | 93.46% | 1,385 | 1.46% | 95,152 |
| Jefferson | 60 | 0.08% | 65,219 | 88.44% | 8,468 | 11.48% | 73,748 |
| Lee | 39,672 | 41.70% | 50,752 | 53.35% | 4,710 | 4.95% | 95,135 |
| Levy | 3,684 | 2.14% | 144,221 | 83.71% | 24,385 | 14.15% | 172,291 |
| Manatee | 26,094 | 45.09% | 30,548 | 52.78% | 1,230 | 2.12% | 57,872 |
| Martin | 2,777 | 3.04% | 84,158 | 92.27% | 4,274 | 4.69% | 91,209 |
| Monroe | 1,487 | 0.26% | 12,873 | 2.24% | 561,142 | 97.50% | 575,502 |
| Nassau | 321 | 1.40% | 22,606 | 98.50% | 23 | 0.10% | 22,950 |
| Okaloosa | 314 | 0.10% | 71,768 | 22.63% | 245,056 | 77.27% | 317,137 |
| Palm Beach | 48,647 | 10.21% | 283,963 | 59.62% | 143,661 | 30.16% | 476,270 |
| Pasco | 15,360 | 14.64% | 89,558 | 85.36% | 0 | 0.00% | 104,919 |
| Pinellas | 15,644 | 93.40% | 1,042 | 6.22% | 65 | 0.39% | 16,750 |
| St. Johns | 4,225 | 6.02% | 65,636 | 93.55% | 300 | 0.43% | 70,161 |
| St. Lucie | 10,588 | 34.89% | 19,680 | 64.85% | 80 | 0.26% | 30,348 |
| Santa Rosa | 246 | 0.10% | 180,465 | 71.16% | 72,900 | 28.74% | 253,610 |
| Sarasota | 47,203 | 43.93% | 60,247 | 56.07% | 7 | 0.01% | 107,456 |
| Taylor | 0 | 0.00% | 90,144 | 98.66% | 1,229 | 1.34% | 91,373 |
| Volusia | 51,039 | 24.55% | 123,977 | 59.64% | 32,845 | 15.80% | 207,862 |
| Wakulla | 299 | 0.12% | 12,323 | 4.95% | 236,209 | 94.93% | 248,831 |
| Walton | 236 | 0.10% | 90,589 | 37.02% | 153,881 | 62.88% | 244,706 |
| Group | 408,570 | 5.91% | 3,597,981 | 52.03% | 2,908,715 | 42.06% | 6,915,267 |
| State | 485,258 | 4.84% | 5,405,774 | 53.96% | 4,126,651 | 41.19% | 10,017,683 |

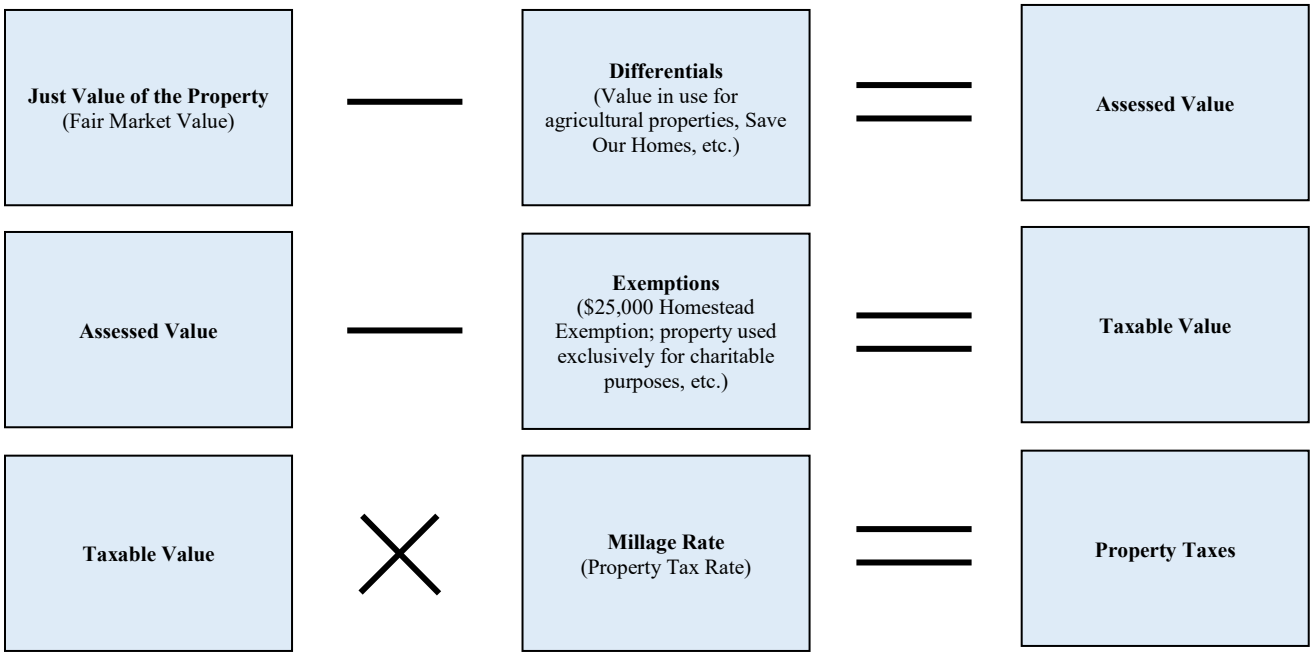
**Table 2.1.1 Part 2 - Conservation Lands by Public Ownership in Inland Counties**

| County | Local | | State/Regional | | Federal | | Total |
|---|---|---|---|---|---|---|---|
| | Acres | % | Acres | % | Acres | % | Acres |
| Alachua | 16,574 | 17.79% | 76,560 | 82.20% | 3 | 0.00% | 93,137 |
| Baker | 2,565 | 1.56% | 37,909 | 23.05% | 123,968 | 75.39% | 164,443 |
| Bradford | 143 | 1.41% | 9,960 | 98.35% | 24 | 0.24% | 10,127 |
| Calhoun | 0 | 0.00% | 5,071 | 84.77% | 911 | 15.23% | 5,982 |
| Clay | 1,185 | 0.93% | 126,316 | 99.07% | 0 | 0.00% | 127,501 |
| Columbia | 1,037 | 0.71% | 28,200 | 19.32% | 116,762 | 79.97% | 146,000 |
| DeSoto | 211 | 0.43% | 45,703 | 93.33% | 3,056 | 6.24% | 48,970 |
| Gadsden | 233 | 1.41% | 16,270 | 98.59% | 0 | 0.00% | 16,502 |
| Gilchrist | 282 | 3.39% | 8,043 | 96.61% | 0 | 0.00% | 8,325 |
| Glades | 206 | 0.27% | 71,856 | 95.16% | 3,446 | 4.56% | 75,508 |
| Hamilton | 4 | 0.02% | 24,051 | 98.07% | 470 | 1.92% | 24,525 |
| Hardee | 14 | 0.12% | 10,707 | 92.74% | 824 | 7.14% | 11,546 |
| Hendry | 0 | 0.00% | 111,020 | 73.51% | 39,999 | 26.49% | 151,019 |
| Highlands | 1,290 | 0.77% | 54,518 | 32.56% | 111,616 | 66.67% | 167,423 |
| Holmes | 0 | 0.00% | 12,891 | 100.00% | 0 | 0.00% | 12,891 |
| Jackson | 855 | 4.62% | 17,635 | 95.38% | 0 | 0.00% | 18,490 |
| Lafayette | 0 | 0.00% | 59,869 | 100.00% | 0 | 0.00% | 59,869 |
| Lake | 6,471 | 3.46% | 99,775 | 53.30% | 80,965 | 43.25% | 187,211 |
| Leon | 4,047 | 3.07% | 23,506 | 17.83% | 104,303 | 79.10% | 131,856 |
| Liberty | 0 | 0.00% | 57,887 | 18.04% | 263,037 | 81.96% | 320,923 |
| Madison | 0 | 0.00% | 14,733 | 99.53% | 69 | 0.47% | 14,802 |
| Marion | 1,148 | 0.33% | 79,192 | 23.00% | 264,014 | 76.67% | 344,353 |
| Okeechobee | 2 | 0.00% | 87,186 | 82.87% | 18,019 | 17.13% | 105,207 |
| Orange | 8,608 | 9.31% | 83,895 | 90.69% | 0 | 0.00% | 92,503 |
| Osceola | 6,614 | 3.98% | 157,488 | 94.84% | 1,962 | 1.18% | 166,064 |
| Polk | 17,047 | 6.39% | 192,485 | 72.17% | 57,191 | 21.44% | 266,722 |
| Putnam | 1,312 | 1.15% | 86,081 | 75.38% | 26,797 | 23.47% | 114,190 |
| Seminole | 6,765 | 17.94% | 30,439 | 80.75% | 493 | 1.31% | 37,697 |
| Sumter | 0 | 0.00% | 108,045 | 100.00% | 0 | 0.00% | 108,046 |
| Suwannee | 77 | 0.37% | 21,004 | 99.60% | 6 | 0.03% | 21,087 |
| Union | 0 | 0.00% | 209 | 100.00% | 0 | 0.00% | 209 |
| Washington | 0 | 0.00% | 49,288 | 100.00% | 0 | 0.00% | 49,288 |
| Group | 76,688 | 2.47% | 1,807,793 | 58.27% | 1,217,935 | 39.26% | 3,102,416 |
| State | 485,258 | 4.84% | 5,405,774 | 53.96% | 4,126,651 | 41.19% | 10,017,683 |

The acreage land share of conservation lands can also be considered in terms of its share of land value and other metrics from the property tax rolls. In this part of the analysis, the just value (JV) reported on the property tax rolls is used as a rough proxy for the market value of real properties designated as conservation lands. Since the property tax rolls include separate value breakouts for improvements and land, EDR isolated just the land values when important to the analysis to do so. However, unless specifically indicated otherwise, the values reported in this report are inclusive of any improvements.

The diagram below provides a tool to facilitate this discussion. Very broadly speaking, the essential operation of Florida's property tax system (ad valorem taxes) takes on the following form; however, the mechanics of implementation vary slightly:[53]

**Figure 2.1.2 Property Tax System Diagram**




As shown in the state totals at the bottom of Part 3 of Tables 2.1.2, 2.1.3, and 2.1.4[54], the 30.09 percent land share in acres only translates into 5.09 percent of the land value and 2.68 percent of total JV reported in the statewide property tax roll for 2018. In part, this is because a significant portion of the conservation land in Florida is relatively remote from the state's major economic development centers or otherwise not conducive to development. Those lands—at least temporarily—are restricted to conservation purposes and hence are valued for tax purposes at far

[53] For additional discussion, *see* the section on Property Taxes in Florida included in the 2007 report by EDR at the following link: http://edr.state.fl.us/Content/special-research-projects/property-tax-study/Ad%20Valorem-iterim-report.pdf.

[54] Acronyms in the table are the ones commonly used in ad valorem tax: JV – Just Value, CAV – County Assessed Value, SAV – School-district Assessed Value, CTV – County Taxable Value, STV – School-district Taxable Value, LND_V – Land Value. These values are contained in the Name-Address-Legal database of ad-valorem tax provided by DOR.

less than their counterparts in urban or residential areas. This treatment has more to do with the tax structure than societal or economic value.

Shares can be similarly calculated for conservation lands in terms of assessed value (AV) or taxable value (TV). In terms of the AV share, 30.09 percent of the land share in acres contributes only 2.67 percent to the county assessed value (CAV) and 2.74 percent to the school-district assessed value (SAV). Taxable value is even more skewed. Section 196.26, Florida Statutes, provides that if certain privately-held land is dedicated in perpetuity for conservation purposes and used exclusively for those purposes, it is fully exempted from ad valorem taxes; if it is dedicated in perpetuity for conservation purposes but also used for commercial purposes, it is 50 percent exempted from ad valorem taxes.[55] More importantly, there is a total exemption for property owned by governmental units, which serves a public purpose.[56] Because of special classified use assessments, the exemptions described above, and other possible ad valorem tax exemptions that are available to these properties,[57] the 30.09 percent land share contributes only 1.0 percent to the state's total ad valorem taxable value (TV) in 2018 (either CTV-based or STV-based).[58] Further, virtually all of the 1.0 percent of taxable value is attributable to the 2.56 percent of conservation acres that is privately owned.

When the acreage land share is examined at the county level, the differences among counties are significant. Conservation lands are distributed from a high of 95.29 percent of land acreage in Monroe County to a low of 0.16 percent of the acres in Union County. To further demonstrate the differences across the state, the 67 counties are divided into three groups: fiscally constrained counties (FCC), non-FCC coastal counties, and non-FCC inland counties. This is done in order to tease out any variances between the three groups. Parts 1 to 3 of Table 2.1.2 provide county-level tax impacts[59], develop metrics for conservation lands, and calculate shares for the 28 non-FCC coastal counties of statewide metrics. Parts 1 to 3 of Table 2.1.3 do the same for the 10 non-FCC inland counties and Parts 1 to 3 of Table 2.1.4 for the 29 FCCs (with the state averages listed at the bottom of each table for ease of comparison).

As shown on Part 3 of Tables 2.1.2, 2.1.3., and 2.1.4., most counties have sizable conservation land shares: eight counties have conservation land shares greater than one half of their total acreage. Five of these are in the non-FCC coastal counties (Broward—62.49 percent, Collier—67.96 percent, Miami-Dade—68.61 percent; Monroe—95.29 percent, and Okaloosa—53.27 percent) and three are in the FCCs (Franklin—81.20 percent, Liberty—62.88 percent, and Wakulla—64.66 percent). Alternatively, 14 counties have shares of less than ten percent

[55] § 218.125, Florida Statutes, directs the Legislature to appropriate funds to offset the reduction in ad valorem tax revenue experienced by fiscally constrained counties as a result of the ad valorem tax exemption for real property dedicated in perpetuity for conservation purposes, as provided in amendments in article VII, section 3(f) of the Florida Constitution. To participate in the distribution of funds, each fiscally constrained county is required to apply annually to the Department of Revenue and provide documentation to support the county's estimated reduction in ad valorem taxes as a result of the constitutional amendment. The county's ad valorem tax revenue is calculated as 95 percent of the estimated reduction in taxable value multiplied by the lesser of the 2010 applicable millage rate or the applicable millage rate for each county taxing jurisdiction in the current year. For Fiscal Year 2018-19, the estimated distribution is $637,080.

[56] § 196.199, Fla. Stat.

[57] There are more than 40 ad valorem tax exemptions and uniquely tracked property tax treatments in Florida.

[58] The TV share is a critical component in determining the impact of conservation lands on the ad valorem tax roll.

[59] For the purpose of Part 1 of these tables, "County Tax" does not include municipal or special district taxes.

(Bradford, Calhoun, Gadsden, Gilchrist, Hamilton, Hardee, Holmes, Jackson, Madison, Nassau, Pinellas, St. Lucie, Suwannee, and Union), and eleven of the fourteen are located in FCCs.

Viewing each of the three groupings as a whole, the natural beauty of the beaches located in the 28 non-FCC coastal counties constitutes one of the most important attributes of Florida's brand. Further, while the state's wide-ranging natural resources provide rich ecological values (such as wetlands) throughout Florida, they are more concentrated in the coastal counties. Thus, it stands to reason that coastal counties have proportionately more conservation lands. The average conservation land share of non-FCC coastal counties is 38.23 percent, which is greater than the state average of 30.09 percent. This share is 26.79 percent for the non-FCC inland counties and 21.49 percent for the FCC group.[60]

The non-FCC coastal counties occupy 45.71 percent of the total land in the state and have 58.08 percent of the state's total conservation land acreage (5.97 million acres out of the state's total of 10.28 million acres in conservation lands). This compares to the ten non-FCC inland counties that have only 17.86 percent of the state's total land and 15.90 percent of the state's total conservation land acreage (1.6 million acres of conservation lands). While the 29 FCCs occupy 36.43 percent of the total state land, their 2.67 million acres of conservation lands contribute only 26.02 percent to the state's total conservation land acreage (most of the FCCs are located in inland areas).

In Part 1 of Tables 2.1.2, 2.1.3, and 2.1.4, EDR used the JV associated with conservation lands and local millage rates to project potential tax losses by county. The task is problematic because a counterfactual situation has to be assumed: if the lands were not conservation lands, what would be the taxable value for each individual parcel? While more work in this area can be done in the future, for now, EDR used the simplifying assumption that the lands are largely vacant and would otherwise be ineligible for any exemptions or special classified use assessments. Effectively, this means that their highest and best use is in conservation. As a result, no assumptions are made regarding alternative development patterns, producing a snapshot of the current situation rather than a probable future outcome. Similarly, it is unknown how local governments would respond if the taxable value were restored to the rolls. Would they retain the same millage rates and raise more taxes, would they reduce the millage rates commensurate with the increase in taxes made possible by the higher level of taxable value, or a combination of both? The possible answers to this latter question produce different characterizations of what is happening today. If the millage rates were retained after restoration, the current tax treatment of conservation lands results in lost taxes. If the millage rate were lowered in this situation, the current tax treatment causes a shift of taxes to other property owners—effectively causing them to pay higher taxes than they otherwise would have.

Using the millage rates for 2018, the potential tax shifts or losses for all counties are projected to be about $418.5 million. For school taxes, the potential tax shifts or losses are projected to be a little over $314 million. At the county level, the greatest projected loss in taxable value occurs in the non-FCC coastal counties, which collectively lose or shift $269.8 million in county taxes and $209.9 million in school taxes. This stands to reason given both the large number of coastal conservation lands and the higher property values seen in these areas. The greatest dollar shifts or

[60] Conservation land acreage data in this report are somewhat different from those provided by FNAI, due to the possibility of different technical tolerance levels used in the GIS computation.

losses in potential county taxes occur in ten counties, seven of which are non-FCC coastal counties: Brevard—$12.3 million, Broward—$16.5 million, Miami-Dade—$25.5 million, Duval—$26.1 million, Hillsborough—$15.7 million, Monroe—$16.5 million, and Palm Beach—$28.8 million. The other three counties are: Alachua at $30.8 million, Osceola at $12.7 million, and Hendry at $12.7 million. At the opposite extreme, 14 counties have projected county tax shifts or losses of less than $1 million. All 14 are FCCs and six of them have shifts or losses of less than $500,000 (Bradford, Calhoun, Hardee, Holmes, Madison, and Union).

Finally, it is worth noting that the 14 counties with the lowest tax shifts or losses described above may still experience significant fiscal burdens because of the magnitude of those losses (albeit low dollar value) relative to their total levy. To analyze this, EDR developed an implied share of the tax base that is lost due to the presence of conservation lands. Statewide, 2.91 percent of county tax base and 2.59 percent of the school tax base are lost to conservation. While both the non-FCC coastal land grouping and the non-FCC inland land grouping roughly match the statewide percentages, the FCC grouping has 17.51 percent of its county tax base and 15.80 percent of its school tax base lost to conservation. Not only are these percentages much higher than the statewide averages, 14 of the 29 FCC counties have implied shares of lost tax bases that exceed 10 percent—the highest is Liberty County at 69.18 percent of the county tax base. The non-FCC inland land grouping had only one county greater than 10 percent (Alachua at 17.27 percent) and the non-FCC coastal land grouping had only three counties (Citrus at 10.64 percent, Monroe at 12.89 percent and Santa Rosa at 10.21 percent).

[See table on following page]

## Table 2.1.2 Part 1 – 2018 Tax Impact of Conservation Lands in Coastal Non-FCCs

| | Potential Tax Collection from all Cons. Land | | Actual Tax Collection on Cons. Land | | Impact on Tax Collection from Cons. Land | | Implied Share of Tax Base Lost | |
|---|---|---|---|---|---|---|---|---|
| County | County Tax | School Tax | County Tax | School Tax | County Tax | School Tax | County Base | School Base |
| Bay | $5,706,875 | $6,489,976 | $278,708 | $330,485 | $5,428,167 | $6,159,491 | 6.26% | 5.84% |
| Brevard | $14,595,325 | $13,708,690 | $2,321,868 | $2,323,127 | $12,273,458 | $11,385,562 | 5.03% | 4.42% |
| Broward | $23,692,176 | $20,646,011 | $7,235,388 | $6,715,886 | $16,456,788 | $13,930,126 | 1.23% | 1.10% |
| Charlotte | $3,876,244 | $2,625,466 | $466,928 | $353,204 | $3,409,316 | $2,272,263 | 2.29% | 2.01% |
| Citrus | $9,771,684 | $7,079,829 | $2,010,935 | $1,546,666 | $7,760,749 | $5,533,163 | 10.64% | 9.46% |
| Collier | $20,091,267 | $18,747,493 | $10,434,367 | $10,529,117 | $9,656,900 | $8,218,376 | 2.03% | 1.76% |
| Miami-Dade | $30,067,682 | $25,117,644 | $4,589,668 | $4,206,153 | $25,478,014 | $20,911,491 | 1.14% | 1.00% |
| Duval | $33,174,267 | $18,303,144 | $7,034,304 | $4,194,071 | $26,139,963 | $14,109,073 | 3.83% | 3.42% |
| Escambia | $9,091,426 | $7,673,958 | $411,413 | $377,646 | $8,680,012 | $7,296,311 | 7.06% | 6.30% |
| Flagler | $2,086,465 | $1,445,520 | $845,466 | $623,143 | $1,240,999 | $822,377 | 1.63% | 1.38% |
| Hernando | $5,083,047 | $3,568,947 | $891,543 | $719,996 | $4,191,504 | $2,848,951 | 5.87% | 4.93% |
| Hillsborough | $21,461,238 | $13,306,047 | $5,744,015 | $3,762,964 | $15,717,223 | $9,543,083 | 1.75% | 1.56% |
| Indian River | $6,192,967 | $5,428,446 | $1,216,030 | $1,165,044 | $4,976,938 | $4,263,401 | 3.69% | 3.34% |
| Lee | $13,283,807 | $11,494,376 | $3,614,923 | $3,521,987 | $9,668,884 | $7,972,390 | 1.73% | 1.51% |
| Manatee | $3,393,022 | $3,174,436 | $906,247 | $897,702 | $2,486,775 | $2,276,734 | 0.95% | 0.86% |
| Martin | $13,196,480 | $9,474,778 | $3,360,751 | $2,578,375 | $9,835,728 | $6,896,403 | 5.17% | 4.71% |
| Monroe | $27,682,553 | $21,579,500 | $11,135,628 | $9,477,445 | $16,546,925 | $12,102,055 | 12.89% | 11.29% |
| Nassau | $3,469,167 | $2,316,029 | $981,675 | $720,027 | $2,487,493 | $1,596,002 | 3.23% | 2.87% |
| Okaloosa | $8,763,191 | $10,793,845 | $1,895,336 | $2,424,380 | $6,867,855 | $8,369,465 | 7.43% | 6.86% |
| Palm Beach | $39,367,995 | $30,201,415 | $10,601,564 | $8,630,429 | $28,766,431 | $21,570,986 | 1.85% | 1.69% |
| Pasco | $7,499,355 | $4,807,004 | $2,883,146 | $1,987,102 | $4,616,209 | $2,819,902 | 1.87% | 1.59% |
| Pinellas | $12,056,864 | $8,753,226 | $5,128,785 | $3,928,320 | $6,928,079 | $4,824,907 | 1.00% | 0.87% |
| St. Johns | $8,962,414 | $7,205,834 | $3,824,400 | $3,222,601 | $5,138,014 | $3,983,233 | 2.59% | 2.31% |
| St. Lucie | $9,171,095 | $4,573,959 | $2,984,795 | $1,618,974 | $6,186,300 | $2,954,985 | 2.82% | 2.33% |
| Santa Rosa | $8,846,559 | $8,454,374 | $2,208,399 | $2,220,494 | $6,638,160 | $6,233,880 | 10.21% | 9.03% |
| Sarasota | $11,048,558 | $14,448,480 | $3,543,323 | $5,022,789 | $7,505,235 | $9,425,690 | 2.42% | 2.16% |
| Volusia | $11,450,884 | $7,539,415 | $2,143,371 | $1,565,377 | $9,307,513 | $5,974,038 | 3.08% | 2.66% |
| Walton | $6,652,835 | $6,985,332 | $1,195,906 | $1,357,133 | $5,456,929 | $5,628,199 | 5.81% | 5.37% |
| Group | $369,735,441 | $295,943,175 | $99,888,883 | $86,020,637 | $269,846,558 | $209,922,538 | 2.47% | 2.20% |
| State Total | $546,618,493 | $424,391,199 | $128,071,100 | $110,197,527 | $418,547,393 | $314,193,672 | 2.91% | 2.59% |

**Table 2.1.2 Part 2 – 2018 Real Property Values of Conservation Lands in Coastal Non-FCCs ($ in millions)**

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Bay | $1,060.11 | $1,026.11 | $1,032.62 | $51.77 | $53.98 | $561.93 | 69,380 |
| Brevard | $2,176.33 | $2,015.26 | $2,046.41 | $346.22 | $368.81 | $1,583.82 | 266,147 |
| Broward | $3,224.48 | $2,924.72 | $3,105.45 | $984.73 | $1,048.88 | $1,922.38 | 482,413 |
| Charlotte | $413.59 | $364.77 | $372.02 | $49.82 | $55.64 | $287.07 | 171,835 |
| Citrus | $1,117.04 | $924.64 | $1,028.82 | $229.88 | $244.03 | $830.58 | 109,032 |
| Collier | $3,713.11 | $3,357.93 | $3,471.82 | $1,928.40 | $2,085.39 | $2,011.99 | 862,782 |
| Miami-Dade | $3,730.53 | $3,142.33 | $3,627.05 | $569.44 | $624.71 | $2,605.51 | 829,685 |
| Duval | $2,908.49 | $2,557.44 | $2,615.80 | $616.72 | $666.47 | $1,713.71 | 96,049 |
| Escambia | $1,213.27 | $1,171.82 | $1,206.08 | $54.90 | $59.71 | $255.81 | 44,966 |
| Flagler | $225.51 | $154.05 | $167.13 | $91.38 | $97.21 | $104.32 | 42,480 |
| Hernando | $562.93 | $494.63 | $508.38 | $98.73 | $113.56 | $415.92 | 85,467 |
| Hillsborough | $2,074.53 | $1,831.96 | $1,881.98 | $555.24 | $586.68 | $1,093.54 | 106,405 |
| Indian River | $799.12 | $636.49 | $646.24 | $156.91 | $171.51 | $502.89 | 98,193 |
| Lee | $1,795.72 | $1,382.38 | $1,642.65 | $488.67 | $550.22 | $974.19 | 98,699 |
| Manatee | $433.02 | $328.99 | $347.57 | $115.65 | $122.45 | $276.97 | 59,490 |
| Martin | $1,380.76 | $870.05 | $1,053.05 | $351.64 | $375.75 | $768.87 | 92,937 |
| Monroe | $6,426.30 | $5,972.10 | $6,219.19 | $2,585.05 | $2,822.35 | $3,897.41 | 576,171 |
| Nassau | $366.63 | $236.20 | $326.86 | $103.75 | $113.98 | $232.22 | 28,680 |
| Okaloosa | $1,696.88 | $1,610.55 | $1,627.09 | $367.01 | $381.13 | $995.88 | 317,137 |
| Palm Beach | $4,595.47 | $3,765.83 | $4,040.90 | $1,237.53 | $1,313.21 | $2,385.34 | 476,283 |
| Pasco | $765.57 | $605.95 | $616.75 | $294.32 | $316.47 | $340.71 | 106,208 |
| Pinellas | $1,301.21 | $1,180.34 | $1,233.21 | $553.51 | $583.96 | $711.37 | 16,750 |
| St. Johns | $1,147.79 | $940.58 | $960.65 | $489.78 | $513.32 | $692.81 | 76,681 |
| St. Lucie | $722.01 | $563.43 | $599.19 | $234.98 | $255.56 | $361.53 | 32,844 |
| Santa Rosa | $1,342.18 | $1,257.62 | $1,268.66 | $335.05 | $352.52 | $875.15 | 255,132 |
| Sarasota | $2,063.18 | $1,226.47 | $1,773.04 | $661.67 | $717.23 | $1,278.79 | 108,335 |
| Volusia | $1,200.35 | $946.89 | $1,012.60 | $224.68 | $249.22 | $767.59 | 210,504 |
| Walton | $1,380.23 | $1,171.21 | $1,341.03 | $248.11 | $268.16 | $1,141.27 | 250,186 |
| Group | $49,836.33 | $42,660.75 | $45,772.22 | $14,025.57 | $15,112.11 | $29,589.62 | 5,970,871 |
| State Total | $69,235.84 | $57,558.03 | $61,414.73 | $17,395.34 | $18,739.18 | $39,498.11 | 10,280,537 |

## Table 2.1.2 Part 3 – 2018 Shares of Conservation Lands in Coastal non-FCCs

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Bay | 5.19% | 5.29% | 5.25% | 0.34% | 0.33% | 8.68% | 14.31% |
| Brevard | 3.65% | 4.21% | 4.15% | 1.00% | 0.94% | 9.36% | 41.32% |
| Broward | 1.21% | 1.32% | 1.36% | 0.55% | 0.54% | 3.31% | 62.49% |
| Charlotte | 1.76% | 1.88% | 1.84% | 0.32% | 0.32% | 4.70% | 39.53% |
| Citrus | 8.91% | 8.64% | 9.37% | 3.09% | 2.92% | 24.93% | 31.08% |
| Collier | 3.39% | 3.50% | 3.54% | 2.24% | 2.30% | 5.54% | 67.96% |
| Miami-Dade | 0.92% | 0.96% | 1.04% | 0.21% | 0.20% | 1.70% | 68.61% |
| Duval | 3.32% | 3.36% | 3.33% | 1.07% | 1.05% | 6.38% | 19.72% |
| Escambia | 4.81% | 5.27% | 5.26% | 0.36% | 0.35% | 4.00% | 10.68% |
| Flagler | 1.84% | 1.46% | 1.56% | 1.13% | 1.06% | 3.52% | 13.68% |
| Hernando | 4.28% | 4.48% | 4.55% | 1.33% | 1.31% | 13.63% | 28.36% |
| Hillsborough | 1.57% | 1.65% | 1.64% | 0.65% | 0.62% | 3.09% | 16.33% |
| Indian River | 3.18% | 3.13% | 3.09% | 0.94% | 0.94% | 6.57% | 30.62% |
| Lee | 1.72% | 1.57% | 1.76% | 0.66% | 0.68% | 3.54% | 19.81% |
| Manatee | 0.95% | 0.84% | 0.86% | 0.35% | 0.34% | 2.38% | 12.52% |
| Martin | 4.95% | 3.83% | 4.50% | 1.86% | 1.85% | 6.19% | 26.87% |
| Monroe | 17.49% | 18.81% | 18.40% | 9.96% | 9.97% | 19.35% | 95.29% |
| Nassau | 3.09% | 2.44% | 3.21% | 1.32% | 1.33% | 6.22% | 6.91% |
| Okaloosa | 7.31% | 7.62% | 7.59% | 2.22% | 2.13% | 13.49% | 53.27% |
| Palm Beach | 1.82% | 1.80% | 1.87% | 0.70% | 0.69% | 3.11% | 37.75% |
| Pasco | 1.94% | 1.83% | 1.82% | 1.19% | 1.14% | 3.67% | 22.59% |
| Pinellas | 1.15% | 1.26% | 1.28% | 0.75% | 0.72% | 1.77% | 9.68% |
| St. Johns | 3.30% | 3.14% | 3.14% | 1.98% | 1.91% | 6.23% | 19.96% |
| St. Lucie | 2.53% | 2.52% | 2.55% | 1.40% | 1.31% | 4.79% | 8.99% |
| Santa Rosa | 9.42% | 9.87% | 9.88% | 3.78% | 3.54% | 19.16% | 39.44% |
| Sarasota | 2.61% | 1.82% | 2.54% | 1.17% | 1.18% | 4.71% | 30.47% |
| Volusia | 2.35% | 2.26% | 2.35% | 0.73% | 0.72% | 6.41% | 29.89% |
| Walton | 6.13% | 5.75% | 6.25% | 1.35% | 1.37% | 13.20% | 37.66% |
| Group | 2.40% | 2.46% | 2.54% | 0.99% | 0.98% | 4.60% | 38.23% |
| State Total | 2.68% | 2.67% | 2.74% | 1.01% | 0.99% | 5.09% | 30.09% |

## Table 2.1.3 Part 1 – 2018 Tax Impact of Conservation Lands in Inland non-FCCs

| County | Potential Tax Collection from All Cons. Land | | Actual Tax Collection on Cons. Land | | Impact on Tax Collection from Cons. Land | | Implied Share of Tax Base Lost | |
|---|---|---|---|---|---|---|---|---|
| | County Tax | School Tax | County Tax | School Tax | County Tax | School Tax | County Base | School Base |
| Alachua | $34,531,842 | $22,058,594 | $3,748,944 | $2,789,909 | $30,782,898 | $19,268,685 | 17.27% | 15.18% |
| Clay | $3,866,325 | $2,947,901 | $766,604 | $638,432 | $3,099,721 | $2,309,470 | 3.75% | 3.26% |
| Lake | $6,962,149 | $5,689,215 | $1,674,553 | $1,483,441 | $5,287,596 | $4,205,774 | 3.43% | 2.97% |
| Leon | $8,849,566 | $6,343,979 | $1,395,634 | $1,084,922 | $7,453,932 | $5,259,057 | 5.22% | 4.73% |
| Marion | $9,884,356 | $9,559,649 | $1,159,913 | $1,238,704 | $8,724,443 | $8,320,946 | 6.75% | 6.00% |
| Orange | $14,906,159 | $14,927,838 | $5,822,444 | $6,053,617 | $9,083,716 | $8,874,221 | 1.03% | 0.91% |
| Osceola | $13,640,505 | $10,479,996 | $959,676 | $778,283 | $12,680,829 | $9,701,712 | 6.01% | 5.55% |
| Polk | $5,971,940 | $4,568,781 | $2,221,588 | $1,844,012 | $3,750,352 | $2,724,769 | 1.59% | 1.34% |
| Seminole | $4,833,264 | $4,254,615 | $2,671,550 | $2,466,681 | $2,161,715 | $1,787,934 | 0.97% | 0.83% |
| Sumter | $1,346,388 | $1,316,318 | $99,126 | $106,211 | $1,247,261 | $1,210,107 | 2.02% | 1.82% |
| Group | $104,792,494 | $82,146,888 | $20,520,032 | $18,484,212 | $84,272,462 | $63,662,675 | 3.21% | 2.85% |
| State Total | $546,618,493 | $424,391,199 | $128,071,100 | $110,197,527 | $418,547,393 | $314,193,672 | 2.91% | 2.59% |

## Table 2.1.3 Part 2 – 2018 Real Property Values of Conservation Lands in Inland Non-FCCs (in $millions)

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Alachua | $3,036.70 | $2,859.66 | $2,924.57 | $329.68 | $384.07 | $446.52 | 95,615 |
| Clay | $476.93 | $397.15 | $419.62 | $94.56 | $103.29 | $305.06 | 138,074 |
| Lake | $895.23 | $676.27 | $680.38 | $215.32 | $233.43 | $547.09 | 190,459 |
| Leon | $1,000.15 | $812.96 | $848.38 | $157.73 | $171.04 | $492.25 | 160,037 |
| Marion | $1,306.14 | $1,125.63 | $1,163.28 | $153.27 | $169.24 | $971.85 | 344,608 |
| Orange | $2,045.19 | $1,793.40 | $1,909.85 | $798.86 | $829.38 | $638.23 | 96,732 |
| Osceola | $1,634.69 | $1,043.58 | $1,082.83 | $115.01 | $121.40 | $1,013.67 | 177,159 |
| Polk | $730.89 | $547.58 | $563.17 | $271.89 | $294.99 | $296.77 | 285,896 |
| Seminole | $673.95 | $559.79 | $609.59 | $372.52 | $390.73 | $268.58 | 38,355 |
| Sumter | $239.03 | $160.70 | $161.39 | $17.60 | $19.29 | $146.60 | 108,144 |
| Group | $12,038.90 | $9,976.71 | $10,363.08 | $2,526.45 | $2,716.87 | $5,126.64 | 1,635,078 |
| State Total | $69,235.84 | $57,558.03 | $61,414.73 | $17,395.34 | $18,739.18 | $39,498.11 | 10,280,537 |

## Table 2.1.3 Part 3 – 2018 Shares of Conservation Lands in Inland Non-FCCs

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Alachua | 12.21% | 13.22% | 12.97% | 2.54% | 2.59% | 8.14% | 17.07% |
| Clay | 2.98% | 2.90% | 3.04% | 0.96% | 0.93% | 7.15% | 35.71% |
| Lake | 2.98% | 2.66% | 2.63% | 1.12% | 1.08% | 6.53% | 31.94% |
| Leon | 3.86% | 3.44% | 3.54% | 1.03% | 1.02% | 7.68% | 37.51% |
| Marion | 4.79% | 5.00% | 5.07% | 0.96% | 0.95% | 15.11% | 34.03% |
| Orange | 1.18% | 1.20% | 1.21% | 0.67% | 0.63% | 1.31% | 16.73% |
| Osceola | 4.56% | 3.53% | 3.58% | 0.48% | 0.47% | 13.66% | 20.88% |
| Polk | 1.61% | 1.45% | 1.44% | 0.96% | 0.92% | 2.80% | 24.90% |
| Seminole | 1.53% | 1.48% | 1.57% | 1.21% | 1.16% | 2.37% | 19.58% |
| Sumter | 1.55% | 1.19% | 1.19% | 0.16% | 0.16% | 5.76% | 30.96% |
| Group | 2.74% | 2.66% | 2.66% | 0.88% | 0.86% | 4.59% | 26.79% |
| State Total | 2.68% | 2.67% | 2.74% | 1.01% | 0.99% | 5.09% | 30.09% |

## Table 2.1.4 Part 1 – 2018 Tax Impact of Conservation Lands in FCCs

| | Potential Tax Collection from All Cons. Land | | Actual Tax Collection on Cons. Land | | Impact on Tax Collection from Cons. Land | | Implied Share of Tax Base Lost | |
|---|---|---|---|---|---|---|---|---|
| **COUNTY** | **County Tax** | **School Tax** | **County Tax** | **School Tax** | **County Tax** | **School Tax** | **County Base** | **School Base** |
| Baker | $1,475,507 | $1,059,140 | $118,765 | $93,103 | $1,356,742 | $966,037 | 17.00% | 14.94% |
| Bradford | $560,934 | $372,614 | $149,880 | $103,688 | $411,055 | $268,926 | 5.65% | 4.93% |
| Calhoun | $173,554 | $111,605 | $21,121 | $14,116 | $152,433 | $97,489 | 4.71% | 4.13% |
| Columbia | $2,681,858 | $1,845,462 | $328,023 | $241,106 | $2,353,834 | $1,604,356 | 10.15% | 8.86% |
| DeSoto | $2,368,752 | $1,363,802 | $151,983 | $90,040 | $2,216,769 | $1,273,761 | 14.83% | 13.56% |
| Dixie | $3,347,336 | $1,574,359 | $261,901 | $125,749 | $3,085,435 | $1,448,610 | 33.99% | 32.68% |
| Franklin | $4,358,347 | $3,921,312 | $1,087,485 | $1,093,736 | $3,270,862 | $2,827,576 | 21.35% | 19.56% |
| Gadsden | $671,441 | $485,920 | $144,677 | $112,325 | $526,764 | $373,595 | 5.08% | 4.43% |
| Gilchrist | $757,927 | $437,165 | $166,993 | $104,856 | $590,934 | $332,308 | 9.82% | 8.46% |
| Glades | $7,479,665 | $3,647,857 | $272,425 | $136,402 | $7,207,239 | $3,511,454 | 52.19% | 50.31% |
| Gulf | $3,423,058 | $2,921,377 | $148,837 | $145,712 | $3,274,221 | $2,775,665 | 20.35% | 18.36% |
| Hamilton | $806,792 | $499,374 | $119,674 | $77,502 | $687,117 | $421,873 | 14.58% | 13.46% |
| Hardee | $703,675 | $472,617 | $243,857 | $166,091 | $459,818 | $306,525 | 5.51% | 5.02% |
| Hendry | $13,336,304 | $6,625,272 | $679,987 | $342,182 | $12,656,317 | $6,283,090 | 41.02% | 38.98% |
| Highlands | $3,293,827 | $2,353,717 | $1,089,280 | $818,591 | $2,204,546 | $1,535,126 | 5.50% | 4.84% |
| Holmes | $254,098 | $166,003 | $20,990 | $15,909 | $233,107 | $150,094 | 6.10% | 5.14% |
| Jackson | $907,910 | $686,386 | $106,637 | $86,164 | $801,273 | $600,223 | 7.36% | 6.65% |
| Jefferson | $1,607,171 | $1,277,480 | $211,366 | $187,951 | $1,395,805 | $1,089,529 | 27.92% | 24.96% |
| Lafayette | $828,366 | $516,396 | $80,648 | $52,216 | $747,718 | $464,179 | 26.41% | 24.22% |
| Levy | $3,540,896 | $2,366,332 | $438,771 | $313,028 | $3,102,125 | $2,053,304 | 17.92% | 16.11% |
| Liberty | $3,315,559 | $2,190,950 | $68,476 | $49,495 | $3,247,083 | $2,141,455 | 69.18% | 66.30% |
| Madison | $428,676 | $263,356 | $62,607 | $39,208 | $366,069 | $224,148 | 6.35% | 5.74% |
| Okeechobee | $4,604,323 | $3,368,138 | $340,946 | $260,837 | $4,263,377 | $3,107,301 | 24.72% | 22.54% |
| Putnam | $3,943,840 | $2,242,951 | $518,892 | $328,197 | $3,424,948 | $1,914,754 | 10.60% | 9.42% |
| Suwannee | $746,628 | $508,544 | $162,679 | $118,969 | $583,949 | $389,576 | 4.68% | 4.10% |
| Taylor | $889,992 | $689,000 | $125,559 | $101,586 | $764,433 | $587,414 | 10.29% | 9.40% |
| Union | $128,142 | $74,934 | $52,059 | $32,819 | $76,083 | $42,115 | 3.39% | 2.77% |
| Wakulla | $4,692,255 | $3,725,746 | $363,063 | $345,342 | $4,329,192 | $3,380,404 | 34.56% | 30.90% |
| Washington | $763,728 | $533,328 | $124,600 | $95,756 | $639,127 | $437,572 | 10.09% | 8.86% |
| Group | $72,090,559 | $46,301,137 | $7,662,185 | $5,692,678 | $64,428,373 | $40,608,459 | 17.51% | 15.80% |
| State Total | $546,618,493 | $424,391,199 | $128,071,100 | $110,197,527 | $418,547,393 | $314,193,672 | 2.91% | 2.59% |

**Table 2.1.4 Part 2 – 2018 Real Property Values of Conservation Lands in FCCs (in $millions)**

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Baker | $169.52 | $150.04 | $150.17 | $13.64 | $14.90 | $140.40 | 164,443 |
| Bradford | $59.05 | $29.40 | $30.06 | $15.78 | $16.43 | $24.70 | 10,735 |
| Calhoun | $17.47 | $7.00 | $7.00 | $2.13 | $2.21 | $6.20 | 6,036 |
| Columbia | $286.16 | $218.40 | $220.34 | $35.00 | $37.39 | $191.96 | 148,432 |
| DeSoto | $218.17 | $112.05 | $119.04 | $14.00 | $14.40 | $110.91 | 49,373 |
| Dixie | $249.90 | $132.89 | $133.63 | $19.55 | $19.96 | $128.18 | 118,034 |
| Franklin | $659.38 | $591.25 | $619.18 | $164.53 | $183.91 | $550.38 | 279,972 |
| Gadsden | $75.10 | $40.69 | $41.48 | $16.18 | $17.36 | $27.58 | 18,792 |
| Gilchrist | $69.17 | $49.41 | $50.05 | $15.24 | $16.59 | $32.44 | 8,441 |
| Glades | $588.08 | $180.35 | $180.43 | $21.42 | $21.99 | $172.88 | 93,321 |
| Gulf | $439.57 | $428.52 | $430.42 | $19.11 | $21.92 | $419.24 | 47,031 |
| Hamilton | $77.61 | $51.89 | $54.94 | $11.51 | $12.05 | $43.21 | 24,661 |
| Hardee | $74.79 | $33.84 | $33.94 | $25.92 | $26.28 | $29.25 | 12,030 |
| Hendry | $1,056.16 | $697.39 | $697.57 | $53.85 | $54.55 | $679.23 | 154,737 |
| Highlands | $372.31 | $298.37 | $307.79 | $123.12 | $129.48 | $244.30 | 182,499 |
| Holmes | $26.68 | $20.71 | $20.71 | $2.20 | $2.56 | $17.17 | 12,891 |
| Jackson | $115.18 | $92.06 | $92.18 | $13.53 | $14.46 | $83.12 | 19,358 |
| Jefferson | $198.27 | $133.94 | $149.81 | $26.08 | $29.17 | $126.79 | 109,078 |
| Lafayette | $82.06 | $61.55 | $61.56 | $7.99 | $8.30 | $56.33 | 59,869 |
| Levy | $374.01 | $251.86 | $252.95 | $46.35 | $49.47 | $231.45 | 172,304 |
| Liberty | $353.15 | $322.60 | $327.79 | $7.29 | $7.98 | $321.83 | 327,357 |
| Madison | $41.24 | $26.23 | $27.10 | $6.02 | $6.14 | $24.66 | 15,222 |
| Okeechobee | $529.66 | $178.57 | $266.82 | $39.22 | $41.02 | $249.96 | 107,693 |
| Putnam | $364.41 | $280.88 | $285.37 | $47.95 | $53.32 | $237.54 | 114,311 |
| Suwannee | $79.47 | $59.55 | $59.64 | $17.32 | $18.59 | $42.82 | 21,187 |
| Taylor | $103.41 | $78.40 | $81.73 | $14.59 | $15.25 | $76.93 | 96,269 |
| Union | $11.76 | $7.36 | $7.39 | $4.78 | $5.15 | $2.93 | 245 |
| Wakulla | $584.06 | $321.11 | $505.36 | $45.19 | $54.14 | $454.93 | 250,264 |
| Washington | $84.79 | $64.23 | $64.94 | $13.83 | $15.22 | $54.55 | 50,004 |
| Group | $7,360.60 | $4,920.57 | $5,279.43 | $843.32 | $910.20 | $4,781.86 | 2,674,589 |
| State Total | $69,235.84 | $57,558.03 | $61,414.73 | $17,395.34 | $18,739.18 | $39,498.11 | 10,280,537 |

**Table 2.1.4 Part 3 – 2018 Shares of Conservation Lands in FCCs**

| County | JV | CAV | SAV | CTV | STV | LND_V | ACRES |
|---|---|---|---|---|---|---|---|
| Baker | 10.29% | 11.31% | 11.30% | 1.79% | 1.69% | 29.15% | 43.89% |
| Bradford | 4.01% | 2.60% | 2.65% | 2.18% | 2.00% | 6.16% | 5.72% |
| Calhoun | 2.17% | 1.43% | 1.43% | 0.68% | 0.62% | 3.21% | 1.66% |
| Columbia | 6.85% | 6.28% | 6.31% | 1.57% | 1.46% | 17.00% | 29.10% |
| DeSoto | 7.05% | 6.49% | 6.75% | 1.19% | 1.11% | 17.25% | 12.11% |
| Dixie | 19.41% | 17.58% | 17.58% | 4.37% | 4.21% | 29.99% | 26.20% |
| Franklin | 23.77% | 23.39% | 23.54% | 9.02% | 9.41% | 31.62% | 81.20% |
| Gadsden | 3.27% | 2.31% | 2.34% | 1.47% | 1.39% | 5.71% | 5.69% |
| Gilchrist | 5.43% | 6.20% | 6.25% | 3.08% | 2.92% | 10.06% | 3.77% |
| Glades | 17.49% | 12.96% | 12.79% | 4.13% | 3.93% | 17.59% | 18.18% |
| Gulf | 14.58% | 18.07% | 17.05% | 1.16% | 1.18% | 26.71% | 13.42% |
| Hamilton | 8.78% | 8.41% | 8.79% | 2.97% | 2.86% | 16.34% | 7.50% |
| Hardee | 2.94% | 2.67% | 2.63% | 3.09% | 2.86% | 6.01% | 2.95% |
| Hendry | 20.57% | 24.81% | 24.48% | 3.74% | 3.48% | 39.25% | 20.98% |
| Highlands | 5.30% | 4.78% | 4.85% | 2.88% | 2.71% | 14.39% | 28.11% |
| Holmes | 2.48% | 3.00% | 3.00% | 0.59% | 0.57% | 9.76% | 4.25% |
| Jackson | 4.26% | 4.26% | 4.25% | 1.06% | 1.02% | 11.27% | 3.30% |
| Jefferson | 16.50% | 18.00% | 19.43% | 5.86% | 5.74% | 42.32% | 28.80% |
| Lafayette | 12.16% | 16.28% | 16.23% | 3.87% | 3.60% | 34.74% | 17.23% |
| Levy | 11.01% | 10.84% | 10.73% | 3.09% | 2.93% | 21.99% | 24.14% |
| Liberty | 41.47% | 56.05% | 55.51% | 4.73% | 4.55% | 81.16% | 62.88% |
| Madison | 3.30% | 3.31% | 3.39% | 1.16% | 1.06% | 9.45% | 3.47% |
| Okeechobee | 14.17% | 8.24% | 11.43% | 2.63% | 2.44% | 25.02% | 21.93% |
| Putnam | 7.14% | 6.79% | 6.79% | 1.80% | 1.78% | 13.43% | 24.64% |
| Suwannee | 3.19% | 3.18% | 3.17% | 1.37% | 1.30% | 7.75% | 4.81% |
| Taylor | 6.47% | 6.65% | 6.78% | 1.88% | 1.79% | 15.58% | 14.45% |
| Union | 1.51% | 1.78% | 1.78% | 2.40% | 2.22% | 2.33% | 0.16% |
| Wakulla | 24.73% | 18.58% | 26.16% | 4.43% | 4.57% | 53.65% | 64.66% |
| Washington | 6.50% | 6.45% | 6.50% | 2.19% | 2.13% | 15.52% | 13.44% |
| Group | 10.62% | 10.07% | 10.57% | 2.75% | 2.65% | 23.01% | 21.49% |
| State Total | 2.68% | 2.67% | 2.74% | 1.01% | 0.99% | 5.09% | 30.09% |

## 2.2 Historical, Current, and Projected Future Conservation Land Expenditures

EDR is directed to analyze historic expenditures and to project future expenditures based upon historical trends and ongoing projects or initiatives associated with real property interests eligible for Florida Forever funding under section 259.105, Florida Statutes. Funding for the acquisition and management of conservation lands in Florida is provided by a variety of institutions, including the federal and state governments, regional governments, local governments, and private non-governmental entities. This part of the analysis focuses on governmental expenditures. To the extent that private non-governmental entities award contracts or grants to governmental agencies, those funds are also included. A variety of available data sources were reviewed and analyzed for

historical and current information on conservation land appropriations and expenditures.[61] This report summarizes the most relevant information.[62]

## *Expenditures of State and Federal Funds*

Several state agencies receive legislative appropriations for programs related to conservation lands, including the Department of Environmental Protection, the Department of Agriculture and Consumer Services, the Fish and Wildlife Conservation Commission, and the Department of State. Because the related expenditures are fully contemplated in the state's budget, state and federal expenditures are addressed together.[63]

### Land Acquisition

*Florida Forever*
The state's most widely known land conservation program is the Florida Forever program. The Florida Constitution authorizes the issuance of tax-supported bonds to finance or refinance the acquisition and improvement of land, water areas, and resources for the purposes of conservation, restoration of natural systems, water resource development, outdoor recreation, and historic preservation.[64] The state's environmental bonds, including Florida Forever bonds as well as Everglades restoration bonds, are secured by Documentary Stamp Tax revenues, and are not backed by the full faith and credit of the state.[65]

The Florida Forever program was initially authorized in 1999 in response to a voter-approved constitutional amendment to acquire land for conservation purposes.[66] Under the Florida Forever program, $3 billion of bonds were authorized to be issued over ten years. The Florida Forever program was extended for another ten years in 2008, increasing the total amount of Florida Forever bonds authorized to be issued to $5.3 billion. To date, the state has issued approximately $2.0 billion of Florida Forever bonds. In 2017, the Legislature authorized $800 million in new Florida Forever bonds, subject to the existing $5.3 billion overall bonding limit, to pay for costs related to land acquisition, planning, and construction of water storage reservoirs.[67] At the time of this report, the additional bond issuance and authorized spending for water storage reservoir projects have not yet been approved. After delivery of the Florida Forever 2018A Refunding Bonds on January 24, 2019, the aggregate principal amount of outstanding bonds will be $769.9 million, with net debt service of approximately $138.9 million due in Fiscal Year 2018-19.[68] If no new bonds are sold,

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[61] Sources include the annual General Appropriations Acts, the Florida Accounting Information Resource (FLAIR) System, the Legislative Appropriations/Planning and Budgeting System (LAS/PBS), periodic agency reports, Water Management District annual financial reports, and local government annual financial reports.
[62] It should be noted that the structure of federal, state, and local funding often results in the duplicative reporting of the same dollars. Attempting to sum the reported expenditures across the various sectors may lead to erroneous conclusions.
[63] The 2019 Edition includes expenditures beginning in Fiscal Year 2008-09, which provides a 10-year history. For a longer history, *see* the 2017 Edition.
http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at p. 24.
[64] Art. VII, §11, Fla. Const.
[65] Subsection 4.1 of this report provides additional information on Everglades restoration bonds.
[66] Ch. 99-247, § 21, Laws of Fla. (codified as amended at § 259.105, Fla. Stat.).
[67] *See* Ch. 2017-10, § 3, Laws of Fla. (codified at § 373.4598, Fla. Stat.).
[68] The debt service for Fiscal Year 2018-19 has been reduced by the expected federal interest subsidy to be received for the 2010B Build America Bonds. The 2010B Bonds were refunded and will be defeased as of January 24, 2019, and no subsidy payments will be applicable after that date.

the estimated debt service is expected to decline through Fiscal Year 2028-29, at which time the Florida Forever bonds would be retired.[69] Table 2.2.1 shows the estimated debt service that will be due each fiscal year.

**Table 2.2.1 Florida Forever Bonds Outstanding Debt Service**

| Fiscal Year | Outstanding Debt Service | Expected Interest Subsidy | Net Debt Service Owed* |
|---|---|---|---|
| FY18-19 | $140.91 | ($2.05) | $138.86 |
| FY19-20 | $134.91 | | $134.91 |
| FY20-21 | $134.92 | | $134.92 |
| FY21-22 | $113.38 | | $113.38 |
| FY22-23 | $102.33 | | $102.33 |
| FY23-24 | $82.15 | | $82.15 |
| FY24-25 | $82.14 | | $82.14 |
| FY25-26 | $65.21 | | $65.21 |
| FY26-27 | $44.78 | | $44.78 |
| FY27-28 | $34.91 | | $34.91 |
| FY28-29 | $15.36 | | $15.36 |
| **TOTAL** | **$950.99** | **($2.05)** | **$948.94** |

*as of January 24, 2019

Funding for the Florida Forever program, including bond proceeds and cash transfers, is held in the Florida Forever Trust Fund and administered by the Department of Environmental Protection (DEP). Section 259.105, Florida Statutes, provides for the distribution of any cash or bond proceeds from the Florida Forever Trust Fund to various agencies and programs. The statutory distributions under the original authorization and under the 2008 reauthorization are displayed in Table 2.2.2. Detailed descriptions of the programs receiving distributions under the Florida Forever program were provided in the 2017 Edition of this report.[70] Any expenditures from the trust fund are subject to annual evaluation and appropriation by the Legislature.[71]

[See table on following page]

[69] It is the intent of the Legislature that all bonds issued to fund the Florida Forever Act be retired by December 31, 2040. *See* § 201.15(3)(a), Fla. Stat. According to the legislative staff analysis, the Florida Forever program is expected to end in 2020. *See* bill analysis for CS/CS/SB 542 available at: http://archive.flsenate.gov/data/session/2008/Senate/bills/analysis/pdf/2008s0542.ga.pdf. (Accessed December 2018).

[70] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at page 29.

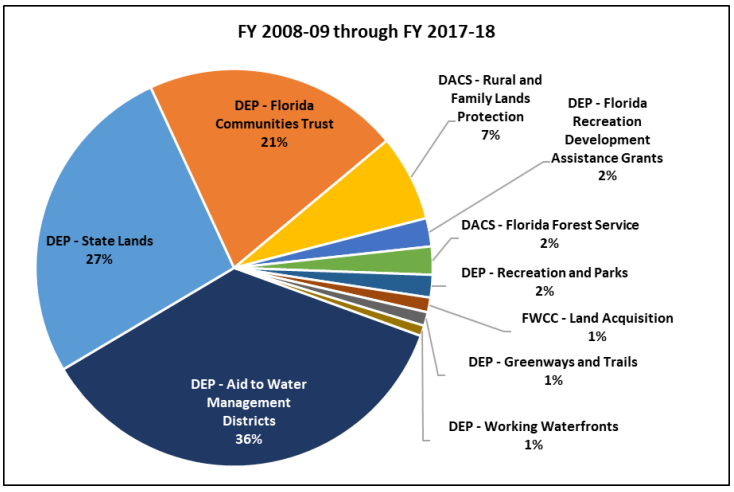
[71] To that point, the Legislature appropriated $95 million from the Florida Forever Trust Fund in Fiscal Year 2018-19. The appropriations include the following amounts and shares of the total: State Lands ($77 million or 81.1 percent); Florida Communities Trust ($10 million or 10.5 percent); Florida Recreation Development and Assistance Grants ($6 million or 6.3 percent); and Working Waterfronts ($2 million or 2.1 percent). *See* Specific Appropriations 1549, 1549A, 1549B, and 1686A of the Fiscal Year 2018-19 General Appropriations Act (ch. 2018-9, Laws of Fla.) and §§ 70 and 71 of ch. 2018-10, Laws of Fla.

## Table 2.2.2 Statutory Distribution of Florida Forever Funds

| Florida Forever Statutory Distribution | FY 2000-01 Through FY 2007-08 | FY 2008-09 Through Present |
|---|---|---|
| Dep. Environmental Protection - State Lands | 35.0% | 35.0% |
| Dep. Environmental Protection - Water Management Districts | 35.0% | 30.0% |
| Dep. Environmental Protection - Florida Communities Trust | 22.0% | 21.0% |
| Dep. Agriculture & Consumer Services - Rural & Family Lands Protection | 0.0% | 3.5% |
| Dep. Environmental Protection - Working Waterfronts | 0.0% | 2.5% |
| Dep. Environmental Protection - Fla Recreation Development Assistance Grants | 2.0% | 2.0% |
| Dep. Environmental Protection - Recreation & Parks | 1.5% | 1.5% |
| Dep. Environmental Protection - Greenways & Trails | 1.5% | 1.5% |
| Fish & Wildlife Conservation Commission - Land Acquisition | 1.5% | 1.5% |
| Dep. Agriculture & Consumer Services - Florida Forest Service | 1.5% | 1.5% |

Since the inception of the program in Fiscal Year 2000-01, the State of Florida has spent more than $3.0 billion for Florida Forever. In the most recent ten years, Fiscal Year 2008-09 through Fiscal Year 2017-18, the total expenditures have been $657.4 million. Figure 2.2.1 shows that the largest share of these expenditures (36 percent) has been to support land conservation efforts by water management districts. The next two highest expenditures were state lands (27 percent) and Florida Communities Trust (21 percent). Table 2.2.3 shows the annual cash expenditures for each program since Fiscal Year 2008-09.[72]

## Figure 2.2.1 Shares of Florida Forever Expenditures in Past Ten Years




[72] Detailed expenditures for each program are available at https://floridadep.gov/lands/environmental-services/content/florida-forever-0. (Accessed December 2018).

**Table 2.2.3 Florida Forever Program Expenditures by Fiscal Year (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| DEP - State Lands | $42.08 | $30.52 | $4.06 | $10.08 | $6.77 |
| DEP - Florida Communities Trust | $72.82 | $24.46 | $17.59 | $4.74 | $7.12 |
| DEP - Working Waterfronts | $0.00 | $5.23 | $0.01 | $0.00 | $0.00 |
| DEP - Recreation and Parks | $0.14 | $3.01 | $3.23 | $0.89 | $0.06 |
| DEP - Florida Recreation Development Assistance Grants | $6.11 | $5.01 | $3.67 | $0.00 | $0.30 |
| DEP - Greenways and Trails | $1.26 | $0.70 | $3.07 | $0.02 | $0.01 |
| FWC - Land Acquisition | $1.00 | $5.32 | $0.05 | $0.74 | $0.01 |
| DACS - Florida Forest Service | $6.06 | $6.18 | $0.63 | $1.72 | $0.02 |
| DACS - Rural and Family Lands Protection | $0.00 | $1.42 | $7.51 | $0.01 | $0.00 |
| DEP - Aid to Water Management Districts | $110.36 | $25.62 | $59.74 | $9.12 | $2.31 |
| **TOTAL** | **$239.83** | **$107.47** | **$99.55** | **$27.34** | **$16.60** |

| CASH EXPENDITURES BY FISCAL YEAR* | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| DEP - State Lands | $14.53 | $18.65 | $4.61 | $18.27 | $25.44 |
| DEP - Florida Communities Trust | $2.79 | $1.25 | $0.00 | $2.34 | $3.94 |
| DEP - Working Waterfronts | $0.01 | $0.32 | $0.00 | $0.02 | $0.00 |
| DEP - Recreation and Parks | $0.02 | $0.51 | $0.77 | $2.52 | $0.94 |
| DEP - Florida Recreation Development Assistance Grants | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| DEP - Greenways and Trails | $0.00 | $0.64 | $0.03 | $0.14 | $1.42 |
| FWC - Land Acquisition | $0.00 | $0.00 | $0.01 | $0.00 | $0.71 |
| DACS - Florida Forest Service | $0.16 | $0.19 | $0.06 | $0.00 | $0.04 |
| DACS - Rural and Family Lands Protection | $0.08 | $1.53 | $0.47 | $7.92 | $27.26 |
| DEP - Aid to Water Management Districts | $0.34 | $22.34 | $0.44 | $5.75 | $0.14 |
| **TOTAL** | **$17.94** | **$45.43** | **$6.38** | **$36.96** | **$59.89** |

*Through June 30, 2018.

To supplement distributions provided through the Florida Forever program, the Legislature has provided additional funds for the following land acquisition programs: the Florida Recreation Development Assistance Program, the Rural and Family Lands Protection Program, Water Management Districts, and State Parks. During the period covering Fiscal Year 2008-09 through Fiscal Year 2017-18, the total additional expenditures for these programs were $316.7 million. Table 2.2.4 shows the annual cash expenditures for these programs that were in addition to their Florida Forever distributions.[73]

[See table on following page]

[73] In Fiscal Year 2017-18, the Legislature appropriated $2.0 million for State Parks; however, no expenditures had been made as of June 30, 2018.

**Table 2.2.4 Annual Cash Expenditures Outside of Florida Forever (in $millions)**

| | ANNUAL CASH EXPENDITURES* | | | |
|---|---|---|---|---|
| **Fiscal Year** | **FRDAP** | **RFLPP** | **WMD** | **TOTAL** |
| FY08-09 | $23.83 | | $59.65 | $83.49 |
| FY09-10 | $18.48 | | $43.30 | $61.78 |
| FY10-11 | $8.96 | | $32.70 | $41.66 |
| FY11-12 | $0.00 | | $29.21 | $29.21 |
| FY12-13 | $0.00 | | $29.64 | $29.64 |
| FY13-14 | $0.10 | | $19.52 | $19.62 |
| FY14-15 | $0.32 | $0.45 | $8.76 | $9.53 |
| FY15-16 | $0.94 | $11.01 | $5.64 | $17.59 |
| FY16-17 | $2.83 | $14.63 | $1.45 | $18.91 |
| FY17-18 | $5.13 | $0.11 | $0.06 | $5.29 |
| **TOTAL** | **$60.58** | **$26.20** | **$229.93** | **$316.71** |

*Through June 30, 2018.

*Other Land Acquisition Programs*

In addition to the land acquisition programs funded through the Florida Forever program, the Legislature has funded other types of land acquisition programs. In the most recent ten years, these programs have included the Off-Highway Vehicle program, statewide forestry land acquisition, the Mitigation Park program, and the acquisition of historic properties throughout the state. Table 2.2.5 shows the annual cash expenditures for these programs during this period. Historic properties is the only program that has received new appropriations in the most recent five fiscal years; however, this funding includes dollars for stand-alone restoration projects as well as land acquisition.

**Table 2.2.5 Expenditures for Other Land Acquisition Programs (in $millions)**

| | ANNUAL CASH EXPENDITURES* | | | | |
|---|---|---|---|---|---|
| **Fiscal Year** | **DACS Off Highway Vehicle** | **DACS Forestry** | **FWC Mitigation Park** | **DOS Historic Properties** | **TOTAL** |
| FY08-09 | $0.00 | $0.09 | $2.08 | $10.85 | $13.02 |
| FY09-10 | $1.21 | $0.10 | $0.00 | $2.13 | $3.44 |
| FY10-11 | $0.07 | $0.14 | $0.00 | $0.67 | $0.88 |
| FY11-12 | $0.01 | $0.00 | $0.00 | $0.00 | $0.02 |
| FY12-13 | $0.02 | $0.00 | $0.00 | $0.00 | $0.02 |
| FY13-14 | $0.07 | $0.01 | $0.00 | $0.13 | $0.21 |
| FY14-15 | $0.03 | $0.00 | $0.00 | $1.78 | $1.81 |
| FY15-16 | $0.00 | $0.00 | $0.00 | $5.72 | $5.72 |
| FY16-17 | $0.00 | $0.00 | $0.00 | $12.27 | $12.27 |
| FY17-18 | $0.00 | $0.00 | $0.00 | $7.41 | $7.41 |
| **TOTAL** | **$1.40** | **$0.35** | **$2.08** | **$40.97** | **$44.80** |

*Through June 30, 2018.

**Land Management**

The agencies responsible for management of Florida's public lands for conservation purposes include DEP (State Lands, Recreation and Parks, Coastal and Aquatic Managed Areas, and Greenways and Trails); The Department of Agriculture and Consumer Services (Florida Forest Service); the Fish and Wildlife Conservation Commission; and the Department of State (Historical Resources). Pursuant to section 259.037, Florida Statutes, the Land Management Uniform Accounting Council (Council) is comprised of representatives from each of the involved agencies/divisions. The Council has established specific cost accounting categories in order to provide consistent data for purposes of policy making. To that end, the Council publishes an annual report detailing the prior year's land management activities and expenditures.[74]

As reported by the Council, these agencies have spent more than $1.7 billion since Fiscal Year 2008-09 to manage the state's conservation lands. The reports include expenditures from all appropriated funds, including both state and federal sources. Table 2.2.6 shows the annual amounts spent for the major cost categories, which were described in detail in the 2017 Edition of this report.[75] For information, the shares have been provided for the major cost categories at the bottom of the table. On average during this period, 30 percent of land management expenditures have been for Recreation/Visitor Services, nearly 22 percent for Capital Improvements, and almost 20 percent for Resource Management.

**Table 2.2.6 Land Management Expenditures by Cost Category (in $millions)**

| Fiscal Year | Resource Management | Administration | Support | Capital Improvements | Recreation/ Visitor Services | Law Enforcement | TOTAL |
|---|---|---|---|---|---|---|---|
| FY08-09 | $37.44 | $34.88 | $14.06 | $56.86 | $45.23 | $9.84 | $198.30 |
| FY09-10 | $33.33 | $26.16 | $12.99 | $56.00 | $41.96 | $12.81 | $183.24 |
| FY10-11 | $29.62 | $23.40 | $12.83 | $34.77 | $43.57 | $12.28 | $156.47 |
| FY11-12 | $30.62 | $20.75 | $14.01 | $16.15 | $40.14 | $12.65 | $134.31 |
| FY12-13 | $30.92 | $21.70 | $14.81 | $22.07 | $38.78 | $13.63 | $141.91 |
| FY13-14 | $26.47 | $12.29 | $18.96 | $26.52 | $50.26 | $6.05 | $140.55 |
| FY14-15 | $29.32 | $14.57 | $20.86 | $30.46 | $54.44 | $6.06 | $155.71 |
| FY15-16 | $34.55 | $13.25 | $24.64 | $38.39 | $55.37 | $7.16 | $173.36 |
| FY16-17 | $36.52 | $14.65 | $30.48 | $42.03 | $61.40 | $7.49 | $192.56 |
| FY17-18 | $40.05 | $15.37 | $27.67 | $41.84 | $72.77 | $7.67 | $205.37 |
| **TOTAL** | **$328.84** | **$197.00** | **$191.30** | **$365.09** | **$503.90** | **$95.65** | **$1,681.79** |
| **Shares** | **19.6%** | **11.7%** | **11.4%** | **21.7%** | **30.0%** | **5.7%** | |

While the reports provide a wealth of knowledge about the state's efforts to manage land for conservation purposes, there are significant management costs that are not currently included in the reports, thus understating the true costs. In Fiscal Year 2017-18 alone, over $72 million was spent to manage state lands where either the acreage is difficult to quantify or the reporting

[74] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2018 Annual report (FY 2017-18), available at: https://floridadep.gov/lands/environmental-services. (Accessed December 2018).
[75] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at page 39.

agencies are not the assigned land manager. These costs for Fiscal Year 2017-18 include, but are not limited to, the following:

- Office of Coastal and Aquatic Managed Areas — $9.0 million for the management of four million acres of submerged lands;

- Florida Forest Service — $2.3 million for the suppression of wildfires and the protection of more than 26.3 million acres of forest land throughout the state.

- Fish and Wildlife Conservation Commission — $31 million for invasive plant control on public lands including controlling and eradicating terrestrial invasive exotic plants on lands managed by other public agencies as well managing aquatic plants in public waterbodies.

- Fish and Wildlife Conservation Commission — $30 million for law enforcement activities on conservation lands for which it is not the lead agency.

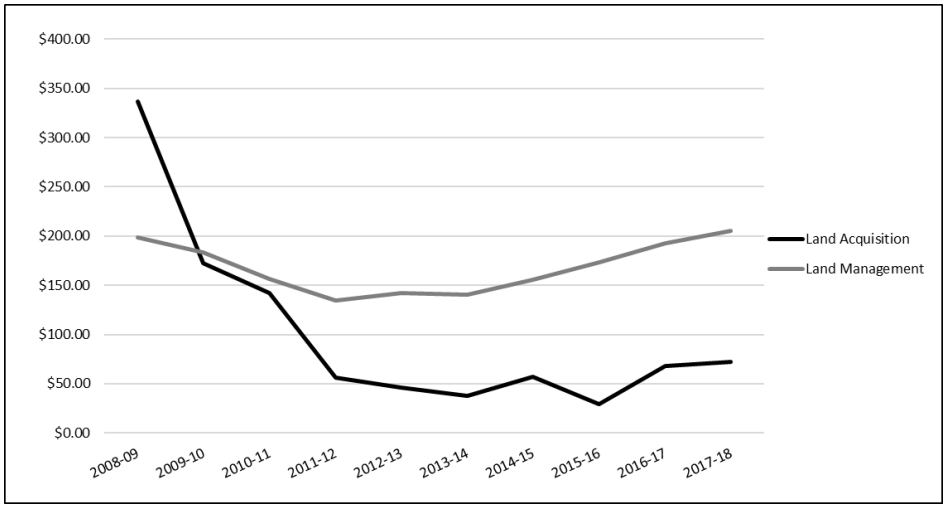
Further, as noted in the Council's 2018 report, the expenditures do "not include local and federal governments or nonprofit conservation organizations that provide significant services towards the state's land conservation and resource-based recreation goals and objectives."[76] For example, the state has provided regular funding for the acquisition and improvement of conservation lands by water management districts and through the Florida Communities Trust, Florida Recreation Development and Assistance Grants, and Stan Mayfield Working Waterfronts programs. While the properties acquired under these programs are purchased with state dollars, the titles are vested in other entities. Any management costs borne by these entities for those properties are not included in the report.

**Forecast of State Expenditures on Conservation Land**

Forecasting annual state conservation land acquisition expenditures is a difficult task because the level varies greatly based on what is available for purchase, the use of bonding to fund acquisitions, and the particular set of circumstances facing changing sets of policy makers. For example, overall funding for environmental programs in the last decade has been significantly affected by the end of the state's housing boom, the subsequent collapse of the housing market, and the commencement of the Great Recession. In this regard, the three sources of state acquisition expenditures from Tables 2.2.3, 2.2.4, and 2.2.5 above along with the land management expenditures from Table 2.2.6 are compiled in Figure 2.2.2. There has been a clear decline in acquisition expenditures over the most recent ten years that mimics the state's economic condition; however, funding in recent years appears to have stabilized. Alternatively, land management expenditures have remained relatively stable over the most recent 10-year period, with approximately 9.7 percent average annual growth in the most recent 3-year period.

[76] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2018 Annual report (FY 2017-18), at 2 (Chair Submittal and Report Abstract), available at: https://floridadep.gov/lands/environmental-services. (Accessed December 2018).

**Figure 2.2.2 Historic State Expenditures on Conservation Land (in $millions)**




Both the acquisition and management forecasts rely on expenditure trends from Fiscal Year 2011-12 through Fiscal Year 2017-18. For land acquisition, the average annual growth rate over this period is 6.0 percent, which is used to develop the forecast. Likewise, the average annual growth rate of 4.3 percent is used for the forecast of land management expenditures. The forecast for all state conservation land expenditures is shown in Table 2.2.7.

**Table 2.2.7 Forecast of State Conservation Land Expenditures (in $millions)**

| | FY 18-19 | FY 19-20 | FY 20-21 | FY 21-22 | FY 22-23 |
|---|---|---|---|---|---|
| **Acquisition** | $76.94 | $81.55 | $86.44 | $91.62 | $97.11 |
| **Management** | $214.28 | $223.58 | $233.29 | $243.42 | $253.99 |
| **Total** | $291.22 | $305.13 | $319.73 | $335.04 | $351.10 |
| | | | | | |
| **Forecast** | **FY 23-24** | **FY 24-25** | **FY 25-26** | **FY 26-27** | **FY 27-28** |
| **Acquisition** | $102.93 | $109.10 | $115.64 | $122.57 | $129.91 |
| **Management** | $265.02 | $276.52 | $288.52 | $301.04 | $314.11 |
| **Total** | $367.95 | $385.62 | $404.16 | $423.61 | $444.02 |

**Federally Funded Program Expenditures**

In addition to appropriations from General Revenue and state trust funds, the Legislature also provides appropriations from federal trust funds. During the most recent ten years, a variety of federal grant programs have been appropriated on a regular basis through the state budget. Most of the programs, which were described in detail in the 2017 Edition of this report,[77] are matching grant programs administered by a state agency. Table 2.2.8 shows ongoing programs and their annual cash expenditures, along with a forecast for future years.[78] Since Fiscal Year 2008-09,

[77] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at page 41.

[78] The 2017 and 2018 Editions of this report reflected agency expenditures data that showed Fixed Capital Outlay appropriations as being spent in the year appropriated, which overstates true expenditures in a given fiscal year. For consistency with the other

expenditures have totaled more than $80 million with approximately $8.0 million being spent annually, on average. In Fiscal Year 2017-18, however, the total expenditures dropped to a historic low of $3.5 million. This is due in part to the cost-reimbursement structure of some of the larger programs (*e.g.*, Recreational Trails and the Land and Water Conservation Fund). Although the federal funding and associated state appropriations have remained fairly constant over this period, the actual expenditures fluctuate from year to year based on the completion of specific projects receiving grants. Further, the federal grant periods extend across multiple state fiscal years, which can also lead to ebbs and flows of expenditures. For these reasons, the forecast is based on the most recent 3-year average level of expenditures, which is then grown annually by Florida population growth rates. Since funding for specific programs is contingent on federal actions, only the total is estimated.

**Table 2.2.8 Federally Funded Conservation Land Programs – Expenditures and Forecast (in $millions)**

| Fiscal Year | America the Beautiful | Ameri Corps | Recreational Trails | Land and Water Conservation Fund | Coastal Partnership Initiative | Endangered Species Conservation Fund | Land Acquisition Grants | Historic Pres. Grants | Total |
|---|---|---|---|---|---|---|---|---|---|
| FY08-09 | $1.26 | $0.55 | $0.04 | $2.56 | $1.80 | $1.03 | $2.81 | $0.11 | $10.16 |
| FY09-10 | $1.09 | $0.56 | $0.25 | $2.23 | $1.72 | $0.95 | $0.00 | $0.30 | $7.09 |
| FY10-11 | $1.25 | $0.55 | $1.53 | $1.03 | $1.76 | $0.78 | $0.00 | $0.12 | $7.02 |
| FY11-12 | $0.98 | $0.63 | $1.10 | $2.05 | $1.56 | $3.37 | $0.60 | $0.20 | $10.47 |
| FY12-13 | $0.96 | $0.57 | $0.82 | $0.94 | $1.93 | $1.01 | $0.00 | $0.21 | $6.45 |
| FY13-14 | $0.79 | $0.44 | $0.60 | $0.38 | $0.84 | $3.67 | $3.80 | $0.09 | $10.60 |
| FY14-15 | $0.76 | $0.37 | $6.89 | $0.39 | $1.02 | $1.18 | $0.00 | $0.12 | $10.73 |
| FY15-16 | $1.18 | $0.41 | $2.12 | $2.04 | $0.61 | $1.12 | $0.00 | $0.16 | $7.63 |
| FY16-17 | $0.76 | $0.55 | $2.44 | $1.19 | $0.59 | $1.06 | $0.00 | $0.14 | $6.74 |
| FY17-18 | $0.68 | $0.61 | $0.64 | $0.55 | $0.57 | $0.31 | $0.00 | $0.19 | $3.54 |
| **Forecast** | | | | | | | | | |
| FY18-19 | | | | | | | | | $6.07 |
| FY19-20 | | | | | | | | | $6.16 |
| FY20-21 | | | | | | | | | $6.26 |
| FY21-22 | | | | | | | | | $6.35 |
| FY22-23 | | | | | | | | | $6.44 |
| FY23-24 | | | | | | | | | $6.52 |
| FY24-25 | | | | | | | | | $6.61 |
| FY25-26 | | | | | | | | | $6.69 |
| FY26-27 | | | | | | | | | $6.76 |
| FY27-28 | | | | | | | | | $6.84 |

expenditures included in this report, the 2019 Edition has been updated to include only the annual cash expenditures within each fiscal year.

## *Regional Expenditures*

Regional expenditures can be undertaken separately from a specific appropriation in the state's budget. The Florida Water Resources Act of 1972, chapter 373, Florida Statutes ("Water Resources Act"), was enacted to provide the legal framework to conserve, protect, manage, and control waters and related land resources in the state. While state-level administration is vested in DEP for many of the water management districts' functions, to the greatest extent possible, the department is encouraged to delegate its powers to the governing boards of the five regional water management districts: Northwest Florida, Suwannee River, St. Johns River, Southwest Florida, and South Florida.[79]

Among the enumerated powers vested in the water management districts (WMDs) is the authority to acquire lands for the purpose of conservation and protection of water and water-related resources.[80] The governing boards of the WMDs are authorized to acquire fee or less-than-fee interests in real property for purposes of "flood control, water storage, water management, conservation and protection of water resources, aquifer recharge, water resource and water supply development, and preservation of wetlands, streams, and lakes."[81]

In order to identify expenditures of the WMDs related to conservation land acquisition and land management, EDR reviewed the WMDs' preliminary budgets and tentative budgets developed in accordance with sections 373.535 and 373.536, Florida Statutes, respectively. These budget documents included actual-audited expenditures by program area. With respect to conservation land acquisition and management, EDR reviewed the actual-audited expenditures for the following activities: 2.1 Land Acquisition[82] and 3.1 Land Management.[83]

Table 2.2.9 provides expenditure data for conservation land acquisitions by each of the water management districts. As explained above, these actual-audited numbers are presented in the budgets[84] of the districts. Ideally, these would only include acquisition of conservation lands and not lands that were acquired for any other lawful purpose. In practice, these numbers cannot be categorized that cleanly and will include some land expenditures for other purposes. Similarly, some conservation land acquisition expenditures may not have been categorized in the "2.1 Land Acquisition" category and will not be accounted for here. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it has been converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

[79] § 373.069, Fla. Stat. (dividing the state into five water management districts).
[80] § 373.139(1), Fla. Stat.
[81] § 373.139(2), Fla. Stat.
[82] The 2.1 Land Acquisition activity is part of the overall program area entitled: 2.0 Land Acquisition, Restoration and Public works.
[83] The 3.1 Land Management activity is part of the overall program area entitled: 3.0 Operation and Maintenance of Lands and Works.
[84] WMD actual-audited budgets for a fiscal year are available in the tentative budgets two fiscal years later. This is required by section 373.536, Florida Statutes.

**Table 2.2.9 Water Management District Land Acquisition Expenditures (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|---|
| **NWFWMD** | $0.02 | $0.04 | $0.03 | $0.03 | $0.09 | $0.02 |
| **SJRWMD** | $8.43 | $11.70 | $11.37 | $15.53 | $12.68 | $3.90 |
| **SFWMD** | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| **SWFWMD** | $0.35 | $0.84 | $0.50 | $3.09 | $0.50 | $6.35 |
| **SRWMD** | $0.40 | $0.19 | $0.65 | $5.41 | $0.07 | $0.10 |
| **Total** | $9.21 | $12.77 | $12.56 | $24.06 | $13.34 | $10.37 |

| Forecast | FY 17-18 | FY 18-19 | FY 19-20 | FY 20-21 | FY 21-22 |
|---|---|---|---|---|---|
| **Total** | $16.11 | $14.41 | $13.88 | $14.80 | $14.36 |

Source: Annual Budgets of the Water Management Districts.

While these expenditures may at times seem lower than one would expect, they represent the actual-audited budgets of the districts. To evaluate each district's conservation land expenditures, the 2017 Edition of this report used the district's Comprehensive Annual Financial Report along with historical documents attained from the districts. All three sources provide significantly different expenditures for the districts. Actual-audited budgets were chosen because they are the only source with consistent expenditures categories across all districts and years. It would be beneficial to future editions of this report for the water management districts to report their conservation land expenditures as a distinct category in their budgets, annual financial reports, or as part of their Florida Forever work plans.

Table 2.2.10 provides expenditure data for conservation land management by each of the water management districts. Similar to the acquisition expenditures shown above, these numbers are presented in the actual-audited budgets of the districts. Again, it would be ideal if these expenditures excluded lands that are managed for non-conservation purposes, if any. In practice, these numbers cannot be categorized that cleanly and will include some management expenditures for other purposes. Similarly, some conservation land management expenditures may not have been categorized in the "3.1 Land management" category and will not be accounted for here. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it has been converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

[See table on following page]

**Table 2.2.10 Water Management District Land Management Expenditures (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|---|
| NWFWMD | $2.51 | $2.38 | $2.15 | $2.49 | $2.32 | $2.64 |
| SJRWMD | $4.60 | $4.12 | $3.95 | $4.35 | $4.10 | $4.69 |
| SFWMD | $19.72 | $13.36 | $14.79 | $14.20 | $27.10 | $14.45 |
| SWFWMD | $4.24 | $2.93 | $2.70 | $3.75 | $3.62 | $4.07 |
| SRWMD | $2.92 | $1.82 | $1.69 | $1.60 | $1.68 | $2.29 |
| Total | $33.99 | $24.61 | $25.27 | $26.39 | $38.81 | $28.13 |

| Forecast | FY 17-18 | FY 18-19 | FY 19-20 | FY 20-21 | FY 21-22 |
|---|---|---|---|---|---|
| Total | $30.87 | $32.46 | $31.38 | $31.57 | $31.80 |

Source: Annual Budgets of the Water Management Districts.

Table 2.2.11 provides a forecast and details a history of expenditures[85] by special districts that are located in multiple counties for conservation land. Examples of these districts include the Port LaBelle Community Development District and the Tampa Bay Estuary Program. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it has been converted to state fiscal years. Forecasts rely on a three-year moving average growth rate as it best fits the nature of the data.

**Table 2.2.11 Conservation Land Expenditures by Regional Special Districts (in $millions)**

| History | LFY 09-10 | LFY 10-11 | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|---|---|
| Total | $2.73 | $1.00 | $1.38 | $1.35 | $1.75 | $1.08 | $1.03 |

| Forecast | FY 16-17 | FY 17-18 | FY 18-19 | FY 19-20 | FY 20-21 |
|---|---|---|---|---|---|
| Total | $1.31 | $1.20 | $1.18 | $1.23 | $1.20 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Account 537 in coordination with survey data.

## *Local Expenditures*

Local expenditures can be undertaken separately from a specific appropriation in the state's budget. Section 218.32, Florida Statutes, requires each local government entity that is determined to be a reporting entity, as defined by generally accepted accounting principles, and each independent special district as defined in section 189.012, Florida Statutes, to submit to the Florida Department of Financial Services (DFS) a copy of its Annual Financial Report (AFR) for the previous fiscal year no later than nine months after the end of the fiscal year. The AFR is not an audit but rather a unique financial document that is completed using a format prescribed by DFS.

Furthermore, section 218.33, Florida Statutes, states: "Each local governmental entity shall follow uniform accounting practices and procedures as promulgated by rule of the department to assure

[85] For further details on the source and methodology of this data, *see* the "Local Expenditures" section.

the use of proper accounting and fiscal management by such units. Such rules shall include a uniform classification of accounts." Assisted by representatives of various local governments, DFS developed the Uniform Accounting System Chart of Accounts to be used as the standard for recording and reporting financial information to the State of Florida. Implementation of the standard Chart of Accounts and Standard Annual Reporting Form began in 1978, and since then, there have been minor changes and updates to both. As mandated by section 218.33, Florida Statutes, reporting entities should use this Chart of Accounts as an integral part of their accounting system so that the preparation of their AFRs will be consistent with other local reporting entities.

AFR account code 537[86] is used to itemize conservation and resource management expenditures. This can include land, water, or any other natural resource. In an effort to narrow this expenditure to conservation land, EDR conducted a survey of all local and regional governments that had listed an expenditure in this category in the last ten years asking them to indicate by-year shares of this expenditure that were specifically for conservation land acquisition. While not all entities responded, a sufficient sample was provided to create average shares for the county-wide, municipality-wide, and special district-wide levels. Actual shares were applied to the data when given and average shares were applied to the non-respondents. Table 2.2.12 provides a forecast and details a history of expenditures by local governments on conservation land. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it has been converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

**Table 2.2.12 Conservation Land Expenditures by Local Governments (in $millions)**

| History | LFY 09-10 | LFY 10-11 | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|---|---|
| Counties | $44.58 | $53.87 | $46.46 | $34.71 | $43.11 | $39.70 | $55.47 |
| Municipalities | $1.21 | $2.05 | $2.52 | $2.07 | $1.72 | $1.19 | $1.74 |
| Special Districts | $2.94 | $3.00 | $5.17 | $4.11 | $20.45 | $6.34 | $5.93 |
| Total | $48.73 | $58.91 | $54.16 | $40.89 | $65.29 | $47.22 | $63.14 |

| Forecast | FY 16-17 | FY 17-18 | FY 18-19 | FY 19-20 | FY 20-21 |
|---|---|---|---|---|---|
| Total | $56.70 | $55.87 | $57.24 | $56.60 | $56.57 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Account 537 in coordination with survey data.

## 2.3 Projecting Expenditures Required to Purchase Lands Identified for Conservation

Under the Florida Forever program, various acquisition lists or work plans are developed to identify projects that are eligible for Florida Forever funding. The Department of Environmental Protection (DEP), the Department of Agricultural and Consumer Services (DACS), the Fish and Wildlife Conservation Commission (FWC) and each of the five water management districts all maintain at least one list of lands identified for potential conservation. It is also possible that

[86] It is possible that some local government expenditures on conservation land acquisition may be reported in other AFR account codes. EDR will continue to explore this topic.

settlement agreements or final judgments would require discrete land acquisitions. While not incorporated in the report at this time, future editions may include this analysis if applicable.

## *State Agency Plans*

The 2018 Florida Forever Priority List is the largest among all of the plans reviewed by EDR.[87] It identifies 121 areas approved for acquisition totaling 3,670,001 acres, of which 1,489,725, or 40.59 percent have already been acquired. For the remaining acreage, 1,485,743 are fee acres and 694,443 are less-than-fee acres[88]. The Florida Forever Five-Year Plan, which is a report containing more detailed project-specific information, provides the tax-assessed value of the acreage to be acquired for each project. EDR adjusts these estimates for inflation[89] based on the year of their assessment. The total estimated cost of purchasing these lands is $1,800.98 million for the fee and $807.18 million[90] for the less-than-fee.

The Florida Forever Priority List represents those proposed projects that have been approved by the Board of Trustees of the Internal Improvement Trust Fund for acquisition by DEP's Division of State Lands under section 259.105(3)(b), Florida Statutes. State agencies, local governments, nonprofit and for-profit organizations, private land trusts, and individual land owners may submit an application to the Acquisition and Restoration Council (ARC) for consideration of a new Florida Forever project or an addition to an existing, listed Florida Forever project.[91] The ARC conducts a full review of the proposed project if five of the ten voting members vote affirmatively to move the project to a full review.[92] Afterward, at least five ARC members must vote affirmatively to include the project on the Florida Forever list subject to approval by the Board of Trustees.[93]

On an annual basis, the ARC is required to review the most current Florida Forever Priority List and develop a new list, ranked and prioritized pursuant to requirements in section 259.105, Florida Statutes, and rules promulgated in chapter 18-24 of the Florida Administrative Code. The new list is then presented to the Board of Trustees for approval.[94] The ARC categorizes and ranks each project within one of the following categories: Critical Natural Lands Project, Partnership and Regional Incentives Projects, Less-Than-Fee Projects, Climate Change Lands Projects, Substantially Complete Projects, and Critical Historical Resources Projects.[95] The Board of Trustees may remove projects from the list, but may not add any new projects or rearrange the priority rankings.[96]

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[87] Florida Forever Priority List available at: http://publicfiles.dep.state.fl.us/DSL/OESWeb/FF2017/FLDEP_DSL_SOLI_2018FloridaForever5YrPlan_20180706.pdf. (Accessed December 2018).
[88] Numbers may not sum to the total due to rounding.
[89] Note that only a calendar year is provided for the assessment. As such, prices are adjusted to be in calendar year 2017 dollars.
[90] Note that the San Felasco Conservation Corridor, a less-than-fee acquisition, did not have an assessed value. This value was estimated using the total cost per acre among other less-than-fee future acquisitions and applying it to the acres to be acquired for the corridor.
[91] § 259.105(3), Fla. Stat.
[92] Fla. Admin. Code R. 18-24.004.
[93] § 259.105(13), Fla. Stat.
[94] *Id.*
[95] § 259.105(17), Fla. Stat.
[96] § 259.106(16), Fla. Stat.

DEP also prepares a Division of State Lands Annual Florida Forever Work Plan (DSL Work Plan) that further prioritizes the approved Florida Forever Priority List and sets forth available funding for land acquisition by the Division of State Lands in that fiscal year.[97] In developing the DSL Work Plan, DEP's Division of State Lands takes into consideration the categories of projects determined by ARC and places each project in the High, Medium, or Low Priority Group.[98] The High Priority Group represents no more than the top 33 percent of the project acreages within each category.[99] The final DSL Work Plan is a subset of the Florida Forever Priority List representing a selection of projects within the High Priority or Medium Priority Groups.

DEP's Division of Recreation and Parks[100] (DRP) also develops and maintains an acquisition or restoration list pursuant to section 259.105(3)(l), Florida Statutes. This potential acquisition list is developed in accordance with the specific criteria and performance measures of the Florida Forever program and represents projects that are eligible for Florida Forever funding by DRP under sections 259.105(3)(e), Florida Statutes. Specifically, DRP's list identifies inholding parcels and additions to existing state parks as well as eligible capital expenditures. The DRP list identifies acreage and expected acquisition costs for some properties.

DEP also administers competitive grant programs that provide financial assistance to local governments and eligible nonprofit environmental organizations to acquire conservation and recreation lands through funds available under the Florida Forever program. The Florida Communities Trust, currently housed in DEP, administers the Parks and Open Space Grant Program and the Stan Mayfield Working Waterfront Program, and DEP's Division of Recreation and Parks administers the Florida Recreation Development Assistance Program. These grant programs fund projects based upon a competitive application cycles and, therefore, maintain priority funding lists that change each fiscal year based upon the applications for eligible projects. For this reason, these lists are not included in this assessment.

DEP maintains the Florida State Owned Lands and Records Information System (SOLARIS), which is intended to be a complete history of all land purchases by the state. This database identifies conservation lands and the funding sources. A historical breakdown of funding sources[101] for the lands held by DEP was used to develop the cost sharing estimates included in the table below. Further, the average cost per acre from SOLARIS was used to calculate the future cost of lands on the DRP list that did not include a cost estimate. The full estimate of future expenditures necessary to purchase lands identified in the DEP plans came from agency reports and is shown in Table 2.3.1.

[97] § 259.105(17), Fla. Stat.
[98] § 259.105(17), Fla. Stat.; *see also* Fla. Admin. Code R. 18-24.006.
[99] Fla. Admin. Code R. 18-24.006.
[100] Previous editions itemized the Office of Greenways and Trails potential acquisitions separately. Discussion with DRP staff indicated that, going forward, the DRP potential acreage includes the Office of Greenways and Trails potential acreage proposed for acquisition under section 259.105(3)(h), Florida Statutes.
[101] The database was reduced down to non-duplicate entries of conservation lands of more than zero acres acquired between Fiscal Years 1917-18 and 2016-17. The one hundred year date range is used to maintain a large sample and all prices are adjusted to a common base year to account for inflation.

**Table 2.3.1 Estimated Future Expenditures on Conservation Lands by DEP (in $millions)**

| | Fee Acres | Federal Cost | State Cost | Regional Cost | Local Cost | Fee Cost |
|---|---|---|---|---|---|---|
| **FL Forever 5yr** | 1,485,743.00 | $39.07 | $1,633.91 | $125.25 | $2.74 | $1,800.98 |
| **Rec & Parks** | 195,041.50 | $10.86 | $454.24 | $34.82 | $0.76 | $500.69 |
| **Fee Total** | 1,680,784.50 | $49.93 | $2,088.15 | $160.07 | $3.50 | $2,301.66 |
| | | | | | | |
| | **LTF Acres** | **Federal Cost** | **State Cost** | **Regional Cost** | **Local Cost** | **LTF Cost** |
| **FL Forever 5yr** | 694,443.00 | $17.51 | $732.31 | $56.14 | $1.23 | $807.18 |
| **Rec & Parks** | - | $- | $- | $- | $- | $- |
| **LTF Total** | 694,443.00 | $17.51 | $732.31 | $56.14 | $1.23 | $807.18 |
| | | | | | | |
| | **Total Acres** | **Federal Cost** | **State Cost** | **Regional Cost** | **Local Cost** | **Total Cost** |
| **DEP Total:** | 2,375,227.50 | $67.45 | $2,820.46 | $216.21 | $4.73 | $3,108.85 |

DACS administers land acquisition programs that purchase fee simple and less-than-fee simple interests in conservation lands. According to data received from the agency, the Rural and Family Lands Protection Program has acquired 45,164.45[102] less-than-fee acres at a total cost of $86.49 million for conservation since its inception in 2001. This represents significant year over year growth and is nearly three times larger than the acreage reported in the 2017 Edition of this report. To estimate the cost of future potential acquisitions, EDR adjusted the program's historical conservation land purchases for inflation and calculated a historical cost per acre for the program in Fiscal Year 2017-18 dollars. Applying this to the less-than-fee acres for purchase yields an expected cost of $734.90 million for 144 projects. Including the expected $18.97 million in pending acquisitions for the next year, the total estimated future expenditures for the Rural and Family Lands Protection Program is $753.86 million. Historically, the acquisitions have been funded 89.41 percent by DACS, 6.89 percent by the federal government, and 3.70 percent by local governments. These shares were applied to the estimates of future costs.

DACS also receives funding through the Forest Legacy Program, a federal grant program administered by the U.S. Forest Service whose purpose is to support state efforts to protect environmentally sensitive forest lands.[103] According to agency reports, DACS has acquired 11,333 fee acres at a total cost of $44.58 million since the inception of the Forest Legacy Program in 2005. Their future expected acquisition list identifies conservation properties totaling 36,676 fee acres and 75,682 less-than-fee acres with expected costs of $89.21 million and $73.77 million, respectively. Approximately 34.09 percent of the fee costs and 56.18 percent of the less-than-fee costs will be federally funded. Historically less than 2 percent of funding for these acquisitions has been privately provided. To avoid forecasting unpredictable future private expenditures and to remain focused on government expenditures, private expenditures are excluded for the purposes of cost sharing. The remaining costs have historically been split as follows: 49.29 percent state, 39.36 percent regional, and 11.35 percent local. These shares were applied to the estimates of future costs.

In addition to administering these programs, DACS maintains the Florida Forest Service Inholdings and Additions list pursuant to section 259.105(3)(f), Florida Statutes, which identifies

[102] The 2018 Edition incorrectly retained the 2017 Edition's value for this acreage. The 2017 Edition reported 15,937.93, the 2018 Edition should have reported 32,276.97.
[103] https://www.fs.fed.us/spf/coop/programs/loa/aboutflp.shtml. (Accessed December 2017).

potential inholding parcels and additions to existing state forests. The current list identifies 34 properties totaling 8,807.38 fee acres. The county in which these acres reside is indicated. To estimate the future costs, the cost per acre for each county, adjusted into Fiscal Year 2017-18 dollars, is calculated using the SOLARIS database and then applied to the county in which the desired land is located.[104] This yields a total estimated cost of acquisition of $34.71 million. The full estimate of future expenditures necessary to purchase lands identified in DACS' plans is shown in Table 2.3.2.

**Table 2.3.2 Estimated Future Expenditures on Conservation Lands by DACS (in $millions)**

| | Fee Acres | Federal Cost | State Cost | Regional Cost | Local Cost | Fee Cost |
|---|---|---|---|---|---|---|
| **Rural Family Lands** | - | $- | $- | $- | $- | $- |
| **Forest Legacy** | 36,676 | $30.42 | $28.98 | $23.14 | $6.67 | $89.21 |
| **Inholding/Addition** | 8,807 | $0.82 | $29.82 | $2.59 | $1.47 | $34.71 |
| **Fee Total** | 45,483 | $31.24 | $58.80 | $25.74 | $8.14 | $123.92 |
| | | | | | | |
| | **LTF Acres** | **Federal Cost** | **State Cost** | **Regional Cost** | **Local Cost** | **LTF Cost** |
| **Rural Family Lands** | 382,024 | $54.46 | $672.21 | $0.00 | $27.19 | $753.86 |
| **Forest Legacy** | 75,682 | $41.44 | $15.93 | $12.72 | $3.67 | $73.77 |
| **Inholding/Addition** | - | $- | $- | $- | $- | $- |
| **LTF Total** | 457,706 | $95.91 | $688.14 | $12.72 | $30.86 | $827.63 |
| | | | | | | |
| | **Total Acres** | **Federal Cost** | **State Cost** | **Regional Cost** | **Local Cost** | **Total Cost** |
| **DACS Total:** | **503,189** | **$127.14** | **$746.94** | **$38.46** | **$39.01** | **$951.55** |

FWC maintains an Inholdings and Additions Acquisitions list pursuant to section 259.105(3)(g), Florida Statutes, which identifies inholding parcels and additions to lands managed by FWC for the conservation of fish and wildlife. This list currently consists of 5,960 parcels totaling 267,208.04 acres across the state. The just value of these parcels is indicated and used to estimate the cost of acquisition. The cost share for future FWC acquisitions is assumed to be the same as the historic cost share of FWC conservation properties derived from SOLARIS. These lands are estimated to cost $868.05 million. An estimate of all future expenditures by federal, state, regional, and local governments necessary to purchase lands identified in plans set forth by state agencies is shown in Table 2.3.3.

**Table 2.3.3 Estimated Future Expenditures on Conservation Lands by State Agencies (in $millions)**

| | Acres | Federal Cost | State Cost | Regional Cost | Local Cost | Total Cost |
|---|---|---|---|---|---|---|
| **DEP** | 2,375,227.50 | $67.45 | $2,820.46 | $216.21 | $4.73 | $3,108.85 |
| **DACS** | 503,189.38 | $127.14 | $746.94 | $38.46 | $39.01 | $951.55 |
| **FWC** | 267,208.04 | $266.25 | $601.79 | $- | $- | $868.05 |
| **Total** | 3,145,624.92 | $460.84 | $4,169.19 | $254.67 | $43.74 | $4,928.44 |

Note that these are rough estimates based primarily upon historical costs per acre and that only purchase price has been addressed. Actual costs would be higher to some degree after accounting

[104] One area of land for future acquisition resided in two counties. For this, the average cost/acre across the two counties was used.

for further costs of acquisition, such as environmental assessments and appraisals, which are unique to each conservation land purchase.

## *Water Management District Plans*

In 2001, the water management districts developed their initial Florida Forever Water Management District Work Plans (Work Plans) identifying projects that are eligible for funding under the Florida Forever Act as required under section 373.199, Florida Statutes. In developing these Work Plans, the water management districts were required to integrate their existing surface water improvement and management plans, Save Our Rivers acquisition lists, stormwater management projects, water restoration projects, and any other land acquisitions or activities that would assist in achieving the Florida Forever goals.[105]

These Work Plans are updated on an annual basis and are reported as a separate chapter in the water management districts' consolidated annual reports.[106] The annual updates include a status of land acquisition for the eligible projects, a list of projects completed during the year, modifications or additions to the Work Plan, a description of land management activities, a list of surplused lands, and the progress of funding, staffing, and resource management of district projects.[107]

Each of the five water management districts provide some degree of detail regarding historic conservation land purchases and identify lands for future acquisition in their Florida Forever Work Plan Annual Reports. To supplement the data in these reports, greater detail regarding historic acquisitions was requested from and provided by the districts. To estimate all future expenditures by federal, state, regional, and local governments necessary to purchase the lands identified in these plans, a consistent methodology was required. Historic acquisition data identifies acreage obtained, type of ownership, region, purchase price, and funding source. EDR calculated the historic cost share by identifying the share of the total historic purchase price paid by federal, state, regional, local, and other dollars. Using price indices from the U.S. Bureau of Labor Statistics, all historic purchases were converted into Fiscal Year 2017-18 dollars. A cost per acre was then determined for each region and each ownership type.[108] This allowed for fee and less-than-fee proposed acquisitions in differing regions of a district to have different estimated costs per acre. These costs per acre by ownership and region were then applied to the proposed acreage of those ownership types in those regions.[109]

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[105] § 373.199(3), Fla. Stat.
[106] § 373.036(7), Fla. Stat.
[107] *Id*.
[108] In the instance of a proposed acquisition existing in a region or of an ownership type not historically seen, WMD wide cost/acre was used for the ownership type.
[109] Exceptions to this methodology include: St. Johns River does not itemize its proposed acquisitions and only provides an acreage total. This acreage was split into fee and less-than-fee acquisition based on its historical purchases, and district-wide costs per acre were applied to the total acreages by ownership type. South Florida did not provide less-than-fee or fee information, nor were historic acquisitions broken into regions. District-wide adjusted average costs per acre were used. Suwannee River's proposed acquisition list does not identify ownership type. This acreage was split into fee and less-than-fee acquisition based on its historical purchases. Additionally, not all proposed acquisitions could be matched to a region with historic purchases, so district-wide costs per acre were used. Finally, Northwest Florida required unique treatment as detailed in the body of this document.

Beginning with the 2018 Florida Forever Work Plan, the Northwest Florida WMD no longer quantifies acreage for potential acquisition and instead notes that "sufficient lands have been identified to allow for a flexible implementation strategy over at least the next five years." Specific acreage was requested and EDR was provided a list totaling 2,770,544 acres. The accompanying GIS map files identified 3,053,976 acres for potential conservation acquisition. For a map showing these locations, see Figure B.1 in Appendix B. Unlike the other WMDs, Northwest Florida is broadly identifying large areas of land that may be considered for acquisition if funding becomes available. This includes, among other things, all lands in the 100-year FEMA floodplain and all land that feeds into certain springsheds. Much of this land is improved property that is not suitable for conservation. Discussion with district staff led EDR to only consider parcels within these lands that were vacant or agricultural.[110] Of the remaining acres, 135,422 acres were vacant and 1,971,112 acres were agricultural. This acreage is still nearly four times higher than the district's list from the previous year's Florida Forever Work Plan. This acreage is also nearly four times higher than the next largest list identified by a WMD, and, if acquired, would put more than one-third of land within the boundary of the Northwest Florida WMD into conservation. As a result, EDR decided to estimate a more realistic acquisition acreage for Northwest Florida. The final column of Table 2.3.5 shows the percentage of conservation lands within each of the other four districts' boundaries if all lands identified the Florida Forever Work Plans were acquired. These four values indicate that, on average, 13.2 percent of each district would be held in conservation. This number is then applied to Northwest Florida, accounting for the lands they have already acquired, to arrive at an estimated 696,867 acres for potential acquisition. District staff agreed that this methodology is reasonable.

The estimated future expenditures to purchase conservation lands in WMD plans can be found in Table 2.3.4.

**Table 2.3.4 Estimated Future Expenditures on Conservation Lands by WMDs (in $millions)**

| | Acres | Federal Cost | State Cost | Regional Cost | Local Cost | Total Cost |
|---|---|---|---|---|---|---|
| Northwest Florida | N/A | N/A | N/A | N/A | N/A | N/A |
| St. Johns River | 117,393 | $7.16 | $263.96 | $22.57 | $0.55 | $294.24 |
| South Florida | 126,164 | $31.03 | $912.46 | $354.23 | $68.32 | $1,366.04 |
| Southwest Florida | 537,600 | $1,135.76 | $2,672.57 | $7.91 | $634.41 | $4,450.64 |
| Suwannee River | 88,211 | $125.44 | $263.78 | $6.66 | $- | $395.88 |
| **Subtotal** | 869,368 | $1,299.38 | $4,112.77 | $391.37 | $703.27 | $6,506.79 |
| Northwest FL Estimate | 696,867 | $6.32 | $801.98 | $0.84 | $- | $809.15 |
| **Total** | 1,566,235 | $1,305.70 | $4,914.75 | $392.22 | $703.27 | $7,315.94 |

Note that these are estimates based primarily upon historical costs per acre and that only purchase price has been addressed. Actual costs may be higher after accounting for further costs of acquisition, such as environmental assessments and appraisals, which are unique to each conservation land purchase.

[110] DOR Land Use Codes 000, 010, and 040 were used for vacant land. Codes 050 through 069 were used for agricultural land. For more information on DOR Land Use Codes, *see*: ftp://sdrftp03.dor.state.fl.us/Tax%20Roll%20Data%20Files/2018_NAL_SDF_NAP_Users_Guide/2018_NAL_SDF_NAP_Users_Guide.docx. (Accessed December 2018).

These plans are often broad and may not be designed with the expectation that the purchase will be completed within a five-year period or even within the remainder of the current Florida Forever program. Moreover, they are not necessarily representative of the projects that the water management districts are actively pursuing for acquisition. Table 2.3.5 identifies total acreage of the water management districts, the approximate acreage they already hold in conservation[111], and the acreage identified for potential future acquisition along with the shares those acquisitions represent of the district's acreage. The final two columns indicate the amount of conservation land each district would hold in acres if all lands in the acquisition plans were acquired.

**Table 2.3.5 Share of Florida Owned as Conservation Lands by WMDs**

| | Total Acres* | Acquired Acres | Share | Future Acres | Share | Past + Future Acres | Share |
|---|---|---|---|---|---|---|---|
| Northwest Florida | 6,974,577 | 223,553 | *3.21%* | 696,867** | *9.99%* | 920,420 | *13.20%* |
| St. Johns River | 9,512,267 | 760,000 | *7.99%* | 117,393 | *1.23%* | 877,393 | *9.22%* |
| South Florida | 6,935,826 | 1,200,000 | *17.30%* | 126,164 | *1.82%* | 1,326,164 | *19.12%* |
| Southwest Florida | 5,963,207 | 450,724 | *7.56%* | 537,600 | *9.02%* | 988,324 | *16.57%* |
| Suwannee River | 4,778,569 | 287,823 | *6.02%* | 88,211 | *1.85%* | 376,034 | *7.87%* |
| **Total** | **34,164,446** | **2,922,100** | ***8.55%*** | **1,566,235** | ***4.58%*** | **4,488,335** | ***13.14%*** |

*Acreages for the WMDs were derived from overlaying district boundaries onto EDR's standard county map. Due to minor variations in the maps, shares of the counties which are broken by WMD boundary lines were evaluated and applied to the consistent county acreages to arrive at a consistent total acreage for the state. For more on the county shares, see Table B.1 in Appendix B.
**Northwest Florida's future acres is an estimate based on methodology described above.

## *Combined State and Water Management District Plans and Effects*

Considering all lands identified in plans set forth by state agencies or water management districts, Table 2.3.6 identifies the total acreage and share of the state that would be acquired if all planned lands were obtained. While the current acreage and shares include federal, local, and private conservation land acquisitions, the additions based on future plans do not. If all identified state and WMD lands were acquired, approximately 43.88 percent[112] of the state would be held as conservation land. If federal, local, and private plans were accounted for, this share would be even greater.

**Table 2.3.6 Share of Florida to be Acquired as Conservation Lands**

| | Acres | Share |
|---|---|---|
| **Current Cons. Land Acquired** | 10,280,537.00 | 30.09% |
| **State Cons. Land to Acquire** | 3,145,624.92 | 9.21% |
| **WMD Cons. Land to Acquire** | 1,566,235.43 | 4.58% |
| **Total if all Acquired** | 14,992,397.35 | 43.88% |

[111] Acquired Acres data was taken from each district's 2018 Florida Forever Work Plan.
[112] EDR has adopted a consistent acreage for the state of 34,164,445.95 acres. Using this acreage, the share of the state to be acquired reported in the 2017 Edition would shift from 42.64 percent to 43.00 percent, and in the 2018 Edition from 43.48 percent to 43.86 percent.

Adding the projected total costs for the additional conservation lands identified in plans produces a preliminary estimate of $12.3 billion as shown in Table 2.3.7. Of the total, the analysis suggests that nearly 75 percent would be a state responsibility. At the average rate of annual state conservation land acquisition expenditures over the most recent five fiscal years, this would take about 172 years to come up with the state's share. The extreme difference between the estimated costs and the current level of investment indicates that significant policy discussion is necessary if these acquisition plans are to be undertaken. As is, this projection does not include all costs of acquisition (such as environmental assessments and appraisals) which makes it understated. Counteracting this effect is the possibility that the lands may be donated, exchanged, or sold cheaper than other similar lands were historically; this would result in lower actual future expenditures than the preliminary estimate suggests.

**Table 2.3.7 Total Costs of Acquiring Additional Conservation Lands (in $millions)**

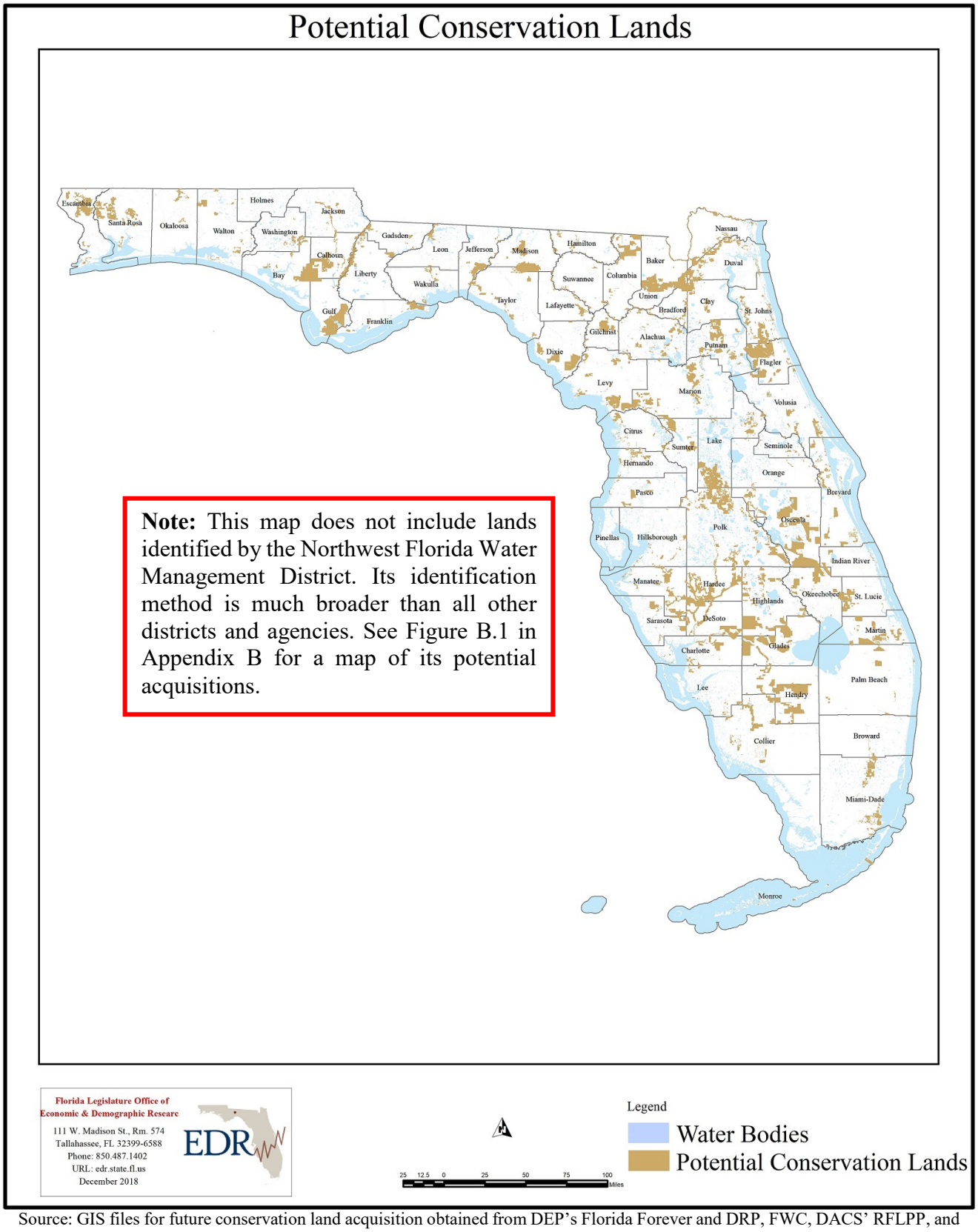
| | Federal Cost | State Cost | Regional Cost | Local Cost | Total Costs |
|---|---|---|---|---|---|
| **State Cons. Land to Acquire** | $464.81 | $4,178.16 | $254.67 | $43.74 | $4,941.38 |
| **WMD Cons. Land to Acquire** | $1,305.70 | $4,914.75 | $392.22 | $703.27 | $7,315.94 |
| **Total if all Acquired** | $1,770.51 | $9,092.91 | $646.89 | $747.01 | $12,257.32 |
| **Share of Total** | 14.44% | 74.18% | 5.28% | 6.09% | |

There does, however, exist some overlap between the various potential conservation land acquisition plans. For example, a WMD and DEP may both independently identify the same parcel for acquisition and place it in their respective plans. EDR requested GIS map data from the five WMDs, DEP, DACS, and FWC to identify any overlap in the lists itemized above.[113] For a visualization of the lands identified for potential future acquisition, see Figure 2.3.1. For a visualization of the lands identified for potential future acquisition along with lands already held in conservation, see Figure 2.3.2.

Summing the individual acres derived from the GIS files that EDR acquired, and excluding the Northwest Florida WMD, 4,048,094 acres are identified for potential future acquisition. Once the maps are overlaid and dissolved into a single layer, 3,349,565 unique acres remain. This suggests that approximately 18 percent of lands identified for potential acquisitions appear on more than one list. As a result, cost estimates presented above may be overstated since overlapping lands would be accounted for more than once. If in the future EDR can obtain GIS files that match the potential acquisition lists discussed above, cost estimates will be reworked to reflect the lower total acreage.

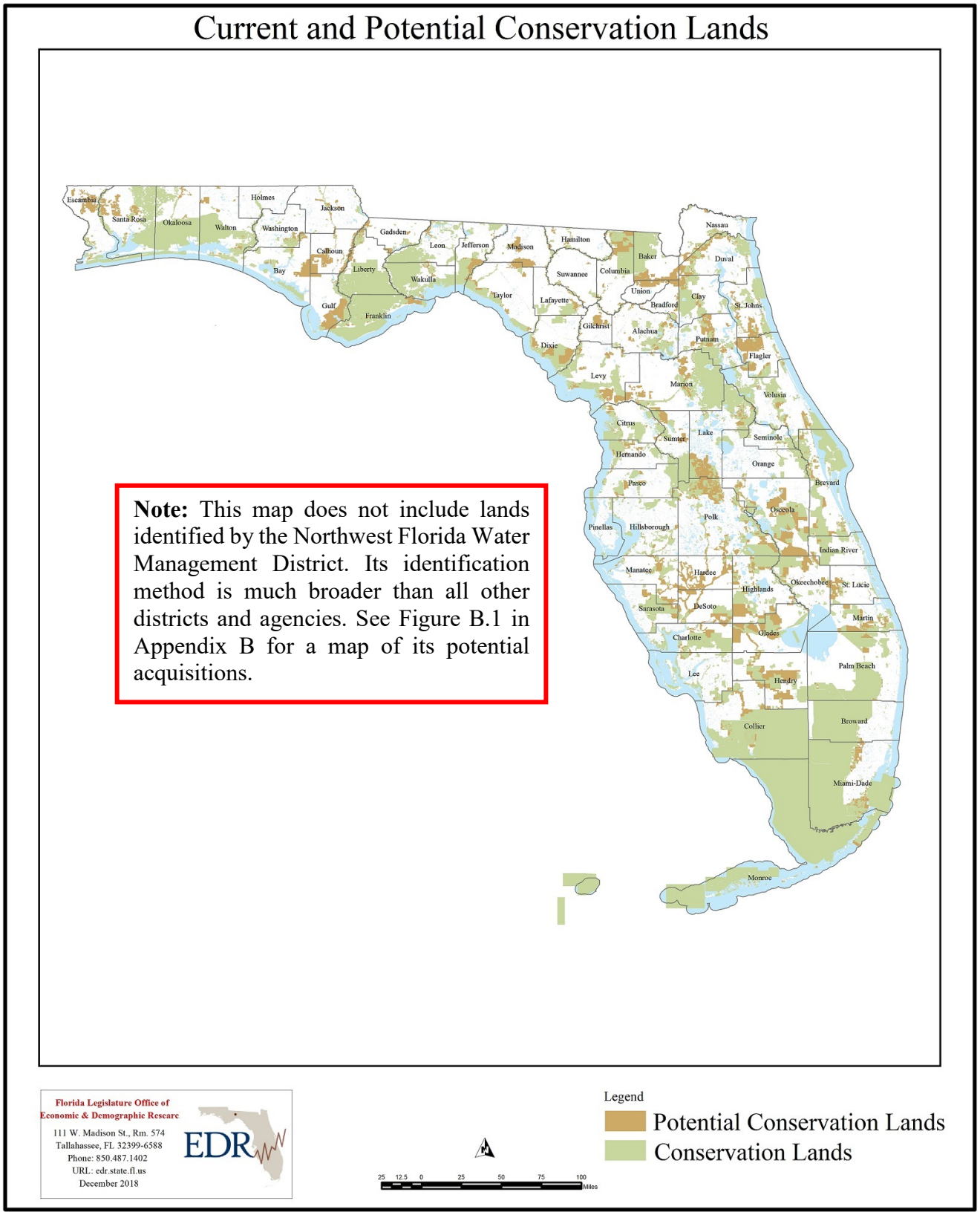
[113] Agencies and WMDs maintain up-to-date GIS map files of their potential acquisitions. The acreages from the GIS files also may not exactly match those acreages identified in the acquisition lists because they were provided at different times. Further, EDR was unable to acquire complete GIS maps for DACS' Forest Legacy program and Inholdings and Additions, but is working with staff to include the missing lists in future editions.

**Figure 2.3.1 Map of Potential Future Conservation Land Acquisitions**




Source: GIS files for future conservation land acquisition obtained from DEP's Florida Forever and DRP, FWC, DACS' RFLPP, and the Saint Johns River, South Florida, Southwest Florida, and Suwannee River Water Management Districts.

**Figure 2.3.2 Current and Potential Conservation Land**




Source: GIS files for future conservation land acquisition obtained from DEP's Florida Forever and DRP, FWC, DACS' RFLPP, and the Saint Johns River, South Florida, Southwest Florida, and Suwannee River Water Management Districts. Current conservation lands are from FNAI and are current as of July, 2018.

## 2.4 Forecasting Dedicated Conservation Land Revenues

EDR is required to forecast revenues that are "dedicated in current law to maintain conservation lands" for federal, state, regional, and local forms of government. After conducting an extensive legal review, EDR discovered that no significant sources of revenue exist that are dedicated in law solely for this purpose. Assuming the Legislature desired to accomplish this in the future, the 2017 Edition of this report included a discussion that identified and forecasts revenues that have historically been used or might be available for this purpose.

Furthermore, as there is very little in current law indicating that revenue sources are dedicated to conservation land maintenance, the identification of potential gaps in projected expenditure and dedicated revenues is somewhat problematic. The 2017 Edition of this report included a discussion of what the gap may look like if certain revenue sources were dedicated to maintaining conservation lands.

It is worth noting, however, that in Fiscal Year 2017-18 the state spent $40.82 per acre[114] on conservation land management. As seen previously, the state alone has identified over 3.1 million acres of land in plans for future conservation. This indicates that an additional $128.4 million will be necessary, on an annual basis, to cover the state management costs of those future acquisitions. Using this cost per acre and the total acreage currently in existence and potentially to be acquired in the future, a total of $696.64 million would be spent annually by federal, state, regional and local forms of government as well as private entities for the purposes of managing conservation lands in Florida.

## 2.5 Costs of Acquisition and Maintenance under Fee and Less-than-fee Simple Ownership

EDR is required to compare the cost of acquiring and maintaining conservation lands under fee simple or less-than-fee simple ownership. Ideally, in order to quantify the difference in the cost of acquiring and maintaining conservation lands under fee simple or less-than-fee simple ownership, EDR would analyze these costs in fee simple versus a lesser interest for the *same* projects. Further, one would have to assume that the acquisition of a lesser property interest than fee simple (or vice versa) would be appropriate and consistent with the overall conservation goals identified for the property, which, in reality, will differ from project to project.

**Comparison of Acquisition Costs**

Public land acquisition agencies are encouraged to include less-than-fee simple techniques to augment their traditionally fee simple acquisition programs.[115] As such, the option to negotiate a less-than-fee interest as part of, or in lieu of, an otherwise proposed fee acquisition is permissible. There are also specific public land acquisition initiatives that identify and prioritize only less-than-

[114] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2018 Annual report (FY 2017-18), at 48, available at: https://floridadep.gov/lands/environmental-services. (Accessed December 2018).
[115] § 253.0251(1), Fla. Stat.

fee acquisition projects, such as the Rural and Family Lands Protection Program[116] and the less-than-fee category of the Florida Forever Priority List.[117] In addition, within the Florida Forever Priority List, projects may be identified for a combination of fee simple and less-than-fee simple land acquisition.

It is intuitive that incorporating alternatives to fee simple acquisition (such as a conservation easement) allows more lands to come under public ownership for conservation or recreation purposes with less expenditure of state funds for acquisition. When a less-than-fee simple interest in land is acquired, public agencies purchase only those rights or interests in the land that are necessary to achieve the conservation or protection goals of the land. The private landowners retain the possessory interest over their land and all the rights or interests not specifically acquired by the public agency.[118] Allowing private landowners to remain stewards of their own land, when appropriate to achieve public policy goals, reduces the state's costs to manage the lands in the future and allows the properties to remain on the local tax rolls.

To compare acquisition costs of fee simple and less-than-fee simple projects (*i.e.,* conservation easements), EDR reviewed appraisals submitted to DEP's Bureau of Appraisal for conservation land acquisition projects approved by the Board of Trustees of the Internal Improvement Trust Fund in Fiscal Years 2015-16 through 2017-18.[119] Based on this request, DEP provided appraisal reports for seven projects that were identified on the Florida Forever Less-Than-Fee project category, or as part of DACS' Rural and Family Lands Protection Program.[120] Generally, the appraisal reports provided an opinion of the market value of the proposed easement by taking the difference between the market value of the land before placement of the easement and the market value of the land once the easement is in place.

EDR found that on average, the less-than-fee values determined by the independent appraisers were 55.92 percent of the fee simple values with a range from 45.47 percent to 66.70 percent of the fee simple value.[121] In addition, the actual purchase price approved by the Board of Trustees was approximately 48.99 percent of fee simple value.[122]

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[116] The Rural and Family Lands Protection Program (RFLPP) is an acquisition program administered by DACS, which is designed to acquire conservation easements on agricultural lands to protect such lands from being converted to other uses while also promoting natural resource conservation. *See* § 570.71, Fla. Stat. (authorizing DACS, on behalf of the Board of Trustees, to acquire less-than-fee interests in agricultural land). For more information on the RFLPP, including a current list of approved acquisition projects, visit: https://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Land-Planning-and-Administration-Section/Rural-and-Family-Lands-Protection-Program2. (Accessed in December 2018).

[117] The less-than-fee category of the Florida Forever Program is part of DEP's Division of State Lands annual work plan under section 259.105(17)(e), Florida Statutes. This category represents a prioritization of less-than-fee projects on the Florida Forever list. For more information on the projects within the Less-than-Fee project category of the Florida Forever Priority List, visit: https://floridadep.gov/lands/environmental-services/documents/florida-forever-priority-list. (Accessed in December 2018).

[118] § 253.0251(2), Fla. Stat.

[119] EDR reviewed seven conservation easements projects, which may not represent all of the conservation easements acquired during this time period. Additional research and coordination with DEP is required to further develop this data.

[120] For each of the seven conservation land acquisition project, two independent appraisal reports were available.

[121] For this analysis, EDR did not examine the final acquisition price of the projects, which may differ from the market value of the conservation easement identified in the appraisal reports, and is highly dependent upon the individual negotiations between the seller and the state.

[122] EDR determined the approved purchase price by reviewing the Board of Trustees agenda meetings associated with each acquisition project during which the appropriate state agency requested approval to acquire the less-than-fee interest.

**Comparison of Management Costs**

To provide a comparison of the cost to manage less-than-fee simple acquisitions in land versus fee simple acquisitions in land, EDR first assumes that a fee simple interest in land is a suitable alternative to the less-than-fee interest purchase.[123] Because less-than-fee acquisitions do not generally provide for active management by the state agency and, instead, allow for the property owner to retain primary management responsibility, the costs to the state for management of these lands are generally limited to expenditures related to monitoring onsite activities for consistency with the easement provisions.

While it is unclear what the state's management costs would have been for the less-than-fee projects had the acquiring agency purchased fee simple interests in those same lands, EDR did compare the costs of monitoring conservation easements and the operational costs to manage conservation lands reported in the 2018 Land Management Uniform Accounting Council (LMUAC) Report.[124]

According to the 2018 LMUAC Report, the Division of State Lands (DSL) is responsible for monitoring approximately 233,396 acres of conservation easements purchased under Florida Forever, Preservation 2000, or obtained through land donations or exchanges. The DSL contracts with the Florida Natural Areas Inventory to conduct site visits and produce monitoring reports for these conservation easements. The easements are monitored every 36 months.[125]

In Fiscal Year 2017-18, DSL reports that it spent $54,135 to monitor 43 of the 121 conservation easements and Green Swamp land protection agreements covering approximately 40,632 acres.[126] Therefore, EDR calculates the cost to monitor conservation easements and land protection agreements in Fiscal Year 2017-18 to be $1.33 per acre if considering only the acres selected for monitoring during that fiscal year, or $0.23 per acre if considering the total acreage DSL is responsible for monitoring.[127]

In comparison, according to the summary data of the operational costs of state-managed conservation lands presented in the 2018 LMUAC Report for Fiscal Year 2017-18, the average operational costs for land managed by DACS' Florida Forest Service (FFS), the Fish and Wildlife Conservation Commission (FWC), and DEP's Division of Recreation and Parks (DRP) was approximately $39.87 per acre.[128] If considering only the operational costs for land managed by

[123] As stated above, the purpose of an acquisition project differs from project to project. For example, conservation easements that seek to preserve working agricultural lands while preserving the properties' natural resource values may never be intended for acquisition of a fee simple interest by the state. Therefore, analyzing the cost to manage these parcels if the state acquired a fee simple interest is somewhat misleading because the acquiring agencies may not have intended a fee simple interest as an alternative to these projects.

[124] As stated in section 2.2, above, the expenditures reported by these agencies in the Land Management Uniform Accounting Council Report may not reflect the total expenditures to the state to manage conservation lands.

[125] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2018 Annual report (FY 2017-18), at 12, available at: https://floridadep.gov/lands/environmental-services. (Accessed December 2018).

[126] *Id*.

[127] Note that FDACS does not include in the 2018 LMUAC Report costs for monitoring conservation easements acquired under the Rural and Family Lands Protection Program (RFLPP). Therefore, the monitoring costs for conservation easements acquired under the RFLPP are not included in this analysis.

[128] This estimate does not include the secondary/additional management costs reported in the Secondary/Additional Management Costs of Conservation Land Management Units (FY 2017-18) table for management services provided by agencies other than the designated lead manager of the conservation land unit.

DACS FFS and FWC, the average operational cost was $26.39.[129] Table 2.5.1 identifies the unit management operational costs per acre reported in the 2018 LMUAC Report.

**Table 2.5.1 Acreages and Costs of Managing State Lands**

| | Total Acres | Operational Costs of Unit Management | Unit Management Operational Costs Per Acre |
|---|---|---|---|
| **CAMA** | 15,631 | $2,087,231 | $133.53 |
| **DHR** | 97 | $1,782,381 | $18,375.06[130] |
| **DRP** | 795,971 | $66,538,551 | $83.59 |
| **FFS** | 1,149,383 | $18,047,239 | $15.70 |
| **FWC** | 1,433,867 | $50,136,810 | $34.97 |

Source: Based on Operational Costs of State-Managed Conservation Land Management Units (FY 2017-18) Table, State of Florida Land Management Uniform Accounting Council Report (LMUAC) 2018 Annual Report (FY 2017-18).

## 2.6 Next Steps and Recommendations

As discussed in subsection 2.1, there is a property tax loss due to the removal of conservation lands from the ad valorem tax roll. The analysis estimated the county tax shift or loss to be $418.5 million and the school tax shift or loss to exceed $314 million for 2018. However, conservation land research does suggest that there is an offset to the loss of property taxes through an increase to the valuation of nearby parcels' property values. The theory assumes that conservation land is an amenity that residents value and are willing to pay extra to live near. In prior editions of this report, this theory was tested by examining the just value valuation and just value growth rates of parcels near conservation land. Unfortunately, neither analyses found evidence to support the theory.[131]

The 2020 Edition of this report will investigate the theory further and ideally arrive at a definitive conclusion regarding whether parcels near conservation land experience increased taxable value. To do this, the report will expand the prior analyses by looking at the attributes and benefits of specific types of conservation land or narrowing the scope to see if the value only occurs in certain geographical regions of Florida. For example, academic research suggests that individuals value certain types of conservation land habitat more than other types of land habitats. Other research suggests that urban areas value the benefits of conservation land more than rural areas.[132] All of these future avenues of research will be investigated and discussed as part of the 2020 Edition.

[129] It is unclear how these less-than-fee projects would be managed if a fee simple interest was acquired (as a state park, wildlife management area, state forest, etc.), or who the lead managing entity would be. EDR assumes that the less-than-fee projects would be managed for similar purposes and uses as those properties managed by FFS and FWC if fee simple interests were acquired. EDR does not consider a statewide average of the costs per acre reported by all five land managing agencies (*i.e.,* $40.82) to reflect a realistic management cost for less-than-fee simple projects had the state acquired a fee simple interest.

[130] In the 2018 LMUAC Report, the unit management operational cost per acre for DHR was reported as $18,416.83. EDR's cost per acre is based on the operational costs divided by the total acres reported for DHR in the summary table. It is unclear why a slightly higher cost per acre value was reported by DHR in the 2018 LMUAC Report.

[131] The full 2017 and 2018 analyses can be found in section 2.5 of their respective reports. The reports can be found on EDR's website: http://edr.state.fl.us/Content/natural-resources/index.cfm.

[132] A good overview of the existing academic literature can be found in the following report: V. McConnel and M. Wells, "The Value of Open Space: Evidence from Studies of Nonmarket Benefits" *Resources for the Future.* January 2005: 30.

EDR will also work to categorize attributes of acquired conservation lands to better identify any overlap in the expenditures for water resources and conservation lands. Because the water management districts are authorized by section 373.139(2), Florida Statutes, to acquire land for flood control, water storage, water management, conservation and protection of water resources, aquifer recharge, water resource and water supply development, and preservation of wetlands, streams, and lakes, it can be argued that 100 percent of the future land acquisitions identified by the districts would be better classified as expenditures that primarily benefit water resources, inclusive of supply and quality. Alternatively, many of those acquisitions meet the criteria for Florida Forever, and therefore should remain within the broader class of conservation lands. This research will be particularly relevant as the state moves to the end of the current Florida Forever program. According to the legislative staff analysis, this will occur in 2020.[133] This issue and others will be developed and discussed in the next edition.

At this time, EDR has no formal land conservation recommendations for legislative consideration.

[133] *See* bill analysis for CS/CS/SB 542 available at: http://archive.flsenate.gov/data/session/2008/Senate/bills/analysis/pdf/2008s0542.ga.pdf. (Accessed December 2018).

# 3. Modeling Future Water Demand and Supply

***Abstract***

*The costs associated with ensuring that future water supplies are available to meet the increasing water demands are estimated to be between $1.6 and $2.2 billion over the 2015 through 2035 planning horizon. This estimate is based on an analysis of projects identified by WMDs through the water supply planning process and may change significantly in the future as the methodologies, both of EDR and the WMDs, are refined. This cost estimate only captures water conservation initiatives and the costs of developing alternative water supplies. An estimate of the costs associated with maintaining the existing water infrastructure and the costs specific to protecting natural systems are not yet included. The future demand not met with existing supply assumes average weather conditions and that the demand which has been met in the past will continue to be met in the future. Additional research will be undertaken and methodologies will be refined to provide more inclusive and more accurate cost estimates for future editions of this annual report.*

Section 403.928(1)(b), Florida Statutes, requires EDR to compile water supply and demand projections developed by each water management district (WMD), documenting any significant differences between the methods used by the WMDs. This section further requires EDR to estimate future expenditures necessary to achieve the Legislature's intent that sufficient water is available for all existing and future reasonable-beneficial uses and the natural systems, and that adverse effects of competition for water supplies be avoided.

In the 2018 Edition, EDR provided a compilation of existing water supply and demand projections. For the 2019 Edition, EDR estimates the costs associated with developing the alternative water supplies (AWS) necessary to meet the increase in water demand projected for the period beginning in 2015 and continuing through 2035 for the following categories: public supply (PS), domestic self-supply (DSS), agricultural self-supply (AG), recreational-landscape irrigation (REC), commercial-industrial-institutional-mining self-supply (CIIM), and power generation (PG).[134] These water demand categories are based on those used by the WMDs and the U.S. Geological Survey (USGS).[135]

For water supply planning regions identified by WMDs (Figure 3.0.1 and Table 3.0.1), EDR uses the following approach to projecting the expenditures necessary to meet the future demand for PS, DSS, AG, REC, CIIM, and PG:

[134] Note that construction costs associated with maintaining capacity or increasing traditional supplies are largely excluded at this time. The period of 2015-2035 was selected to match the 20-year planning period used in the WMDs' Regional Water Supply Plans (for some planning regions, the WMDs are now using the 2020-2040 planning period, with 2015 estimates also provided).

[135] As described in the 2018 Edition of the EDR report, the category titles adopted by EDR for the water demand categories are based on the comparison of the titles used by various agencies. For example, the categories used by the WMDs are based on the following use classes provided in rule 62-40.531 of the Florida Administrative Code: public supply, domestic self-supply, agriculture, recreational irrigation, industrial/commercial/institutional, and thermoelectric. *See* pages 77-79 of the 2018 Edition, available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2018Edition.pdf.

1. **Identify projected water demand increase.** The expected increase in water demand for the 2015-2035 planning period is currently based on the Regional Water Supply Plan (RWSP) or Water Supply Assessment (WSA) estimates and projections developed by the WMDs and summarized in the Regional Water Supply Planning 2017 Annual Report, published in August of 2018 (DEP (2018)), see Table 3.0.1. EDR considers two scenarios:

    a. "Net Demand Change" not accounting for potential conservation effects, and

    b. "Net Demand Change" minus "Conservation Projections to Meet Future Demand."

2. **Evaluate the existing supply.** Estimated existing water supply sources available to meet future demands are taken from DEP (2018).

3. **Calculate additional water needs.** Additional water needs are equal to the net demand change that is not met by estimated existing sources. The needs are estimated as the difference between the demand and supply described in (1) and (2) above. Similar to the projected demand estimates, two scenarios are developed that differ by how potential water conservation is considered.

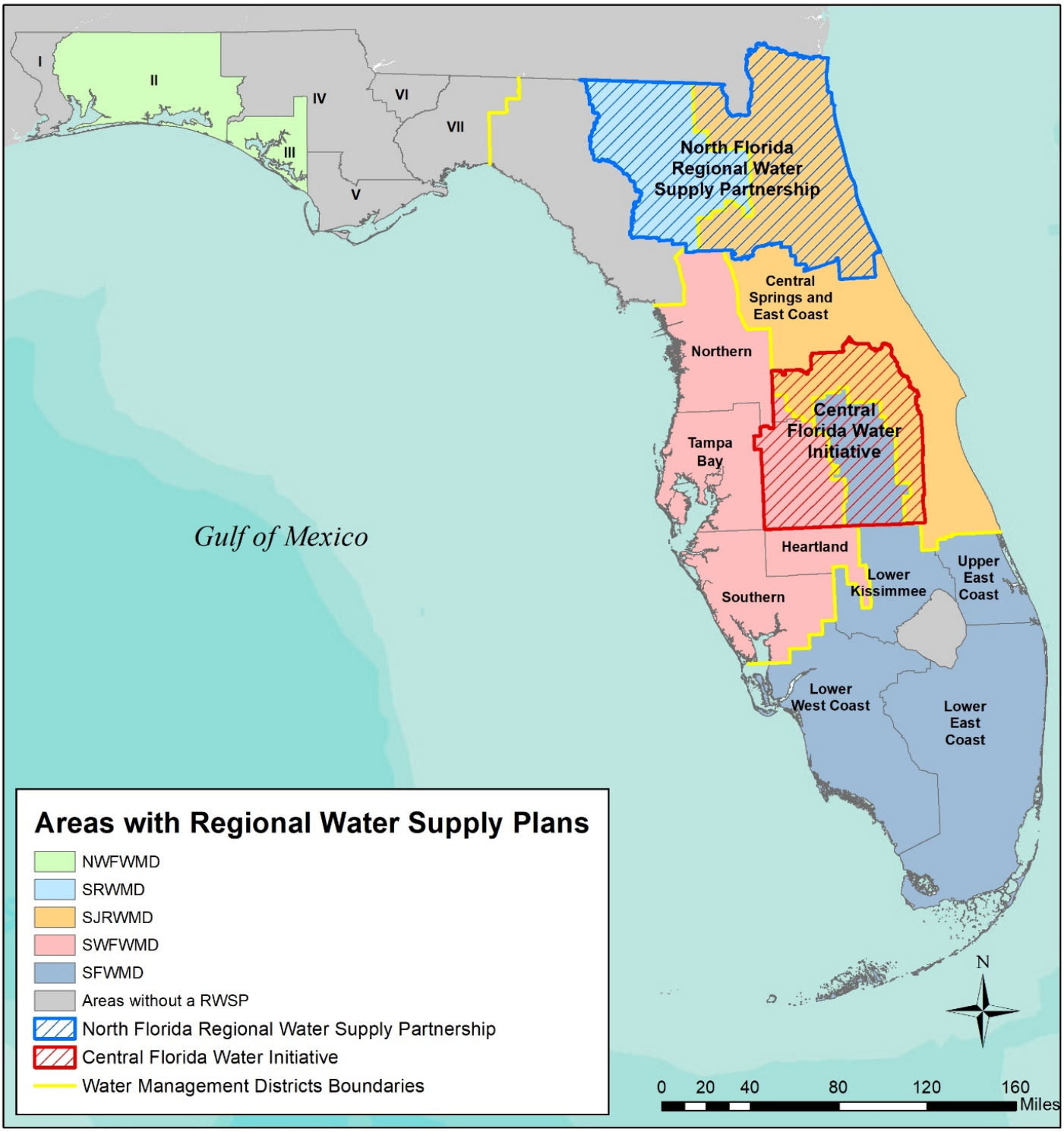
4. **Examine the mix of AWS projects potentially available to meet future water demand in each water supply planning region.** The combination of project types potentially available to meet the demand increase in various water supply planning regions is based on projects identified in the Project Appendix of DEP (2018). It reflects the mix of the projects identified by WMDs as a part of their regional water supply planning process.

5. **Estimate the cost of AWS project construction and the water conservation initiatives needed to meet the water needs identified in (3).** Costs for AWS projects and water conservation initiatives are calculated using a statistical model and the project data in the Project Appendix of DEP (2018).[136]

[See figure on following page]

[136] As per Section 373.709, Florida Statutes, the WMDs are required to identify in each of their RWSPs a list of water supply development project options (including both traditional and alternative water supply projects) of which the total capacity of the projects exceed the water supply needs for all existing and future reasonable-beneficial uses within the planning horizon. In practice, this means that the WMDs are required to identify more AWS project options than needed to meet the gap remaining after accounting for traditional water sources, conservation initiatives, and any other supply constraints.

**Figure 3.0.1 Florida's Water Management Districts and Supply Planning Regions**




Note: WMD coloring in the legend applies only to regions that currently require a regional water supply plan. The hatching identifies the planning regions that cross the borders between WMDs and where regional water supply plans were developed through collaboration by two or three WMDs.
Source: Provided by staff at the Office of Water Policy, Department of Environmental Protection.

## Table 3.0.1 2015-2035 RWSP Summary Table

| WMD | Water Supply Planning Region | Water Supply Planning Region Abbreviation | Net Demand Change (mgd) | Estimated Existing Sources Available to Meet Future Demands (mgd) | Net Demand Change of which Additional AWS or Conservation Must Surpass (mgd) | Conservation Projection to Meet Future Demands (mgd) | AWS Options to Meet Future Demands (mgd) |
|---|---|---|---|---|---|---|---|
| NWFWMD | Region II | NW-II | 19.5 | 17.7 | 1.8 | 6.5 | 48.0 |
| | Region III | NW-III | 8.9 | 8.9 | 0.0 | 9.5 | 35.0 |
| | Regions I, IV, V, VI, & VII | NW-I, NW-IV, NW-V, NWVI, and NW-VII | 12.0 | 12.0 | 0.0 | 3.6 | 0.0 |
| SFWMD | Lower Kissimmee Basin | SF-LKB | 17.5 | 17.5 | 0.0 | 0.0 | 0.0 |
| | Upper East Coast | SF-UEC | 52.4 | 51.6 | 0.8 | 14.0 | 92.1 |
| | Lower East Coast | SF-LEC | 188.8 | 179.9 | 8.9 | 52.0 | 234.6 |
| | Lower West Coast | SF-LWC | 190.0 | 185.9 | 4.1 | 41.0 | 101.3 |
| SJRWMD | Central Springs East Coast (Regions 2, 4, and 5) | SJR-CSEC | 78.8 | 50.8 | 28.0 | 33.6 - 47.0 | 307.4 |
| SRWMD | SR District (excluding NFRWSP) | SR-outside NFRWSP | 21.8 | 21.8 | 0.0 | 10.9 | 0.0 |
| SWFWMD | Northern (excluding CFWI) | SW-NR (excluding CFWI) | 51.7 | 23.9 | 27.8 | 23.0 | 113.6 |
| | Tampa Bay | SW-TB | 63.8 | 63.8 | 0.0 | 52.0 | 125.2 |
| | Heartland (excluding CFWI) | SW-HR (excluding CFWI) | 8.3 | 5.8 | 2.5 | 4.4 | 8.5 |
| | Southern | SW-SR | 50.2 | 46.8 | 3.4 | 18.8 | 238.0 |
| SJRWMD, SWFWMD, and SFWMD | Central Florida Water Initiative | CFWI | 233.6 | 0.0 | 233.6 | 36.8 | 333.6 |
| SJRWMD and SRWMD | North Florida Regional Water Supply Partnership | NFRWSP | 112.2 | Not Quantified | 112.2 | 40.7 – 53.0 | 97.2 |
| **Total statewide** | | | **1,109.5** | | **423.1** | **346.8 – 372.5** | **1,734.5** |

Source: Based on RWSP Summary Table in DEP (2018).

Table 3.0.1 presents a summary of the WMDs' Water Supply Assessments and Regional Water Supply Plans (WSAs/RWSPs) available in DEP (2018). The projections are developed for average year conditions as defined by each WMD. During drought year conditions, total demand in each region is projected to increase as compared with the average year (see 1-in-10 demand projections in WMDs' RWSPs), which may influence both the water supply available from existing sources and the water supply projected to be produced from AWS sources.[137] The WMDs develop drought

[137] While total demand for each region is projected to increase during drought conditions, water restrictions may be imposed which are intended to decrease water use.

demand projections; however, the data shown in Table 3.0.1 above is not specified for a drought scenario. For the 2019 Edition, EDR follows the approach presented in DEP (2018) and focuses on the average year condition only.

It is also important to note that the table summarizes information developed by the WMDs for water supply *planning* purposes, and is not intended to be used to evaluate individual consumptive use permit (CUP) or water use permit (WUP) applications associated with the regulatory functions.

## 3.1 Water Demand Projections

The Net Demand Change reported in Table 3.0.1 is "the quantity of additional water that is needed to meet future demands" (p. 9, DEP 2018). It is derived as the difference between 2035 projected and 2015 estimated total water demand for PS, DSS, AG, REC, CIIM, and PG**.** The total demand forecasted by the WMDs is shown in Figure 3.1.1. RWSPs and WSAs typically do not quantify water that may be needed for the natural systems.[138] The protection of water resources and related natural systems is intended to be achieved through statutory and regulatory criteria such as water use permitting, minimum flows and minimum water levels (MFLs), Water Reservations, Restricted Allocation Areas and Water Shortage declarations. For EDR it is important for this value to be specifically quantified because EDR is required to forecast costs necessary to meet the Legislature's intent that sufficient water be available for the natural systems. For future editions, EDR will continue to work with the WMDs and DEP to quantify these needs.

According to water demand projections developed by the state's five WMDs for planning purposes,[139] from 2015 to 2035, statewide water demand is expected to increase by 17 percent, from 6,407.2 to 7,515.9 mgd.[140] Each of the WMDs categorizes its water demand into six generally consistent categories: public supply (*e.g.*, water utilities), domestic self-supplied (*e.g.*, domestic wells providing for both indoor and outdoor household water uses), agricultural self-supplied, recreational-landscape irrigation (*e.g.*, golf courses and parks), commercial-industrial-institutional-mining self-supplied, and power generation.[141] Driven by population growth, public supply is expected to increase in need from 2,508.4 to 3,091.7 mgd (or by 23 percent). More water will also be used for two other population-related categories: recreational-landscape irrigation and power generation. While by absolute value the increases in recreational-landscape irrigation and

[138] Some SWFWMD RWSPs do include an "Environmental Restoration" category in their water demand forecast. *See* subsection 3.1 of the 2018 Edition of this report for more details on this category.

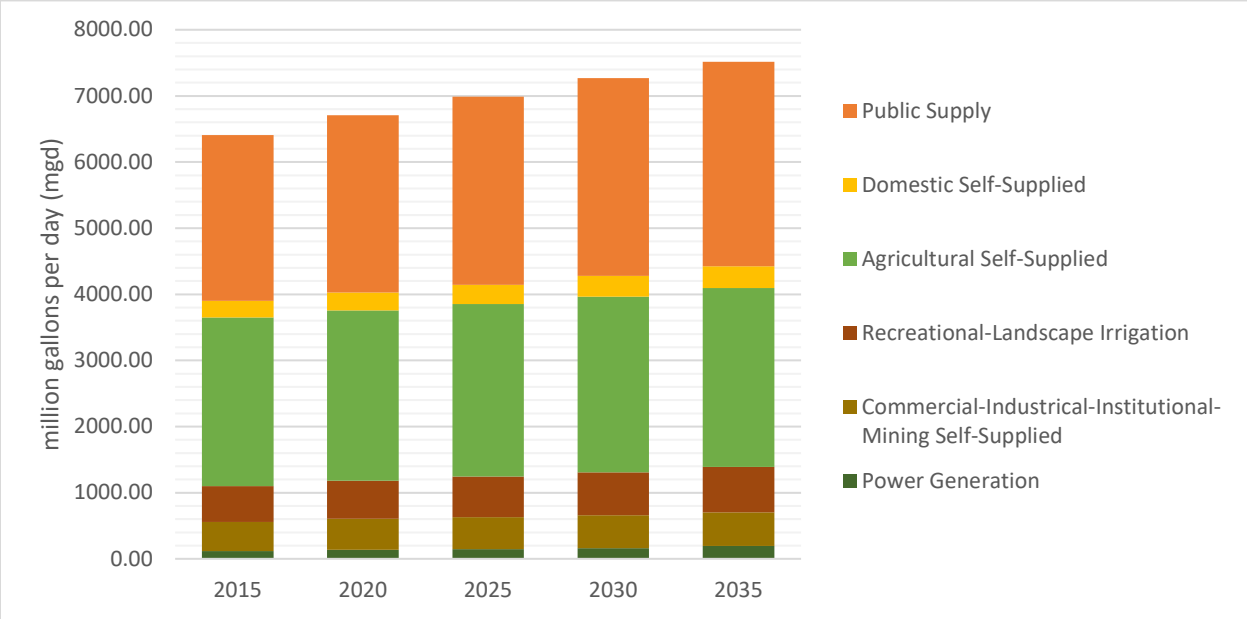
[139] This paragraph refers to the RWSPs and WSAs used in the 2018 Edition of this report and DEP (2018). EDR recognizes that new WSAs and RWSPs have been developed for SRWMD, NWFWMD, and SFWMD in 2018. However, to be consistent with the annually updated data presented in DEP (2018), the demand estimates in the new WSAs and RWSPs will be included in the next edition.

[140] These estimates are for "average year" weather conditions (also referred to as 5-in-10). WMDs also develop drought demand estimates for a 1-in-10 year drought event, defined as: "An event that results in an increase in water demand of a magnitude that would have a 10 percent probability of occurring during any given year. " (p. 16 in Florida Department of Environmental Protection (DEP). 2009. Format and Guidelines for Regional Water Supply Plans. DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD.). For a summary of drought year demand, *see* 2018 Edition of the EDR report at http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2018Edition.pdf. Further, the difference between these statewide numbers varies slightly (less than 1 mgd) from that shown in Table 3.0.1 due to the overlap of the CFWI and SWFWMD's Heartland and Northern planning regions and the different publication cycles of the CFWI and SWFWMD RWSPs.

[141] Many of these demand categories are referred to as "supply" or "self-supplied" while representing an underlying demand. For example, in the majority of WMDs, the "public supply" category represents the demand of all users receiving water from a public or private utility, and it does not describe the total potentially available supply of water.

power generation categories are small (144.6 mgd and 77.3 mgd, respectively), the rates of increase in each individual sector are substantial (27 percent and 66 percent, respectively). Agricultural self-supplied is expected to grow from 2,549.6 to 2,703.9 mgd, or by 6 percent. Florida is ranked first in the nation in the production value of citrus, sugarcane, and various fresh market vegetables,[142] and these crops will continue to account for a large portion of irrigated acreage and agricultural irrigation water use.[143] Water demand in the commercial-industrial-institutional-mining self-supplied category is also expected to grow, though the increase is small.

**Figure 3.1.1 Total Statewide Water Demand Projections for 2015-2035 Developed by the WMDs for Planning Purposes (Assuming Average Rainfall, mgd)**




Note: The 2015 estimate/projection reported in the WMDs' regional water supply plans (RWSPs) and districtwide water supply assessments (WSAs) may differ from the actual 2015 water use. Some RWSPs and WSAs were developed prior to the date when the final 2015 data were available, and hence, 2015 water use was projected based on water use in prior years (often, 2010 water use or a previous five-year average of water use). Further, for the Lower East Coast Region of SFWMD, 2030 water demand projections were used for 2035 water demand projections. The RWSP update was approved for the region in November 2018, and will be incorporated into the future editions of the EDR report.

The methodologies used by the WMDs to estimate existing water use and to project future demand are discussed in the 2018 Edition of this report. The RWSPs and WSAs used in that edition were the same as those used in DEP (2018). Although new RWSPs and WSAs have been published since that time, EDR attempts to maintain consistency between the existing water supply and water

[142] Florida Department of Agriculture and Consumer Services (DACS). Undated. Florida Agriculture Overview and Statistics. DACS, Division of Marketing and Development, Tallahassee, FL. http://www.freshfromflorida.com/Divisions-Offices/Marketing-and-Development/Education/For-Researchers/Florida-Agriculture-Overview-and-Statistics. (Accessed December 2018).

[143] The Balmoral Group. 2018. Florida Statewide Agricultural Irrigation Demand: Estimated Agricultural Water Demand, 2016 – 2040. Produced for Florida Department of Agriculture and Consumer Services. The Balmoral Group, 36p. https://www.freshfromflorida.com/content/download/81553/2381484/FSAID-V-Water-Use-Estimates-June-2018.pdf. (Accessed December 2018).

demand data. New methodologies will be summarized in future editions of this report when they are included in DEP's Regional Water Supply Planning Annual Report or are developed by EDR.

The WMDs' public supply water demand estimates are largely based on the average per-capita water use observed in the last five years. For all use categories, the demand accounts for the existing water conservation efforts, but not the potential for a future increase in water conservation.[144] Also, when evaluating what quantity of water may need to be created to meet future demand, the WMDs only consider the new, or incremental, water demand change between 2015 and 2035 (1,109.5 mgd). In effect, they assume the existing supply can meet the quantity of the 2015 demand (6,407.2 mgd or 85.2 percent of the total projected demand in 2035) throughout the 20 year planning period. Table 3.0.1 identifies "Conservation Projection to Meet Future Demands" as the projected reduction in the "Net Demand Change" that could result from additional conservation measures.[145] As projected by the WMDs in Table 3.0.1, additional water conservation can potentially offset one third of the "Net Demand Change" from 2015 to 2035. For this edition, EDR considers two scenarios:

a. "Net Demand Change" not accounting for potential conservation effects, and

b. "Net Demand Change" minus "Conservation Projections to Meet Future Demand," which assumes the conservation projections are met.

## 3.2 Existing Water Supply Available to Meet the Growing Water Demand

The value identified in Table 3.0.1 as "Estimated Existing Sources Available to Meet Future Demands" is calculated by the WMDs and reported to DEP as the total estimated volume of water potentially available to meet the net demand change. For DEP's reporting, this number is constrained to not exceed the net demand change. The WMDs use the following estimation methods:

[144] In this report, water conservation generally refers to a reduction in per-capita water use (*e.g.*, due to the use of more efficient fixtures or infrastructure improvements.)

[145] For PS, two general methods are used by the WMDs to derive the "Conservation Projections to Meet Future Demand":

- Specific per-capita water use goal (*e.g.*, NWFWMD's goal of all utilities reducing gross per capita per day water use to a maximum of 150 gallon);
- Estimates from various decision support tools developed to assist public suppliers in their conservation planning such as EZ Guide, the Florida Automated Water Conservation Estimation Tool, and the Alliance for Water Efficiency's Water Conservation Tracking Tool. Specific assumptions are made regarding the conservation measures that can be implemented and the rate of adoption of these measures by the customers.

Some RWSPs also discuss the conservation potential for the demand categories other than the PS. For example, in the CFWI RWSP, for DSS, the water conservation potential per household was assumed to be directly proportional to that of the residential part of PS. Similarly, the water conservation potential for CIIM is estimated as being directly proportional to the conservation potential of commercial and industrial uses served by the PS systems. The estimate of the water conservation potential for REC was based on the projections for publicly-supplied outdoor water use. The conservation potential for PG in the CFWI was assumed at 1.2 percent of 2035 water demand. Finally, for AG conservation, estimates from mobile irrigation labs, FDACS' FSAID, and SWFWMD's model farm were employed. NFRWSP is the only region that provides a range for the "Conservation Projection to Meet Future Demands". NFRWSP estimates the lower level using the EZ Guide and the assumptions for DSS, REC, CIIM, and PG conservation that are similar to the ones discussed above for the CFWI. Water conservation could be increased to the higher level if all public supply systems and DSS residents whose use is above the average gross per capita achieve the average gross per capita rate for the whole NFRWSP area.

- ***Permitted but unused water (SWFWMD):*** This value represents the permitted but unused quantities of surface water, brackish groundwater, and Upper Floridan Aquifer groundwater within each of the District's four planning regions.[146] In general, the SWFWMD calculates this as the difference between total permitted allocations, which have been determined to not cause harm to the water resources of the area or interfere with existing legal uses, and the current reported withdrawals of those permittees at the time of RWSP development.[147]

- ***Permitted but unused water and unused DEP permitted treatment capacity (SFWMD)***: For SFWMD planning regions except the Upper Kissimmee Basin Planning Area (included in CFWI), the projected increase in the PS category accounts for a large share of the "Net Demand Change" with the water demand for the other categories, such as AG, being relatively stable or declining. Therefore, the assessment of existing water supply focuses only on the sources available for PS. To estimate "Existing Sources Available to Meet Future Demand," except the Upper Kissimmee Basin Planning Area (included in CFWI), the SFWMD considers the permitted but unused water and unused DEP permitted treatment capacity. For each supplier, projects are then identified to meet the difference between the projected demand[148] and the permitted allocation or existing treatment capacity (as described in Subsection 3.3 below).[149]

- ***Currently permitted water for PS (NWFWMD):*** The NWFWMD uses the currently permitted volumes of water for public supply to estimate "Existing Sources Available to Meet Future Demand".

- ***Hydrogeologic computer models of planning-level groundwater withdrawal scenarios (CFWI, NFRWSP, SJRWMD-CSEC)***: Hydrogeologic computer models are used to examine groundwater withdrawal scenarios corresponding to the projected demands on the planning-region level for PS, DSS, CIIM, REC, AG, and PG. The models are used to determine the estimated maximum withdrawal levels for which further increases in withdrawals may be constrained by at least one natural system (*e.g.*, a failure to meet an MFL).[150] For the CFWI, the model[151] indicated that, on a water supply planning level, alternative sources or conservation would be needed to meet all "Net Demand Change".

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[146] Potential water supplies from the surficial aquifer, seawater desalination, and reclaimed water are accounted for in the column of Table 3.0.1 titled "AWS Options to Meet Future Demands."
[147] For each permittee, SWFWMD evaluates the level of water use as either a five-year average of reported withdrawals or a single year estimate.
[148] Utilities utilize various methodologies to forecast future demand based on the number of people per connection, number of connections, and other characteristics of their service areas. SFWMD has its own methodology to project demand (based on BEBR population projections, 5-year average per capita use, etc.). As a part of the RWSP development process, SFWMD and utilities discuss and agree to the amount of water needed for the region.
[149] The utilities are planning and reporting based on their peak capacity. Unless utility-specific coefficients are estimated, average capacity is approximately 80 percent of the peak capacity. The projects identified by the utilities also focus on projected peak capacity, since utilities need to meet peak future demand.
[150] It is important to note that while water may be available on a permit-by-permit basis, the hydrogeologic modeling provides a planning level estimate of how much water the WMDs must identify through conservation or AWS project options.
[151] The East Central Florida Transient Groundwater Flow Model.

For NFRWSP, several groundwater withdrawal scenarios were assessed using a hydrogeologic model[152] and, for all scenarios considered, water withdrawals were constrained by at least one natural system. "Estimated Existing Sources Available to Meet Future Demands" were listed as "Not Quantified". Note that as stated above, the "Net Demand Change" value does not include the water that may be needed for the natural systems. Therefore, it is possible that water projects must be completed to meet the base year water demand in addition to the "Net Demand Change."

- ***Conclusions from the Water Supply Assessment (SRWMD outside NFRWSP):*** For this region, the 2010 WSA indicated that existing water sources are adequate to meet existing and projected reasonable-beneficial needs while sustaining water resources and related natural systems through the 2030 planning horizon. The 2018 WSA, however, recommended regional water supply planning in portions of the SRWMD outside the NFRWSP, implying that, in some locations, existing water sources are not adequate through the 2035 planning horizon.

For 10 of the 19 water supply planning regions, estimated existing water supplies are not sufficient to meet the 2035 expected water demand. The most significant differences between existing supplies and future demands are found in the fast-growing CFWI (*i.e.*, Orlando and vicinity) and the NFRWSP (that includes Jacksonville and portions of SRWMD). Overall, every WMD in Florida identified at least one planning region where the estimated increase in demand exceeds existing water supplies. While water conservation can partially offset the increase in water demand in some water supply planning regions, it cannot eliminate the need for developing alternative water supplies in the state, and particularly, in the CFWI, NFRWSP, and SW-NR (excluding CFWI) planning regions.

## 3.3 Additional Water Needs and Expenditure Forecasts

Additional water needs are estimated as the amount of the "Net Demand Change" that is not met by existing sources. Similar to the projected demand estimates, two scenarios are developed for the 2019 Edition of the EDR report, which differ by how potential water conservation is considered**:**

- **High additional water needs scenario (High Needs Scenario)** – This scenario considers the future water demand that exceeds the existing sources available to meet it, not accounting for the additional conservation projections reported in DEP (2018).

- **Low additional water needs scenario (Low Needs Scenario)** – This scenario considers the future water demand that exceeds the existing sources available to meet it, accounting for the additional conservation projections reported in DEP (2018).

[152] The North Florida-Southeast Georgia regional groundwater flow model, with groundwater being the traditional water source for the region.

Additional water needs for the two scenarios are presented in Table 3.3.1. The estimates for the High Needs Scenario are equal to "Net Demand Change of which Additional AWS or Conservation Must Surpass" reported in Table 3.0.1. This value represents the total additional amount of water each WMD identifies that is needed to meet future demands. This value is calculated by each WMD as the difference between "Net Demand Change" and "Estimated Existing Sources Available to Meet Future Demands". For this scenario, AWS will be required to meet the growing demand in every WMD. In total, AWS investments are necessary to provide 423.1 mgd among ten planning regions by 2035. The water needs are particularly high in the CFWI and NFRWSP planning regions.

**Table 3.3.1 AWS Needs by Planning Region**

| Planning Regions | Net Demand Change (mgd)[a] | Estimated Existing Sources Available to Meet Future Demands (mgd)[a] | Conservation Projection to Meet Future Demands (mgd)[a] | Additional Water Needs by 2035 | |
|---|---|---|---|---|---|
| | | | | Low Needs Scenario (mgd) | High Needs Scenario (mgd)[a] |
| (1) | (2) | (3) | (4) | (5) = (2) – (3) – (4) (if negative, then 0) | (6) = (2) – (3) |
| NW-II | 19.5 | 17.7 | 6.5 | 0.0 | 1.8 |
| NW-III | 8.9 | 8.9 | 9.5 | 0.0 | 0.0 |
| NW-I, NW-IV, NW-V, NWVI, and NW-VII | 12.0 | 12.0 | 3.6 | 0.0 | 0.0 |
| SF-LKB | 17.5 | 17.5 | 0.0 | 0.0 | 0.0 |
| SF-UEC | 52.4 | 51.6 | 14.0 | 0.0 | 0.8 |
| SF-LEC | 188.8 | 179.9 | 52.0 | 0.0 | 8.9 |
| SF-LWC | 190.0 | 185.9 | 41.0 | 0.0 | 4.1 |
| SJR-CSEC | 78.8 | 50.8 | 33.6[b] | 0.0 | 28.0 |
| SR-outside NFRWSP | 21.8 | 21.8 | 10.9 | 0.0 | 0.0 |
| SW-NR (excluding CFWI) | 51.7 | 23.9 | 23.0 | 4.8 | 27.8 |
| SW-TB | 63.8 | 63.8 | 52.0 | 0.0 | 0.0 |
| SW-HR (excluding CFWI) | 8.3 | 5.8 | 4.4 | 0.0 | 2.5 |
| SW-SR | 50.2 | 46.8 | 18.8 | 0.0 | 3.4 |
| CFWI | 233.6 | 0.0 | 36.8 | 196.8 | 233.6 |
| NFRWSP | 112.2 | Not Quantified[c] | 40.7[b] | 71.5 | 112.2 |
| **Total statewide** | **1,109.5** | | **346.8** | **273.1** | **423.1** |

[a] Based on 2015-2035 RWSP Summary Table in DEP (2018).
[b] This value is the low end of a range provided in DEP (2018). The low bound is used by EDR to represent a more conservative approach to the effect of conservation on water demand.
[c] Interpreted as zero, because in DEP (2018), "Net Demand Change" is equal to "Net Demand Change of which Additional AWS or Conservation Must Surpass" for this region.

For the Low Needs Scenario, water conservation projections completely offset the increase in the demand projected by 2035 in all water supply planning regions except the NFRWSP, CFWI, and SW-NR (excluding CFWI). The total additional water needed for these regions is 273.1 mgd, which is approximately two-thirds of the needs identified in the High Needs Scenario. It is particularly important for EDR to account for the cost of conservation programs for the Low Needs Scenario since conservation can potentially offset a significant portion of the demand and AWS investments.

## *The Mix of AWS Projects Expected to Meet Future Water Demand in Each Water Supply Planning Region*

According to section 373.019, Florida Statutes, "alternative water supplies" is defined as:

- salt water;
- brackish surface and groundwater;
- surface water captured predominately during wet-weather flows;
- sources made available through the addition of new storage capacity for surface or groundwater;
- water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses;
- the downstream augmentation of waterbodies with reclaimed water;
- stormwater; and
- any other water supply source that is designated as nontraditional in the applicable RWSP.

As shown in Table 3.0.1, WMDs have identified "AWS Options to Meet Future Demands" that exceed the additional water needs even for the High Needs Scenario. For the methodologies used by the WMDs to estimate "AWS Options to Meet Future Demands" see Appendix A.1.

Each planning region has identified more water supply projects than are needed to meet the increasing demand in the planning period. The projects identified in the Project Appendix of DEP (2018) reflect the types of projects implemented in each region since Fiscal Year 2005-06, as well as the project options identified in RWSPs for the future. For the 2019 Edition of the EDR report, this project list is used to develop the mix of projects likely to be implemented in each planning region in the future, as well as their costs.

**Project Appendix of DEP (2018)**

As described in DEP (2018), the Project Appendix of DEP (2018) represents "water resource and water supply development projects that, if constructed, could produce approximately 1.6 [billion gallons daily] of water by 2035" along with "a total of 747 projects [that] have been completed statewide since FY 2005-06 and an additional 202 projects [that] are in the design or construction phase." DEP further indicates that "from FY 2005-06 to today, total project costs exceeded $4.5 billion and made available 690.5 mgd in additional water (reuse and non-reuse)." These numbers are higher than indicated by EDR's review of completed projects, in part because DEP includes all projected future costs associated with projects that are still incomplete (*e.g.*, in the construction and design phases). The remaining differences are explained in the following subsections.

The projects in the list are identified by the WMDs by regional water supply planning area. Specifically, according to section 373.709, Florida Statutes, each RWSP must include a list of *water supply development project options*, including traditional and alternative water supply project options that are technically and financially feasible, from which local government, government-owned and privately-owned utilities, regional water supply authorities, multijurisdictional water supply entities, self-suppliers, and others may choose for water supply development.[153] For each RWSP, traditional water sources, conservation initiatives, and AWS must exceed a quantification of the water supply needs for all existing and future reasonable-beneficial uses within the planning horizon.[154] The total capacity of the projects should take into account water conservation and other demand management measures, as well as water resources constraints, including adopted minimum flows and minimum water levels and water reservations.[155]

Each RWSP must also include a *water resource development* component, with a listing of those water resource development projects that support water supply development for all existing and future reasonable-beneficial uses and for the natural systems as identified in the recovery or prevention strategies for adopted minimum flows and minimum water levels or water reservations.[156] Finally, to ensure that sufficient water is available for all existing and future

[153] In addition to projects solicited and included by the district through a coordinated effort with water users and stakeholders, such users may propose specific projects for inclusion in the list of alternative water supply projects. If such users propose a project to be listed as an alternative water supply project, the district shall determine whether it meets the goals of the plan, and, if so, it shall be included in the list (§ 373.709(2)(a)2, Fla. Stat.).

[154] The level-of-certainty planning goal associated with identifying the water supply needs of existing and future reasonable-beneficial uses must be based upon meeting those needs for a 1-in-10-year drought event (§ 373.709(2)(a)1, Fla. Stat.).

[155] Where the WMD determines it is appropriate, the plan should specifically identify the need for multijurisdictional approaches to project options that, based on planning level analysis, are appropriate to supply the intended uses and that, based on such analysis, appear to be permittable and financially and technically feasible. The list of water supply development options must also contain provisions that recognize that alternative water supply options for agricultural self-suppliers are limited (§ 373.709(2)(a)2, Fla. Stat.).

For each project option, the following must be provided (§ 373.709(2)(a)3, Fla. Stat.):

a. An estimate of the amount of water to become available through the project.
b. The timeframe in which the project option should be implemented and the estimated planning-level costs for capital investment and operating and maintaining the project.
c. An analysis of funding needs and sources of possible funding options. For alternative water supply projects, the water management districts shall provide funding assistance pursuant to section 373.707(8), Florida Statutes.
d. Identification of the entity that should implement each project option and the current status of project implementation.

[156] *See* § 373.709(2), Fla. Stat. For each water resource development project listed, RWSP should include an estimate of the amount of water to become available through the project for all existing and future reasonable-beneficial uses and for the natural systems as identified in the recovery or prevention strategies for adopted minimum flows and minimum water levels or water reservations. The timeframe in which the project option should be implemented and the estimated planning-level costs for capital investment

reasonable-beneficial uses and the natural systems, the applicable RWSP shall be amended to include any water supply development project or water resource development project identified in *a recovery or prevention strategy*.[157] A recovery or prevention strategy shall include the development of additional water supplies and other actions to: achieve recovery to the established minimum flow or minimum water level as soon as practicable; or prevent the existing flow or water level from falling below the established minimum flow or minimum water level.[158]

The Project Appendix of DEP (2018) was downloaded from the DEP interactive RWSP 2017 Annual Report website[159] in September 2018. After data cleaning,[160] the project list includes 1,092 projects. For each project, the Project Appendix of DEP (2018) summarizes the following information (when available):

- General project information
  - Project name
  - Project description
  - Project type (*e.g.*, "conservation" or "stormwater")
  - Lead entity
  - Latitude and longitude

- Water supply planning region and benefitting waterbody(ies)
  - Water Management District (with district project number)
  - RWSP region supported (and RWSP-identified project tracking)
  - Waterbody benefitted
  - MFL supported (and MFL-identified project tracking)
  - Year first added to RWSP / RPS

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and for operating and maintaining the project should also be included, along with an analysis of funding needs and sources of possible funding options. Identification of the entity that should implement each project option and the current status of project implementation should also be included. Finally, a funding strategy for water resource development projects should be discussed, which shall be reasonable and sufficient to pay the cost of constructing or implementing all of the listed projects.

[157] § 373.0421(3), Fla. Stat.

[158] § 373.0421(2), Fla. Stat.

[159] The web address is http://fdep.maps.arcgis.com/apps/MapJournal/index.html?appid=aed4de2d3bc54ba3bc6b894d4705b1be. (Accessed December 2018).

[160] The original list included 1,340 projects, while only 1,092 projects are included in the analysis based on the following screening procedure:

- Three projects were listed in the spreadsheet twice. These were two conservation projects (#28323 in SJRWMD and #06-6930-7-2202-05-03 in SRWMD), and one surface water project (#H009 in SWFWMD).
- Furthermore, 182 projects from SFWMD were omitted because the quantity or reuse flow were marked with superscripts, potentially indicating preliminary estimates or sub-components of larger projects (e-mail communication with DEP staff).
- An additional 30 projects were removed because of the footnotes marking the "project total" ($) estimates, or "project total" ($) estimates marked as "TBD" or "N/A". The footnotes were assumed to indicate preliminary estimates or sub-components of larger projects.
- Finally, 30 projects were removed due to their "canceled" status.

Discussion with DEP and WMD staff suggests that many of these removed projects are potentially phases of projects. For future editions of this report, EDR will continue to collaborate with DEP and WMD staff regarding how to account for the water quantities made available and costs associated with these types of phased projects. Further, an updated SFWMD dataset was provided to EDR in late November, after statistical analysis had concluded. A smaller analysis, considering this new dataset can be found in Appendix A.7.

    - Fiscal Year included in 5-Year Water Resource Development Work Program, If Applicable

- Project status and dates of implementation
    - Project status (*e.g.*, "complete" or "construction")
    - Beginning and completion dates

- Potential water supply or water resource benefits
    - Storage capacity created (MG)
    - The quantity of water made available to date (MGD)
    - Reuse flow made available to date (MGD)
    - The quantity of water made available upon completion (MGD)
    - Reuse flow made available upon project completion (MGD)

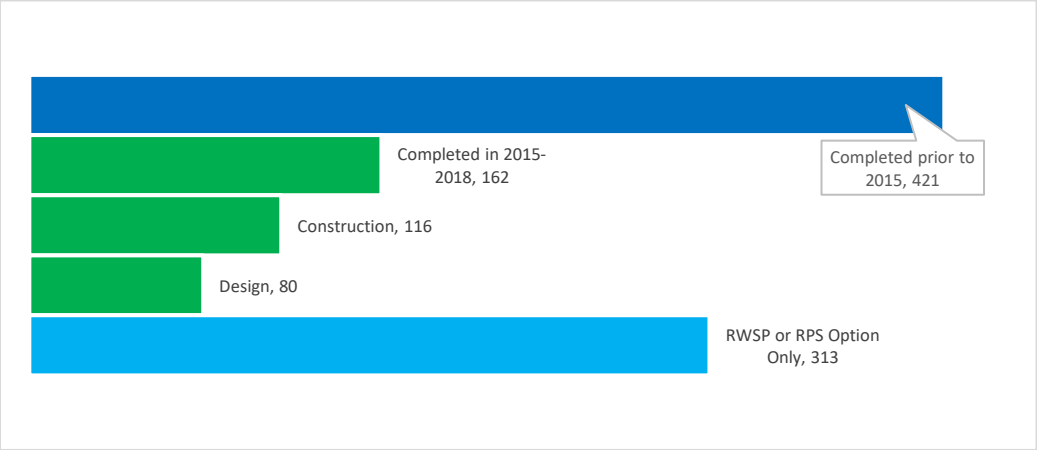
- Funding information
    - Projected funding
    - Initial fiscal year funded
    - Most recent fiscal year funded
    - Funding from applicable source:
        - Water Protection and Sustainability Program funding, springs funding, other state funding, total state funding, total district funding, total land acquisition funding by district or state
    - Project sponsor match
    - Total construction costs
    - Project total
    - Land acquisition component ("yes", "no", or missing values; with less than 1 percent of projects including "yes" response)

- Comments

Projects in the list are identified as either "Complete", "Construction", "Design", or "RWSP or RPS Option Only." Most of the projects in the Project Appendix of DEP (2018) are identified as complete, and most of them were completed before 2015 (see Figure 3.3.1). Many projects have been completed since 2015, or are currently in construction or design. While all or some of the expenses for these projects have been incurred, these expenses are not specifically identified in the EDR expenditure forecast. The group identified as "RWSP or RPS Option Only" represents the future potential projects identified to create water usable to meet future water demand.

[See figure on following page]

**Figure 3.3.1 Number of Projects by Status**




For approximately half of the projects, the Project Appendix of DEP (2018) identifies a supported MFL (Table 3.3.2), and some of these projects may provide water for the natural systems *and* to meet the "Net Demand Change." Therefore, the estimates of the water made available upon completion of the project supporting an MFL should be treated with caution. The information currently available for the projects does not separately quantify the volumes of water that may be intended to meet future demand and to protect the natural systems**.**

**Table 3.3.2 Number of Projects Supporting an MFL, by Project Status**

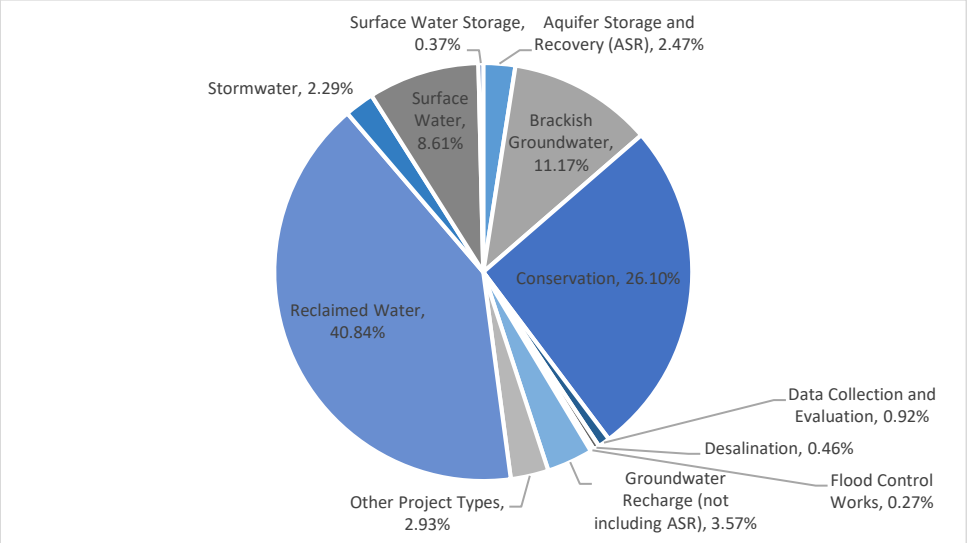
| Project status | Project number | |
|---|---|---|
| | Supporting an MFL | Total |
| Projects completed prior to 2015 | 118 | 421 |
| Projects completed in 2015 or after | 91 | 162 |
| Construction | 59 | 116 |
| Design | 53 | 80 |
| RWSP or RPS Option Only | 204 | 313 |
| **Total** | **525** | **1092** |

More than 85 percent of the 1,092 projects included into the Project Appendix of DEP (2018) are one of four types: reclaimed water (446 projects or 40.84 percent), conservation[161] (285 projects,

[161] Conservation in this context refers to a project category identified in the Project Appendix of DEP (2018) and it is different from the "Conservation Projection to Meet Future Demands" seen in Table 3.0.1. The "Conservation Projection to Meet Future Demands" represents a reasonable quantity of water that can potentially be conserved in the 20-year forecast period (*see* a brief description of the estimation methodology in footnote 145). The projects categorized as "conservation" in the Project Appendix of DEP (2018) represent specific projects or initiatives that conserve a different quantity of water. Currently, the projects in the Project Appendix of DEP (2018) identify a smaller quantity of water than the "Conservation Projections to Meet Future Demands." More details on conservation projects can be found in Appendix A.2.

or 26.10 percent), brackish groundwater (122 projects, or 11.17 percent), or surface water (94 projects, or 8.61 percent) (See Figure 3.3.2). The projects are further described in Appendix A.2.

**Figure 3.3.2 Share of Different Project Types in the Total Project Set (N=1092)**




**Water or Reuse Flow Made Available by the Projects**

When available, the volume of water or reuse flow made available is recorded in the following fields of the Project Appendix of DEP (2018):

- Storage capacity created (millions of gallons)
- The quantity of water made available to date (mgd)
- Reuse flow made available to date (mgd)
- The quantity of water made available upon completion (mgd)
- Reuse flow made available upon project completion (mgd)

EDR summed the last two fields mentioned above to estimate the total volume of water made available (or expected to be made available) by each project upon completion. If zero or missing values were provided in both fields, the information was treated as "missing." If one of the fields contained zero or missing values, the total was based on the value provided in the other field. "Water made available" and "reuse flow made available" are treated interchangeably in this report. In other words, for this edition, EDR is assuming that all alternative water supplies provide a 1:1 replacement of the water quantified in the "Net Demand Change", or have a 100 percent potable

offset.[162] For example, reclaimed water use can have a potable offset ranging from 0 percent to 100 percent depending upon the use (Table A.2.1 in Appendix A.2). Ideally, the reclaimed water projects would be classified into reuse types when added to the Project Appendix to allow the estimation of traditional water offsets and potential recharge. Future editions of this report may consider the use different offset ratios.

For the projects other than conservation,[163] the total volume of water and reuse flow available upon the project completion is summarized in Table 3.3.3. The water or reuse flow made available upon the project completion is not uniformly provided for the projects (compare columns 2 and 3 in Table 3.3.3). Therefore, the total volume of water that can be created if all the projects are completed could be higher than reported in the table.

**Table 3.3.3 Water and Reuse Flow Made Available upon Project Completion (for Projects Other than Conservation)**

| Project Status | Total number of projects | Number of projects with water / reuse flow information available | Total volume of water created upon completion (for the projects with available information only) (mgd) |
|---|---|---|---|
| Completed prior to 2015 | 275 | 198 | 578.91 |
| Completed in 2015 or later | 115 | 74 | 151.28 |
| Construction | 66 | 53 | 150.54 |
| Design | 66 | 41 | 81.78 |
| RWSP or RPS Option Only | 285 | 272 | 1,341.69 |

Based on EDR's analysis of the project list, there appears to be no correlation between the project data in the Project Appendix of DEP (2018) and the RWSP summary table in DEP (2018). For some regions, the water created by projects ("RWSP or RPS Option Only") is higher than the "AWS Options to Meet Future Demands" while for other regions it is lower. This indeterminate relationship may be attributed to differences in publication timing (of RWSPs and DEP annual reports) and methodology and can be observed by comparing the highlighted columns in Table 3.3.4.

[162] For an analysis considering a 75 percent offset ratio, *see* Appendix A.7.
[163] Conservation will be accounted for separately.

## Table 3.3.4 Project Summary

| Planning Regions | Net Demand Change (mgd)[a] | Estimated Existing Sources Available to Meet Future Demands (mgd) [a] | Net Demand Change of which Additional AWS or Conservation Must Surpass (mgd) [a] | Conservation Projection to Meet Future Demands (mgd) [a] | AWS Options to Meet Future Demands (mgd) [a] | Project Appendix of DEP (2018): AWS and Other Projects (excluding conservation) [b] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Completed prior to 2015 (mgd) | Completed in 2015-2018 (mgd) | Construction (mgd) | Design (mgd) | RWSP or RPS Option Only (mgd) |
| NW-II | 19.5 | 17.7 | **1.8** | 6.5 | 48.0 | 16.40 | 1.00 | 0.00 | 0.00 | 0.00 |
| NW-III | 8.9 | 8.9 | **0.0** | 9.5 | 35.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| NW-I, NW-IV, NW-V, NWVI, and NW-VII | 12.0 | 12.0 | **0.0** | 3.6 | 0.0 | 16.25 | 0.00 | 0.85 | 0.60 | 0.00 |
| SF-LKB[d] | 17.5 | 17.5 | **0.0** | 0.0 | 0.0 | 2.91 | 0.00 | 0.00 | 0.00 | 0.00 |
| SF-UEC[d] | 52.4 | 51.6 | **0.8** | 14.0 | 92.1 | 48.22 | 0.00 | 0.00 | 0.00 | 235.57 |
| SF-LEC[d] | 188.8 | 179.9 | **8.9** | 52.0 | 234.6 | 133.14 | 0.00 | 2.00 | 0.00 | 215.10 |
| SF-LWC[d] | 190.0 | 185.9 | **4.1** | 41.0 | 101.3 | 148.52 | 1.00 | 10.64 | 0.00 | 101.75 |
| SJR-CSEC | 78.8 | 50.8 | **28.0** | 33.6[c] | 307.4 | 32.75 | 14.15 | 25.33 | 39.36 | 11.10 |
| SR-outside NFRWSP | 21.8 | 21.8 | **0.0** | 10.9 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SW-NR (excluding CFWI) | 51.7 | 23.9 | **27.8** | 23.0 | 113.6 | 4.25 | 0.75 | 1.70 | 0.94 | 95.18 |
| SW-TB | 63.8 | 63.8 | **0.0** | 52.0 | 125.2 | 49.77 | 17.63 | 14.29 | 7.74 | 322.22 |
| SW-HR (excluding CFWI) | 8.3 | 5.8 | **2.5** | 4.4 | 8.5 | 0.09 | 0.00 | 0.00 | 0.00 | 42.34 |
| SW-SR | 50.2 | 46.8 | **3.4** | 18.8 | 238.0 | 28.53 | 3.00 | 9.84 | 11.10 | 169.98 |
| CFWI | 233.6 | 0.0 | **233.6** | 36.8 | 333.6 | 72.14 | 66.22 | 52.98 | 9.65 | 97.10 |
| NFRWSP | 112.2 | Not Quantified | **112.2** | 40.7[c] | 97.2 | 25.94 | 47.53 | 32.91 | 12.39 | 51.35 |
| **Total statewide** | **1,109.5** | | **423.1** | **346.8**[c] | **1,734.5** | **578.91** | **151.28** | **150.54** | **81.78** | **1,341.69** |

[a] From DEP (2018).

[b] These estimates account only for the projects for which the water or reuse flow made available upon the project completion (mgd) is reported. For many projects in the Project Appendix of DEP (2018), the water or reuse flow estimates are not available. As mentioned above, for this EDR report, projects with footnotes for water/reuse flow or total project ($) were excluded. When the analysis was repeated including all the projects on the Project Appendix of DEP (2018), the total volume and reuse flow made available upon project completion was estimated at 1,518.30 mgd.

[c] The lower boundary for conservation projection is used.

[d] For SFWMD, an updated list of projects is available and will be examined for the next Edition of the EDR report.

The project types differed by the planning regions, as well as the project status. For the ten water supply planning regions where AWS needs are identified in the High Needs Scenario, EDR examined the mix of projects, considering (a) the projects implemented prior to 2015, (b) projects implemented in 2015 or later, or projects in construction and design; and (c) RWSP or RPS Options only. Both the total volume of water and/or reuse flow created by the projects, and the total number of projects of each type were considered (see Appendix A.3). A summary of the project types selected by EDR for the ten regions is provided in Table 3.3.5.

**Table 3.3.5 Project Type(s) Selected by EDR for the Ten Regions Included in the High Needs Scenario (for Projects Other than Conservation)**

| Planning region | Reclaimed water | Brackish groundwater | Surface water | Groundwater recharge (not including ASR) | Desalination |
|---|---|---|---|---|---|
| **NW-II** | ✓ | | | | |
| **SF-UEC** | ✓ | See note 'b' | | | |
| **SF-LEC** | ✓ | See note 'b' | | | |
| **SF-LWC** | ✓ | See note 'b' | | | |
| **SJR-CSEC** | ✓ | | ✓ | | |
| **SW-NR** | ✓ | | | | ✓ |
| **SW-HR** | ✓ | | | | |
| **SW-SR** | ✓ | | | | |
| **CFWI** | ✓ | ✓ | | | |
| **NFRWSP** | ✓ | | | ✓ | |

[a] For the regions with water needs being less than 10 mgd in the High Needs Scenario, only one project type is identified (typically, the type with the greatest number of projects implemented since 2015 or in design or construction). For the regions, with higher water needs identified, two project types are selected based on the largest project type categories (by project number or water created upon completion) since 2015 and in RWSP and RPS options. For SW-NR, desalination was selected (rather than the larger surface water category) due to the lower estimated cost of that option.

[b] While reclaimed water projects appear most frequently for the SFWMD in the projects list, according to comments received from DEP and the WMDs, utilities in SFWMD are generally depending upon brackish groundwater to meet their future needs. For the analysis developed later in this subsection, reclaimed water is assumed to meet the additional water needs of the relevant SFWMD planning regions. For an evaluation of SFWMD considering brackish groundwater instead of reclaimed, see Appendix A.7.

**Project Funding**

When available, the Project Appendix of DEP (2018) provides dollar estimates in the following fields:

- Projected funding
- Initial fiscal year funded
- Most recent fiscal year funded

- For a few projects:
    - Water Protection and Sustainability Program funding, springs funding, other state funding, total state funding, total district funding, total land acquisition funding by district or state

- Project sponsor match

- Total construction costs

- Project total

The "Project Total" information is primarily used in this analysis. It is provided for the greatest number of projects, as compared with the other fields. Moreover, for most projects, the Project Total was the largest dollar estimate that generally was equal or exceeded the funding listed for any individual source. The construction cost accounted for 49.39 to 100.00 percent of total funding estimates. For this Edition, EDR focuses on forecasting expenses based on "Project Total" estimates reported as a part of the WMDs' water supply planning process and summarized in the Project Appendix of DEP (2018). In future editions, EDR intends to collaborate with WMDs and DEP to identify the proportions of project construction and implementation costs contained in the "Project Total."

To account for inflation and convert all "Project Total" estimates to January 2018 dollars, the consumer price index[164] was used. To account for inflation, the month and year in which the projects' costs were estimated should be identified. The following assumptions were made:

- For the projects in "construction" or "design" stages, the "Project Total" is assumed to be expressed in 2018 dollars;

- For the projects listed as "complete" and for which the date of completion is provided, the "Project total" is assumed to be current for the completion date. Note that if the project was completed in 2018, no inflation indexation was applied;

- For the remaining projects, January of the fiscal year when the project was included in the 5-Year Water Resource Development Work Program was used (and if several FYs were listed, then the January of the last FY was selected). If this date was not available, then indexing for inflation was based on the January of the year when the project was first added to RWSP or RPS.

A summary of the project total ($), converted to 2018 USD, is provided in Table 3.3.6. Almost $2.40 billion (in 2018 US$) was spent on 271 projects completed in 2010-2015. Projects completed in 2015 or later are estimated at $0.49 billion in expenditures, and another $0.70 billion were (or will be) spent on the projects in construction and design statuses. It is important to note that the

[164] BLS Series Id: CUUR0000AA0.

median and mean costs are by far the highest for the projects listed as "RWSP or RPS Option Only," potentially indicating that the projects constructed to meet the future Net Demand Change will be more costly than the projects implemented in the past.

**Table 3.3.6 Total Project Cost (for Projects Other than Conservation)**

| Project Status | Number of projects | Number of projects with Total Project estimates* | Total Project ($million 2018) | Funding per project, $million 2018 | | | |
|---|---|---|---|---|---|---|---|
| | | | | Mean | Median | Min | Max |
| Completed prior to 2015 | 275 | 271 | 2,396.05 | 8.84 | 2.38 | 0.01 | 266.67 |
| Completed in 2015 or later | 115 | 115 | 487.52 | 4.24 | 1.18 | 0.02 | 97.49 |
| Construction | 66 | 66 | 484.33 | 7.34 | 3.00 | 0.13 | 54.61 |
| Design | 66 | 65 | 217.69 | 3.35 | 1.25 | 0.04 | 32.20 |
| RWSP or RPS Option Only | 285 | 251 | 13,479.56 | 53.70 | 8.55 | 0.09 | 1,205.53 |

* For projects with $0 reported in Project Total field, it was assumed that the cost estimates are missing.

**Comparison of Project Options Based on Cost per mgd**

For the projects with relevant information available, cost per mgd was estimated as the ratio of the Project Total (in $millions 2018) to the water and reuse flow made available upon the project completion (mgd).[165] Based on the mean and median cost per mgd, the least costly project types were aquifer storage and recovery (ASR) and "other project types". Note, however, that for these types, less than half of the projects had the cost and water or reuse flow data provided, therefore, the cost per mgd results may misrepresent the typical results for these projects. Groundwater recharge (not including ASR) and stormwater projects were also relatively inexpensive based on the mean and median estimates and the relatively small number of projects in the dataset. Brackish groundwater and reclaimed water projects—that is, the categories expected to be the most widely used to meet future demand—are more expensive, based on the median and mean estimates. Although desalination is identified as the most costly project type, there are only five desalination projects in the dataset.

Table 3.3.7 provides statewide summary statistics of project types. For the same data by planning region, see Appendix A.4.

[See table on following page]

[165] This approach does not account for the project life time and the maintenance costs, since this information is not available.

**Table 3.3.7 Cost per mgd by Project Types**

| Project Type | N projects | N projects with available information | Cost per mgd (million dollars per mgd) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Mean | Median | Minimum | Maximum | Std Dev |
| Aquifer Storage and Recovery (ASR) | 27 | 12 | **2.99** | **1.37** | 0.33 | 9.17 | 2.99 |
| Brackish Groundwater | 122 | 110 | **10.73** | **6.41** | 0.10 | 184.54 | 19.48 |
| Desalination | 5 | 5 | **16.58** | **15.68** | 10.30 | 23.38 | 6.37 |
| Groundwater Recharge (not including ASR) | 39 | 24 | **4.20** | **2.39** | 0.17 | 11.28 | 3.82 |
| Other Project Types | 32 | 11 | **4.10** | **1.90** | 0.33 | 16.34 | 5.34 |
| Reclaimed Water | 446 | 361 | **7.34** | **5.01** | 0.04 | 384.72 | 20.95 |
| Stormwater | 25 | 21 | **5.39** | **1.13** | 0.07 | 50.18 | 13.56 |
| Surface Water | 94 | 56 | **16.35** | **5.12** | 0.09 | 397.17 | 52.90 |

Note: Data collection and evaluation, flood control works, and surface water storage were removed from the analysis (since data was available for only one project in each of these project types).

Note that the project type identified as most typical for most regions – reclaimed water (see Table 3.3.5) – is near the middle of the cost per mgd range. The categories with lower cost per mgd – stormwater, other project types, groundwater recharge, and ASR – may not be viable in some areas, which partially explains their relatively low use rates.

Overall, the analysis of the Project Appendix of DEP (2018) allowed EDR to identify the mix of sources typically used in each planning region to meet increasing water demand. Reclaimed water, surface water, and brackish groundwater have been widely used in the ten planning regions where water demand is projected to outstrip existing supplies (given the High Needs Scenario). These water sources account for a large share of RWSP and RPS options as well. Therefore, for the planning level estimates, these AWS projects should be considered to forecast the funding needed to meet the "Net Demand Change" identified for 2015-2035. NFRWSP may also add groundwater recharge projects to this mix, given the large share of such projects in the region's RWSP and RPS options. While generally similar water supply sources are expected to be used in all planning regions, the project costs differ by region. The projects in some planning regions include high project costs, which may be due, in part, to reporting differences between the WMDs. In addition to reporting differences, project costs would be expected to vary across the state depending on the number and depth of water withdrawal facilities, the type of treatment used, and concentrate disposal methods. Finally, the projects that will be implemented to meet the future water demand are expected to be more expensive than the projects implemented in the past (even for the same project type).

## *Average AWS Project Expenditures*

EDR forecasts water supply and conservation expenditures based on the averages for "Project Total" reported in the Project Appendix of DEP (2018) for various project types and planning regions. First, for each water supply planning region, the total number of projects to be constructed is calculated by dividing the additional water needs (see Table 3.3.1) by the average project size (estimated from the Project Appendix data). Then, the number of projects is multiplied by the estimated average "Project Total" to forecast the total expenditures needed to meet the 2035

demand in each water supply planning region. These estimates are developed separately for the Low and High Needs Scenarios.

A statistical model is used to calculate the average "Project Total" for various project types and regions. An advantage of using a statistical model is that it allows the use of all information from the WMDs to assess the relationships between "Project Total" and such project characteristics as size, type, and completion status. This analysis is not possible at the water supply planning region level when there is a limited number of observations. At the same time, statistical models present average estimates only, and they may over- or under- estimate the expenditures incurred in a specific region.

To develop the statistical model, the following project types were selected from the 1092 projects in the dataset developed from the Project Appendix of DEP (2018):

- Desalination,
- Brackish groundwater,
- Surface water,
- Groundwater recharge,
- Aquifer storage and recovery (ASR),
- Reclaimed water projects,
- Stormwater projects,
- Conservation, and
- Other project types.

Among these projects, 669 had non-missing and non-zero values for both "Total Project" and the volume of water or reuse flow available upon the project completion. Of this total, 38 projects (or 5.68 percent) were excluded after the initial runs of the statistical model. These projects were either classified as outliers (*i.e.*, projects for which "Total Project" or the volume of water or reuse flow were significantly different from the other projects) or as projects exhibiting high leverage on the modeling results (*i.e.*, a few projects that determine the model estimation outcomes).[166] Six more

[166] The *glm* procedure implemented in SAS 9.4 software was used to model the relationship between the natural logarithm of "Project Total" ($million 2018) and project sizes, types, locations, and statuses. The values of the studentized residual larger than 3 in absolute value were used to identify the outliers. Studentized residuals are a measure of the deviation of the estimated values from the actual values of the dependent variable (*i.e.*, the natural logarithm of "Project Total"). Further, Cook's D measure above 0.25 was used to isolate the projects with significant leverage on the estimation result. For each project, Cook's D shows the change in model estimates that results from deleting this project from the dataset. Overall, 38 projects were deleted as either the outliers or high-leverage projects. These include 15 reclaimed water projects, eight conservation projects, five surface water projects, four brackish groundwater projects, three stormwater projects, one ASR project, one desalination project, and one groundwater recharge

projects were identified as having repeat district project numbers (even though they had slightly different project descriptions), and they were also removed from the final dataset used in the model.[167] Overall, the final dataset included 625 projects, representing different water supply planning regions and various project types (Tables 3.3.8 and 3.3.9).

**Table 3.3.8 Number of Projects, by Type, Used for Statistical Modeling of "Project Total"**

| Project Type | Number | Percent |
|---|---|---|
| Aquifer Storage and Recovery (ASR) | 11 | 1.76 |
| Brackish Groundwater | 106 | 16.96 |
| Conservation | 55 | 8.8 |
| Desalination | 4 | 0.64 |
| Groundwater Recharge (not including ASR) | 23 | 3.68 |
| Other Project Types | 11 | 1.76 |
| Reclaimed Water | 346 | 55.36 |
| Stormwater | 18 | 2.88 |
| Surface Water | 51 | 8.16 |
| **Total** | **625** | **100** |

**Table 3.3.9 Number of Projects, by Water Supply Planning Region, in the Dataset Used for Statistical Modeling of "Project Total"**

| Water Supply Planning Regions | Frequency | Percent |
|---|---|---|
| NWFWMD* | 11 | 1.76 |
| SF-LKB | 5 | 0.80 |
| SF-UEC | 24 | 3.84 |
| SF-LEC | 50 | 8.00 |
| SF-LWC | 54 | 8.64 |
| SJR-CSEC | 54 | 8.64 |
| SW-NR (excluding CFWI) | 26 | 4.16 |
| SW-TB | 94 | 15.04 |
| SW-HR (excluding CFWI) | 9 | 1.44 |
| SW-HR | 60 | 9.60 |
| CFWI | 129 | 20.64 |
| NFRWSP** | 109 | 17.44 |
| **Total** | **625** | **100.00** |

* Due to the small number of projects, NWFWMD was modeled as one water supply planning region.
** NFRWSP here includes one project from SR-outside NFRWSP.

project. These projects were from various regions (eight CFWI projects, seven NFRWSP projects, one project from NWFWMD, and 2 to 4 projects from the other planning regions). The projects removed tended to be the larger projects (in size or "Project Total").

[167] The district project numbers are 'NS006', 'S0796', and '2013/14-180'.

The statistical model was then used to estimate the average project expenditure for various project sizes, types, statuses, and regions. The dependent variable is the natural logarithm of "Project Total" ($million 2018). The independent variables used to explain the variation in the "Project Total" are:

- project size (in mgd of water and reuse flow made available upon project completion),
- project size squared,
- dummy variables for project types (*e.g.*, reclaimed water or desalination),
- dummy variables for project status (*e.g.*, completed or "RWSP or RPS Option Only"),
- dummy variables for planning regions, and
- variables for the interactions among the variables listed above.

In total, 232 variables were coded (the list is available upon request), and SAS 9.4 statistical software was used to identify the variables that are correlated with "Project Total".[168] The final model[169] is presented in Table 3.3.10. It contains 33 variables (including the intercept) and explains approximately 74 percent of the variation in the independent variable, the natural logarithm of the "Project Total" (in $million 2018).

[See table on following page]

[168] The analysis used *stepwise* option in *glmselect* procedure implemented in SAS 9.4. The procedure utilizes the forward selection technique that starts with an empty model and then adds in variables one by one. In each step, a variable that gives the single best improvement to the model statistical performance is added. Variables are also removed from the model based on *F* statistics. If at any step of the stepwise method, any variable already in the model is not significant at 0.15 level, then the least significant of the variables is removed from the model, and the algorithm proceeds to the next step. This process ensures that no effect can be added to a model while some effect currently in the model is not deemed significant. The stepwise process ends when none of the variables outside the model has an *F* statistic significant at the 0.15 level and every variable in the model is significant at the 0.15 level. *See* more in SAS Institute Inc. Undated. *SAS/STAT(R) 9.22 User's Guide: Stepwise Selection(STEPWISE)*. Available at https://support.sas.com/documentation/cdl/en/statug/63347/HTML/default/viewer.htm#statug_glmselect_a0000000241.htm. (Accessed December 2018).

[169] The model was estimated using *glm* procedure in SAS 9.4 software. The Ordinary Least Squares (OLS) regression method was employed. Model diagnostics results are available in Appendix A.5.

## Table 3.3.10 Statistical Model Estimation Results

| Parameter | Parameter Notation | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| **Dependent variable: ln of "Total Project" (in $million 2018)** | | | | | |
| model intercept | **Intercept** | 0.0391 | 0.0869 | 0.4500 | 0.6524 |
| dummy variable for "RWSP or RPS Options Only" projects | **Opt** | 0.9152 | 0.0994 | 9.2100 | <.0001 |
| dummy variable for projects of "Other project types" | **oth** | -0.9657 | 0.3098 | -3.1200 | 0.0019 |
| dummy variable for conservation projects | **conserv** | -3.6703 | 0.5997 | -6.1200 | <.0001 |
| project size (mgd) | **qtot** | 0.5799 | 0.0308 | 18.8000 | <.0001 |
| interaction between project size and the dummy for projects in construction status | **qconstruction** | 0.3110 | 0.1379 | 2.2600 | 0.0245 |
| interaction between project size and the dummy for stormwater projects | **qstorm** | -0.3515 | 0.0381 | -9.2300 | <.0001 |
| project size - squared | **qsq** | -0.0225 | 0.0021 | -10.6100 | <.0001 |
| interaction between project size (squared) and the dummy for projects in construction status | **qqconstruction** | -0.0583 | 0.0207 | -2.8100 | 0.0051 |
| interaction between project size (squared) and the dummy for "RWSP or RPS Options Only" projects | **qqoption** | 0.0044 | 0.0013 | 3.3400 | 0.0009 |
| dummy variable for projects in NWFWMD | **NWF** | 0.7064 | 0.3063 | 2.3100 | 0.0214 |
| dummy variable for projects in SF-LKB region | **LKB** | -1.5738 | 0.4428 | -3.5500 | 0.0004 |
| dummy variable for projects in SF-UEC region | **UEC** | -0.4151 | 0.2128 | -1.9500 | 0.0516 |
| interaction between dummy variables for SF-LEC region and surface water projects | **LECsurface** | -1.9552 | 0.4058 | -4.8200 | <.0001 |
| interaction between project size and dummy variables for SF-LEC region and stormwater projects | **qLECstorm** | 3.9059 | 1.3296 | 2.9400 | 0.0034 |
| interaction between project size (squared) and dummy variables for SF-LEC region and reclaimed water projects | **qqLECreclaimed** | 0.0028 | 0.0019 | 1.4500 | 0.1469 |
| interaction between project size and dummy variables for SF-LWC region and ASR projects | **qLWCASR** | -0.1696 | 0.0711 | -2.3900 | 0.0173 |
| interaction between project size and dummy variables for SJR-CSEC region and conservation projects | **qCSECconserv** | 42.4461 | 20.6602 | 2.0500 | 0.0404 |
| interaction between dummy variables for SW-NR region and reclaimed water projects | **SWNRreclaimed** | -1.8325 | 0.5207 | -3.5200 | 0.0005 |
| interaction between project size and dummy variables for SW-NR region and reclaimed water projects | **qSWNRreclaimed** | 6.1161 | 1.7506 | 3.4900 | 0.0005 |
| interaction between project size (squared) and dummy variables for SW-NR region and reclaimed water projects | **qqSWNRreclaimed** | -2.9843 | 1.0097 | -2.9600 | 0.0032 |
| interaction between project size (squared) and dummy variables for SW-NR region and surface water projects | **qqSWNRsurface** | 0.0029 | 0.0013 | 2.1900 | 0.0287 |
| interaction between dummy variables for SW-TB region and brackish water projects | **SWTBbrackish** | 1.2661 | 0.4912 | 2.5800 | 0.0102 |
| interaction between dummy variables for SW-HR region and reclaimed water projects | **SWHRreclaimed** | -1.3667 | 0.5707 | -2.3900 | 0.0169 |
| interaction between dummy variables for SW-SR region and surface water projects | **SWSRsurface** | 0.4536 | 0.2732 | 1.6600 | 0.0973 |
| interaction between dummy variables for SW-SR region and brackish water projects | **SWSRbrackish** | 0.8823 | 0.3526 | 2.5000 | 0.0126 |
| dummy variable for projects in CFWI | **CFWI** | -0.3119 | 0.1098 | -2.8400 | 0.0046 |
| interaction between project size and dummy variables for CFWI and conservation projects | **qCFWIconserv** | 39.8694 | 12.1619 | 3.2800 | 0.0011 |
| dummy variable for projects in NFRWSP | **NFRWSP** | -1.8527 | 0.3303 | -5.6100 | <.0001 |
| interaction between dummy variables for NFRWSP region and reclaimed water projects | **NFRWSPreclaimed** | 1.2274 | 0.3536 | 3.4700 | 0.0006 |
| interaction between dummy variables for NFRWSP region and brackish water projects | **NFRWSPbrackish** | 2.0809 | 0.5433 | 3.8300 | 0.0001 |
| interaction between dummy variables for NFRWSP region and conservation projects | **NFRWSPconserv** | 3.8820 | 0.6965 | 5.5700 | <.0001 |

| Parameter | Parameter Notation | Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| interaction between project size (squared) and dummy variables for NFRWSP region and groundwater recharge projects | **qqNFRWSPgwr** | 0.0629 | 0.0217 | 2.9000 | 0.0038 |
| **Model performance:*** | | | | | |
| *R-Squared* | | *0.7564* | | | |
| *Adjusted R-Squared* | | *0.7432* | | | |
| *Root MSE* | | *0.9727* | | | |
| *F-test for the model as a whole* | | *57.45 (p<.0001)* | | | |

* For additional model diagnostics, see Appendix A.5.

Based on the statistical model, "Project Total" increases with the project size in a non-linear fashion. Of note, "Other project type" and "Conservation" projects tend to be cheaper than the other projects. Further, the "Project Total" is higher for "RWSP or RPS Options Only", indicating that meeting future water demand can cost more even if project types do not change over time.

"Project Total" also differs by planning regions. SF-LKB and SF-UEC projects tend to be less expensive than the projects implemented in the other areas. For surface water, projects are generally cheaper in SF-LEC than in the other regions. In SW-SR and NFRWSP, brackish groundwater projects tend to be more costly than in the other areas.

The statistical model for "Project Total" in combination with the project size assumptions allow forecasting the number of projects and expenditures in each water supply planning region. Project sizes differed by water supply planning regions,[170] and therefore different average project sizes were assumed for various project types and planning regions. The expenditure forecast also reflects that the future AWS projects would be more expensive than the projects implemented in the past (*i.e.*, the coefficient for the variable "Opt" was utilized in the expenditure forecast, see Table 3.3.10).

## *Statewide Expenditure Forecast Based on Model Results*

Table 3.3.11 presents a forecast of the total number of projects and expenditures needed to meet the 2035 demand in each water supply planning region. Note that the forecast depends on the assumptions made regarding primary water sources and typical project sizes. For the regions with high water needs, two water sources are assumed, with the water needs met by the sources in equal proportions. Furthermore, the number of projects is based on the mean project size for the respective project type and planning region (with the project number rounded *up* to an integer value, implying a slight overestimation of the water delivered by these projects, as compared with the water needs in the planning regions).

[170] For each project type, *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that the samples of the projects from various regions were drawn from the same distribution. The results are reported in Appendix A.6. Among the types examined, EDR failed to reject the hypothesis for the desalination and conservation projects only. For desalination, the statewide average project size was used, while for conservation, the project size was still differentiated by regions in estimations (to match the actual project cost more closely).

Overall, it is expected that to meet the 2035 water needs in PS, DSS, AG, REC, CIIM, and PG sectors, the expenditures for AWS projects will be between $1.1 and $2.2 billion for the Low and High water needs scenarios, respectively. The estimated expenses are $3.93 million per mgd and $5.12 million per mgd for the two scenarios considered. Note that the water that may be needed for the restoration of natural systems (*e.g.*, if an MFL is not met) and related expenses are not included. This forecast also excludes the expenditures associated with existing infrastructure replacement, as well as other possible costs associated with existing water supplies. Finally, these estimates exclude the expenses associated with increased conservation efforts that can be especially important in the Low Needs Scenario, in which conservation is projected to offset the increase in water demand in seven out of the ten planning regions included in the High Needs Scenario.

### Table 3.3.11 Expenditure Forecasts for the High and Low Water Needs Scenarios

| Water Supply Planning Regions | Sources assumed to meet 2015-2035 additional water needs | Project characteristics | | | Low Needs Scenario | | | High Needs Scenario | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Average size (mgd) | Estimated project total (million 2018 $) | Estimated cost-effectiveness (million 2018 dollars per mgd) | Water needs (mgd) | Number of projects | Total (million 2018 dollars) | Water needs (mgd) | Number of projects | Total (million 2018 dollars) |
| **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7) = (6) / (3)** | **(8) = (7) * (4)** | **(9)** | **(10) = (9) / (3)** | **(11) = (10) * (4)** |
| NW-II | reclaimed | 0.58 | 7.32 | 12.63 | 0 | 0 | 0 | 1.8 | 4 | 29.29 |
| SF-UEC* | reclaimed | 3.82 | 12.06 | 3.16 | 0 | 0 | 0 | 0.8 | 1 | 12.06 |
| SF-LEC* | reclaimed | 5.54 | 40.32 | 7.28 | 0 | 0 | 0 | 8.9 | 2 | 80.63 |
| SF-LWC* | reclaimed | 3.50 | 15.83 | 4.52 | 0 | 0 | 0 | 4.1 | 2 | 31.66 |
| SJR-CSEC | 50% reclaimed | 1.26 | 5.24 | 4.16 | 0 | 0 | 0 | 14 | 12 | 62.87 |
| | 50% surface | 7.86 | 80.77 | 10.28 | 0 | 0 | 0 | 14 | 2 | 161.55 |
| | Total | | | | 0 | 0 | 0 | 28 | 14 | 224.42 |
| SW-NR (excluding CFWI) | 50% reclaimed | 0.52 | 6.00 | 11.54 | 4.8 | 10 | 60.01 | 13.9 | 27 | 162.02 |
| | 50% desalination | 16.25 | 267.06 | 16.43 | 0 | 0 | 0 | 13.9 | 1 | 267.06 |
| | Total | | | | 4.8 | 10 | 60.01 | 27.8 | 28 | 429.08 |
| SW-HR (excluding CFWI) | reclaimed | 0.09 | 0.70 | 7.75 | 0 | 0 | 0 | 2.5 | 28 | 19.53 |
| SW-SR | reclaimed | 1.2 | 5.07 | 4.23 | 0 | 0 | 0 | 3.4 | 3 | 15.22 |
| CFWI | 50% reclaimed | 1.73 | 4.91 | 2.84 | 98.4 | 57 | 279.89 | 116.8 | 68 | 333.91 |
| | 50% brackish | 0.74 | 2.89 | 3.91 | 98.4 | 133 | 384.51 | 116.8 | 158 | 456.78 |
| | Total | | | | 196.8 | 190 | 664.40 | 233.6 | 226 | 790.69 |
| NFRWSP | 50% reclaimed | 0.85 | 2.25 | 2.64 | 35.8 | 43 | 96.55 | 56.1 | 66 | 148.20 |
| | 50% groundwater recharge | 2.84 | 19.34 | 6.81 | 35.8 | 13 | 251.40 | 56.1 | 20 | 386.77 |
| | Total | | | | 71.5 | 56 | 347.95 | 112.2 | 86 | 534.96 |
| **Total statewide** | | | | | **273.1** | **141** | **1,072.36** | **423.1** | **394** | **2,167.54** |

*For an analysis of SFWMD considering a revised dataset (that indicates that reclaimed costs shown in this table may be understated) and considering brackish groundwater instead of reclaimed, see Appendix A.7.

To develop an initial assessment of potential water conservation expenditures, the average "Project Total" ($million 2018) for conservation projects was evaluated using the statistical model described above. The dataset used in the statistical modeling includes 55 projects from three water supply planning regions: SJR-CSEC, NFRWSP,[171] and CFWI. NFRWSP accounts for 80.00 percent of the projects in the dataset. Most of the projects are agricultural water conservation or water distribution infrastructure improvements. Only a few projects include replacement of toilets, irrigation efficiency improvements, and other potential conservation programs in non-agricultural uses. In the future, EDR intends to collect additional information about conservation projects implemented in various Florida regions, as well as projects of more diverse conservation types.

Overall, conservation projects tend to be cheaper than the other project types (see the coefficient for "conserv" variable in Table 3.3.10). Among the regions, conservation projects from NFRWSP tend to be more expensive than the projects from SJR-CSEC and CFWI; on the other hand, the project expenditures tend to increase more quickly with the volume of water conserved in SJR-CSEC and CFWI (see coefficients for "qCFWIconserv" and "qCSECconserv" in Table 3.3.10).

The "Project Total" (in $million 2018) for conservation projects was estimated using the average project sizes (Appendix A.6) and the statistical model coefficients for the respective variables (Table 3.3.10). The average sizes for the projects in SJR-CSEC, CFWI, and NFRWSP were based on the respective regions' data,[172] and for the rest of the state, the average for all three regions was applied.

Estimated expenditures for conservation projects for the Low Needs Scenario are reported in Table 3.3.12. The total conservation expenditures are projected at $548.08 million to conserve 150 mgd by 2035, or $3.65 million per mgd conserved. In SJR-CSEC, the conservation projects are estimated to be notably expensive ($9.24 million per mgd conserved). EDR acknowledges that these expenses are likely over-estimated, driven by the types of projects included in the analysis (*e.g.*, water infrastructure replacement projects). However, this result highlights the fact that water conservation programs are not costless, and their expenses should be accounted for in water-related funding.

[See table on following page]

[171] The only project reported for SR-outside NFRWSP was combined with the projects in NFRWSP region.

[172] EDR failed to reject the hypothesis that the conservation project sizes were the same in the three regions (based on most statistical tests applied, except Cramer-von Mises Statistics, *see* Appendix A.5). However, different project sizes were assumed to ensure that the estimated "Project Total" generally matches the data available in the Project Appendix of DEP (2018).

## Table 3.3.12 Conservation Expenditure Projections

| Water Supply Planning Regions | Water Needs | | Conservation potential projected for the Low water needs scenario (mgd) | Estimated conservation project characteristics | | | Forecast | |
|---|---|---|---|---|---|---|---|---|
| | Low water needs scenario (mgd) | High water needs scenario (mgd) | | Average size (mgd) | Average Project Total ($million 2018) | Cost-effectiveness | Number of conservation projects | Total expenditure ($million 2018) |
| (1) | (2) | (3) | (4) = (3) – (2) | (5) | (6) | (7) | (8) = (4) / (5) | (9) = (6) * (8) |
| NW-II | 0 | 1.8 | 1.80 | 0.40 | 0.08 | 0.21 | 5 | 0.41 |
| SF-UEC | 0 | 0.8 | 0.80 | 0.40 | 0.08 | 0.21 | 3 | 0.25 |
| SF-LEC | 0 | 8.9 | 8.90 | 0.40 | 0.08 | 0.21 | 23 | 1.91 |
| SF-LWC | 0 | 4.1 | 4.10 | 0.40 | 0.08 | 0.21 | 11 | 0.91 |
| SJR-CSEC | 0 | 28 | 28.00 | 0.04 | 0.37 | 9.24 | 700 | 258.84 |
| SW-NR (excluding CFWI) | 4.8 | 27.8 | 23.00 | 0.40 | 0.08 | 0.21 | 59 | 4.89 |
| SW-HR (excluding CFWI) | 0 | 2.5 | 2.50 | 0.40 | 0.08 | 0.21 | 7 | 0.58 |
| SW-SR | 0 | 3.4 | 3.40 | 0.40 | 0.08 | 0.21 | 9 | 0.75 |
| CFWI | 196.8 | 233.6 | 36.80 | 0.04 | 0.24 | 6.10 | 920 | 224.64 |
| NFRWSP | 71.5 | 112.2 | 40.70 | 0.50 | 0.67 | 1.34 | 82 | 54.90 |
| **Total statewide** | **273.1** | **423.1** | **150.00** | | | | **1,817.00** | **548.08** |

Note: The projections are based on a small sample (N=55) of conservation projects for which both "Project Total" and the volume of the water or reuse flow upon the project completion were available. The data included mostly infrastructure replacement and agricultural water conservation projects, and therefore, the forecast misrepresents the actual cost of water conservation if a large part of this conservation is reduction in residential water use. The EDR intends to continue collecting information regarding conservation projects in order to improve the accuracy of the forecast.

Combining the AWS and conservation forecasts reported in Tables 3.3.11 and 3.3.12, total expenditures to meet the 2035 demand for PS, DSS, AG, REC, CIIM, and PG are $1,620.30 million for the Low Needs Scenario, and $2,167.54 million for the High Needs Scenario (or $1.6 and $2.2 billion, respectively). The water that may be necessary for the restoration of natural systems (*e.g.*, if an MFL is not met) and related expenses are not included. This forecast also largely excludes the expenditure associated with existing water supplies, including plumbing and infrastructure maintenance and replacement, as well as improving and protecting water quality (Table 3.3.13). Other expenditures that are not included are the cost of testing and disinfecting private wells (*e.g.*, after a hurricane), the cost of meeting the potentially increased demand during droughts, and the costs of addressing the impacts associated with climate change and sea level rise (*e.g.*, higher average temperatures and saltwater intrusion in coastal areas).

## Table 3.3.13 Water Expenditure Forecast: Summary

| Type of Expenditures | Forecast for 2015-2035 |
|---|---|
| AWS and conservation projects to meet future PS, DSS, AG, REC, CIIM, and PG demand | $1.6 - $2.2 billion |
| Projects that may be needed for the restoration of natural systems (*e.g.*, if an MFL is not met) | Not yet assessed by EDR |
| Water infrastructure maintenance and replacement costs to meet existing demand | Not yet assessed by EDR |
| Cost to improve water quality for tap or well water | Not yet assessed by EDR |
| Increased costs to meet drought demand or address climate change impacts | Not yet assessed by EDR |

The Project Appendix of DEP (2018) was also examined to identify the expected state and district cost shares and likely local sponsor matches (with "sponsor" typically, but not exclusively, referring to a governmental entity). In total, relevant information was identified for 388 completed

projects of the types other than conservation.[173] On average, "Total Project" is split among the state, WMDs, and the sponsor in 10 percent / 30 percent / 60 percent shares, respectively. In turn, for 193 completed conservation projects for which funding source information is available, no state funding was provided, and on average, the funding was allocated in 45 percent / 55 percent split between the WMD and the sponsor. Using these splits, implementation of the AWS and conservation projects to meet the 2035 demand will require from $107.24 million to $216.75 million from state sources, and from $568.28 million to $650.26 million from the WMDs (for the Low and High Needs Scenarios, respectively; see Table 3.3.14). In both scenarios, the bulk of the expenditures is expected to be incurred by the project sponsors (*i.e.*, from $944.78 to $1,300.53 million, depending on the scenario considered).

**Table 3.3.14 Potential Expenditures from the State, WMDs, and Project Sponsors to Meet the Increase in Water Demand by 2035**

| Scenario | Expenditure Purpose | Total Expenditure (million $) | | | |
|---|---|---|---|---|---|
| | | State | WMDs | Sponsors | Total |
| Low water needs | AWS | 107.24 | 321.71 | 643.42 | 1072.36 |
| | Conservation | 0.00 | 246.57 | 301.37 | 547.9426 |
| | Total | 107.24 | 568.28 | 944.78 | 1,620.302 |
| High water needs | AWS | 216.75 | 650.26 | 1,300.53 | 2,167.543 |

## 3.4 Next Steps and Recommendations

The following issues must be addressed over the near-term for EDR to make further progress in the forecasting of the expenditures needed to ensure that sufficient water is available for all existing and future reasonable-beneficial uses and the natural systems:

1. **A more inclusive summary of water supply is needed for the development of EDR's integrated water supply and demand model.**

   When planning for sufficient water provision, it is crucial to answer the question: how much water do we have? Detailed information regarding water availability, as well as the existing supply, is essential to EDR's task of forecasting the expenditures to meet both existing and future demands. Here, the definitions of "water availability" and "existing supply" are based on the water supply planning practices used in other states, particularly Texas.[174]

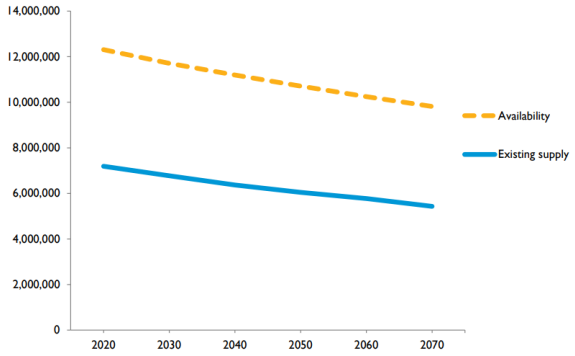
[173] Three projects were excluded from this analysis since the funding from the state, WMDs, or the sponsor exceeded "Project Total".

[174] Similar to Florida, Texas is one of the fastest growing states in the nation (measured by population increase), with irrigated agriculture being an important economic sector there, as in Florida. Texas relies on both surface water and groundwater to meet total water demands. In recent years, Texas has experienced record droughts, and its statewide plan is intended to ensure that the state has adequate water supplies during those conditions. In this section of the EDR report, water availability and the existing supply discussion is based on the 2017 State Water Plan published by the Texas Water Development Board and available at http://www.twdb.texas.gov/waterplanning/swp/2017/doc/2017_swp_adopted.pdf. (Accessed January 2019).

Water availability is defined here as the maximum volume of water that could be withdrawn annually from each source (such as a reservoir or aquifer). The concept of water availability should be independent from the existing use or the permitted withdrawals. For example, the 2017 Texas State Water Plan describes water availability as follows: "Water availability is analyzed from the perspective of the source and answers the question: How much water from this source could be delivered to water users as either an existing water supply or, in the future, as part of a water management strategy?" (p. A-69, Texas Water Development Board 2017).

In turn, existing supply can be defined as a component of the water availability that is already committed to a water user group based on CUPs/WUPs. Most of the time, existing supply involves existing infrastructure (such as treatment and distribution systems). "Existing supply is analyzed from the perspective of water users and answers the question: How much water supply could each water user group already rely on should there be a repeat of the drought of record?" (p. A-69, Texas Water Development Board 2017). As an example, Figure 3.4.1 presents estimates of statewide groundwater availability and groundwater existing supply developed as a part of drought response planning in Texas.

**Figure 3.4.1 Assessment Results for Annual Groundwater Availability and Existing Groundwater Supplies in Texas (acre-feet)**




Source: Texas Water Development Board. 2017. 2017 State Water Plan. http://www.twdb.texas.gov/waterplanning/swp/2017/doc/2017_swp_adopted.pdf. (Accessed January 2019).

Further, information regarding the water necessary to protect and restore the natural systems should be quantified and summarized. The expenditure forecast currently produced by EDR from the WMD data focuses on 2015-2035 Net Demand Change projected by the WMDs and summarized in DEP (2018). The Net Demand Change is calculated as the difference between 2035 projected water demand and 2015 estimated demand for PS, DSS, AG, REC, CIIM, and PG. This method of calculating the net demand change prevents explicit quantification of the statewide water needs for the recovery of natural systems, which are currently affected by excessive water withdrawals. Alternative water supply, groundwater recharge, conservation, or other projects are required in some areas for the recovery of natural systems which have already exceeded sustainable levels of withdrawals. Further, these projects are costly and the water created is not for the purpose of offsetting Net Demand Change. To quantify the

expenditures, strategies to summarize the water needs of the natural systems for regional and planning levels should be identified.[175]

**2. Greater emphasis should be placed on the continued availability of the supply used to meet current demand as well as the cost of maintaining the supply system.**

The WMDs assume that the existing supply is available throughout the planning period by focusing on the change to demand. EDR must go further than this by considering the costs necessary to maintain the existing supply and evaluating the stability of this assumption. While, this edition of the EDR report focuses on the expenditures necessary to meet the change in demand between 2015 and 2035, future editions will begin to address these issues.

Further, significant investments are needed to maintain and improve the existing water supply infrastructure. For example, U.S. EPA (2018)[176] estimated that $21.9 billion is necessary to fund capital improvements for Florida's water systems (Figure 3.4.2). These expenditures are necessary to continue providing safe drinking water to the public over the next 20 years (between January 2015 and December 2034). While there may be some overlap between these capital improvement estimates and the expenditure forecast produced by EDR, the overlap is probably small. U.S. EPA (2018) focuses on the infrastructure projects eligible for funding from the Drinking Water State Revolving Fund (DWSRF), which is meant to serve the public health needs of the existing population.[177] The U.S. EPA estimate, however, shows that the cost of maintaining and improving existing drinking water infrastructure likely significantly exceeds the expenditures for new projects needed to meet the increase in water demand. Therefore, the infrastructure cost should be carefully assessed and examined.

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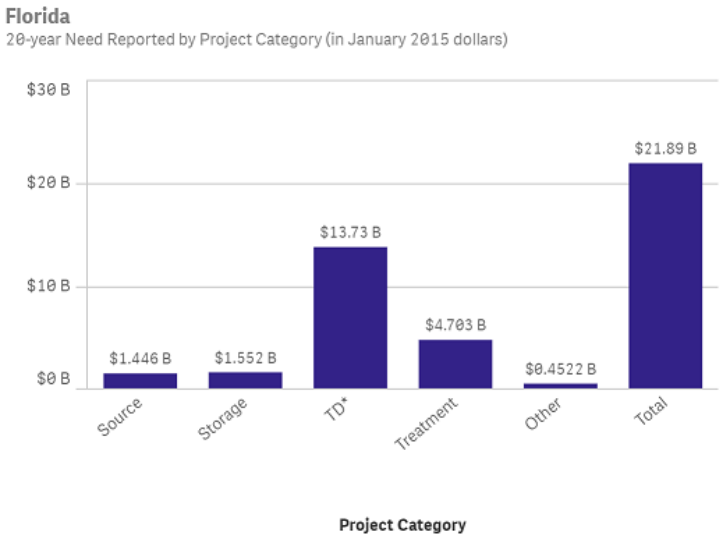
[175] The water needs for the natural systems are currently discussed in the MFL prevention and recovery strategies for individual waterbodies. Statewide, there are 71 MFLs in Recovery 3, in addition to 43 MFLs in Recovery 1 or 2 (where the lower recovery ranking intends to reflect lower regional importance of the waterbody or lesser severity of the MFL violation). A summary of prevention and recovery water needs, presented in consistent metrics (*e.g.*, mgd reduction in existing groundwater withdrawals, or groundwater recharge mgd) and on the statewide basis is vital for EDR's expenditure forecasting.
Reference: DEP. 2018. Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies.
https://floridadep.gov/sites/default/files/2017STAR_MainReport_WithCoverLetter_062718.pdf. (Accessed January 2019).

[176] U.S. EPA. 2018. Drinking Water Infrastructure Needs Survey and Assessment. Sixth Report to Congress. Office of Water (4606M), EPA 816-K-17-002. March 2018.
https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf. (Accessed January 2019).

[177] The principal objective of the DWSRF is to facilitate compliance with the national primary drinking water regulations or otherwise significantly advance the public health protection objectives of the Safe Drinking Water Act. The DWSRF is meant to serve the public health needs of the existing population. The Congress directed that the DWSRF program avoid the use of funds to finance the expansion of any public water system in anticipation of future population growth. The U.S. EPA specified in the DWSRF Interim Final Rule that a project which is intended primarily to address public health or regulatory compliance issues for the existing service population may be sized for a "reasonable" amount of population growth over the useful life of the project. The projects eligible for funding can be rehabilitation of existing infrastructure or construction of new facilities (*e.g.*, alternative supply in case of emergency or drought).
Reference: U.S. EPA. 2017. Drinking Water State Revolving Fund Eligibility Handbook. EPA Provisional Document. June 2017. Office of Ground Water and Drinking Water. EPA 816-B-17-001. https://www.epa.gov/sites/production/files/2017-06/documents/dwsrf_eligibility_handbook_june_13_2017_updated_508_version.pdf. (Accessed January 2019).

**Figure 3.4.2 U.S. EPA's Drinking Water Infrastructure Needs Survey and Assessment for Florida**




*transmission and distribution

Source: U.S. EPA. 2018. Drinking Water Infrastructure Needs Survey and Assessment. Sixth Report to Congress. Office of Water (4606M), EPA 816-K-17-002. March 2018. https://www.epa.gov/drinkingwatersrf/epas-6th-drinking-water-infrastructure-needs-survey-and-assessment. (Accessed December 2018).

Similarly, an evaluation of the existing supply is necessary to test the assumption of its continued availability over a 20-year period. In this edition, EDR did not separately consider the potential variability and vulnerability of water supply caused by weather (*e.g.*, droughts) or saltwater intrusion that in the future may be exacerbated by climate change. Meanwhile, according to the Fourth National Climate Assessment, the southeastern U.S. (including Florida) will face a widespread and continuous threat posed by sea level rise (which is projected at 1 to 4 feet in the 21st century; see Figure 3.4.3 for a graphical assessment of sea level rise risks). A nontrivial percentage of the state's surface water and groundwater, as well as water and wastewater infrastructure, are vulnerable to the impacts of sea level rise. Freshwater supplies from rivers, streams, and groundwater sources near the coast are at risk from accelerated saltwater intrusion due to higher sea levels. For example, officials in the city of Hallandale Beach, Florida, have already abandoned six of their eight drinking water wells.[178] Increasing temperatures and the associated increase in frequency, intensity, and duration of extreme heat events (*i.e.*, days with 95°F or above) will affect the region. Higher temperatures will increase evaporative losses, which combined with growing demand will reduce the availability of water in the southeast.[179] To account for such effects in the statewide expenditure forecast, consideration of various weather conditions and climate change impacts should be included.

[178] Berry, L., F. Bloetscher, H. N. Hammer, M. Koch-Rose, D. Mitsova-Boneva, J. Restrepo, T. Root, and R. Teegavarapu, 2011: Florida Water Management and Adaptation in the Face of Climate Change. 68 pp., Florida Climate Change Task Force. Referenced by: The Fourth National Climate Assessment, *see* https://nca2014.globalchange.gov/highlights/regions/southeast#intro-section-2. (Accessed January 2019).

[179] https://nca2014.globalchange.gov/highlights/regions/southeast. (Accessed January 2019).

**Figure 3.4.3 Map of Relative Coastal Vulnerability as Sea Levels Rise**


Source: Fourth National Climate Assessment Report; based on a Coastal Vulnerability Index, which combines a coastal system's susceptibility to change with its natural ability to adapt to changing environmental conditions (Data from Hammar-Klose and Thieler 2001)[180]

**3. Additional, standardized information should be collected for the alternative water supply projects and conservation initiatives to further improve the accuracy of the EDR expenditure forecast.**

The 2015-2035 Net Demand Change, which is based on WMD's information and reported in DEP (2018), is expressed as a demand for water in the final use (*e.g.*, potable water if PS demand category is considered, or freshwater if agricultural water demand category is analyzed). However, many projects included in the Project Appendix of DEP (2018) are described as reclaimed water flow, groundwater recharge, storage, or ASR water volumes. Additional information should be collected to assess what proportion of water provided by these projects specifically meets the 2015-2035 Net Demand Change, as opposed to, for example, groundwater recharge. As previously described, for reclaimed water projects specifically, the potable water offset can range from 0 to 100 percent, implying that a gallon of reclaimed water provided by a project may or may not meet the demand for a gallon of potable water in public supply.

Furthermore, the expenditure forecast provided by EDR in this edition is based on cost, water flow, and reuse flow data from the Project Appendix of DEP (2018). WMDs and DEP assembled this data from the documents submitted by various entities, and the methods employed by the individual entities determine the quality of the data. The dataset used in the EDR analysis shows significant variation in the cost for projects within the same category (*e.g.*, reclaimed water projects). Further study is needed to identify if some of the variability can be explained by the differences in the methods used by various entities to assess the costs.

Overall, the lack of standardization is problematic. "Total Project ($)" used in EDR's analysis does not explicitly identify if operation and maintenance costs are included. For the projects

[180] Hammar-Klose, E., and E. Thieler, 2001: National Assessment of Coastal Vulnerability to Future Sea-Level Rise: Preliminary Results for the U.S. Atlantic, Pacific and Gulf of Mexico Coasts. U.S. Reports 99–593, 00-178, and 00-179. U.S. Geological Survey.

for which both "Total Project ($)" and "Construction Cost ($)" are provided, "Construction Cost ($)" accounts for 50 to 100 percent of the "Project Total", making it difficult to identify if operation and maintenance, project design, land acquisition, and other costs are consistently excluded from the "Total Project ($)".

Further study is also needed to ensure that the costs of projects implemented in phases is assessed comprehensively and reported consistently among all the WMDs. For the 2019 Edition, EDR considered different strategies to account for the projects implemented in phases in SFWMD. SFWMD is the only district that explicitly identified phases of a project, and additional discussions are needed to ensure that staged projects are treated consistently among the districts.

The information currently provided about many of the projects is limited. Specific project components that influence the total project cost are not described. For example, the relative sizes of treatment versus distribution components may explain part of the variability in reclaimed water project costs; however, the description of many projects does not identify these components.

The information about expected projects' lifespan is also missing, preventing the assessment of costs per million gallons of water or reuse flow. For example, projects with the same total cost and volume of water can have different costs per million gallons, if the projects' lifespans are different. Due to the lack of data about projects' lifespan, this difference is currently not accounted for in the EDR analysis.

Finally, in this edition, specific assumptions are made regarding the mix of projects to meet the net demand change in each planning region. These assumptions are based on the number of projects and the volume of water created by the projects listed in the dataset based on the original Appendix (DEP 2018). However, a variety of alternative plausible scenarios of the future project mixes can be developed. In the future, the sensitivity of the expenditure forecast to the scenario assumption should be further examined.

4. **Refined water demand projections can enable EDR to model the timing of water supply expenditures in relation to the water demand increase.**

EDR intends to independently assess the statewide water demand in future editions to ensure consistency across the state, as well as create linkages to the official Florida Economic and Demographic forecasts. Further, the demand projections should be compared to the existing supply and water availability to better identify the timing of the expenditures for the alternative water supplies or conservation initiatives. Investments in alternative water supply or conservation will need to be incurred in advance, to ensure that water is available to the users when it is needed. Timing for potential land acquisition, project design, and construction should be appropriately accounted for and related to the timing of the demand increases.

Further, in this edition, EDR uses the water demand projection and estimates developed by the WMDs and assembled by the DEP. County population estimates and projections are relied upon by the State and Florida's five WMDs for water supply planning, water use permitting,

and a host of other uses. Because water management district boundaries do not always follow county boundaries, allocating the official population estimates and medium county projections can be difficult in those areas. For that reason, during 2019, EDR has requested that the University of Florida, Bureau of Economic and Business Research (BEBR) undertake an analysis of different methods to allocate county population estimates and projections to water management district boundaries. This analysis will be conducted as part of an annual Demographic Analytical Services contract that the University has with the Legislature.

Opportunities to model changes in water demand depending on various environmental and socio-economic parameters will be explored using existing data sources. For example, a multi-year and multi-utility dataset called H2OSAV is being assembled by the University of Florida Extension to merge information from water meters, conservation programs, and property appraiser data.[181] The goal of H2OSAV is to facilitate the evaluation of consumption patterns and the effectiveness of individual conservation programs. Currently, the dataset includes information for the CFWI, Gainesville, and Sarasota County Utilities, and the geographic coverage is expected to increase in the future. Other datasets may exist to refine the demand forecasting on the statewide level.

5. **It is important to evaluate potential economic implications of any identified gaps between water demand and existing supply.**

Economic implications of the potential gap between projected demand and existing supply can be much broader than the direct expenditures for alternative water supplies and conservation. They may include changes in the urban development pattern in response to changes in fresh groundwater availability, shifts in agricultural production further inland in response to saltwater intrusion in coastal areas, reduction in agricultural output due to more frequent drought water use restrictions, etc. EDR intends to include a discussion of such broader implications of water availability and use for the state's economy in future editions.

## *Recommendations*

In order for EDR to further the development of an integrated water supply and demand model, as required in section 403.928, Florida Statutes, EDR recommends that the Legislature establish a workgroup to address many of the data limitations discussed above. The workgroup, led by EDR, should consist of representatives from DEP and each WMD, and should convene immediately, and as necessary thereafter, to reach agreement on the following:

- Identification and quantification of all existing water supply sources in a consistent manner, including water available from both traditional and alternative water supplies;

- Evaluation of the assumption that all existing water supplies will be available to satisfy the existing demand over the 20-year planning period;

[181] *See* https://h2osav.buildgreen.org/. (Accessed December 2018). H2OSAV was funded via legislative appropriation for Fiscal Years 2016-17 and 2017-18 (recurring), individual utilities, and DACS (pending). Based on the information reported in the meeting summary of CFWI, July 2017, available at https://cfwiwater.com/meetings/pdfs/2018/01-19/Meeting-Summary-20170718.pdf. (Accessed December 2018).

- Development of criteria for evaluating the infrastructure costs necessary to maintain the supply used to meet the existing demand;

- Quantification of the water needed for the protection and restoration of the natural systems and how to incorporate it within the context of EDR's integrated water supply and demand model; and

- Development of a methodology to appropriately plan for droughts, including a consistent definition and an approach for estimating the sources available to meet demand during a drought.

EDR should develop a report detailing the findings of the workgroup, including any matters for which agreement among the workgroup members could not be attained, and how EDR will incorporate the findings in its integrated water supply and demand model. The report should be submitted to the Governor, the President of the Senate, and the Speaker of the House of Representatives no later than October 15, 2019, and include any recommendations for statutory revisions.

# 4. Florida's Water-Resource Related Expenditures and Revenues

Florida's waters are the state's most basic and valued resource, providing an array of benefits crucial to existence, quality of life, and the economy. These benefits include water storage, flood protection, water purification, habitat for plant and animal species, recreational and educational opportunities, and scenic beauty. Florida is ranked third in the country in inland water area with almost 40 percent of its total area covered by water.[182] The state has 27,561 miles of streams and rivers; more than 7,700 lakes, reservoirs, and ponds that are at least 10 acres in size covering a surface area over 1.6 million acres; 11.3 million acres of freshwater and tidal wetlands;[183] and 825 miles of sandy beaches.[184] Florida also has more than 1,000 known springs, which include 33 of the 78 first magnitude springs in the United States.[185] In addition, Florida has fresh groundwater in underlying aquifers which provides drinking water through public supply or private residential wells to approximately 90 percent of Florida's population[186]—a demand that is in addition to the needs of the natural environment.

The management, protection, and restoration of Florida's surface water and groundwater require a coordinated effort among various state agencies, water management districts, public and private utilities, local governments, and other stakeholders. Because water is recognized as a public resource benefiting the entire state, water resource management in Florida is conducted on a state and regional basis.[187] The Florida Department of Environmental Protection (DEP) is vested with the power and responsibility to conserve, protect, manage, and control waters of the state with the flexibility to delegate appropriate powers to the five water management districts.[188] The web of regulatory and non-regulatory water programs, as well as financial assistance programs for water projects and initiatives, establish the existing framework for water resource management.

This section of the report provides an assessment of the various programs and initiatives associated with water supply and water quality. The assessment includes historic and estimated future expenditures on water programs and projects, forecasts of revenues used for these purposes, and an identification of gaps between projected revenues and estimated expenditures. This section also begins to analyze future expenditures necessary to comply with federal and state laws and regulations governing water quality protection and restoration.

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[182] June 2016, *Integrated Water Quality Assessment for Florida: 2016 Sections 303(d), 305(b), and 314 Report and Listing Update.* Florida Department of Environmental Protection, at page 33, https://floridadep.gov/dear/watershed-assessment-section/documents/2016-integrated-303d305b-report. (Accessed on December 2018).
[183] *Ibid* at page 34.
[184] DEP, Beaches, https://floridadep.gov/water/beaches. (Accessed on December 2018).
[185] June 2016, *Integrated Water Quality Assessment for Florida: 2016 Sections 303(d), 305(b), and 314 Report and Listing Update.* Florida Department of Environmental Protection, at 43, https://floridadep.gov/dear/watershed-assessment-section/documents/2016-integrated-303d305b-report. (Accessed on December 2018).
[186] Marella, R.L. *Water Withdrawals in Florida, 2012,* U.S. Geological Survey Open File Report 2015-1156, available at: https://pubs.usgs.gov/of/2015/1156/ofr20151156_marella-water-use-2012.pdf. (Accessed on December 2018).
[187] § 373.016(4)(a), Fla. Stat.
[188] § 373.016(5), Fla. Stat.

## 4.1 Historical, Current, and Projected Future Water Resource Expenditures

Funding for water resources in Florida is provided by a variety of institutions, including the federal and state governments, regional governments, local governments, and private non-governmental entities. This section summarizes the most relevant information regarding expenditures by these various organizations for water resources.[189] The emphasis is on expenditures rather than appropriations to take account of appropriations that can be spent over multiple years, including bond proceeds.

### *Expenditures of State and Federal Funds*

Each year, the Legislature appropriates General Revenue, state trust funds, and federal trust funds to support programs and initiatives relating to water resources. For this section of the report, EDR has summarized the expenditures for various water resources programs and initiatives related to water supply and water quality.

The DEP is required to develop the Florida Water Plan in cooperation with the water management districts (WMDs), regional water supply authorities, and other appropriate entities.[190] The Florida Water Plan includes the state's water quality standards, the district water management plans, and the water resource implementation rule in chapter 62-40 of the Florida Administrative Code.[191] The Florida Water Plan is also required to include the programs and activities of DEP that relate to water supply, water quality, flood protection and floodplain management, and natural systems.[192]

Ideally, to identify the state's water supply and water quality-related expenditures, EDR would align the appropriations and expenditures to the programmatic structure identified in the Florida Water Plan, and include any other projects and initiatives identified by EDR in the state budget as relating to water resources. Given the current budget structure and the complexity of multi-year historical comparisons, EDR relied on a broader framework for identifying relevant water resource-related expenditures. Refinements to this methodology may occur over time as better data or categorizations are developed.

Since DEP is the primary agency for implementing environmental protection programs, including water resource-related programs on the state-level, EDR primarily focused on DEP's organizational structure and included other state agencies where appropriate. Based on the current structure of DEP,[193] EDR identified the water-related offices and divisions, and the water-related

[189] Sources include the annual General Appropriations Acts, the Florida Accounting Information Resource (FLAIR) System, the Legislative Appropriations/Planning and Budgeting System (LAS/PBS), periodic agency reports, Water Management District annual financial reports, local government annual financial reports, and Public Service Commission private utility data. It should be noted that the structure of federal, state, and local funding often results in duplicative reporting of the same dollars. Attempting to sum the reported expenditures across the various sectors may lead to erroneous conclusions. Further refinements were made to the methodology for the 2019 Edition of this report, and the historical data series has been revised where appropriate.
[190] § 373.036, Fla. Stat.
[191] § 373.036(1)(b)-(d), Fla. Stat.
[192] § 373.036(1)(a), Fla. Stat.
[193] The DEP currently divides itself into three primary areas: Land and Recreation, Regulatory, and Ecosystem Restoration. Within these primary areas, there are offices and divisions that implement various programs and activities. For this section of the report,

programs, projects, or initiatives that received an appropriation in the most recent ten years and assigned them to the following components where appropriate: **Water Supply** or **Water Quality and Other Water Resource-Related Programs**. Additionally, in order to ensure that the staff implementing such programs or initiatives were taken into account in EDR's analysis, the related personnel expenditures were identified and grouped within these two components. For offices or divisions that conducted programs and initiatives that included, but were not exclusively, water resource-related, EDR included those areas and noted that not all of the expenditures were directly related to water resources.

**Water Supply Expenditures**

For the purpose of this report and the development of EDR's integrated water supply and demand model, EDR defined water supply projects or initiatives as activities that appear to more directly promote the availability of sufficient water for all existing and future reasonable-beneficial uses and the natural systems. This would include those activities associated with increasing available water supplies and related water infrastructure, as well as water supply planning activities.[194] For the most part, expenditures for water supply occur on the regional and local level with some programs and activities, such as funding assistance and statewide oversight of WMDs, occurring on the state level.

Within the water supply expenditures component, the state-appropriated funding is primarily associated with the Drinking Water State Revolving Fund (DWSRF) administered by DEP's Division of Water Restoration Assistance pursuant to section 403.8532, Florida Statutes, and the federal Safe Drinking Water Act.[195] With funding provided by federal and state sources, the DWSRF provides low interest loans that finance infrastructure improvements related to public water systems for the purpose of achieving and maintaining compliance with federal and state law.[196] In order to receive the federal capitalization grant for the state revolving fund, the state must match at least 20 percent of the total grant amount made available to the state.[197]

In addition to the DWSRF, beginning in Fiscal Year 2017-18, the Water Storage Facility Revolving Loan program was created with an appropriation of $30.0 million.[198] At the time of this report, no disbursements have been made for this program; however, the funding remains available for expenditure in the Water Resource Protection and Sustainability Program Trust Fund. Since Fiscal Year 2008-09, the expenditures for the revolving funds have totaled nearly $586 million, with approximately 90 percent from federal funding sources. Table 4.1.1 shows the annual cash expenditures since Fiscal Year 2008-09.[199] Due to the inconsistent history of these expenditures, the forecast relies on a 3-year moving average level of expenditures. While an expenditure forecast has been provided for Fiscal Year 2018-19, the appropriation is $122.9 million. Because these

EDR is focusing on DEP's Regulatory and Ecosystem Restoration program areas. *See* Florida Department of Environmental Protection, About DEP, https://floridadep.gov/about-dep (Accessed on December 2018).

[194] Activities associated with the regulation of public water systems by DEP under the Florida Safe Drinking Water Act, part IV of chapter 403, Florida Statutes, or by the Florida Department of Health under section 381.0062, Florida Statutes, are included when identifiable within EDR's water quality and other water resource-related program component.

[195] 42 U.S.C. §300f et. seq.

[196] § 403.8532(1), Fla. Stat.

[197] 42 U.S.C. § 300j-12(e).

[198] *See* § 12, ch. 2017-10, Laws of Fla.

[199] The personnel expenditures associated with the Drinking Water State Revolving Fund are included within the total personnel expenditures for Water Restoration Assistance, Table 4.1.4.

funds are provided for fixed capital outlay projects, the expenditures occur over multiple fiscal years.

**Table 4.1.1 Water Supply Annual Expenditures and Forecast (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Revolving Fund - Drinking Water | $50.99 | $72.52 | $76.45 | $72.23 | $34.75 |
| | | | | | |
| **CASH EXPENDITURES BY FISCAL YEAR*** | **FY13-14** | **FY14-15** | **FY15-16** | **FY16-17** | **FY17-18** |
| Revolving Fund - Drinking Water | $82.49 | $52.95 | $27.41 | $57.49 | $58.58 |
| | | | | | |
| **Forecast** | **FY18-19** | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** |
| State Water Supply Expenditures | $47.83 | $54.63 | $53.68 | $52.05 | $53.45 |
| | | | | | |
| **Forecast** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** | **FY27-28** |
| State Water Supply Expenditures | $53.06 | $52.85 | $53.12 | $53.01 | $52.99 |

*Through June 30, 2018.

**Water Quality and Other Water Resource-Related Program Expenditures**

Article II, Section 7 of the Florida Constitution requires that adequate provision in law be made for the abatement of water pollution. Recognizing the importance of the state's water resources, the Florida Legislature passed the Florida Air and Water Pollution Control Act[200] in 1967 and the Florida Water Resource Act[201] in 1972. In addition, the Florida Safe Drinking Water Act[202] was passed in 1977 to ensure "safe drinking water at all times throughout the state, with due regard for economic factors and efficiency in government."[203] Further, chapter 376, Florida Statutes, addresses surface and groundwater pollution through various programs including state-funded cleanup for petroleum and dry-cleaning solvents, waste cleanup requirements for potentially responsible parties, and restoration of certain potable water systems or private wells impacted by contamination.

To identify the water quality and other water resource-related program expenditures, EDR reviewed the projects and initiatives implemented by DEP and other state agencies related to the protection or restoration of water quality, as well as the activities associated with the regulation of drinking water in Florida. Potentially all existing environmental or natural resource-based programs, projects, and initiatives may influence the quality of water. Therefore, EDR attempted to identify those areas that appeared to be more directly related to the protection and restoration of water quality. Future editions may include refinements to these categorizations.

For the water quality and other water resource-related program component, EDR grouped the identified programs, projects, and initiatives into four categories generally following the internal

[200] Ch. 67-436, Laws of Fla.; § 403.011 et seq.
[201] Ch. 72-299, Laws of Fla.; Ch. 373, Fla. Stat.
[202] Ch. 77-337, Laws of Fla.; § 403.850, Fla. Stat. et seq.
[203] Ch. 77-337, § 2, Laws of Fla.; § 403.851(3), Fla. Stat.

structure of DEP: Environmental Assessment and Restoration; Water Restoration Assistance; Other Programs and Initiatives; and Regulatory/Clean-up Programs.

*Environmental Assessment and Restoration*

DEP's Division of Environmental Assessment and Restoration (DEAR) implements critical responsibilities under state and federal law relating to protecting and restoring water quality in Florida. These responsibilities include adopting, reviewing, and revising Florida's surface water quality standards; monitoring and reporting on water quality; assessing waterbodies to identify those that are impaired; developing water quality restoration targets for the impaired waterbodies (*i.e.,* total maximum daily loads or TMDLs), developing and implementing water quality restoration plans such as basin management action plans (BMAPs), and providing laboratory services to DEP and other agencies.[204]

Expenditures related to DEAR, including personnel and operational costs, monitoring programs, laboratory services and support, and the TMDL program are included in this category. The expenditures identified for the TMDL program are primarily related to projects and activities adopted in basin management action plans, which are developed with state, regional, and local stakeholders to achieve one or more TMDLs. The TMDL and BMAP programs are discussed is more detail in section 4.2, below.

Since Fiscal Year 2008-09, expenditures for environmental assessment and restoration have totaled $284.9 million. The majority of the expenditures has been from state sources (71 percent) with the remaining 29 percent from federal sources. Most of the federal funding is associated with the TMDL program. Table 4.1.2 shows the annual cash expenditures over the past ten years.

[See table on following page]

[204] DEP, Division of Environmental Assessment and Restoration, https://floridadep.gov/dear. (Accessed December 2018).

## Table 4.1.2 DEP's Division of Environmental Assessment and Restoration Expenditures (in $millions)

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Personnel | $12.91 | $12.67 | $11.31 | $10.67 | $10.23 |
| Operations | $2.40 | $2.25 | $2.33 | $2.22 | $2.14 |
| Lab Support | $0.68 | $1.51 | $0.70 | $0.50 | $0.62 |
| Watershed Monitoring | $1.70 | $2.02 | $1.94 | $1.93 | $2.00 |
| TMDL Program** | $4.05 | $2.82 | $5.98 | $7.08 | $12.71 |
| Other Projects | $1.76 | $2.52 | $2.44 | $1.88 | $1.57 |
| **TOTAL** | **$23.50** | **$23.78** | **$24.71** | **$24.29** | **$29.28** |

| CASH EXPENDITURES BY FISCAL YEAR* | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| Personnel | $11.30 | $13.02 | $12.81 | $12.08 | $12.00 |
| Operations | $2.56 | $2.59 | $2.63 | $3.56 | $3.25 |
| Lab Support | $0.62 | $0.32 | $0.19 | $0.51 | $0.44 |
| Watershed Monitoring | $3.59 | $3.09 | $2.30 | $2.33 | $2.62 |
| TMDL Program** | $11.01 | $10.24 | $21.61 | $8.96 | $9.08 |
| Other Projects | $1.68 | $1.57 | $1.75 | $0.95 | $0.67 |
| **TOTAL** | **$30.76** | **$30.83** | **$41.29** | **$28.39** | **$28.07** |

*Through June 30, 2018.

** In the 2018 Edition, certain expenditures were erroneously reported in both the Environmental Assessment and Restoration category (TMDL Program) and the Water Restoration Assistance category (Nonpoint Source Funds), which overstated the total expenditures for these categories. In this edition, the duplicated expenditures are removed, and each type of expenditure is assigned to only one of the categories. EDR will continue to refine these categorizations in future editions.

## Table 4.1.3 DACS Water-Related Expenditures (in $millions)

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Personnel | $2.65 | $2.64 | $2.61 | $2.26 | $2.32 |
| Operations | $0.30 | $0.27 | $0.27 | $0.35 | $0.38 |
| Best Management Practices | $8.51 | $6.55 | $10.98 | $10.74 | $14.58 |
| Other Projects | $1.00 | $0.54 | $0.42 | $0.33 | $0.86 |
| **TOTAL** | **$12.46** | **$10.00** | **$14.28** | **$13.68** | **$18.15** |

| CASH EXPENDITURES BY FISCAL YEAR* | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| Personnel | $2.43 | $2.58 | $2.77 | $3.45 | $3.91 |
| Operations | $0.39 | $0.50 | $0.56 | $0.75 | $0.53 |
| Best Management Practices | $14.98 | $25.91 | $24.54 | $46.07 | $33.18 |
| Other Projects | $0.64 | $0.42 | $0.54 | $0.69 | $0.60 |
| **TOTAL** | **$18.44** | **$29.41** | **$28.40** | **$50.96** | **$38.22** |

*Through June 30, 2018.

In addition to the expenditures for water quality initiatives associated with assessment and restoration at DEP, the Legislature also provides funding to support water-related programs

administered by the Department of Agriculture and Consumer Services (DACS). Since Fiscal Year 2008-09, the expenditures for these programs have totaled $234.0 million, primarily from state sources. Table 4.1.3 shows the annual cash expenditures over the past ten years.

Much of this funding is to support projects and initiatives related to the implementation of agricultural best management practices (BMPs). In addition to cost-sharing programs that assist farmers in implementing BMPs, this category includes expenditures related to the operation of ten hybrid wetland treatment technology systems and three floating aquatic vegetative tilling wetland treatment facilities (with one under construction), as well as ongoing nitrate and nitrite research and remediation.

DACS has primary authority to develop and adopt BMP manuals, by rule, that address agricultural nonpoint sources of pollution, as well as to verify the implementation of BMPs. BMPs are designed to improve water quality while maintaining agricultural production through practices and measures that reduce the amount of fertilizers, pesticides, animal waste, and other pollutants that enter the state's waters. Typical practices include nutrient management, irrigation management, and water resource protection.[205]

Agricultural BMPs serve as the primary tool to prevent and reduce water pollution. DEP, WMDs, and DACS are required to assist agricultural entities with implementation of BMPs. To that end, DACS implements cost-share programs to provide financial assistance for BMP implementation. According to DACS' Office of Agricultural Water Policy, as of December 31, 2017, there were an estimated 3,749,331 agricultural acres enrolled in BMPs statewide representing approximately 53 percent of total agricultural areas statewide (not including silviculture).[206]

*Water Restoration Assistance*

DEP's Division of Water Restoration Assistance (DWRA) is responsible for providing financial assistance in the form of low-interest loans or grants to fund water quality and water quantity projects throughout the state.[207] This includes the federal and state-funded State Revolving Fund; nonpoint source grants under both the federal Clean Water Act Section 319(h) grants and the state's TMDL Water Quality Restoration grants; and the Deepwater Horizon program.[208] DWRA also manages legislatively appropriated water projects and springs restoration funding.[209]

Expenditures related to DEP's DWRA, including personnel and the various loan and grant programs, are included in this category. Since Fiscal Year 2008-09, the expenditures for the identified programs total more than $2.4 billion. Of the total appropriations, approximately 56

[205] DACS, *What are Agricultural Best Management Practices?*, available at: http://www.freshfromflorida.com/content/download/30796/761833/Brochure_-What_are_Agricultural_Best_Management_Practices.pdf. (Accessed December 2018).

[206] *See* Florida Department of Agriculture and Consumer Services, Status of Implementation of Agricultural Nonpoint Sources Best Management Practices, July 1, 2018, available at: https://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy. (Accessed December 2018). In the 2018 Edition of this report, EDR reported that, as of March 31, 2017, a total of 11,316,311 acres were enrolled in agricultural BMPs. The statewide BMP enrollment totals also included BMP enrollment related to silviculture (6,418,292 acres).

[207] DEP, *Division of Water Restoration Assistance*, https://floridadep.gov/wra. (Accessed December 2018).

[208] For the 2020 Edition and beyond, expenditures for beach management projects and non-mandatory land reclamation may be excluded as not being directly related to water quality restoration or improvement. In addition, these programs are currently being administered by DEP's Division of Water Resource Management.

[209] DEP, *Division of Water Restoration Assistance*, https://floridadep.gov/wra. (Accessed December 2018).

percent has been funded from federal sources and 44 percent from state sources. Most of the federal funding is associated with the State Revolving Fund, including grants for Wastewater Treatment Facilities Construction and grants for Small Community Wastewater Treatment. Table 4.1.4 shows the annual cash expenditures since Fiscal Year 2008-09.

**Table 4.1.4 Water Restoration Assistance Expenditures (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Personnel | $4.86 | $4.58 | $4.47 | $4.19 | $3.84 |
| Operations | $0.79 | $0.38 | $0.61 | $0.66 | $0.64 |
| Revolving Fund - Wastewater Facilities | $76.86 | $121.18 | $107.04 | $154.88 | $101.75 |
| Revolving Fund - Wastewater Small Community | $13.93 | $21.97 | $9.67 | $12.59 | $22.03 |
| Water Projects | $120.94 | $41.31 | $28.86 | $16.58 | $16.44 |
| Nonpoint Source Funds** | $33.99 | $25.84 | $19.60 | $12.17 | $7.68 |
| Springs Restoration | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Beach Projects/Restoration[210] | $30.01 | $16.87 | $12.46 | $15.97 | $15.52 |
| Non-Mandatory Land Reclamation | $3.05 | $2.48 | $2.29 | $4.92 | $1.44 |
| Deepwater Horizon Projects[211] | $0.00 | $0.51 | $2.02 | $1.18 | $1.88 |
| Other Projects | $15.00 | $0.00 | $0.00 | $0.50 | $0.00 |
| **TOTAL** | **$299.44** | **$235.12** | **$187.02** | **$223.65** | **$171.21** |

| CASH EXPENDITURES BY FISCAL YEAR* | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| Personnel | $3.75 | $3.38 | $3.28 | $6.58 | $3.88 |
| Operations | $0.38 | $0.48 | $0.42 | $0.50 | $0.35 |
| Revolving Fund - Wastewater Facilities | $80.60 | $162.99 | $119.05 | $161.73 | $169.88 |
| Revolving Fund - Wastewater Small Community | $37.33 | $21.60 | $16.49 | $7.28 | $0.89 |
| Water Projects | $9.26 | $20.07 | $43.43 | $49.96 | $47.79 |
| Nonpoint Source Funds** | $3.08 | $2.80 | $3.86 | $10.96 | $10.06 |
| Springs Restoration | $10.00 | $0.06 | $5.19 | $9.36 | $17.00 |
| Beach Projects/Restoration | $15.69 | $24.92 | $37.42 | $37.24 | $38.74 |
| Non-Mandatory Land Reclamation | $0.86 | $1.53 | $2.18 | $1.02 | $0.17 |
| Deepwater Horizon Projects | $3.29 | $32.87 | $12.92 | $19.01 | $20.00 |
| Other Projects | $0.12 | $0.01 | $0.16 | $0.37 | $1.82 |
| **TOTAL** | **$164.36** | **$270.70** | **$244.41** | **$304.01** | **$310.61** |

*Through June 30, 2018.

** In the 2018 Edition, certain expenditures were erroneously reported in both the Environmental Assessment and Restoration category (TMDL Program) and the Water Restoration Assistance category (Nonpoint Source Funds), which overstated the total expenditures for these categories. In this edition, the duplicated expenditures are removed, and each type of expenditure is assigned to only one of the categories. EDR will continue to refine these categorizations in future editions.

[210] Beach restoration and inlet management projects may not be considered traditional water quality restoration or improvement projects. However, because of the significance of funding assistance for beaches in Florida, as well as their potential value as a defense against storm surge, EDR has continued to include these expenditures within this section for reference among the other water funding assistance programs. In future editions, EDR may reevaluate including these expenditures.

[211] The amounts shown are those expenditures identified as being related to water resources and are not inclusive of all expenditures funded through Deepwater Horizon-related settlements.

During this time, approximately 64 percent of identified expenditures were for water quality projects funded through the Clean Water State Revolving Fund (CWSRF),[212] Section 319 Clean Water Acts grants,[213] and the state TMDL Water Quality Restoration grants. Eligible projects under the CWSRF include the construction or upgrade of wastewater and stormwater infrastructure. Projects funded through Section 319 and TMDL grants (nonpoint source funds) are intended to reduce nonpoint source pollution and may include demonstration and evaluation of urban and agricultural best management practices, storm water retrofits, and public education projects.[214]

A more recent funding initiative is the annual statutory distribution from the Land Acquisition Trust Fund for spring restoration, protection, and management projects. Of the funds remaining after payment of debt service for Florida Forever bonds and Everglades restoration bonds, the lesser of 7.6 percent or $50 million is to be appropriated for springs projects.[215] In the General Appropriations Acts of 2015, 2016, 2017, and 2018 the Legislature appropriated funds for land acquisition to protect springs and for projects that protect water quality and water quantity that flow from springs. Through the end of Fiscal Year 2017-18, approximately $41.6 million of the funds appropriated for springs restoration had been spent.

The final major category of funding assistance is provided through specific legislative appropriations for water projects identified each year in the General Appropriations Act. These water projects vary from year to year, although some projects have received funding in multiple years. The projects address water quality improvement (including septic-to-sewer projects), stormwater management, wastewater management, waterbody restoration, water supply,[216] flooding, and other water resource-related concerns. Expenditures on water projects have ranged from as high as $120.9 million in Fiscal Year 2008-09 to as little as $9.3 million in Fiscal Year 2013-14. In the most recent two fiscal years, 2016-17 and 2017-18, spending on water projects has averaged $48.9 million per year.

*Other Programs and Initiatives*

In addition to Environmental Assessment and Restoration and Water Restoration Assistance, the Legislature has funded a variety of other water quality restoration projects and initiatives over the past ten years. Since Fiscal Year 2008-09, expenditures for these programs have exceeded $986 million. More than 98 percent of expenditures were from state sources and less than two percent from federal sources. The largest initiative in this category is Everglades restoration, with total expenditures of $806.8 million or 81.8 percent of the total over this time period.[217]

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[212] *See* 33 U.S.C. § 1383; § 403.1835, Fla. Stat.

[213] 33 U.S.C. § 1329(h).

[214] DEP, Nonpoint Source Funds, https://floridadep.gov/WRA/319-TMDL-Fund. (Accessed December 2018).

[215] § 375.041(3)(b)2., Fla. Stat.

[216] Water supply projects such as drinking water infrastructure projects and alternative water supply projects have also received legislatively-appropriated funding under this category. Although expenditures for drinking water infrastructure projects and alternative water supply projects would relate to water supply, these expenditures are included in this category because insufficient project level data currently exists to allocate the expenditures between water supply and water quality.

[217] The total expenditures for Everglades restoration include a $34.0 million transfer to the Everglades Trust Fund in Fiscal Year 2017-18. A more detailed discussion of Everglades restoration is included in subsection 5.1 of the report. In addition to these state-appropriated expenditures for Everglades restoration, the federal government has directly spent over $1.0 billion on Everglades restoration efforts since 2011. *See* Table 5.1.3 for more details.

The annual cash expenditures since Fiscal Year 2008-09 are shown in Table 4.1.5. Three new components were added to this category in this year's report – the Transfer to the Everglades Trust Fund, the Herbert Hoover Dike rehabilitation, and red tide research. These issues were added because of their importance to the state's response to recent algae blooms and red tide.

**Table 4.1.5 Other Programs and Initiatives Expenditures (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Everglades Restoration | $55.84 | $38.35 | $69.27 | $27.54 | $26.60 |
| Transfer to Everglades Trust Fund | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Hoover Dike Rehabilitation | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Office of Water Policy | $0.00 | $0.00 | $0.00 | $0.00 | $1.79 |
| Other Projects | $6.67 | $5.21 | $6.47 | $6.91 | $8.06 |
| Red Tide Research | $3.52 | $1.00 | $1.00 | $0.64 | $0.64 |
| **TOTAL** | **$66.03** | **$44.57** | **$76.73** | **$35.09** | **$37.09** |

| CASH EXPENDITURES BY FISCAL YEAR* | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| Everglades Restoration | $93.92 | $54.56 | $115.77 | $140.37 | $150.53 |
| Transfer to Everglades Trust Fund | $0.00 | $0.00 | $0.00 | $0.00 | $34.00 |
| Hoover Dike Rehabilitation | $0.00 | $0.00 | $0.00 | $0.00 | $50.00 |
| Office of Water Policy | $2.27 | $2.29 | $2.36 | $2.32 | $2.43 |
| Other Projects | $7.61 | $15.46 | $14.88 | $17.76 | $15.88 |
| Red Tide Research | $1.28 | $1.26 | $0.62 | $0.68 | $0.43 |
| **TOTAL** | **$105.09** | **$73.57** | **$133.63** | **$161.12** | **$253.27** |

*Through June 30, 2018.

During and since the summer months of 2018, toxic algae blooms have posed a threat to the state's public health, safety, and welfare as well as its sensitive environment and ecosystems, prompting the Governor to issue a series of executive orders declaring a state of emergency in affected Florida counties. Executive Order 18-191 was issued in July 2018, declaring a state of emergency in Glades, Hendry, Lee, Martin, Okeechobee, Palm Beach, and St. Lucie counties because of widespread algae blooms caused by discharges of water from Lake Okeechobee into the Caloosahatchee River, the St. Lucie River, the Indian River Lagoon, and estuaries.[218] Similarly, the Governor issued a second Executive Order 18-221 in August, declaring a state of emergency in Charlotte, Collier, Hillsborough, Lee, Pinellas, Manatee, and Sarasota counties due to red tide algae bloom development in the Gulf of Mexico off the coast of Southwest Florida.[219] Subsequent Executive Orders 18-275 and 18-282 were issued in October 2018, expanding the state of

[218] Executive Order 18-191 (July 9, 2018). Available at https://www.flgov.com/wp-content/uploads/2018/07/EO-18-191.pdf. (Accessed December 2018). This Executive Order was extended by Executive Orders 18-249 (September 6, 2018) and Executive Order 18-311 (November 5, 2018). Executive Order 18-311 expired January 4, 2019.

[219] Executive Order 18-221 (August 13, 2018). Available at https://www.flgov.com/wp-content/uploads/orders/2018/EO_18-221.pdf. (Accessed December 2018). This Executive Order was extended and expanded by Executive Orders 18-275 (October 4, 2018) and 18-282 (October 17, 2018). Executive Order 18-282 expired December 16, 2018.

emergency to include Brevard, Broward, Indian River, Martin, Miami-Dade, Palm Beach, and St. Lucie counties.

As shown in Table 4.1.5, over the past ten years, the state has spent an average of $1.1 million per year for ongoing red tide research. The Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute partners with Mote Marine Laboratory to monitor the organism that causes most red tides along the southwest coast. Through this partnership, scientists conduct water sampling and monitoring and update the public on the status of red tide.[220]

Due to the widespread nature and longer duration of the current algae blooms, the state's response to this issue has become more robust over the past 20 months. First, the Legislature passed Senate Bill 10 in the 2017 Regular Session, which authorized annual transfers to the Everglades Trust Fund administered by the South Florida Water Management District.[221] In Fiscal Year 2017-18, the state transferred $34 million to the trust fund, including $30 million to acquire land or negotiate leases or for any cost related to planning or constructing the Everglades Agricultural Area (EAA) reservoir project; $3 million for developing the post-authorization change report; and $1 million for negotiating Phase II of the C-51 reservoir project.[222] The EAA reservoir project is included in the Comprehensive Everglades Restoration Plan (CERP) as Component G and is intended to improve the timing of water discharges from Lake Okeechobee. Currently, the releases of water from Lake Okeechobee include cyanobacteria (blue-green algae), which produce hazardous toxins in the rivers, lagoons, and estuaries that receive the discharges. Beginning in Fiscal Year 2018-19, $64 million is to be transferred annually to the Everglades Trust Fund to continue the planning and construction of the EAA reservoir project.[223]

Second, the State of Florida invested $100 million to help rehabilitate the Herbert Hoover Dike, which is a 143-mile earthen dam that surrounds Lake Okeechobee in order to protect adjacent communities from floods during periods of heavy rain. The funds are intended to both strengthen the dike for flood protection and increase its capacity to retain water in Lake Okeechobee. The additional water retention is intended to reduce the discharges that are contributing to the algae blooms. The funds were distributed as follows: $50 million in May 2018 (Fiscal Year 2017-18) and $50 million in September 2018 (Fiscal Year 2018-19) to the U.S. Army Corps of Engineers.[224] The U.S. Army Corps of Engineers announced in July that $514.2 million in federal funds has also been authorized to speed the repairs, with a targeted completion date of 2022.[225]

Finally, since the 2018-19 state budget was approved in March 2018, an additional $28.2 million has been authorized through a series of budget amendments to address the algae blooms and red

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[220] *See* https://myfwc.com/research/red-tide/monitoring/current/coop/. (Accessed December 2018).
[221] Ch. 2017-10, Laws of Fla.
[222] §§ 10 and 11 of ch. 2017-19, Laws of Fla.
[223] Specific Appropriation 1581 of the Fiscal Year 2018-19 General Appropriations Act (ch. 2018-9, Laws of Fla.) provides the required transfer of $64.0 million from the Land Acquisition Trust Fund to the Everglades Trust Fund as part of the appropriations for Everglades restoration. Subparagraph (3)(a)4. of section 375.041, Fla. Stat, provides that any funds remaining in a fiscal year from the EAA reservoir project are made available for Phase II of the C-51 reservoir project or the Everglades restoration projects approved in chapter 2016-201, Laws of Florida.
[224] The Fiscal Year 2017-18 expenditures are shown in Table 4.1.5. The expenditures made in Fiscal Year 2018-19 will be included in the 2019 Edition of this report.
[225] Turner, Jim (2018, July 6). Herbert Hoover Dike repairs get $514.2 million boost in federal funding. *The Orlando Sentinel.* Retrieved from https://www.orlandosentinel.com. (Accessed January 2019).

tide. Of this amount, $22.2 million is authorized to be spent from the General Revenue Fund and $6.0 million from trust funds. The budget amendments provide funding for additional monitoring and water sampling, research and experimental testing, fishery stock enhancement, and grants to local governments and governmental agencies, such as water management districts. Expenditures of these funds will be included in the 2020 Edition of this report.

*Regulatory and Clean-Up Programs*

EDR included DEP's regulatory section in its analysis of expenditures for water quality and other water resource-related programs because program areas within this section implement or enforce laws related to water quality, provide research that supports water-related programs, or implement programs that are associated with the assessment or remediation of surface and groundwater pollution.

Since Fiscal Year 2008-09, the State of Florida has spent more than $2.4 billion for regulatory and clean-up programs administered by DEP. The majority of this funding, approximately 92.7 percent, has been funded from state sources. Most of the expenditures are associated with clean-up programs for hazardous waste sites; petroleum tanks; underground tanks; and water wells. The personnel included in this grouping are employed by DEP's district offices, water resource management, waste management, and the Florida Geological Survey. DEP's district offices are responsible for implementing programs relating to air and waste regulation, as well as water resource protection and restoration. EDR was unable to identify the personnel who exclusively work on water within the available data; therefore, all personnel costs have been included. Table 4.1.6 shows the annual cash expenditures since Fiscal Year 2008-09.

**Table 4.1.6 Regulatory and Clean-up Program Expenditures (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Personnel | $66.33 | $66.67 | $65.60 | $61.48 | $58.87 |
| Operations | $8.80 | $7.25 | $7.37 | $8.04 | $6.88 |
| Petroleum Restoration | $162.13 | $28.35 | $109.54 | $120.29 | $132.11 |
| Waste Clean-Up | $60.86 | $147.16 | $37.79 | $41.45 | $36.68 |
| Other Projects | $32.55 | $38.83 | $35.74 | $21.47 | $16.83 |
| **TOTAL** | **$330.67** | **$288.26** | **$256.05** | **$252.73** | **$251.38** |
| | | | | | |
| **CASH EXPENDITURES BY FISCAL YEAR*** | **FY13-14** | **FY14-15** | **FY15-16** | **FY16-17** | **FY17-18** |
| Personnel | $59.07 | $58.15 | $56.24 | $52.74 | $65.04 |
| Operations | $7.13 | $7.65 | $8.42 | $8.63 | $10.04 |
| Petroleum Restoration | $81.85 | $59.73 | $80.97 | $119.44 | $122.40 |
| Waste Clean-Up | $26.38 | $28.68 | $37.40 | $36.11 | $36.61 |
| Other Projects | $14.63 | $15.02 | $15.29 | $16.74 | $18.87 |
| **TOTAL** | **$189.06** | **$169.24** | **$198.32** | **$233.66** | **$252.96** |

*Through June 30, 2018. Data in this table has been revised and supersedes that reported in previous editions.

As shown in Table 4.1.6, petroleum cleanup activities account for the majority of expenditures in this category. They range from approximately 35 percent to 53 percent in Fiscal Years 2008-09 through 2017-18 (except in Fiscal Year 2009-10 when less than 10 percent was spent on petroleum restoration).

The expenditures shown for Waste Clean-Up include the activities associated with the following major types of clean-up efforts: dry-cleaning solvent contamination; hazardous waste; underground storage tanks; water wells; and contracts with local governments. In addition, the expenditures shown for Other Projects include various programs and projects including waste planning grants, underground storage tank compliance verification, solid waste management activities, and transfers to other agencies for specified activities (*e.g.*, to the Department of Health for Biomedical Waste Regulation).

*State Aid to Water Management Districts*

Each year in the state budget, the Legislature provides funding to support the Water Management Districts (WMDs). Since Fiscal Year 2008-09, direct expenditures to support the districts' water quality and other water resource-related programs have totaled more than $127 million. Most of the funding is provided through DEP; however, the expenditures related to Everglades restoration are provided through the Florida Department of Transportation. In this regard, a portion of the toll revenue deposited into the State Transportation Trust Fund from the Alligator Alley Toll Road has been provided, when available, to the South Florida Water Management District for Everglades restoration projects.[226] Table 4.1.7 shows the annual cash expenditures since Fiscal 2008-09.

**Table 4.1.7 State Aid to Water Management Districts (in $millions)**

| CASH EXPENDITURES BY FISCAL YEAR* | FY08-09 | FY09-10 | FY10-11 | FY11-12 | FY12-13 |
|---|---|---|---|---|---|
| Operations and Permitting Assistance | $9.70 | $3.76 | $4.74 | $0.19 | $1.71 |
| Minimum Flows and Levels | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Wetland Protection | $0.63 | $0.49 | $0.61 | $0.36 | $0.73 |
| Dispersed Water Storage | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 |
| Everglades Restoration | $2.00 | $0.00 | $0.00 | $0.00 | $4.40 |
| **TOTAL** | **$12.34** | **$4.24** | **$5.35** | **$0.55** | **$6.84** |
| | | | | | |
| **CASH EXPENDITURES BY FISCAL YEAR*** | **FY13-14** | **FY14-15** | **FY15-16** | **FY16-17** | **FY17-18** |
| Operations and Permitting Assistance | $2.26 | $8.08 | $8.30 | $8.30 | $8.30 |
| Minimum Flows and Levels | $0.00 | $0.00 | $1.50 | $1.50 | $3.45 |
| Wetland Protection | $2.44 | $0.88 | $0.00 | $0.00 | $0.00 |
| Dispersed Water Storage | $0.00 | $10.00 | $5.00 | $5.00 | $5.00 |
| Everglades Restoration | $4.40 | $8.60 | $7.06 | $0.00 | $8.01 |
| **TOTAL** | **$9.10** | **$27.56** | **$21.87** | **$14.80** | **$24.76** |

*Through June 30, 2018. In the 2018 Edition, this table was included within regional expenditures. For the 2019 Edition, it has been moved to state expenditures to better reflect the state's investment in water resources.

[226] § 338.26, Fla. Stat. (Each year, tolls are generated from the use of Alligator Alley. The Department of Transportation is authorized to transfer any funds in excess of those used to conduct certain activities prescribed in paragraph (3)(a) to SFWMD for Everglades restoration.)

*Forecast of Expenditures on Water Quality and Other Water Resource-Related Programs*
Table 4.1.8 provides a forecast for total state expenditures on water quality and other water resource-related programs. Beginning in Fiscal Year 2008-09, the expenditures for these programs declined each year before resuming growth after the low point in Fiscal Year 2012-13. Since that time, the annual growth rate has averaged approximately 12 percent as increased revenues became available to reinvest in these programs. The highest growth rate occurred in Fiscal Year 2016-17 at 18.7 percent, followed by an increase of 14.5 percent in Fiscal Year 2017-18. Because of this unusual pattern, the forecast applies the change in the most recent two growth rates to the prior year's growth rate. This essentially produces a decay factor that is applied to each forecast year, resulting in continued, but slowing, annual increases. By the 2025-26 fiscal year in the forecast, the annual growth rates are very close to Florida population growth rates of approximately 1.5 percent. While an expenditure forecast has been provided for Fiscal Year 2018-19, appropriations for this year have already been made. Because some of these funds are provided for fixed capital outlay projects, the expenditures will occur over multiple fiscal years.

**Table 4.1.8 History and Forecast of State Expenditures on Water Quality and Other Water Resource-Related Programs (in $millions)**

| **History** | **FY08-09** | **FY09-10** | **FY10-11** | **FY11-12** | **FY12-13** |
|---|---|---|---|---|---|
| Expenditures | $744.44 | $605.98 | $564.14 | $549.99 | $513.94 |
| **History** | **FY13-14** | **FY14-15** | **FY15-16** | **FY16-17** | **FY17-18** |
| Expenditures | $516.81 | $601.31 | $667.92 | $792.95 | $907.89 |
| **Forecast** | **FY18-19** | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** |
| Expenditures | $1,009.77 | $1,097.51 | $1,171.35 | $1,232.36 | $1,282.06 |
| **Forecast** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** | **FY27-28** |
| Expenditures | $1,322.09 | $1,354.06 | $1,379.41 | $1,399.40 | $1,415.10 |

Note: History differs from the 2018 Edition due to the inclusion of state aid to WMDs and other data refinements.

## *Regional Expenditures*

Recognizing that water resource problems vary in magnitude and complexity from region to region across the state, the Legislature vests in DEP the power and responsibility to accomplish conservation, protection, management, and control of waters of the state, but with enough flexibility to accomplish these ends through the delegation of powers to the various water management districts (WMDs).[227]

Chapter 373, Florida Statutes, provides the state's five WMDs with broad authority to conduct a wide range of regulatory and non-regulatory programs and initiatives addressing four areas of responsibility: water supply, water quality, flood protection and floodplain management, and

[227] § 373.016(5), Fla. Stat.

natural systems. Similar to the analyses for the WMDs' conservation land acquisition and management, in order to identify expenditures of the WMDs related to water supply and water quality, EDR reviewed the WMDs' budget documents, which, in general, provide additional information on the specific fiscal resources used to support the four areas of responsibility. In this regard, EDR reviewed the WMDs' preliminary budgets and tentative budgets developed in accordance with sections 373.535 and 373.536, Florida Statutes, respectively.

Within the preliminary and tentative budgets, each WMD allocates the prior fiscal year's actual expenditures to program areas that generally align with the water supply, water quality, flood protection and floodplain management, and natural systems areas of responsibility.[228] For purposes of developing their budgets, the WMD program areas identified in section 373.536, Florida Statutes, along with DEP's guidance on standard definitions are:

- 1.0 Water Resource Planning and Monitoring: includes all water management planning, including water supply planning, development of minimum flows and levels, and other water resources planning; research, data collection, analysis, and monitoring; and technical assistance (including local and regional plan and program review).

- 2.0 Acquisition, Restoration and Public Works: includes the development and construction of all capital projects (except for those contained in Program 3.0), including water resource development projects, water supply development assistance, water control projects, and support and administrative facilities construction; cooperative projects; land acquisition and the restoration of lands and waterbodies.

- 3.0 Operation and Maintenance of Lands and Works: includes all operation and maintenance of facilities, flood control and water supply structures, lands, and other works authorized by Chapter 373, Florida Statutes.

- 4.0 Regulation: includes water use permitting, water well construction permitting, water well contractor licensing, environmental resource and surface water management permitting, permit administration and enforcement, and any delegated regulatory program.

- 5.0 Outreach: includes all environmental education activities, such as water conservation campaigns and water resources education; public information activities; all lobbying activities relating to local, regional, state, and federal governmental affairs; and all public relations activities, including related public service announcements and advertising in the media.

- 6.0 Management and Administration:[229] includes all governing [and basin board] support; executive support; management information systems; unrestricted reserves; and general counsel, ombudsman, human resources, finance, audit, risk management, and administrative services.

[228] § 373.536(5), Fla. Stat.
[229] For the purposes of this analysis, program area 6.0 is excluded.

These statutorily-prescribed program areas are further divided into categories and subcategories; however, the actual-audited expenditures are allocated among the four areas of responsibility only at the program level. Note that the allocation among the four areas of responsibility is based on estimates, which may include allocations that split programs, activities, and sub-activities, in cases where overlap exists.

Further, to avoid double counting WMD expenditures between the conservation land and water sections of this report, the total expenditures on categories "2.1 Land Acquisition" and "3.1 Land Management" have been removed[230] from the expenditures in the following four tables. Table 4.1.9 provides a forecast and details a history of expenditures that the WMDs attributed to the water supply area of responsibility. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

**Table 4.1.9 Water Management District Water Supply Expenditures (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $3.49 | $8.31 | $8.03 | $8.20 | $7.90 |
| **SJRWMD** | $22.20 | $22.27 | $42.49 | $42.38 | $42.50 |
| **SFWMD** | $81.99 | $89.62 | $90.43 | $85.53 | $93.71 |
| **SWFWMD** | $60.96 | $57.40 | $53.38 | $34.06 | $26.16 |
| **SRWMD** | $2.67 | $3.20 | $5.00 | $6.19 | $3.93 |
| **Total** | $171.31 | $180.81 | $199.34 | $176.35 | $174.20 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $183.85 | $180.23 | $179.61 | $181.23 | $180.35 |

Source: Annual Budgets of the Water Management Districts.

Table 4.1.10 provides a forecast and details a history of expenditures that the WMDs attributed to the water quality area of responsibility. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts now rely on the average of the three-year moving average and three-year moving average growth rate. Now reported as actuals, the expenditure for local Fiscal Year 2016-17 was significantly higher than anticipated in the 2018 Edition.

[See table on following page]

[230] While the districts are not required to allocate each category and subcategory among the four areas of responsibility, Northwest Florida WMD approximated that 10 percent of land acquisition and management is categorized as Water Supply, and 30 percent to each of Water Quality, Flood Protection, and Natural Systems. These shares are used across all districts and years to address the removal of subcategories 2.1 Land Acquisition and 3.1 Land Management.

**Table 4.1.10 Water Management District Water Quality Expenditures (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $1.50 | $3.67 | $5.67 | $4.92 | $5.35 |
| **SJRWMD** | $23.17 | $23.76 | $24.57 | $25.05 | $27.34 |
| **SFWMD** | $61.10 | $87.03 | $88.53 | $89.18 | $113.99 |
| **SWFWMD** | $30.38 | $23.52 | $19.12 | $25.12 | $22.23 |
| **SRWMD** | $1.29 | $1.65 | $2.01 | $4.09 | $2.29 |
| **Total** | $117.44 | $139.63 | $139.89 | $148.36 | $171.21 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $164.09 | $173.30 | $183.87 | $191.32 | $201.94 |

Source: Annual Budgets of the Water Management Districts.

Table 4.1.11 provides a forecast and details a history of expenditures that the WMDs attributed to the flood protection area of responsibility. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

**Table 4.1.11 Water Management District Flood Protection Expenditures (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $1.64 | $2.34 | $2.89 | $2.70 | $2.36 |
| **SJRWMD** | $17.42 | $17.93 | $7.44 | $8.42 | $11.47 |
| **SFWMD** | $95.54 | $93.58 | $90.29 | $90.42 | $98.50 |
| **SWFWMD** | $31.42 | $30.87 | $26.11 | $17.47 | $17.94 |
| **SRWMD** | $1.75 | $1.99 | $2.38 | $4.47 | $2.62 |
| **Total** | $147.76 | $146.70 | $129.11 | $123.48 | $132.89 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $129.65 | $128.36 | $129.51 | $129.17 | $129.01 |

Source: Annual Budgets of the Water Management Districts.

Table 4.1.12 provides a forecast and details a history of expenditures that the WMDs attributed to the natural systems area of responsibility. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts now rely on the average of the three-year moving average and three-year moving average growth rate. Now reported as actuals, the expenditure for local Fiscal Year 2016-17 was significantly higher than anticipated in the 2018 Edition.

[See table on following page]

**Table 4.1.12 Water Management District Natural Systems Expenditures (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $2.02 | $2.91 | $4.33 | $3.60 | $4.26 |
| **SJRWMD** | $16.69 | $17.28 | $30.63 | $31.10 | $34.03 |
| **SFWMD** | $82.82 | $120.00 | $134.85 | $121.42 | $147.16 |
| **SWFWMD** | $32.79 | $27.17 | $34.21 | $32.77 | $32.58 |
| **SRWMD** | $2.40 | $2.73 | $3.61 | $5.86 | $3.55 |
| **Total** | $136.72 | $170.09 | $207.63 | $194.75 | $221.57 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $220.37 | $228.67 | $240.46 | $250.65 | $262.28 |

Source: Annual Budgets of the Water Management Districts.

Table 4.1.13 provides a forecast and details a history of water expenditures[231] by special districts[232] that are located in multiple counties. Based on survey results, a portion of the local government account identified as 537 Conservation and Resource Management is expended on water supply and a portion on water quality protection and restoration. Further, the accounts identified as 535 Sewer/Wastewater Services, 536 Water-Sewer Combination Services, and 538 Flood Control/Stormwater Management have been classified as water quality protection and restoration expenditures. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

**Table 4.1.13 Water Expenditures by Regional Special Districts (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Supply** | $0.01 | $0.01 | $0.01 | $0.01 | $0.01 |
| **Quality Protection & Restoration** | $102.14 | $101.13 | $100.54 | $101.35 | $104.21 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Supply** | $0.01 | $0.01 | $0.01 | $0.01 | $0.01 |
| **Quality Protection & Restoration** | $101.77 | $102.14 | $102.47 | $102.13 | $102.24 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts. A portion of 537 is shared out in accordance with local government survey results for supply and demand; 535, 536, 538, and a portion of 537 shared out by local government survey results for quality protection and restoration.

[231] For further details on the source and methodology of this data, *see* "Local Expenditures" in subsection 2.2.

[232] There exists a small number of governmental entities (*e.g.*, utility authorities) that cross counties but are technically not special districts. Their expenditures are included here.

## *Local Expenditures*

Table 4.1.14 provides a forecast and details a history of water supply expenditures by local governments. Based on survey results, a portion of the local government account[233] identified as 537 Conservation and Resource Management is attributed to water supply. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts rely on a three-year moving average as it best fits the nature of the data.

**Table 4.1.14 Water Supply Expenditures by Local Governments (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $8.46 | $6.95 | $7.00 | $6.46 | $7.84 |
| **Municipalities** | $1.29 | $1.25 | $0.83 | $0.94 | $1.27 |
| **Special Districts** | $0.04 | $0.02 | $0.03 | $0.06 | $0.06 |
| **Total** | $9.78 | $8.22 | $7.85 | $7.46 | $9.18 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $8.08 | $8.13 | $8.32 | $8.18 | $8.21 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts a portion of 537 shared out by local government survey.

Table 4.1.15 provides a forecast and details a history of water quality protection and restoration expenditures by local governments. Based on survey results, a portion of the local government account identified as 537 Conservation and Resource Management is attributed to water quality protection and restoration. Further, the accounts identified as 535 Sewer/Wastewater Services, 536 Water-Sewer Combination Services, and 538 Flood Control/Stormwater Management have been classified as water quality protection and restoration expenditures. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Forecasts rely on a three-year moving average growth rate as it best fits the nature of the data.

[See table on following page]

[233] For further details on the source and methodology of this data, *see* "Local Expenditures" in subsection 2.2.

**Table 4.1.15 Water Quality Protection & Restoration Expenditures by Local Governments (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| Counties | $2,019.60 | $2,060.02 | $2,143.76 | $2,175.66 | $2,320.52 |
| Municipalities | $3,052.59 | $3,095.91 | $3,167.20 | $3,260.64 | $3,373.61 |
| Special Districts | $389.63 | $399.78 | $420.25 | $516.92 | $555.53 |
| Total | $5,461.83 | $5,555.71 | $5,731.22 | $5,953.22 | $6,249.66 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| Total | $6,406.38 | $6,665.79 | $6,943.48 | $7,220.14 | $7,513.74 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 535, 536, 538, and a portion of 537 shared out by local government survey.
Note: Data in this table has been revised and supersedes that reported in previous editions.

## *Public and Private Utilities Expenditures*

Table 4.1.16 provides a forecast and details a history of expenditures by public water utilities. The source of this data is the local government account identified as 533 Water Utility Services. It is possible that a portion of public utility expenditures has been accounted for in the local government expenditures through EDR's categorization of the accounts identified as 535, 536, and 538 described above. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Population growth drives the forecast as utility expenditures are generally expected to follow population growth.

**Table 4.1.16 Expenditures by Public Water Utilities (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| Public Utilities | $1,141.99 | $1,154.32 | $1,163.92 | $1,260.97 | $1,267.97 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| Public Utilities | $1,287.45 | $1,309.15 | $1,330.88 | $1,351.43 | $1,371.80 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 533.

Table 4.1.17 provides a forecast and details a history of expenditures by private water utilities. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC). As of December 2018, only 38 of Florida's 67 counties are within the jurisdiction of the PSC. Because of this, the remaining expenditures from counties outside their jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix[234] of rural and urban counties both in and out of the PSC's jurisdiction. Note that the

[234] Florida Public Service Commission, Water and Wastewater, PSC Jurisidictional and Non-Jurisdictional Counties, http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/wawtextchart.pdf. (Accessed December 2018).

historic data is in calendar years. For forecasting purposes, it was converted to state fiscal years. Population growth drives the forecast as utility expenditures are generally expected to follow population growth.

**Table 4.1.17 Expenditures by Private Utilities (in $millions)**

| History | CY 2013 | CY 2014 | CY 2015 | CY 2016 | CY 2017 |
|---|---|---|---|---|---|
| Private Utilities | $70.63 | $71.43 | $74.27 | $76.08 | $79.46 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| Private Utilities | $79.06 | $80.28 | $81.49 | $82.68 | $83.83 |

Source: A historical series was created using data provided by the Florida Public Service Commission.

## 4.2 Estimating Future Expenditures Necessary to Comply with Laws and Regulations Governing Water Quality Protection and Restoration

EDR is directed to identify programs and initiatives associated with protecting and restoring water quality in Florida. While EDR has identified some expenditure categories currently associated with water quality in section 4.1, these are not all of the expenditures that will be necessary to comply with all laws and regulations. For this edition, EDR begins its analysis by focusing on the state's responsibilities under the federal Clean Water Act and the Florida Watershed Restoration Act. This includes the total maximum daily load (TMDL) program and the basin management action plan (BMAP) program. These programs represent major, long-term funding initiatives whose primary and direct effects relate to the restoration of waterbodies.

In future editions, EDR will begin to integrate other relevant projects and initiatives, including Everglades restoration and any new initiatives associated with addressing blue-green algae and red tide in Florida. EDR will also conduct further research to identify and integrate the various regulatory and non-regulatory programs that protect ground and surface waters.[235]

**Federal Clean Water Act**

The first major federal law to address water pollution in the United States was the Federal Water Pollution Control Act of 1948. In 1972, the Act was significantly amended through the passage of the Clean Water Act.[236] The primary purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[237] Two national goals were also established: (1) the elimination of pollutant discharges into navigable waters by 1985; and (2)

Counties in PSC jurisdiction: Alachua, Bradford, Brevard, Broward, Charlotte, Clay, Duval, Escambia, Franklin, Gadsden, Gulf, Hardee, Highlands, Jackson, Lake, Lee, Leon, Levy, Manatee, Marion, Martin, Monroe, Nassau, Okaloosa, Okeechobee, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Putnam, Seminole, St. Johns, St. Lucie, Sumter, Volusia, and Washington.
Counties out of PSC jurisdiction: Baker, Bay, Calhoun, Citrus, Collier, Columbia, DeSoto, Dixie, Flagler, Gilchrist, Glades, Hamilton, Hendry, Hernando, Hillsborough, Holmes, Indian River, Jefferson, Lafayette, Liberty, Madison, Miami-Dade, Santa Rosa, Sarasota, Suwannee, Taylor, Union, Wakulla, and Walton.

[235] While EDR will conduct further research to appropriately address the various regulatory programs of DEP that protect water quality, EDR has already identified certain regulatory and site cleanup expenditures in Table 4.1.6.

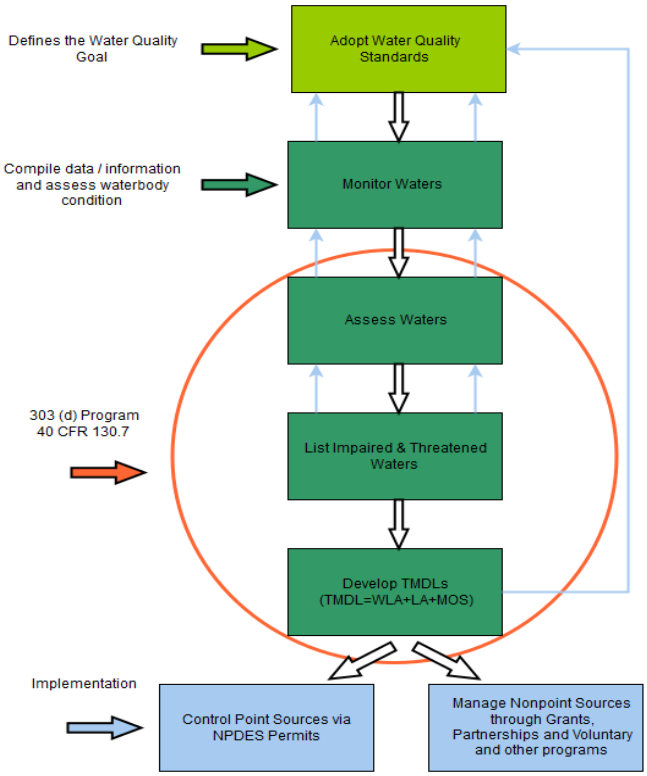
[236] 33. U.S.C. § 1251 et seq.

[237] 33 U.S.C. § 1251(a).

fishable and swimmable waters by 1983.[238] Although these dates have long passed, the intent behind these ambitious goals are still embodied in the Clean Water Act.

The Clean Water Act establishes the basic framework for states to control water pollution in navigable waters. In addition to regulating pollutant discharges and providing funding opportunities to address water quality issues, the Clean Water Act also imposes various requirements on states with regard to water quality management. Overall, the Clean Water Act provides the general structure by which states manage water quality—*i.e.*, setting, reviewing, and revising water quality standards, assessing the condition of waterbodies, and establishing water quality restoration goals (through the adoption of total maximum daily loads) for waters which do not meet water quality standards. Figure 4.2.1 illustrates the general approach for managing water quality under the Clean Water Act.

**Figure 4.2.1 Water Quality-Based Approach of the Federal Clean Water Act**




Source: U.S. Environmental Protection Agency, Overview of Identifying and Restoring Impaired Waters under Section 303(d) of the CWA, https://www.epa.gov/tmdl/overview-identifying-and-restoring-impaired-waters-under-section-303d-cwa. (Accessed December 2018).

The Clean Water Act directs states to establish water quality standards, or if the state fails to act, requires the U.S. Environmental Protection Agency (U.S. EPA) to do so.[239] Florida's surface water quality standards are adopted by rule in Chapter 62-302 of the Florida Administrative Code, and

[238] 33 U.S.C. § 1251(a).
[239] 33 U.S.C. § 1313(a)-(c).

consist of designated uses (such as potable water),[240] numeric and narrative criteria necessary to safely support such uses, the state's anti-degradation policy, and moderating provisions (such as variances, mixing zone rules, or exemptions).[241]

The Clean Water Act requires each state to classify its surface waters according to their designated uses.[242] Florida has seven classes of designated uses that are arranged in order. The highest classification requires the highest degree of protection (*i.e.,* Class I – Potable Water Supplies). This classification generally has the most stringent applicable water quality criteria.

**Table 4.2.1 Classification of Surface Waters**

| | |
|---|---|
| CLASS I | Potable Water Supplies |
| CLASS I-Treated | Treated Potable Water Supplies |
| CLASS II | Shellfish Propagation or Harvesting |
| CLASS III | Fish Consumption; Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife |
| CLASS III-Limited | Fish Consumption; Recreation or Limited Recreation; and/or Propagation and Maintenance of a Limited Population of Fish and Wildlife |
| CLASS IV | Agricultural Water Supplies |
| CLASS V | Navigation, Utility, and Industrial Use |

Source: Fla. Admin. Code R. 62-302.400(1) (2018).

Through permitting under the National Pollution Discharge Elimination System (NPDES) program,[243] limits are imposed on discharges to surface waters from all point sources (*e.g.,* wastewater treatment facilities) and stormwater controls are required for certain stormwater discharges (*i.e.,* municipal separate storm sewer systems or MS4s) to ensure that water quality standards are attained. Any waters not fully supporting their designated uses must be placed on the 303(d) Impaired Waters List for development of a total maximum daily load (TMDL). Any waters that do not meet applicable water quality standards as a result of natural conditions or pollution not caused by pollutants are noted in DEP's water quality assessment under section 305(b) of the Clean Water Act.[244] On even numbered years, DEP submits an integrated water quality report to the U.S. EPA to meet reporting requirements of the Clean Water Act under sections 303(d), 305(b), and 314 of the Clean Water Act.[245]

**Total Maximum Daily Loads and Basin Management Action Plans**

In 1999, the Florida Legislature passed the Florida Watershed Restoration Act, section 403.067, Florida Statutes, which established the state's total maximum daily load (TMDL) program to

[240] The term "designated use" is defined as "the present and future most beneficial use of a body of water as designated by the Environmental Regulation Commission by means of the Classification system contained in [rule chapter 62-302]." Fla. Admin. Code R. 62-302.200(9).
[241] Fla. Admin. Code R. 62-302.200(42).
[242] 33 U.S.C. § 1313(c).
[243] The NPDES permit program is a federal program, authorized in section 402 of the Clean Water Act, which DEP administers at the state-level.
[244] Fla. Admin. Code R. 62-303.100(2).
[245] The most recent integrated water quality report is available at: https://floridadep.gov/dear/dear/content/integrated-water-quality-assessment-florida. (Accessed January 2019).

implement section 303(d) of the federal Clean Water Act.[246] Under this program, waters identified as impaired (*i.e.,* not meeting water quality standards) are placed on DEP's Verified List of impaired waterbodies for which TMDLs must be developed. [247] DEP identifies a priority schedule to establish the TMDLs. The Verified List is adopted by secretarial order and is submitted to the U.S. EPA pursuant to 303(d) of the Clean Water Act.[248] The U.S. EPA must approve or disapprove the 303(d) list and may independently add additional waterbodies not identified by a state.

Establishing a TMDL for an impaired waterbody represents a major first step toward restoring water quality. The TMDL represents the maximum amount of a specific pollutant that a waterbody or waterbody segment can assimilate from all sources while still maintaining applicable water quality standards.[249] Using the TMDL as the maximum value, individual wasteload allocations for point sources (*e.g.,* NPDES wastewater and NPDES stormwater facilities) and the load allocations for nonpoint sources (*e.g.,* stormwater from residential and agricultural areas) are assigned, along with a margin of safety to account for uncertainty in the scientific analysis. All TMDLs include either an explicit (*i.e.*, a specified amount of loading held in reserve) or implicit (*i.e.*, conservative assumptions made and documented during TMDL development) margin of safety. These allocations along with other management and restoration strategies are intended to provide for the attainment of the TMDL.[250]

In 2005, the Florida Watershed Restoration Act was amended to authorize DEP to adopt basin management action plans (BMAPs). These are restoration plans that are unique to Florida. BMAPs provide the state's primary mechanism for implementing TMDLs for surface waters and groundwater-fed springs. The plans represent the management strategies committed to by state, regional, local, and private stakeholders to reduce pollutant sources, and thereby achieve water quality standards for the pollutants causing impairment. BMAPs are adopted by DEP secretarial order and are enforceable by law.[251]

A BMAP includes an equitable allocation of pollutant reductions to individual basins, as a whole to all basins, or to each identified point source or category of nonpoint sources.[252] Through participation from governmental and private stakeholders, DEP identifies appropriate management strategies, schedules for implementation, feasible funding strategies, plans for evaluating the effectiveness of the management strategies, and strategies to address potential future increases in pollutant loadings.[253] A BMAP must include milestones for implementation and water quality improvement as well as an associated water quality monitoring component to evaluate the progress of pollutant reductions. An assessment of the progress toward meeting the milestones is conducted every five years and revisions to BMAPs are made when deemed necessary or appropriate. In

[246] 33 U.S.C. § 1313(d).
[247] *See generally* Fla. Admin. Code Ch. 62-303 (establishing the methodology for identifying impaired waters to be included on the state's Verified List of impaired waters, as well as the Planning List and Study List identifying potentially impaired waters and waters where additional information is needed, respectively).
[248] *See* Fla. Admin. Code R. 62-303.100(1); *see also* Fla. Admin. Code R. 62-303.150(1). The Statewide Comprehensive Verified List of Impaired Waters is available at: https://floridadep.gov/dear/watershed-assessment-section/content/assessment-lists. (Accessed January 2019).
[249] *See* Fla. Admin. Code R. 62-303.200(31).
[250] § 403.067(6), Fla. Stat.
[251] § 403.067(7)(d)1., Fla. Stat. (providing that BMAPs are enforceable pursuant to sections 403.067, 403.121, 403.141, and 403.161, Florida Statutes).
[252] § 403.067(7)(a)2., Fla. Stat.
[253] *See* § 403.067(7)(a), Fla. Stat.

recent years, additional requirements have been placed on BMAPs. For example, beginning in 2016, each new or revised BMAP must also include:

- A description of best management practices (BMP) adopted by rule (*e.g.,* DACS-adopted BMP manuals);
- A list of projects in priority ranking with planning-level cost estimates and an estimated date of project completion;
- The source and amount of financial assistance available by DEP, a WMD, or other entity, if applicable; and
- A planning-level estimate of each listed project's expected load reduction, if applicable.[254]

There are also new BMAP requirements, added in 2016, specifically for Outstanding Florida Springs under the Florida Springs and Aquifer Protection Act,[255] and for BMAPs adopted for Lake Okeechobee, the Caloosahatchee Estuary Basin, and the St. Lucie Estuary Basin under the Northern Everglades and Estuaries Protection Program.[256] A notable requirement relating to TMDL implementation places a 20-year target to achieve the TMDLs, with 5-year, 10-year, and 15-year intermediate milestones.[257]

**Best Management Practices**

While TMDLs are implemented by point sources of pollution through timely changes in NPDES permit conditions (such as new discharge limits), nonpoint sources not subject to NPDES permitting achieve the necessary level of pollution reduction detailed in BMAPs by implementing appropriate best management practices (BMPs) or by conducting water quality monitoring prescribed by DEP or the applicable WMD.

For nonagricultural nonpoint sources not subject to NPDES permitting (*i.e.,* non-MS4 sources), BMAP strategies are implemented through other existing permitting programs, such as DEP and the WMDs' environmental resource program (ERP).[258] In addition, stakeholders may identify projects, such as the construction of retention systems, like grass swales, detention systems, such as dry or wet ponds, and educational or outreach programs, to meet their pollution reduction goals.[259]

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[254] § 403.067(7)(a)4.c., Fla. Stat.
[255] §§ 373.801 – 373.813, Fla. Stat.
[256] § 373.4595, Fla. Stat.
[257] *See* § 373.4595, Fla. Stat. (requiring DEP to develop a schedule establishing 5-year, 10-year, and 15-year milestones and targets to achieve the TMDL within 20 years after adoption of the Lake Okeechobee BMAP, Caloosahatchee Estuary BMAP, and the St. Lucie River and Estuary BMAP; or else provide an explanation of the constraints that prevent achievement within 20 years, an estimate of the time needed, and additional 5-year measurable milestones); *see also* § 373.807, Fla. Stat. (requiring DEP to develop a schedule establishing 5-year, 10-year, and 15-year milestones and targets to achieve the nutrient TMDLs within 20 years of adopting a BMAP for an Outstanding Florida Spring).
[258] *See* Ch. 62-330, Fla. Admin. Code. (adopting the statewide environmental resource permitting program).
[259] *See, e.g.,* DEP, Statewide Best Management Practice (BMP) Efficiencies for Nonpoint Sources Management of Surface Waters, Draft—July 2018, available at https://floridadep.gov/dear/water-quality-restoration/documents/statewide-best-management-

For agricultural nonpoint sources, agricultural BMPs serve as the primary tool to prevent and reduce water pollution. Agricultural BMPs are intended to be practical, cost-effective measures that agricultural producers can undertake to conserve water and reduce the amount of pesticides, fertilizers, animal waste, and other pollutants from entering water resources.[260] An agricultural producer who implements and maintains verified, DACS-adopted BMPs receives a presumption of compliance with state water quality standards for the pollutants addressed by the BMPs.[261] While the BMP program is generally voluntary, where DEP adopts a BMAP that includes agriculture, producers are required to implement DACS-adopted BMPs or conduct water quality monitoring to demonstrate compliance with water quality standards. DEP or the applicable WMD reviews and approves any monitoring plans developed for this effort.[262]

Currently, DACS implements its BMP programs through three divisions or offices: the Office of Agricultural Water Policy (OAWP), the Florida Forest Service (FFS), and the Division of Aquaculture. There are currently BMP manuals adopted into rule for citrus, cow/calf, dairy, equine, nurseries, poultry, sod, specialty fruit and nut crops, vegetable and agronomic crops, wildlife (for state imperiled species), agriculture in the Lake Okeechobee Watershed, conservation plans containing BMPs for specified agricultural operations,[263] aquaculture,[264] and silviculture.[265]

According to DACS' Office of Agricultural Water Policy, as of December 31, 2017, there were an estimated 3.75 million agricultural acres enrolled in its BMPs statewide (excluding aquaculture and silviculture). The enrolled acreage represents approximately 53 percent of total agricultural areas statewide.[266] Of those, approximately two million acres are within BMAP areas with the highest percentage of enrollment within the southern Florida region. See Figure 4.2.2 for a map of BMP-enrolled agricultural lands statewide, excluding silviculture and aquaculture.[267] As of January 2019, eight of the BMAPs for Outstanding Florida Springs are effective, while five other BMAPs are pending the outcome of legal challenges. Once the pending BMAPs for Outstanding Florida Springs are effective, BMP enrollment is expected to increase in northern and central Florida.

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practice-bmp-efficiencies. (describing DEP methods to calculate total nitrogen and total phosphorous reductions for urban stormwater when site-specific information is unavailable) (Accessed December 2018).

[260] *See* DACS, Agricultural Best Management Practices, What Are Agricultural Best Management Practices?, https://www.freshfromflorida.com/Business-Services/Water/Agricultural-Best-Management-Practices. (Accessed December 2018).

[261] § 403.067(7)(c), Fla. Stat.

[262] *See* § 403.067(7)(b), Fla. Stat.

[263] *See* DACS, Agricultural Best Management Practices, BMP Rules, Manuals, Notices of Intent Forms and Brochures, https://www.freshfromflorida.com/Business-Services/Water/Agricultural-Best-Management-Practices. (providing a list of adopted commodity-specific BMPs) (Accessed December 2018). *See also* Fla. Admin. Code Title 5M (containing rule chapters for adopted BMP manuals).

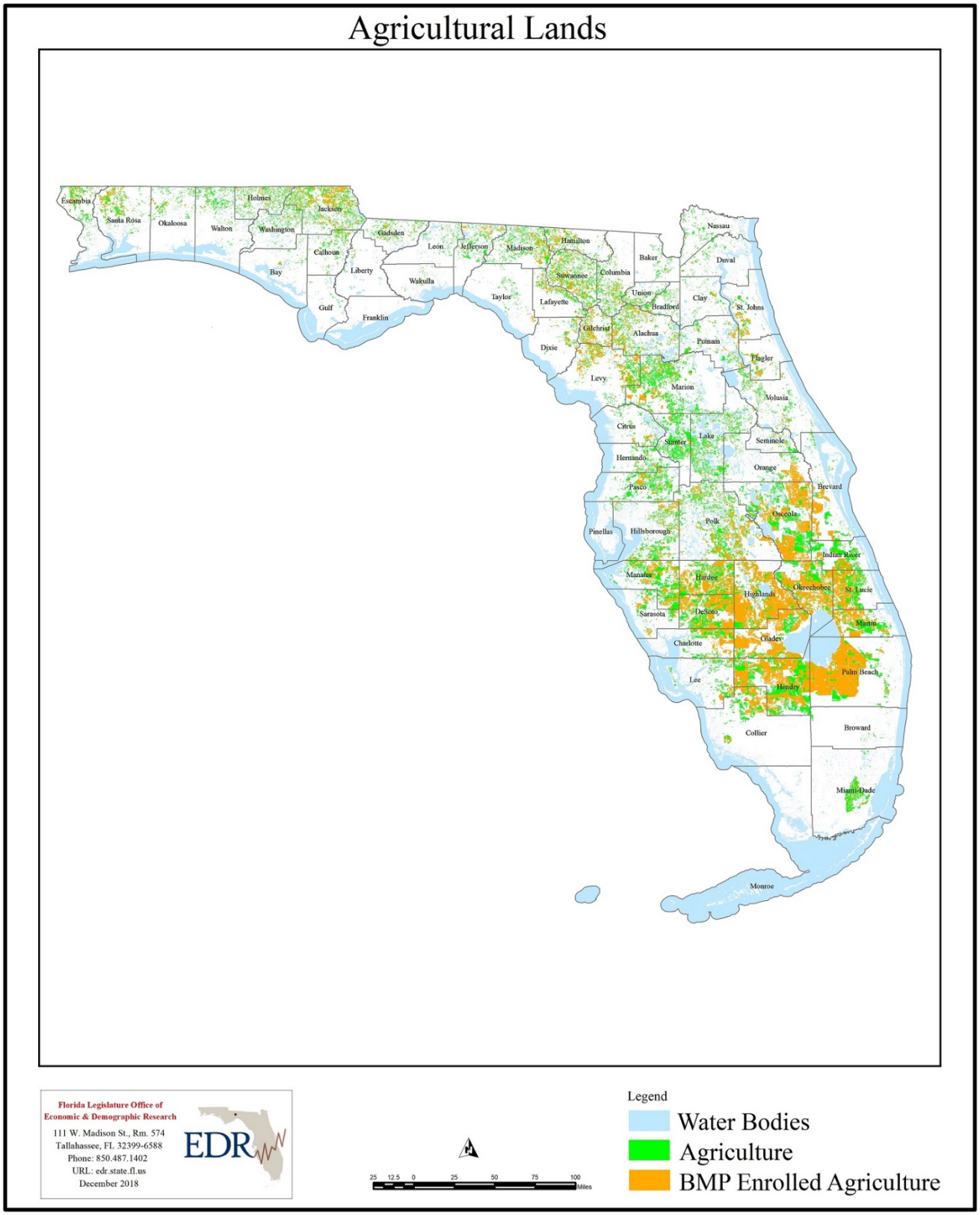
[264] *See* DACS, Division of Aquaculture, Popular Links, https://www.freshfromflorida.com/Divisions-Offices/Aquaculture. (Accessed December 2018). *See also* Fla. Admin. Code Ch. 5L-3, Aquaculture Best Management Practices.

[265] *See* DACS, Forest Hydrology, Silviculture BMPs, https://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Best-Management-Practices-BMPs. *See also* Fla. Admin. Code. Ch. 5I-6, Best Management Practices for Silviculture.

[266] *See* DACS, Status of Implementation of Agricultural Nonpoint Sources Best Management Practices, July 1, 2018, available at: https://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy. (Accessed December 2018). \

[267] The estimates for BMP-enrolled agricultural areas do not include BMP enrollment for aquaculture or silviculture. EDR is coordinating with DACS' Florida Forest Service (FFS) to identify BMP-enrolled silviculture for future editions, if appropriate. The current edition of this report reflects data provided by DACS' Office of Agricultural Water Policy in its Status of Implementation of Agricultural Nonpoint Sources Best Management Practices Report, July 1, 2018.

**Figure 4.2.2 Map of BMP-enrolled Agricultural Lands (Excluding Silviculture & Aquaculture)**




Source: GIS data provided by DACS' Office of Agricultural Water Policy.

**Assessment of Impaired Waterbodies**

DEP assesses waters through a watershed management approach whereby 29 basins throughout the state rotate on a five-year, five-phase cycle of: (1) monitoring, (2) assessment, (3) TMDL development, (4) basin management action plan (BMAP) development, and (5) implementation of restoration activities.[268] The watershed management approach allows DEP to focus its resources on specific basins throughout the state during each phase and ideally ensures that a given basin will be assessed at least every five years.

Based on the statewide comprehensive Verified List of impaired waters, which includes the most recent updates adopted in June 27, 2018, there are approximately 1,728 waterbody-parameter combinations that are impaired and require a TMDL.[269] Note that a waterbody or waterbody segment not meeting water quality standards for multiple reasons, such as excessive nutrients and fecal coliform, would be identified more than once on the Verified List as separate waterbody-parameter combinations.

In June 2018, DEP submitted its first annual progress report to the Governor and Florida Legislature, which, in part, provides the status of each TMDL and BMAP (Statewide Annual Report, or STAR Report).[270] In the STAR Report, DEP must include a status of BMAP projects identified to achieve a TMDL, and, if applicable, an explanation of possible causes and potential solutions for any 5-year, 10-year, or 15-year milestone, or 20-year target date not met.[271] The report must also include project descriptions, estimated costs, proposed priority project ranking, and funding needs to achieve the TMDL.[272]

According to the STAR Report, as of December 31, 2017, DEP has adopted a total of 409 TMDLs covering many of the largest watersheds in the state.[273] Specifically, there are 224 TMDLs for dissolved oxygen (DO), nutrients, and/or un-ionized ammonia; 179 TMDLs for bacteria; and five for other parameters (iron, lead, and turbidity).[274] In addition to these site-specific TMDLs, DEP also adopted a statewide TMDL for mercury affecting over 1,100 waterbody segments.[275] For the 2015 through 2022 time period, DEP expects to develop site-specific TMDLs for 80 priority waterbodies or waterbody segments.[276] For a map of TMDL activities in the state, see Figure 4.2.3.

Additionally, as of December 31, 2017, DEP has adopted 25 BMAPs and is developing or updating numerous BMAPs statewide including new and revised BMAPs addressing Outstanding Florida

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[268] *See* Florida Department of Environmental Protection, Final Integrated Water Quality Assessment for Florida: 2018 Sections 303(d), 305(b), and 314 Report and Listing Update, at 136-39 (describing the watershed management approach), available at: https://floridadep.gov/sites/default/files/2018_integrated_report.pdf. (Accessed December 2018.)

[269] Florida Department of Environmental Protection, Statewide Comprehensive Verified List of Impaired Waters, available at: https://floridadep.gov/dear/watershed-assessment-section/content/assessment-lists. (Accessed December 2018).

[270] § 403.0675, Fla. Stat. (requires DEP to provide a status on TMDLs, BMAPs, minimum flows or minimum water levels, and recovery or prevention strategies. For this section of the report, EDR is focusing on the TMDL and BMAP programs.)

[271] § 403.0675(1), Fla. Stat.

[272] *Id*.

[273] Florida Department of Environmental Protection, Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water levels, and Recovery or Prevention Strategies, at 3, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2018).

[274] *Id*.

[275] *Id*.

[276] *See* Appendix A of Letter from Gregory P. DeAngelo, P.E.., Florida Department of Environmental Protection, to Gracy Danois, Chief, U.S. Environmental Protection Agency (September 1, 2015), available at: https://floridadep.gov/sites/default/files/PriorityFrameworkDocument.pdf. (Accessed January 2019).

Springs.[277] The majority of adopted BMAPs address nutrient impairments. Note that for this edition, EDR has not included in its analysis any pending BMAPs or revisions to BMAPs.[278] For a map of adopted and pending BMAPs, see Figure 4.2.4. For a list of adopted BMAPs and the pollutants addressed, as of December 31, 2017, see Table 4.2.2.

### Table 4.2.2 Adopted BMAPs and Parameter(s) Addressed (as of Dec. 2018)

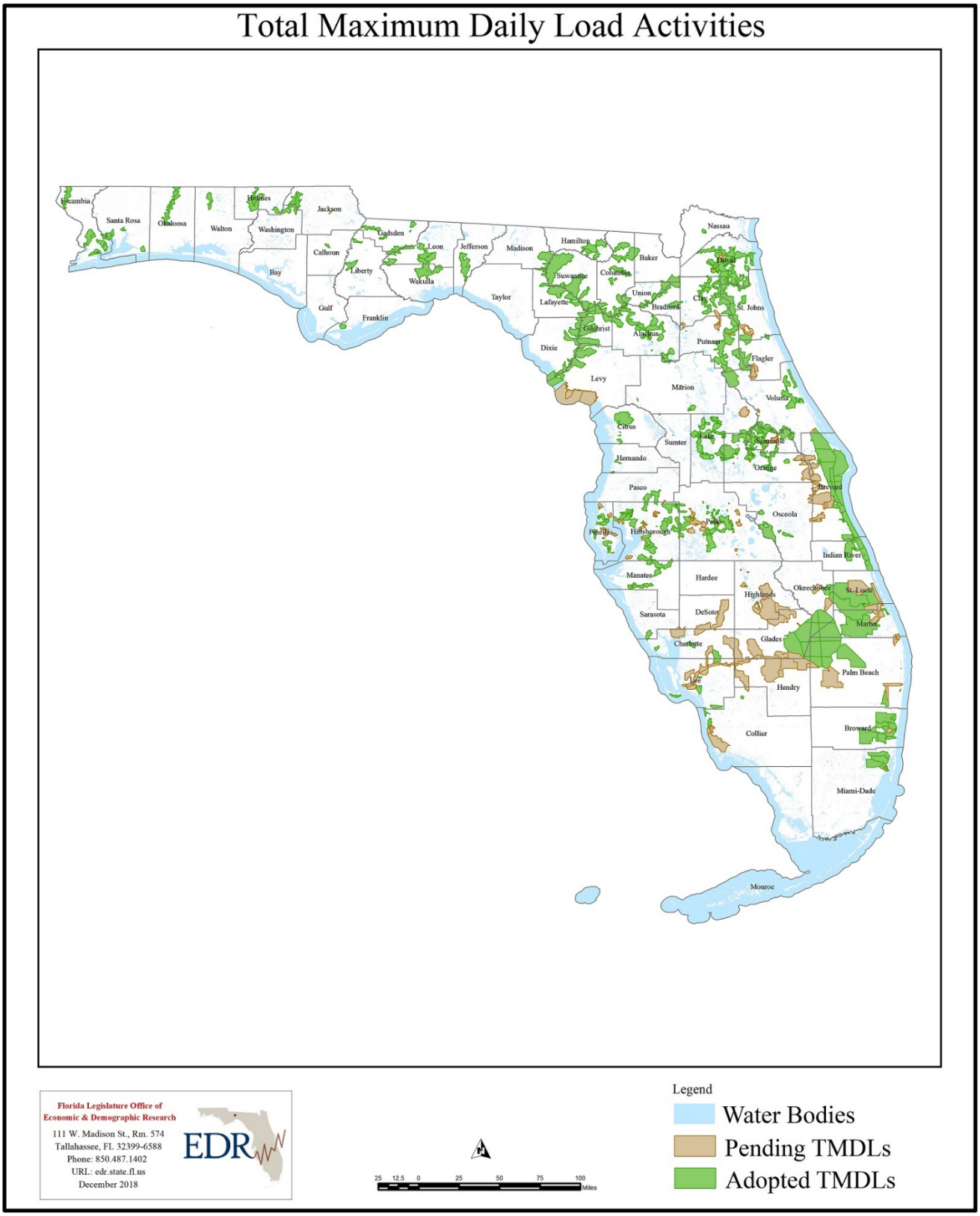
| BMAP | BMAP Adopted | BMAP Acres | Parameter(s) Addressed* |
|---|---|---|---|
| Upper Oklawaha River Basin | August 2007 | 561,999 | TP |
| Orange Creek | May 2008 | 385,271 | TN, TP, FC |
| Long Branch | May 2008 | 3,628 | FC, DO |
| Lower St. Johns River Basin Main Stem | October 2008 | 1,807,397 | TN, TP |
| Hillsborough River | September 2009 | 50,743 | FC |
| Lower St. Johns River Basin Tributaries I | December 2009 | 16,543 | FC |
| Lake Jesup | May 2010 | 95,718 | TN, TP, UA |
| Lower St. Johns River Basin Tributaries II | August 2010 | 50,925 | FC |
| Bayou Chico (Pensacola Basin) | October 2011 | 6,906 | FC |
| Santa Fe River Basin | February 2012 | 1,076,656 | $NO_3$, DO |
| Lake Harney, Lake Monroe, Middle St. Johns River, & Smith Canal | August 2012 | 241,928 | TN, TP |
| Caloosahatchee Estuary Basin | November 2012 | 277,408 | TN |
| Everglades West Coast | November 2012 | 55,469 | TN, DO |
| Banana River Lagoon | February 2013 | 97,139 | TN, TP |
| Central Indian River Lagoon | February 2013 | 476,469 | TN, TP |
| North Indian River Lagoon | February 2013 | 211,398 | TN, TP |
| St. Lucie River and Estuary Basin | June 2013 | 521,170 | TN, TP, BOD |
| Alafia River Basin | March 2014 | 47,199 | FC, TN, TP, DO |
| Manatee River Basin | March 2014 | 16,028 | FC, TN, TP, DO |
| Lake Okeechobee Basin | December 2014 | 3,898,203 | TP |
| Silver Springs Group and Silver River | October 2015 | 632,810 | $NO_3$ |
| Upper Wakulla River and Wakulla Springs | October 2015 | 848,484 | $NO_3$ |
| Wekiva River, Rock Springs Run, and Little Wekiva Canal | October 2015 | 328,613 | $NO_3$, TP, DO |
| Rainbow Springs and Rainbow Run | December 2015 | 434,806 | $NO_3$ |
| Jackson Blue Spring | July 2016 | 90,132 | $NO_3$ |

*FC = Fecal Coliform; TN = Total Nitrogen; TP = Total Phosphorus; DO = Dissolved Oxygen; UA = Un-ionized Ammonia; $NO_3$ = Nitrate; BOD = Biochemical Oxygen Demand.
Source: DEP, Final Integrated Water Quality Assessment for Florida: 2018 Sections 303(d), 305(b), and 314 Report and Listing Update, at 85-88, available at: https://floridadep.gov/sites/default/files/2018_integrated_report.pdf. (Accessed December 2018).

[See figure on following page]

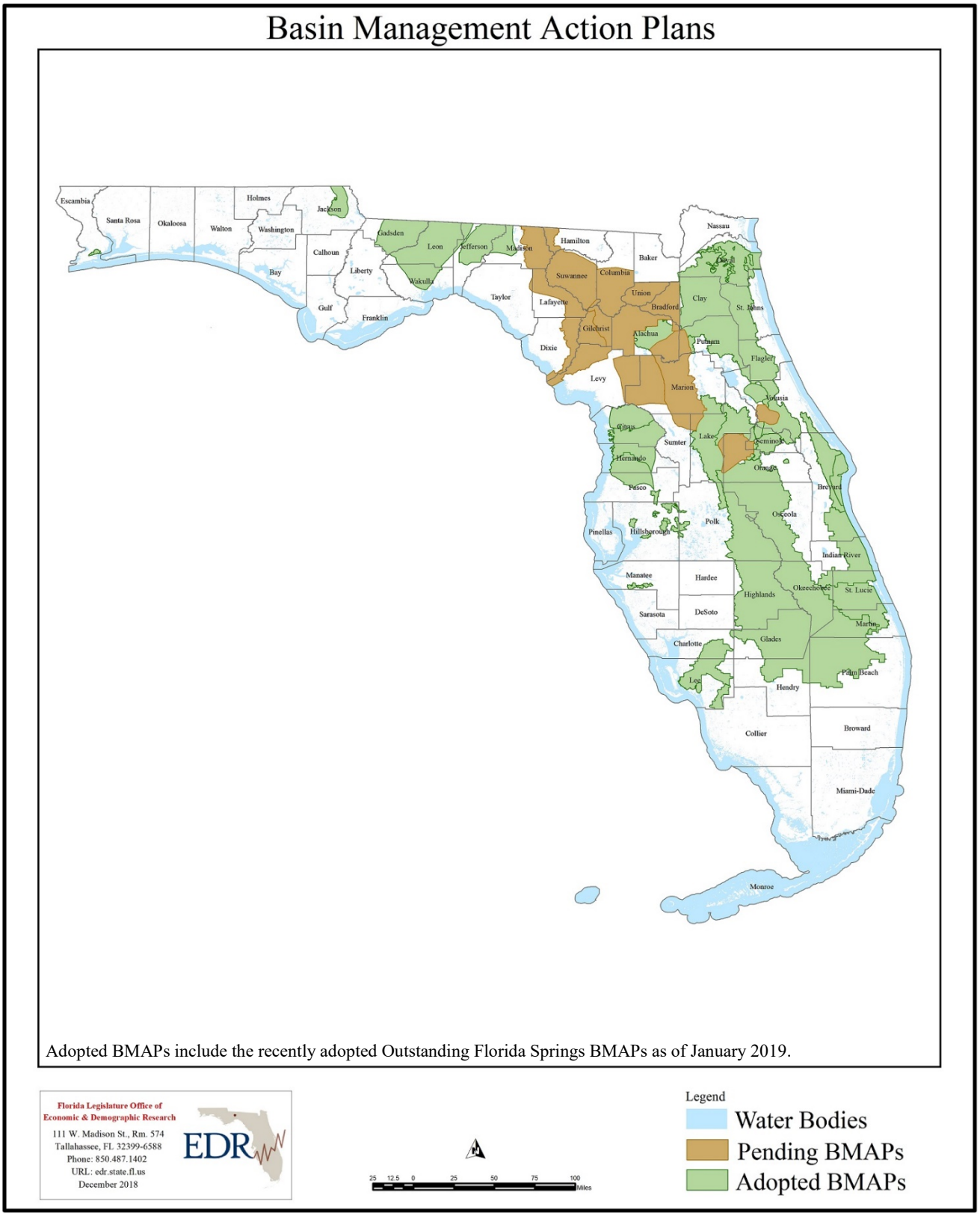
[277] Florida Department of Environmental Protection, Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water levels, and Recovery or Prevention Strategies, at 5, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2018).
[278] A current list of pending and adopted BMAPs is available at: https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps. (Accessed January 2019).

**Figure 4.2.3 Map of Current and Pending TMDLs**




Source: GIS data from DEP's Geospatial Open Data Portal available online at: http://geodata.dep.state.fl.us/.

**Figure 4.2.4 Map of Current and Pending BMAPs**




Source: GIS data from DEP's Geospatial Open Data Portal available online at: http://geodata.dep.state.fl.us/.

For purposes of presenting the data in the STAR Report, DEP divided the BMAPs into the following four sections: Northern Everglades and Estuaries Protection Program (section 373.4595, Florida Statutes); Outstanding Florida Springs BMAPs (section 373.807, Florida Statutes); surface water BMAPs for nutrients; and fecal indicator bacteria BMAPs. For each reported BMAP, DEP included relevant background information and a summary of completed projects and the total pollutant reduction estimated to be achieved by the completed projects, and a summary of planned or underway projects with an estimate of total pollutant reductions.

In order to begin analyzing the expenditures necessary to complete the known BMAP projects, EDR requested from DEP the project lists for all BMAPs reported in its STAR Report. Generally, the project lists contain the following fields:

- Lead entity
- Partners
- Project number
- Project description
- Project type
- Project status
- Estimated completion date
- Total Nitrogen (TN) reduction (lbs/yr) *(only if TN reduction is addressed in BMAP)*
- Total Phosphorus (TP) reduction (lbs/yr) *(only if TP reduction is addressed in BMAP)*
- Location
- Acres treated
- Cost estimate
- Cost of annual operation and maintenance
- Funding source
- Funding amount
- DEP contract agreement number

According to DEP, prior to reporting the project information in the STAR Report, DEP contacted the lead entities to gather updated information on projects and confirm previously reported information. As indicated in the project fields, details for many projects were not provided by the lead entities ("Not provided"), not currently available ("TBD"), or not relevant to that project (N/A). This includes information pertinent to EDR's analysis such as cost estimates, annual operation and maintenance costs, and funding sources. Where information such as cost estimates are available, there is uncertainty as to the level of accuracy in the cost estimates provided to DEP. To that end, as additional information is reported to DEP by the appropriate stakeholders and existing details are updated on the project lists, EDR will also refine its analysis.

After compiling and merging all of the projects identified in the lists, EDR reviewed the project fields including the project description, project type, project status, cost estimate, annual operation and maintenance cost, the funding sources, and, when applicable, estimated pounds per year reductions of total nitrogen and total phosphorus. EDR categorized the funding sources listed in the dataset into a funding type, when possible. Many projects are shown as funded by multiple government types and private developers, resulting in EDR categorizing such funding sources as "Multi". Further, the "Utility" category is often municipal utilities that may be better categorized as "Local".

Based on the project status, EDR categorized projects as "Completed" or "Planned and Underway". Of the 3,600 completed projects, 1,466 have cost estimates (40.72 percent) and only 543 have operation and maintenance estimates (15.08 percent). Of the 839 planned and underway projects, 512 have cost estimates (61.03 percent) and 85 have operations and maintenance estimates (10.13 percent). Some of the reported information is ambiguous. In this regard, a cost estimate identified as "Not provided" in DEP's project list may indicate that the cost is unknown, or it may indicate zero cost. For example, there are 34 completed projects identified as "Fertilizer Cessation", none of which identify a cost estimate (the entry is either "Not provided" or "N/A"), but for which it would seem reasonable to assume zero cost.

In other instances, there seems to be stark differences between the completed and planned and underway projects. Of the completed projects in BMAPs addressing nutrients, 61.66 percent have an associated total nitrogen (TN) reduction and 52.99 percent have an associated total phosphorus (TP) reduction, accounting for an estimated total of 7,044,684.18 pounds of TN and 821,906.71 pounds of TP reduced statewide. Of the planned and underway projects in BMAPs addressing nutrients, 36.82 percent have an associated TN reduction and 23.64 percent have an associated TP reduction, accounting for an estimated total of 1,393,777.43 pounds of TN and 133,234.95 pounds of TP to be reduced statewide.

Unlike BMAPs that have estimated pollutant load reductions for projects, bacteria BMAPs do not have a similar measure in their project lists because water quality improvement relates to the number of times a sampled waterbody exceeds a certain threshold of fecal coliform bacteria over time. According to DEP, project reporting is being revised so that projects will be more focused

on the identification, elimination, and prevention of fecal bacteria sources to waterbodies.[279] Because quantifying progress in relation to project costs may be more difficult for bacteria BMAPs, EDR will initiate discussions with DEP to better understand how to estimate these costs.

Table 4.2.3 shows the cost estimates of the completed and planned and underway projects broken down by funding sources. In evaluating Table 4.2.3, it is important to note that not all impaired waterbodies have a TMDL adopted yet and that not all adopted TMDLs have a BMAP in place. Further, BMAPs may be implemented in phases and the cost estimates shown are only for current and past phases. Finally, if the less expensive projects for improving water quality are undertaken first, these costs can be expected to increase over time. For example, if less expensive projects are undertaken first and if the cost estimates below represent only one-third of the BMAP projects necessary and only one of the three phases needed to achieve TMDLs, the costs could be more than nine times as high.

**Table 4.2.3 Estimated Cost of Completed and Planned and Underway BMAP Projects (in $millions)**

| Completed | Cost Estimate | | Operation and Maintenance Estimate | |
|---|---|---|---|---|
| **Funding Type** | **Cost** | **Share** | **Cost** | **Share** |
| Federal | $12.58 | 0.34% | $0.65 | 1.21% |
| State | $457.50 | 12.38% | $11.42 | 21.23% |
| Regional | $8.39 | 0.23% | $0.11 | 0.21% |
| Local | $544.16 | 14.72% | $18.09 | 33.64% |
| Utility | $814.02 | 22.03% | $2.03 | 3.78% |
| Multi | $886.07 | 23.98% | $6.72 | 12.49% |
| Private | $3.97 | 0.11% | $2.39 | 4.45% |
| N/A | $968.80 | 26.22% | $12.37 | 23.00% |
| **Total:** | **$3,695.48** | | **$53.78** | |

| Planned and Underway | Cost Estimate | | Operation and Maintenance Estimate | |
|---|---|---|---|---|
| **Funding Type** | **Cost** | **Share** | **Cost** | **Share** |
| Federal | $803.02 | 27.43% | $0.74 | 22.51% |
| State | $1,265.31 | 43.22% | $0.56 | 17.01% |
| Regional | $18.36 | 0.63% | $0.01 | 0.15% |
| Local | $231.07 | 7.89% | $0.05 | 1.64% |
| Utility | $13.82 | 0.47% | $- | 0.00% |
| Multi | $359.90 | 12.29% | $1.48 | 45.04% |
| Private | $0.05 | 0.00% | $0.13 | 3.94% |
| N/A | $236.25 | 8.07% | $0.32 | 9.72% |
| **Total:** | **$2,927.77** | | **$3.30** | |

Source: Appendix F of DEPs "Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water levels, and Recovery or Prevention Strategies." Available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2018).

[279] Florida Department of Environmental Protection, Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water levels, and Recovery or Prevention Strategies, Appendix D, at 2, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2018).

At best, Table 4.2.3 provides the minimum floor of what is currently known. The 2020 Edition of this report will build and expand upon the analysis of BMAPs and TMDLs, as well as identify other expenditures necessary to comply with federal and state laws and regulations governing water quality protection and restoration. To accomplish this, EDR will collaborate with DEP along with other appropriate entities.

## 4.3 Forecasting Revenues Dedicated and Historically Allocated to Water

EDR is required to forecast "federal, state, regional, and local government revenues dedicated in current law for the purposes… [of projects or initiatives associated with water supply and water quality protection and restoration] or that have been historically allocated for these purposes, as well as public and private utility revenues." There are a variety of revenue sources that support state appropriations related to water resources, including specific taxes and fees that are dedicated in law. Similar to the analysis of state-appropriated expenditures, the following discussion identifies and forecasts the relevant revenues as either *Water Supply* or *Water Quality and Other Water Resource-Related Programs.*

### *State-Appropriated Revenue Sources*

Historically, the Legislature has appropriated state and federal trust funds, as well as General Revenue, to support programs, projects, and initiatives related to water resources, often combining state and federal sources to support the same activities. As a result, this section on state-appropriated revenue sources includes both state and federal trust funds and the revenue sources that are deposited in the identified trust funds.

**Water Supply Revenue Sources**
The primary sources of revenue for water supply initiatives are federal grants and repayment of loans, which are deposited in the Drinking Water Revolving Loan Trust Fund.[280] The trust fund is used to provide low-interest loans for planning, engineering, design, and construction of public drinking water systems and improvements to such systems.

Based on a review of state accounts and agency trust fund data for the last five years, a historical data series was constructed for the identified revenues. The Long-Term Revenue Analysis adopted by the Revenue Estimating Conference includes a forecast for federal grants, which is used as the basis for the forecast through Fiscal Year 2027-28. For repayments of loans, a historical average level is used for the forecast. The historical series and the forecast are shown in Table 4.3.1.

[See table on following page]

[280] § 403.8533, Fla. Stat.

**Table 4.3.1 Revenues Available for Water Supply (in $millions)**

| HISTORY | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| Federal Grants | $58.27 | $29.12 | $34.71 | $35.70 | $28.76 |
| Repayment of Loans | $41.24 | $47.22 | $44.97 | $90.00 | $36.37 |
| **TOTAL** | **$99.51** | **$76.34** | **$79.67** | **$125.70** | **$65.13** |
| | | | | | |
| **FORECAST (FY18-19 through FY22-23)** | **FY18-19** | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** |
| Federal Grants | $29.20 | $29.70 | $30.10 | $30.50 | $30.90 |
| Repayment of Loans | $42.85 | $41.40 | $40.20 | $41.48 | $41.03 |
| **TOTAL** | **$72.05** | **$71.10** | **$70.30** | **$71.98** | **$71.93** |
| | | | | | |
| **FORECAST (FY23-24 through FY27-28)** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** | **FY27-28** |
| Federal Grants | $31.30 | $31.70 | $32.10 | $32.50 | $32.90 |
| Repayment of Loans | $40.91 | $41.14 | $41.02 | $41.02 | $41.06 |
| **TOTAL** | **$72.21** | **$72.84** | **$73.12** | **$73.52** | **$73.96** |

In addition to the federal grants and repayment of loans, state funds including General Revenue and Land Acquisition Trust Fund receipts are also deposited in the Drinking Water Revolving Loan Trust Fund to provide the state match for federal grants. The state matching funds were approximately $6.2 million per year, on average, during the past five years.

**Water Quality and Other Water Resource-Related Program Revenue Sources**

There are a number of state and federal revenue sources that have been used historically to support appropriations related to water quality. For this analysis, these revenues are categorized as either Documentary Stamp Tax revenue or Non-Documentary Stamp Tax revenue.

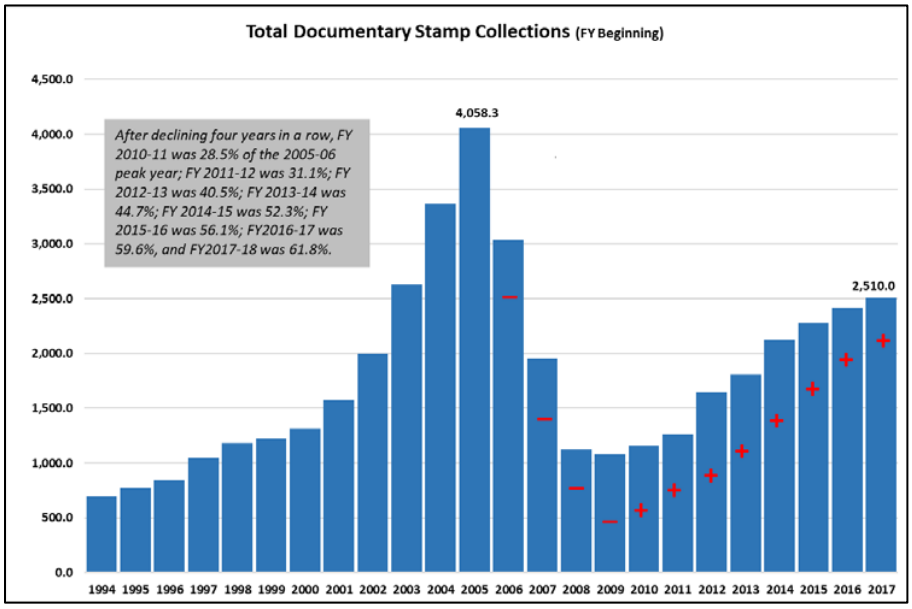
*Documentary Stamp Tax Revenue*

The primary source of revenue currently dedicated to water and land conservation and restoration is the Documentary Stamp Tax,[281] which is largely dependent on the health of Florida's housing market. Today, Florida's housing market is still recovering from the extraordinary upheaval of the housing boom and its subsequent collapse. The housing boom was underway by late Fiscal Year 2002-03 and clearly in place by Fiscal Year 2003-04, with the peak occurring during Fiscal Year 2005-06. Documentary Stamp Tax collections (shown in Figure 4.3.1) also reached their peak in Fiscal Year 2005-06, posting total collections of nearly $4.06 billion. At the end of the 2017-18 fiscal year, collections were 61.8 percent of their prior peak.

[See figure on following page]

[281] Ch. 201, Fla. Stat.

**Figure 4.3.1 Total Documentary Stamp Tax Collections**




The pace of Florida's recovery in Documentary Stamp Tax collections will be driven in large measure by the time it takes the construction industry to revive fully. Because construction activity continues to be subpar, attention over the past few years has focused on the market for existing homes as an upstream indicator of future construction need. All of these metrics point to an existing home market that appears to be fully recovered. Existing home sales volume in the 2014, 2015, 2016, and 2017 calendar years exceeded the 2005 peak year, and calendar year 2018 is on course to do the same. The story is similar for sales price. Florida's existing home price gains have roughly tracked national gains over the last three years; however, growth in the state's median home price for single family homes has generally stayed upwardly steady as the national median peaks and dips. The state's median price in November 2018 was 97.9 percent of the national median price; it exceeded the state's prior peak (June 2006) in June 2018 for the first time and has hovered close to that level since.

The recent upward pressure on prices has likely been caused—at least in part—by tightened supply as the excess number of homes coming into the market from the foreclosure process finally comes to an end. Part of the past difference in strength between sales volume and price was attributable to the fact that the supply of existing homes for sale in Florida was inflated over the last eight years by the atypically large number of homes coming out of the lengthy foreclosure process and into the market. As these homes returned to the available sales inventory, they dampened some of the price changes suggested by the increased demand. This foreclosure effect has largely unwound.

Single-Family building permit activity, an indicator of new construction, remains in positive territory, beginning with strong back-to-back growth in both the 2012 and 2013 calendar years (over 30 percent in each year). The final data for the 2014 calendar year revealed significantly slowing (but still positive) activity—posting only 1.6 percent growth over the prior year. However, calendar year activity for the past three calendar years ran above their individual periods a year

prior; single family data was higher than the prior year by 20.3 percent in 2015, 11.1 percent in 2016, and 13.5 percent in 2017. Despite the strong percentage growth rates in five of the last six calendar years, the level is still low by historic standards – about half of the long-run per capita level.

Even with a fully recovered existing home market, Documentary Stamp Tax collections still lag behind the prior peak in Fiscal Year 2005-06, with collections expected to reach just 65.2 percent of the prior peak in the 2018-19 fiscal year. This raises a question about the source of the continued drag. Part of the answer lies in the still subdued construction market described above, but another part lies in the distinction between deeds and notes in the tax base. While financed sales continue to gain as a percentage of all sales, ending August 2018 with a higher share than this segment had in August 2017 (63.1 percent versus 54.4 percent), the share for cash sales remains elevated. A cash sale results in a deed; it does not result in a note. This means that the feed-through to Documentary Tax Stamp taxes is muted.

The availability of funding for water resources is closely linked to the trajectory of this revenue source. Based on the December 2018 General Revenue Estimating Conference, Documentary Stamp Tax total collections are expected to be $2.65 billion in Fiscal Year 2018-19, an increase of 5.4 percent over the Fiscal Year 2017-18 collections. Growth rates are expected to be between 4.2 percent and 3.5 percent in the earlier years of the forecast, before settling in at 3.0 percent annual growth at the end of the 10-year forecast period. The prior peak level of nearly $4.06 billion is not expected to be exceeded until Fiscal Year 2032-33 in the long-term outlook.

Table 4.3.2 shows the historical and forecasted total collections from the Documentary Stamp Tax, as well as the constitutionally required distribution to the LATF.[282] These estimates were adopted by the Revenue Estimating Conference for General Revenue in December 2018.

Section 201.15, Florida Statutes, directs the distribution of Documentary Stamp Tax revenues.[283] Figure 4.3.2 illustrates the effect of the statutory distributions for the 2018-19 fiscal year. The total forecast for Documentary Stamp Tax revenue is $2.65 billion, with an estimated $1.92 billion (72.7 percent) expected to be distributed to the General Revenue Fund and the LATF. In the figure, the distribution to the LATF is split into two component parts (debt service and all other uses) that together reach the required 33 percent after the deduction for the Department of Revenue's administrative costs.

[See table on following page]

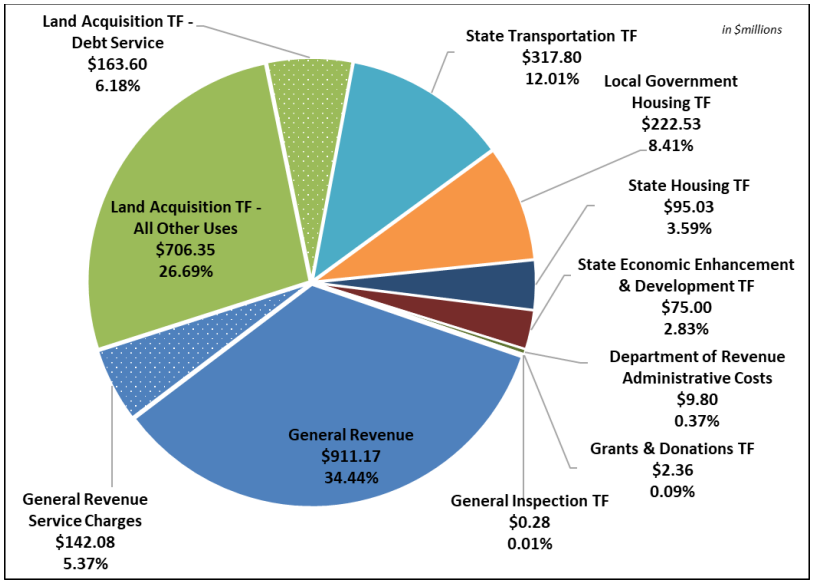
[282] In 2014, Florida voters approved the Water and Land Conservation constitutional amendment (Amendment 1) to provide a dedicated funding source for water and land conservation and restoration. The amendment created article X, section 28 of the Florida Constitution, which requires that starting on July 1, 2015, for 20 years, 33 percent of the net revenues derived for the existing excise tax on documents must be deposited into the Land Acquisition Trust Fund.

[283] A forecast showing the distributions is available on EDR's website: http://edr.state.fl.us/content/conferences/docstamp/docstampresults.pdf.

**Table 4.3.2 Documentary Stamp Tax History and Forecast (in $millions)**

| Fiscal Year | Total Doc Stamps | Percent Change | Total to LATF | Debt Service | Remainder LATF | Uncommitted LATF Based on Statute |
|---|---|---|---|---|---|---|
| **FY13-14** | $1,812.50 | 10.29% | | | | |
| **FY14-15** | $2,120.80 | 17.01% | | | | |
| **FY15-16** | $2,276.87 | 7.36% | | | | |
| **FY16-17** | $2,417.76 | 6.19% | | | | |
| **FY17-18** | $2,510.02 | 3.82% | | | | |
| **FY18-19** | $2,646.00 | 5.42% | $869.95 | $163.60 | $706.35 | **$410.76** |
| **FY19-20** | $2,757.10 | 4.20% | $906.61 | $163.61 | $743.00 | **$438.25** |
| **FY20-21** | $2,859.40 | 3.71% | $940.37 | $163.67 | $776.70 | **$463.53** |
| **FY21-22** | $2,963.20 | 3.63% | $974.62 | $142.15 | $832.47 | **$513.47** |
| **FY22-23** | $3,066.40 | 3.48% | $1,008.68 | $131.16 | $877.52 | **$558.52** |
| **FY23-24** | $3,169.40 | 3.36% | $1,042.67 | $111.03 | $931.64 | **$612.64** |
| **FY24-25** | $3,273.70 | 3.29% | $1,077.09 | $111.07 | $966.02 | **$647.02** |
| **FY25-26** | $3,379.40 | 3.23% | $1,111.97 | $87.65 | $1,024.32 | **$705.32** |
| **FY26-27** | $3,489.70 | 3.26% | $1,148.37 | $67.28 | $1,081.09 | **$767.09** |
| **FY27-28** | $3,597.70 | 3.09% | $1,184.01 | $49.84 | $1,134.17 | **$820.17** |

**Figure 4.3.2 Fiscal Year 2018-19 Statutory Distribution of Documentary Stamp Tax Revenue**




The LATF is expected to receive approximately $870 million in total, including $163.6 million for debt service payments and $706.4 million for other uses. Pursuant to the Florida Constitution, the funds in the LATF must be expended only for the following purposes:

1) As provided by law, to finance or refinance: the acquisition and improvement of land, water areas, and related property interests, including conservation easements, and resources for conservation lands including wetlands, forests, and fish and wildlife habitat; wildlife management areas; lands that protect

water resources and drinking water sources, including lands protecting the water quality and quantity of rivers, lakes, streams, springsheds, and lands providing recharge for groundwater and aquifer systems; lands in the Everglades Agricultural Area and the Everglades Protection Area, as defined in Article II, Section 7(b); beaches and shores; outdoor recreation lands, including recreational trails, parks, and urban open space; rural landscapes; working farms and ranches; historic or geologic sites; together with management, restoration of natural systems, and the enhancement of public access or recreational enjoyment of conservation lands.

2) To pay the debt service on bonds issued pursuant to Article VII, Section 11(e).

Of the LATF revenues available for other uses, approximately $295.6 million is dedicated in law to the Everglades, spring restoration, and Lake Apopka projects as provided in section 375.041, Florida Statutes. The remaining $410.8 million is available for other qualifying projects authorized and appropriated by the Legislature. Table 4.3.3 shows all Fiscal Year 2018-19 appropriations from the LATF ($884.2 million). Excluding the WMDs, slightly less than one-half of these appropriations are for water quality and other water resource-related programs, with total combined appropriations of $428.4 million, or approximately 48 percent of the total. Within the water quality components, the largest programs include Everglades projects ($205.7 million); springs restoration ($50.0 million); and beach projects ($50.0 million). The trust fund is also used to pay debt service for Everglades and Florida Forever bonds; to support land conservation and management activities; and to support agency operations at DEP, DACS, FWC, and the Department of State (DOS).

**Table 4.3.3 Land Acquisition Trust Fund Appropriations (in $millions)**

| Program Area | FY18-19 Recurring | FY18-19 Nonrecurring | FY18-19 Total | FY19-20 Base Budget |
|---|---|---|---|---|
| Water Quality - Other Programs and Initiatives | $133.37 | $109.70 | $243.06 | $133.37 |
| Land Conservation and Management | $216.38 | $24.80 | $241.18 | $217.02 |
| Debt Service | $167.34 | $0.00 | $167.34 | $167.34 |
| Water Quality - Water Restoration Assistance | $86.67 | $28.85 | $115.52 | $86.68 |
| Water Quality - Environmental Assessment and Restoration | $38.09 | $12.56 | $50.65 | $38.14 |
| Water Quality - Regulatory and Clean-up Programs | $19.14 | $0.00 | $19.14 | $19.22 |
| Water Management Districts | $18.68 | $0.00 | $18.68 | $18.68 |
| All Other Programs | $28.58 | $0.00 | $28.58 | $28.70 |
| **TOTAL** | **$708.26** | **$175.90** | **$884.16** | **$709.16** |

The outcome of pending civil litigation pertaining to specific appropriations from the LATF and spending of appropriated money by the executive agencies, may affect future editions of this report. [284] The litigation seeks a determination that the state has violated the 2014 Water and Land Conservation constitutional amendment that sets aside 33 percent of the excise tax on documents

[284] *Fla. Wildlife Fed'n, Inc. v. Joe Negron, as President of the Fla. Senate*, No. 2015 CA 001423 (Fla. 2d Cir. Ct. amended complaint filed May 5, 2015).

for water and land conservation. From the funds set aside pursuant to this amendment since 2015, the Legislature has appropriated $3.3 billion for water and land conservation efforts. The trial judge issued an order in June declaring unconstitutional certain appropriations for 2015 and 2016 totaling $426.4 million. Further, the judge's order states that funds identified in the constitutional amendment:

> "*must be expended, if at all, to acquire conservation lands or other conservation property interests, as defined by that provision, that the State of Florida did not own on the effective date of that amendment and thereafter, to improve, manage, restore natural systems thereon, and enhance public access or enjoyment of those conservation lands."*[285]

This ruling is currently on appeal. If this ruling is upheld and the funds are restricted to the purchase of new conservation lands and the maintenance thereof, many appropriations within the DEP, DACS, DOS, and FWC will be affected going forward. Revenue forecasts for conservation land management and water resources may require future adjustments to reflect any final decisions of the litigation. Additionally, it is unclear what legislative action, if any, would have to be taken to address the use of those funds in Fiscal Years 2015-16 through 2018-19.

*Non-Documentary Stamp Tax Revenue*

In order to determine the types of revenue historically allocated for water quality and other water resource-related programs, the various state and federal trust funds from which funds have been appropriated in the most recent five-year period were identified and described in the 2018 Edition of this report.[286] They include the following: Internal Improvement Trust Fund, Inland Protection Trust Fund, General Inspection Trust Fund, Florida Coastal Protection Trust Fund, Minerals Trust Fund, Florida Permit Fee Trust Fund, Save Our Everglades Trust Fund, Solid Waste Management Trust Fund, Wastewater Treatment and Stormwater Management Revolving Loan Trust Fund, Water Quality Assurance Trust Fund, Nonmandatory Land Reclamation Trust Fund, Grants and Donations Trust Fund, and Federal Grants Trust Fund. Within the identified trust funds, the types of revenue were also identified and described.[287] These revenues include: Fees and Licenses; Fines, Penalties, and Judgments; Grants and Donations; Pollutant Taxes and Fees; Repayment of Loans; Sales and Leases; and Severance Taxes.

Based on a review of state accounts and agency trust fund data, a 5-year historical data series was constructed for the identified revenues. With the exception of repayment of loans, each of the revenue sources is forecasted by the Revenue Estimating Conference, meeting specifically on Transportation Revenues, General Revenue, and the Long-Term Revenue Analysis. The assumptions used within these conferences provide the basis for the overall forecast through Fiscal Year 2027-28. For the repayment of loans, a historical average level is used for the forecast. The historical series and the forecast are shown in Table 4.3.4.

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[285] Final Judgment for the Plaintiffs at 7, *Fla. Wildlife Fed'n, Inc. v. Joe Negron, as President of the Fla. Senate*, No. 2015 CA 001423 (Fla. 2d Cir. Ct. June 28, 2018).

[286] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2018Edition.pdf at page 186.

[287] *Ibid* at page 188.

**Table 4.3.4 Non-Documentary Stamp Tax Revenues Available for Water Quality and Other Water Resource-Related Programs (in $millions)**

| HISTORY | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 |
|---|---|---|---|---|---|
| FEES AND LICENSES | $40.85 | $37.83 | $34.88 | $40.32 | $35.11 |
| FINES, PENALTIES, JUDGMENTS | $90.05 | $88.76 | $10.35 | $4.32 | $6.12 |
| GRANTS AND DONATIONS | $88.09 | $94.73 | $88.94 | $90.53 | $92.16 |
| POLLUTANT TAXES AND FEES | $248.53 | $255.26 | $268.15 | $274.71 | $286.16 |
| REPAYMENT OF LOANS | $102.85 | $99.72 | $83.38 | $95.95 | $68.56 |
| SALES AND LEASES | $18.17 | $16.07 | $16.06 | $23.88 | $22.85 |
| SEVERANCE TAXES | $5.26 | $4.76 | $6.81 | $6.62 | $6.85 |
| **TOTAL NON-DOCUMENTARY STAMP TAX REVENUES** | **$593.80** | **$597.14** | **$508.58** | **$536.32** | **$517.80** |
| | | | | | |
| **FORECAST (FY 2018-19 TO FY 2022-23)** | **FY18-19** | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** |
| FEES AND LICENSES | $35.70 | $36.30 | $36.80 | $37.30 | $37.80 |
| FINES, PENALTIES, JUDGMENTS | $6.20 | $6.30 | $6.40 | $6.50 | $6.60 |
| GRANTS AND DONATIONS | $93.70 | $95.10 | $96.50 | $97.90 | $99.30 |
| POLLUTANT TAXES AND FEES | $290.20 | $293.50 | $295.90 | $298.00 | $299.80 |
| REPAYMENT OF LOANS | $82.63 | $82.38 | $77.85 | $80.95 | $80.40 |
| SALES AND LEASES | $23.20 | $23.60 | $24.00 | $24.30 | $24.60 |
| SEVERANCE TAXES | $7.60 | $7.60 | $7.50 | $7.50 | $5.50 |
| **TOTAL NON-DOCUMENTARY STAMP TAX REVENUES** | **$539.23** | **$544.78** | **$544.95** | **$552.45** | **$554.00** |
| | | | | | |
| **FORECAST (FY 2023-24 TO FY 2027-28)** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** | **FY27-28** |
| FEES AND LICENSES | $38.30 | $38.80 | $39.30 | $39.80 | $40.20 |
| FINES, PENALTIES, JUDGMENTS | $6.70 | $6.80 | $6.90 | $7.00 | $7.10 |
| GRANTS AND DONATIONS | $100.60 | $101.90 | $103.10 | $104.30 | $105.40 |
| POLLUTANT TAXES AND FEES | $301.40 | $302.40 | $303.20 | $303.90 | $304.60 |
| REPAYMENT OF LOANS | $79.73 | $80.36 | $80.16 | $80.09 | $80.20 |
| SALES AND LEASES | $24.90 | $25.20 | $25.50 | $25.80 | $26.10 |
| SEVERANCE TAXES | $4.00 | $4.10 | $4.10 | $4.20 | $4.30 |
| **TOTAL NON-DOCUMENTARY STAMP TAX REVENUES** | **$555.63** | **$559.56** | **$562.26** | **$565.09** | **$567.90** |

## *Regional Revenues*

The WMDs are required to report their annual revenues in their Comprehensive Annual Financial Reports. While each district must report its total revenues, the breakdown of categories is largely at the discretion of the district. As a result, intergovernmental sources cannot be identified at a more granular level. Table 4.3.5 provides a forecast and details a history of WMD revenues from their own sources. Ad valorem collections[288] comprise 50 to 95 percent of this revenue, with the remainder a mix of investment earnings, timber harvesting and sales, apiary use, billboard and cell tower leases, sales of excavated materials, cattle grazing, alligator egg harvests, feral hog hunts,

[288] Within the WMDs, there can exist basin boards for various purposes detailed in Section 373.0695, Florida Statutes. The WMD's governing board can levy ad valorem taxes within the designated basin of the basin boards. Currently, only three such basin boards exist and all of them are within the SFWMD. Their 2016 millage rates are 0.1477 for Okeechobee Basin, 0.0471 for Everglades Construction, and 0.1336 for Big Cypress. Ad valorem collections for the basin boards are accounted for in the revenues in Table 4.3.5. The 2016 district wide millage rate for the five districts are as follows: 0.0366 in NWFWMD, 0.2885 in SJRWMD, 0.1359 in SFWMD, 0.3317 in SWFWMD, and 0.4093 in SRWMD.

and other miscellaneous revenues. As a result, the forecast for the ad valorem share of this revenue relies on the growth rate of county taxable value as adopted by the December 2018 Ad Valorem Revenue Estimating Conference. The forecast for the remaining share of this revenue relies on population growth. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years.

**Table 4.3.5 Water Management District Revenues from Own Sources (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $5.66 | $4.90 | $7.03 | $5.08 | $6.31 |
| **SJRWMD** | $83.08 | $85.48 | $88.27 | $90.89 | $90.24 |
| **SFWMD** | $309.00 | $319.10 | $326.46 | $312.66 | $310.64 |
| **SWFWMD** | $106.72 | $105.23 | $110.48 | $114.46 | $112.72 |
| **SRWMD** | $7.32 | $6.20 | $7.06 | $7.69 | $7.60 |
| **Total** | $511.77 | $520.90 | $539.30 | $530.78 | $527.51 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $565.92 | $600.43 | $635.94 | $669.74 | $705.83 |

Source: Comprehensive Annual Financial Reports of the Water Management Districts. Data in this table has been revised and supersedes that reported in previous editions.

Table 4.3.6 provides a forecast and details a history of WMD revenues sourced from other governments. This can be federal, state, or local cities and counties. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.6 Water Management District Revenues from Intergovernmental Sources (in $millions)**

| History | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 | LFY 16-17 |
|---|---|---|---|---|---|
| **NWFWMD** | $5.34 | $11.88 | $12.87 | $14.00 | $14.86 |
| **SJRWMD** | $20.97 | $20.80 | $28.84 | $23.45 | $28.57 |
| **SFWMD** | $37.46 | $85.61 | $103.36 | $137.45 | $176.79 |
| **SWFWMD** | $16.54 | $8.53 | $12.37 | $6.24 | $13.62 |
| **SRWMD** | $4.92 | $8.34 | $14.20 | $15.75 | $8.41 |
| **Total** | $85.22 | $135.15 | $171.64 | $196.88 | $242.25 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Total** | $234.74 | $238.37 | $241.96 | $245.48 | $248.92 |

Source: Comprehensive Annual Financial Reports of the Water Management Districts. Data in this table has been revised and supersedes that reported in previous editions.

Table 4.3.7 provides a forecast and details a history of water supply revenues from federal and state sources to special districts[289] that are located in multiple counties. Considering only the account identified as 323.300 Franchise Fee – Water, no water supply revenues are generated independently by these special districts. The accounts identified as 334.310 State Grant – Water Supply System and 335.310 State Revenue Sharing – Water Supply System are categorized as water supply revenue from the state and the account identified as 331.310 Federal Grant – Water Supply System is categorized as a water supply revenue from the federal government. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.7 Water Supply Revenues Generated to Regional Special Districts by Government Source (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| State | $- | $- | $- | $- | $0.07 |
| Federal | $- | $- | $0.48 | $1.47 | $1.33 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| State | $ 0.07 | $ 0.07 | $ 0.08 | $ 0.08 | $0.08 |
| Federal | $1.35 | $1.37 | $1.40 | $1.42 | $1.44 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 334.310 and 335.310 for State and 331.310 for Federal.

Table 4.3.8 provides a forecast and details a history of water quality protection and restoration revenues by special districts that are located in multiple counties. Based on survey results, a portion of the local government account identified as 343.700 Service Charge – Conservation and Resource Management is self-generated for use on water quality protection and restoration projects and initiatives. Further, the account identified as 323.600 Franchise Fee – Sewer is categorized as water quality protection and restoration self-generated revenue. The accounts identified as 334.350 State Grant – Sewer/Wastewater, 334.360 State Grant – Stormwater Management, and 335.350 State Shared Revenues – Sewer/Wastewater are categorized as water quality protection and restoration revenues from the state. Finally, the account identified as 331.350 Federal Grant – Sewer/Wastewater is categorized as water quality protection and restoration revenue from the federal government. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

[289] There exists a small number of governmental entities (*e.g.*, utility authorities) that cross counties but are technically not special districts. Their expenditures are included here.

**Table 4.3.8 Water Quality Protection & Restoration Revenues Generated to Regional Special Districts by Government Source (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| Self | $0.10 | $0.12 | $0.17 | $0.03 | $0.03 |
| State | $2.94 | $2.26 | $0.31 | $0.74 | $0.43 |
| Federal | $- | $1.06 | $1.28 | $0.03 | $- |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| Self | $0.03 | $0.03 | $0.03 | $0.03 | $0.03 |
| State | $0.44 | $0.45 | $0.45 | $0.46 | $0.47 |
| Federal | $- | $- | $- | $- | $- |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 323.600 and a portion of 343.700 shared out by local government survey results for self; 334.350, 334.360, and 335.350 for State; and 331.350 for Federal. Data in this table has been revised and supersedes that reported in previous editions.

## *Local Revenues*

Table 4.3.9 provides a forecast and details a history of water supply revenues that are self-generated by local governments. Based on survey results, a portion of the local government account[290] identified as 343.700 Service Charge – Conservation and Resource Management is self-generated for use on water supply projects and initiatives. Further, the account identified as 323.300 Franchise Fee – Water is categorized as water supply self-generated revenue. In addition, local governments may have other revenue sources used to fund water supply initiatives including impact fees and special assessments. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.9 Water Supply Revenues Generated by Local Governments (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| Counties | $1.79 | $1.81 | $1.82 | $2.05 | $2.44 |
| Municipalities | $10.86 | $11.57 | $21.43 | $18.02 | $12.37 |
| Special Districts | $- | $- | $- | $- | $- |
| Total | $12.65 | $13.38 | $23.26 | $20.06 | $14.81 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| Total | $15.06 | $15.31 | $15.56 | $15.80 | $16.04 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 323.300 and a portion of 343.700 shared out by local government survey results.

Table 4.3.10 provides a forecast and details a history of water supply revenues generated by the state and provided to local governments. The accounts identified as 334.310 State Grant – Water

[290] For further details on the source and methodology of this data, *see* the "Local Expenditures" piece of subsection 2.2.

Supply System and 335.310 State Revenue Sharing – Water Supply System are categorized as water supply revenues from the state. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.10 Water Supply Revenues Provided to Local Governments from the State (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $1.75 | $0.56 | $2.02 | $5.92 | $0.85 |
| **Municipalities** | $11.39 | $2.62 | $1.45 | $15.72 | $11.30 |
| **Special Districts** | $0.18 | $0.18 | $0.18 | $0.37 | $0.21 |
| **Total** | $13.32 | $3.36 | $3.65 | $22.01 | $12.36 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $12.56 | $12.78 | $12.99 | $13.19 | $13.39 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 334.310 and 335.310.

Table 4.3.11 provides a forecast and details a history of water supply revenues generated by the federal government and provided to local governments. The account identified as 331.310 Federal Grant – Water Supply System is categorized as water supply revenue from the federal government. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.11 Water Supply Revenues Provided to Local Governments from the Federal Government (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $0.00 | $0.00 | $0.08 | $4.63 | $2.34 |
| **Municipalities** | $10.54 | $6.73 | $7.97 | $8.50 | $4.44 |
| **Special Districts** | $0.01 | $0.59 | $0.38 | $0.79 | $- |
| **Total** | $10.55 | $7.33 | $8.42 | $13.93 | $6.78 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $6.89 | $7.01 | $7.13 | $7.24 | $7.35 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 331.310.
Note: "$-" indicates a zero, whereas "$0.00" indicates an amount less than $5,000.

Table 4.3.12 provides a forecast and details a history of water quality protection and restoration self-generated revenues by local governments. Based on survey results, a portion of the local government account identified as 343.700 Service Charge – Conservation and Resource Management is self-generated for use on water quality protection and restoration projects and

initiatives. Further, the account identified as 323.600 Franchise Fee – Sewer is categorized as water quality protection and restoration self-generated revenue. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.12 Water Quality Protection & Restoration Revenues Generated by Local Governments (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $1.29 | $1.67 | $1.79 | $1.85 | $2.28 |
| **Municipalities** | $24.39 | $28.61 | $28.73 | $31.42 | $29.31 |
| **Special Districts** | $0.44 | $0.48 | $1.90 | $0.22 | $0.17 |
| **Total** | $26.13 | $30.76 | $32.42 | $33.49 | $31.76 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $32.29 | $32.83 | $33.38 | $33.89 | $34.40 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 323.600 and a portion of 343.700 shared out by local government survey results. Data in this table has been significantly revised and supersedes that reported in previous editions.

Table 4.3.13 provides a forecast and details a history of water quality protection and restoration revenues generated by the state and provided to local governments. The accounts identified as 334.350 State Grant – Sewer/Wastewater, 334.360 State Grant – Stormwater Management, and 335.350 State Shared Revenues – Sewer/Wastewater are categorized as water quality protection and restoration revenues from the state. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.13 Water Quality Protection & Restoration Revenues Provided to Local Governments from the State (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $8.92 | $8.19 | $27.74 | $21.53 | $8.00 |
| **Municipalities** | $21.58 | $12.37 | $13.42 | $21.99 | $30.22 |
| **Special Districts** | $1.04 | $1.07 | $1.14 | $1.56 | $3.18 |
| **Total** | $31.55 | $21.62 | $42.30 | $45.08 | $41.40 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $42.09 | $42.80 | $43.51 | $44.18 | $44.85 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 334.350, 334.360, and 335.350.

Table 4.3.14 provides a forecast and details a history of water quality protection and restoration revenues generated by the federal government and provided to local governments. The account identified as 331.350 Federal Grant – Sewer/Wastewater is categorized as water quality protection and restoration revenue from the federal government. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.14 Water Quality Protection & Restoration Revenues Provided to Local Governments from the Federal Government (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Counties** | $2.03 | $2.61 | $5.65 | $0.97 | $0.08 |
| **Municipalities** | $14.09 | $11.58 | $11.55 | $10.83 | $11.02 |
| **Special Districts** | $- | $0.41 | $0.05 | $0.01 | $- |
| **Total** | $16.12 | $14.60 | $17.24 | $11.81 | $11.09 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Total** | $11.28 | $11.47 | $11.66 | $11.84 | $12.02 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 331.350.

## *Public and Private Utilities Revenues*

Table 4.3.15 provides a forecast and details a history of revenues generated by public water utilities. The source of this data is the local government accounts identified as 314.300 Utility Service Tax – Water, 343.300 Service Charge – Water Utility, 343.500 Service Charge – Sewer/Wastewater Utility, and 343.600 Service Charge – Water/Sewer Combination Utility. Note that the historic data was in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.15 Revenues Generated by Public Water Utilities (in $millions)**

| History | LFY 11-12 | LFY 12-13 | LFY 13-14 | LFY 14-15 | LFY 15-16 |
|---|---|---|---|---|---|
| **Public Utilities** | $6,903.91 | $6,995.70 | $7,287.27 | $7,545.72 | $7,905.66 |
| | | | | | |
| **Forecast** | **FY 16-17** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** |
| **Public Utilities** | $8,038.19 | $8,173.70 | $8,309.39 | $8,437.68 | $8,564.82 |

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 314.300, 343.300, 343.500, and 343.600. Data in this table has been significantly revised and supersedes that reported in previous editions.

Table 4.3.16 provides a forecast and details a history of revenues generated by private water utilities. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC). Only 38 of Florida's 67 counties are within the jurisdiction of the PSC. As a result, the remaining revenues from counties outside of their jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix of rural an urban counties both in and out of the PSC's jurisdiction. Note that the historic data is in calendar years. For forecasting purposes, it was converted to state fiscal years. As revenues are largely based on population, forecasts rely on population growth rates.

**Table 4.3.16 Revenues Generated by Private Utilities (in $millions)**

| History | CY 2013 | CY 2014 | CY 2015 | CY 2016 | CY 2017 |
|---|---|---|---|---|---|
| **Private Utilities** | $99.63 | $102.36 | $106.83 | $114.62 | $118.15 |
| | | | | | |
| **Forecast** | **FY 17-18** | **FY 18-19** | **FY 19-20** | **FY 20-21** | **FY 21-22** |
| **Private Utilities** | $118.32 | $120.15 | $121.96 | $123.73 | $125.47 |

Source: A historical series was created using data provided by the Florida Public Service Commission.

## 4.4 Water-Related Expenditures and State Revenue Gap

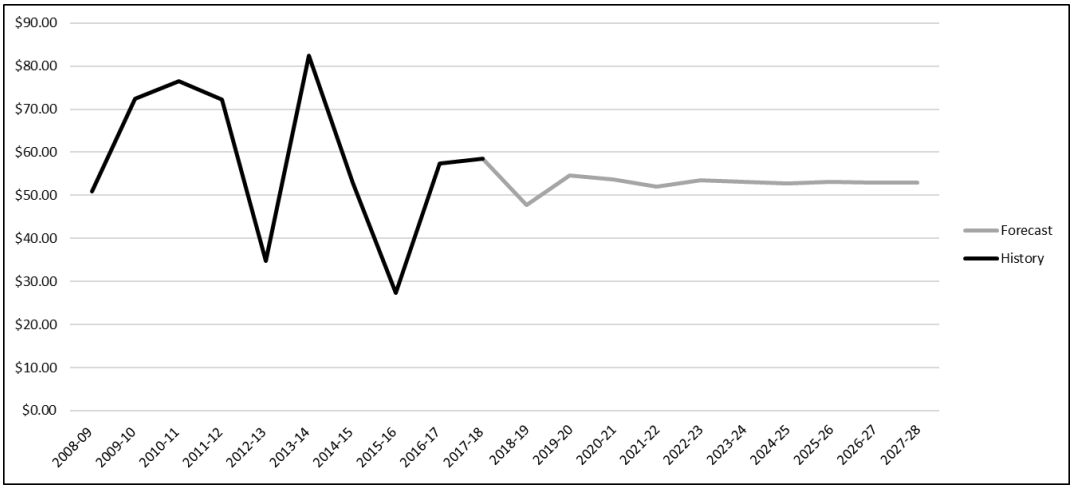
This assessment is required to identify the gap between the state's[291] projected revenues and projected expenditures. Excluding the ongoing research related to expenditures necessary to comply with the laws and regulations governing water quality protection and restoration, the prior subsections of this report have developed the necessary revenue and expenditure forecasts to conduct an initial assessment.

Water supply expenditures by the state have been inconsistent over the past ten years. This is likely due, in order of magnitude, to: (1) the effect on state revenues caused by the housing boom, collapse of the housing market, and onset of the Great Recession; (2) the varying size of federal grant awards; and (3) the terms and rates of loan repayments. The history of these expenditures is shown in Figure 4.4.1. This type of data is very difficult to forecast with any reliable degree of accuracy. The forecast used for the purposes of this gap analysis was a simple 3-year moving average level, which is also shown in Figure 4.4.1. While slightly higher, the forecast is similar to the 2018 Edition of this report.

[See figure on following page]

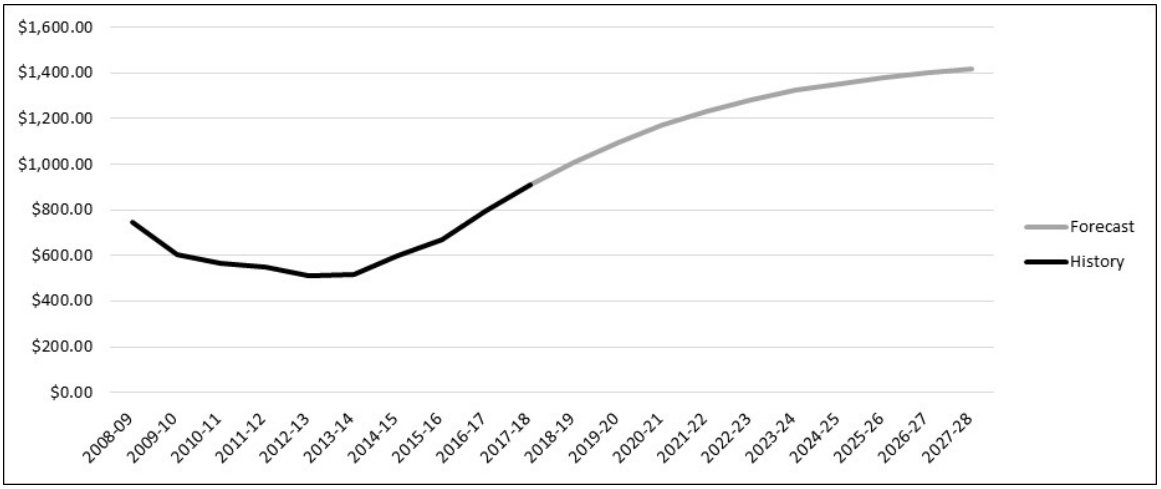
[291] State is inclusive of federal revenues appropriated in the General Appropriations Act each year.

**Figure 4.4.1 Water Supply Expenditures (in $millions)**




Water quality expenditures by the state have been more stable; however, there was a significant decline following the collapse of the housing market, which was exacerbated by the Great Recession. After reaching a low point in Fiscal Year 2012-13, expenditures have increased approximately 12 percent per year, on average. This type of data is also very difficult to forecast with any reliable degree of accuracy. The forecast used for the purposes of this gap analysis has been modified to apply the change in the most recent two growth rates to the prior year's growth rate for each year of the forecast. The forecast this produces is shown in Figure 4.4.2. Overall, this is a higher forecast than developed for the 2018 Edition.

**Figure 4.4.2 Water Quality and Other Water Resource-Related Program Expenditures (in $millions)**




In subsection 4.3, EDR identified various state and federal revenue sources dedicated or historically allocated to water resource purposes. Through the state Revenue Estimating

Conference process, most of these revenues already have official forecasts associated with them. Table 4.4.1 details these revenue forecasts along with the projected expenditures just described.

For purposes of the gap analysis, the water resource revenues include the non-Documentary Stamp Tax revenue sources described and forecasted in subsection 4.3 of this report, the water-related statutory distributions of Documentary Stamp Taxes to the LATF, and a three-year average General Revenue expenditure level. Based on the projected revenues from sources historically allocated to water resources, the recent levels of expenditure increases cannot be sustained into the future without supplementation from other revenue sources, including statutorily uncommitted Documentary Stamp Taxes in the LATF, additional General Revenue funds, or the use of bonds. Moreover, the projected gap has more than tripled by Fiscal Year 2026-27, the last year of the forecast identified in the 2018 Edition.

Historically, the Legislature has appropriated LATF funds above and beyond the water-related statutory distributions. In Fiscal Year 2018-19, for example, the Legislature appropriated a total of $428.4 million from the LATF to water-related activities. While all of the uncommitted Documentary Stamp Tax revenues distributed to the LATF could be used for water-related projects and initiatives, there are currently other priorities supported by these revenues, including land conservation. To the extent the uncommitted Documentary Stamp Taxes in the LATF are used for water resources, it would remove the ability to use them for land conservation or other purposes. Further, any changes to the uses of LATF funds arising from the current litigation on the 2014 Water and Land Conservation constitutional amendment may restrict the availability of these funds for water-related purposes.

[See table on following page]

### Table 4.4.1 State Forecast of Potential Water Resource Revenues, Expenditures, and Gap (in $millions)

| **Revenues** | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** | **FY27-28** |
|---|---|---|---|---|---|---|---|---|---|
| Non-Doc Stamp Revenues* | $615.87 | $615.26 | $624.44 | $625.92 | $627.84 | $632.40 | $635.39 | $638.61 | $641.87 |
| Doc Stamps Water-Related Statutory Distributions to LATF | $304.75 | $313.18 | $319.00 | $319.00 | $319.00 | $319.00 | $319.00 | $314.00 | $314.00 |
| Average Water-Related GR Funding | $128.62 | $128.62 | $128.62 | $128.62 | $128.62 | $128.62 | $128.62 | $128.62 | $128.62 |
| **Total Potential Revenue Available** | **$1,049.24** | **$1,057.05** | **$1,072.06** | **$1,073.54** | **$1,075.46** | **$1,080.02** | **$1,083.01** | **$1,081.23** | **$1,084.49** |
| **Expenditures** | | | | | | | | | |
| **Total Projected Water Resource Expenditures** | **$1,152.14** | **$1,225.03** | **$1,284.41** | **$1,335.51** | **$1,375.15** | **$1,406.91** | **$1,432.53** | **$1,452.41** | **$1,468.09** |
| **Difference** | | | | | | | | | |
| **Gap (Revenues minus Expenditures)** | **($102.90)** | **($167.97)** | **($212.35)** | **($261.97)** | **($299.69)** | **($326.89)** | **($349.52)** | **($371.18)** | **($383.61)** |
| Other Revenues Potentially Available to Close the Gap | | | | | | | | | |
| *LATF Doc Stamps Statutorily Uncommitted* | *$438.25* | *$463.53* | *$513.47* | *$558.52* | *$612.64* | *$647.02* | *$705.32* | *$767.09* | *$820.17* |

*This row consists of the "Total Non-Documentary Stamp Tax Revenues" shown in Table 4.3.4 plus the total revenues available for water supply shown in Table 4.3.1. As discussed in subsection 4.3, these revenues include both state and federal sources that are appropriated by the Legislature.

As shown in Table 4.4.2, the projected revenues in the 2019 Edition are slightly less than forecasted in the 2018 Edition, and the projected expenditures are higher.

### Table 4.4.2 Comparison of 2018 and 2019 Edition Projections (in $millions)

| | **FY19-20** | **FY20-21** | **FY21-22** | **FY22-23** | **FY23-24** | **FY24-25** | **FY25-26** | **FY26-27** |
|---|---|---|---|---|---|---|---|---|
| 2018 Edition Projected Revenues | $1,064.45 | $1,079.56 | $1,095.90 | $1,101.90 | $1,107.00 | $1,113.10 | $1,119.00 | $1,119.90 |
| 2019 Edition Projected Revenues | $1,049.24 | $1,057.05 | $1,072.06 | $1,073.54 | $1,075.46 | $1,080.02 | $1,083.01 | $1,081.23 |
| *Difference* | *-$15.21* | *-$22.51* | *-$23.84* | *-$28.36* | *-$31.54* | *-$33.08* | *-$35.99* | *-$38.67* |
| 2018 Edition Projected Expenditures | $1,148.86 | $1,161.96 | $1,177.68 | $1,193.87 | $1,208.10 | $1,222.58 | $1,222.70 | $1,236.47 |
| 2019 Edition Projected Expenditures | $1,152.14 | $1,225.03 | $1,284.41 | $1,335.51 | $1,375.15 | $1,406.91 | $1,432.53 | $1,452.41 |
| *Difference* | *$3.28* | *$63.07* | *$106.73* | *$141.64* | *$167.05* | *$184.33* | *$209.83* | *$215.94* |
| 2018 Edition Projected Gap | -$84.41 | -$82.40 | -$81.78 | -$91.97 | -$101.10 | -$109.48 | -$103.70 | -$116.57 |
| 2019 Edition Projected Gap | -$102.90 | -$167.97 | -$212.35 | -$261.97 | -$299.69 | -$326.89 | -$349.52 | -$371.18 |
| *Difference* | *-$18.49* | *-$85.57* | *-$130.57* | *-$170.00* | *-$198.59* | *-$217.41* | *-$245.82* | *-$254.61* |

The higher projection for expenditures is attributable to changes in the underlying assumptions used to build the forecast. The gap analysis sums the individual forecasts for water supply and quality that have developed separately in Tables 4.1.1 and 4.1.8. The assumptions underlying the water supply expenditure forecast were unchanged, whereas the assumptions underlying the water quality expenditure forecast were refined.

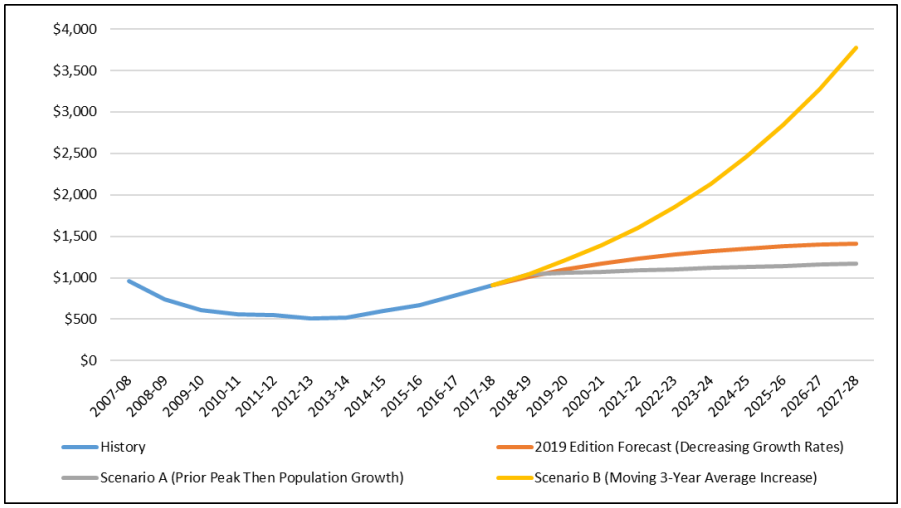
In the 2018 Edition, the forecast for water quality assumed that the expenditures would increase annually by a 3-year average increase until the prior peak within the 10-year historical series (in this case, Fiscal Year 2007-08) was surpassed. Once the peak was surpassed, it was assumed the growth rates would fall to match Florida population growth rates of about 1.5 percent per year, on average. This methodology essentially assumed that the large increases seen in the most recent four years were "catching up" after the Great Recession, and at the point the prior peak was surpassed, the annual increases would return to a more moderate growth pattern. Under this methodology, the prior peak was surpassed in Fiscal Year 2018-19; thus, beginning in Fiscal Year 2019-20, the annual increases were reduced to Florida population growth rates.

In this year's edition, however, that methodology could not be used to develop the water quality expenditure forecast. In the 10-year historical series used for the 2019 Edition, the prior peak occurred in Fiscal Year 2008-09 and was already surpassed in Fiscal Year 2016-17. To construct the forecast, the projections were based on the relative decline from the year-over-year percentage increase in Fiscal Year 2016-17 (18.72 percent) to the year-over-year percentage increase in Fiscal Year 2017-18 (14.49 percent). This decay factor (77 percent) was then applied to all years of the forecast to show continued, but slowing, growth rates. Although the growth rates are higher than those used in most years of the 2018 Edition forecast, this year's forecast is still conservative given the higher growth rates in the most recent years.

The difference in the results between the two water quality forecasts illustrates the sensitivity of the projections to changes in the underlying assumptions. To test this sensitivity, EDR recalculated the gap analysis under two scenarios. *Scenario A* relies on the same methodology for projecting water quality expenditures that was used in the 2018 Edition. In this scenario, the Fiscal Year 2018-19 expenditures projection is based on a 3-year average growth rate (14.76 percent). Because the projected expenditures for Fiscal Year 2018-19 would surpass the 2007-08 peak expenditures, the growth rates are then set to Florida population growth rates beginning in Fiscal Year 2019-20. *Scenario B* relies on a simple moving 3-year average increase in annual water quality expenditures for each year of the forecast. There were no changes to the underlying methodology used for the water supply forecast under either scenario. Figure 4.4.3 shows the three expenditure forecasts that are produced using these assumptions.

[See figure on following page]

**Figure 4.4.3 Comparison of State Expenditure Forecasts (in $millions)**




Scenario B is the most representative of recent growth rates and shows the levels that would be expected if annual expenditures continue to increase by approximately 15 percent per year. This scenario could be thought of as the upper bound given current trends. Scenario A results in a slightly lower expenditures forecast than is currently included in the 2019 Edition of the report. However, the shape of the forecast is very similar.

As shown in Table 4.4.3, each of these methodologies results in projected gaps between the expected revenues and projected expenditures for each year of the state forecast. The only difference is in the magnitude of the gap.

**Table 4.4.3 Comparison of Potential Gaps between Water Resource Revenues and Expenditures (in $millions)**

| | FY19-20 | FY20-21 | FY21-22 | FY22-23 | FY23-24 |
|---|---|---|---|---|---|
| 2019 Edition Forecast (Decreasing Growth Rates) | ($102.90) | ($167.97) | ($212.35) | ($261.97) | ($299.69) |
| Scenario A (Prior Peak Then Population Growth) | ($63.01) | ($69.64) | ($68.05) | ($82.53) | ($94.25) |
| Scenario B (Moving 3-Year Average Increase) | ($213.94) | ($387.46) | ($583.35) | ($831.02) | ($1,111.41) |

| | FY24-25 | FY25-26 | FY26-27 | FY27-28 |
|---|---|---|---|---|
| 2019 Edition Forecast (Decreasing Growth Rates) | ($326.89) | ($349.52) | ($371.18) | ($383.61) |
| Scenario A (Prior Peak Then Population Growth) | ($103.00) | ($113.30) | ($127.50) | ($136.31) |
| Scenario B (Moving 3-Year Average Increase) | ($1,433.85) | ($1,808.96) | ($2,245.53) | ($2,744.31) |

In recent years, the Legislature has generally used cash to pay for water resources projects and initiatives. However, Documentary Stamp Tax revenues can be used to secure bonds for some of these purposes. In Fiscal Year 2019-20, the total remaining statutory authority for the issuance of

Florida Forever and Everglades bonds is $3.45 billion. Table 4.4.4 shows the available authority by program.

**Table 4.4.4 Florida Forever and Everglades Restoration Bonding Authority**

| Bond Program | Available Authority |
|---|---|
| Florida Forever | $3.3 billion |
| Everglades Restoration | $100 million |
| Everglades Restoration (Florida Keys) | $50 million |
| TOTAL | $3.45 billion |

In 2017, the Legislature authorized the issuance of Florida Forever bonds to pay for costs related to land acquisition, planning, and construction of certain water storage reservoirs.[292] The bonds may be issued in an amount of up to $800 million for this purpose; the authorization falls within the $3.3 billion total available authorization.[293] Florida Forever bonds are statutorily limited to $300 million in annual debt service, and it is the intent of the Legislature that all bonds issued be retired by December 31, 2040. The annual limitation on debt service could potentially be reached before issuing the full $3.3 billion of remaining bond authorization. For Fiscal Year 2019-20, based on the current debt service payments for previously issued bonds, the Legislature could appropriate up to an additional $165 million for debt service payments to secure new bonds. Assuming 20-year level debt at a 5.0 percent long-term interest rate, up to approximately $2.0 billion in new Florida Forever bonds, including bonds for water storage reservoirs, could be issued in Fiscal Year 2019-20 within the $300 million annual debt service cap.

Bonds for Everglades restoration may be issued in an amount not to exceed $100 million per fiscal year, unless the Legislature authorizes an additional amount of bonds within the statutory criteria.[294] For example, Everglades restoration bonds to fund the Florida Keys Area of Critical State Concern protection program and the City of Key West Area of Critical State Concern may be issued in an amount not to exceed $50 million per fiscal year. Everglades restoration bonds must be issued by Fiscal Year 2019-20. Thus, bonds of $100 million for Everglades restoration and $50 million for Florida Keys/Key West could be issued for Fiscal Year 2019-20; however, no bonds can be issued after that point without a statutory change. Assuming 20-year level debt at a 5.0 percent long-term interest rate, new bonds of $150 million would generate a need for approximately $12.0 million in additional annual debt service.

Although the sale of bonds can significantly increase the amount available for expenditure in a given fiscal year, it is important to remember that in any year where a bond sale is made, a portion of the Documentary Stamp Tax revenue is obligated into the future. This means that the state gives up a portion of the future tax collections in order to enjoy the benefit of having a larger amount to spend on projects in the present time. Based on the current statutory distributions of Documentary

[292] *See* Ch. 2017-10, § 3, Laws of Fla. (codified at § 373.4598, Fla. Stat.).
[293] § 201.15(3)(a), Fla. Stat. No bonds may be issued for water storage reservoirs unless such bonds are approved and the debt service for the remainder of the fiscal year in which the bonds are issued is specifically appropriated in the General Appropriations Act or other law.
[294] § 215.619, Fla. Stat.

Stamp Tax collections to the LATF, increases to the required debt service payments will have corresponding decreases to the statutory distributions for water-related projects as well as the uncommitted cash. Essentially, new bond authorizations have the effect of shifting funds in future years from paying for new projects to paying debt service for previously authorized projects—the total distributions to the LATF would remain the same.

# 5. Special Topics

Because of the complexity of the programs and initiatives devoted to Florida's water resources and conservation lands, EDR has identified special topics that are more appropriately discussed on their own rather than being split among the report's conservation land, water quality, and water supply subsections. These topics may vary from year to year. The topics included in this year's report are Everglades restoration, red tide and harmful algal blooms, and Hurricane Michael, which are important components in the state's efforts to protect its natural resources.

## 5.1 Everglades Restoration

The Florida Everglades, the "River of Grass," is a mosaic of sawgrass marshes, freshwater ponds, prairies, and forested uplands that supports a diverse plant and wildlife community. The Greater Everglades ecosystem originally encompassed 11,000 square miles from central Florida to the Florida Keys. Historically, sheets of freshwater naturally flowed from the Kissimmee chain of lakes to Lake Okeechobee, where its flood waters traveled southward through a variety of low-lying habitat types before finally emptying into the Gulf of Mexico, Florida Bay, and Biscayne Bay.

Because of efforts to drain the marshland for flood control, agriculture, and development, the Everglades today is half the size it was a century ago. Yet, what remains of the Everglades is still considered one of the most unique ecosystems in the world and one of Florida's great treasures.[295] The Everglades wetlands provide numerous benefits to South Florida including water supply, flood control, and recreational opportunities, and serve as a unique habitat for diverse species of wildlife and plant life.[296] The Everglades wetlands also provide natural water storage for the environment during drier seasons and serve as an important water recharge area for South Florida.

To restore and protect the greater Everglades ecosystem, the Florida Legislature established the State of Florida's responsibilities in a series of statutes under the Florida Water Resources Act, chapter 373, Florida Statutes. In addition to authorizing the South Florida Water Management District (SFWMD) to serve as the local sponsor for the majority of restoration efforts,[297] the Legislature directed the roles and responsibilities of both the Department of Environmental Protection and SFWMD for plans authorized through the Everglades Forever Act, the Comprehensive Everglades Restoration Plan, the Northern Everglades and Estuaries Protection Program, and the Everglades Restoration Investment Act.

**Everglades Forever Act**

In 1994, the Legislature enacted the Everglades Forever Act (EFA) establishing a long-term commitment to restoring and protecting the remaining Everglades ecosystem by improving water quality and water quantity.[298] The EFA required SFWMD to develop a plan for achieving compliance with state water quality standards, including total phosphorous criterion, by 2003. In 2003, the EFA was amended to incorporate SFWMD's Long-Term Plan for Achieving Water

[295] § 373.4592(1)(a), Fla. Stat.
[296] § 373.4592(1), Fla. Stat.
[297] § 373.1501, Fla. Stat.
[298] Ch. 94-115, §§ 1-2, Laws of Fla. (codified as amended in § 373.4595, Fla. Stat.).

Quality Goals for the Everglades Protection Area consisting of various projects that would achieve compliance with the total phosphorous criterion.[299]

In 2014, the EFA was amended to include the State of Florida and U.S. Environmental Protection Agency's agreement on new strategies for improving water quality in the Everglades. Known as the Restoration Strategies Regional Water Quality Plan, this technical plan includes the creation of 6,500 acres of new stormwater treatment areas (STAs) and 116,000 acre-feet of additional water storage (flow equalization basins or FEBs) to achieve compliance with the water quality standards for the Everglades.[300] The estimated cost of implementing the Restoration Strategies is $880 million over a 13-year period. A total of $500.7 million in funds will be provided by SFWMD with the balance to be provided by the state. The 2013 Legislature appropriated $32 million on a recurring basis to support the implementation of the technical water quality plan.

**Comprehensive Everglades Restoration Plan**

In 2000, Congress approved the Comprehensive Everglades Restoration Plan (CERP) with the passage of the Water Resources Development Act of 2000, Public Law 106-541 (WRDA 2000) to provide a coordinated plan for restoring the water resources of central and southern Florida, including the Everglades. The CERP is a large, comprehensive, long-term 50-50 partnership with the federal government, which focuses primarily on the restoration of the water quantity, quality, timing, and distribution within the Everglades ecosystem. According to a report published by the Congressional Research Service in 2017, the CERP consists of more than the 50 original projects and will take more than 50 years to complete at an estimated cost of $16.4 billion.[301] Under WRDA 2000, the federal government is responsible for 50 percent of the cost of carrying out CERP projects, although any land acquisition necessary to implement CERP projects is the responsibility of the State (the amount of which is credited towards the State's share).

In addition, the Central Everglades Planning Project (CEPP), a component of the CERP, was federally approved in December 2016. The cost of the CEPP is estimated to be $1.98 billion, nearly half of which ($991.5 million) will be funded by the state pursuant to the cost-share requirements in section 601(e) of WRDA 2000.[302] As discussed in subsection 4.3, section 375.041, Florida Statutes, already directs distributions of certain funds in the Land Acquisition Trust Fund (LATF) for Everglades restoration, including the CEPP component of the CERP.

In 2017, section 373.4598, Florida Statutes, was enacted to establish an expedited schedule for the SFWMD to design and construct the Everglades Agricultural Area (EAA) reservoir project. This

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[299] The "Everglades Protection Area" is defined as Water Conservation Areas 1, 2A, 2B, 3A, 3B, the Arthur R. Marshall Loxahatchee National Wildlife Refuge, and the Everglades National Park. § 373.4592(2)(i), Fla. Stat.

[300] SFWMD, Restoration Strategies Regional Water Quality Plan. 2012. Available at: https://www.sfwmd.gov/sites/default/files/documents/rs_waterquality_plan_042712_final.pdf. For additional information, *see also* SFWMD, Restoration Strategies for Clean Water for the Everglades, https://www.sfwmd.gov/our-work/restoration-strategies. (Accessed January 2018).

[301] The Congressional Research Service, in their February 2017 report, cites the 2015 Report to Congress on the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan, available at: https://evergladesrestoration.gov/content/cerpreports/cerp_2015_rpt_to_congress.pdf. (Accessed January 2019). EDR has adjusted the estimate of completion cost (available in both reports) for inflation to July 2018. This results in $17.4 billion. A summary of past estimates of completion costs is available at: https://www.everycrsreport.com/files/20170213_R42007_24c2bacd21b6492ad095bde06b6db1cdc1054eb1.pdf. (Accessed January 2019).

[302] Water Infrastructure Improvements for the Nation Act (WIIN Act), Pub. L. No.114-322 (2016).

project, providing additional water storage south of Lake Okeechobee, is intended to reduce high-volume discharges from the lake to the St. Lucie and Caloosahatchee estuaries and restore the hydrological connection to the Everglades.[303] A part of the water storage features of the EAA reservoir was included as a component of the CEPP. In October 2018, the EAA reservoir was federally authorized (as a change to the water storage components of CEPP) with the passage of the America's Water Infrastructure Act of 2018.[304] A federal appropriation for the project, however, is still required.

**Northern Everglades and Estuaries Protection Act**

In 2007, the Legislature enacted the Northern Everglades and Estuaries Protection Program (NEEPP), which expanded the existing Lake Okeechobee Protection Program, to include protection and restoration of Lake Okeechobee, Caloosahatchee, and St. Lucie River watersheds.[305] The purpose of the NEEPP is to coordinate implementation of watershed-based protection plans to improve water quality and quantity, control exotic species, and restore habitat within these three northern Everglades watersheds.[306]

In 2016, the Florida Legislature amended NEEPP to reflect the basin management action plans adopted for Lake Okeechobee (2014), the Caloosahatchee Estuary Basin (2012), and the St. Lucie Estuary Basin (2013), as the pollution control programs for these watersheds. The amendments also clarify the roles and responsibilities of SFWMD, DEP, and DACS in implementing the program.[307]

**Everglades Restoration Investment Act**

In 2000, the Legislature passed the Everglades Restoration Investment Act, which provided the framework for the state to fund its share of the partnership, through cash or bonds to finance or refinance the cost of acquisition and improvement of land and water areas necessary for implementing CERP.[308] In 2007 and 2008, the Legislature expanded the use of the Save Our Everglades Trust Fund and bonds issued for Everglades restoration to include the Lake Okeechobee Watershed Protection Plan and the River Watershed Protection Plans under the Northern Everglades and Estuaries Protection Program, and the Keys Wastewater Plan.[309]

**State Funding for Everglades Restoration**

As discussed in Section 4.1 of this report, the State of Florida has spent more than $806 million for projects related to Everglades restoration. This funding is included in the reported state expenditures for water quality restoration projects and initiatives.[310] Table 5.1.1 shows the annual cash expenditures for the various projects related to Everglades restoration. The majority of the funding (shown in the "Restoration Projects" column) is for projects that support CERP and the

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[303] *See* 373.4598, Fla. Stat.
[304] Pub. L. No: 115-270 (2018).
[305] Ch. 2007-253, § 3, Laws of Fla. (amending § 373.4595, Fla. Stat.).
[306] § 373.4595, Fla. Stat.
[307] Ch. 2016-1, § 15, Laws of Fla. (amending § 373.4595, Fla. Stat.). For more information on basin management action plans associated with NEEPP, visit: DEP, Basin Management Action Plans, https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps. (Accessed December 2018).
[308] Ch. 2000-129, § 5, Laws of Fla. (codified as amended in § 373.470, Fla. Stat.).
[309] The Keys Wastewater Plan is defined as "the plan prepared by the Monroe County Engineering Division dated November 2007 and submitted to the Florida House of Representatives on December 4, 2007). § 373.470(2)(e), Fla. Stat.
[310] *See* Table 4.1.5.

Restoration Strategies Regional Water Quality Plan. The expenditures shown for the 2017-18 restoration projects include $34 million that was provided in Senate Bill 10 (2017) for the Everglades Agricultural Area reservoir, the post-authorization change report, and Phase II of the C-51 reservoir project.

**Table 5.1.1 State Expenditures for Everglades Restoration (in $millions)**

| Fiscal Year | Restoration Projects | Land Acquisition | Florida Keys Wastewater Treatment | Lake Okeechobee Agricultural Projects | Other Projects | TOTAL |
|---|---|---|---|---|---|---|
| FY08-09 | $55.84 | $0.00 | $0.00 | $0.00 | $0.00 | $55.84 |
| FY09-10 | $38.35 | $0.00 | $0.00 | $0.00 | $0.00 | $38.35 |
| FY10-11 | $69.27 | $0.00 | $0.00 | $0.00 | $0.00 | $69.27 |
| FY11-12 | $27.54 | $0.00 | $0.00 | $0.00 | $0.00 | $27.54 |
| FY12-13 | $26.60 | $0.00 | $0.00 | $0.00 | $0.00 | $26.60 |
| FY13-14 | $54.77 | $0.00 | $39.16 | $0.00 | $0.00 | $93.92 |
| FY14-15 | $35.25 | $0.00 | $10.72 | $4.72 | $3.88 | $54.56 |
| FY15-16 | $55.50 | $0.05 | $26.20 | $6.65 | $27.37 | $115.77 |
| FY16-17 | $89.70 | $6.52 | $6.23 | $5.72 | $32.19 | $140.37 |
| FY17-18 | $119.41 | $22.61 | $6.01 | $7.53 | $28.97 | $184.53 |
| **TOTAL** | **$572.23** | **$29.18** | **$88.32** | **$24.62** | **$92.41** | **$806.75** |

*Through June 30, 2018.

The funding sources for Everglades restoration projects have included General Revenue, trust fund balances, and bond proceeds. Current law authorizes the issuance of bonds to finance or refinance the cost of Everglades restoration.[311] Bonds may be issued in Fiscal Years 2002-03 through 2019-20, in an amount not to exceed $100 million per fiscal year except under certain conditions.[312] To date, the state has issued approximately $336.8 million of Everglades bonds. The most recent year that new bonds were authorized was Fiscal Year 2014-15, when the Legislature authorized bonds of up to $50.0 million for the purpose of constructing sewage collection, treatment, and disposal facilities included in the Florida Keys Area of Critical State Concern.[313]

The aggregate principal amount of outstanding bonds is approximately $202.3 million, with net debt service of approximately $23.4 million due in Fiscal Year 2018-19. If no new bonds are sold, the estimated debt service is expected to decline each year through Fiscal Year 2034-35, at which time the Everglades bonds would be retired. Table 5.1.2 shows the estimated debt service that will be due each fiscal year.

[311] § 215.619, Fla. Stat.
[312] Section 215.619(1)(a), Florida Statutes, authorizes bonds to exceed $100 million per fiscal year if DEP requests additional amounts to achieve cost savings or accelerate the purchase of lands, or the Legislature authorizes additional bonds to fund the Florida Keys and Key West Areas of Critical State Concern.
[313] Specific Appropriation 1626A, ch. 2014-51, Laws of Fla. (Fiscal Year 2014-15 General Appropriations Act).

**Table 5.1.2 Everglades Restoration Bonds Outstanding Debt Service (in $millions)**

| Fiscal Year | Outstanding Debt Service | Expected Interest Subsidy | Net Debt Service Owed* |
|---|---|---|---|
| FY18-19 | $23.91 | ($0.55) | $23.36 |
| FY19-20 | $24.56 | ($0.51) | $24.05 |
| FY20-21 | $24.33 | ($0.47) | $23.85 |
| FY21-22 | $24.45 | ($0.43) | $24.02 |
| FY22-23 | $24.49 | ($0.39) | $24.10 |
| FY23-24 | $24.48 | ($0.34) | $24.13 |
| FY24-25 | $24.49 | ($0.29) | $24.19 |
| FY25-26 | $17.96 | ($0.24) | $17.72 |
| FY26-27 | $17.94 | ($0.19) | $17.75 |
| FY27-28 | $10.33 | ($0.14) | $10.20 |
| FY28-29 | $10.27 | ($0.07) | $10.20 |
| FY29-30 | $6.93 | $0.00 | $6.93 |
| FY30-31 | $6.93 | $0.00 | $6.93 |
| FY31-32 | $6.93 | $0.00 | $6.93 |
| FY32-33 | $3.43 | $0.00 | $3.43 |
| FY33-34 | $3.43 | $0.00 | $3.43 |
| FY34-35 | $3.43 | $0.00 | $3.43 |
| **TOTAL** | **$258.27** | **($3.64)** | **$254.63** |

*Assumes 3.25% interest rate on the 2007A&B variable rate Everglades Bonds.

The Everglades bonds have been issued on a parity basis with Florida Forever bonds, which means both bond programs have a first lien on pledged revenues (*i.e.*, Documentary Stamp Tax). The debt service is paid from the LATF for both Florida Forever bonds and Everglades bonds.

**Federal Funding for Everglades Restoration**

Under CERP, the federal government is required to fund half of the costs for restoration. Federal funding is provided through the U.S. Army Corps of Engineers and the U.S. Department of the Interior. According to the Congressional Research Service, the federal government has spent just over $1.0 billion on Everglades restoration efforts since 2011.[314] Table 5.1.3 shows the federal expenditures since Federal Fiscal Year 2011.

**Table 5.1.3 Federal Expenditures for Everglades Restoration (in $millions)**

| Federal Fiscal Year | Dept. of Interior | Army Corps | TOTAL |
|---|---|---|---|
| FY10-11 | $70.60 | $131.07 | $201.67 |
| FY11-12 | $99.88 | $142.49 | $242.37 |
| FY12-13 | $66.36 | $96.01 | $162.36 |
| FY13-14 | $70.45 | $47.62 | $118.07 |
| FY14-15 | $62.27 | $68.55 | $130.82 |
| FY15-16 | $64.43 | $94.05 | $158.47 |
| **TOTAL** | **$433.99** | **$579.77** | **$1,013.76** |
| FY16-17 Preliminary | $63.00 | $106.00 | $169.00 |
| FY17-18 Preliminary | $54.00 | $76.00 | $130.00 |

[314] *Everglades Restoration: Federal Funding and Implementation Progress*. Congressional Research Service (Oct. 6, 2017). Available at https://www.everycrsreport.com/reports/R42007.html. (Accessed December 2018).

**Regional Funding for Everglades Restoration**
As in the previous edition, no funding from SFWMD has been included, although it certainly exists. Because SFWMD is the local sponsor and receives funding from a variety of sources, their assistance is needed to identify the expenditures made from the district's own sources of revenue. EDR continues to work with staff of the SFWMD to identify these expenditures.

## 5.2 Red Tide and Harmful Algal Blooms

Unusually persistent harmful algal blooms (HABs)[315] have plagued fresh and salt water environments in southern Florida during the summer of 2018. The result has been a plethora of dead wildlife and negative impacts on the residents, visitors, and communities that rely on those marine environments.[316] The extent of the HABs in the salt water environment from June through December, 2018, is shown in Figure 5.2.1.

As discussed in subsection 4.1, in July 2018, Executive Order 18-191 was issued by the Governor, declaring a state of emergency in Glades, Hendry, Lee, Martin, Okeechobee, Palm Beach, and St. Lucie counties because of widespread algae blooms.[317] In the Executive Order, the blooms were linked to the discharges of harmful water from Lake Okeechobee into the Caloosahatchee River, St. Lucie River, the Indian River Lagoon, and estuaries. The order directed DEP to issue an emergency order to urge the U.S. Army Corps of Engineers and the SFWMD to take emergency actions to help redirect the flow of water and curb the potential for algae blooms.

Furthermore, in August, a second Executive Order 18-221 was issued, declaring a state of emergency in Charlotte, Collier, Hillsborough, Lee, Pinellas, Manatee, and Sarasota counties due to red tide algae bloom development in the Gulf of Mexico off the coast of Southwest Florida.[318] Subsequent Executive Orders 18-275 and 18-282 were issued in October 2018, expanding the state of emergency to include Brevard, Broward, Indian River, Martin, Miami-Dade, Palm Beach, and St. Lucie counties.

The original Executive Order 18-191, issued in July 2018, directed DEP to establish a grant program to provide local governments with funding to contract for clean-up services. As directed, DEP established a grant program to help eligible counties provide targeted algal bloom clean-up efforts to quickly reduce and address impacts to significantly affected areas, such as marinas, boat ramps and other public access areas. In addition, through separate grant funding available from

[315] Algal blooms are caused by abnormal increases in the concentration of certain microscopic algae and algae-like organisms. Some of these organisms produce toxins that can be harmful to people, either directly through exposure or indirectly through the consumption of contaminated seafood. The toxins can also be harmful to fish, shellfish, marine mammals, and birds.
*See* UF IFAS 2015. Harmful Algal Blooms. https://edis.ifas.ufl.edu/topic_harmful_algal_blooms. (Accessed January 2019).
*See also* NOAA. 2016. What is a harmful algal bloom? https://www.noaa.gov/what-is-harmful-algal-bloom. (Accessed January 2019).
[316] U.S. EPA. 2018. Freshwater HABs Newsletter. https://www.epa.gov/sites/production/files/2018-09/documents/habs-newsletter-aug-2018.pdf. (Accessed January 2019).
[317] Executive Order 18-191 (July 9, 2018). Available at https://www.flgov.com/wp-content/uploads/2018/07/EO-18-191.pdf. (Accessed December 2018). This Executive Order was extended by Executive Orders 18-249 (September 6, 2018) and Executive Order 18-311 (November 5, 2018). Executive Order 18-311 remained in effect on January 3, 2018.
[318] Executive Order 18-221 (August 13, 2018). Available at https://www.flgov.com/wp-content/uploads/orders/2018/EO_18-221.pdf. (Accessed December 2018).

DEP's Clean Marina Program, DEP provided assistance to marinas.[319] The list of other emergency actions taken from July 2018 to October 2018 can be found in DEP's website under "Emergency Authorizations Implement Measures to Address South Florida Algal Blooms".[320]

**Figure 5.2.1 Saltwater Harmful Algal Bloom Status Statewide from June to December, 2018**

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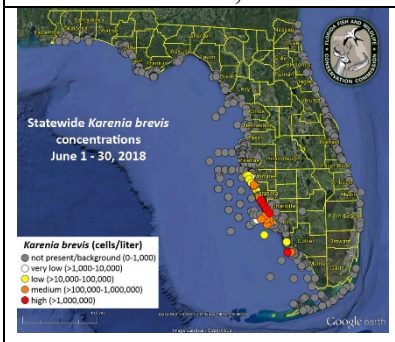
<tr><td> 
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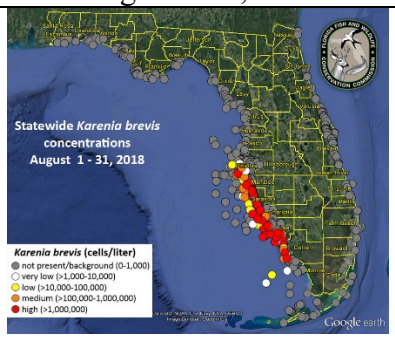
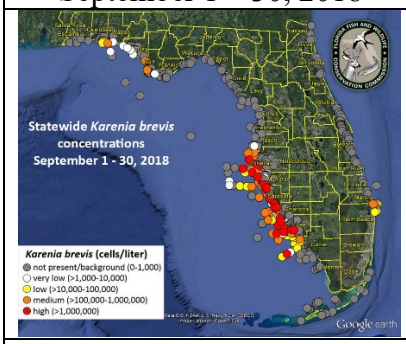
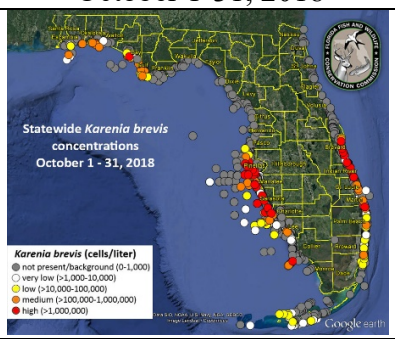
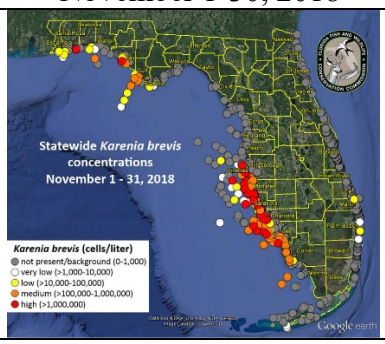
</td><td> 
</td></tr>
<tr><td>September 1 – 30, 2018</td><td>October 1-31, 2018</td><td>November 1-30, 2018</td></tr>
<tr><td> 
</td><td> 
</td><td> 
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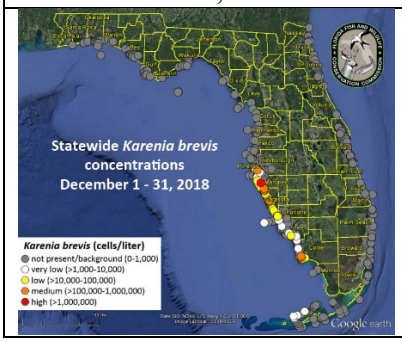
<tr><td>December 1-31, 2018</td><td></td><td></td></tr>
<tr><td> 
</td><td colspan="2">The HABs in Florida coastal waters that are frequently referred to as red tide are typically associated with Karenia brevis dinoflagellate microorganism. An HAB occurs when underlying conditions are favorable to blooms (e.g., high concentrations of nutrients, adequate light, and, generally, warm water).<br>Sources: Red Tide Current Status: Archived status maps available at: https://myfwc.com/research/red-tide/statewide/. (Accessed January 2019).<br>McGuire, M. 2018. Red Tide. UF/IFAS Blog Post, available at: http://blogs.ifas.ufl.edu/flaglerco/2018/07/31/red-tide/. (Accessed January 2019).</td></tr>
</table>

EDR intends to discuss the recent initiatives and any upcoming actions to address algal blooms in the next editions of this annual report. Based on the expenditures over the past ten years (from

[319] DEP. 2018. 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. (Accessed January 2019).

[320] The website is available at https://floridadep.gov/dear/algal-bloom/content/emergency-authorizations-implement-measures-address-south-florida-algal. (Accessed January 2019).

Fiscal Year 2008-09 to Fiscal Year 2017-18), the state has spent an average of $1.1 million per year for ongoing red tide research (see Table 4.1.5). Due to the widespread nature and longer duration of the current algae blooms, the state's response to this issue has become more robust over the past 20 months. Among other initiatives, the Legislature passed Senate Bill 10 in the 2017 Regular Session, which authorized annual transfers to the Everglades Trust Fund administered by the SFWMD to undertake a series of steps intended to reduce discharges from Lake Okeechobee that resulted in toxic blue-green algae blooms.[321] In Fiscal Year 2017-18, the state transferred $34 million to the trust fund, including $30 million to acquire land or negotiate leases or for any cost related to planning or constructing the Everglades Agricultural Area (EAA) reservoir project; $3 million for developing the post-authorization change report; and $1 million for negotiating Phase II of the C-51 reservoir project.[322]

The harmful algal bloom events can have a variety of economic consequences, including, but not limited to costs associated with public health, commercial fishery reduction, decrease in recreation and tourism, and management and monitoring.[323] While the economic effects of the 2018 HAB still need to be evaluated, past studies and anecdotal evidence suggest that the cost can be high.

Several authors have examined the economic impacts of past HABs in Florida. The U.S. EPA has provided a summary of some of these studies that is excerpted, in part, below:

> *"Larkin and Adams (2007) used a time series model to estimate that restaurant and lodging revenues decline by $4.2 million and $5.6 million, respectively, per month along a 10-mile stretch of shoreline. This represents 29% of revenue in the restaurant sector and 35% in lodging along that 10-mile stretch of shoreline. According to Morgan et al. (2009), the Small Business Association provided 36 businesses in southwest Florida with loans between $5,680 and $96,295 as a result of red tide events between 1996 and 2002. Morgan et al. (2009) used daily sales data from three coastal restaurants in southwest Florida to estimate the impact of red tide events on revenues. They found that individual restaurant sales decreased by $868 to $3,734 (13.7% to 15.3%) each day during red tide events. As noted by Morgan et al. (2009), Larkin and Adams (2007), and Evans and Jones (2001), the documented tourism impacts arising from algal blooms are localized. In response to outbreaks that impede recreation in one area, visitors may shift their activities to other areas. To the extent that this occurs, the adverse economic impacts associated with HABs represent transfers of economic activity between areas, rather than a true economic loss. As such, the tourism results presented in this section represent only the impacts within the geographic boundaries specified within each study. The impacts described do not necessarily represent true economic losses considering larger geographical areas. On the other hand, there may be a halo effect in which localized events spur avoidance of a much larger area surrounding the affected waterbody, expanding the geographic size and severity of impacts associated with a particular event."*[324]

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[321] Ch. 2017-10, Laws of Fla.
[322] §§ 10 and 11 of ch. 2017-19, Laws of Fla.
[323] *See* http://www.whoi.edu/cms/files/Economics_report_18564_23050.pdf and https://link.springer.com/chapter/10.1007/978-3-540-32210-8_30. (Accessed January 2019).
[324] U.S. EPA (2015). https://www.epa.gov/sites/production/files/2015-04/documents/nutrient-economics-report-2015.pdf. (Accessed January 2019).

The same U.S. EPA report also identifies studies that suggest elevated nutrient levels, low dissolved oxygen levels, and decreased water clarity have resulted in depressed property values of waterfront and nearby homes. With regards to healthcare costs, the Florida Department of Health reports that, during a past harmful algal bloom, the costs of hospital visits for respiratory illness alone in Sarasota County ranged between $0.5 to $4 million dollars.[325] An example of commercial fishery reduction is reported in a study of the extended HAB event that occurred from November 2015 through April 2016 and significantly disrupted the harvest of cultured shellfish (hard clams and sunray venus clams) in the Charlotte Harbor region and Tampa Bay region. Additionally:

> *"The analysis found that the extended red tide event of 2015-16 resulted in a sales loss of $1.33 million. This reduction in sales generated a negative economic impact of $3.25 million to the Florida economy, as well as tax generation loss of almost $90,000. In addition, approximately 30 jobs were lost due to the sales reductions associated with the red tide event. These negative impacts were distributed across hatcheries, growers, seafood dealers, supply dealers, seafood retailers, restaurants, and other business that are connected with the molluscan shellfish culture industry."*[326]

Overall, HABs can lead to significant impacts to local economies, and effective strategies should be developed to reduce their frequency, intensity, and duration, to develop resiliency of local communities, and to adequately respond to future events.

## 5.3 The Effects of Hurricane Michael

In October of 2018, Hurricane Michael hit Florida's panhandle with wind speeds in excess of 155 miles per hour. The storm devastated this area of the state, causing billions of dollars of damage and the loss of many businesses, homes, and lives.

Neither the expenditure nor revenue forecasts in this edition were adjusted specifically to consider the impacts of this storm. Relevant expenditures that may be impacted are the NWFWMD's water supply, water quality, flood protection, and natural systems expenditures seen in Tables 4.1.9, 4.1.10, 4.1.11, and 4.1.12, respectively, as well as any water-related expenditures of the affected local and regional governments. Relevant revenues lost include future ad valorem taxes to local and regional governments from properties that were destroyed as well as timber sale revenues by the NWFWMD. As the impacts of the storm become more fully known, forecasts in future editions will account for these effects.

At the time of this report, $384.7 million has been authorized through a series of budget amendments for Hurricane Michael response and recovery efforts. Of this, $298 million is authorized to be spent from the General Revenue Fund and $86.7 million from trust funds. Further, of the total authorized appropriations, approximately $27.7 million is for recovery efforts related to land management and water quality. The Fish and Wildlife Conservation Commission is

[325] *See* http://www.floridahealth.gov/environmental-health/aquatic-toxins/_documents/economic-impacts.pdf. (Accessed January 2019).
[326] Source: UF/IFAS. http://shellfish.ifas.ufl.edu/news/red-tide-causes-economic-losses-sw-florida-industry/. (Accessed January 2019).

authorized to spend $10.9 million for derelict vessel removal and law enforcement activities. The Department of Environmental Protection is authorized to spend $16.8 million for emergency repairs to state parks and coastal and aquatic managed areas.

A number of state parks are within the area that experienced hurricane-force winds. At the time of this report, three state parks remain closed (Florida Caverns, Three Rivers, and St. George Island), and three additional parks are partially closed (St. Andrews, St. Joseph Peninsula, and Torreya). Table 5.3.1 shows a list of these parks with each one's location, current closure status, and prior year operational costs and generated revenues. At this time, the actual impact of the closures on expenditures and revenues for Fiscal Year 2018-19 as forecasted in this edition cannot be determined.

**Table 5.3.1 State Parks Remaining Closed or Partially Closed After Hurricane Michael**

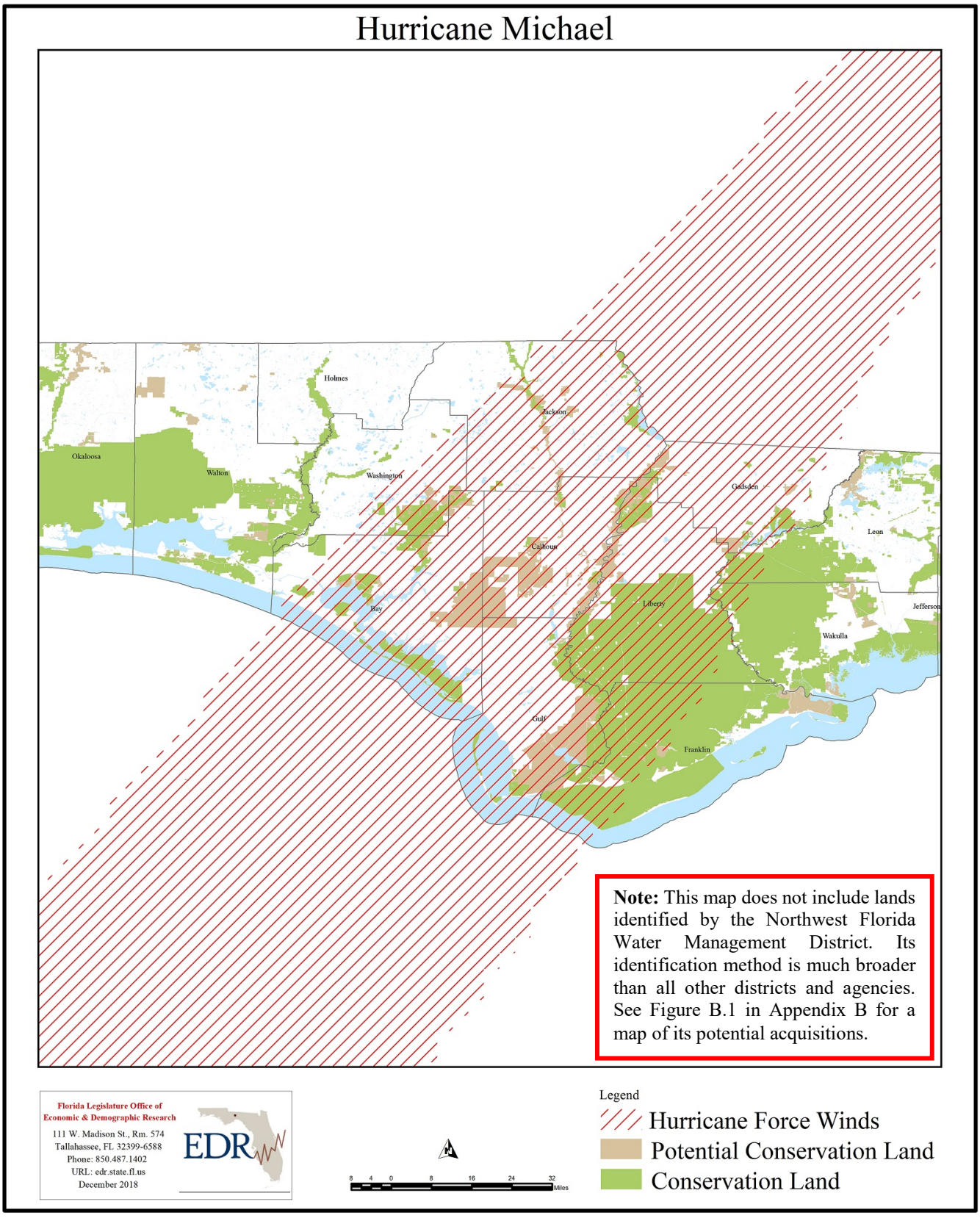
| State Park | County | Status | FY 2017-18 Operational Costs | FY 2017-18 Revenues Generated |
|---|---|---|---|---|
| **Florida Caverns State Park** | Jackson | Closed | $576,429 | $374,446 |
| **Three Rivers State Park** | Jackson | Closed | $254,444 | $143,622 |
| **St. George Island State Park** | Franklin | Closed - May Reopen 3/1/19 | $735,274 | $849,425 |
| **St. Joseph Peninsula State Park** | Gulf | Campground and Trails Closed | $795,097 | $1,462,918 |
| **St. Andrews State Park** | Bay | Campground Closed | $1,045,730 | $3,317,440 |
| **Torreya State Park** | Liberty, Gadsden | Campground Closed | $441,994 | $300,344 |

Source: Land Management Uniform Accounting Council, 2018 Annual Report (FY 2017-18).

While the storm caused widespread destruction, land that was proposed for future conservation prior to the storm is expected to still be suitable for conservation.[327] EDR has identified 287,268.32 acres of land that withstood sustained hurricane force winds which are on lists of future potential conservation land from state agencies. In addition, the NWFWMD has broadly identified a class of 3,053,976 acres within its boundaries that it has some interest in acquiring. At this time, it is unknown how this general class interplays with the state agency plans. See Figure 5.3.1 for a map of conservation lands acquired in the past or identified for future acquisition located within the area that felt sustained hurricane force winds (*i.e.*, in excess of 64 knots).[328] Given the large number of acres that have been identified for potential land acquisition, policy makers may see conservation as an option as they develop a vision and plan for recovery in this area. Purchasing lands for conservation would have the benefit of protecting identified lands while providing immediate financial relief to willing local land owners.

[327] Prior to acquisition, an in depth inspection of the specific projects may be needed to determine if the land is still suitable for Florida Forever funding. In addition, new parcels may now be available that were previously not included.
[328] For details on defining "hurricane force," *see*: http://www.aoml.noaa.gov/hrd/tcfaq/D10.html. (Accessed December 2018).

**Figure 5.3.1 The Path of Hurricane Michael**



# 6. Overlap in Water and Conservation Land Expenditures

The annual assessment is required to identify any overlap in the expenditures for water resources and conservation lands. Historically, when EDR has encountered overlap in expenditures, the benefits of said expenditures are apportioned based upon funding sources. For example, if the state provides economic development funding for a firm to build a headquarters in Florida such that the state covers 25 percent of the costs and the firm covers the remaining 75 percent, EDR would apportion the economic benefits that headquarters brings to the state and credit 25 percent to the state funding and 75 percent to the firm. This apportionment cannot be applied to expenditures on water resources and land conservation for other purposes. To do so would require EDR to analyze expenditure data for each acquisition project and apportion a specific amount solely to water resource protection.

According to DEP, since the inception of the Florida Forever program in July 2001, the state has protected 414,770 acres of natural floodplains; 760,610 acres important to significant waterbodies; 419,180 acres that minimize damage from flooding; 9,490 acres of fragile coastline; 304,890 acres of functional wetlands; and 735,640 acres of significant groundwater recharge areas.[329] Segregating the cost for water resource conservation and protection from other conservation goals of a particular acquisition poses a great deal of difficulty because a portion of funding for land conservation may have been intended to primarily protect water resources, whereas land conservation for other purposes, such as wildlife habitat protection, may also provide benefit to water resource protection or restoration. In fact, through public land acquisition programs, such as the Florida Forever program, agencies are encouraged to identify and promote a combination of goals, including protection of Florida's water resources; thereby, creating an intended overlap among various environmental benefits.

The natural relationship between land and surface and groundwater in Florida underscores the importance of land conservation as a tool for water resource protection. Whether intended to be the primary purpose or not, protection of water supply and water quality may result from conserving land in its predominantly natural state. For example, areas identified as providing groundwater recharge protect land areas where rainfall, streams and other sources infiltrate downward into the ground recharging groundwater—the primary source of Florida's drinking water. Reducing conversion of natural areas to development or other land uses that may contribute to pollutant loading into waterbodies may result in water quality protection within that watershed. In addition, acquisition of conservation lands may, to some extent, reduce expenditures for water supply or water quality needs.

At this time, EDR has identified three areas of state and regional conservation land acquisition expenditure that overlap with protection and restoration of water resources. These land acquisition expenditures are related to: (1) water management districts' acquisitions, (2) springs, and (3) basin management action plans.

[329] *See* DEP, Florida Forever, https://floridadep.gov/lands/environmental-services/content/florida-forever. (Accessed December 2018). This data is based on the Florida Forever Conservation Needs Assessment maintained by the Florida Natural Areas Inventory (FNAI), which provides an analysis of the geographic distribution of certain natural resources and resource-based land. For more information on the Conservation Needs Assessment, visit: https://fnai.org/FlForever.cfm. (Accessed December 2018). Note that acreages may overlap among the Conservation Needs Assessment categories.

First, EDR has identified land acquisitions by water management districts as clearly having a primary water resource benefit which results in overlap. In light of the specific duties and responsibilities of the water management districts for regional water management activities, the districts are statutorily authorized to acquire land for "flood control, water storage, water management, conservation and protection of water resources, aquifer recharge, water resource and water supply development, and preservation of wetlands, streams, and lakes."[330] The water management districts' expenditures on conservation land and water areas are further explained in subsection 2.2 and Table 2.2.9. In this report, EDR has once again apportioned WMD land acquisition expenditures entirely to conservation land, despite the statutory language referenced above. In this regard, nearly all public conservation land acquisition results directly or indirectly in the protection of water resources. Ideally, land acquired for district works (*e.g.*, infrastructure) should be separately identified and attributed to water resources; however, EDR cannot make this distinction using the currently available data.

Second, land acquisition that clearly has water resource benefits and results in overlap is land acquisition for springs protection. As stated in subsection 4.1, in the last four years (2015 through 2018), the Legislature has appropriated funds for land acquisition to protect springs and for projects that protect water quality and water quantity that flow from springs. In DEP's Guidance on Springs Project Funding dated October 17, 2017, DEP identified factors to be considered for land acquisition including proximity to primary focus areas or springs, location within a BMAP area, recharge potential, current land use, and manageability.[331] According to DEP, approximately $19.3 million of total springs funding to date has been for projects that include a land acquisition component.[332] State expenditures for all springs restoration projects are shown in Table 4.1.4. Through the end of Fiscal Year 2017-18, approximately $41.6 million of the funds appropriated for springs restoration had been spent. In this report, EDR has apportioned springs restoration funding used for land acquisition entirely to water resources.

A third area of land acquisition expenditures that have water resource benefits and result in overlap are land acquisition projects identified in basin management action plans (BMAPs). Using the BMAP project lists in DEP's Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies dated June 2018 (2018 STAR Report), EDR identified 65 completed land acquisition projects with cost estimates for 60 of those projects totaling approximately $454.5 million of federal, state, regional, and local expenditures. Based on the projects inclusion in BMAPs, it is assumed that these land acquisition projects are identified as a management strategy expected to reduce current or future pollutant loading for waterbodies associated with the BMAPs. The completed land acquisition projects were included in the project lists for the following BMAPs: Caloosahatchee Estuary Basin; Everglades West Coast Basin; Orange Creek; Silver Springs, Silver Springs Group and Upper Silver River; Upper Wakulla and Wakulla Springs; and Wekiva River, Rock Springs Run and Little Wekiva Canal. Note, however, that overlap between BMAPs project lists and Spring project lists may exist if funding for projects identified in a springs BMAP was provided through the Springs program.

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[330] § 373.139, Fla. Stat.
[331] DEP, Guidance on Springs Project Funding, October 17, 2017, available at: https://floridadep.gov/sites/default/files/Spring%20Guidance%20Document%202017.pdf. (Accessed December 2018).
[332] E-mail communication with DEP on December 13, 2018. Note that this amount reflects current state funding that has been spent or is encumbered.

# 7. Conclusion

EDR has completed the third annual assessment of Florida's water resources and conservation lands, pursuant to section 403.928, Florida Statutes, and has identified a schedule for completion of the remaining analyses.

In Fiscal Year 2017-18, the State of Florida expended $72.6 million on conservation land acquisition and $205.4 million on conservation land management. Regarding the impact on ad valorem taxation, roughly 2.91 percent of the statewide county tax base and 2.59 percent of the statewide school tax base have been removed from the tax roll. As a result, on net, approximately $419 million in county taxes and $314 million in school taxes were shifted to other property owners or lost due to lands being held in conservation in 2018. Approximately 30 percent of all land in the State of Florida is currently managed for conservation purposes, with eight counties already over 50 percent. If all lands identified in plans set forth by state agencies and water management districts are acquired, this share will jump to nearly 44 percent. If federal, local, and private plans were accounted for, this share would be even greater. Summing the projected total acquisition costs for the additional conservation lands identified in the plans developed by the state and water management districts produces a preliminary cost estimate of just over $12.2 billion, of which the analysis suggests that nearly 75 percent would be a state responsibility. At the current rate of annual state conservation land acquisition expenditures, it would take about 172 years to generate the state's share. Any future conservation lands that are acquired will entail additional costs for management as well as the acquisition cost. Currently, a dedicated revenue source for managing the state's lands does not exist. Assuming the current level of expenditures per acre, the additional cost to the state to manage its potential land acquisitions is projected to be $128.4 million, annually.

In the 2017-18 fiscal year, the State of Florida expended approximately $59 million on water supply projects and an additional $908 million on water quality and other water resource-related programs. EDR's forecasts indicate that the recent levels of increases in expenditures cannot be sustained into the future using only the implied revenue shares historically allocated to water resources. In this regard, a gap exists in every future year, growing to $383.6 million by the end of the ten-year forecast period—and this does not include any specific adjustments for new or expanding initiatives.

According to the water management districts, water demand is projected to increase by 17 percent in the next 20 years and reach 7,515.9 millions of gallons daily by 2035 (assuming average annual rainfall and not accounting for potential new water conservation activities). The projected water demand may grow even higher if drought conditions occur. On the other hand, the increases in demand can be partially offset if effective water conservation strategies are implemented. The costs associated with ensuring that future water supplies are available to meet the increasing water demands are estimated to be between $1.6 and $2.2 billion over the 2015 through 2035 planning horizon. An estimate of the costs associated with maintaining the existing water infrastructure and the costs specific to protecting natural systems are not yet included.

Further, EDR began the process of evaluating the data and methodology to be used in forecasting expenditures necessary to comply with federal and state laws and regulations governing water quality. As a first step, EDR identified the federal Clean Water Act and the Florida Watershed

Restoration Act as having specific requirements for water quality protection and restoration. Within these laws, the costs associated with establishing Total Maximum Daily Loads and implementing them through Basin Management Action Plans are necessary for compliance with these laws and therefore must be included in EDR's forecasts. Basin Management Action Plans continue to be developed for impaired waterbodies and are generally implemented in phases. At best, the total estimated costs of completed, planned, and underway projects of $6.6 billion (plus $57.08 million annually in operation and maintenance) provides the minimum floor of what is currently known.

Subsequent editions of this report will further analyze the future expenditures necessary to comply with laws governing water supply and water quality as well as achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems, while avoiding the adverse effects of competition for water supplies. EDR is currently working to improve the integrated water supply and demand model necessary to address this analysis. EDR intends to rely primarily on the districts for water supply and water source data, focusing instead on the development and timing of water demand, as well as the economic ramifications of the interaction between demand and supply.

# Appendix A: Additional Resources Regarding Water Supply and Demand Modelling and Expenditures Forecasts

## A.1 Methodologies to Estimate "AWS Options to Meet Future Demands"

The WMDs use the following methodologies to estimate "AWS Options to Meet Future Demands" as seen in the RWSP Summary Table of DEP (2018):

- ***Comprehensive assessment of water availability for each water supply source (SWFWMD)***. In SWFWMD, seawater, surface water, reclaimed water, and freshwater from surficial and intermediate aquifers are accounted for in the "AWS Options to Meet Future Demands". For each source category:

    - The estimates for seawater desalination are based on project options (*e.g.*, desalination projects that can be co-located with existing or proposed power generation plants).

    - For surface water, the available yield for each river was calculated using its established minimum flow and/or hydrodynamic modeling (if available) and its current permitted allocation. If the minimum flow for a river was not yet established or a hydrodynamic model was not available, planning-level minimum flow criteria were utilized (*e.g.*, 90 percent of the flow preserved, with the remaining 10 percent assumed available for withdrawals).

    - For reclaimed water, the 2035 wastewater flow for each wastewater treatment plant (WWTP) was assessed (based on the population projections for WWTP service areas). Further, SWFWMD assumed that its goal of 70 percent utilization of this flow is met (*i.e.*, 70 percent of the 2035 wastewater flow is applied to beneficial uses). Furthermore, SWFWMD recognizes that customers tend to use more reclaimed water than potable water because reclaimed water is generally less expensive and not as restricted as potable water. Therefore, water resource benefits are defined as the amount of potable-quality groundwater or surface water that is replaced by reclaimed water usage (also referred to as "benefit efficiency" or "potable water offset"), or the amount of reclaimed water used for environmental enhancement (also referred to as "recharge"). SWFWMD's goal is to achieve 70 percent of benefit efficiency for all reclaimed water by the year 2035. This targeted benefit efficiency was then applied to calculate "AWS Options to Meet Future Demands" for reclaimed water. For example, for a utility with 100 mgd wastewater flow projected for 2035, the 70 percent utilization goal assumes that 70 mgd of this flow is utilized for beneficial uses, and, of that, 70 percent benefit efficiency goal assumes that the potable water offset would be 49 mgd (70 percent of 70 percent of 100 mgd).

- For freshwater from surficial and intermediate aquifers, the available water is based on the prior assessment conducted by the SWFWMD.[333]

- ***Water expected to be made available by project options and broad programmatic efforts (NWFWMD)***: For the two regions (II and III) in the NWFWMD that require RWSPs, "AWS Options to Meet Future Demands" are the total water that can result from implementation of specific projects, as well as broad programmatic efforts (*e.g.*, inland wellfield development or expansion of reclaimed water reuse). For reclaimed water reuse, an estimate of up to 5 mgd in each RWSP (Region II and Region III) represents a cumulative goal that may be achieved from multiple reuse projects.

- ***Water resource development projects, water supply development projects, and projects included in the prevention and recovery strategies (SFWMD, SJR-CSEC, CFWI, and NFRWSP):*** Water supply development projects are solicited from CUP/WUP holders. While all CUP/WUP holders are invited to share their water supply project options, most of the AWS options are for the PS category.

For reclaimed water projects, the total reclaimed water flow is typically reported, as opposed to the potable water offsets published by the SWFWMD. In the past, SFWMD annually updated their estimates of the water supply development project options from annual progress reports submitted by utilities as required by section 373.709(8)(b), Florida Statutes, while the other districts generally updated the project options once every five years, following the required schedule of WSA/RWSP updates. This created a range of "AWS Options to Meet Future Demands" shown in earlier reports.

## A.2 Description of Project Types

**Reclaimed Water Projects**
More than one-third of the projects in the Project Appendix of DEP (2018) (*i.e.*, 446 projects) are reclaimed water projects. Reclaimed water is defined as "water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility." [334] The types of reuse include:

- landscape irrigation/public-access reuse;

- agricultural irrigation;

- industrial reuse;

[333] Basso, R. 2009. Technical Memorandum: An Evaluation of Future Water Supply Yield from the Surficial and Intermediate Aquifer Systems in the Southwest Florida Water Management District. Southwest Florida Water Management District, Brooksville, FL.
[334] § 373.019(17), Fla. Stat. *See also*: DEP. 2015. Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater and Excess Surface Water (Senate Bill 536) Office of Water Policy Florida Department of Environmental Protection. https://floridadep.gov/sites/default/files/SB536%20Final%20Report.pdf

- aquifer recharge;
- environmental enhancement and restoration;
- indirect potable reuse; and
- direct potable reuse.

The Project Appendix of DEP (2018) does not include a separate field to identify the intended use of reclaimed water for each project. To further characterize the projects, content analysis of the "Project Description" field was used. Specifically, an exploratory text analysis was first performed using Word Clouds (Figure A.2.1).[335] Based on the words most frequently used in the project descriptions, keywords were selected to characterize various project components. Then, using the *index* option in the SAS 9.4 software package, projects whose descriptions included specific keywords were identified. Note that several keywords can be included in the same project description, implying that the projects may have several components. EDR acknowledges that the keyword search is an imprecise method of characterizing the projects. For example, if "irrigation" is used as a keyword, then any projects that have "irrigation" in their description would be listed as having an irrigation element. However, a visual inspection of selected projects identified as having specific components based on the keyword search showed that that the keyword search procedure used by the EDR is reasonably accurate.[336]

**Figure A.2.1 Word Cloud Generated from the Descriptions of the Reclaimed Water Projects**


Note: Generated using Word Cloud tool available in Google Doc. The following words were removed from the cloud (as not informative): reclaimed, water, project, includes, mg, construction, approximately, south, inch, reuse, construct, area, expansion, system, feet, station, north, facility, city, county, st, provide, additional, wastewater, wwtp, installation, lf, city's, and consists.

Almost a quarter of all projects (107 projects, or 23.99 percent) are described very briefly (*e.g.*, capacity expansion, WWTP consolidation, system improvement, facility upgrade, etc.).

Reuse purposes are explicitly identified for a little more than a quarter of all projects (124 projects, or 27.80 percent). These purposes include[337]:

- Irrigation (frequently residential, but also includes golf course and athletic field irrigation): 69 projects

[335] Word Clouds have been suggested for the exploratory stage of qualitative data analysis (*e.g.*, *see* Cidell, J. 2010. Content clouds as exploratory qualitative data analysis. *Area*, 42(4), 514-523). For this Edition, the word cloud tool available in Google Documents was used.

[336] For example, 69 reclaimed water projects were identified using various keyword searches as having a water reuse purpose listed (including reuse for potable reuse, irrigation, natural system recharge, etc.). The description of these projects was then printed and examined. Out of 69 projects, only 2 (or approximately 3 percent) were identified as having reuse components mislabeled.

[337] Note that some projects were identified as having more than one reuse purpose. Keyword searches used to identify the reuse types are: "irrigate" (to identify projects with an irrigation component); "natural system", "wetland", "RIB", or "recharge" (to identify projects with wetlands, rapid infiltration basins (RIBs), recharge, or natural system components); "potable reuse project" (several projects include this within the project description); "ASR" (to identify ASR projects); "industrial reuse project" and "indirect potable" (several projects include this within the project description).

- Wetlands, rapid infiltration basins (RIBs), recharge, and natural system: 35 projects
- Potable reuse projects: 10 projects
- ASR projects: 8 projects
- Industrial reuse projects: 2 projects
- Indirect potable reuse: 2 projects

For 254 projects, or 56.95 percent of the reclaimed water projects (including the projects with a reuse purpose identified above), infrastructure components are described, such as:

- Transmission and distribution infrastructure, including mains, pipes, and lines: 180 projects
- Storage construction, expansion, or upgrades: 98 projects
- Pump construction, modifications, or connection: 93 projects
- Construction of filtering capacities: 14 projects

Some projects include study, modeling, or evaluation components (13 projects, or 2.91 percent), or they are described as reclaimed water Master Plan development or modification (9 projects, or 2.02 percent). Further, some projects include system interconnects (24 projects, or 5.38 percent) or policy coordination components (1 project or 0.22 percent). Finally, for 3 projects, no description is provided (0.67 percent).

From DEP (2015):

> "not all reuse types are created equal in terms of benefitting water supply. That is, some types of reuse are more efficient than others at replacing the use of potable quality water withdrawn from ground or surface waters ("offsetting" potable water use"), or at recharging the aquifer. Therefore, from a pure efficiency standpoint, reuse that provides a 1:1 replacement of potable quality water, or a 1:1 recharge of the aquifer, is considered the most desirable from a water supply standpoint. Table 2.1 lists average Potable Quality Water Offsets and Recharge Fractions, which were developed as part of DEP's Water Conservation Initiative, for various reuse activities. However, the figures shown in Table 2.1 are generalizations." (p. 21).

The table referenced in the quote as "Table 2.1" is provided below as Table A.2.1.

**Table A.2.1 Relative Desirability of Reuse Activities and Groundwater Offsets**

| | Reuse Activity | Offset[a,c] | Recharge Fraction[b,c] |
|---|---|---|---|
| High desirability | Indirect potable reuse | -- | 100 |
| | Industrial uses | 100 | 0 |
| | Toilet flushing | 100 | 0 |
| | Rapid Infiltration Basins (where groundwater is used) | 0 | 90 |
| | Efficient agricultural irrigation where irrigation is needed | 75 | 25 |
| | Efficient landscape irrigation (golf courses, parks, etc.) | 75 | 10 |
| | Efficient residential irrigation | 60 | 40 |
| | Cooling towers | 100 | 0 |
| | Vehicle washing | 100 | 0 |
| | Commercial laundries | 100 | 0 |
| | Cleaning of roads, sidewalks, & work areas | 100 | 10 |
| | Fire protection | 100 | 10 |
| | Construction dust control | 100 | 0 |
| | Mixing of pesticides | 100 | 0 |
| Moderate desirability | Inefficient landscape irrigation (parks and other landscaped areas) | 50 | 50 |
| | Inefficient agricultural irrigation | 50 | 50 |
| | Surface water with direct connection to groundwater (canals of SE Florida) | 0 | 75 |
| | Wetlands restoration (when additional water is needed) | 75 | 10 |
| | Inefficient residential irrigation | 25 | 50 |
| | Flushing & testing of sewers and reclaimed water lines | 50 | 0 |
| | Rapid Infiltration Basins where groundwater is currently not used | 0 | 25 |
| Low desirability | Aesthetic features (ponds, fountains, etc.) | 75 | 10 |
| | Sprayfields (wastewater disposal on grass or other cover crop at irrigation rates higher than agronomically necessary; intended to provide some groundwater recharge) | 0 | 50 |
| | Wetlands (when additional water is not needed) | 0 | 10 |

Source: based on Florida Department of Environmental Protection (DEP). 2015. Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater and Excess Surface Water (Senate Bill 536). Florida Department of Environmental Protection, Tallahassee, FL. 230pp.

[a] Percentage of reclaimed water that replaces potable water;

[b] Percentage of reclaimed water that augments potable groundwater or Class I surface water;

[c] Depending on local circumstances, the offset and recharge may not be of equal importance. *Modified from:* (DEP 2002) *page 151*

EDR's analysis of the project descriptions showed that most of the projects are described in terms of the infrastructure needs, or include only a general description of the projects. As a result, it is often impossible to identify the intended reuse type and the offset ratio for these projects. Therefore, an offset ratio of 100 percent is assumed for this report. For an analysis considering a 75 percent offset ratio, see Appendix A.7.

**Brackish Groundwater**

In the Project Appendix of DEP (2018), 122 projects are listed as "brackish groundwater", making this project type the second largest alternative water supply category by project number (after reclaimed water). Brackish groundwater is water that has a higher total dissolved solids content than that occurring in freshwater, but not as much as seawater. In the RWSPs, WMDs define brackish groundwater as having total dissolved solids concentration greater than 500 milligrams

per liter (mg/L) or water with a chloride concentration of greater than 250 mg/L and less than 19,000 mg/L.

Based on keyword searches in the "Project Description" field provided in the Project Appendix of DEP (2018), the projects generally include one or more of the following characteristics:

- Approximately one-third of the projects (39 projects or 31.97 percent) are described in general terms as "brackish groundwater development" or "brackish groundwater expansion";

- The majority—74 projects or 60.66 percent of all brackish groundwater projects—are described in terms of the infrastructure involved, with the following components explicitly mentioned in the project descriptions:

    - reverse osmosis treatment: 46 projects

    - well construction or wellfield expansion: 41 projects

    - pump improvements or expansion of pumping capacity: 19 projects

    - pipeline or main construction, improvements, or expansion: 14 projects

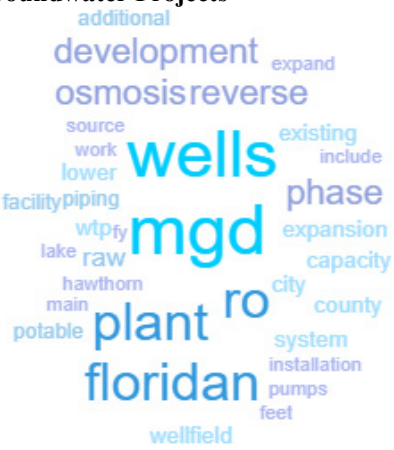
    - disposal or injection wells: 6 projects.

- Seven projects (or 5.73 percent) are described as studies (with 4 out of the 7 projects included by the SWFWMD);

- Only one project explicitly mentions the use of brackish groundwater (*i.e.*, irrigation of a golf course);

- For one project (0.82 percent), the project description is not available.

**Figure A.2.2 Word Cloud Created from Project Description for Brackish Groundwater Projects**




Note: Created using Word Cloud Add-on in Google Docs. "RO" in project description refers to reverse osmosis. Words excluded from the cloud (as not informative): water, treatment, brackish, project, construction, construct, provide, production, supply, groundwater, includes, and aquifer

**Surface Water and Surface Water Storage**

According to Section 373.019, Florida Statutes, alternative water supplies include surface water captured predominately during wet-weather flows, as well as sources made available through the addition of new storage capacity for surface or groundwater.

The Project Appendix of DEP (2018) identifies four "surface water storage" projects. They are included by the SJRWMD, and all of them are in construction or design phases. Only one project

includes an estimate of the water quantity made available upon completion, likely because this project is directly tied to water supply (the other three projects focus on historical flow restoration and agricultural runoff treatment).

In turn, the Project Appendix of DEP (2018) identifies 94 "surface water" projects (completed, construction, design, and RWSP or RPS options). The majority of the surface water projects in the list (68 projects, or 72.34 percent) are from the SWFWMD.

Based on the keyword searches conducted in the project descriptions (based on selected keywords identified through Word Cloud, Figure A.2.3), surface water projects in Project Appendix of DEP (2018) are described as follows:

**Figure A.2.3 Word Cloud Created from "Project Description" for the Surface Water Projects**


Note: Created using Word Cloud Add-on in Google Docs. Words removed from the cloud as not informative: water, surface, project, st, east, south, supply, include, construction, construct, development, includes, reduce, system, increase

- Projects described very briefly (such as surface water development, water transfer, reduction of groundwater withdrawals, and treatment expansion): 25 projects, or 25.51 percent

- Infrastructure components: identified for 42 projects (42.86 percent), including:

    - Storage, reservoir or tank construction, expansion, or upgrades: 26 projects

    - Transmission and distribution infrastructure, including mains, pipes, and lines: 13 projects

    - Pump construction, modifications, or connection: 13 projects

    - Construction or enhancement of berms and control structures: 6 projects

- The intended use of water provided by the project: 28 projects (or 28.57 percent), including:

    - Wetlands, marshes, recharge and treatment areas: 18 projects

    - Agricultural projects (such as agricultural surface water development, dispersed water storage on agricultural lands, and treatment of agricultural discharge): 7 projects

    - Reclaimed water projects (*i.e.*, surface water supplementing reclaimed water, as well as reclaimed water storage and treatment areas): 4 projects

- Irrigation: 4 projects
- Potable surface water development: 2 projects
- ASR: 2 projects

- System interconnects: 11 projects (11.22 percent)

- Study, modeling, review, feasibility assessment, or evaluation components: 10 projects (10.20 percent).

**Groundwater Recharge**
The Project Appendix of DEP (2018) includes 39 projects classified as "Groundwater Recharge (not including ASR)". More than a third (38.46 percent) involve reclaimed water. Project descriptions also show that many of the projects involve the restoration of natural systems or natural water flow. Four projects are listed as "studies".

**Aquifer Storage and Recovery (ASR)**
The Project Appendix of DEP (2018) identifies 27 ASR projects proposed by SWFWMD or SFWMD and led by municipalities or utility companies. Approximately one-quarter (8 projects) involve reclaimed water ASR. Many projects are listed as "study" or "pilot" projects.

**Stormwater Projects**
Stormwater is defined as the flow of water, which results from and which occurs immediately following a rainfall event and which is normally captured in ponds, swales, or similar areas for water quality treatment or flood control (DEP 2013). Project Appendix of DEP (2018) includes 25 stormwater projects, with ten of them (or 40.00 percent) being agricultural rainwater harvesting and other projects implemented in agricultural areas. The other projects are proposed by municipalities or utilities and include dilution of reverse osmosis (RO) concentrate or reclaimed water used for irrigation, stormwater capture for aquifer recharge, and other miscellaneous projects.

**Desalination**
Five projects in the Project Appendix of DEP (2018) are listed as "Desalination". All of them are proposed as a potential future option (*i.e.*, "RWSP or RPS Option Only"), and all of them are from SWFWMD RWSP (specifically, the Northern, Tampa Bay, and Southern regions). Three of the projects are described as "potable seawater desalination development", one project is "seawater desalination development", and one project is "seawater desalination expansion". Project sizes vary between 10 and 25 mgd, and in total, they are capable of producing 90 mgd upon completion.

**Data Collection and Evaluation**
Ten "data collection and evaluation" projects are included by NWFWMD and SRWMD, and all of them are either completed or in the design status. Four of them are spring protection projects and involve a multifaceted approach consisting of establishing MFLs, water quality and quantity monitoring, and spring enhancement projects. The other six projects include evaluation, modeling,

and assessment of water systems to evaluate water supply sources, analyze system improvements, or develop a capital improvement plan.

**Flood Control Works**
Three flood control projects in the Project Appendix of DEP (2018) are for the SRWMD's portion of the NFRWSP. Two projects are intended to restore natural flows (with or without aquifer recharge), and one project improves drainage to alleviate flood conditions and recharge aquifers. The three projects can result in 3.02 mgd of water upon completion (with one project already completed, and the other two listed as RWSP or RPS Option Only).

**Other Project Types**
Thirty-two projects are listed as "Other Project Types." For one of these projects, a description is not available. The description of the other projects shows a mix of projects, including infrastructure replacement (*e.g.*, replacement of water meters, water line replacement, valves replacement, system interconnect, water tank construction), traditional water sources (*e.g.*, shifting water withdrawals inland, SAS WTP expansion), construction of looped systems, a planning and design project, and other. Only 12 out of 32 projects provide the quantity of water made available upon completion, which potentially indicates that many of the projects may enhance system reliability or collect data, rather than increase actual water supply.

**Conservation Projects**
According to section 373.227, Florida Statutes, the overall water conservation goal of the state is to prevent and reduce wasteful, uneconomical, impractical, or unreasonable use of water resources. Pursuant to rule 62-40.412, Florida Administrative Code, the WMDs are directed to accomplish this overall water conservation goal by requiring efficient use of water, along with other actions. Efficiency measures that shall be considered include the following:

- Programs and measures that promote or require efficient irrigation practices.
- Imposition of year-round restrictions.
- Minimization of unaccounted-for water losses.
- The use of conservation rate structures wherever practical.
- The use of informative billing practices for utilities.
- Accurate measurement and reporting of water use, including metering.
- Promotion of water-conserving plumbing fixtures and appliances, water-efficient landscaping, and automatic rain sensors or soil moisture sensors.

To achieve the state's overall water conservation goal, the WMDs are required to facilitate public information and education programs, promote the efficient and effective reuse of reclaimed water

and recycling of stormwater and industrial wastewater, and implement other programs and measures, as needed (Rule 62-40.412, Florida Administrative Code).

The Project Appendix of DEP (2018) includes 285 projects defined as "conservation". Based on keyword searches and professional judgment, the projects were further classified into sub-categories (Table A.2.2). The most significant number of projects were classified as infrastructure projects. This category included projects intended to automate line flushing (to reduce water use for unnecessary system flushing), retrofit or replace transmission mains, repair storage tanks, replace or eliminate fire hydrants, install insertion valves to create zones in the distribution system that can be quickly isolated from each other, replace a pumping station, etc. Most of these projects can help prevent or eliminate leaks, though actual water savings can be difficult to quantify. Infrastructure projects are among the most costly conservation projects when project costs[338] per mgd conserved are considered. Overall, only 24.21 percent of conservation projects in the Project Appendix of DEP (2018) include both project total ($) and water made available upon project completion (mgd) estimates, making the information regarding cost-effectiveness limited. The final column of Table A.2.3 summarizes the cost of conservation projects in the dataset based on the Project Appendix of DEP (2018).

[See table on following page]

[338] Based on "Project total" field in the Project Appendix of DEP (2018), as discussed above.

## Table A.2.2 Cost per mgd Estimates for the Sub-categories of Water Conservation Projects

| Categories* | Project examples | Total number of projects | Number of cost per mgd estimates | Cost per mgd** (million dollars per mgd conserved) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Mean | Median | Minimum | Maximum |
| Improved data collection and management | Software to target and measure conservation program impacts | 12 | 2 | 0.50 | **0.50** | 0.28 | 0.73 |
| Irrigation improvement (mixed or undefined water use sectors) | Smart irrigation technology devices for 106 locations | 10 | 1 | 1.89 | **1.89** | 1.89 | 1.89 |
| Irrigation improvement (residential) | Irrigation system calibration for 10 HOAs | 16 | 3 | 5.30 | **2.16** | 0.40 | 13.33 |
| Toilet replacement & rebate (residential) | Rebates for HETs for multifamily complexes built before 1994 | 40 | 1 | 2.50 | **2.50** | 2.50 | 2.50 |
| Ag water conservation | Seepage irrigation system conversion to center pivot | 30 | 19 | 18.38 | **2.76** | 0.12 | 282.68 |
| Toilet replacement & rebate (mixed or undefined water use sectors) | Rebates for HETs for residential and commercial properties | 14 | 1 | 4.17 | **4.17** | 4.17 | 4.17 |
| Other | Irrigation system improvement and hot water recirculation | 9 | 2 | 4.35 | **4.35** | 1.76 | 6.94 |
| Indoor fixture (residential) | Plumbing retrofit kits | 27 | 4 | 5.19 | **4.44** | 2.50 | 9.38 |
| Recreation-landscape irrigation conservation projects | Rain sensors for medians and right-of-ways throughout a city | 13 | 1 | 5.10 | **5.10** | 5.10 | 5.10 |
| Meter replacement or improved meter reading | Automated meter installation | 21 | 5 | 4.27 | **5.33** | 1.15 | 7.27 |
| Indoor fixture (non-residential, mixed or undefined water use sectors) | Low flow fixture distribution | 9 | 2 | 5.84 | **5.84** | 5.60 | 6.09 |
| Commercial-industrial-institutional-mining conservation projects | Power-spray washers for restaurants | 23 | 5 | 334.59 | **10.50** | 5.26 | 1599.10 |
| Infrastructure | Replacement of leaking fire hydrants | 52 | 21 | 134.90 | **14.25** | 0.26 | 1892.17 |
| Infiltration wetland construction | New WWTP with wetland treatment | 2 | 2 | 23.19 | **23.19** | 11.65 | 34.74 |
| Local conservation programs | FFL ordinances | 3 | 0 | - | **-** | - | - |
| Rainwater harvesting | Reimbursement for rainwater storage capacity | 4 | 0 | - | **-** | - | - |

* Defined by EDR based on the project description.

** Descriptive statistics for projects' cost per mgd (calculated by EDR as the total water or reuse flow made available upon project completion (mgd) divided by the total project ($)).

## Table A.2.3 2015-2035 RWSP Summary Table (DEP 2018), Combined with Information Regarding Conservation Projects from Project Appendix of DEP (2018)

| WMD | Planning Regions | Net Demand Change (mgd) | Estimated Existing Sources Available to Meet Future Demands (mgd) | Net Demand Change of which Additional AWS or Conservation Must Surpass (mgd) | Conservation Projection to Meet Future Demands (mgd) | AWS Options to Meet Future Demands (mgd) | Project Appendix of DEP (2018): Conservation* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Completed prior to 2015 (mgd) | Completed in 2015-2018 (mgd) | Construction (mgd) | Design (mgd) | RWSP or RPS Option Only (mgd) |
| NWFWMD | Region II | 19.5 | 17.7 | **1.8** | 6.5 | 48.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Region III | 8.9 | 8.9 | **0.0** | 9.5 | 35.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Regions I, IV, V, VI, & VII | 12.0 | 12.0 | **0.0** | 3.6 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SFWMD | Lower Kissimmee Basin | 17.5 | 17.5 | **0.0** | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Upper East Coast | 52.4 | 51.6 | **0.8** | 14.0 | 92.1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Lower East Coast | 188.8 | 179.9 | **8.9** | 52.0 | 234.6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Lower West Coast | 190.0 | 185.9 | **4.1** | 41.0 | 101.3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SJRWMD | Central Springs East Coast (Regions 2, 4, and 5) | 78.8 | 50.8 | **28.0** | 33.6 - 47.0 | 307.4 | 0.00 | 0.48 | 0.02 | 0.00 | 5.50 |
| SRWMD | SR District (excluding NFRWSP) | 21.8 | 21.8 | **0.0** | 10.9 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SWFWMD | Northern (excluding CFWI) | 51.7 | 23.9 | **27.8** | 23.0 | 113.6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Tampa Bay | 63.8 | 63.8 | **0.0** | 52.0 | 125.2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Heartland (excluding CFWI) | 8.3 | 5.8 | **2.5** | 4.4 | 8.5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Southern | 50.2 | 46.8 | **3.4** | 18.8 | 238.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SJRWMD, SWFWMD, and SFWMD | CFWI | 233.6 | 0.0 | **233.6** | 36.8 | 333.6 | 0.00 | 1.45 | 0.07 | 0.21 | |
| SJRWMD and SRWMD | NFRWSP | 112.2 | Not Quantified | **112.2** | 40.7 – 53.0 | 97.2 | 0.19 | 2.45 | 18.53 | 5.74 | 13.06 |
| **Total statewide** | | **1,109.5** | | **423.1** | **346.8 – 372.5** | **1,734.5** | **0.19** | **4.38** | **18.62** | **5.95** | **18.56** |

* These estimates account only for the projects for which the water or reuse flow made available upon the project completion (mgd) is reported. For many projects in the Project Appendix of DEP (2018), this water or reuse flow is not provided.

## A.3 Project Types Expected to Be Implemented to Meet the Future Demand

In this portion of the appendix, EDR summarizes the number of projects and volume of water or reuse flow (upon project completion) identified for the projects in the Project Appendix of DEP (2018). The summary was developed for each of the ten planning regions for which additional water needs by 2035 were identified (see Table 3.3.5 in the main text). For the analysis, the projects are divided into three general categories: (a) historical: the projects implemented before 2015, (b) current: the projects implemented in 2015 or later, and projects in construction and design status; and (c) future: RWSP or RPS Options only. Based on this summary, one or two of the most typical project types are selected for each planning region. The results for each planning region are summarized below.

**Table A.3.1 Project Categories Selected for the Water Supply Planning Regions Identified in the High Needs Scenario**

| Regions | Largest project type categories | | | | Second largest project type categories | | | | Category selected for High Needs Scenario |
|---|---|---|---|---|---|---|---|---|---|
| | 2015 and after, in design or construction | | RWSP or RPS Option Only | | 2015 and after, in design or construction | | RWSP or RPS Option Only | | |
| | N | mgd | N | mgd | N | mgd | N | mgd | |
| NW-II | other | reclaim. | - | - | reclaim. | - | - | - | reclaim. |
| SF-UEC** | - | - | brackish | surface | - | - | reclaim. | brackish | reclaim*** |
| SF-LEC | reclaim. | reclaim. | brackish | reclaim. | - | - | reclaim. | brackish | reclaim*** |
| SF-LWC | reclaim. | reclaim. | brackish | brackish | ASR | ASR | reclaim. | reclaim. | reclaim*** |
| SJR-CSEC | reclaim. | surface | surface, gw recharge | gw recharge | surface | reclaim. | reclaim. | gw recharge | reclaim., surface |
| SW-NR** | reclaim. | reclaim. | reclaim. | surface | - | - | surface | desalination | reclaim., desal. |
| SW-HR | surface | - | reclaim. | surface | - | - | surface | stormwater | reclaim. |
| SW-SR | reclaim. | surface | surface | surface | ASR | brackish | reclaim. | desalination | reclaim. |
| CFWI | reclaim. | reclaim. | brackish | brackish | brackish | brackish | reclaim. | reclaim. | reclaim., brackish |
| NFRWSP | reclaim. | reclaim. | reclaim. | gw recharge | gw recharge | gw recharge | gw recharge | reclaim. | reclaim., gw recharge |

Note: "gw" refers to groundwater; "ASR" is aquifer storage and recovery; "reclaim." stands for reclaimed water projects
** For SF-UEC and SW-NR, project categories were selected based on the analysis of the project number and volume created, as well as estimated project cost. For SW-NR, desalination was chosen over the surface water due to its lower estimated cost. For SF-UEC, reclaimed water projects were chosen over brackish water projects due to its lower cost.
***For the SFWMD, district staff indicated brackish groundwater is the primary source utilities are planning to use. For an analysis considering brackish groundwater instead of reclaimed for the SFWMD, see Appendix A.7.

**NWFWMD's Region II (NW-II)**

Out of 21 projects completed since 2015, the absolute majority are classified as "other project types". However, water or reuse flow estimates are provided for 2 projects only, and both of these projects are classified as "reclaimed water". RWSP or RPS Option Only projects are not provided in the Project Appendix of DEP (2018). Based on this information, it was assumed that reclaimed water projects or projects of "other project types" would likely be implemented to meet the Net Demand Change in the region.

## Table A.3.2 NW-II Projects

| Project Type | Completed before 2015 | | | Completed in 2015 and after, in design or construction | | |
|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Data Collection and Evaluation | 0 | 0 | 0.00 | 3 | 0 | NA |
| Other Project Types | 1 | 1 | 15.10 | 12 | 0 | NA |
| Reclaimed Water | 2 | 2 | 1.30 | 6 | 2 | 1.00 |
| **Total** | **3** | **3** | **16.40** | **21** | **2** | **1.00** |

### SFWMD's Upper East Coast (SF-UEC)

The information about the projects completed in 2015 and later, as well as the projects in design or construction status, is not available in the dataset based on the original Project Appendix of DEP (2018). Before 2015, most of the "new" water was provided by the brackish groundwater projects. Brackish groundwater projects are also the largest category in the RWSP or RPS Option Only category (by project number). Reclaimed water projects were also a significant category historically, and are expected to remain significant in future. It is assumed that reclaimed water projects would be implemented to meet the future demand.

## Table A.3.3 SF-UEC Projects

| Project Type | Completed before 2015 | | | RWSP or RPS Option Only | | |
|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Aquifer Storage and Recovery (ASR) | 0 | 0 | 0.00 | 1 | 1 | 16.25 |
| Brackish Groundwater | 4 | 4 | 37.42 | 7 | 7 | 37.53 |
| Other Project Types | 0 | 0 | 0.00 | 3 | 3 | 2.04 |
| Reclaimed Water | 4 | 4 | 10.80 | 6 | 6 | 27.35 |
| Surface Water | 0 | 0 | 0.00 | 3 | 2 | 152.40 |
| **Total** | **8** | **8** | **48.22** | **20** | **19** | **235.57** |

Note: Data tabulated and used in the main analysis are derived from the originally published Project Appendix of DEP (2018). In late November, an update became available for the SFWMD projects. While this was too late to fully integrate into the statistical analysis, for a more limited analysis considering the costs per mgd for the SFWMD using the new table, as well as considering brackish groundwater instead of reclaimed water, see Appendix A.7.

### SFWMD's Lower East Coast (SF-LEC)

Only one project is listed in the dataset based on the original Project Appendix of DEP (2018) as completed since 2015 or being in construction or design status, and this project is of the reclaimed water type. RWSP or RPS Option Only projects are also primarily reclaimed water, and many of them are also brackish groundwater projects. It is assumed that reclaimed water would provide for future demand.

## Table A.3.4 SF-LEC Projects

| Project Type | Completed before 2015 | | | Completed in 2015 and after, in design or construction | | | RWSP or RPS Option Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Aquifer Storage and Recovery (ASR) | 2 | 2 | 6.50 | 0 | 0 | 0.00 | 0 | 0 | 0.00 |
| Brackish Groundwater | 13 | 13 | 59.71 | 0 | 0 | 0.00 | 9 | 9 | 46.50 |
| Other Project Types | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 1 | 1 | 8.50 |
| Reclaimed Water | 9 | 9 | 38.15 | 1 | 1 | 2.00 | 8 | 8 | 143.10 |
| Stormwater | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 3 | 3 | 9.00 |
| Surface Water | 6 | 5 | 28.78 | 0 | 0 | 0.00 | 1 | 1 | 8.00 |
| **Total** | **30** | **29** | **133.14** | **1** | **1** | **2.00** | **22** | **22** | **215.10** |

Note: Data tabulated and used in the main analysis are derived from the originally published Project Appendix of DEP (2018). In late November, an update became available for the SFWMD projects. While this was too late to fully integrate into the statistical analysis, for a more limited analysis considering the costs per mgd for the SFWMD using the new table, as well as considering brackish groundwater instead of reclaimed water, see Appendix A.7.

### SFWMD's Lower West Coast (SF-LWC)

Historically, currently, and in the future, reclaimed water and brackish groundwater projects account for the largest share of projects and amount of water or reuse flow made available. It is assumed that reclaimed water would provide for future demand.

## Table A.3.5 SF-LWC projects

| Project Type | Completed before 2015 | | | Completed in 2015 and after, in design or construction | | | RWSP or RPS Option Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Aquifer Storage and Recovery (ASR) | 6 | 4 | 17.17 | 2 | 2 | 1.54 | 2 | 2 | 7.90 |
| Brackish Groundwater | 13 | 12 | 70.43 | 0 | 0 | 0.00 | 9 | 9 | 54.00 |
| Other Project Types | 4 | 1 | 12.50 | 0 | 0 | 0.00 | 3 | 3 | 6.10 |
| Reclaimed Water | 15 | 8 | 32.90 | 3 | 2 | 10.10 | 6 | 6 | 28.95 |
| Stormwater | 2 | 2 | 13.00 | 0 | 0 | 0.00 | 2 | 2 | 2.80 |
| Surface Water | 3 | 2 | 2.52 | 0 | 0 | 0.00 | 1 | 1 | 2.00 |
| **Total** | **43** | **29** | **148.52** | **5** | **4** | **11.64** | **23** | **23** | **101.75** |

Note: Data tabulated and used in the main analysis are derived from the originally published Project Appendix of DEP (2018). In late November, an update became available for the SFWMD projects. While this was too late to fully integrate into the statistical analysis, for a more limited analysis considering the costs per mgd for the SFWMD using the new table, as well as considering brackish groundwater instead of reclaimed water, see Appendix A.7.

### SJRWMD's Central Springs East Coast (SJR-CSEC)

Projects completed in 2015 and after, or in design or construction, are primarily groundwater recharge (not including ASR) or reclaimed water. The same project types account for the largest share of projects and amount of water or reuse flow made available for the RWSP or RPS Option Only. Therefore, it is assumed that these two categories of sources would likely provide for the future demand.

## Table A.3.6 SJR-CSEC Projects

| Project Type | Completed prior to 2015 | | | Completed in 2015 and after, in design or construction | | | | RWSP or RPS Option Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) |
| Brackish Groundwater | 1 | 1 | 4.00 | 0 | 0 | 0.00 | 0.00% | 0 | 0 | 0.00 | 0.00% |
| Groundwater Recharge (not including ASR) | 1 | 0 | NA | 2 | 2 | 12.50 | 15.85% | 2 | 1 | 4.00 | 38.46% |
| Reclaimed Water | 22 | 22 | 27.25 | 22 | 22 | 27.04 | 34.30% | 1 | 1 | 1.20 | 11.54% |
| Stormwater | 1 | 1 | 1.50 | 0 | 0 | 0.00 | 0.00% | 0 | 0 | 0.00 | 0.00% |
| Surface Water | 0 | 0 | 0.00 | 5 | 5 | 39.30 | 49.85% | 2 | 2 | 5.20 | 50.00% |
| Surface Water Storage | 0 | 0 | 0.00 | 3 | 0 | NA | 0.00% | 0 | 0 | 0.00 | 0.00% |
| **Total** | **25** | **24** | **32.75** | **32** | **29** | **78.84** | **100.00%** | **5** | **4** | **10.40** | **100.00%** |

### SWFWMD's Northern (excluding CFWI) (SW-NR (excluding CFWI))

For projects completed in 2015 and after, or in design or construction status, most of the water was provided by reclaimed water projects. Reclaimed water projects are also the largest category of projects in RWSP or RPS Option Only (by number). However, surface water projects and the desalination project account for the majority of the RWSP or RPS Option Only water and reuse flow. Reclaimed water and desalination are considered as the most likely water sources for the regions (since the estimated surface water project costs exceeded the one project cost for desalination).

## Table A.3.7 SW-NR (excluding CFWI) Projects

| Project Type | Completed before 2015 | | | Completed in 2015 and after, in design or construction | | | | RWSP or RPS Option Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) |
| Desalination | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00% | 1 | 1 | 15.00 | 15.76% |
| Reclaimed Water | 7 | 6 | 4.25 | 6 | 4 | 3.39 | 100.00% | 14 | 14 | 7.70 | 8.09% |
| Stormwater | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00% | 1 | 1 | 12.40 | 13.03% |
| Surface Water | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 0.00% | 4 | 4 | 60.08 | 63.12% |
| **Total** | **7** | **6** | **4.25** | **6** | **4** | **3.39** | **100.00%** | **20** | **20** | **95.18** | **100.00%** |

**SWFWMD's Heartland (excluding CFWI) (SW-HR (excluding CFWI))**
Surface water and reclaimed water projects account for the largest share of the past, current, and future option projects (by number of projects and by the amount of water and reuse flow made available upon completion). A comparison of the cost for the two categories of projects in the region showed that reclaimed water projects tend to be less expensive to implement. Therefore, it is assumed that this category would provide for future demand identified in the High Needs Scenario.

## Table A.3.8 SW-HR (excluding CFWI) Projects

| Project Type | Completed prior to 2015 | | | Completed in 2015 and after, in design or construction | | | RWSP or RPS Option Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Reclaimed Water | 2 | 1 | 0.09 | 0 | 0 | 0.00 | 6 | 6 | 1.74 |
| Stormwater | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 1 | 1 | 12.40 |
| Surface Water | 12 | 0 | NA | 3 | 0 | NA | 5 | 5 | 28.20 |
| **Total** | **14** | **1** | **0.09** | **3** | **0** | **NA** | **12** | **12** | **42.34** |

**SWFWMD's Southern Region (SW-SR)**
Both historically and for the RWSP or RPS Option Only, reclaimed water accounts for the largest share of projects. Therefore, it is assumed that this category would likely provide for the future needs.

## Table A.3.9 SW-SR Projects

| Project types | Completed before 2015 | | | Completed in 2015 and after, in design or construction | | | RWSP or RPS Option Only | | |
|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) |
| Aquifer Storage and Recovery (ASR) | 1 | 1 | 0.41 | 7 | 0 | NA | 1 | 0 | NA |
| Brackish Groundwater | 2 | 1 | 1.50 | 3 | 1 | 4.00 | 6 | 6 | 21.53 |
| Desalination | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 2 | 2 | 40.00 |
| Groundwater Recharge (not including ASR) | 0 | 0 | 0.00 | 1 | 0 | NA | 0 | 0 | 0.00 |
| Reclaimed Water | 19 | 13 | 11.92 | 9 | 5 | 3.94 | 15 | 15 | 23.75 |
| Stormwater | 0 | 0 | 0.00 | 0 | 0 | 0.00 | 2 | 2 | 13.40 |
| Surface Water | 5 | 1 | 14.70 | 4 | 3 | 16.00 | 18 | 10 | 71.30 |
| **Total** | **27** | **16** | **28.53** | **24** | **9** | **23.94** | **44** | **35** | **169.98** |

## Central Florida Water Initiative (CFWI)

Among the projects implemented since 2015, or in construction or in design, most of the water or reuse flow is provided by reclaimed water and brackish groundwater. The same project categories account for most of the "RWSP or RPS Option Only" projects. Therefore, it is assumed that these project types will provide for the future water needs.

### Table A.3.10 CFWI Projects

| Project Types | Completed prior to 2015 | | | Completed in 2015 and after, in design or construction | | | | RWSP or RPS Option Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) |
| Aquifer Storage and Recovery (ASR) | 0 | 0 | 0.00 | 1 | 0 | NA | | 0 | 0 | 0.00 | 0.00% |
| Brackish Groundwater | 0 | 0 | 0.00 | 9 | 4 | 34.40 | 26.70% | 33 | 33 | 56.47 | 58.16% |
| Groundwater Recharge (not including ASR) | 1 | 0 | NA | 2 | 0 | NA | | 5 | 5 | 3.92 | 4.04% |
| Reclaimed Water | 43 | 33 | 62.00 | 31 | 30 | 72.94 | 56.61% | 25 | 25 | 26.71 | 27.51% |
| Stormwater | 2 | 1 | 0.14 | 1 | 1 | 4.50 | 3.49% | 0 | 0 | 0.00 | 0.00% |
| Surface Water Storage | 1 | 1 | 10.00 | 1 | 1 | 17.00 | 13.19% | 1 | 1 | 10.00 | 10.30% |
| **Total** | **47** | **35** | **72.14** | **45** | **36** | **128.84** | **100.00%** | **64** | **64** | **97.10** | **100.00%** |

## North Florida Regional Water Supply Partnership (NFRWSP)

Reclaimed water and groundwater recharge (not including ASR) projects account for the greatest number of projects and the greatest share of water and reuse flow, both in the category "Completed in 2015 and after, in design or construction" and in "RWSP or RPS Option Only". Therefore, it is assumed that these two project types would provide for the needed water.

[See table on following page]

### Table A.3.11 NFRWSP Projects

| Project Types | Completed prior to 2015 | | | Completed in 2015 and after, in design or construction | | | | RWSP or RPS Option Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) | N projects | N projects with water or reuse flow data provided | Water or reuse flow (mgd) | Proportion of the total water/reuse flow (%) |
| Brackish Groundwater | 5 | 5 | 13.46 | 3 | 3 | 3.67 | 3.95% | 0 | 0 | 0.00 | 0.00% |
| Data Collection and Evaluation | 4 | 0 | NA | 0 | 0 | 0.00 | 0.00% | 0 | 0 | 0.00 | 0.00% |
| Other Project Types | 1 | 1 | 0.01 | 0 | 0 | 0.00 | 0.00% | 1 | 1 | 6.00 | 11.68% |
| Flood Control Works | 0 | 0 | 0.00 | 1 | 1 | 1.12 | 1.21% | 2 | 2 | 2.90 | 5.65% |
| Groundwater Recharge (not including ASR) | 0 | 0 | 0.00 | 9 | 9 | 33.60 | 36.19% | 5 | 5 | 18.10 | 35.25% |
| Reclaimed Water | 11 | 9 | 10.58 | 39 | 39 | 42.15 | 45.41% | 10 | 9 | 17.85 | 34.76% |
| Stormwater | 1 | 1 | 1.90 | 2 | 1 | 2.24 | 2.41% | 1 | 1 | 2.50 | 4.87% |
| Surface Water | 0 | 0 | 0.00 | 3 | 3 | 10.05 | 10.83% | 1 | 1 | 4.00 | 7.79% |
| **Total** | **22** | **16** | **25.94** | **57** | **56** | **92.84** | | **20** | **19** | **51.35** | **0.00%** |

## A.4 Additional Comparison of Projects Based on Cost per mgd

See the tables below for summary statistics, by project category, of cost per mgd. Only the planning regions identified in the High Needs Scenario that include the relevant project categories in the dataset developed from the original Project Appendix of DEP (2018) are included.

### Table A.4.1 Reclaimed Water Projects: Cost per mgd, by Planning Regions

| Planning regions | N Observations | N observations with "Project Total" and water or reuse flow information | **Mean** | **Median** | Minimum | Maximum | Std Dev |
|---|---|---|---|---|---|---|---|
| NW-II | 8 | 4 | **5.27** | **4.75** | 1.03 | 10.56 | 4.19 |
| SF-UEC | 10 | 10 | **5.69** | **4.38** | 0.58 | 12.85 | 5.22 |
| SF-LEC | 18 | 18 | **8.84** | **3.49** | 0.33 | 39.89 | 11.31 |
| SF-LWC | 24 | 16 | **3.93** | **2.25** | 0.68 | 17.69 | 4.96 |
| SJR-CSEC | 45 | 44 | **6.13** | **3.24** | 0.26 | 54.90 | 9.80 |
| SW-NR (excluding CFWI) | 27 | 24 | **7.56** | **8.55** | 0.62 | 14.94 | 3.00 |
| SW-HR (excluding CFWI) | 8 | 7 | **9.54** | **8.55** | 8.55 | 15.46 | 2.61 |
| SW-SR | 43 | 33 | **6.16** | **6.55** | 0.76 | 18.16 | 3.52 |
| CFWI | 99 | 81 | **10.07** | **3.89** | 0.13 | 384.72 | 42.57 |
| NFRWSP | 60 | 48 | **4.69** | **1.97** | 0.04 | 42.03 | 7.24 |

[See table on following page]

## Table A.4.2 Brackish Groundwater Projects: Cost per mgd, by Planning Regions

| Planning regions | N Observations | N observations with "Project Total" and water or reuse flow information | **Mean** | **Median** | Minimum | Maximum | Std Dev |
|---|---|---|---|---|---|---|---|
| SF-UEC | 11 | 11 | **2.88** | **2.12** | 0.66 | 8.37 | 2.13 |
| SF-LEC | 22 | 22 | **5.92** | **3.96** | 0.22 | 29.60 | 6.71 |
| SF-LWC | 22 | 21 | **6.61** | **4.16** | 0.30 | 25.72 | 6.53 |
| SJR-CSEC | 1 | 1 | **4.22** | **4.22** | 4.22 | 4.22 | . |
| SW-SR | 11 | 8 | **9.03** | **8.55** | 7.28 | 13.99 | 2.07 |
| CFWI | 42 | 36 | **20.00** | **11.27** | 0.10 | 184.54 | 31.18 |
| NFRWSP | 8 | 7 | **6.95** | **2.32** | 0.26 | 28.55 | 10.20 |

## Table A.4.3 Surface Water Projects: Cost per mgd, by Planning Regions

| Planning regions | N Observations | N observations with "Project Total" and water or reuse flow information | **Mean** | **Median** | Minimum | Maximum | Std Dev |
|---|---|---|---|---|---|---|---|
| SF-UEC | 3 | 2 | **4.42** | **4.42** | 3.71 | 5.13 | 1.00 |
| SF-LEC | 7 | 6 | **0.61** | **0.54** | 0.09 | 1.35 | 0.46 |
| SF-LWC | 4 | 3 | **2.11** | **0.86** | 0.36 | 5.10 | 2.61 |
| SJR-CSEC | 7 | 5 | **1.00** | **0.98** | 0.86 | 1.18 | 0.13 |
| SW-NR (excluding CFWI) | 4 | 4 | **11.19** | **11.97** | 3.58 | 17.24 | 5.71 |
| SW-HR (excluding CFWI) | 20 | 5 | **11.20** | **6.45** | 0.43 | 29.99 | 11.53 |
| SW-SR | 27 | 14 | **11.68** | **10.45** | 1.03 | 29.27 | 9.28 |
| CFWI | 2 | 2 | **15.32** | **15.32** | 2.71 | 27.94 | 17.84 |
| NFRWSP | 4 | 3 | **133.37** | **2.56** | 0.37 | 397.17 | 228.46 |

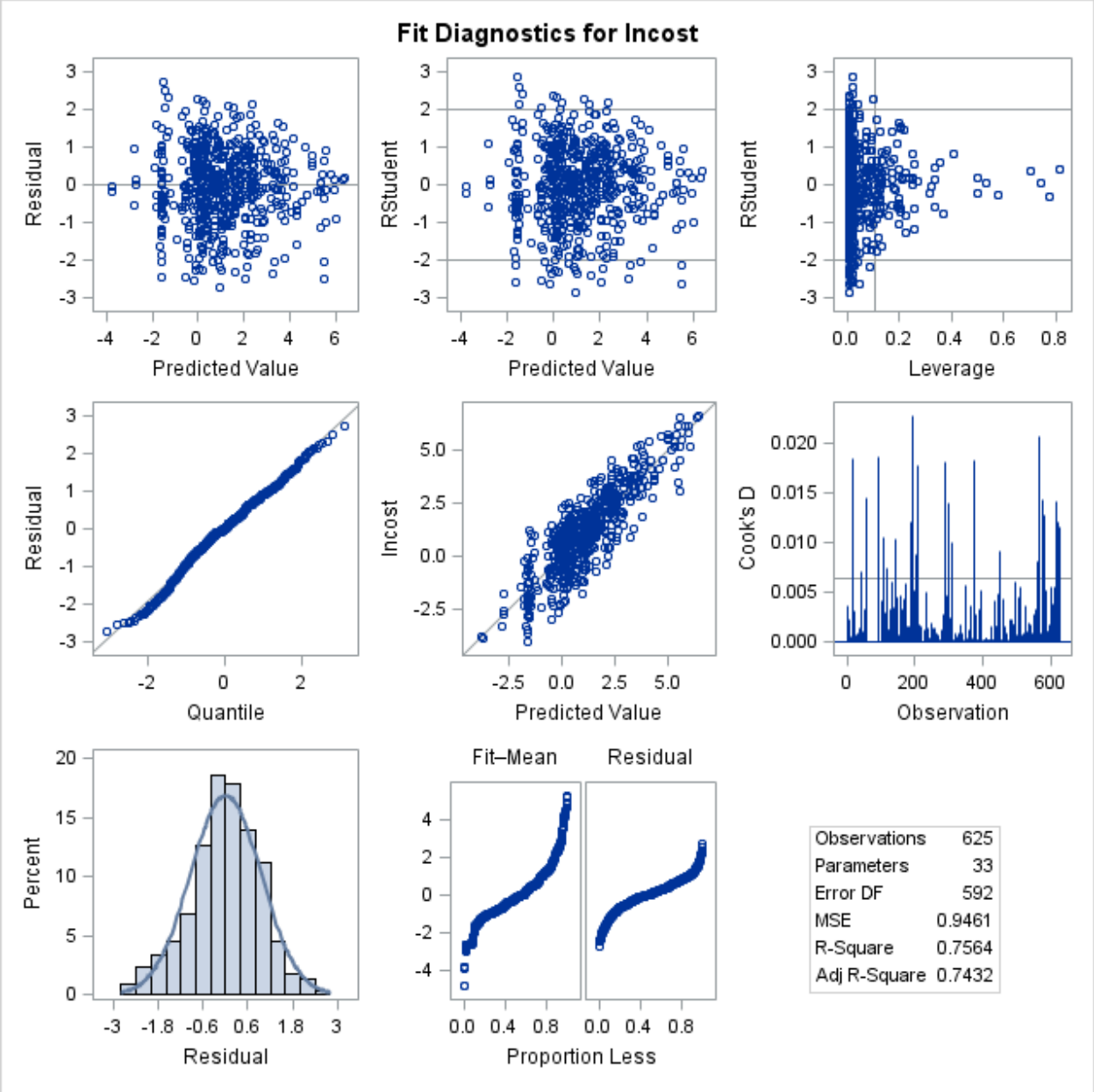
## Table A.4.4 Groundwater Recharge Projects: Cost per mgd, by Planning Regions

| Planning regions | N Observations | N observations with "Project Total" and water or reuse flow information | **Mean** | **Median** | Minimum | Maximum | Std Dev |
|---|---|---|---|---|---|---|---|
| SJR-CSEC | 5 | 1 | **1.86** | **1.86** | 1.86 | 1.86 | . |
| CFWI | 8 | 5 | **8.69** | **8.55** | 8.52 | 9.30 | 0.34 |
| NFRWSP | 14 | 10 | **1.34** | **0.65** | 0.17 | 5.86 | 1.79 |

## A.5 Additional Fit Diagnostics for the Statistical Model Estimated for "Project Total"

Figure A.5.1 provides fit diagnostics for the ordinary least squares model of the dependent variable, the natural logarithm of "Project Total" ($millions 2018). The independent variables used in this model are: project size (linear and squared terms), project type, status, location, and interaction variables.

**Figure A.5.1 Fit Diagnostics for the Ordinary Least Squares (OLS) Model**




Note: The graphics are produced by the *glm* procedure within the SAS 9.4 statistical software package. The dependent variable, Ln("Project Total"), is referred to as "lncost" on the graphics.

## A.6 Average Project Sizes for the Projects Included into the Dataset for Statistical Analysis

This portion of the appendix includes various tables summarizing the average project size, by project types, for the relevant planning regions used in the statistical analysis described in subsection 3.3.

### Table A.6.1 Project Size Statistics for Reclaimed Water Projects, by Regions

| Water supply planning region | N observations | Mean project size (mgd) |
|---|---|---|
| NW-II | 4 | 0.58 |
| NW-I, NW-IV, NW-V, NW-VI, and NW-VII | 5 | 1.62 |
| SF-UEC | 10 | 3.82 |
| SF-LEC | 17 | 5.54 |
| SF-LWC | 14 | 3.50 |
| SJR-CSEC | 43 | 1.26 |
| SW-NR (excluding CFWI) | 22 | 0.52 |
| SW-TB | 69 | 2.40 |
| SW-HR (excluding CFWI) | 3 | 0.09 |
| SW-SR | 33 | 1.20 |
| CFWI | 79 | 1.73 |
| NFRWSP | 47 | 0.85 |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that projects from the different regions belong to the same distribution. The hypothesis was rejected based on ANOVA ($p < .0001$), Kruskal-Wallis test ($p<.0001$), Median One-Way Analysis test ($p<.0001$), Van der Waerden One-Way Analysis ($p<.0001$), Savage One-Way Analysis ($p<.0001$), and Cramer-von Mises Statistics ($p=0.020540$). EDR failed to reject the hypothesis based on Kolmogorov-Smirnov Statistics ($p=0.202956$).

[See table on following page]

## Table A.6.2 Project Size Statistics for Surface Water Projects, by Regions

| Water supply planning region | N Observations | Mean project size (mgd) |
|---|---|---|
| SF-LEC | 6 | 6.13 |
| SF-LWC | 3 | 1.51 |
| SJR-CSEC | 5 | 7.86 |
| SW-NR (excluding CFWI) | 2 | 25.00 |
| SW-TB | 11 | 6.46 |
| SW-HR (excluding CFWI) | 5 | 5.64 |
| SW-SR | 14 | 7.29 |
| CFWI | 2 | 10.00 |
| NFRWSP | 3 | 3.35 |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that projects from different planning regions were drawn from the same distribution. The hypothesis was rejected based on ANOVA (p= 0.0046), Van der Waerden One-Way Analysis (p= 0.0286), Savage One-Way Analysis (p= 0.0026), and Cramer-von Mises Statistics (p= 0.039237). EDR failed to reject the hypothesis based on Kruskal-Wallis test (p= 0.1023), Kolmogorov-Smirnov Statistics (p= 0.273266), and Median One-Way Analysis test (p= 0.4399).

## Table A.6.3 Project Size Statistics for Desalination Projects

| N | Mean (mgd) | Std Dev | Minimum (mgd) | Maximum (mgd) |
|---|---|---|---|---|
| **4** | 16.25 | 4.79 | 10 | 20 |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that projects from different planning regions belong to the same distribution. EDR failed to reject the hypothesis (based on a battery of tests ran by the SAS procedure; at p=0.10).

## Table A.6.4 Project Size Statistics for Brackish Groundwater Projects, by Regions

| Water supply planning region | N Observations | Mean project size (mgd) |
|---|---|---|
| SF-UEC | 11 | 6.81 |
| SF-LEC | 22 | 4.83 |
| SF-LWC | 21 | 5.93 |
| SJR-CSEC | 1 | 4.00 |
| SW-TB | 4 | 3.25 |
| SW-SR | 8 | 3.38 |
| CFWI | 34 | 0.74 |
| NFRWSP | 5 | 3.13 |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that the projects from the different planning regions belong to the same distribution. The hypothesis was rejected based on ANOVA (p= 0.0001), Kruskal-Wallis test (p<.0001), Median One-Way Analysis test (p= 0.0003), Van der Waerden One-Way Analysis (p<.0001), Savage One-Way Analysis (p= 0.0001), and Cramer-von Mises Statistics (p= 0.049820). EDR failed to reject the hypothesis based on Kolmogorov-Smirnov Statistics (p= 0.367186).

**Table A.6.5 Project Size Statistics for Groundwater Recharge (not including ASR) Projects, by Regions**

| Water supply planning region | N Observations | Mean project size (mgd) |
|---|---|---|
| SJR-CSEC | 1 | 5.00 |
| SW-TB | 8 | 7.16 |
| CFWI | 5 | 0.78 |
| NFRWSP | 9 | 2.84 |
| Total sample | 23 | 3.99 |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that the projects from different planning regions belong to the same distribution. The hypothesis was rejected based on Kruskal-Wallis test (p= 0.0686), Cramer-von Mises Statistics (p= 0.037527), and Van der Waerden One-Way Analysis (p= 0.0718). EDR failed to reject the hypothesis based on the Savage One-Way Analysis (p= 0.1517), Kolmogorov-Smirnov Statistics (p= 0.300668), Median One-Way Analysis test (p= 0.4321), and ANOVA (p= 0.2148).

**Table A.6.6 Project Size Statistics for Conservation Projects, by Regions**

| Water supply planning region | N Observations | Mean project size (mgd) |
|---|---|---|
| SJR-CSEC | 3 | 0.04 |
| CFWI | 8 | 0.04 |
| NFRWSP | 44 | 0.50 |
| **Total for the sample** | **55** | **0.40** |

Note: The *NPAR1WAY* procedure in the SAS 9.4 software package was used to test the hypothesis that projects from different planning regions belong to the same distribution. The hypothesis was rejected based on Cramer-von Mises Statistics (p= 0.009707). EDR failed to reject the hypothesis based on Kruskal-Wallis test (p= 0.5122), Van der Waerden One-Way Analysis (p= 0.4843), Savage One-Way Analysis (p= 0.6596), Kolmogorov-Smirnov Statistics (p= 0.135891), Median One-Way Analysis test (p= 0.7257), and ANOVA (p= 0.7728).

## A.7 Sensitivity Analysis

### Project Types and Expenditure in SFWMD

Estimated project total (column (4) in Table 3.3.11) is based on an econometric modeling of "Project Total" using the Project Appendix of DEP (2018). The original list included many SFWMD projects marked with superscripts (no superscripts were found in the data for the other districts), and these projects were removed before the econometric modeling to eliminate the possibility of double counting. At the end of November, 2018, an updated list of projects for SFWMD was shared with EDR. The dataset eliminated the footnotes and included additional information about the projects (*e.g.*, "distribution / transmission capacity created (MGD)" for reclaimed water projects). Using information for "Project Total ($)", "Water Made Available Upon Project Completion (MGD)", "Reuse Flow Made Available Upon Project Completion (MGD)", and "Distribution / Transmission Capacity Created (MGD)", the average expenditure ($/mgd) was estimated for the two primary project types in the SFWMD – reclaimed water and brackish groundwater water projects (Table A.7.1).

**Table A.7.1 Average Cost for SFWMD's Two Project Types – Reclaimed Water and Brackish Groundwater, Based on an Updated List of Projects**

| Project types | Average Cost (in million dollars per mgd) | | |
|---|---|---|---|
| | Calculated as "Total project (million $)" divided by "Reuse flow made available upon project completion (mgd)" | Calculated as "Total project (million $)" divided by either "Reuse flow made available upon project completion (mgd)" or "Distribution / Transmission Capacity Created (MGD)" | Calculated as "Total project (million $)" divided by "Water made available upon project completion (mgd)" |
| Reclaimed water (N=198) | 7.73 (N = 52) | 11.12 (N = 95) | - |
| Brackish groundwater (N = 105) | - | - | 3.18 (N = 37) |

Note: Unlike the baseline analysis, nominal values for "Project Total ($)" were used (no adjustment for inflation was made).

The average cost estimates reported in Table A.7.1 (3.18 to 11.12 million dollars per mgd) are generally higher than the estimated cost per mgd reported in Table 3.3.11 (*i.e.*, 3.16 to 7.28 million per mgd[339]). This implies that the use of the updated estimates may increase the total expenditure forecast for the alternative water supply in SFWMD. Note, however, that the estimates in Table 3.3.11 (referred to as "baseline") are developed by, first, estimating the total number of projects that could meet the increasing water demand, and second, estimating the cost of these projects. Average project size is assumed for various regions and project types. Given that the project number is discrete (and one cannot implement one-half of a project), the total water created by these projects exceeds the total water needs identified for the planning regions, and therefore, the total cost on the regional level are also estimated at a higher level.

EDR compared this baseline forecast with the forecast when the SFWMD alternative water supply expenditures are calculated as the average "Project total" (per mgd, calculated from the recently shared dataset), multiplied by the total water needs in the region. Three scenarios are considered: (a) the average cost per mgd is estimated as the ratio of "Project total" to the volume of reuse flow made available upon project completion; (b) the average cost per mgd is estimated as the ratio of "Project total" to "Distribution / Transmission Capacity Created" (or reuse flow made available upon the project completion, if "Distribution / Transmission Capacity Created (MGD)" is not reported); and (c) assuming brackish groundwater is used instead of reclaimed water to meet future needs in the region, as "Project total" to the volume of water made available upon project completion. The results are reported in Table A.7.2.

The change in the assumption regarding the project type to be used to meet future water demands in the region (*i.e.*, using brackish water instead of reclaimed water) cuts the expenditure forecast for SFWMD by more than half. In contrast, the alternative result that reclaimed water projects in SFWMD cost approximately 11.12 million per mgd would increase the SFWMD expenditure forecast by 23.41 percent. In both cases, the total statewide expenditure forecast changes by just a few percentage points, since the total water needs in SFWMD that are unmet by existing supply sources are relatively small (*e.g.*, compared with CFWI).

[339] Note that estimates in Table 3.3.11 are corrected for inflation, while Table A.7.1 estimates are not.

**Table A.7.2 High Needs Scenario: Sensitivity Analysis Using Revised SFWMD Data and Considering Reclaimed Water Projects and Brackish Groundwater Projects**

| Water Supply Planning Regions | Water Needs | Baseline Scenario: Reclaimed water projects in SFWMD | | | | | | Scenario with reclaimed water projects in SFWMD at 7.73 million $ per mgd | | Scenario with reclaimed water projects in SFWMD at 11.12 million $ per mgd | | Scenario with brackish groundwater projects in SFWMD at 3.18 million $ per mgd | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Project characteristics | | | Regional estimates | | | | | | | | |
| | | Average size (mgd)* | Estimated "project total", per project (million 2018 $) | Estimated cost (million 2018 dollars per mgd) | Number of projects needed | Water created by the projects* | **Total (million 2018 dollars)** | **Total (million 2018 dollars)** | **Percentage change from the baseline** | **Total (million 2018 dollars)** | **Percentage change from the baseline** | **Total (million 2018 dollars)** | **Percentage change from the baseline** |
| SF-UEC | 0.8 | 3.82 | 12.06 | 3.16 | 1 | 3.82 | **12.06** | **6.19** | -48.67% | **8.90** | -26.20% | **2.55** | -78.86% |
| SF-LEC | 8.9 | 5.54 | 40.32 | 7.28 | 2 | 11.08 | **80.63** | **68.82** | -14.65% | **98.98** | 22.76% | **28.33** | -64.86% |
| SF-LWC | 4.1 | 3.50 | 15.83 | 4.52 | 2 | 7.00 | **31.66** | **31.70** | 0.13% | **45.60** | 44.03% | **13.05** | -58.78% |
| Total for SFWMD | 13.8 | | | | 5 | 21.9 | **124.35** | **106.67** | -14.22% | **153.46** | 23.41% | **43.88** | -64.71% |
| Total for other planning regions | 409.3 | | | | | 417.03 | **2,043.19** | **2,043.19** | 0.00% | **2,043.19** | 0.00% | **2,043.19** | 0.00% |
| Total for the state | 423.1 | | | | | 438.93 | **2,167.54** | **2,149.90** | -0.81% | **2,196.66** | 1.34% | **2,087.07** | -3.71% |

Note: As discussed in the main text of the chapter, it is assumed that the projects of average size are implemented to meet future water demand, and the total number of projects is sufficient to supply *at least* the projected 2035 demand.

**Potable Water Offset for Reclaimed Water Projects**

As discussed in Subsection 3.3, reclaimed water provides various levels of potable water offsets, depending on the specific use of reclaimed water. For highly desirable reuse activities, DEP (2015)[340] reports the offset as ranging from 0 to 100 percent. For efficient residential irrigation, the offset is 60 percent, and for efficient agricultural or landscape irrigation, the offset is 75 percent. Further, SWFWMD (2010)[341] suggests that water utilities must demonstrate that at least 75 percent of its treated domestic wastewater will be beneficially reused, and that at least 75 percent of that quantity will offset existing and planned water supplies within 10 years of permit issuance.

To examine the sensitivity of EDR's expenditure forecast to the assumption regarding the potable water offset of reclaimed water, a 0.75 offset ratio was used. For the future, it is important to consider the actual use of reclaimed water for each project, and then identify project-specific potable offset and groundwater recharge ratios.

As a first step to examine the effect of the offset ratio on the expenditure forecast, it was assumed that only 75 percent of reclaimed water produced by reclaimed water projects can be used to meet "Net Demand Change". This assumption effectively increases the number of reclaimed water projects that will be needed to meet the increasing demand. In Table 3, the total number of projects needed in each planning region is estimated as the ratio of water needs to average project size, after the size is multiplied by the 0.75 offset ratio. The analysis is conducted for both the Low and High Needs Scenarios. The estimated total statewide expenditure increases by 12 to 13 percent, compared with the baseline scenarios.

Note that the larger the share of the reclaimed water projects becomes, the more sensitive the expenditure forecast is to the potable water offset assumption. In this analysis, as the starting point, it is assumed that projects other than reclaimed water meet half of the future demand increase in such "thirsty" regions as CFWI, NFRWSP, and SW-NR. This assumption moderates the effect on the total statewide expenditure forecast of the offset ratio change.

**Sensitivity to Changes in Other Assumptions**

A significant share of the total expenditures for the state are attributed to the cost of projects in CFWI, NFRWSP, and SW-NR; therefore, any assumptions regarding the project types or costs implemented in these three regions are especially important to accurately predicting the state's share of the total expenditure forecast. In the next edition of this report, EDR intends to more fully examine the sensitivity of the expenditure forecast to various assumptions.

[340] Source: based on Florida Department of Environmental Protection (DEP). 2015. Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater and Excess Surface Water (Senate Bill 536). Florida Department of Environmental Protection, Tallahassee, FL. 230pp.

[341] SWFWMD. (2010). Utility Reference Manual. https://www.swfwmd.state.fl.us/sites/default/files/calendar/others/Utility_Reference_Manual.pdf (last accessed on January 14, 2019)

## Table A.7.3 Expenditure Forecasts for the High and Low Water Needs Scenarios

| Water Supply Planning Regions | Sources assumed to meet 2015-2035 additional water needs | Project characteristics | | | Low water needs scenario | | | | | | High water needs scenario | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Average size (mgd) | Estimated project total ($million 2018) | Estimated cost per mgd ($million 2018 per mgd) | Water needs (mgd) | Baseline Analysis | | 0.75 offset ratio for reclaimed projects | | | Water needs (mgd) | Baseline Analysis | | 0.75 offset ratio for reclaimed projects | | |
| | | | | | | Number of projects | **Total ($million 2018)** | Number of projects | **Total ($million 2018)** | **Percentage change from the baseline** | | Number of projects | **Total ($million 2018)** | Number of projects | **Total ($million 2018)** | **Percentage change from the baseline** |
| NW-II | reclaimed | 0.58 | 7.32 | 12.63 | 0 | 0 | **0** | 0 | **0** | 0.00% | 1.8 | 4 | **29.29** | 5 | **36.61** | 24.99% |
| SF-UEC | reclaimed | 3.82 | 12.06 | 3.16 | 0 | 0 | **0** | 0 | **0** | 0.00% | 0.8 | 1 | **12.06** | 1 | **12.06** | 0.00% |
| SF-LEC | reclaimed | 5.54 | 40.32 | 7.28 | 0 | 0 | **0** | 0 | **0** | 0.00% | 8.9 | 2 | **80.63** | 3 | **120.95** | 50.01% |
| SF-LWC | reclaimed | 3.50 | 15.83 | 4.52 | 0 | 0 | **0** | 0 | **0** | 0.00% | 4.1 | 2 | **31.66** | 2 | **31.66** | 0.00% |
| SJR-CSEC | 50% reclaimed | 1.26 | 5.24 | 4.16 | 0 | 0 | **0** | 0 | **0** | 0.00% | 14 | 12 | **62.87** | 15 | **78.59** | 25.00% |
| | 50% surface | 7.86 | 80.77 | 10.28 | 0 | 0 | **0** | 0 | **0** | 0.00% | 14 | 2 | **161.55** | 2 | **161.55** | 0.00% |
| | Total | | | | 0 | 0 | **0** | 0 | **0** | 0.00% | 28 | 14 | **224.42** | 17 | **240.14** | 7.00% |
| SW-NR (excluding CFWI) | 50% reclaimed | 0.52 | 6.00 | 11.54 | 4.8 | 10 | **60.01** | 13 | **78.01** | 30.00% | 13.9 | 27 | **162.02** | 36 | **216.03** | 33.34% |
| | 50% desalination | 16.25 | 267.06 | 16.43 | 0 | 0 | **0** | 0 | **0** | 0.00% | 13.9 | 1 | **267.06** | 1 | **267.06** | 0.00% |
| | Total | | | | 4.8 | 10 | **60.01** | 13 | **78.01** | 30.00% | 27.8 | 28 | **429.08** | 37 | **483.09** | 12.59% |
| SW-HR (excluding CFWI) | reclaimed | 0.09 | 0.70 | 7.75 | 0 | 0 | **0** | 0 | **0** | 0.00% | 2.5 | 28 | **19.53** | 38 | **26.50** | 35.69% |
| SW-SR | reclaimed | 1.2 | 5.07 | 4.23 | 0 | 0 | **0** | 0 | **0** | 0.00% | 3.4 | 3 | **15.22** | 4 | **20.30** | 33.38% |
| CFWI | 50% reclaimed | 1.73 | 4.91 | 2.84 | 98.4 | 57 | **279.89** | 76 | **373.19** | 33.33% | 116.8 | 68 | **333.91** | 91 | **446.85** | 33.82% |
| | 50% brackish | 0.74 | 2.89 | 3.91 | 98.4 | 133 | **384.51** | 133 | **384.51** | 0.00 | 116.8 | 158 | **456.78** | 158 | **456.78** | 0.00% |
| | Total | | | | 196.8 | 190 | **664.40** | 209 | **757.7** | 14.04% | 233.6 | 226 | **790.69** | 249 | **903.63** | 14.28% |
| NFRWSP | 50% reclaimed | 0.85 | 2.25 | 2.64 | 35.8 | 43 | **96.55** | 57 | **127.99** | 32.56% | 56.1 | 66 | **148.20** | 88 | **197.60** | 33.33% |
| | 50% groundwater recharge | 2.84 | 19.34 | 6.81 | 35.8 | 13 | **251.40** | 13 | **252.40** | 0.40% | 56.1 | 20 | **386.77** | 20 | **386.77** | 0.00% |
| | Total | | | | 71.5 | 56 | **347.95** | 70 | **380.39** | 9.32% | 112.2 | 86 | **534.96** | 108 | **584.37** | 9.24% |
| **Total statewide** | | | | | **273.1** | **141** | **1,072.36** | **292** | **1,215.10** | 13.31% | **423.1** | **394** | **2,167.54** | **394** | **2,435.90** | **12.38%** |

Note: The cost of conservation initiatives are not accounted for.

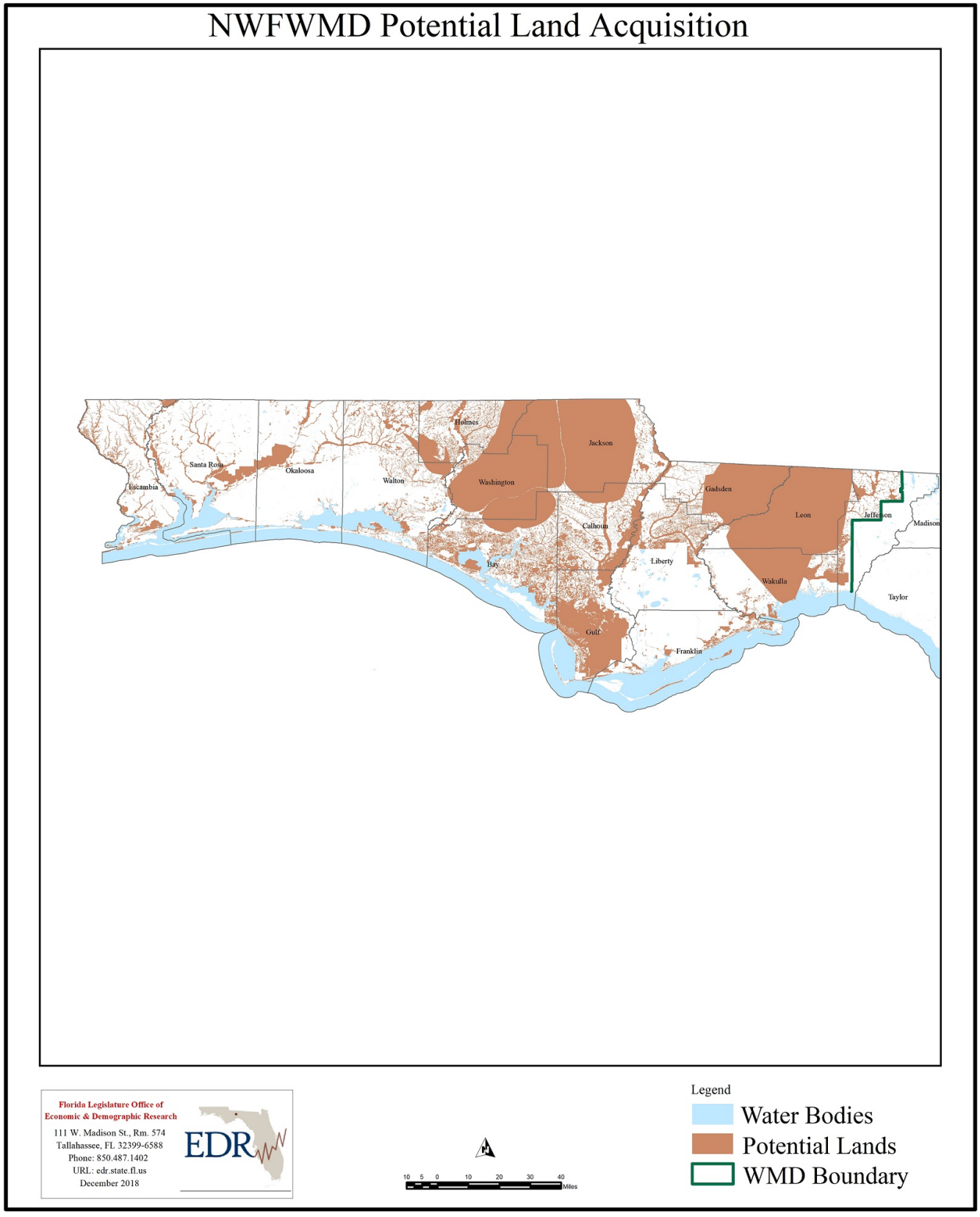
# Appendix B: Miscellaneous Tables

### Table B.1 County Acreage and Geographical Share in WMD

| COUNTY | ACRES | WMD(S) SHARE |
|---|---|---|
| **ALACHUA** | 560,024.49 | 44.15% SJRWMD, 55.85% SRWMD |
| **BAKER** | 374,678.28 | 91.5% SJRWMD, 8.5% SRWMD |
| **BAY** | 484,935.19 | 100% NWFWMD |
| **BRADFORD** | 187,643.97 | 2.04% SJRWMD, 97.96% SRWMD |
| **BREVARD** | 644,170.77 | 100% SJRWMD |
| **BROWARD** | 771,973.36 | 100% SFWMD |
| **CALHOUN** | 363,164.76 | 100% NWFWMD |
| **CHARLOTTE** | 434,677.86 | 65.24% SWFWMD, 34.76% SFWMD |
| **CITRUS** | 350,786.36 | 100% SWFWMD |
| **CLAY** | 386,629.11 | 100% SJRWMD |
| **COLLIER** | 1,269,487.31 | 100% SFWMD |
| **COLUMBIA** | 510,094.11 | 100% SRWMD |
| **DESOTO** | 407,554.92 | 100% SWFWMD |
| **DIXIE** | 450,483.94 | 100% SRWMD |
| **DUVAL** | 487,121.06 | 100% SJRWMD |
| **ESCAMBIA** | 421,085.95 | 100% NWFWMD |
| **FLAGLER** | 310,469.36 | 100% SJRWMD |
| **FRANKLIN** | 344,787.71 | 100% NWFWMD |
| **GADSDEN** | 330,551.49 | 100% NWFWMD |
| **GILCHRIST** | 224,016.43 | 100% SRWMD |
| **GLADES** | 513,215.79 | 100% SFWMD |
| **GULF** | 350,340.92 | 100% NWFWMD |
| **HAMILTON** | 328,914.43 | 100% SRWMD |
| **HARDEE** | 408,130.42 | 100% SWFWMD |
| **HENDRY** | 737,446.84 | 100% SFWMD |
| **HERNANDO** | 301,377.79 | 100% SWFWMD |
| **HIGHLANDS** | 649,200.14 | 30.42% SWFWMD, 69.58% SFWMD |
| **HILLSBOROUGH** | 651,572.89 | 100% SWFWMD |
| **HOLMES** | 303,296.51 | 100% NWFWMD |
| **INDIAN RIVER** | 320,704.89 | 100% SJRWMD |
| **JACKSON** | 586,999.74 | 100% NWFWMD |
| **JEFFERSON** | 378,774.65 | 46.66% NWFWMD, 53.34% SRWMD |
| **LAFAYETTE** | 347,500.05 | 100% SRWMD |
| **LAKE** | 596,247.83 | 90.5% SJRWMD, 9.5% SWFWMD |
| **LEE** | 498,162.66 | 100% SFWMD |
| **LEON** | 426,653.78 | 100% NWFWMD |
| **LEVY** | 713,746.62 | 68.42% SRWMD, 31.58% SWFWMD |
| **LIBERTY** | 520,586.24 | 100% NWFWMD |

| COUNTY | ACRES | WMD(S) SHARE |
|---|---|---|
| **MADISON** | 439,116.26 | 100% SRWMD |
| **MANATEE** | 475,202.15 | 100% SWFWMD |
| **MARION** | 1,012,692.64 | 66.79% SJRWMD, 33.21% SWFWMD |
| **MARTIN** | 345,838.18 | 100% SFWMD |
| **MIAMI-DADE** | 1,209,265.51 | 100% SFWMD |
| **MONROE** | 604,641.11 | 100% SFWMD |
| **NASSAU** | 415,280.86 | 100% SJRWMD |
| **OKALOOSA** | 595,284.68 | 100% NWFWMD |
| **OKEECHOBEE** | 490,979.23 | 13.33% SJRWMD, 86.67% SFWMD |
| **ORANGE** | 578,114.87 | 71.34% SJRWMD, 28.66% SFWMD |
| **OSCEOLA** | 848,592.89 | 39.35% SJRWMD, 60.65% SFWMD |
| **PALM BEACH** | 1,261,772.10 | 100% SFWMD |
| **PASCO** | 470,216.41 | 100% SWFWMD |
| **PINELLAS** | 173,031.46 | 100% SWFWMD |
| **POLK** | 1,148,365.41 | 78.99% SWFWMD, 21.01% SFWMD |
| **PUTNAM** | 463,861.86 | 99.98% SJRWMD, 0.02% SRWMD |
| **ST. JOHNS** | 384,168.70 | 100% SJRWMD |
| **ST. LUCIE** | 365,350.67 | 100% SFWMD |
| **SANTA ROSA** | 646,813.67 | 100% NWFWMD |
| **SARASOTA** | 355,560.78 | 100% SWFWMD |
| **SEMINOLE** | 195,880.72 | 100% SJRWMD |
| **SUMTER** | 349,252.02 | 100% SWFWMD |
| **SUWANNEE** | 440,716.13 | 100% SRWMD |
| **TAYLOR** | 666,310.55 | 100% SRWMD |
| **UNION** | 153,344.67 | 100% SRWMD |
| **VOLUSIA** | 704,171.37 | 100% SJRWMD |
| **WAKULLA** | 387,034.55 | 100% NWFWMD |
| **WALTON** | 664,332.96 | 100% NWFWMD |
| **WASHINGTON** | 372,044.92 | 100% NWFWMD |
| **TOTAL:** | **34,164,445.95** | |

**Figure B.1 Northwest Florida Potential Conservation Land Acquisition**



# Appendix C: Acronyms

**Table C.1 List of All Acronyms Used in this Report**

| Acronym/Label | Meaning |
|---|---|
| **AFR** | Annual Financial Report |
| **AG** | Agricultural Self-Supply |
| **ARC** | Acquisition and Restoration Council |
| **ASR** | Aquifer Storage and Recovery |
| **AV** | Assessed Value |
| **AWS** | Alternative Water Supply |
| **BEBR** | Bureau of Economic and Business Research (a function of the University of Florida) |
| **BMAP** | Basin Management Action Plan |
| **BMP** | Best Management Practices |
| **Board of Trustees** | Board of Trustees of the Internal Improvement Trust Fund |
| **BOD** | Biochemical Oxygen Demand |
| **CARL** | Conservation and Recreation Lands |
| **CAV** | County Assessed Value |
| **CEPP** | Central Everglades Planning Project |
| **CERP** | Comprehensive Everglades Restoration Plan |
| **CFWI** | Central Florida Water Initiative |
| **CIIM** | Commercial-Industrial-Institutional-Mining Self-Supply |
| **CTV** | County Taxable Value |
| **CUP** | Consumptive Use Permit |
| **CY** | Calendar Year |
| **DACS** | The Florida Department of Agriculture and Consumer Services |

| Acronym/Label | Meaning |
|---|---|
| **DEAR** | Division of Environmental Assessment and Restoration (a division of the Florida Department of Environmental Protection) |
| **DEP** | The Florida Department of Environmental Protection |
| **DEP (2002)** | Florida Water Conservation Initiative, April 2002 |
| **DEP (2015)** | Report on Expansion of Beneficial Use of Reclaimed Water, Stormwater and Excess Surface Water |
| **DEP (2018)** | Regional Water Supply Planning 2017 Annual Report |
| **DFS** | Florida Department of Financial Services |
| **DO** | Dissolved Oxygen |
| **DOR** | The Florida Department of Revenue |
| **DOS** | The Florida Department of State |
| **DRP** | Division of Recreation and Parks (a division of the Florida Department of Environmental Protection) |
| **DSL** | Division of State Lands (a division of the Florida Department of Environmental Protection) |
| **DSS** | Domestic Self-Supply |
| **DWRA** | Division of Water Restoration Assistance (a division of the Florida Department of Environmental Protection) |
| **DWSRF** | Drinking Water State Revolving Fund |
| **EAA** | Everglades Agricultural Area |
| **EDR** | The Office of Economic and Demographic Research |
| **EEL** | Environmentally Endangered Lands |
| **EFA** | Everglades Forever Act |
| **ERP** | Environmental Resource Program |
| **FAWCET** | Florida Automated Water Conservation Estimation Tool |
| **FC** | Fecal Coliform |
| **FCC** | Fiscally Constrained Counties |
| **FFS** | The Florida Forest Service (a division of the Florida Department of Agriculture and Consumer Services) |
| **FFY** | Federal Fiscal Year (October 1 through September 30) |

| Acronym/Label | Meaning |
|---|---|
| **FNAI** | Florida Natural Areas Inventory |
| **FSAID** | Florida Statewide Agricultural Irrigation Demand (A roman numeral following the acronym indicates the version number) |
| **FWC** | The Florida Fish and Wildlife Conservation Commission |
| **FY** | Fiscal Year (July 1 through June 30) |
| **HAB** | Harmful Algal Bloom |
| **JV** | Just Value |
| **LATF** | Land Acquisition Trust Fund |
| **LFY** | Local Fiscal Year (October 1 through September 30) |
| **LND_V** | Land Value |
| **LMUAC** | Land Management Uniform Accounting Council |
| **MFL** | Minimum Flows and Minimum Water Levels |
| **mgd** | Millions of Gallons Daily |
| **N** | The number of observations in a statistical sample |
| **NEEPP** | Northern Everglades and Estuaries Protection Program |
| **NFRWSP** | North Florida Regional Water Supply Partnership |
| **NO3** | Nitrate |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NPDES** | National Pollution Discharge Elimination System |
| **NWFWMD** | Northwest Florida Water Management District |
| **NW-I** | Northwest Florida Water Management District's water supply planning region I |
| **NW-II** | Northwest Florida Water Management District's water supply planning region II |
| **NW-III** | Northwest Florida Water Management District's water supply planning region III |
| **NW-IV** | Northwest Florida Water Management District's water supply planning region IV |
| **NW-V** | Northwest Florida Water Management District's water supply planning region V |

| Acronym/Label | Meaning |
|---|---|
| **NW-VI** | Northwest Florida Water Management District's water supply planning region VI |
| **NW-VII** | Northwest Florida Water Management District's water supply planning region VII |
| **OAWP** | The Office of Agricultural Water Policy (an office of the Florida Department of Agriculture and Consumer Services) |
| **OES** | Office of Environmental Services (an office of the Florida Department of Environmental Protection) |
| **OFS** | Outstanding Florida Springs |
| **OGT** | Office of Greenways and Trails (an office of the Florida Department of Environmental Protection) |
| **OLS** | Ordinary Least Squares |
| **OSTDS** | Onsite Sewage Treatment and Disposal System |
| **P2000** | Preservation 2000 |
| **PG** | Power Generation |
| **Project Appendix of DEP (2008)** | A spreadsheet appendix from DEP's Regional Water Supply Planning 2017 Annual Report |
| **PS** | Public Supply |
| **PSC** | The Florida Public Service Commission |
| **REC** | Recreational-Landscape Irrigation |
| **RIB** | Rapid Infiltration Basin |
| **RO** | Reverse Osmosis |
| **RPS** | Recovery and Prevention Strategies |
| **RWSP** | Regional Water Supply Plan |
| **SAV** | School District Assessed Value |
| **SF-LEC** | South Florida Water Management District's Lower East Coast water supply planning region |
| **SF-LKB** | South Florida Water Management District's Lower Kissimmee Basin water supply planning region |
| **SF-LWC** | South Florida Water Management District's Lower West Coast water supply planning region |
| **SF-UEC** | South Florida Water Management District's Upper East Coast water supply planning region |

| Acronym/Label | Meaning |
|---|---|
| **SF-UKB-CFWI** | South Florida Water Management District's Upper Kissimmee Basin water supply planning region which is part of the Central Florida Water Initiative |
| **SFWMD** | South Florida Water Management District |
| **SJR-CFWI** | St. Johns River Water Management District's water supply planning region inside the Central Florida Water Initiative |
| **SJR-CSEC** | St. Johns River Water Management District's Central Springs and East Coast water supply planning region |
| **SJR-NFRWSP** | St. Johns River Water Management District's water supply planning region inside the North Florida Regional Water Supply Partnership |
| **SJRWMD** | St. Johns River Water Management District |
| **SOLARIS** | Florida State Owned Lands and Records Information System |
| **SR-NFRWSP** | Suwannee River Water Management District's water supply planning region inside the North Florida Regional Water Supply Partnership |
| **SR-outside NFRWSP** | Suwannee River Water Management District's water supply planning region outside the North Florida Regional Water Supply Partnership |
| **SRWMD** | Suwanee River Water Management District |
| **STA** | Stormwater Treatment Areas |
| **STAR Report** | Florida Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water levels, and Recovery or Prevention Strategies |
| **STV** | School Taxable Value |
| **SWFWMD** | Southwest Florida Water Management District |
| **SW-HR** | Southwest Florida Water Management District's Heartland water supply planning region |
| **SW-NR** | Southwest Florida Water Management District's Northern water supply planning region |
| **SW-SR** | Southwest Florida Water Management District's Southern water supply planning region |
| **SW-TB** | Southwest Florida Water Management District's Tampa Bay water supply planning region |
| **TMDL** | Total Maximum Daily Load |
| **TN** | Total Nitrogen |
| **TP** | Total Phosphorus |
| **TV** | Taxable Value |
| **U.S. EPA** | United States Environmental Protection Agency |

| Acronym/Label | Meaning |
|---|---|
| **UA** | Un-ionized Ammonia |
| **USGS** | United States Geological Survey |
| **WMD** | Water Management District |
| **WRDA 2000** | Water Resources Development Act of 2000 |
| **WSA** | Water Supply Assessment |
| **WUP** | Water Use Permit |
| **WWTP** | Wastewater Treatment Plant |