Annual Assessment of Florida's Water Resources and Conservation Lands

2021 Edition

Acknowledgements

EDR wishes to thank staff members of the following organizations for their substantial assistance with this report:

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, Institute of Food and Agricultural Sciences, University of Florida

Northwest Florida Water Management District

Program for Resource Efficient Communities, Institute of Food and Agricultural Sciences, University of Florida

South Florida Water Management District

Southwest Florida Water Management District

St. Johns River Water Management District

Suwannee River Water Management District

U.S. Department of Agriculture, Office of Rural Development

U.S. Environmental Protection Agency

U.S. Geological Survey

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Executive Summary

The Office of Economic and Demographic Research (EDR) has completed the fifth annual assessment of Florida's water resources and conservation lands pursuant to section 403.928, Florida Statutes. The report presents topics in isolation that, at least in part, overlap. Land conservation, water supply, water quality, and water infrastructure are all interrelated, and investments in one of these areas will almost certainly benefit another.

Lands can be acquired for conservation by public or private entities and can be obtained in fee or less-than-fee simple ownership. 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 2019-20, the State of Florida expended $77.5 million on conservation land acquisition and $220.5 million on conservation land management.[1] Regarding the impact on ad valorem taxation, roughly 1.8 percent of the statewide county tax base and 1.6 percent of the statewide school tax base have been removed from the tax roll as a result of the total acquisitions to date. This translates into, on net, $294.8 million in county taxes and $224.6 million in school taxes that were shifted to other property owners or lost due to lands being held in conservation in 2020.[2]

Approximately 30 percent of all land in the State of Florida is currently designated for conservation purposes, with eight counties already over 50 percent.[3] If all lands identified in plans set forth by state agencies and water management districts are acquired, this share will jump to over 41 percent.[4] 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 $27 billion. The analysis suggests that roughly 86 percent of this cost would be the state's responsibility. At the current rate of annual state conservation land acquisition expenditures, it would take about 370 years to generate the state's share; in other words, it will take nearly four years for the state to generate its share for just one percent of the total additional conservation lands identified in plans. 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 $104.9 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 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

[1] *See* Table 2.2.8.

[2] *See* Table 2.1.3. Further, value reductions reported in the 2020 Edition were overstated as explained at the end of Section 2.1. See Table B.4 in Appendix B for corrected values for the previous edition.

[3] *See* Tables 2.1.1. The eight counties are: Broward, Collier, Miami-Dade, Monroe, Okaloosa, Franklin, Liberty, and Wakulla.

[4] *See* Table 2.3.3. This projection does not include any additions to current federal, local, or private conservation lands.

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 and fiscal concerns associated with government ownership of conservation land? Are adequate funds available for managing current and future acquisitions? One of EDR's objectives for this ongoing report is to assist policy makers in developing the answers to these questions.

EDR is currently modeling water supply and demand with two approaches: one based on water management district projections (the principal model used in this edition) and the other using an independent water demand forecast (EDR's pilot model). The principal model projects water demand to increase by over 15 percent between 2020 and 2040, reaching 7,407.8 millions of gallons daily by 2040.[5] EDR's pilot model suggests a lower forecast, primarily because it takes greater account of the historic pace of conservation. The two largest drivers of water demand are and will continue to be population growth and agriculture. According to the districts' regional water supply plans and water supply assessments, the water needs of the state can be met through the 2040 planning horizon through a combination of traditional and alternative water sources; however, this assumes appropriate management, continuing conservation efforts, and necessary investments are made. These investments are related to alternative water supply projects identified in regional water supply plans. Because no district can meet its future demand solely with existing source capacity, these extra efforts (and the funding for them) are critical beginning now and continuing through 2040.

Using water demand projections from the principal model shows that the total costs, excluding operations and maintenance, associated with ensuring that future water supplies are available to meet the increasing water demands are between $0.57 and $1.13 billion over the 2020 through 2040 planning horizon.[6] Using EDR's pilot model suggests that the average total cost would be similar, but would fall within a tighter range. These estimates are 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. 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. In this edition, EDR has begun to explore the risks inherent in some of these assumptions.

The cost estimates described above only capture the cost of developing alternative water supplies. In addition, the estimated cost to complete projects benefitting the natural systems must be taken into account. These are projects needed to meet the minimum flows and minimum water levels for natural systems that are currently in recovery and prevention status, as well as additional projects expected to primarily benefit the natural systems. This cost is estimated to be $665.1 million.[7]

Overall, the state's share of the expenditures necessary to ensure sufficient water is available to meet the growing water demand, as well as the needs of the natural systems, varies based on

[5] This assumes average annual rainfall and does not account for potential new water conservation activities. For more details, see Section 4.3.
[6] *See* Table 4.6.5.
[7] *See* Section 4.9, which provides an explanation of the reduced cost estimate since the previous edition.

location and project type, but is expected to be about 10.4 percent. Based on the costs identified to date, this amounts to a state investment of $157.3 million by 2040; however, additional research is planned that is likely to increase this estimate.

Preliminary estimates of the expenditures necessary to comply with key federal and state laws and regulations governing water quality protection and restoration suggest required state expenditures of approximately $270.5 million for the development of total maximum daily loads,[8] $3.2 billion for the implementation of basin management action plans,[9] and $8.4 billion for completion of the Comprehensive Everglades Restoration Plan.[10] Future editions will expand the water quality analysis to include expenditure forecasts for other activities required by or implemented pursuant to federal or state law, including alternative plans for impaired waters, water quality monitoring, and Everglades restoration initiatives outside of the Comprehensive Everglades Restoration Plan. Alone, the expected state expenditures for Total Maximum Daily Load development, Basin Management Action Plan implementation, and Comprehensive Everglades Restoration Plan implementation will exceed currently dedicated revenues and result in funding shortfalls.[11] The degree to which the assumed timeframes and cost shares underlying these expenditure forecasts are legally required is still being assessed.

In the 2019-20 fiscal year, the State of Florida expended approximately $172.8 million on water supply[12] projects and an additional $933.9 million on water quality and other water resource-related programs.[13] In recent years, expenditures for water resources have increased significantly, leading to questions about financial sustainability. Based on historical trends, 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 quality. In this regard, a gap exists in every future year, growing to $840.69 million by the end of the ten-year forecast period.[14] This gap 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? One of EDR's objectives for this ongoing report is to assist policy makers in developing the answers to these questions.

There is, however, yet another cost to be considered. Expenditures necessary to replace, maintain, and expand Florida's aging water infrastructure over the next decades will reach tens of billions of dollars. The U.S. Environmental Protection Agency's most recent drinking water, wastewater, and stormwater 20-year capital-needs estimates for Florida total nearly $45 billion after adjusting for inflation. While only $20.9 billion of that total is attributable to wastewater and stormwater infrastructure, EDR's initial attempts to estimate that subset of needs total $40.3 billion, nearly

[8] *See* Table 5.1.4.
[9] *See* Table 5.1.6.
[10] *See* the conclusion of Section 7.2.
[11] *See* Table 8.2.4.
[12] *See* Table 3.1.1.
[13] *See* Table 3.3.7.
[14] *See* Table 8.1.2.

doubling the cost identified by the U.S. Environmental Protection Agency. EDR is preparing to survey drinking water and wastewater utilities to produce an independent cost estimate that includes all expenditures, not just the capital investment portion. A key policy question arises: once they have been identified, what is the state's role in addressing these infrastructure costs?

Subsequent editions of this report will continue to satisfy the requirements of section 403.928, Florida Statutes, and address those subjects that require further research. First, EDR is continuing to refine its integrated water supply and demand model and preparing to submit its pilot model for publication and peer-review before full deployment. Second, EDR will work with the Department of Environmental Protection and the water management districts to incorporate additional expenditures that are necessary to comply with laws governing water quality. Finally, EDR's estimates of necessary water infrastructure expenditures will continue to be developed. This includes incorporating the results of the forthcoming EDR surveys and assessing the higher stormwater expenditure needs in coastal areas.

1. Introduction and Purpose

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, 33 first magnitude springs,[16] and habitat for 528 endangered or threatened plant species and 55 endangered or threatened animal species.[17] In addition, Florida has fresh groundwater in underlying aquifers which provides drinking water through public supply or private residential wells to more than 90 percent of Florida's population.[18] It is the intent of this report to assist policy makers with the information needed to effectively and efficiently manage Florida's natural resources.

1.1 Statutory Requirement

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. The following directory includes the statutory language as well as the issue's placement in the 2021 Edition of the analysis.

Section 403.928, Florida Statutes:
Assessment of water resources and conservation lands.—The Office of Economic and Demographic Research shall conduct an annual assessment of Florida's water resources and conservation lands.

(1) WATER RESOURCES.—The assessment must include all of the following:	
(a) Historical and current expenditures and projections of future expenditures by federal, state, regional, and local governments and public and private utilities based upon historical trends and ongoing projects or initiatives associated with: 1. Water supply and demand; and 2. Water quality protection and restoration.	***Sections 3.1 & 3.3***

[15] https://floridadep.gov/water/beaches. (Accessed December 2020.)
[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 2020.)
[17] http://www.fnai.org/FieldGuide/plant_intro.cfm. (Accessed December 2020.)
[18] 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 2020.)

(b) An analysis and estimates of future expenditures by federal, state, regional, and local governments and public and private utilities necessary to comply with federal and state laws and regulations governing subparagraphs (a)1. and 2. The analysis and estimates must address future expenditures by federal, state, regional, and local governments and all public and private utilities necessary to achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems, and that adverse effects of competition for water supplies be avoided. The assessment must include a compilation of projected water supply and demand data developed by each water management district pursuant to ss. 373.036 and 373.709, with notations regarding any significant differences between the methods used by the districts to calculate the data.	***Ch. 4, Ch. 5, Ch. 6, & Ch. 7***
(c) Forecasts of federal, state, regional, and local government revenues dedicated in current law for the purposes specified in subparagraphs (a)1. and 2. or that have been historically allocated for these purposes, as well as public and private utility revenues.	***Sections 3.2 & 3.4***
(d) An identification of gaps between projected revenues and projected and estimated expenditures.	***Ch. 8***
(2) CONSERVATION LANDS.—The assessment must include all of the following:	
(a) Historical and current expenditures and projections of future expenditures by federal, state, regional, and local governments based upon historical trends and ongoing projects or initiatives associated with real property interests eligible for funding under s. 259.105.	***Section 2.2***
(b) An analysis and estimates of future expenditures by federal, state, regional, and local governments necessary to purchase lands identified in plans set forth by state agencies or water management districts.	***Section 2.3***
(c) An analysis of the ad valorem tax impacts, by county, resulting from public ownership of conservation lands.	***Section 2.1***

(d) Forecasts of federal, state, regional, and local government revenues dedicated in current law to maintain conservation lands and the gap between projected expenditures and revenues.	***Section 2.4***
(e) The total percentage of Florida real property that is publicly owned for conservation purposes.	***Section 2.1***
(f) A comparison of the cost of acquiring and maintaining conservation lands under fee simple or less than fee simple ownership.	***2020 Ed.****
(3) The assessment shall include analyses on a statewide, regional, or geographic basis, as appropriate, and shall identify analytical challenges in assessing information across the different regions of the state.	
(4) The assessment must identify any overlap in the expenditures for water resources and conservation lands.	***2020 Ed.****
(5) The water management districts, the Department of Environmental Protection, the Department of Agriculture and Consumer Services, the Fish and Wildlife Conservation Commission, counties, municipalities, and special districts shall provide assistance to the Office of Economic and Demographic Research related to their respective areas of expertise.	
(6) The Office of Economic and Demographic Research must be given access to any data held by an agency as defined in s. 112.312 if the Office of Economic and Demographic Research considers the data necessary to complete the assessment, including any confidential data.	
(7) The assessment shall be submitted to the President of the Senate and the Speaker of the House of Representatives by January 1, 2017, and by January 1 of each year thereafter.	

*Final discussions of these topics can be found in the 2020 Edition on pages 51 and 54, available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

Because this annual report may play a supporting role for future lawmaking 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. Some required components of the report are still in development and will be finalized in future editions. 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 – Development of a prototype water demand model with preliminary statewide results. Expanded analysis of water quality programs and the expenditures necessary to comply with applicable laws and regulations. Introduction of water infrastructure systems and an overview of the existing estimates of the expenditures necessary to maintain them.

- January 1, 2021 – Enhancement of water demand and expenditure forecasting model and initial preparation for peer-review. Analysis of methodologies and data sources, as well as development of surveys for water and wastewater facilities, for the purpose of estimating the expenditures necessary to maintain, repair, and replace Florida's aging water infrastructure.

- January 1, 2022 and Beyond – Deployment of a peer-reviewed water demand model, capable of modelling various scenarios (*e.g.*, drought, climate change, population shifts), and the resulting annual statewide expenditure forecasts. Complete analysis of water quality programs and the expenditures necessary to comply with applicable laws and regulations. Analysis of survey responses from water and wastewater facilities and development of independent estimates of expenditures necessary to maintain, repair, and replace Florida's aging water infrastructure.

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. A table of acronyms is provided in Appendix D.

1.2 Principles of Natural Resource Economics

Certain economic principles apply to natural resources that frame many of the analyses in this report. A brief overview of these concepts is provided here for context.

Inherently, economics is the study of the allocation of scarce resources.[19] Scarcity describes a state where available resources are finite, while the demand for the resource is potentially unlimited. Land, freshwater, and the capacity of water resources to assimilate pollutants are examples of scarce resources.

Given this scarcity, society must evaluate economic tradeoffs associated with alternative resource use scenarios and select the optimal scenario. This report examines the combination of feasible and cost-effective projects and activities designed to achieve the following policy goals:

- Meet the growing demand for water.
- Restore and protect water quality.
- Restore and protect the natural systems.

Certain principles of economics apply to natural resource markets that also require consideration. A market failure occurs when a free and competitive market leads to an equilibrium that is not socially optimal. This generally occurs due to unique attributes of the good or market. Regarding water resources, market failure potentially occurs due to the following attributes[20]:

- **Public Good**: This occurs if the use of a good by one person does not diminish the availability of the good for other users (non-rival), and it is prohibitively expensive to exclude someone from using the good (non-excludable). For example, recreational uses of public water bodies are generally non-rival and non-excludable and, as such, are public goods. With such goods, well-defined property rights cannot be established, preventing the market system from optimally allocating the resource.

- **Commons**: If a good is non-excludable and two or more users have access to the resource, and if use by one diminishes the use by the other(s), then each user has an incentive to overuse the resource while it is still available. In these instances, resources are often depleted quickly and are not allocated optimally.

  Aquifers serve as an example of commons since, in the absence of government regulation, individuals have incentives to over-withdraw water before it is withdrawn by others.

[19] Russell, R.R. and M. Wilkinson. 1979. Microeconomics: A Synthesis of Modern and Neoclassical Theory. New York: John Wiley and Sons. Cited by: Griffin, R.C. 2006. Water Resource Economics: The Analysis of Scarcity, Policies, and Projects. MIT Press, Cambridge, MA.

[20] Various sources: Griffin, R.C. 2006. Water Resource Economics: The Analysis of Scarcity, Policies, and Projects. MIT Press, Cambridge, MA.
Field, B.C. 2015. Natural Resource Economics: An Introduction. Third Edition. Waveland Press.
Hanley, N., Shogren, J.F., and B. White. Environmental Economics: in Theory and Practice. Macmillan International Higher Education.

Another example of commons is pollution loading from the Mississippi River Basin into the Gulf of Mexico. The Mississippi watershed includes, in part or in whole, 13 states. Nutrient loading from urban and agricultural areas in these states contributes to increased nutrient concentration in the Gulf, which leads to low-oxygen dead zones. Past reports have also linked nutrient loading from the Mississippi River with harmful algal blooms off the west coast of Florida.[21] Given the size of the watershed and the pollution impact that occurs in distant downstream locations, it has been extremely difficult to exclude economic agents from using (and overusing) the pollution assimilative capacity of the Gulf of Mexico.

- **Externalities**: This occurs when a party other than those involved in a market transaction are directly affected by the outcome of the transaction. Externalities can be positive or negative. Water pollution is a classic example of a negative externality. When an economic agent, such as an industrial facility, is responsible for pollution downstream, the downstream effects (without existing regulations) are not reflected in the economic transactions of the plant. An example of a positive externality is return flow. Some water used by one agent, such as a hydroelectric power plant, may be returned back to a stream or aquifer and made available for others to use. However, the initial agents using the water likely do not consider the effects of their activities on the return flow because "they do not derive personal benefits or costs from their own return flow, so, they are not motivated to control return flow to the benefits of agents lying downstream."[22]

- **Natural Monopoly**: This form of monopoly exists when large investments are needed to be in a position to serve customers, and one supplier can serve the entire market at a smaller cost than multiple suppliers. This prevents the competition that is necessary for a market to lead to a socially optimal outcome, but the monopoly may be preferred to the market not existing due to high barriers to entry. Examples of natural monopolies include water utilities and wastewater treatment services. For these markets to be competitive, significant duplication of infrastructure costs would be necessary, which ultimately leads to a more costly provision of goods relative to one supplier. Under a natural monopoly, one supplier controls the market, and in the absence of regulatory mechanisms to appropriately limit its market power, such a monopoly would be expected to set higher prices for goods and services, even if that constrains consumption in comparison with the socially optimal outcome.

- **Overdiscounting**: Private agents tend to overuse depletable resources (such as groundwater) and underinvest in large-scale projects designed to extend or augment the useful life of such resources (such as reservoirs). Decisions depend on individuals' preferences for present-day versus future outcomes. As such, individual preferences determine the rate of discounting of future events. Some studies argue that individuals tend to over-discount future events: "individuals have faulty 'telescopic' vision concerning the future, and are inclined not to make sufficient provision to it."[23] Such over-discounting

[21] National Oceanic and Atmospheric Administration. (2007, November 9). Florida Red Tides Linked To Mississippi River Nutrient Outflow. ScienceDaily. www.sciencedaily.com/releases/2007/11/071108190413.htm . (Accessed November 2019.)

[22] Griffin, R.C. 2006. Water Resource Economics: The Analysis of Scarcity, Policies, and Projects. MIT Press, Cambridge, MA. At P. 111.

[23] Sassone, P.G., and W.A. Schaeffer. 1978. Cost-Benefit Analysis. New York: Academic Press. Cited in: Griffin, R.C. 2006. Water Resource Economics: The Analysis of Scarcity, Policies, and Projects. MIT Press, Cambridge, MA. At p. 105.

may lead to over-use of resources today and underinvestment in resource preservation and augmentation.

Market failures provide justifications for institutions other than markets to be developed to achieve a more societally desirable water resource or land allocation. Government policies that are intended to correct for market failures should be designed to achieve an allocation of goods that is as close to the socially optimal allocation of goods as possible. This is traditionally attempted through two tools:

- Regulations (such as standards or quotas).
- Economic instruments (such as subsidies, taxes and fees, and market-based instruments such as water quality credit trading and payment for ecosystem services).

Policies used to correct for market failures in Florida include a mix of regulations and economic instruments. Examples of regulatory policies include the permitting programs that regulate consumptive uses of water or pollutant discharges into waterbodies. Examples of economic instruments include the inclining block rate structure of many water utilities under which the price per unit of water increases with the amount of water demanded.

This framework may offer guidance in evaluating two particular parts of section 403.928(1)(b), Florida Statutes, which states that this annual report's analysis and estimates must address future expenditures "necessary to achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems, and that adverse effects of competition for water supplies be avoided." The interpretation of this subsection is crucial to the foundation of much of the water supply and demand analysis in this report.

The first part, regarding "the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses" is made difficult by the fact that the determination of whether a use is reasonable-beneficial can change over time and is, in part, influenced by the quantity of water to be used.[24] For example, imagine an agricultural producer who can produce a crop using a variety of irrigation systems. In a world without water scarcity, irrigation relying on a low-efficiency and low-cost system could be considered a reasonable-beneficial use. In reality, as population and other commercial water uses grow, water scarcity increases. As such, for a use to be considered reasonable-beneficial in the future, more costly technologies with higher irrigation efficiencies may be required. As time goes on and demand for water in the state continues to increase, the efficiency requirements for agricultural irrigation systems could become

[24] To obtain a water use permit, an applicant must establish that the proposed use of water: (a) is a reasonable-beneficial use; (b) will not interfere with any presently existing legal use of water; and (c) is consistent with the public interest. The term "Reasonable-beneficial use" is defined in section 373.019, Florida Statutes, as: "the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest." Further guidance is provided in rule 62-40.410 of the Florida Administrative Code, DEP's Water Resource Implementation Rule, which identifies 18 factors to be considered in determining if a water use is a reasonable-beneficial use, the first of which is the "quantity of water requested for the use."

increasingly stringent,[25] making an agricultural operation with a specific irrigation system that would have been considered a reasonable-beneficial use 20 years ago not pass muster 20 years from now. Similarly, considering water use permits for public supply, the projected per capita water use cap could be reduced over time in response to increasing water scarcity due to more and more users of the limited existing supply.

The question arises: when is it possible that there is not sufficient water available for a reasonable-beneficial use, particularly if it is possible that the determination of a use as reasonable-beneficial can partially depend on whether sufficient water is available? Considering all of this, EDR assumes that this part of section 403.928(1)(b), Florida Statutes, is to be interpreted to include a similar regulatory structure to address water scarcity as is seen today. For example, if an entity is seeking to withdraw 100 million gallons of water daily from an aquifer, it must seek a permit from the appropriate water management district and, depending on the efficiency of water use in the proposed activity, availability of water, and the status of affected natural systems, it may need to invest in alternative water supply projects (for which governmental subsidies may be available).

The second part of section 403.928(1)(b), Florida Statutes, indicates that the report's analysis must address the Legislature's intent that "adverse effects of competition for water supplies be avoided." As a scarce resource in high demand, competition for water supplies is inevitable. In *A Model Water Code*, used as a basis for the existing water regulations in Florida, it was suggested that the:

> [R]egulation of consumptive uses and reallocation of water to more productive uses … would enable state officials to prevent overdevelopment and competition for water, requiring low value users to seek new supplies. Underdevelopment as well as overdevelopment can be avoided by a choice of the better use when pending applications for water use relate to the same supply and the available water is not sufficient for both. … Long-range plans must not only anticipate such changes in water use patterns, but must actually induce transfers to higher value uses.[26]

In other words, when the water policies in Florida were developed, the choice of the types of use in the process of granting water use permits was envisioned as a strategy to address the competition for water resources. While the water policies in Florida have evolved since *A Model Water Code* was written, competition for water supplies remains. The question that arises is: when is competition for water supplies considered adverse? EDR interprets "adverse effects of competition for water supplies" to mean that water scarcity has driven the costs associated with obtaining water supplies to such a level that reasonable-beneficial uses exist that can no longer be afforded due to this increased cost, even after accounting for government subsidies. Thus, if there are sufficient water supplies available for all existing and future reasonable-beneficial uses, then the adverse effects of competition for those water supplies have been avoided.

[25] For example, see the changes in the efficiency goals over time for supplemental irrigation in SWFWMD on p. 62 in Water Use Permit Applicant's Handbook, Part B, available at: https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/WUP_Applicants_Handbook_Part_B.pd_.pdf. (Accessed November 2019.)

[26] Malone et al. "A Model Water Code" 1972 at 74-75, available at: https://ufdc.ufl.edu/WL00004678/00001/. (Accessed November 2019.)

The economic concepts and principles presented in the section provide a framework for evaluating the unique aspects of natural resources and the role of government in both preserving and allocating them.

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 outdoor, resource-based recreation, but the approach has evolved over time. 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 or the federal government.[27]

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.[28]

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.[29]

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.[30]

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; the funds were distributed to the five water management districts (WMDs) roughly in proportion to the population within their districts.[31] Through the Save Our Rivers program, the WMDs acquired more than 1.7 million acres of land,

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[27] Farr, James A., *Florida's Landmark Programs for Conservation and Recreation Land Acquisition* (2006), Sustain, a Journal of Environmental and Sustainability Issues, Issue 14, Spring/Summer 2006, available at: http://partnershipgreencity.wixsite.com/greencitypartnership/sustain-magazine. (Accessed September 2020.)
[28] *Id.*
[29] *Id.*
[30] *Id.*
[31] For a map of the five WMDs, see Figure 3.0.1.

including land acquired by the South Florida Water Management District as part of the restoration efforts of the Florida Everglades.[32]

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 were 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 WMDs' 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 $3 billion.[33]

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.[34] To date, the Florida Forever program has been responsible for the acquisition of 835,107 acres of land at a cost of nearly $3.2 billion dollars.[35] The Florida Forever program is discussed in greater detail in Section 2.2 of this edition.

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, is charged with "acquisition, administration, management, control, supervision, conservation, protection, and disposition" of state lands.[36] 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.[37] Lands acquired by the 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 the WMDs also have authority to sell real property or interests in real property determined to be surplus in accordance with applicable procedures prescribed in law. In some cases, the process of selling lands determined to be surplus may result in an exchange of real property. In general, the procedures under which the Board of Trustees may surplus state-owned lands are 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. Further, for any conservation lands acquired under the P2000 program, the Board of Trustees and the WMDs must also comply with additional requirements set forth in section 259.101(6), Florida Statutes. For more information regarding the surplus process for conservation lands, see the 2019 Edition.[38]

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[32] *Id.*
[33] Committee on Environmental Preservation and Conservation, The Florida Senate, *Land Acquisition in Florida*, Report Number 2008-123, available at: http://archive.flsenate.gov/data/publications/2008/senate/reports/interim_reports/pdf/2008-123eplong.pdf. (Accessed September 2020.)
[34] Ch. 99-247, Laws of Fla. (codified as amended at § 259.105, Fla. Stat.).
[35] Florida Department of Environmental Protection, Florida Forever Monthly Complete Report (as of June 30, 2020) available at https://floridadep.gov/lands/environmental-services/content/florida-forever. (Accessed September 2020.)
[36] § 253.03(1), Fla. Stat.
[37] § 259.105(7)(c), Fla. Stat.
[38] *See*: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2019Edition.pdf.

Once state-owned conservation lands are sold through the surplus process, 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 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 (1) the payment of debt service on revenue bonds or notes or (2) the purchase of other lands for flood control, water storage, water management, conservation and protection of water resources, aquifer recharge, water resource and water supply development, or preservation of wetlands, streams, and lakes.[42]

A summary of surplus conservation land sales reported by each WMD and the Florida Department of Environmental Protection, on behalf of the Board of Trustees (BOT), is provided in Table 2.0.1.

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

WMD/State	FY2017-18		FY2018-19		FY2019-20		Available Acres for Surplus
	Acres	Revenue ($millions)	Acres	Revenue ($millions)	Acres	Revenue ($millions)	
NWFWMD	-	$-	-	$-	-	$-	123.39
SJRWMD	1.53	$0.00	-	$-	-	$-	-
SFWMD	2,591.73	$1.27	-	$-	-	$-	-
SWFWMD	1,151.81	$5.90	-	$-	-	$-	871.13
SRWMD	100.22	$0.00	-	$-	-	$-	208.82
BOT	40.84	$0.02	1.16	$0.17	-	$-	7.66
Total:	**3,886.13**	**7.19**	**1.16**	**$0.17**	**-**	**$-**	**1,211.00**

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 2018, 2019, and 2020 fiscal years, produced by the Florida Department of Environmental Protection and the Florida Department of Management Services.

Finally, the required comparison of acquiring and maintaining conservation lands through fee simple versus less than fee simple ownership, as well as the identification of any overlap in the expenditures for water resources and conservation lands, can be found in the 2020 Edition.[43]

2.1 Percentage and Effect of Publicly-owned Real Property for Conservation Purposes

The Office of Economic and Demographic Research (EDR) is directed to analyze the percentage of Florida real property that is publicly owned for conservation purposes as well as the ad valorem tax impacts, by county, resulting from public ownership of conservation lands. Lands held in

[39] § 253.0341(12), Fla. Stat.
[40] § 253.0341(13), Fla. Stat.
[41] *Id.*
[42] § 373.139(1), (6), Fla. Stat.
[43] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf at pages 51 and 54.

conservation by public entities are totally exempt from ad valorem taxation and, as such, reduce ad valorem tax collections. In previous editions, EDR has explored whether this reduction in collections is offset, at least in part, by an increase in property values of surrounding properties. No definitive conclusions were drawn.

The Percentage of Florida Owned for Conservation Purposes by Public Entities

The Florida Natural Areas Inventory (FNAI), a non-profit organization administered by Florida State University, is one of the most complete repositories for geo-information on conservation land areas in Florida.[44] FNAI's primary contract is with the Florida Department of Environmental Protection (DEP). Under this contract, FNAI provides various services such as natural resource assessments in aid of assessing and setting priorities for the Florida Forever program.[45] Through its funding from DEP, FNAI also compiles the "Summary of Florida Conservation Lands," which identifies the conservation land acreages managed by federal, state, local, and private entities in Florida.[46]

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."[47] EDR uses the FNAI data in identifying conservation lands in Florida as it provides the most comprehensive information on lands managed for conservation purposes by federal, state, local, and private entities.[48]

It is clear from Figure 2.1.1 that much of the conservation land identified by FNAI is in fact water areas being managed as part of conservation land. In determining the share of the state held as conservation lands, it is necessary that the numerator (the amount of Florida land held as conservation land) and the denominator (the amount of Florida land) be from the same source and not include water. The United States Census Bureau maintains annually updated geographic files

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[44] Florida Natural Areas Inventory, Conservation Lands, http://www.fnai.org/conservationlands.cfm. (Accessed September 2020.)
[45] Florida Natural Areas Inventory, Partnerships, http://www.fnai.org/partnerships.cfm. (Accessed September 2020.)
[46] *See* Florida Natural Areas Inventory, Summary of Florida Conservation Lands Acreages (Including Less-than-Fee) February 2019, available at: https://www.fnai.org/PDF/Maacres_202002_FCL_plus_LTF.pdf. (Accessed September 2020.)
[47] Florida Natural Areas Inventory, Conservation lands, Frequently Asked Questions about Florida Conservation Lands, http://www.fnai.org/conlands_faq.cfm. (Accessed September 2020.)
[48] 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 a water management district 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.

of each state, its counties, and all waterbodies.[49] The Census Bureau county and waterbody geographies are used to calculate the total acres and conservation land acres of each Florida county.[50]

As of June 2020, all non-submerged conservation lands in Florida cover 10.43 million acres, comprising 30.43 percent of the total state land area (34.27 million acres). Figure 2.1.1 provides a map of all conservation lands in Florida. Table 2.1.1 provides county level detail regarding acreage in and out of conservation and the share of total county land acreage held in public or private conservation. Also included are the population density and effective population density calculated as the population of a county as of April 1, 2019 divided by the land acreage and the land acreage not held for conservation, respectively.

The effective population density provides a more realistic view of density, particularly in counties like Monroe County where population density increases from 0.12 persons per acre to nearly 2.4 persons per acre when the effects of conservation lands are considered. Statewide, population density in 2019 was 0.62 persons per acre but increases to 0.89 when conservation lands are removed. Finally, the densest county in the state is typically considered to be Pinellas County at 5.58, but when the effect of conservation land is considered, the densest county is Miami-Dade County at 7.39.

[See figure on following page]

[49] United States Census Bureau, TIGER/Line Shapefiles, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html. (Accessed September 2020.)
[50] This results in minor variances in county and statewide acreage between editions of this report.

Figure 2.1.1 Map of All Conservation Lands in Florida

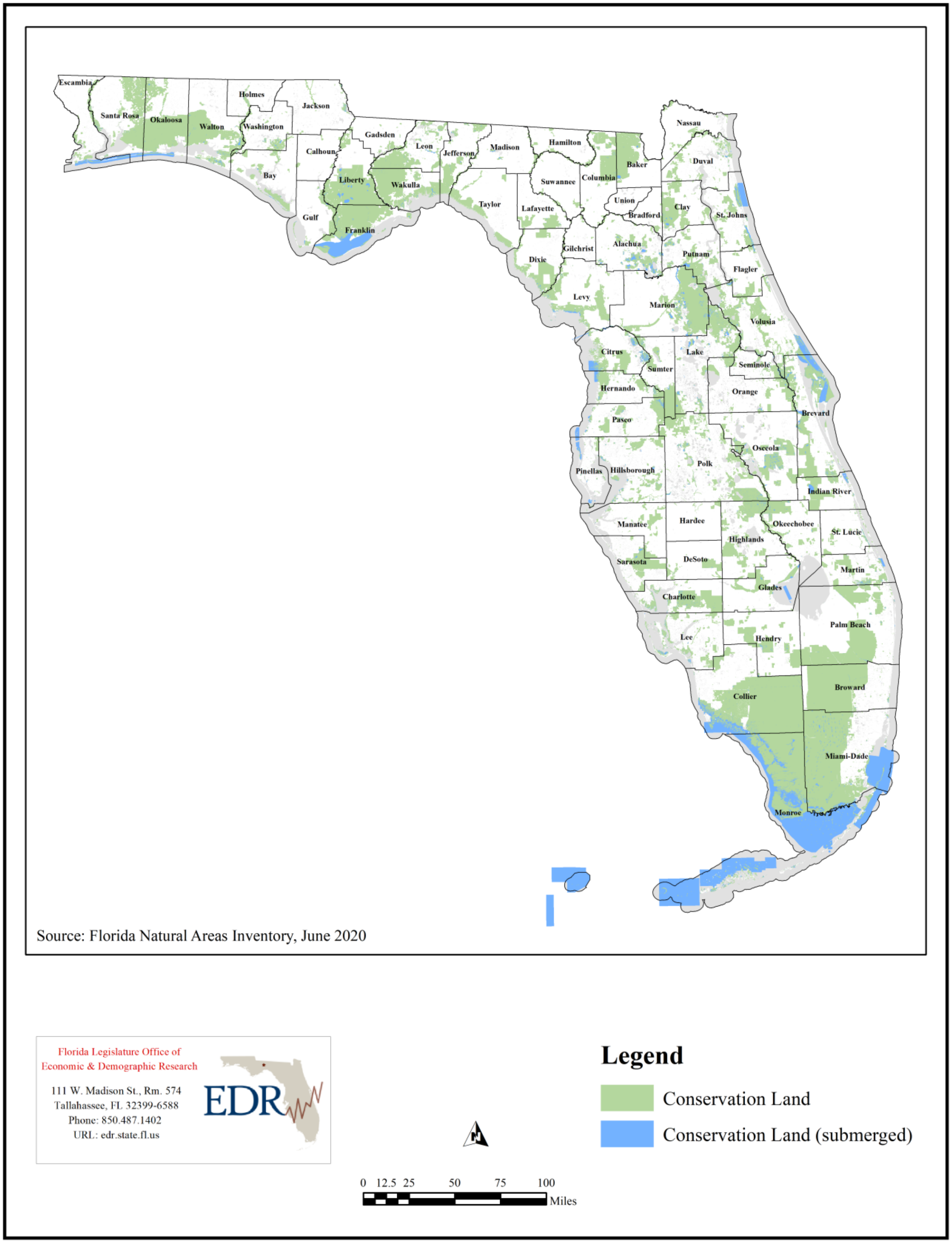


Table 2.1.1 Conservation Lands and Effective Population Density

	County Acres	Non-Conservation Acres	Conservation Acres	Public Conservation Acres	Private Conservation Acres	Share of County in Conservation	Pop. Density	Effective Pop. Density
Alachua	559,816.61	459,839.89	99,976.72	96,002.17	3,974.55	17.86%	0.48	0.58
Baker	374,547.47	209,941.58	164,605.89	164,572.04	33.85	43.95%	0.08	0.13
Bay	485,502.11	414,935.57	70,566.54	63,639.52	6,927.02	14.53%	0.34	0.40
Bradford	188,013.68	176,901.69	11,111.98	10,273.02	838.96	5.91%	0.15	0.16
Brevard	645,559.33	376,168.18	269,391.15	265,667.46	3,723.69	41.73%	0.92	1.58
Broward	769,807.20	287,714.24	482,092.96	482,061.78	31.18	62.63%	2.49	6.67
Calhoun	363,090.56	354,754.86	8,335.70	5,971.08	2,364.62	2.30%	0.04	0.04
Charlotte	435,268.82	263,225.18	172,043.64	171,996.76	46.89	39.53%	0.42	0.69
Citrus	369,589.48	246,653.07	122,936.41	122,540.39	396.03	33.26%	0.40	0.60
Clay	386,955.36	243,921.35	143,034.01	127,623.72	15,410.28	36.96%	0.56	0.88
Collier	1,277,940.86	403,635.03	874,305.83	862,023.50	12,282.33	68.42%	0.29	0.93
Columbia	510,237.12	361,840.40	148,396.72	145,964.24	2,432.48	29.08%	0.14	0.19
DeSoto	407,237.02	356,250.85	50,986.16	49,071.78	1,914.38	12.52%	0.09	0.10
Dixie	451,278.74	318,664.12	132,614.63	132,614.63	-	29.39%	0.04	0.05
Duval	488,083.77	407,038.78	81,045.00	68,727.07	12,317.92	16.60%	1.99	2.38
Escambia	420,479.52	375,602.84	44,876.68	42,489.71	2,386.96	10.67%	0.76	0.85
Flagler	310,464.31	266,374.51	44,089.81	40,464.80	3,625.01	14.20%	0.36	0.42
Franklin	348,764.95	65,672.31	283,092.63	281,631.04	1,461.59	81.17%	0.04	0.19
Gadsden	330,442.87	311,649.91	18,792.96	16,525.17	2,267.78	5.69%	0.14	0.15
Gilchrist	223,801.07	215,366.15	8,434.92	8,316.04	118.88	3.77%	0.08	0.08
Glades	514,140.94	421,909.83	92,231.11	73,944.80	18,286.31	17.94%	0.03	0.03
Gulf	351,223.79	303,828.41	47,395.38	47,395.38	-	13.49%	0.04	0.04
Hamilton	328,822.36	303,835.91	24,986.46	24,849.96	136.50	7.60%	0.04	0.05
Hardee	408,047.90	396,933.76	11,114.14	10,629.58	484.56	2.72%	0.07	0.07
Hendry	739,705.77	579,385.81	160,319.96	156,604.00	3,715.96	21.67%	0.05	0.07
Hernando	302,423.60	215,358.66	87,064.95	86,790.60	274.35	28.79%	0.62	0.87
Highlands	649,981.49	457,222.09	192,759.40	174,346.20	18,413.20	29.66%	0.16	0.23
Hillsborough	654,029.16	544,336.98	109,692.18	108,304.91	1,387.27	16.77%	2.21	2.65
Holmes	303,736.09	290,779.28	12,956.81	12,956.81	-	4.27%	0.07	0.07
Indian River	321,067.66	223,080.84	97,986.82	94,918.90	3,067.91	30.52%	0.48	0.69
Jackson	587,049.30	567,326.04	19,723.26	18,853.14	870.12	3.36%	0.08	0.08
Jefferson	382,657.15	272,174.16	110,482.99	77,778.09	32,704.90	28.87%	0.04	0.05
Lafayette	347,739.99	287,820.15	59,919.84	59,919.84	-	17.23%	0.02	0.03
Lake	606,406.38	410,021.44	196,384.94	193,137.12	3,247.82	32.39%	0.59	0.87
Lee	500,117.09	399,637.16	100,479.94	96,759.24	3,720.69	20.09%	1.47	1.84
Leon	426,800.81	266,467.22	160,333.59	132,131.69	28,201.90	37.57%	0.69	1.11
Levy	714,994.32	540,424.24	174,570.07	173,027.33	1,542.74	24.42%	0.06	0.08
Liberty	520,479.88	193,019.91	327,459.98	321,026.22	6,433.75	62.92%	0.02	0.05
Madison	445,712.46	428,816.93	16,895.53	16,474.12	421.42	3.79%	0.04	0.05
Manatee	475,921.80	413,451.49	62,470.31	61,008.36	1,461.94	13.13%	0.81	0.94
Marion	1,015,685.77	669,923.89	345,761.88	345,515.04	246.84	34.04%	0.35	0.54
Martin	346,469.92	253,219.69	93,250.23	91,526.80	1,723.43	26.91%	0.46	0.63
Miami-Dade	1,215,790.88	380,580.58	835,210.29	821,814.58	13,395.71	68.70%	2.31	7.39
Monroe	625,754.44	31,828.38	593,926.06	593,061.54	864.52	94.91%	0.12	2.39
Nassau	415,150.08	384,869.75	30,280.33	22,738.93	7,541.39	7.29%	0.20	0.22
Okaloosa	595,342.93	278,156.06	317,186.86	317,186.86	-	53.28%	0.34	0.72
Okeechobee	490,733.69	383,022.10	107,711.59	105,229.11	2,482.48	21.95%	0.09	0.11
Orange	577,193.16	479,731.90	97,461.26	92,510.64	4,950.62	16.89%	2.40	2.89
Osceola	848,064.32	671,051.06	177,013.26	165,828.50	11,184.76	20.87%	0.44	0.55
Palm Beach	1,257,136.82	780,404.69	476,732.13	476,719.41	12.72	37.92%	1.15	1.86
Pasco	471,769.69	363,406.15	108,363.54	106,580.27	1,783.27	22.97%	1.12	1.45
Pinellas	175,220.99	157,908.32	17,312.67	17,312.67	-	9.88%	5.58	6.19
Polk	1,148,795.42	860,300.77	288,494.65	266,397.49	22,097.16	25.11%	0.60	0.80
Putnam	463,820.85	346,803.66	117,017.19	116,131.58	885.61	25.23%	0.16	0.21
Santa Rosa	647,397.60	390,855.79	256,541.81	255,020.44	1,521.36	39.63%	0.28	0.46
Sarasota	355,822.14	247,361.36	108,460.78	107,587.53	873.25	30.48%	1.20	1.72
Seminole	196,290.33	157,817.34	38,472.99	37,894.75	578.24	19.60%	2.40	2.99
St. Johns	384,359.12	300,466.24	83,892.87	73,745.65	10,147.23	21.83%	0.66	0.85
St. Lucie	365,556.23	332,540.39	33,015.84	30,515.34	2,500.51	9.03%	0.85	0.93
Sumter	355,549.32	246,019.92	109,529.40	109,420.34	109.06	30.81%	0.36	0.52
Suwannee	440,671.68	419,444.20	21,227.48	21,129.95	97.53	4.82%	0.10	0.11
Taylor	667,729.70	570,551.44	97,178.26	92,283.36	4,894.90	14.55%	0.03	0.04
Union	153,335.65	153,100.64	235.01	199.09	35.92	0.15%	0.10	0.10
Volusia	704,293.26	477,312.55	226,980.71	223,129.35	3,851.36	32.23%	0.76	1.13
Wakulla	388,104.26	136,534.87	251,569.40	250,838.81	730.59	64.82%	0.08	0.24
Walton	664,163.26	414,480.67	249,682.60	244,702.45	4,980.14	37.59%	0.11	0.17
Washington	373,481.82	323,211.54	50,270.28	49,556.39	713.89	13.46%	0.07	0.08
Statewide	34,271,622.09	23,842,884.77	10,428,737.33	10,133,609.06	295,128.27	30.43%	0.62	0.89

Conservation lands in Florida are owned[51] by federal, state, and local governments, or by private entities.[52] Of the total 10.43 million acres of conservation lands in Florida in 2020, 97.17 percent is publicly-owned (10.13 million acres). Among the publicly-owned conservation lands, 54.14 percent is owned by the state government, 40.90 percent is owned by the federal government, and 4.96 percent is owned by local governments. At this time, every county in Florida has publicly-owned lands dedicated to conservation purposes. Table 2.1.2 provides a breakdown of publicly held conservation lands by county and indicates that 29.57 percent of the state's total land area is publicly held for conservation.

[See table on following page]

[51] 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.
[52] 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 2.1.2, such regional conservation lands are included in the State/Regional category.

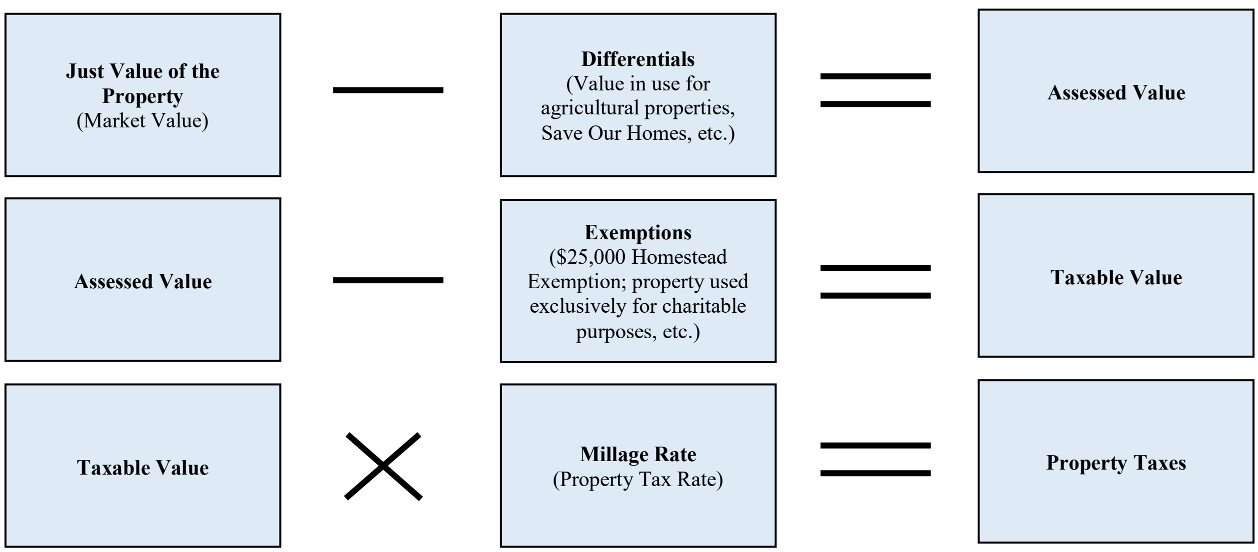
Table 2.1.2 Conservation Lands by Public Ownership

County	Local		State/Regional		Federal		Total Public Cons.	
	Acres	%	Acres	%	Acres	%	Acres	%
Alachua	19,756.52	3.53%	76,242.16	13.62%	3.49	0.00%	96,002.17	17.15%
Baker	2,591.17	0.69%	37,905.30	10.12%	124,075.57	33.13%	164,572.04	43.94%
Bay	2,940.40	0.61%	31,175.60	6.42%	29,523.53	6.08%	63,639.52	13.11%
Bradford	144.77	0.08%	10,103.94	5.37%	24.31	0.01%	10,273.02	5.46%
Brevard	18,043.54	2.80%	153,924.65	23.84%	93,699.27	14.51%	265,667.46	41.15%
Broward	4,974.31	0.65%	477,069.55	61.97%	17.92	0.00%	482,061.78	62.62%
Calhoun	-	0.00%	5,060.13	1.39%	910.94	0.25%	5,971.08	1.64%
Charlotte	4,480.47	1.03%	166,956.29	38.36%	560.01	0.13%	171,996.76	39.52%
Citrus	304.94	0.08%	112,989.18	30.57%	9,246.27	2.50%	122,540.39	33.16%
Clay	1,165.60	0.30%	126,458.12	32.68%	-	0.00%	127,623.72	32.98%
Collier	4,578.83	0.36%	213,697.16	16.72%	643,747.50	50.37%	862,023.50	67.45%
Columbia	1,048.79	0.21%	28,249.85	5.54%	116,665.60	22.86%	145,964.24	28.61%
DeSoto	210.71	0.05%	45,829.50	11.25%	3,031.57	0.74%	49,071.78	12.05%
Dixie	-	0.00%	104,612.11	23.18%	28,002.52	6.21%	132,614.63	29.39%
Duval	22,993.55	4.71%	29,568.04	6.06%	16,165.49	3.31%	68,727.07	14.08%
Escambia	1,772.86	0.42%	28,220.76	6.71%	12,496.10	2.97%	42,489.71	10.11%
Flagler	6,870.68	2.21%	33,594.12	10.82%	-	0.00%	40,464.80	13.03%
Franklin	296.17	0.08%	247,651.90	71.01%	33,682.97	9.66%	281,631.04	80.75%
Gadsden	232.80	0.07%	16,292.38	4.93%	-	0.00%	16,525.17	5.00%
Gilchrist	273.19	0.12%	8,042.84	3.59%	-	0.00%	8,316.04	3.72%
Glades	206.02	0.04%	71,932.41	13.99%	1,806.38	0.35%	73,944.80	14.38%
Gulf	96.08	0.03%	46,463.06	13.23%	836.23	0.24%	47,395.38	13.49%
Hamilton	4.46	0.00%	24,369.71	7.41%	475.79	0.14%	24,849.96	7.56%
Hardee	-	0.00%	10,629.58	2.60%	-	0.00%	10,629.58	2.60%
Hendry	-	0.00%	116,487.84	15.75%	40,116.16	5.42%	156,604.00	21.17%
Hernando	1,054.81	0.35%	79,823.89	26.39%	5,911.89	1.95%	86,790.60	28.70%
Highlands	1,351.51	0.21%	61,284.16	9.43%	111,710.54	17.19%	174,346.20	26.82%
Hillsborough	60,816.41	9.30%	42,180.59	6.45%	5,307.92	0.81%	108,304.91	16.56%
Holmes	-	0.00%	12,956.81	4.27%	-	0.00%	12,956.81	4.27%
Indian River	4,861.73	1.51%	88,670.45	27.62%	1,386.73	0.43%	94,918.90	29.56%
Jackson	854.52	0.15%	17,998.62	3.07%	-	0.00%	18,853.14	3.21%
Jefferson	59.94	0.02%	67,087.69	17.53%	10,630.45	2.78%	77,778.09	20.33%
Lafayette	-	0.00%	59,919.84	17.23%	-	0.00%	59,919.84	17.23%
Lake	8,494.44	1.40%	102,574.28	16.92%	82,068.40	13.53%	193,137.12	31.85%
Lee	39,843.86	7.97%	51,525.22	10.30%	5,390.15	1.08%	96,759.24	19.35%
Leon	4,046.70	0.95%	23,526.29	5.51%	104,558.70	24.50%	132,131.69	30.96%
Levy	3,681.69	0.51%	144,383.84	20.19%	24,961.80	3.49%	173,027.33	24.20%
Liberty	-	0.00%	57,986.06	11.14%	263,040.16	50.54%	321,026.22	61.68%
Madison	-	0.00%	16,474.12	3.70%	-	0.00%	16,474.12	3.70%
Manatee	27,046.53	5.68%	32,713.32	6.87%	1,248.51	0.26%	61,008.36	12.82%
Marion	1,616.67	0.16%	80,069.69	7.88%	263,828.68	25.98%	345,515.04	34.02%
Martin	2,735.50	0.79%	84,517.67	24.39%	4,273.63	1.23%	91,526.80	26.42%
Miami-Dade	10,234.64	0.84%	274,556.54	22.58%	537,023.40	44.17%	821,814.58	67.60%
Monroe	1,600.10	0.26%	14,429.09	2.31%	577,032.34	92.21%	593,061.54	94.78%
Nassau	317.87	0.08%	22,412.53	5.40%	8.52	0.00%	22,738.93	5.48%
Okaloosa	313.50	0.05%	71,793.99	12.06%	245,079.37	41.17%	317,186.86	53.28%
Okeechobee	-	0.00%	87,268.17	17.78%	17,960.93	3.66%	105,229.11	21.44%
Orange	8,971.22	1.55%	83,539.42	14.47%	-	0.00%	92,510.64	16.03%
Osceola	6,601.77	0.78%	157,264.88	18.54%	1,961.85	0.23%	165,828.50	19.55%
Palm Beach	48,586.54	3.86%	284,473.45	22.63%	143,659.42	11.43%	476,719.41	37.92%
Pasco	16,807.30	3.56%	89,772.96	19.03%	-	0.00%	106,580.27	22.59%
Pinellas	15,745.02	8.99%	1,412.84	0.81%	154.81	0.09%	17,312.67	9.88%
Polk	17,362.12	1.51%	193,505.41	16.84%	55,529.96	4.83%	266,397.49	23.19%
Putnam	1,320.86	0.28%	87,912.08	18.95%	26,898.64	5.80%	116,131.58	25.04%
Santa Rosa	245.96	0.04%	181,834.13	28.09%	72,940.35	11.27%	255,020.44	39.39%
Sarasota	47,404.78	13.32%	60,176.40	16.91%	6.35	0.00%	107,587.53	30.24%
Seminole	6,821.26	3.48%	30,580.27	15.58%	493.21	0.25%	37,894.75	19.31%
St. Johns	7,352.95	1.91%	66,092.75	17.20%	299.95	0.08%	73,745.65	19.19%
St. Lucie	10,616.17	2.90%	19,805.97	5.42%	93.19	0.03%	30,515.34	8.35%
Sumter	3.69	0.00%	109,416.65	30.77%	-	0.00%	109,420.34	30.78%
Suwannee	77.23	0.02%	21,052.69	4.78%	0.03	0.00%	21,129.95	4.79%
Taylor	-	0.00%	90,998.65	13.63%	1,284.71	0.19%	92,283.36	13.82%
Union	-	0.00%	199.09	0.13%	-	0.00%	199.09	0.13%
Volusia	51,829.26	7.36%	138,357.75	19.64%	32,942.35	4.68%	223,129.35	31.68%
Wakulla	368.33	0.09%	12,310.93	3.17%	238,159.55	61.36%	250,838.81	64.63%
Walton	238.40	0.04%	90,532.25	13.63%	153,931.80	23.18%	244,702.45	36.84%
Washington	-	0.00%	49,556.39	13.27%	-	0.00%	49,556.39	13.27%
Statewide	502,269.15	1.47%	5,486,473.98	16.01%	4,144,865.93	12.09%	10,133,609.06	29.57%

The Reduction of Ad Valorem Tax Collections Resulting from Public Ownership of Conservation Lands

While FNAI provides data regarding boundaries and management, the data does not provide any economic information regarding the conservation lands. To acquire this information, EDR used the FNAI boundaries in conjunction with the county level parcel maps to identify whole and partial parcels identified as conservation lands. For the partial parcels, the share of the parcel held in conservation is calculated. These parcels are then matched up to the real property roll available from the Florida Department of Revenue (DOR) to identify value-related data. For the partial parcels, the calculated conservation share is applied to the total parcel value; for the whole parcels, the total parcel value is used. Broadly speaking, the essential operation of Florida's property tax system takes on the form shown in Figure 2.1.2. The mechanics of implementation, however, vary slightly.[53]

Figure 2.1.2 Property Tax System Diagram



To analyze the ad valorem tax impacts resulting from public ownership of conservation lands, the just value (JV) reported for each parcel on the real property rolls is used as a rough proxy for the market value of real properties designated as conservation lands. The county taxable value (CTV) and school-district taxable value (STV) are used in conjunction with the respective county-wide effective CTV and STV millage rates[54] to approximate actual collections from public conservation lands. These millage rates are then applied to the JV to estimate the potential collections if the lands were not held in conservation. The difference between the potential collections and the actual collections is the estimated impact on ad valorem taxes from public ownership of conservation lands. This estimated impact is then added to the total CTV and STV for each county, with their

[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] Provided upon request by the Florida Department of Revenue.

respective millage rates applied, to estimate total tax collections for each county if there were no land publicly held for conservation. Finally, the estimated impact on collections is compared to the total potential collections to determine the implied share of tax base lost.

Table 2.1.3 identifies the impact by county on ad valorem tax collections resulting from conservation lands along with an implied share of tax base lost for both CTV and STV. For five counties (Dixie, Glades, Hendry, Liberty, and Wakulla) the implied share of the tax base that is lost due to the presence of conservation lands was greater than 20 percent for both CTV and STV, while in eleven counties (Broward, Flagler, Lee, Manatee, Miami-Dade, Orange, Pasco, Pinellas, Polk, Seminole, and Union) the implied base loss was less than one percent for both CTV and STV. The potential tax shifts or losses for all counties are projected to be approximately $294.81 million, or a 1.83 percent base loss, and for school taxes, the potential tax shifts or losses are projected to be approximately $224.61 million, or a 1.60 percent base loss.

Note that Table 2.1.3 shown in the 2020 Edition erroneously included total tax values prior to the reductions for partial conservation parcels as described in the text. A corrected version of the 2020 Edition table can be found in Appendix B at Table B.4.

Previous editions of this report did not fully address instances of multiple polygons representing a single parcel in the county level parcel maps published by DOR. As a result, the value of certain parcels was counted more than once and thus the reported tax base losses were overstated. To correct this and other technical issues, the methodology has been further refined in this edition. The results shown in Table 2.1.3 supersede those reported in previous editions.

[See table on following page]

Table 2.1.3 2020 Tax Impact of Conservation Lands by County (in $millions)

County	Potential Tax Collection from all Conservation Land		Actual Tax Collection on Conservation Land		Impact on Tax Collection from Conservation Land		Implied Share of Tax Base Lost	
	County Tax	School Tax	County Tax	School Tax	County Tax	School Tax	County Base	School Base
Alachua	$8.37	$5.13	$0.16	$0.10	$8.21	$5.03	4.68%	4.20%
Baker	$1.17	$0.81	$0.02	$0.01	$1.15	$0.79	13.33%	11.70%
Bay	$4.93	$5.56	$0.01	$0.02	$4.92	$5.54	5.47%	5.07%
Bradford	$0.09	$0.06	$0.00	$0.00	$0.09	$0.06	1.20%	1.06%
Brevard	$11.31	$10.76	$0.13	$0.13	$11.18	$10.63	4.26%	3.81%
Broward	$8.77	$7.75	$0.12	$0.12	$8.65	$7.63	0.58%	0.54%
Calhoun	$0.08	$0.05	$0.00	$0.00	$0.08	$0.05	2.50%	2.19%
Charlotte	$3.51	$2.61	$0.02	$0.02	$3.50	$2.59	2.05%	1.86%
Citrus	$5.95	$4.10	$0.12	$0.09	$5.83	$4.01	7.40%	6.65%
Clay	$2.44	$2.08	$0.03	$0.03	$2.41	$2.05	2.58%	2.32%
Collier	$15.76	$14.82	$7.03	$7.60	$8.73	$7.22	1.66%	1.39%
Columbia	$1.48	$1.06	$0.02	$0.01	$1.46	$1.05	6.46%	5.77%
DeSoto	$2.16	$1.17	$0.03	$0.02	$2.13	$1.15	12.91%	11.68%
Dixie	$2.82	$1.27	$0.12	$0.06	$2.70	$1.22	29.49%	28.17%
Duval	$18.34	$8.62	$0.21	$0.10	$18.13	$8.51	2.10%	1.93%
Escambia	$23.11	$18.29	$0.14	$0.12	$22.97	$18.17	14.91%	13.57%
Flagler	$0.54	$0.35	$0.06	$0.04	$0.48	$0.31	0.56%	0.49%
Franklin	$2.85	$2.37	$0.11	$0.10	$2.74	$2.27	16.88%	15.82%
Gadsden	$0.17	$0.11	$0.00	$0.00	$0.17	$0.11	1.60%	1.40%
Gilchrist	$0.28	$0.16	$0.01	$0.01	$0.27	$0.15	4.28%	3.72%
Glades	$4.52	$2.11	$0.08	$0.04	$4.44	$2.07	37.51%	35.62%
Gulf	$2.92	$2.36	$0.03	$0.03	$2.89	$2.33	18.04%	16.24%
Hamilton	$0.51	$0.30	$0.01	$0.01	$0.49	$0.29	10.24%	9.43%
Hardee	$0.33	$0.21	$0.05	$0.03	$0.29	$0.18	3.09%	2.72%
Hendry	$8.36	$4.06	$0.08	$0.04	$8.28	$4.02	29.45%	27.51%
Hernando	$4.23	$2.57	$0.03	$0.02	$4.20	$2.54	4.69%	4.04%
Highlands	$1.60	$1.10	$0.14	$0.10	$1.46	$1.00	3.40%	3.06%
Hillsborough	$11.97	$6.93	$0.12	$0.07	$11.85	$6.86	1.11%	1.02%
Holmes	$0.15	$0.09	$0.00	$0.00	$0.15	$0.09	3.96%	3.36%
Indian River	$3.25	$2.79	$0.06	$0.06	$3.18	$2.73	2.22%	2.08%
Jackson	$0.47	$0.36	$0.00	$0.00	$0.46	$0.35	4.65%	4.22%
Jefferson	$0.66	$0.49	$0.02	$0.01	$0.65	$0.47	13.83%	12.21%
Lafayette	$0.54	$0.32	$0.00	$0.00	$0.54	$0.32	19.82%	18.22%
Lake	$3.13	$2.93	$0.10	$0.10	$3.03	$2.83	1.83%	1.62%
Lee	$4.33	$3.58	$0.07	$0.07	$4.26	$3.51	0.69%	0.63%
Leon	$2.80	$1.89	$0.04	$0.03	$2.76	$1.86	1.77%	1.64%
Levy	$2.86	$1.81	$0.08	$0.05	$2.78	$1.76	14.77%	13.25%
Liberty	$2.91	$1.85	$0.01	$0.00	$2.91	$1.85	65.24%	62.56%
Madison	$0.25	$0.14	$0.01	$0.00	$0.24	$0.14	4.05%	3.61%
Manatee	$1.13	$1.01	$0.03	$0.03	$1.10	$0.98	0.37%	0.34%
Marion	$7.72	$6.58	$0.10	$0.10	$7.62	$6.48	4.79%	4.29%
Martin	$8.31	$5.29	$0.27	$0.18	$8.04	$5.11	3.67%	3.44%
Miami-Dade	$15.91	$14.07	$0.72	$0.69	$15.18	$13.38	0.61%	0.56%
Monroe	$11.68	$9.35	$1.08	$1.14	$10.60	$8.21	7.92%	7.14%
Nassau	$1.88	$1.19	$0.01	$0.01	$1.87	$1.18	2.07%	1.91%
Okaloosa	$5.93	$6.94	$0.37	$0.44	$5.56	$6.50	5.42%	5.05%
Okeechobee	$2.53	$1.72	$0.10	$0.07	$2.43	$1.66	13.79%	12.58%
Orange	$5.12	$4.84	$0.05	$0.05	$5.07	$4.80	0.49%	0.45%
Osceola	$9.26	$6.73	$0.09	$0.06	$9.18	$6.67	3.60%	3.33%
Palm Beach	$18.48	$15.32	$0.18	$0.16	$18.30	$15.16	1.08%	1.02%
Pasco	$2.78	$1.67	$0.20	$0.12	$2.58	$1.55	0.89%	0.80%
Pinellas	$4.53	$3.16	$0.03	$0.02	$4.50	$3.14	0.56%	0.52%
Polk	$2.07	$1.56	$0.49	$0.38	$1.59	$1.18	0.59%	0.51%
Putnam	$2.42	$1.34	$0.05	$0.03	$2.38	$1.32	6.40%	5.80%
Santa Rosa	$5.89	$5.40	$0.09	$0.09	$5.80	$5.31	7.81%	7.01%
Sarasota	$6.32	$8.24	$0.03	$0.05	$6.29	$8.20	1.83%	1.72%
Seminole	$1.12	$0.93	$0.15	$0.13	$0.97	$0.80	0.38%	0.35%
St. Johns	$3.83	$3.12	$0.54	$0.47	$3.29	$2.65	1.46%	1.34%
St. Lucie	$4.04	$2.24	$0.16	$0.09	$3.88	$2.14	1.54%	1.35%
Sumter	$1.08	$0.87	$0.02	$0.02	$1.06	$0.85	1.19%	1.08%
Suwannee	$0.38	$0.25	$0.03	$0.02	$0.36	$0.23	2.79%	2.48%
Taylor	$0.52	$0.37	$0.01	$0.00	$0.51	$0.36	6.69%	6.16%
Union	$0.01	$0.01	$0.00	$0.00	$0.01	$0.01	0.41%	0.34%
Volusia	$6.87	$4.51	$0.38	$0.26	$6.49	$4.24	1.96%	1.73%
Wakulla	$3.66	$2.73	$0.01	$0.01	$3.65	$2.72	27.62%	24.75%
Walton	$5.49	$5.79	$0.05	$0.05	$5.45	$5.73	4.91%	4.68%
Washington	$0.43	$0.29	$0.01	$0.01	$0.42	$0.28	6.71%	5.93%
Statewide	$309.33	$238.54	$14.52	$13.93	$294.81	$224.61	1.83%	1.60%

2.2 Historical, Current, and Projected Future Conservation Land Expenditures

EDR is directed to analyze historic expenditures and to forecast 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 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 provide funding 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.[55] This section summarizes the most relevant information.[56]

Expenditures of State and Federal Funds

Several state agencies receive legislative appropriations for programs related to conservation land acquisition and management, including the Department of Environmental Protection (DEP), the Department of Agriculture and Consumer Services (DACS), the Fish and Wildlife Conservation Commission (FWC), and the Department of State (DOS). In some instances, federal dollars are also provided to the state. When this occurs, the federal dollars are appropriated, although separately identified. Because the related expenditures are fully contemplated in the state's budget, state and federal expenditures are then addressed together.[57]

Land Acquisition

Florida Forever

The state's current 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 and water areas for the purposes of conservation, restoration of natural systems, water resource development, outdoor recreation, and historic preservation.[58] The state's environmental bonds, including Florida Forever bonds and Everglades restoration bonds, are secured by Documentary Stamp Tax revenues and are not backed by the full faith and credit of the state.[59]

The Florida Forever program was initially authorized in 1999 in response to a voter-approved constitutional amendment to acquire land for conservation purposes.[60] Under the Florida Forever program, $3 billion of bonds were authorized to be issued over ten years. In 2008, the Florida

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[55] 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.

[56] 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.

[57] The 2021 Edition includes expenditures beginning in Fiscal Year 2010-11, which provides a 10-year history. For a longer history, *see* the 2017 Edition, at p. 24, available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf.

[58] Art. VII, §11, Fla. Const.

[59] Chapter 7 of this report provides additional information on Everglades restoration bonds.

[60] Ch. 99-247, § 21, Laws of Fla. (codified as amended at § 259.105, Fla. Stat.).

Forever bonding authorization was extended for another ten years. This increased the maximum amount of potential Florida Forever bonds to $5.3 billion. To date, the state has issued approximately $2.0 billion of Florida Forever bonds. The most recent bond issuance was in 2017, when the Legislature authorized $800 million in new Florida Forever bonds to pay for costs related to land acquisition, planning, and construction of water storage reservoirs.[61] At the end of Fiscal Year 2019-20, the aggregate principal amount of outstanding bonds was $567.55 million with debt service of $134.92 million due in Fiscal Year 2020-21. If no new bonds are sold, the estimated debt service is expected to decline through Fiscal Year 2028-29, at which time the existing Florida Forever bonds would be retired.[62] 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 (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	Total
Principal	$106.83	$90.63	$84.12	$68.14	$71.54	$58.19	$40.67	$32.83	$14.63	**$567.55**
Interest	$28.09	$22.75	$18.22	$14.01	$10.60	$7.03	$4.12	$2.08	$0.73	**$107.62**
Outstanding Debt Service	$134.92	$113.38	$102.33	$82.15	$82.14	$65.21	$44.78	$34.91	$15.36	**$675.17**

Source: State Board of Administration of Florida Annual Debt Service Report for the Fiscal Year Ended June 30, 2020
Note: Values may not sum to totals due to rounding.

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.[63] Any expenditures from the trust fund are subject to annual evaluation and appropriation by the Legislature.

[See table on following page]

[61] *See* Ch. 2017-10, § 3, Laws of Fla. (codified at § 373.4598, Fla. Stat.).
[62] *See* § 201.15(3)(a), Fla. Stat. ("It is the intent of the Legislature that all bonds issued to fund the Florida Forever Act be retired by December 31, 2040.")
[63] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at page 29.

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%

*These distributions are limited to inholdings and additions to lands managed by these agencies.

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 2010-11 through Fiscal Year 2019-20, the total expenditures have been $420.57 million. Figure 2.2.1 shows that the largest share of these expenditures (43.40 percent) has been to support land conservation efforts by the DEP Division of State Lands. The next two highest expenditures were Aid to the Water Management Districts (25.90 percent) and the Rural and Family Lands Protection program (11.79 percent). Table 2.2.3 shows the annual cash expenditures for each program since Fiscal Year 2010-11.

[See figure on following page]

Figure 2.2.1 Shares of Florida Forever Expenditures in Past Ten Years

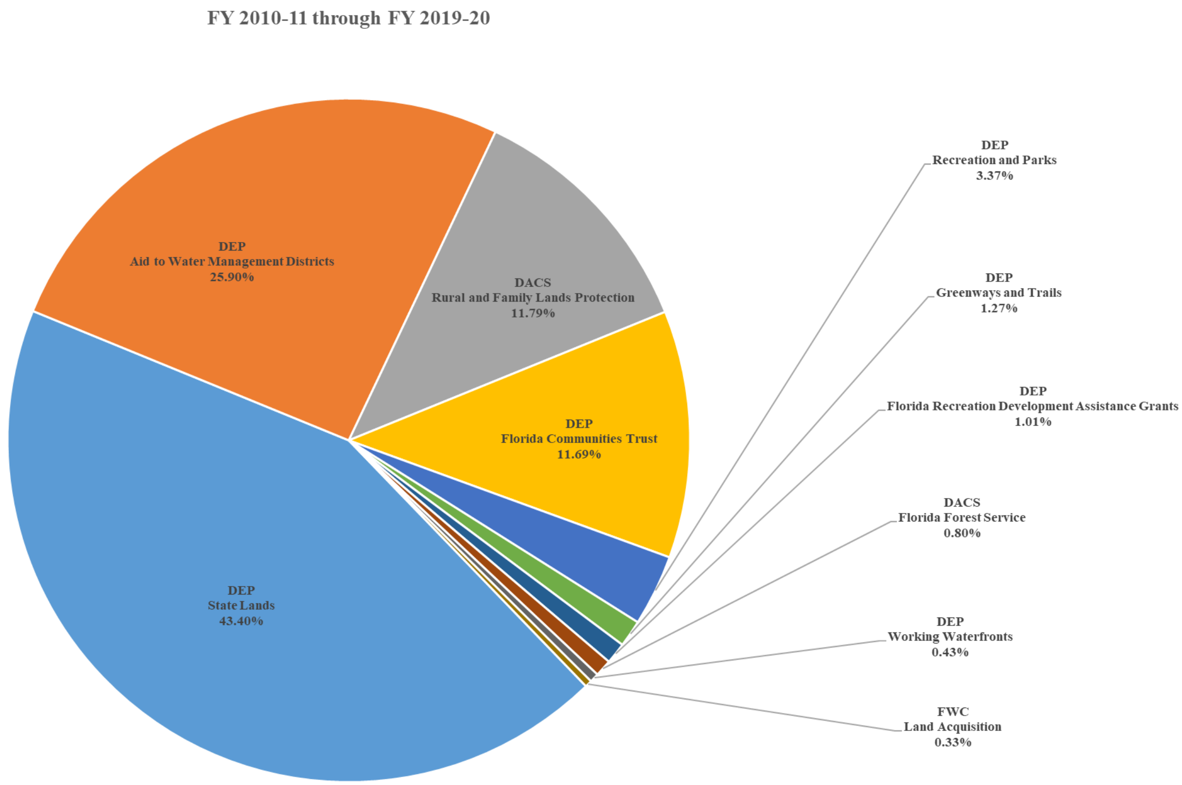

Table 2.2.3 Florida Forever Program Expenditures by Fiscal Year (in $millions)

Agency and Division/Program		FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
DEP	State Lands	$3.86	$10.23	$6.81	$14.53	$19.85	$3.41	$18.46	$25.31	$18.54	$61.53
DEP	Florida Communities Trust	$17.15	$5.59	$7.12	$2.79	$1.25	$0.00	$2.34	$3.48	$8.75	$0.70
DEP	Working Waterfronts	$0.01	$-	$0.01	$0.00	$0.32	$-	$0.02	$0.01	$0.00	$1.45
DEP	Recreation and Parks	$3.22	$0.90	$0.05	$0.02	$0.51	$0.77	$7.33	$0.94	$0.15	$0.29
DEP	Florida Recreation Development Assistance Grants	$3.69	$-	$0.30	$-	$-	$-	$-	$-	$0.10	$0.15
DEP	Greenways and Trails	$3.07	$0.03	$0.01	$0.00	$0.64	$0.03	$0.14	$1.42	$-	$0.01
DEP	Aid to Water Management Districts	$63.37	$9.52	$3.14	$0.48	$21.12	$1.66	$5.70	$0.16	$0.23	$3.53
DACS	Florida Forest Service	$0.66	$0.93	$0.76	$0.18	$0.23	$0.02	$0.00	$0.05	$0.50	$0.04
DACS	Rural and Family Land Protection Program	$7.47	$0.01	$0.04	$0.08	$1.49	$0.51	$7.92	$27.25	$4.83	$-
FWC	Land Acquisition	$0.05	$0.35	$0.01	$-	$-	$0.01	$-	$0.71	$0.22	$0.03
	Total	**$102.56**	**$27.55**	**$18.25**	**$18.09**	**$45.41**	**$6.39**	**$41.92**	**$59.35**	**$33.32**	**$67.74**

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 (FRDAP), the Rural and Family Lands Protection Program (RFLPP), Water Management Districts (WMDs), and State Parks. During the period covering Fiscal Year 2010-11 through Fiscal Year 2019-20, the total additional expenditures for these programs were $198.75 million. Table 2.2.4 shows the annual cash expenditures for these programs that were in addition to their Florida Forever distributions.

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

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
FRDAP	$8.96	$-	$-	$0.10	$0.32	$0.94	$2.83	$5.13	$3.88	$3.24
RFLPP	$-	$-	$-	$0.01	$0.45	$11.01	$14.63	$0.11	$4.47	$0.60
WMDs	$32.70	$29.21	$29.64	$19.52	$8.76	$5.64	$1.45	$0.06	$0.13	$0.03
State Parks	$-	$-	$-	$-	$0.05	$0.67	$11.00	$2.06	$1.17	$-
Total	**$41.66**	**$29.21**	**$29.64**	**$19.63**	**$9.57**	**$18.26**	**$29.91**	**$7.35**	**$9.65**	**$3.88**

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, and the acquisition of historic properties throughout the state by DOS. 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)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
DACS Off Highway Vehicle	$0.07	$0.01	$0.02	$0.07	$0.03	$-	$-	$-	$-	$-
DACS Forestry	$0.14	$0.00	$-	$0.01	$0.00	$-	$-	$-	$-	$-
DOS Historic Properties	$0.67	$-	$-	$0.13	$1.78	$5.72	$12.27	$7.41	$6.56	$5.87
Total	**$0.88**	**$0.02**	**$0.02**	**$0.21**	**$1.81**	**$5.72**	**$12.27**	**$7.41**	**$6.56**	**$5.87**

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 (CAMA), and Greenways and Trails); DACS (Florida Forest Service or FFS); FWC; and DOS (Historical Resources). Pursuant to section 259.037, Florida Statutes, the Land Management Uniform Accounting Council (Council) is comprised of representatives from each of the land managing agencies. 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.[64]

As reported by the Council, these agencies have spent nearly $1.9 billion over the most recent ten fiscal years 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 that were described in detail in the 2017 Edition of this report[65] plus the eradication of terrestrial invasive plants by FWC on lands managed by agencies other than FWC and the FFS's wildfire protection on lands not designated as state forests.

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

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Resource Management	$29.62	$30.62	$30.92	$26.47	$29.32	$34.55	$36.52	$40.05	$44.76	$44.24
Administration	$23.40	$20.75	$21.70	$12.29	$14.57	$13.25	$14.65	$15.37	$19.60	$20.34
Support	$12.83	$14.01	$14.81	$18.96	$20.86	$24.64	$30.48	$27.67	$25.00	$25.21
Capital Improvements	$34.77	$16.15	$22.07	$26.52	$30.46	$38.39	$42.03	$41.84	$38.61	$36.75
Recreation/ Visitor Services	$43.57	$40.14	$38.78	$50.26	$54.44	$55.37	$61.40	$72.77	$69.92	$65.92
Law Enforcement	$12.28	$12.65	$13.63	$6.05	$6.06	$7.16	$7.49	$7.67	$7.55	$9.72
Terrestrial Invasive Plant Control	$6.96	$5.21	$5.41	$12.15	$13.08	$15.24	$16.00	$14.08	$13.24	$11.14
Wildfire Protection	$7.11	$7.11	$7.11	$7.11	$7.11	$7.11	$7.11	$7.10	$7.66	$7.19
Total	**$170.54**	**$146.64**	**$154.43**	**$159.81**	**$175.90**	**$195.71**	**$215.68**	**$226.55**	**$226.35**	**$220.51**

While the Council's land management reports provide a wealth of knowledge about the state's efforts to manage land for conservation purposes, there are significant management costs that are related to managing state lands but are not categorized in this report as direct land management expenditures. This includes the management of submerged lands by CAMA, aquatic invasive plant control by FWC, and law enforcement by FWC on non-FWC managed areas.

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[64] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2020 Annual report (FY 2019-20), available at: http://publicfiles.dep.state.fl.us/DSL/OESWeb/FLDEP_DSL_OES_LMUAC_AnnualReport.pdf. (Accessed November 2020.)
[65] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2017Edition.pdf at page 39.

Table 2.2.7 quantifies these indirect or additional management expenditures related to conservation land. Early land management expenditures for FWC law enforcement activities on non-FWC managed areas are not included in the expenditures shown below because only data for Fiscal Year 2017-18 and onward are available.[66] These totals are not considered in the forecasting of land management expenditures found below in Table 2.2.8.

Table 2.2.7 Additional Management Expenditures Related to State Lands (in $millions)

	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
CAMA Submerged Lands	$5.83	$4.84	$8.96	$7.51	$7.88
Aquatic Invasive Plant Control	$18.03	$23.33	$16.97	$13.49	$15.46
FWC Law Enforcement (non-FWC land)	N/A	N/A	$29.95	$26.35	$35.29
Total	**$23.86**	**$28.16**	**$55.89**	**$47.36**	**$58.62**

Further, as noted in the Council's 2020 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."[67] 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 the willingness of sellers, 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 protracted recovery from the state's housing market collapse and 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 was a clear decline in acquisition and management expenditures over the early years in the 10 year history that mimics the state's economic condition; however, funding in recent years appears to have stabilized.

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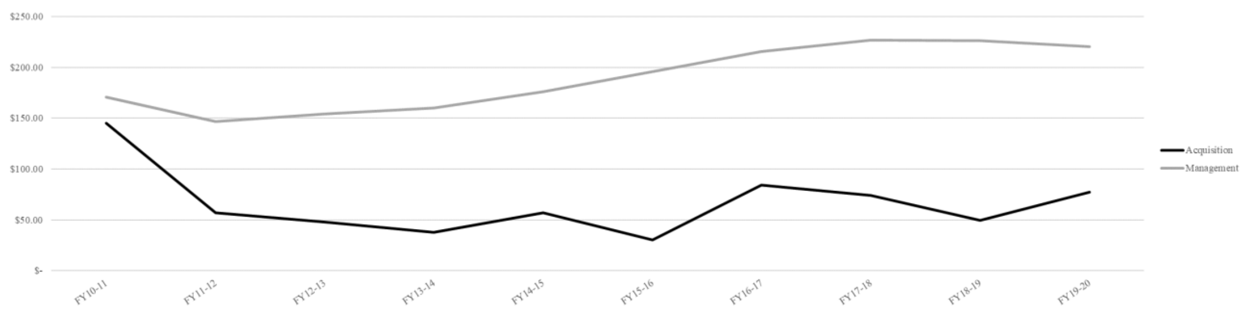
[66] Chapter 2012-088, Laws of Florida, transferred the responsibility of law enforcement on DEP-managed conservation lands, such as state parks, from DEP to FWC. At that time, expenditures for FWC law enforcement activities on non-FWC managed lands were not included in the LMUAC reports. It was not until the LMUAC reporting for Fiscal Year 2017-18 that these land management expenditures were included. Chapter 2019-141, Laws of Florida, transferred this responsibility back to DEP.

[67] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2020 Annual report (FY 2019-20), at 3 (Chair Submittal and Report Abstract), available at: http://publicfiles.dep.state.fl.us/DSL/OESWeb/FLDEP_DSL_OES_LMUAC_AnnualReport.pdf. (Accessed November 2020.)

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



Both the acquisition and management forecasts rely on a three year moving average of the data. The forecast for all state conservation land expenditures is shown in Table 2.2.8.

Table 2.2.8 History and Forecast of State Conservation Land Expenditures (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Land Acquisition	$145.10	$56.78	$47.91	$37.93	$56.79	$30.37	$84.10	$74.11	$49.53	$77.49
Land Management	$170.54	$146.64	$154.43	$159.81	$175.90	$195.71	$215.68	$226.55	$226.35	$220.51
Total	**$315.64**	**$203.42**	**$202.34**	**$197.74**	**$232.69**	**$226.08**	**$299.78**	**$300.66**	**$275.88**	**$298.00**
Forecast	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**	**FY 29-30**
Land Acquisition	$67.04	$64.68	$69.74	$67.15	$67.19	$68.03	$67.46	$67.56	$67.68	$67.57
Land Management	$224.47	$223.78	$222.92	$223.72	$223.47	$223.37	$223.52	$223.46	$223.45	$223.48
Total	**$291.51**	**$288.46**	**$292.66**	**$290.88**	**$290.66**	**$291.40**	**$290.98**	**$291.01**	**$291.13**	**$291.04**

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,[68] are matching grant programs administered by a state agency. Table 2.2.9 shows the ongoing programs and their annual cash expenditures, along with a forecast for future years. Since Fiscal Year 2010-11, expenditures have totaled $86 million with an average of $8.6 million being spent annually. 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. The final forecast is based on

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

the three year moving average of the expenditures. Since funding for specific programs is contingent on federal actions, only the total is estimated.

Table 2.2.9 Federally Funded Conservation Land Programs – Expenditures and Forecast (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
America the Beautiful	$1.25	$0.98	$0.96	$0.79	$0.76	$1.18	$0.76	$0.68	$0.69	$0.67
AmeriCorp	$0.55	$0.63	$0.57	$0.44	$0.37	$0.41	$0.55	$0.61	$0.50	$0.52
Recreational Trails	$1.58	$1.15	$3.86	$5.37	$9.85	$2.73	$2.44	$0.64	$1.71	$0.94
Land and Water Conservation Fund	$1.03	$2.05	$0.94	$0.38	$0.39	$2.04	$1.19	$0.55	$0.46	$2.03
Coastal Partnership Initiative	$1.76	$1.56	$1.93	$0.84	$1.02	$0.61	$0.59	$0.57	$1.02	$0.86
Endangered Species Conservation Fund	$0.78	$3.37	$1.01	$3.67	$1.18	$1.12	$1.06	$0.31	$1.07	$0.52
Land Acquisition Grants	$-	$0.60	$-	$3.80	$-	$-	$-	$-	$-	$-
Historic Preservation Grants	$0.12	$0.20	$0.21	$0.09	$0.12	$0.16	$0.14	$0.19	$0.18	$0.17
Total	**$7.07**	**$10.52**	**$9.49**	**$15.37**	**$13.68**	**$8.24**	**$6.74**	**$3.54**	**$5.63**	**$5.71**

Forecast	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Total	**$4.96**	**$5.43**	**$5.37**	**$5.25**	**$5.35**	**$5.32**	**$5.31**	**$5.33**	**$5.32**	**$5.32**

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, 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, to the greatest extent possible, it 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.[69]

Among the enumerated powers vested in the WMDs is the authority to acquire lands for the purpose of conservation and protection of water and water-related resources.[70] 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

[69] § 373.069, Fla. Stat. (dividing the state into five water management districts).
[70] § 373.139(1), Fla. Stat.

recharge, water resource and water supply development, and preservation of wetlands, streams, and lakes."[71]

In order to identify WMD expenditures 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 allocated to six program areas including "2.0 Land Acquisition, Restoration, and Public Works" and "3.0 Operation and Maintenance of Works and Lands." With respect to conservation land acquisition and management, EDR reviewed the actual audited expenditures for the following activities within those program areas: "2.1 Land Acquisition" and "3.1 Land Management."

Table 2.2.10 provides expenditure data for conservation land acquisitions by each of the WMDs. As explained above, these actual audited numbers are included as part of district budgets.[72] 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 may include some land acquisition expenditures for other purposes. Similarly, some conservation land acquisition expenditures may not have been assigned to the "2.1 Land Acquisition" activity if a WMD assigned land acquisition expenditures to the particular program or activity that the acquisitions support. In these instances, land acquisition expenditures 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, the data 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 2.2.10 Water Management District Land Acquisition Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$0.03	$0.09	$0.02	$0.74	$1.07
SJRWMD	$15.53	$12.68	$3.90	$16.24	$3.05
SFWMD	$-	$-	$-	$-	$-
SWFWMD	$3.09	$0.50	$6.35	$0.50	$0.57
SRWMD	$5.41	$0.07	$0.10	$3.26	$0.08
Total	$24.06	$13.34	$10.37	$20.74	$4.77
Forecast	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24
Total	$12.67	$13.19	$11.54	$12.47	$12.40

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 outlays of the districts. To evaluate each district's conservation land expenditures, the 2017 Edition of this report used each district's Comprehensive Annual Financial Report along with historical documents provided by the districts. All three sources provide significantly different

[71] § 373.139(2), Fla. Stat.

[72] WMD actual audited budgets for a fiscal year are available as part of the tentative budgets two fiscal years later. This is required by section 373.536, Florida Statutes.

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 2.2.11 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 assigned to the "3.1 Land Management" activity and are not accounted for here. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, the data 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 2.2.11 Water Management District Land Management Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$2.49	$2.32	$2.64	$2.41	$2.73
SJRWMD	$4.35	$4.10	$4.69	$4.83	$4.83
SFWMD	$14.20	$27.10	$14.45	$11.33	$10.78
SWFWMD	$3.75	$3.62	$4.07	$4.22	$4.49
SRWMD	$1.60	$1.68	$2.29	$2.59	$2.77
Total	$26.39	$38.81	$28.13	$25.38	$25.60
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$27.47	$26.36	$26.46	$26.76	$26.52

Source: Annual Budgets of the Water Management Districts.

In Florida, there are a number of special districts that are located across multiple counties. For the purposes of this report, EDR categorizes these entities as regional entities. Table 2.2.12 provides a forecast and details a history of conservation land expenditures[73] by regional special districts based on survey results.[74] 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 as it best fits the nature of the data.

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

[74] In the 2019 Edition of this report, all applicable special districts responded regarding account 537. For this year's survey, only one responded. As a result, the previous year's shares were applied for non-respondents to avoid skewing the data.

Table 2.2.12 Conservation Land Expenditures by Regional Special Districts (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Acquisition	$-	$-	$-	$-	$-
Management	$3.54	$1.21	$0.45	$0.84	$1.56
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Acquisition	$-	$-	$-	$-	$-
Management	$0.92	$1.01	$1.10	$1.01	$1.04

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government. Accounts 537 and 572 are shared out in accordance with local government survey results.

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 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 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 is used to itemize conservation and resource management expenditures.[75] This may include land, water, or any other natural resource. Further, account code 572 is used to itemize parks and recreation expenditures which may include conservation land or water resource related expenditures. In an effort to narrow these expenditures to conservation land acquisition and management, EDR conducted a survey of all local and regional governments that had listed an expenditure[76] of greater than ten thousand dollars[77] in any of these accounts for local Fiscal Year 2017-18. The survey asked them to indicate the shares of these expenditure that were specifically

[75] 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.

[76] The survey asked about expenditures in accounts 537 and 572 as well as revenues in account 343.700, a service charge for conservation and resource management.

[77] Local and regional governments representing less than 0.01 percent of the total value of these accounts are not surveyed due to this.

for conservation land acquisition and management. 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 weighted shares by government type and account were applied to the non-respondents. See Table B.1 in Appendix B for response rates and applied shares and Table B.2 in Appendix B for unallocated financial account data. Table 2.2.13 provides a forecast and details a history of expenditures by local governments on conservation land acquisition. 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 2.2.13 Conservation Land Acquisition Expenditures by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$20.28	$21.90	$17.95	$14.13	$36.50
Municipalities	$3.45	$3.35	$3.78	$3.77	$6.61
Special Districts	$-	$-	$-	$-	$8.92
Total	$23.73	$25.25	$21.73	$17.90	$52.03
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$28.32	$30.23	$34.02	$30.85	$31.70

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 537 and 572 are shared out in accordance with local government survey results.

Table 2.2.14 provides a forecast and details a history of expenditures by local governments on conservation land management. 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 2.2.14 Conservation Land Management Expenditures by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$59.40	$57.67	$73.01	$57.20	$91.86
Municipalities	$47.18	$51.57	$58.08	$62.97	$22.61
Special Districts	$0.83	$0.97	$1.01	$1.18	$0.16
Total	$107.42	$110.21	$132.10	$121.35	$114.63
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$122.32	$120.89	$119.84	$121.02	$120.58

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government Accounts 537 and 572 are shared out in accordance with local government survey results

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 Agriculture 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 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. Note that in addition to land being identified as potential conservation land and funding being made available, a willing seller is necessary. Further, section 253.025(8)(j)1., Florida Statutes, states that: "An offer by a state agency may not exceed the value for that parcel as determined pursuant to the highest approved appraisal or the value determined pursuant to the rules of the board of trustees, whichever value is less."

Estimating Conservation Land Acquisition Costs using Ad Valorem Data

There are a total of six plans identified by state agencies and one each for the five water management districts (WMDs). The six state plans are DEP's Florida Forever Priority List (FFPL) and Division of Recreation and Parks Optimum Boundaries (DRP); DACS' Rural and Family Lands Protection Program (RFLPP), Forest Legacy Program (FLP), and Florida Forest Service Inholdings and Additions (DACSI&A); and FWC's Inholdings and Additions (FWCI&A). Geographic Information System (GIS) maps were provided[78] for all except for the DACSI&A. In that case, DACS identified which areas overlapped with the FFPL and staff is working to produce a GIS map in the future. These GIS maps of potential conservation lands are utilized to identify the overlap between lists. These maps are overlaid to ensure the same land area appears on a maximum of one list and are then cross referenced with the Florida Department of Revenue (DOR) real property roll to approximate the cost of acquisition. While the WMD lists would never have geographic overlap, any other combination of lists can. Further, these lists can overlap with existing conservation land identified by FNAI. This can happen if, for example, a municipality owns an area and it falls within the optimum boundary of a state park. Any such overlap is removed prior to analysis as the land has already been acquired for conservation.[79] Table 2.3.1 itemizes, in a mutually exclusive way, all of the acres identified in plans by the lists that contain them. As discussed in the 2020 Edition[80], less-than-fee acquisitions are considerably less costly than fee acquisitions. As such, the FFPL is divided into its fee[81] and less-than-fee components.

[78] The Northwest Florida Water Management District provided maps, however, the district continues to use a broad approach to identification and 3,053,425 acres are identified. As a result, this district has a unique methodology that differs from the rest.
[79] A total of 1,532,598.71 acres were removed from the analysis as existing conservation land identified for future acquisition.
[80] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf at page 51.
[81] Note that this category includes all properties in the FFPL not identified as less-than-fee. It is possible that the lands identified as fee will be acquire in less-than-fee.

Table 2.3.1 Overlap in Plans for Future Conservation Lands

	FLP	FFPL (fee)	FFPL (ltf)	DRP	RFLPP	FWC I&A	SWF WMD	SR WMD	SJR WMD	SF WMD	Acres	Priority List (purchaser)
	✓	✓			✓						1,760	FLP
	✓	✓									37.291805	FLP
	✓		✓		✓						7,070	FLP
	✓		✓								0	FLP
	✓				✓						3,214	FLP
	✓										49	FLP
		✓		✓	✓						1263.3996	FFPL(fee)
		✓		✓		✓				✓	220.66136	FFPL(fee)
		✓		✓		✓					174.6578	FFPL(fee)
		✓		✓			✓				4939.5855	FFPL(fee)
		✓		✓				✓			2209.1763	FFPL(fee)
		✓		✓					✓		1711.6283	FFPL(fee)
		✓		✓						✓	146.31103	FFPL(fee)
		✓		✓							42,882	FFPL(fee)
		✓			✓	✓					3738.1542	FFPL(fee)
		✓			✓				✓		4,908	FFPL(fee)
		✓			✓					✓	6,650	FFPL(fee)
		✓			✓						33,879	FFPL(fee)
		✓				✓		✓			7866.1963	FFPL(fee)
		✓				✓				✓	2260.3256	FFPL(fee)
		✓				✓					90,967	FFPL(fee)
		✓					✓	✓			0	FFPL(fee)
		✓					✓				29,501	FFPL(fee)
		✓						✓			78,063	FFPL(fee)
		✓							✓		31,539	FFPL(fee)
		✓								✓	5,189	FFPL(fee)
		✓									1,178,556	FFPL(fee)
			✓	✓	✓			✓			651	FFPL(ltf)
			✓	✓	✓						2,570	FFPL(ltf)
			✓	✓				✓			644	FFPL(ltf)
			✓	✓							3,156	FFPL(ltf)
			✓		✓	✓					5425.6501	FFPL(ltf)
			✓		✓			✓			10,108	FFPL(ltf)
			✓		✓					✓	14091.731	FFPL(ltf)
			✓		✓						41,229	FFPL(ltf)
			✓			✓					6,878	FFPL(ltf)
			✓				✓				100	FFPL(ltf)
			✓					✓			38,243	FFPL(ltf)
			✓						✓		127	FFPL(ltf)
			✓							✓	1	FFPL(ltf)
			✓								569,873	FFPL(ltf)
				✓	✓			✓			2.08864	DRP
				✓	✓						6634.205	DRP
				✓		✓				✓	124	DRP
				✓		✓					1191.367	DRP
				✓			✓				211	DRP
				✓				✓			6301.9963	DRP
				✓					✓		686	DRP
				✓						✓	721	DRP
				✓							89094.625	DRP
					✓	✓		✓			1395.3071	RFLPP
					✓	✓					12681.548	RFLPP
					✓		✓				10,265	RFLPP
					✓			✓			16,535	RFLPP
					✓				✓		6	RFLPP
					✓					✓	641	RFLPP
					✓						139928.87	RFLPP
						✓	✓				334	FWCI&A
						✓		✓			24,121	FWCI&A
						✓				✓	7	FWCI&A
						✓					157135.54	FWCI&A
							✓	✓			0	SFWMD*
							✓				187,061	SFWMD
								✓			328,673	SWFWMD
									✓		75,955	SJRWMD
										✓	59,163	SRWMD
Acres on List	12,129	1,528,461	700,168	165,534	324,647	314,520	232,413	514,814	114,933	89,216	3,996,836	
Acres(purchaser)	12,129	1,526,664	693,098	104,967	181,453	181,598	187,062	328,673	75,955	59,163	3,350,763	

*Less than half an acre stretched in a thin line along the border of the SFWMD and SWFWMD in Polk County is identified by both districts. EDR assigns priority to SFWMD for this area.

The individual GIS maps summed to 3,996,836 acres for potential future conservation across the state. With overlapping acres removed, 3,350,763 unique acres remain. These map files, with the overlap removed, were matched with the parcel data from the ad valorem tax rolls to identify just values. Oftentimes an area identified for acquisition will not strictly follow parcel boundaries. As such, the percentage of the parcel within the area is applied to the just value amount. For acres to be acquired as less-than-fee acquisitions as identified on the FFPL (ltf) and RFLPP lists, value estimate is reduced to 51.62 percent of its fee acquisition value based on the analysis in the 2020 Edition[82].

To identify a potential acquisition as fee or less-than-fee and to identify a cost share between federal, state, regional, and local governments, a prioritization between lists must be created. In other words, for each acre identified, an assumption must be made as to which state agency or WMD will most likely acquire it. The order of prioritization is as follows: The DACS FLP is a federal grant program administered by the U.S. Forest Service, consisting of acquisitions expected to occur in the near future. All acreage on the FLP list is assumed to be purchased by FLP. This is followed by the FFPL, DRP, RFLPP, FWCI&A, and the district lists.

The Northwest Florida WMD (NWFWMD) identifies land for acquisition using a much broader approach and currently includes areas totaling more than 3 million acres. To make this comparable to the other districts and agency lists, EDR removed existing conservation lands using the FNAI database and narrowed the list to only agricultural parcels using the real property roll. This resulted in 2,026,542 acres remaining with parcel value information. Sharing out the just value by the portion of the parcel that falls into the NWFWMD list, the just value of the 2 million acres is $4.96 billion. In the 2019 Edition of this report, EDR, in coordination with district staff, identified 696,867 acres to be a fair estimate of NWFWMD's potential conservation land acquisition list. Since that time, the district has acquired 1,018 acres, leaving 695,849 on the potential list. Comparing this acreage to the total agricultural acres identified on NWFWMD's GIS list, EDR estimates 34.34 percent of the GIS agricultural acres may potentially be acquired. This allows for 34.34 percent of the just value of those acres, or $1.7 billion, to reflect the cost of potential conservation land acquisition for NWFWMD. Assuming the average overlap among other lists of 16.16 percent, this reduces the total to 583,368 acres at a cost of $1.4 billion.

The DACSI&A list had no GIS component, providing no possibility for just value analysis. It does, however, identify 9,186 acres of which 3,032 were identified by DACS as being on the FFPL. The remaining acres are further reduced by the average overlap among non-FFPL areas (14.20 percent). The cost estimate of $24.6 million was based on the historical cost of conservation land per acre by county, adjusted for inflation to FY 2019-20 dollars, using the DEP maintained Land Inventory Tracking System database.

Each list potentially has a unique form of cost sharing. DEP maintains the Florida State Owned Lands and Records Information System (often referred to as SOLARIS), which is intended to be a complete history of all land purchases by the state. This database identifies conservation lands

[82] *See* http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf at page 51.

and the funding sources. A historical breakdown of funding sources[83] for the lands in the database was used to develop the cost sharing estimates.[84] The full estimate of future expenditures necessary to purchase lands identified in plans set forth by state agencies or water management districts is shown in Table 2.3.2.

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

Entity	List	Acres	Federal	State	Regional	Local	Total
DEP	FFPL (fee)	1,526,664.12	$214.16	$8,991.04	$686.22	$15.30	$9,906.72
	FFPL (ltf)	693,097.99	$21.74	$912.50	$69.64	$1.55	$1,005.43
	DRP	104,966.85	$15.59	$654.47	$49.95	$1.11	$721.12
DACS	RFLPP	181,453.40	$5.63	$236.24	$18.03	$0.40	$260.30
	FLP	12,129.48	$4.33	$9.79	$-	$-	$14.13
	I&A	6,894.94	$0.53	$22.33	$1.70	$0.04	$24.61
FWC	I&A	181,597.53	$266.29	$601.72	$-	$-	$868.02
WMD	NWF	583,367.85	$-	$1,405.27	$21.16	$-	$1,426.43
	SR	328,673.50	$2.68	$116.26	$0.15	$23.84	$142.94
	SJR	75,954.73	$28.39	$659.61	$106.70	$118.05	$912.75
	SWF	187,061.79	$115.29	$3,916.45	$7.49	$622.94	$4,662.17
	SF	59,163.46	$168.71	$5,660.70	$895.84	$441.34	$7,166.59
	Total	3,941,025.62	$843.35	$23,186.38	$1,856.89	$1,224.57	$27,111.19
Statewide Cost Share			3.11%	85.53%	6.84%	4.52%	

Considering all lands identified in plans set forth by state agencies or water management districts, Table 2.3.3 identifies the total acreage[85] 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 41.54 percent of the state would be held as conservation land. If federal, local, and private plans were accounted for, this share would be even greater.

[See table on following page]

[83] The database was reduced to non-duplicate entries of conservation lands of more than zero acres acquired between Fiscal Years 1918-19 and 2019-20. 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.
[84] While DEP, FWC, and the WMDs each have the funding entity identified, the funding for the DACS acquisitions are not identified by agency. The RFLPP and DACSI&A lists assume the same cost share as DEP, and the more federally funded FLP assumes the FWC cost share.
[85] The 2020 Edition calculated the total state acreage and existing conservation acreage with water removed, but kept water in the future land to acquire. This has been corrected in this edition such that all values in this table have water removed. This does, however, result in the future acreage in this table being slightly less than the sum of the acres from Table 2.3.2. For that analysis, water is retained because it is may be a valuable part of a parcel that should not be removed for cost estimating purposes.

Table 2.3.3 Share of Florida to be Acquired as Conservation Lands

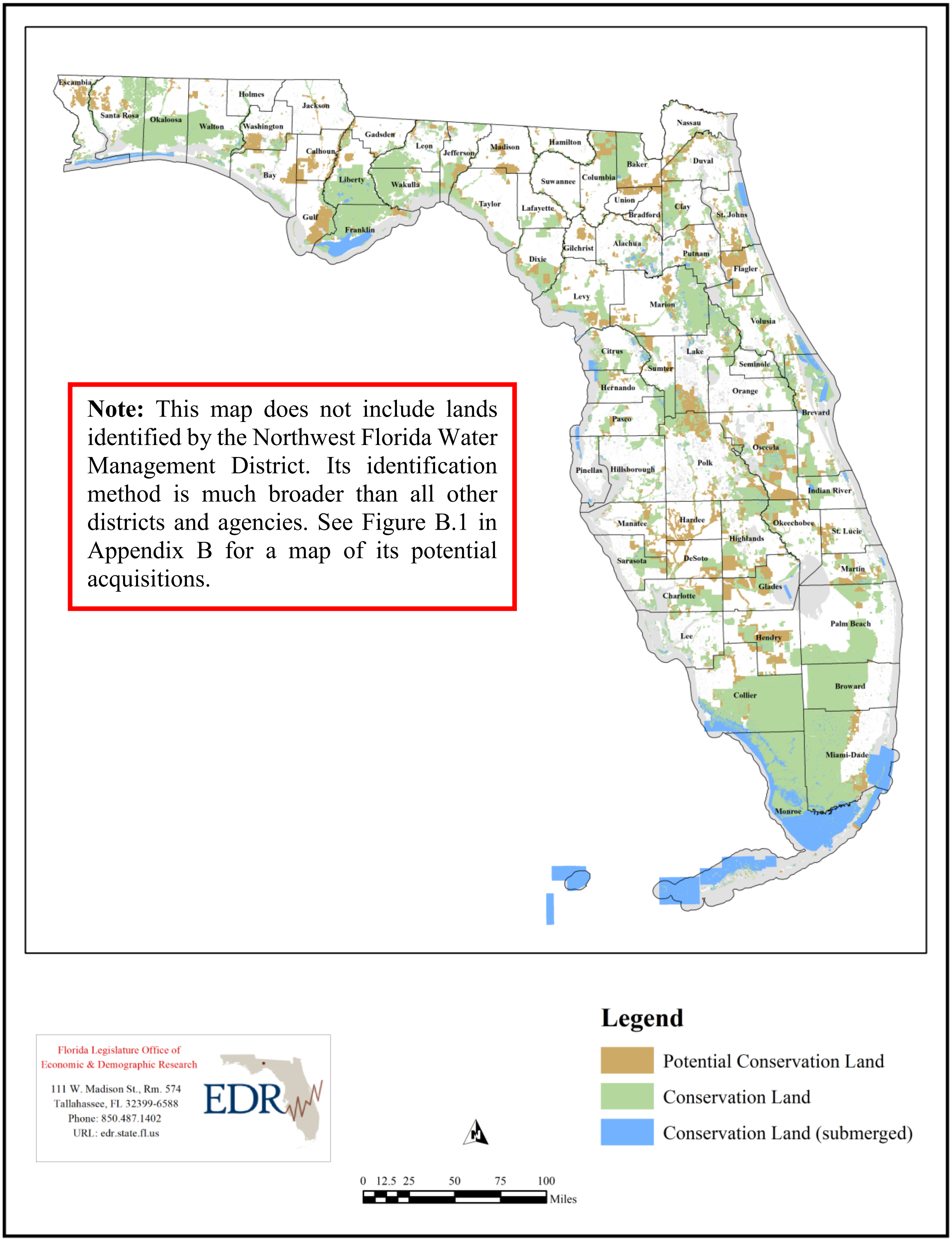
	Acres	Share
Current Cons. Land Acquired	10,428,737.33	30.43%
State Cons. Land to Acquire	2,636,554.83	7.69%
WMD Cons. Land to Acquire	1,170,611.61	3.42%
Total if all Acquired	14,235,903.77	41.54%

Adding the projected total costs for the additional conservation lands identified in plans produces a preliminary cost estimate of $27.1 billion as shown in Table 2.3.2. Of the total, the analysis suggests that approximately 86 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 nearly 370 years to produce the state's share. The extreme difference between the estimated costs and the current level of investment indicates that significant policy discussions are necessary if these acquisition plans are to be undertaken. As is, this projection does not include all costs of acquisition associated with real estate transactions, which makes the projection understated. Counteracting this effect is the possibility that the lands may be donated, exchanged, or sold at a lower price than other similar lands were historically. This would result in lower actual future expenditures than the preliminary estimate suggests.

For a visualization of the lands identified for potential future acquisition along with lands already held in conservation, see Figure 2.3.1.

[See figure on following page]

Figure 2.3.1 Current and Potential Conservation Land



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 nothing 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 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 2019-20 the state spent $39.80 per acre on conservation land management.[86] As discussed previously, the state alone has identified over 2.6 million acres of land in plans for potential future conservation. This indicates that an additional $104.9 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 $566.6 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. Further, Table B.3 in Appendix B compiles survey results regarding the revenues listed in local government account code 343.700 Charges for Services – Conservation and Resource Management that were indicated as dedicated to or used for conservation land acquisition and management.

2.5 Next Steps and Recommendations

EDR will continue to refine the methodology for cost estimates of future land acquisitions, particularly for entities with unreliable or missing GIS data as discussed in Section 2.3, and for land management expenditures for entities not broadly covered in the Land Management Uniform Accounting Council report. Future editions will also evaluate the economic impacts of holding land in conservation, including the restriction of development and the increase in population density, as well as the characteristics of recent conservation land acquisitions.

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

[86] *See* State of Florida Land Management Uniform Accounting Council (LMUAC) 2019 Annual report (FY 2018-19), at 51, available at: http://publicfiles.dep.state.fl.us/DSL/OES/2019_LMR_LMUAC_Reports/. (Accessed October 2019.)

3. Florida's Expenditures and Revenues Related to Water Supply and Water Quality

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. 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.

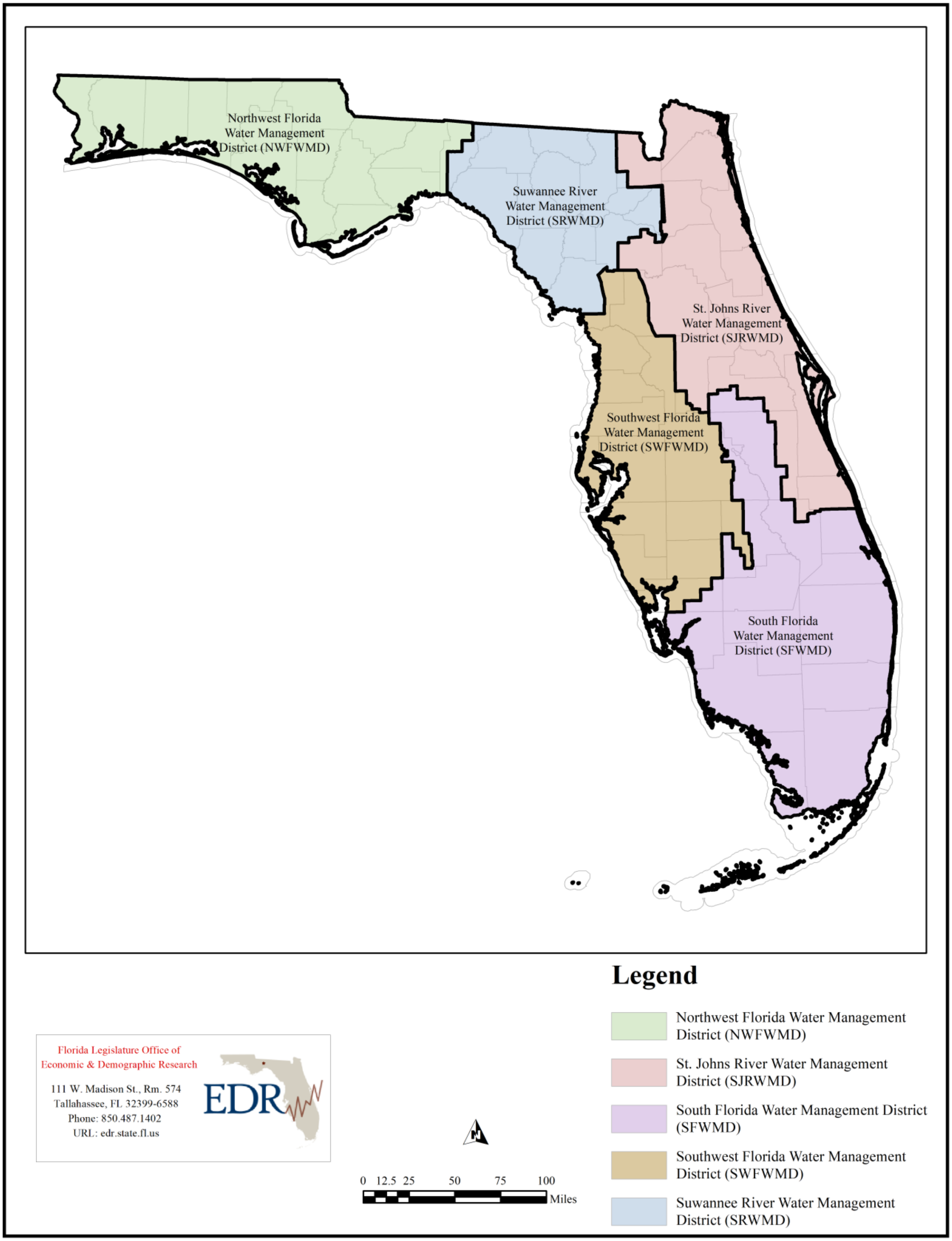
Water resource management in Florida is conducted on a state and regional level.[87] Recognizing that water resource problems vary in magnitude and complexity from region to region across the state, the Legislature vests in the Department of Environmental Protection (DEP) the power and responsibility to accomplish conservation, protection, management, and control of waters of the state, but with enough flexibility to accomplish these ends by delegating powers to the five water management districts (WMDs).[88] Chapter 373, Florida Statutes, provides the WMDs with broad authority to implement a wide range of regulatory and non-regulatory programs that address four areas of responsibility: water supply, water quality, flood protection and floodplain management, and natural systems. The five WMDs are identified in Figure 3.0.1. In addition, state agencies including the Florida Department of Agriculture and Consumer Services and the Florida Fish and Wildlife Conservation Commission implement activities that support water quality protection and restoration.

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 as well as forecasts of revenues used for these purposes. For an identification of gaps between projected revenues and estimated expenditures, see Chapter 8.

[See figure on following page]

[87] § 373.016(4)(a), Fla. Stat.
[88] § 373.016(5), Fla. Stat.

Figure 3.0.1 Water Management Districts



3.1 Historical and Projected Future Water Supply Expenditures

The Office of Economic and Demographic Research (EDR) defines 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 activities associated with increasing available water supplies, drinking water infrastructure needed to convey and treat water supplies, and water supply planning activities.[89] 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 the water management districts (WMDs), occurring at the state level.

Expenditures of State and Federal Funds

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.[90] 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.[91] 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.[92] The Fiscal Year 2020-21 appropriation for the DWSRF is $215.06 million.

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.[93] 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 2010-11, the expenditures for the revolving funds have totaled nearly $750 million, with approximately 90 percent from federal funding sources.

In Fiscal Year 2005-06, funding for an alternative water supply grant program was established to provide funds for the WMDs to cost share alternative water supply projects with local applicants.[94] Between Fiscal Year 2005-06 and Fiscal Year 2008-09, $227.70 million was appropriated to this program. The statutory appropriation was repealed in Fiscal Year 2008-09.[95] Of the $227.70 million appropriated, $202.49 has been expended, with $18.75 million occurring in the most recent ten fiscal years.

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[89] 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.
[90] 42 U.S.C. §300f et. seq.
[91] § 403.8532(1), Fla. Stat.
[92] 42 U.S.C. § 300j-12(e).
[93] *See* § 12, ch. 2017-10, Laws of Fla.
[94] *See* § 17, ch. 2005-291, Laws of Fla. For more information on alternative water supply projects see Chapter 4 and the project list maintained by DEP available at:
https://fdep.maps.arcgis.com/sharing/rest/content/items/c0fb905537c0497a826efdd6a854d5ff/data. (Accessed November 2020.)
[95] *See* § 1, ch. 2009-68, Laws of Fla.

In Fiscal Year 2019-20, funding was established for a water supply and water resource development grant program. In the first year, $39 million was appropriated from General Revenue (GR) and $1 million from the Water Protection and Sustainability Program Trust Fund (WPSPTF). In Fiscal Year 2020-21, an additional $38.2 million was appropriated from GR and $1.8 million from WPSPTF. Of note, in Fiscal Year 2019-20, $22.48 million of the GR and $0.75 million of the WPSPTF appropriations was expended.

Table 3.1.1 shows the annual cash expenditures since Fiscal Year 2010-11.[96] Due to the inconsistent history of these expenditures, the forecast relies on a 3-year moving average level of expenditures. Because these funds are provided for fixed capital outlay projects, the expenditures occur over multiple fiscal years.

Table 3.1.1 Water Supply Annual Expenditures and Forecast (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Drinking Water Revolving Fund	$76.45	$72.23	$34.75	$82.49	$52.95	$27.41	$57.49	$58.58	$138.41	$149.20
Aid to WMDs for Alternative Water Supply	$8.03	$1.63	$0.51	$0.27	$0.17	$1.65	$1.09	$3.42	$1.58	$23.63
Total	**$84.48**	**$73.86**	**$35.26**	**$82.77**	**$53.13**	**$29.05**	**$58.58**	**$62.00**	**$140.00**	**$172.82**
Forecast	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**	**FY 29-30**
Total	$124.94	$145.92	$147.89	$139.58	$144.47	$143.98	$142.68	$143.71	$143.46	$143.28

Regional Expenditures

Similar to the analyses for the WMDs' conservation land acquisition and management, in order to identify expenditures of the WMDs related to water supply, 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 include actual audited expenditures allocated to six program areas and across each of the four areas of responsibility, including water supply.[97]

Table 3.1.2 provides a forecast and details a history of expenditures that the WMDs attributed to the water supply area of responsibility. These expenditures include activities related to water supply assessments, regional water supply plans, alternative water supply, minimum flows and

[96] The personnel expenditures associated with the Drinking Water State Revolving Fund are included within the total personnel expenditures for Water Restoration Assistance, Table 3.3.3.

[97] The six program areas are: 1.0 Water Resources Planning and Monitoring; 2.0 Land Acquisition, Restoration and Public Works; 3.0 Operation and Maintenance of Works and Lands; 4.0 Regulation; 5.0 Outreach; and 6.0 District Management and Administration. The WMDs report expenditures in the four areas of responsibility at the program level only. Each program area contains multiple activities or sub-activities. The program allocation by area of responsibility are estimates since projects and initiatives may serve more than one purpose.

levels and associated recovery or prevention strategies, water conservation initiatives, water resource monitoring and data collection, land acquisition and management, and regulatory water use permitting. To avoid double counting WMD expenditures between the conservation land and water sections of this report, the total expenditures assigned to the "2.1 Land Acquisition" and "3.1 Land Management" activities have been removed[98] from the expenditures in Table 3.1.2 and the WMD water quality tables in Section 3.3. Note that the historic data is 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 3.1.2 Water Management District Water Supply Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$8.03	$8.20	$7.90	$5.23	$3.90
SJRWMD	$42.49	$42.38	$42.50	$41.33	$25.78
SFWMD	$90.43	$85.53	$93.71	$92.45	$90.57
SWFWMD	$53.38	$34.06	$26.16	$33.25	$37.34
SRWMD	$5.00	$6.19	$3.93	$5.38	$5.58
Total	$199.34	$176.35	$174.20	$177.64	$163.17
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$172.77	$172.11	$170.56	$171.81	$171.49

Source: Annual Budgets of the Water Management Districts.

Table 3.1.3 provides a forecast and details a history of water supply expenditures[99] by special districts[100] that are located in multiple counties. Based on survey results, a portion of the local government expenditures identified in 537 Conservation and Resource Management and 572 Parks and Recreation may be for water supply purposes. Additionally, the Account 533 Water Utility Service Expenditures is included as a water supply expenditure of the respective government type as public utility data cannot be accurately separated from the local government data. Note that the historic data is 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]

[98] While the districts are not required to allocate each activity and sub-activity 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.

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

[100] 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 3.1.3 Water Supply Expenditures by Regional Special Districts (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Supply	$267.38	$277.32	$281.26	$284.53	$295.20
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Supply	$298.69	$305.11	$312.59	$319.58	$326.86

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government. Account 533 and a portion of accounts 537 and 572 are shared out in accordance with local government survey results.

Local Expenditures

Table 3.1.4 provides a forecast and details a history of water supply expenditures by local governments. Based on survey results, a portion of the local government expenditures[101] identified in accounts 537 Conservation and Resource Management and 572 Parks and Recreation may be attributed to water supply. Additionally, the Account 533 Water Utility Service Expenditures is included as a water supply expenditure of the respective government type as public utility data cannot be accurately separated from the local government data. Note that the historic data is 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.

Table 3.1.4 Water Supply Expenditures by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$278.74	$322.65	$315.98	$304.59	$311.87
Municipalities	$623.92	$663.20	$679.20	$724.79	$754.34
Special Districts	$13.14	$18.45	$17.71	$19.68	$19.88
Total	$915.80	$1,004.29	$1,012.90	$1,049.06	$1,086.10
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$1,110.38	$1,145.74	$1,183.31	$1,221.10	$1,260.40

Source: Annual Financial Report data obtained from the Florida Department of Financial Services, Division of Accounting and Auditing, Bureau of Local Government. Account 533 and a portion of accounts 537 and 572 are shared out by local government survey.

Private Utility Expenditures

Table 3.1.5 provides a forecast and details a history of water supply expenditures by private drinking water utilities. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC) from the annual financial reports submitted by private drinking water utilities

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

within jurisdictional counties. As of September 2020, only 38 of Florida's 67 counties had resolutions or ordinances adopted to impose PSC jurisdiction over private water and wastewater utilities.[102]. Because of this, the remaining expenditures from counties outside its jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix of rural and 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. Population growth drives the forecast as utility expenditures are generally expected to follow population growth.

Table 3.1.5 Water Supply Expenditures by Private Drinking Water Utilities (in $millions)

History	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019
Total	$46.24	$45.94	$44.78	$37.64	$38.71	$40.77	$40.65	$42.64	$41.78	$46.33
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**
Total	$44.83	$45.42	$45.99	$46.59	$47.16	$47.71	$48.24	$48.77	$49.30	$49.82

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

3.2 Historical and Projected Future Revenues for Water Supply

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."[103] There are a variety of revenue sources that support water resources, including specific taxes and fees that are dedicated in law. The following discussion identifies and forecasts the relevant water supply revenues.

State-Appropriated Revenue Sources

The primary sources of state-appropriated revenue for water supply initiatives are federal grants and repayment of loans, which are deposited in the Drinking Water Revolving Loan Trust Fund.[104] 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.

[102] As of the date of this report, there were 38 jurisdictional counties: 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. The non-jurisdictional counties were: 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. For an updated list of jurisdiction counties, see http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/wawtextchart.pdf. (Accessed September 2020.)

[103] § 403.921(1)(c), Fla. Stat.

[104] § 403.8533, Fla. Stat.

Based on a review of state accounts for the last ten fiscal 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 that part of the forecast through Fiscal Year 2029-30. For repayments of loans, a three-year moving average is used for the forecast. The historical series and the forecast are shown in Table 3.2.1.

Table 3.2.1 Revenues Available for Water Supply (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Federal Grants	$68.39	$38.97	$42.40	$58.39	$21.26	$31.22	$29.69	$26.74	$31.55	$46.34
Repayment of Loans	$30.51	$34.32	$33.09	$41.30	$47.22	$44.83	$90.13	$36.37	$37.98	$43.54
Total	**$98.90**	**$73.29**	**$75.49**	**$99.69**	**$68.48**	**$76.05**	**$119.82**	**$63.11**	**$69.53**	**$89.88**

Forecast	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Federal Grants	$55.55	$42.17	$40.97	$41.69	$42.51	$43.41	$44.24	$45.11	$45.99	$46.87
Repayment of Loans	$39.30	$40.27	$41.04	$40.20	$40.50	$40.58	$40.43	$40.51	$40.51	$40.48
Total	**$94.85**	**$82.45**	**$82.00**	**$81.89**	**$83.01**	**$83.99**	**$84.67**	**$85.61**	**$86.50**	**$87.35**

In addition to the federal grants and repayment of loans, state funds including General Revenue and Land Acquisition Trust Fund (LATF) receipts are also deposited in the Drinking Water Revolving Loan Trust Fund to provide the state match for federal grants. On average, the state matching funds were approximately $6.84 million per year during the past ten fiscal years. These dollars are included in the revenue forecast.

Regional Revenues

Revenues generated by the WMDs are identified in full in Section 3.4. While all of the WMDs' revenues may be dedicated to managing water resources, an attempt to categorize the split between water supply and water quality would be arbitrary. As a result, the revenues for water supply are blended with the revenues for water quality and other water resource-related expenditures.

Table 3.2.2 provides a forecast and details a history of water supply revenues from self-generated sources as well as federal and state sources to special districts that are located in multiple counties.[105] Similar to the expenditures, beginning with this edition of EDR's report, public utility revenues are contained in their respective government's revenues. Self-generated revenues include the accounts identified as 314.300 Utility Service Tax - Water, 323.300 Franchise Fee – Water, and 343.300 Charges for Services - Water Utility, as well as survey results regarding 343.700 Charges for Services – Conservation and Resource Management. The accounts identified as

[105] 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.

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 is 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 3.2.2 Water Supply Revenues Generated by Regional Special Districts by Government Source (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Self	$312.02	$309.29	$317.56	$324.65	$333.18
State	$-	$-	$0.07	$0.13	$-
Federal	$0.48	$1.47	$1.33	$0.07	$-
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Self	$338.99	$344.61	$350.03	$355.29	$360.38
State	$-	$-	$-	$-	$-
Federal	$-	$-	$-	$-	$-

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, 323.300, 343.300, and survey results are applied to 343.700 for self; 334.310 and 335.310 for State; and 331.310 for Federal.

Local Revenues

Table 3.2.3 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[106] identified as 343.700 Service Charge – Conservation and Resource Management is self-generated for use on water supply projects and initiatives. Further, the accounts identified as 314.300 Utility Service Tax - Water, 323.300 Franchise Fee – Water, and 343.300 Charges for Services - Water Utility are 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 is 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.

[See table on following page]

[106] For further details on the source and methodology of this data, *see* the "Local Expenditures" piece of Section 2.2.

Table 3.2.3 Water Supply Revenues Generated by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$403.00	$413.31	$432.65	$457.24	$465.58
Municipalities	$1,161.75	$1,173.88	$1,338.89	$1,437.41	$1,416.47
Special Districts	$47.28	$48.26	$48.56	$52.03	$58.29
Total	$1,612.04	$1,635.45	$1,820.11	$1,946.68	$1,940.34
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$1,974.17	$2,006.90	$2,038.45	$2,069.08	$2,098.76

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, 323.300, 343.300 and survey results are applied to Account 343.700.

Table 3.2.4 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 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 is 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 3.2.4 Water Supply Revenues Provided to Local Governments from the State (in $millions)

History	LFY 12-13	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17
Counties	$2.02	$5.92	$0.85	$2.25	$1.65
Municipalities	$1.45	$15.72	$12.02	$10.47	$7.94
Special Districts	$0.18	$0.37	$0.21	$0.06	$0.21
Total	$3.65	$22.01	$13.08	$12.78	$9.80
Forecast	**FY 17-18**	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**
Total	$9.97	$10.13	$10.29	$10.45	$10.60

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 3.2.5 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 is 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 3.2.5 Water Supply Revenues Provided to Local Governments from the Federal Government (in $millions)

History	LFY 12-13	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17
Counties	$0.08	$4.63	$2.34	$-	$0.03
Municipalities	$7.97	$8.50	$4.44	$6.70	$5.06
Special Districts	$0.38	$0.79	$-	$-	$-
Total	$8.42	$13.93	$6.78	$6.70	$5.09
	$0.08	$4.63	$2.34	$-	$0.03
Forecast	**FY 17-18**	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**
Total	$5.18	$5.27	$5.35	$5.43	$5.51

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.

Private Utility Revenues

Table 3.2.6 provides a forecast and details a history of water supply-related revenues generated by private drinking water utilities. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC) from the annual financial reports submitted by drinking water utilities within jurisdictional counties. As of September 2020, only 38 of Florida's 67 counties had resolutions or ordinances adopted to impose PSC jurisdiction over private water and wastewater utilities.[107] As a result, the remaining revenues from counties outside of its jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix of rural and 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 3.2.6 Revenues Generated by Private Drinking Water Utilities (in $millions)

History	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019
Total	$66.93	$67.66	$66.17	$53.98	$54.55	$56.71	$59.98	$61.83	$59.73	$64.29
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**
Total	$63.11	$63.93	$64.74	$65.58	$66.38	$67.16	$67.91	$68.66	$69.40	$70.12

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

[107] As of the date of this report, there were 38 jurisdictional counties: 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. The non-jurisdictional counties were: 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. For an updated list of jurisdiction counties, see http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/wawtextchart.pdf. (Accessed September 2020.)

3.3 Historical and Projected Future Water Quality and Other Water Resource-Related 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[108] in 1967 and the Florida Water Resource Act[109] in 1972. In addition, the Florida Safe Drinking Water Act[110] 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."[111] 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.

Expenditures of State and Federal Funds

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 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 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.[112]

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

[108] Ch. 67-436, Laws of Fla.; § 403.011 et seq.
[109] Ch. 72-299, Laws of Fla.; Ch. 373, Fla. Stat.
[110] Ch. 77-337, Laws of Fla.; § 403.850, Fla. Stat. et seq.
[111] Ch. 77-337, § 2, Laws of Fla.; § 403.851(3), Fla. Stat.
[112] DEP, Division of Environmental Assessment and Restoration, https://floridadep.gov/dear. (Accessed September 2020.)

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 in more detail in Chapter 5.

Since Fiscal Year 2010-11, expenditures for environmental assessment and restoration have totaled $305.39 million. The majority of the expenditures has been from state sources (74 percent) with the remaining 26 percent from federal sources. Most of the federal funding is associated with the TMDL program. Table 3.3.1 shows the annual cash expenditures over the past ten years.

Table 3.3.1 DEP's Division of Environmental Assessment and Restoration Expenditures (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Personnel	$11.31	$10.67	$10.23	$11.30	$13.02	$12.81	$12.08	$12.00	$12.35	$12.50
Operations	$2.33	$2.22	$2.14	$2.56	$2.59	$2.63	$3.56	$3.25	$2.89	$2.58
Lab Support	$0.70	$0.50	$0.62	$0.62	$0.32	$0.19	$0.51	$0.44	$0.38	$0.25
Watershed Monitoring	$1.94	$1.93	$2.00	$3.59	$3.09	$2.30	$2.33	$2.62	$2.34	$2.48
TMDL Program*	$5.98	$7.08	$12.99	$12.72	$11.77	$24.32	$9.50	$9.46	$11.97	$11.65
Other Projects	$2.44	$1.88	$1.57	$1.68	$1.57	$1.75	$0.95	$0.67	$0.86	$0.39
Total	**$24.71**	**$24.29**	**$29.56**	**$32.46**	**$32.36**	**$43.99**	**$28.93**	**$28.44**	**$30.78**	**$29.86**

* Note that this table only includes TMDL expenditures by DEAR and does not include grants awarded to eligible entities by the DEP's Division of Water Restoration Assistance for TMDL implementation. The latter is included in the Nonpoint Source Funds category of Table 3.3.3.

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 2010-11, the expenditures for these programs have totaled $290.58 million, primarily from state sources. Table 3.3.2 shows the annual cash expenditures over the past ten years.

[See table on following page]

Table 3.3.2 DACS Water-Related Expenditures (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Personnel	$2.61	$2.26	$2.32	$2.43	$2.58	$2.77	$3.45	$3.91	$4.01	$3.94
Operations	$0.27	$0.35	$0.38	$0.39	$0.50	$0.56	$0.75	$0.53	$0.50	$0.62
Best Management Practices	$10.98	$10.74	$14.58	$14.94	$21.29	$20.24	$34.53	$33.18	$33.68	$34.94
Hybrid Wetlands	$-	$-	$-	$0.03	$4.61	$4.30	$11.55	$-	$-	$-
Nitrate & Nitrite Research and Remediation	$0.42	$0.33	$0.86	$0.64	$0.42	$0.54	$0.69	$0.60	$0.80	$0.53
Total	**$14.28**	**$13.68**	**$18.15**	**$18.44**	**$29.41**	**$28.40**	**$50.96**	**$38.22**	**$38.99**	**$40.04**

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, DACS' water-related expenditures include 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.[113]

Agricultural BMPs serve as the primary tool to prevent and reduce water pollution. DEP, WMDs, and DACS are required to assist agricultural entities with their implementation. 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 their status report dated July 1, 2020, there were 3,983,488 agricultural acres enrolled in BMPs statewide representing approximately 56 percent of total agricultural areas statewide (not including silviculture).[114]

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

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[113] DACS, *What are Agricultural Best Management Practices?*, available at: https://www.fdacs.gov/content/download/30796/file/What-Are-FDACS-best-management-practices.pdf. (Accessed September 2020.)

[114] *See* Florida Department of Agriculture and Consumer Services, Status of Implementation of Agricultural Nonpoint Sources Best Management Practices, July 1, 2020, available at: https://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy. (Accessed September 2020.)

projects throughout the state.[115] 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 State Water-quality Assistance Grants (formerly known as the TMDL Water Quality Restoration Grants); and the Deepwater Horizon program.[116] DWRA also manages legislatively appropriated water projects and springs restoration funding.[117]

Expenditures related to DEP's DWRA, including personnel and the various loan and grant programs, are included in this category. Since Fiscal Year 2010-11, the expenditures for the identified programs total more than $2.60 billion. Of the total appropriations, approximately 62 percent has been funded from federal sources and 38 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 3.3.3 shows the annual cash expenditures over the past 10 years.

[See table on following page]

[115] DEP, *Division of Water Restoration Assistance*, https://floridadep.gov/wra. (Accessed September 2020.)
[116] For the 2022 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.
[117] DEP, *Division of Water Restoration Assistance*, https://floridadep.gov/wra. (Accessed September 2020.)

Table 3.3.3 Water Restoration Assistance Expenditures (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Personnel	$4.47	$4.19	$3.84	$3.75	$3.38	$3.28	$6.58	$3.88	$4.42	$4.08
Operations	$0.61	$0.66	$0.64	$0.38	$0.48	$0.42	$0.50	$0.35	$0.38	$0.37
Revolving Fund - Wastewater Facilities	$107.04	$154.88	$101.75	$80.60	$162.99	$119.05	$161.73	$169.88	$244.56	$231.12
Revolving Fund - Wastewater Small Community	$9.70	$12.88	$22.21	$37.47	$22.03	$16.49	$7.28	$0.89	$0.90	$1.85
Water Projects	$28.86	$16.58	$16.44	$9.26	$20.07	$43.43	$49.96	$47.79	$33.28	$48.39
Nonpoint Source Funds	$19.60	$12.17	$7.68	$3.08	$2.80	$3.86	$12.72	$17.91	$10.74	$11.16
Springs Restoration	$-	$-	$-	$10.00	$0.06	$5.19	$9.36	$17.00	$15.47	$33.85
Beach Projects/Restoration*	$12.46	$15.97	$15.52	$15.69	$24.92	$37.42	$37.24	$38.74	$29.04	$27.02
Non-Mandatory Land Reclamation	$2.29	$4.92	$1.44	$0.86	$1.53	$2.18	$1.02	$0.17	$0.60	$1.34
Deepwater Horizon Projects**	$2.02	$1.18	$1.88	$3.29	$32.87	$12.92	$19.01	$20.00	$29.96	$17.14
Other Projects	$-	$0.50	$-	$0.12	$0.01	$0.16	$0.37	$1.82	$4.47	$0.50
Total	**$187.06**	**$223.94**	**$171.38**	**$164.50**	**$271.13**	**$244.41**	**$305.78**	**$318.45**	**$373.82**	**$376.82**

* 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 continues 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.
** 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 67 percent of water restoration assistance expenditures were for water quality projects funded through the Clean Water State Revolving Fund (CWSRF),[118] Section 319 Clean Water Acts grants,[119] and the State Water-quality Assistance Grants. Eligible projects under the CWSRF include the construction or upgrade of wastewater and stormwater infrastructure. A more extensive discussion of CWSRF eligibility and federal funding allocation to states can be found in Chapter 6. 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, stormwater retrofits, and public education projects.[120]

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[118] *See* 33 U.S.C. § 1383; § 403.1835, Fla. Stat.
[119] 33 U.S.C. § 1329(h).
[120] DEP, Nonpoint Source Funds, https://floridadep.gov/WRA/319-TMDL-Fund. (Accessed September 2020.)

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.[121] In the five most recent General Appropriations Acts, 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 2019-20, $90.94 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,[122] flooding, and other water resource-related concerns. Expenditures on water projects have ranged from as high as $49.96 million in Fiscal Year 2016-17 to as little as $9.3 million in Fiscal Year 2013-14. In Fiscal Year 2019-20, spending on water projects was $48.39 million.

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 2010-11, expenditures for these programs have reached nearly $1.41 billion. 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 $1.22 billion or 87 percent of the total over this time period. See Chapter 7 for a dedicated discussion of Everglades expenditures. The annual cash expenditures since Fiscal Year 2010-11 are shown in Table 3.3.4.

Table 3.3.4 Other Programs and Initiatives Expenditures (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Everglades Restoration	$69.27	$27.54	$26.60	$93.92	$54.56	$115.77	$140.37	$184.53	$276.28	$232.16
Office of Water Policy	$-	$-	$1.79	$2.27	$2.29	$2.36	$2.32	$2.43	$2.48	$2.40
Other Projects	$6.47	$6.91	$8.06	$7.61	$15.46	$14.88	$17.76	$19.59	$24.08	$30.51
Red Tide Research	$1.00	$0.64	$0.64	$1.28	$1.26	$0.62	$0.68	$0.43	$3.67	$7.23
Total	**$76.73**	**$35.09**	**$37.09**	**$105.09**	**$73.57**	**$133.63**	**$161.12**	**$206.98**	**$306.51**	**$272.31**

[121] § 375.041(3)(b)2., Fla. Stat.

[122] 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.

Over the past ten fiscal years, the state has spent an average of $1.75 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.[123]

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 2010-11, the State of Florida has spent more than $2.31 billion for regulatory and clean-up programs administered by DEP. Nearly all of this funding, approximately 93 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 3.3.5 shows the annual cash expenditures since Fiscal Year 2010-11.

Table 3.3.5 Regulatory and Clean-up Program Expenditures (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Personnel	$65.60	$61.48	$58.87	$59.07	$58.15	$56.24	$52.74	$65.04	$66.20	$66.11
Operations	$7.37	$8.04	$6.88	$7.13	$7.65	$8.42	$8.63	$10.04	$9.56	$9.23
Petroleum Restoration	$109.54	$120.29	$132.11	$81.85	$59.73	$80.97	$119.44	$122.40	$119.08	$127.91
Waste Clean-Up	$37.79	$41.45	$36.68	$26.38	$28.68	$37.40	$36.11	$36.61	$38.06	$38.18
Other Projects	$35.74	$21.47	$16.83	$14.63	$15.02	$15.29	$16.74	$18.87	$17.31	$17.00
Total	**$256.05**	**$252.73**	**$251.38**	**$189.06**	**$169.24**	**$198.32**	**$233.66**	**$252.96**	**$250.20**	**$258.43**

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

[123] *See* Florida Fish and Wildlife Conservation Commission, FWC/FWRI-Mote Cooperative Red Tide Program, https://myfwc.com/research/redtide/monitoring/current/coop/. (Accessed September 2020.)

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 WMDs. Since Fiscal Year 2010-11, direct expenditures to support the districts' water quality and other water resource-related programs have totaled nearly $150 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.[124] Table 3.3.6 shows the annual cash expenditures since Fiscal Year 2010-11.

Table 3.3.6 State Aid to Water Management Districts (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Operations and Permitting Assistance	$4.74	$0.19	$1.71	$2.26	$8.08	$7.95	$7.95	$7.95	$7.95	$7.95
Minimum Flows and Levels	$-	$-	$-	$-	$-	$1.50	$1.50	$3.45	$3.45	$3.45
Wetland Protection	$0.61	$0.36	$0.73	$2.44	$0.88	$1.31	$0.00	$-	$-	$-
Dispersed Water Storage	$-	$-	$-	$-	$10.00	$5.00	$5.00	$5.00	$5.00	$5.00
Everglades Restoration	$-	$-	$4.40	$4.40	$8.60	$7.06	$-	$8.01	$5.24	$-
Total	**$5.35**	**$0.55**	**$6.84**	**$9.10**	**$27.56**	**$22.83**	**$14.45**	**$24.41**	**$21.63**	**$16.40**

Note: "$-" indicates a zero, whereas "$0.00" indicates an amount less than $5,000.

Forecast of Expenditures on Water Quality and Other Water Resource-Related Programs
Table 3.3.7 provides a forecast for total state expenditures on water quality and other water resource-related programs. Beginning in Fiscal Year 2010-11, 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 10 percent as increased revenues became available to reinvest in these programs. The highest growth rate occurred in Fiscal Year 2016-17 at 18.36 percent, followed by increases of 9.38 percent in Fiscal Year 2017-18 and 17.54 percent in Fiscal Year 2018-19. This was followed by a decline of 2.75 percent in Fiscal Year 2019-20. Because of this unusual pattern, the forecast uses the average growth rate over the ten year history of 5.51 percent.

[124] § 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.)

Table 3.3.7 History and Forecast of State Expenditures on Water Quality and Other Water Resource-Related Programs (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Total	$564.18	$550.28	$514.39	$518.65	$603.27	$671.59	$794.91	$869.46	$1,021.94	$993.86

Forecast	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Total	$1,048.63	$1,106.42	$1,167.40	$1,231.73	$1,299.61	$1,371.24	$1,446.81	$1,526.54	$1,610.67	$1,699.43

Regional Expenditures

Similar to the analyses for the WMDs' conservation land acquisition, land management, and water supply, in order to identify WMD expenditures related to water quality, 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 include actual audited expenditures allocated to six program areas and across each of the four areas of responsibility, including water quality.[125] Note that due to the SFWMD's unique responsibilities related to Everglades restoration, a large component of its water quality expenditures is related to the implementation of the Restoration Strategies Regional Water Quality Plan, water quality features of the Comprehensive Everglades Restoration Plan (CERP), and other ecosystem restoration projects supporting water quality goals within the Everglades ecosystem.

Table 3.3.8 provides a forecast and details a history of expenditures across all program areas that the WMDs attribute to the water quality area of responsibility. These expenditures include activities related to water quality improvement and restoration, environmental monitoring and data collection, land acquisition and management, and regulatory permitting (*e.g.,* environmental resource permitting program and water well construction permitting). To avoid double counting WMD expenditures between the conservation land and water sections of this report, the total expenditures assigned to "2.1 Land Acquisition" and "3.1 Land Management" activities have been removed from the expenditures in Table 3.3.8, 3.3.9, and 3.3.10. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years. Rather than using the simple three-year moving average, the forecast also takes into account the three-year moving average growth rate, averaging the two.

[See table on following page]

[125] The six program areas are: 1.0 Water Resources Planning and Monitoring; 2.0 Land Acquisition, Restoration and Public Works; 3.0 Operation and Maintenance of Works and Lands; 4.0 Regulation; 5.0 Outreach; and 6.0 District Management and Administration. The WMDs report expenditures in the four areas of responsibility at the program level only. Each program area contains multiple activities or sub-activities. The program allocation by area of responsibility are estimates since projects and initiatives may serve more than one purpose.

Table 3.3.8 Water Management District Water Quality Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$5.67	$4.92	$5.35	$6.25	$5.83
SJRWMD	$24.57	$25.05	$27.34	$51.88	$36.99
SFWMD	$88.53	$89.18	$113.99	$121.59	$123.33
SWFWMD	$19.12	$25.12	$22.23	$23.74	$24.30
SRWMD	$2.01	$4.09	$2.29	$2.73	$3.58
Total	$139.89	$148.36	$171.21	$206.19	$194.03
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$202.47	$216.87	$224.47	$235.48	$248.33

Source: Annual Budgets of the Water Management Districts.

Table 3.3.9 provides a forecast and details a history of expenditures across all program areas that the WMDs attribute to the flood protection area of responsibility. Note that the historic data is 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 3.3.9 Water Management District Flood Protection Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$2.89	$2.70	$2.36	$2.62	$2.72
SJRWMD	$7.44	$8.42	$11.47	$15.30	$18.61
SFWMD	$90.29	$90.42	$98.50	$109.50	$101.54
SWFWMD	$26.11	$17.47	$17.94	$26.12	$31.31
SRWMD	$2.38	$4.47	$2.62	$3.00	$3.83
Total	$129.11	$123.48	$132.89	$156.55	$158.01
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$146.27	$151.51	$151.81	$149.86	$151.06

Source: Annual Budgets of the Water Management Districts.

Table 3.3.10 provides a forecast and details a history of expenditures across all program areas that the WMDs attribute to the natural systems area of responsibility. Note that the historic data is 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.

[See table on following page]

Table 3.3.10 Water Management District Natural Systems Expenditures (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$4.33	$3.60	$4.26	$4.32	$4.39
SJRWMD	$30.63	$31.10	$34.03	$7.53	$18.36
SFWMD	$134.85	$121.42	$147.16	$136.48	$138.13
SWFWMD	$34.21	$32.77	$32.58	$25.61	$29.38
SRWMD	$3.61	$5.86	$3.55	$4.29	$5.09
Total	$207.63	$194.75	$221.57	$178.23	$195.34
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$198.33	$192.82	$194.07	$195.08	$193.99

Source: Annual Budgets of the Water Management Districts.

Table 3.3.11 provides a forecast and details a history of water quality protection and restoration expenditures[126] by special districts[127] that are located in multiple counties. The expenditures in accounts 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 is 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. Note that the data in this table has been significantly revised and supersedes the data provided in the 2020 Edition.

Table 3.3.11 Water Quality Protection and Restoration Expenditures by Regional Special Districts (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Quality Protection & Restoration	$100.78	$101.93	$105.35	$119.28	$118.55
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Quality Protection & Restoration	$113.01	$115.85	$115.86	$114.91	$115.54

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 accounts 537 and 572 are shared out in accordance with local government survey results.

Local Expenditures

Table 3.3.12 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 expenditures in accounts 537 Conservation and Resource Management and 572 Parks and

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

[127] 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.

Recreation may be attributed to water quality protection and restoration. Further, expenditures in accounts 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 is 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.

Table 3.3.12 Water Quality Protection & Restoration Expenditures by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$2,169.81	$2,204.88	$2,371.30	$2,446.70	$2,522.53
Municipalities	$3,169.13	$3,263.44	$3,395.27	$3,516.99	$3,746.40
Special Districts	$418.60	$497.16	$535.21	$589.46	$883.27
Total	$5,757.54	$5,965.48	$6,301.77	$6,553.15	$7,152.20
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$7,409.03	$7,855.59	$8,372.08	$8,885.80	$9,440.81

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 and 572 are shared out by local government survey.

Private Utility Expenditures

Table 3.3.13 provides a forecast and details a history of water quality expenditures by private wastewater utilities. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC) from the annual financial reports submitted by wastewater utilities within jurisdictional counties. As of September 2020, only 38 of Florida's 67 counties had resolutions or ordinances adopted to impose PSC jurisdiction over private water and wastewater utilities.[128] Similar to the private drinking water utilities detailed in Section 3.1, the remaining expenditures from counties outside its jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix of rural and 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. Population growth drives the forecast as utility expenditures are generally expected to follow population growth.

[128] As of the date of this report, there were 38 jurisdictional counties: 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. The non-jurisdictional counties were: 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. For an updated list of jurisdiction counties, see http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/wawtextchart.pdf. (Accessed September 2020.)

Table 3.3.13 Water Quality Expenditures by Private Wastewater Utilities (in $millions)

History	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019
Total	$38.22	$38.14	$37.01	$32.99	$32.72	$33.50	$35.42	$37.08	$39.40	$43.28
Forecast	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29
Total	$42.07	$42.62	$43.16	$43.72	$44.25	$44.77	$45.27	$45.77	$46.26	$46.75

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

3.4 Historical and Projected Future Revenues for Water Quality and Other Water Resource-Related Programs

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 water resources, including specific taxes and fees that are dedicated in law. The following discussion identifies and forecasts the relevant water quality and other water resource-related revenues.

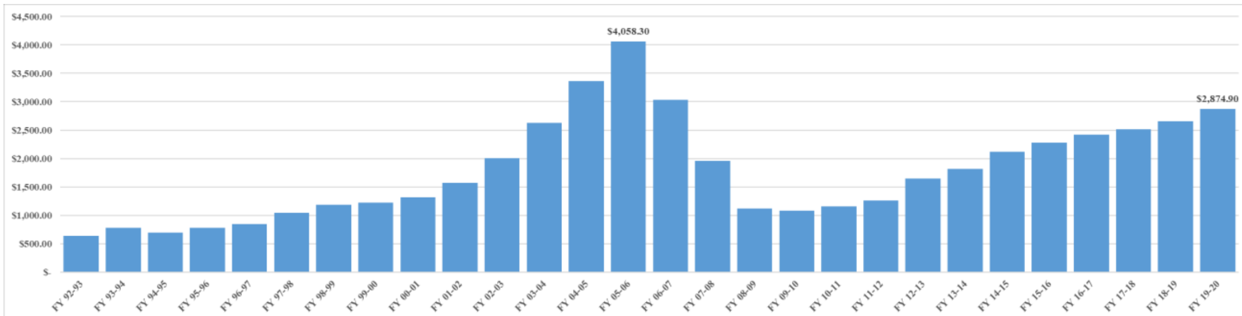
State-Appropriated Revenue Sources

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 land conservation and water resource-related initiatives is the Documentary Stamp Tax,[129] 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 3.4.1) also reached their peak in Fiscal Year 2005-06, posting total collections of nearly $4.06 billion. At the end of Fiscal Year 2019-20, collections were 70.84 percent of their prior peak and, based on the August 2020 Documentary Stamp Tax Collections and Distributions Revenue Estimating Conference, they are not expected to reach or surpass the Fiscal Year 2005-06 peak until Fiscal Year 2030-31.

[129] Ch. 201, Fla. Stat.

Figure 3.4.1 Total Documentary Stamp Tax Collections (in $millions)



The availability of funding for water resources is closely linked to the trajectory of this revenue source. Table 3.4.1 shows the historical and forecasted total collections from the Documentary Stamp Tax, as well as the constitutionally required distribution to the Land Acquisition Trust Fund (LATF).[130] These estimates were adopted by the Revenue Estimating Conference in August 2020.

Table 3.4.1 Documentary Stamp Tax History and Forecast (in $millions)

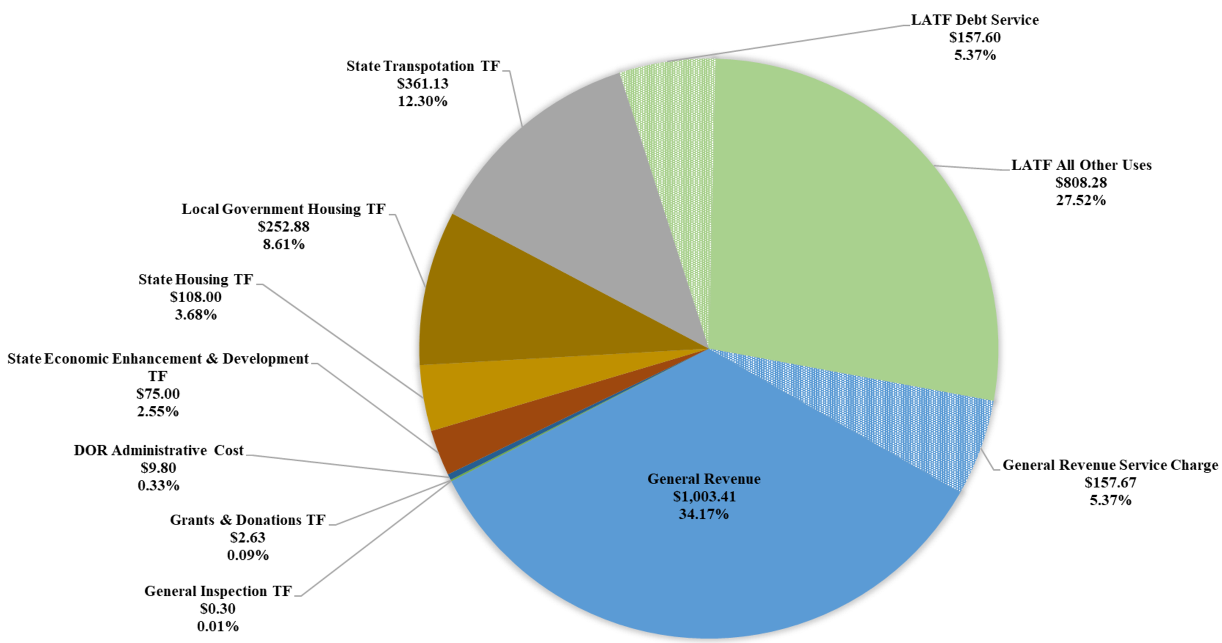
History	**FY 10-11**	**FY 11-12**	**FY 12-13**	**FY 13-14**	**FY 14-15**	**FY 15-16**	**FY 16-17**	**FY 17-18**	**FY 18-19**	**FY 19-20**
Doc Stamp Collections	$1,156.50	$1,261.60	$1,643.40	$1,812.50	$2,120.80	$2,276.87	$2,417.76	$2,510.02	$2,651.07	$2,874.90
Percent Change	7.22%	9.09%	30.26%	10.29%	17.01%	7.36%	6.19%	3.82%	5.62%	8.44%
Committed to Water Resources	$-	$-	$-	$-	$-	$-	$-	$254.22	$294.77	$316.09

Forecast	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**	**FY 29-30**
Doc Stamp Collections	$2,936.70	$3,167.70	$3,246.60	$3,335.87	$3,429.62	$3,529.80	$3,633.21	$3,740.05	$3,854.06	$3,969.73
Percent Change	2.15%	7.87%	2.49%	2.75%	2.81%	2.92%	2.93%	2.94%	3.05%	3.00%
Total to LATF	$965.88	$1,042.11	$1,068.14	$1,097.60	$1,128.54	$1,161.60	$1,195.73	$1,230.98	$1,268.61	$1,306.78
Debt Service	$157.60	$136.07	$125.02	$104.83	$104.83	$81.32	$60.90	$44.37	$24.82	$6.93
Remaining for LATF	$808.28	$906.04	$943.12	$992.77	$1,023.71	$1,080.28	$1,134.83	$1,186.61	$1,243.79	$1,299.85
Committed to Water Resources	**$319.00**	**$319.00**	**$319.00**	**$319.00**	**$319.00**	**$319.00**	**$314.00**	**$314.00**	**$314.00**	**$314.00**
Uncommitted LATF Based on Statute	**$489.28**	**$587.04**	**$624.12**	**$673.77**	**$704.71**	**$761.28**	**$820.83**	**$872.61**	**$929.79**	**$985.85**

[130] 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.

Section 201.15, Florida Statutes, directs the distribution of Documentary Stamp Tax revenues.[131] Figure 3.4.2 illustrates the effect of the statutory distributions for Fiscal Year 2020-21. The Documentary Stamp Tax collections forecast for Fiscal Year 2020-21 is $2.9 billion, with an estimated $2.1 billion (72.43 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.

Figure 3.4.2 Fiscal Year 2020-21 Statutory Distribution of Documentary Stamp Tax Revenue (in $millions)



In Fiscal Year 2020-21, the LATF is expected to receive approximately $966 million in total, including $157.60 million for debt service payments and $808.28 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

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

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 $319 million is dedicated in law to the Everglades, spring restoration, and Lake Apopka projects as provided in section 375.041, Florida Statutes. The remaining $489.28 million is available for other qualifying purposes authorized and appropriated by the Legislature. Table 3.4.2 shows all Fiscal Year 2020-21 appropriations from the LATF ($1.04 billion). Slightly less than one-half of these appropriations are for water quality and other water resource-related programs, with total combined appropriations of $511.72 million, or approximately 49 percent of the total. Within the water quality components, the largest program is Everglades restoration with an appropriation of $264.25 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 specific agency operations at DEP, DACS, the Fish and Wildlife Conservation Commission (FWC), and the Department of State (DOS).

Table 3.4.2 Land Acquisition Trust Fund Appropriations (in $millions)

Program Area	FY20-21 Recurring	FY20-21 Nonrecurring	FY20-21 Total	FY21-22 Base Budget
Water Quality - Other Programs and Initiatives	$132.05	$186.87	$318.91	$132.06
Land Conservation and Management	$220.94	$105.08	$326.02	$222.46
Debt Service	$157.68	$-	$157.68	$157.68
Water Quality - Water Restoration Assistance	$101.11	$5.00	$106.11	$101.12
Water Quality - Environmental Assessment and Restoration	$39.36	$26.78	$66.14	$39.50
Water Quality - Regulatory and Clean-up Programs	$20.55	$-	$20.55	$20.76
Water Management Districts	$18.68	$0.10	$18.78	$18.68
All Other Programs	$29.95	$-	$29.95	$30.26
TOTAL	**$720.31**	**$323.83**	**$1,044.14**	**$722.53**

The outcome of pending civil litigation pertaining to specific appropriations from the LATF and the spending of appropriated money by the executive agencies may affect future editions of this report.[132]

Total State Revenues for Water Quality and Other Water Resource-Related Programs

In addition to the Documentary Stamp Tax discussed above, there are a variety of other revenue sources available for water quality. 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

[132] For a detailed history of litigation, see the 2020 Edition of this report at page 86, available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

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.[133] 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.[134] These revenues include: Fees and Licenses; Fines, Penalties, and Judgments; Grants and Donations; Pollutant Taxes and Fees; Repayment of Loans; Sales and Leases; Severance Taxes, and Sale of Bonds.

Based on a review of state accounts for the last ten fiscal years, a historical data series was constructed for the identified revenues. With the exception of repayment of loans and sale of bonds, 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 2029-30. For the repayment of loans, a three-year moving average is used for the forecast. The historical series and the forecast for the total revenues available for water quality and other water resource-related programs, comprised of the non-Documentary Stamp Tax revenues and the Documentary Stamp Tax revenues committed to water resources from Table 3.4.1, are shown in Table 3.4.3.

[See table on following page]

133 http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2018Edition.pdf at page 186.
134 *Id.* at 188.

Table 3.4.3 Revenues Available for Water Quality and Other Water Resource-Related Programs (in $millions)

History	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Fees and Licenses	$26.61	$33.44	$28.54	$25.64	$28.23	$24.22	$24.23	$23.39	$25.04	$24.76
Fines, Penalties, Judgements	$0.08	$0.07	$16.38	$0.87	$78.62	$9.56	$3.74	$5.39	$47.15	$2.45
Grants and Donations	$175.58	$113.49	$86.93	$81.18	$93.08	$96.89	$82.62	$73.19	$106.87	$107.34
Pollutant Taxes and Fees	$251.02	$246.36	$246.85	$252.04	$260.33	$267.19	$273.15	$286.48	$301.35	$282.40
Repayment of Loans	$63.90	$75.52	$86.76	$102.86	$99.78	$83.38	$95.98	$68.24	$81.72	$119.71
Sales and Leases	$0.51	$2.37	$1.67	$4.96	$1.38	$1.33	$1.33	$1.58	$1.06	$1.56
Severance Taxes	$25.59	$5.00	$5.55	$5.24	$4.93	$6.85	$6.61	$6.83	$6.70	$5.94
Sale of Bonds	$-	$-	$49.90	$-	$-	$49.87	$-	$-	$-	$-
Non-Doc Stamp Subtotal	**$517.71**	**$471.24**	**$467.12**	**$467.55**	**$561.43**	**$482.57**	**$481.04**	**$458.28**	**$563.18**	**$538.23**
Doc Stamp Committed to Water Resources	$-	$-	$-	$-	$-	$-	$-	$254.22	$294.77	$316.09
Total Water Quality Revenues	**$517.71**	**$471.24**	**$467.12**	**$467.55**	**$561.43**	**$482.57**	**$481.04**	**$712.50**	**$857.95**	**$854.32**

Forecast	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Fees and Licenses	$25.08	$25.40	$25.73	$26.04	$26.35	$26.64	$26.93	$27.22	$27.51	$27.79
Fines, Penalties, Judgements	$2.49	$2.52	$2.55	$2.58	$2.61	$2.64	$2.67	$2.70	$2.73	$2.76
Grants and Donations	$128.69	$97.69	$94.89	$96.57	$98.47	$100.56	$102.48	$104.49	$106.54	$108.57
Pollutant Taxes and Fees	$266.22	$284.38	$292.54	$296.40	$298.89	$300.83	$302.31	$303.55	$304.58	$305.49
Repayment of Loans	$89.89	$97.11	$102.24	$96.41	$98.58	$99.08	$98.02	$98.56	$98.55	$98.38
Sales and Leases	$1.58	$1.60	$1.62	$1.64	$1.66	$1.68	$1.70	$1.72	$1.73	$1.75
Severance Taxes	$5.92	$5.95	$4.41	$3.19	$3.18	$3.21	$3.45	$3.53	$3.53	$3.65
Sale of Bonds	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Non-Doc Stamp Subtotal	**$513.95**	**$508.69**	**$519.57**	**$519.65**	**$526.56**	**$531.44**	**$534.12**	**$538.24**	**$541.65**	**$544.74**
Doc Stamp Committed to Water Resources	$319.00	$319.00	$319.00	$319.00	$319.00	$319.00	$314.00	$314.00	$314.00	$314.00
Total Water Quality Revenues	**$832.95**	**$827.69**	**$838.57**	**$838.65**	**$845.56**	**$850.44**	**$848.12**	**$852.24**	**$855.65**	**$858.74**

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 granular level. Further, the amount of these revenues used for water supply purposes versus water quality is not identifiable, and projects or initiatives may benefit both purposes. Table 3.4.4 provides a forecast and details a history of WMD revenues from their own sources. Ad valorem collections[135] comprise approximately 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, and other miscellaneous revenues. The ad valorem portion of the first two years of the forecast come from the adopted and tentative budgets of the WMDs while the final three years rely on a three-year moving average growth rate by district.[136] The forecast for the remaining share of this revenue relies on population growth adopted by the July Demographic Estimating Conference. Note that the historic data is in local fiscal years, which begin October 1 and end September 30. For forecasting purposes, it was converted to state fiscal years.

Table 3.4.4 Water Management District Revenues from Own Sources (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$7.03	$5.08	$6.31	$7.05	$5.69
SJRWMD	$88.27	$90.89	$90.24	$91.81	$98.35
SFWMD	$326.46	$312.66	$310.64	$317.29	$340.40
SWFWMD	$110.48	$114.46	$112.72	$117.29	$130.25
SRWMD	$7.06	$7.69	$7.60	$6.91	$9.86
Total	$539.30	$530.78	$527.51	$540.35	$584.54
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$585.32	$595.74	$605.14	$615.43	$625.76

Source: Comprehensive Annual Financial Reports of the Water Management Districts.

Table 3.4.5 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 is 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.

[135] 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. Table B.4 in Appendix B contains a short history of these rates.

[136] In the 2019 Edition and prior, the forecast for the ad valorem share of this revenue relied on the growth rate of county taxable value as adopted by the Ad Valorem Revenue Estimating Conference. The conference growth rate for the county taxable value was significantly outperforming the actual collections growth rate for the districts.

Table 3.4.5 Water Management District Revenues from Intergovernmental Sources (in $millions)

History	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18	LFY 18-19
NWFWMD	$12.87	$14.00	$14.86	$17.88	$17.73
SJRWMD	$28.84	$23.45	$28.57	$38.31	$23.80
SFWMD	$103.36	$137.45	$176.79	$170.20	$208.09
SWFWMD	$12.37	$6.24	$13.62	$6.92	$10.14
SRWMD	$14.20	$15.75	$8.41	$14.03	$14.64
Total	$171.64	$196.88	$242.25	$247.34	$274.41
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**
Total	$272.36	$275.94	$279.42	$283.06	$286.51

Source: Comprehensive Annual Financial Reports of the Water Management Districts.

Table 3.4.6 provides a forecast and details a history of revenues used for water quality purposes by special districts that are located in multiple counties. Based on survey results, a portion of the 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, accounts 323.600 Franchise Fee – Sewer, 343.500 Charges for Services - Sewer-Wastewater Utility, and 343.600 Charges for Services - Water-Sewer Combination Utility are categorized as water quality protection and restoration self-generated revenue. Accounts 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, account 331.350 Federal Grant – Sewer/Wastewater is categorized as water quality protection and restoration revenue from the federal government. Note that the historic data is 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 3.4.6 Water Quality Protection & Restoration Revenues Generated to Regional Special Districts by Government Source (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Self	$91.35	$94.65	$97.83	$102.40	$104.30
State	$0.31	$0.74	$0.43	$0.15	$1.49
Federal	$1.28	$0.03	$-	$-	$0.01
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Self	$106.12	$107.88	$109.58	$111.22	$112.82
State	$1.51	$1.54	$1.56	$1.59	$1.61
Federal	$0.01	$0.01	$0.01	$0.01	$0.01

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, 343.500, 343.600, and survey results are applied to 343.700 for self; 334.350, 334.360, and 335.350 for State; and 331.350 for Federal.

Local Revenues

Table 3.4.7 provides a forecast and details a history of self-generated revenues by local governments used for water quality purposes. Based on survey results, a portion of the local government account 343.700 Service Charge – Conservation and Resource Management is self-generated for use on water quality protection and restoration projects and initiatives. Further, accounts 323.600 Franchise Fee – Sewer, 343.500 Charges for Services - Sewer-Wastewater Utility, and 343.600 Charges for Services - Water-Sewer Combination Utility are categorized as water quality protection and restoration self-generated revenue. Note that the historic data is 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 3.4.7 Water Quality Protection & Restoration Revenues Generated by Local Governments (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$2,005.30	$2,092.15	$2,241.08	$2,378.98	$2,440.08
Municipalities	$3,073.71	$3,211.88	$3,221.87	$3,369.69	$3,474.45
Special Districts	$216.37	$221.94	$235.17	$241.70	$242.20
Total	$5,295.38	$5,525.96	$5,698.12	$5,990.37	$6,156.72
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$6,264.04	$6,367.90	$6,468.03	$6,565.22	$6,659.38

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 survey results are applied to Account 343.700.

Table 3.4.8 provides a forecast and details a history of revenues generated by the state and provided to local governments for water quality purposes. Accounts 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 is 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.

[See table on following page]

Table 3.4.8 Water Quality Protection & Restoration Revenues Provided to Local Governments from the State (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$27.74	$21.53	$8.00	$9.79	$11.95
Municipalities	$13.42	$21.99	$30.23	$34.57	$32.35
Special Districts	$0.74	$0.80	$2.56	$0.26	$0.95
Total	$41.91	$44.31	$40.78	$44.63	$45.25
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$46.04	$46.80	$47.54	$48.25	$48.94

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 3.4.9 provides a forecast and details a history of revenues generated by the federal government and provided to local governments for water quality purposes. Account 331.350 Federal Grant – Sewer/Wastewater is categorized as water quality protection and restoration revenue from the federal government. Note that the historic data is 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 3.4.9 Water Quality Protection & Restoration Revenues Provided to Local Governments from the Federal Government (in $millions)

History	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
Counties	$5.65	$0.97	$0.08	$0.51	$0.57
Municipalities	$11.55	$10.83	$12.07	$6.40	$6.18
Special Districts	$1.67	$1.77	$0.75	$0.54	$1.00
Total	$18.86	$13.57	$12.89	$7.46	$7.76
Forecast	**FY 18-19**	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**
Total	$7.89	$8.02	$8.15	$8.27	$8.39

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. Data in this table has been significantly revised and supersedes that reported in previous editions.

Private Utility Revenues

Table 3.4.10 provides a forecast and details a history of revenues generated by private wastewater utilities for water quality-related purposes. The basis for this data was provided to EDR by the Florida Public Service Commission (PSC) from the annual financial reports submitted by private wastewater utilities within jurisdictional counties. As of September 2020, only 38 of Florida's 67 counties had resolutions or ordinances adopted to impose PSC jurisdiction over private water and wastewater utilities.[137] As a result, the remaining revenues from counties outside of its jurisdiction were estimated based on per capita utility expenditures. This methodology should provide suitable estimates due to a similar mix of rural and 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 3.4.10 Revenues Generated by Private Wastewater Utilities (in $millions)

History	CY 2010	CY 2011	CY 2012	CY 2013	CY 2014	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019
Total	$63.92	$55.79	$53.07	$45.65	$47.81	$50.12	$54.64	$56.71	$58.12	$60.94
Forecast	**FY 19-20**	**FY 20-21**	**FY 21-22**	**FY 22-23**	**FY 23-24**	**FY 24-25**	**FY 25-26**	**FY 26-27**	**FY 27-28**	**FY 28-29**
Total	$60.58	$61.37	$62.15	$62.95	$63.72	$64.46	$65.19	$65.90	$66.61	$67.31

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

[137] As of the date of this report, there were 38 jurisdictional counties: 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. The non-jurisdictional counties were: 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. For an updated list of jurisdiction counties, see http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/wawtextchart.pdf. (Accessed December 2020.)

4. Modeling Future Water Demand and Supply

Abstract

The expenditures associated with ensuring that future water supplies are available to meet the increase in water demands are projected to be $852 million over the 2020 through 2040 planning horizon, with a projected state expenditure of $92.6 million over that period. These expenditures are based on the water demand projections and existing supply estimates produced by the water management districts. If the preliminary water demand forecast produced by the EDR pilot model is considered, it points to modestly lower future expenditures needed to meet the increase in the future water demand, partially because it assumes greater conservation efforts. 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. An overview of the expenditures needed to maintain and replace existing infrastructure required for current demand is discussed in Chapter 6. In addition, regarding the expenditures necessary to ensure that sufficient water is available for the natural systems, EDR examined projects implementing the recovery and prevention strategies for minimum flows and minimum water levels of water courses, water bodies, and aquifers, as well as additional projects expected to primarily benefit the natural systems. The estimated cost of these projects has been significantly revised to $665.1 million, of which the state's share is projected to be $64.7 million. These estimates will continue to evolve as methodologies and the accompanying data sources are further refined. Additional research will be undertaken to provide more complete and more precise cost estimates for future editions of this annual report.

In Chapter 3, the historical expenditures related to water supply and demand management, and spending for the protection and restoration of natural systems, are discussed. The objective of Chapter 4 is to determine whether the expenditure level is sufficient to meet the Legislature's intent. Specifically, section 403.928(1)(b), Florida Statutes, requires the Office of Economic and Demographic Research (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 the adverse effects of competition for water supplies be avoided.[138] The historical level of expenditures discussed in Chapter 3 may differ from the expenditures necessary to achieve this intent.

This chapter starts with a review of the existing water supply planning framework in Florida. It continues with the analysis of water demand and supply, inferred supply shortage, and expenditure estimates. The final section of this chapter discusses future steps to further improve the expenditure forecast.

4.1 Water Supply Planning in Florida

Florida law provides a comprehensive framework for water supply planning. Water supply assessments (WSAs) and regional water supply plans (RWSPs) developed by the water management districts (WMDs) are the primary tools for long-term water demand and supply

[138] This section also 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 WMDs.

planning in Florida.[139] Under section 373.036, Florida Statutes, the governing board of each WMD must develop a district water management plan.[140] Every district water management plan must be prepared for at least a 20-year planning period and is required to address water supply, water quality, flood protection and floodplain management, and natural systems. For water supply specifically, all district water management plans include WSAs. The assessments determine whether existing and reasonably anticipated sources of water and conservation efforts are adequate to supply water for all existing legal uses and reasonably anticipated future needs and to sustain water resources and related natural systems over the next 20 years.

Furthermore, in cases where it is determined that existing water sources are inadequate to meet the needs over the next 20 years, RWSPs must be developed. Each RWSP contains water supply development project options, and water resource development projects and programs.[141] The total capacity of the projects included in the regional water supply plans must exceed the water supply needs for all existing and future reasonable-beneficial uses within the 20-year planning horizon. An RWSP should also take into account water conservation and other demand management measures, as well as water resources constraints, including adopted minimum flow and minimum water levels and water reservations. Both RWSPs and districtwide WSAs are required to be updated at least once every five years.[142]

Florida Statutes require "[t]he planning must be conducted in an open public process, in coordination and cooperation with local governments, regional water supply authorities, government-owned and privately owned water and wastewater utilities, multijurisdictional water supply entities, self-suppliers, reuse utilities, the Department of Environmental Protection, the Department of Agriculture and Consumer Services, and other affected and interested parties" (§ 373.709(1), Fla. Stat.). While developing RWSPs, the WMDs share information about planning results and solicit comments from interested stakeholders via meetings, public workshops, webpage updates, and other means.

The Department of Environmental Protection (DEP) is charged with providing the Governor and Florida Legislature an annual status summary of regional water supply planning activities in each WMD.[143] The most recent status summary (for calendar year 2019) published in November 2020 is referred to in this chapter as "DEP (2020a)."[144] Florida is divided into 19 mutually exclusive

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[139] For a map of the five WMDs, see Figure 3.0.1.

[140] According to § 373.036, Florida Statutes, a governing board may substitute an annual strategic plan for the requirement to develop a district water management plan and the district water management plan annual report. The strategic plan should meet "the following minimum requirements:

1. The strategic plan establishes the water management district's strategic priorities for at least a future 5-year period.
2. The strategic plan identifies the goals, strategies, success indicators, funding sources, deliverables, and milestones to accomplish strategic priorities.
3. The strategic plan development process includes at least one publicly noticed meeting to allow public participation in its development.
4. The strategic plan includes separately, as an addendum, an annual work plan report on the implementation of the strategic plan for the previous fiscal year, addressing success indicators, deliverables, and milestones."

[141] Based on § 373.709, Fla. Stat.

[142] § 373.036, Fla. Stat. For more details on the water supply planning process in Florida, see pages 66-70 of the 2018 Edition of this report, available online at: http://edr.state.fl.us/Content/natural-resources/index.cfm (accessed January 2021).

[143] § 373.709, Fla. Stat.

[144] DEP. 2020a. Regional Water Supply Planning 2019 Annual Report, available online at: https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=04f84e6ae64c45e292e5b3db82f045e3. (Accessed December 2020.)

water supply planning regions (Table 4.1.1; Figure 4.1.1). For presentation purposes, the DEP (2020a) combines six of the seven water supply planning regions in the NWFWMD, reducing the number of regions statewide from 19 to 14. Water supply is projected to meet the demand throughout the planning period in all six of those NWFWMD regions, so they do not require RWSPs. For all 14 regions, the DEP includes data for "Base Year Total Water Use," "Net Demand Change," and "Water Needed," from which EDR infers available supply data. The WMDs use different schedules for their 5-year updates of the water supply assessments and plans. Specifically, 12 of the areas currently use the 2020-2040 planning horizon, while two areas still have a 2015-2035 planning horizon. Table 4.1.1 summarizes the RWSPs/WSAs used in the "Annual Status Report on Regional Water Supply Planning" in DEP (2020a).

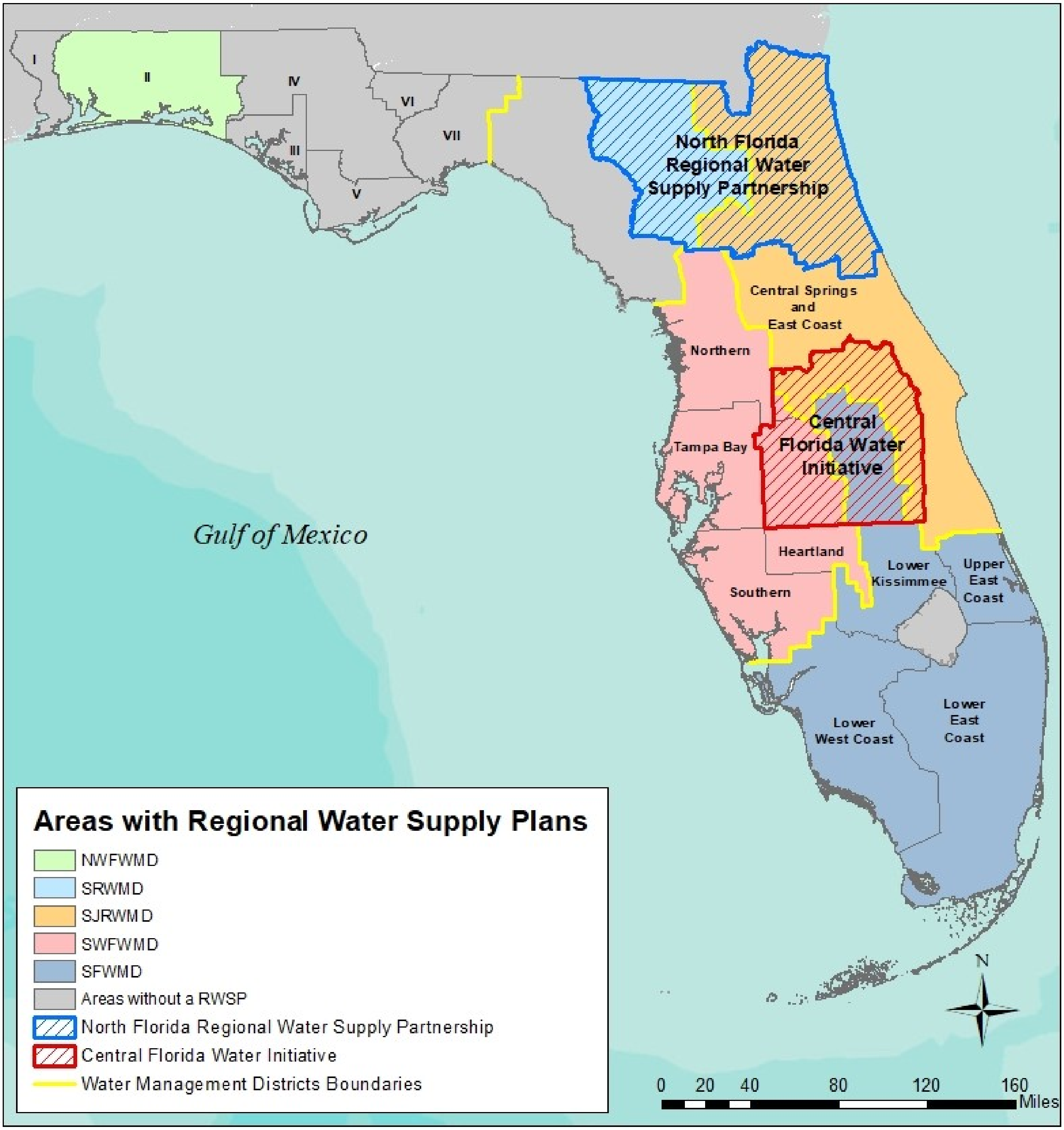
[See table on following page]

Table 4.1.1 Water Supply Planning Regions

Water Management District	Water Supply Planning Region	Counties	Abbreviation	Water Supply Planning Document Referenced in DEP (2020a)	Base Year for Water Use Estimates	Planning Horizon 2015-2035	Planning Horizon 2020-2040
Northwest Florida Water Management District (NWFWMD)	I	Escambia	**NW – Oth**	2018 Water Supply Assessment Update (2018)	2015		√
	III[a]	Bay[a]					
	IV	Calhoun, Jackson, Holmes, Liberty, Washington					
	V[b]	Franklin and Gulf[b]					
	VI	Gadsden					
	VII	Jefferson (part), Leon, Wakulla					
	II	Okaloosa, Santa Rosa, and Walton	**NW – II**	2019 Region II Regional Water Supply Plan (2020)[c]	2015		√
Suwannee River Water Management District (SRWMD)	Area outside NFRWSP	Dixie, Jefferson (part), Lafayette, Levy (part), Madison, and Taylor	**SR – West**	Water Supply Assessment 2015-2035 (2018)	2010	√	
St. Johns River Water Management District (SJRWMD)	Central Springs and East Coast (Region 2, formerly Regions 2, 4, and 5)	Brevard, Indian River Marion (part), Lake (part), Okeechobee (part), and Volusia	**SJR – CSEC**	Under Development[d]	2015		√
Southwest Florida Water Management District (SWFWMD)	Northern Planning Region (partially in Central Florida Water Initiative)[e]	Citrus, Hernando, Lake (part), Levy (part), Marion (part), and Sumter[e]	**SW – N**[e]	2020 Regional Water Supply Plan (Draft); partially in CFWI Regional Water Supply Plan 2020 (Draft)	2015		√
	Tampa Bay Planning Region	Hillsborough, Pasco, and Pinellas	**SW – TB**	2020 Regional Water Supply Plan (Draft)	2015		√
	Heartland Planning Region (partially in Central Florida Water Initiative)[e]	Hardee, Highlands (part), Polk (part)[e]	**SW – H**[e]	2020 Regional Water Supply Plan (Draft); partially in CFWI Regional Water Supply Plan 2020 (Draft)	2015		√
	Southern Planning Region	Charlotte (part), DeSoto, Manatee, and Sarasota	**SW – S**	2020 Regional Water Supply Plan (Draft)	2015		√
South Florida Water Management District (SFWMD)	Lower Kissimmee Basin	Glades (part), Highlands (part), and Okeechobee (part)	**SF – LKB**	Regional Water Supply Plan Update (2019)	2017[f]		√
	Upper East Coast	Martin, Okeechobee (part), and St. Lucie	**SF – UEC**	Regional Water Supply Plan Update (2016)	2013[f]		√
	Lower East Coast	Broward, Collier (part), Hendry (part), Miami-Dade, Monroe (part), and Palm Beach	**SF – LEC**	Regional Water Supply Plan Update (2018)	2016[f]		√
	Lower West Coast	Charlotte (part), Collier (part), Glades (part), Hendry (part), Monroe (part), and Lee	**SF – LWC**	Regional Water Supply Plan Update (2017)	2014[f]		√
SRWMD and SJRWMD	North Florida Regional Water Supply Partnership	Alachua, Baker, Bradford, Clay, Columbia, Duval, Flagler, Gilchrist, Hamilton, Nassau, Putnam, St. Johns, Suwannee, and Union	**NFRWSP**	NFRWSP Regional Water Supply Plan (2017)	2010	√	
SJRWMD, SWFWMD, and SFWMD	Central Florida Water Initiative	Lake (part), Orange, Osceola, Seminole, and Polk	**CFWI**	CFWI Regional Water Supply Plan 2020 (Draft)	2015		√

[a] The RWSP for Region III was first approved in 2008 and updated in 2014. This plan was discontinued in December 2018.
[b] The Region V RWSP was approved in 2007 and discontinued in 2014.
[c] The 2018 WSA is incorporated by reference, with the 2018 WSA containing the technical data, modeling tools, and methods used to develop the 2019 RWSP.
[d] SJR-CSEC's RWSP update has not been published. The demand estimates and projections are available in DEP (2020a). The draft RWSP is expected to be available for public comments in Spring 2021.
[e] In this report, the portion of the region outside Central Florida Water Initiative is mentioned, with the abbreviations SW – N (for the Northern Region) and SW – H (for the Heartland Region).
[f] Water demand estimates for 2015 are available in DEP (2020a).

Figure 4.1.1 Florida's WMDs and Water Supply Planning Regions



Note: WMD coloring applies only to regions that have a regional water supply plan. The hatching identifies the planning regions that cross the borders between the WMDs and where regional water supply plans were developed through collaboration by two or three WMDs.
Source: Provided by DEP, Office of Water Policy & Ecosystems Restoration.

4.2 The Expenditure Forecast: Role of EDR

Section 403.928, Florida Statutes, directs EDR to estimate future expenditures necessary to provide sufficient water for all existing and future reasonable-beneficial uses and the natural systems. EDR is also directed to include, in this report, "a compilation of projected water supply and demand data developed by each water management district pursuant to ss. 373.036 and 373.709, with notations regarding any significant differences between the methods used by the districts to calculate the data" (§ 403.928, Fla. Stat.).

To meet these requirements, EDR's expenditure analysis focuses on synthesizing a single statewide forecast using the data from other state agencies, the plans developed by the WMDs, and the most recent economic and demographic projections adopted by the Consensus Estimating Conferences. Note that the Economic Estimating Conferences develop official projections related to the state economy while the Demographic Estimating Conference develops official information concerning the population (§ 216.136, Fla. Stat.). In developing its official estimates, the Demographic Estimating Conference uses the official population estimates provided by EDR (§§ 216.136 and 186.901, Fla. Stat.).[145] EDR contracts with the University of Florida's Bureau of Economic and Business Research (BEBR) to produce the population projections. The goal for future editions of this report is to link the water expenditure forecast with the official economic and demographic forecasts for purposes of the state planning and budgeting system.

The information in the DEP's annual status report (DEP 2020a[146]) provides an important basis for the EDR expenditure forecast presented in this edition. Demand estimates and projections for at least a 20-year planning horizon are developed by the WMDs using standard techniques with region-specific information. The WMDs' estimates and projections are vetted and verified through discussions with water utilities, local governments, and other water users and stakeholder groups. The WMDs analyze water supply availability by simulating future demands through the use of hydrogeological models. The WMDs' projections fulfill the statutory requirements of water supply planning and provide the districts with sufficient information for planning purposes within their sub-regions. The DEP exercises general supervisory authority over the WMDs throughout this process (§ 373.036(7), Fla. Stat.).

For estimating and projecting populations in water supply plans, the WMDs shall consider the BEBR medium population projections and population projection data and analysis submitted by a local government if the data and analysis support the local government's comprehensive plan (§ 373.709, Fla. Stat.). Any adjustment of or deviation from the BEBR projections must be fully described, and the original BEBR data must be presented along with the adjusted data. The WMDs' projections, however, may not aggregate well to the annual statewide forecast needed by EDR to produce its required expenditure forecast. Specifically:

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[145] General provisions for the Consensus Estimating Conferences are defined in § 216.134, Fla. Stat. Specifically, the Consensus Estimating Conferences are within the legislative branch. The membership of each consensus estimating conference consists of principals and participants. The principals of each conference shall be the professional staff of the Executive Office of the Governor designated by the Governor, the coordinator of EDR, professional staff of the Senate designated by the President of the Senate, and professional staff of the House of Representatives designated by the Speaker of the House of Representatives.

[146] DEP. 2020a. Regional Water Supply Planning 2019 Annual Report, available online at: https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=04f84e6ae64c45e292e5b3db82f045e3. (Accessed December 2020.)

- The schedules to develop the WMDs' projections are not required to be synchronized. As a result, the 20-year planning horizons can differ among the regions.[147] Currently, all but two planning regions use the 2020-2040 planning horizon.

- The asynchronous 5-year updates for the RWSPs/WSAs result in different population and economic projections utilized in the different regions. For example, the SF – UEC projections utilize the 2014 BEBR population publication (with the BEBR's base year estimates for 2013). The SF – LKB uses the 2018 BEBR publication (with the BEBR's base year estimates for 2017). By 2040, the difference between the 2014 and 2018 BEBR statewide population projections is almost one million people. In other words, even though the regions consider the BEBR medium projection for the 2040 population, the statewide population projection for 2040 is not equal to the sum of the population projections from the WMDs' planning regions.[148]

- The WMDs' water demand projections are generally updated every five years,[149] while EDR annually provides population estimates and projections to the Executive Office of the Governor (§ 186.901, Fla. Stat.). Furthermore, the updated statewide population forecast is adopted several times per year (through the Consensus Estimating Conferences). The updates can be considerable. For example, in 2017, a significant increase in the projected population was incorporated in the statewide population forecast linked to the influx of Puerto Ricans migrating to the state due to Hurricane Maria's impacts.[150]

- According to WMD staff, economic conditions are considered in developing their water demand projections. Still, combined statewide results are unlikely to be consistent with the official Florida Economic forecast or share the same overarching economic outlook. Regardless, the official Florida Economic forecast is updated more frequently than the WMDs' projections. Projected increases in water demand should be closely tied to the most recent long-term forecast adopted by the Florida Consensus Estimating Conferences. The annually updated long-term population forecast adopted by the Demographic Estimating Conference, along with the economic forecasts produced by EDR, can serve as the basis for EDR's prototype water demand projections intended for statewide expenditure modeling.[151]

- Asynchronous schedules of WSAs/RWSPs updates also lead to the application of different versions of agricultural acreage and water use projections by the WMDs. The Florida

[147] Following the terminology defined in the Guidelines (DEP et al. 2019), "planning period" or "planning horizon" refers to "the period of time starting with the first projected year (…). This period must not be less than 20 years. This planning period may begin before the final approval of the plan, so long as the plan is approved within five years of the start of the planning period. The planning period must end on a year ending in 5 or 0 (*e.g.*, 2020, 2025, 2030, etc.) for statewide reporting consistency" (DEP et al. 2019, p. 4). In turn, the "base year" is "typically between one and five years prior to the first year of the planning period" and "water use in the base year is not a projection, but rather actual or estimated use" (DEP et al. 2019, p. 4).

[148] For selected WMDs, the county population considered in WSAs/RWSPs may differ from the BEBR medium population projections due to the WMDs' analysis of permanent and non-permanent populations (the BEBR focuses on the permanent population only).

[149] Updated as part of the WMD water supply planning requirements (§ 373.036, Fla. Stat.)

[150] See EDR. 2017. Demographic Estimating Conference Executive Summary. December 5, 2017. http://edr.state.fl.us/Content/conferences/population/archives/171205demographic.pdf (accessed January 2021.)

[151] EDR focuses on statewide water demand and expenditure modeling. In contrast, the WMDs focus on region-specific water demand projections, which is more appropriate for the WMDs' mission.

Department of Agriculture and Consumer Services (DACS) has been releasing yearly updates of its Florida Statewide Agricultural Irrigation Demand (FSAID) Geodatabase. During the initial years of the FSAID, data sources and methods were continually refined. Currently, the seventh update of the agricultural acreage and irrigation demand is available. For illustration, existing forecasts from the NFRWSP use the second update, while the predictions for the SWFWMD and SF – LKB rely on the fifth update.

- Significant differences in the demand estimation and projection methodologies exist among the WMDs (as discussed in the following section). These methodologies reflect data availability since underlying data sources vary across the state. Note that the WMDs and the DEP collaborate on developing consistent methodologies for water demand and supply planning for the CFWI, NFRWSP, and SR – West, as well as updating the guidelines for regional water supply planning (DEP et al. 2019[152]).

- The WMDs' projections are not required to be annual.[153] In contrast, as Florida's legislative budgeting process is completed annually, EDR must develop annual estimates of future expenditures to be useful in the budgeting process. Specifically, while yearly forecasts can be generated by interpolating 5-year forecasts, such interpolation requires an assumption of a trend (*e.g.*, an equal increase in the water demand each year in a 5-year interval).

It is worth reiterating that the WMDs' information is sufficient for the planning purposes of the WMDs' planning regions and is consistent with statutory direction. Further, based on discussions with WMD staff, the WMDs and DEP have made considerable effort to update their guidelines and methodologies to standardize their planning data formats. Nevertheless, due to the importance of updated economic and demographic data for the water demand forecast, and considering the office's forecasting capacity, EDR is confident that it can produce an independent demand projection to facilitate the expenditure forecast while ameliorating the difficulties bulleted above. Further, for the EDR forecast, adjustments can be made each year. Alternative scenarios can be explored, such as drought, fluctuations in tourism (if the seasonal population is incorporated in the demand projections), and economic cycles. A water demand forecast produced by EDR could also extend beyond the 20-year planning horizon used by the WMDs in the attempt to account for long-term trends, such as weather and climate patterns.[154]

Note that EDR's forecast should only be considered at the statewide level for the purposes identified in section 403.928, Florida Statutes, and is not appropriate for any regional planning or permitting use. This difference between the projections of the WMDs and the forecast of EDR is partly because EDR is more focused on predicting a reliable statewide expenditure forecast and does not intend to tailor the predictions to reflect specific regional-level drivers.

[152] DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.

[153] Water demand projections are required to be developed for 5-year intervals during the planning period, see subparagraph 62-40.531(1)(a), F.A.C.

[154] For example, the Texas 2017 State Water Plan focuses on the 2020-2070 planning period (available online at: https://www.twdb.texas.gov/waterplanning/swp/index.asp; accessed January 2021.) California also considers a 50-year planning horizon, with projected state funding needs for their State Water Plan Goal 2 "Strengthen Resiliency and Operational Flexibility of Existing and Future Infrastructure" estimated at $59.0 billion by 2068 (available online at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2018/Final/California-Water-Plan-Update-2018.pdf; accessed January 2021.)

4.3 Water Use Projections Based on WMD Data

While the most recent WSAs and RWSPs were developed or updated in different years, estimated or projected water uses are available for most regions for 2020 to 2040, based on 5-year intervals. The exceptions are two regions — SR – West and NFRWSP — where demand estimates and projections are available for 2015-2035 only.[155] For these regions, EDR estimates the 2040 use with a linear trend (see Appendix A.1).[156]

Based on the WMDs' data, between 2020 and 2040, the total statewide water use is projected to increase by about 980 million gallons per day (mgd), or approximately 15% (Table 4.3.1). Roughly two-thirds of the statewide water use increase (656.78 mgd) can be attributed to four regions: NFRWSP, CFWI, SF – LEC, and SF – LWC.

Overall, all but one planning region expect an increase in water use. The exception is the SW – H (outside the CFWI), where a slight reduction in water use is projected by 2040, though this reduction follows an increase in 2020-2030. In that region, agricultural irrigation is projected to decline, and despite the expected increase in water use in public supply and domestic self-supply categories, the total regional water demand is also forecasted to decline (by less than 3%).

[See table on following page]

[155] Throughout this chapter, we use the terms "water use" and "water demand" interchangeably. However, in economic literature, the word "demand" refers to the quantity of water used given a specific price level, and "demand function" refers to the relationship between the quantity of water used and the price of water.
[156] This projection is being used to create a single 20-year timeframe. For the two regions, extending the WMDs' projections in a linear trend is a simple forecasting approach. It does not account for the myriad factors the WMDs must incorporate into their predictions.

Table 4.3.1 Water Use Projections by WMDs

Region	Estimates or Projections (mgd)	Projections (mgd)					Difference between 2020 and 2040 water use projections	
	2015	2020	2025	2030	2035	2040	mgd	%
NW – II	69.74	76.88	82.25	87.03	91.19	94.88	18.00	23.4%
NW – Oth	254.16	273.72	287.12	296.92	304.58	311.90	38.18	14.0%
SR – West*	100.55	106.53	110.92	116.69	122.35	127.54*	21.01*	19.7%*
SJR – CSEC	353.17	383.47	395.62	406.11	416.72	427.87	44.40	11.6%
SW – N**	131.08	142.49	153.55	163.54	173.09	181.73	39.24	27.5%
SW – TB	385.71	413.34	432.77	436.96	450.56	461.85	48.51	11.7%
SW – H**	94.91	91.52	89.45	96.17	94.96	89.15	-2.38	-2.6%
SW – S	234.95	245.02	254.22	265.77	272.99	279.33	34.31	14.0%
SF – LKB	245.29	249.90	251.83	253.68	253.83	257.49	7.59	3.0%
SF – UEC	272.95	279.15	288.89	298.46	325.38	354.68	75.53	27.1%
SF – LEC	1,739.61	1,813.99	1,863.91	1,923.28	1,963.65	2,006.54	192.55	10.6%
SF – LWC	980.33	1,030.31	1,073.57	1,113.64	1,170.36	1,210.68	180.37	17.5%
NFRWSP*	555.29	585.06	612.70	641.36	667.47	696.57*	111.51*	19.1%*
CFWI	667.12	735.24	789.49	836.65	873.94	907.59	172.35	23.4%
State	**6,084.85**	**6,426.62**	**6,686.29**	**6,936.25**	**7,181.07**	**7,407.80**	**981.18**	**15.3%**

* For the SR-West and NFRWSP, 2040 projections are developed by EDR using a linear trend and 2015-2035 estimates and projections available from the WMDs.
** Portion of the region outside the CFWI.

In each water supply planning region, the demand projections are developed for six use-type categories defined in part through water supply means (*i.e.*, public supply or self-supply). The names of the categories vary slightly among the WMDs, and therefore, EDR adopts the names suggested in the 2019 regional water supply planning guidelines:[157]

a) *Public Supply (PS)* — such as water utilities supplying water for various uses, including household and community purposes, as well as commercial, industrial, institutional, mining, power generation, and recreational landscaping uses. According to the Format and Guidelines for the RWSP (DEP et al. 2019[158]), public supply uses with a current allocation greater than or equal to 0.1 mgd should be listed individually. Small public supply systems (*i.e.*, public supply systems with an allocation of less than 0.1 mgd) and individual residential irrigation wells may also be included in the PS category (DEP et al. 2019). Note that in their RWSPs, the SWFWMD combines public supply and domestic self-supply into one group, together with the estimated water use for residential irrigation wells. This group is then split into PS and Domestic Self-Supply (DSS) in the DEP (2020a[159]) to make the categories more consistent with that used by the other WMDs.

[157] Note that these names are slightly different from that used in § 62-40.531(1)(b), Florida Administrative Code. These names are different from those used in the 2018 and 2019 Editions of this EDR report and from those used in some of the WSAs/RWSPs. The names are consistent with the 2019 Format and Guidelines document (DEP et al. 2019).
Reference: DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.
[158] DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.
[159] DEP. 2020a. Regional Water Supply Planning 2019 Annual Report, available online at: https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=04f84e6ae64c45e292e5b3db82f045e3. (Accessed December 2020.)

b) *Domestic Self-Supply (DSS)* — such as domestic wells providing for both indoor and outdoor household uses.[160] Note that a WMD may consider individual residential irrigation wells, including those both within and outside a public supply service area, in either the DSS or the landscape / recreational use categories (DEP et al. 2019). Also, the WMDs may choose to include small public supply systems in the DSS category (DEP et al. 2019).

c) *Agriculture (AG)* — includes self-supplied agricultural irrigation, livestock watering, aquaculture, and frost-freeze protection. DEP et al. (2019) suggest that all known self-supplied agriculture irrigation should be included based on the best available data. In determining the best available data, the WMDs are required to consider the DACS's future agricultural water supply demands data (§§ 373.709 and 570.93, Fla. Stat.).

d) *Landscape/Recreational (L/R)* — includes, but is not limited to, self-supplied golf courses, parks (including water parks), and commercial center irrigation (DEP et al. 2019). Note that a WMD may consider individual residential irrigation wells, including those both within and outside a public supply service area, in either the DSS or the L/R use categories (DEP et al. 2019).

e) *Commercial/Industrial/Institutional (CII)* — includes various self-supplied commercial, industrial, and institutional activities that are not supplied with water through PS. Self-supplied commercial, industrial, and institutional uses equal to or greater than 0.1 mgd may be listed individually or in the aggregate. The WMDs may exclude appropriate quantities of recirculated water from demand projections for planning purposes (DEP et al. 2019).

f) *Power Generation (PG)* — includes power generation facilities that rely on self-supplied groundwater or fresh surface water. According to DEP et al. (2019), self-supplied power generation uses with an individual water use permit or Site Certification issued by the DEP should be listed individually. Other known self-supplied power generation uses may be listed individually or in the aggregate. The WMDs should exclude recirculated water from demand projections for planning purposes.

According to DEP et al. (2019), the WMDs must account for reclaimed water[161] when analyzing and projecting demand for all the water use categories except the DSS. Therefore, although category names may include the reference to "self-supply," a share of water use in these categories can be met by reclaimed water from domestic wastewater treatment plants.

As mentioned above, the WMDs' projections for the water use categories depend on local and regional data availability. While the general approach to estimating and projecting the water demand is consistent among the regions, differences were identified in the specifics. A detailed analysis of the differences among the WMDs' methods can be found in Appendix A.2. Significant differences include:

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[160] As stated above, the SWFWMD combines public supply and domestic self-supply into one group, together with the estimated water use for residential irrigation wells. This group is then split into the PS and DSS categories in the DEP (2020a) to make the categories more consistent with that used by the other WMDs.

[161] "Reclaimed water" is defined in Chapter 62-610.200, Florida Administrative Code, as "water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility."

- *The definition of the population used to forecast PS water use*. For each water utility included in PS, all WMDs project water demand as a product of the per capita water use rate (based on the last year or last several years) and the projected population. The definitions of the population, however, differ between the WMDs. Some WMDs explicitly base their projections on the permanent and non-permanent population.

- *County population projections utilized in PS and DSS projections.* All WMDs reconcile their county population projections (*i.e.*, the total of PS and DSS populations) to that of the BEBR.[162] However, the publication years for the annual BEBR projections used by the WMDs range from 2014 to 2018. Therefore, the population considered in all the WSAs/RWSPs does not add up to the most recent statewide adopted population projections. Note that the BEBR's population projections are prepared under a contractual agreement with the Florida Legislature. As part of this agreement, EDR works closely with BEBR on continuously updating the projections.

- *Agricultural water use projection.* Districts are required to consider irrigated agricultural acreage and demand data published in the most recent DACS's Florida Statewide Agricultural Irrigation Demand (FSAID) Geodatabase (§ 373.709, Fla. Stat.). While some WMDs apply agricultural water use projections developed by the DACS, others develop their projections independently (*e.g.*, using FSAID acreage data), based on suitability within specific planning regions.

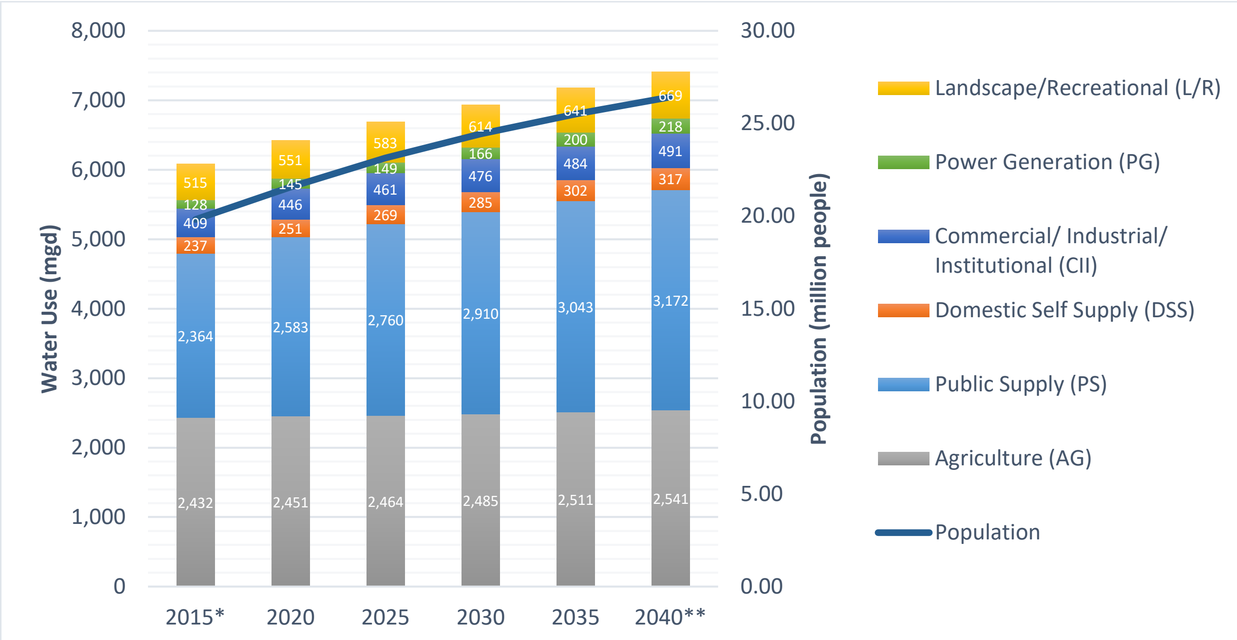
Water use is projected to grow in all categories, but the most substantial escalation is projected for public supply (*i.e.,* 589.13 mgd out of the total increase of 981.18 mgd). While the statewide water use data for 2020 are not yet available, the WMDs' projections show that public supply surpasses agriculture and becomes the largest water use category. The rate of water use expansion in public supply (22.81%), domestic self-supply (26.36%), and landscape / recreational (21.33%) generally match the rate of population growth (22.61% in 2020-2040, based on the EDR population forecast). Water use in agriculture is also forecasted to increase; however, the rate is only 3.65% over the 20-year period.[163] A graph summarizing this data is provided in Figure 4.3.1.

[See figure on following page]

[162] The NWFWMD and SWFWMD also explicitly account for the non-permanent population.
Overall, according to Section 373.709(2)(a)1.a, Florida Statutes, "Population projections used for determining public water supply needs must be based upon the best available data. In determining the best available data, the district shall consider the University of Florida Bureau of Economic and Business Research (BEBR) medium population projections and population projection data and analysis submitted by a local government pursuant to the public workshop described in subsection (1) if the data and analysis support the local government's comprehensive plan. Any adjustment of or deviation from the BEBR projections must be fully described, and the original BEBR data must be presented along with the adjusted data."

[163] Note that the water demand projections are different from that discussed in the 2020 Edition of this report. Appendix A.3 explains the key reasons for the changes in the WMDs' water demand projections.

Figure 4.3.1 WMDs' Water Use Projections (mgd)



Source: DEP, with adjustments for 2040 demand in NFRWSP and SR-West
* For most regions, water use in 2015 is estimated based on available data; for selected regions with older RWSPs, the use was projected using 2010 data.
** For two regions—NFRWSP and SR-West—2040 projections were not available in DEP 2020; EDR estimated the water use based on a linear trend. Note that for all water use categories in both regions, linear trend represented 2015-2035 data extremely well (R-squared for Ordinary Least Squares regression above 0.99, estimated in Microsoft Excel).

Alternative Water Use Scenarios: Impacts of Water Conservation and Droughts

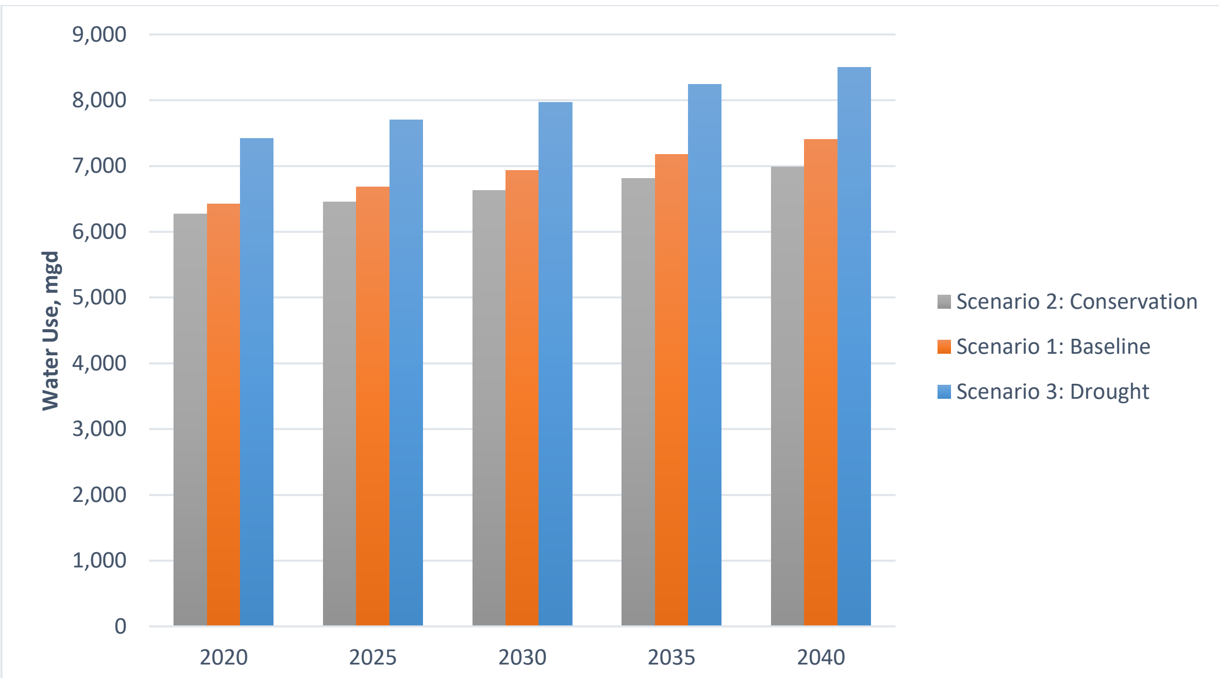
The projected 2020-2040 increase in statewide water use is significant – 15.27%. We refer to the scenario discussed above as "Scenario 1" or "baseline scenario." The EDR expenditure forecast is based on this "baseline scenario." However, it is important to realize that part of the water use increase projected for Scenario 1 can be offset by improving water use efficiency and water conservation, which is not explicitly accounted for in the water demand projection. Conversely, the demand can exceed the projections, especially given drought conditions.

The conservation projections are intended to represent "reasonably expected demand reduction at the end of the planning period due to conservation activities" (DEP et al. 2019, p. 30).[164] Statewide, conservation could offset 418.14 mgd by 2040,[165] reducing the statewide projected water demand by 5.64%, from 7,407.80 mgd to 6,989.66 mgd (Figure 4.3.2). In terms of the projected 2020-2040 demand increase, conservation, with appropriate investments, can reduce this increase by

[164] An alternative water use scenario accounts for conservation potential. This scenario is referred to as Scenario 2, conservation. For planning purposes, water conservation is defined as "the prevention and reduction of wasteful, or unreasonable uses of water to improve the efficiency of use" (p. 30, DEP et al. [2019]).
Reference: DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.
[165] In DEP, the value is 399.29; however, the projection stops at 2035 for two regions.

approximately a quarter (from 981.18 mgd to 717.20 mgd).[166] This scenario is referred to as Scenario 2, conservation. Note that the WMDs emphasize that the potential conservation should not be directly removed from water demand estimates since actual savings are based on endorsement and implementation of conservation measures by public supply utilities and other users, as well as being highly contingent on specific user participation rates. Substantial investments may be needed to realize these savings. As a result, conservation projections are developed by the WMDs separately from the water demand projections.

Figure 4.3.2 Statewide Water Use Projections Based on WMDs Data



The WMDs are required to incorporate a level-of-certainty planning goal associated with demand for a 1-in-10-year drought event.[167] The 1-in-10-year drought event is defined as "a year in which below normal rainfall occurs with a 10% probability of occurring in any given year" (DEP et al. 2019). For the final year of their current planning horizons (*i.e.*, 2035 or 2040), all WMDs calculate the drought year water demand. These estimates are summarized in DEP (2020a). Some WMDs also provide drought demand projections for the 5-year intervals. EDR relied on these projections to develop 5-year drought demand estimates, along with a review of individual WSAs and RWSPs (see Appendix A.5 for a summary of EDR drought demand calculations, by region). Statewide,

[166] The calculations of the conservation potential for 2020-2040 are discussed in Appendix A.4. This report generally includes the estimates presented in DEP (2020a), accounting for both "Conservation Projection" and "Additional Conservation Projection" from DEP (2020a).
Reference: DEP. 2020a. Regional Water Supply Planning 2019 Annual Report, available online at: https://floridadep.gov/water-policy/water-policy/content/water-supply . (Accessed November 2020.)
[167] Specifically, the Florida Statutes require the level-of-certainty planning goal associated with identifying the water supply needs of existing and future reasonable-beneficial uses to be based upon meeting those needs for a 1-in-10-year drought event (§ 373.709(2)(a)1, Fla. Stat.).

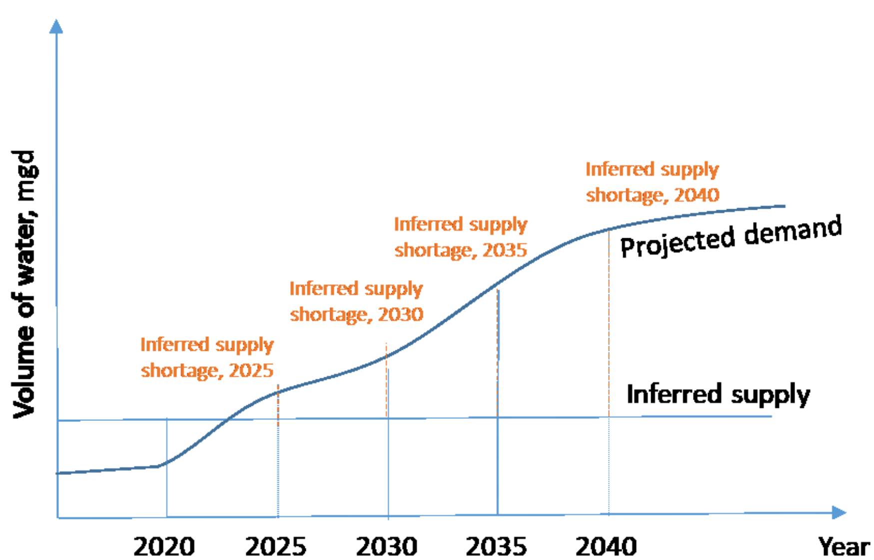
the drought demand is expected to be approximately 15% higher than the demand in the baseline scenario. The scenario that accounts for the 1-in-10-year drought but does not explicitly consider the conservation potential is referred to as Scenario 3 (see Figure 4.2.2).

4.4 Inferred Water Supply and Inferred Water Shortage

The EDR expenditure forecasts must rely on the estimates of the difference between the projected demand and the existing water supply. If the difference is negative or zero, no investments in increasing the water supply are needed. In this case, only expenditures for maintaining or replacing existing infrastructure and investments for natural system restoration are needed. In contrast, if the projected demand is greater than the existing supply, additional water supplies should be identified, and invested in, to meet water demand growth.

EDR defines the potential "inferred water supply shortage" as the projected water demand's exceedance over the existing inferred supply. This "inferred water supply shortage" should not be considered as the actual water shortage emergency.[168] In contrast, EDR defines "inferred water supply shortage" as a potential future imbalance between the projected demand and the currently existing supply, which should be addressed by proactively investing in the development of additional water supplies. For each planning region listed in DEP (2020a) and for each period, it is calculated as the difference between projected demand in that period and the 2020 inferred water supply (see Figure 4.4.1).

Figure 4.4.1 Schematic Illustration of Inferred Water Supply Shortage Calculations



[168] The "inferred water supply shortage" is developed for the EDR's expenditure forecasts only, and it is not the same as "water shortage" defined in Chapter 40A-21, Florida Administrative Code, which describes water shortage as a situation that "usually occurs as a result of a drought." (A similar description is presented in 40A-21, 40B-21, 40C-21, 40D-21 and 40E-21, Florida Administrative Code)

To infer the existing water supply, EDR subtracts "water needed" reported in DEP (2020a) from the demand projected for the last year of the WMDs' planning horizon (*i.e.*, 2035 or 2040, depending on the region).[169] This inferred supply does not necessarily represent the total water volume available for withdrawals.[170] The dynamic nature of hydrogeology and water quality do not easily lend themselves to calculating a specific static water supply. The inferred supply described, however, is the best proxy for the total water supply that EDR can use to calculate the expenditure forecasts.

Table 4.4.1 summarizes the water demand at the end of a WMD's planning period and related water needed information provided by the WMDs and reported in DEP (2020a). Note that these water demand projections focus on demand Scenario 1 (baseline); that is, they do not account for the potential drought, and they do not explicitly consider the conservation potential. The projected water demand in the last year of the region's planning horizon minus "water needed" is equal to the inferred water supply, as shown in Figure 4.4.2 below.

Figure 4.4.2 Inferred Water Supply Equation

[See table on following page]

[169] Based on DEP et al. (2019), water needed can be interpreted as the amount of water a WMD identifies as needed to meet future demands.
Reference: DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.

[170] For example, in the NWFWMD, water resources are examined using methods such as potentiometric surface mapping, long-term hydrograph trend analysis, generalized groundwater budget evaluation, and groundwater quality analysis. Determining the total water supply is not the goal of such analysis; instead, the focus is on whether the projected demand can impact and potentially harm water resources. In addition to this general determination, the NWFWMD uses the currently permitted volumes of water for public supply to estimate the total demand that can be met, as well as related "water needed." Therefore, as long as projected demand can be met with the permitted water volumes, no other determinations of the total water supply are made by the NWFWMD. The approach is different in selected other regions, where the WMDs identify the total water availability. For example, in the CFWI, it was determined that "the CFWI Planning Area could potentially sustain up to 760 mgd of fresh groundwater withdrawals, but local management strategies will be needed (...) to address unacceptable impacts" (CFWI 2020, p. iv). For the description of the methods used by the WMDs to identify supplies, see Appendix A.6.
Reference: CFWI. 2020. 2020 Central Florida Water Initiative (CFWI) Regional Water Supply Plan (RWSP), Volume I. Public Review draft.

Table 4.4.1 Inferring Water Supply

Planning Region	Data from DEP (2020a)			Calculations by EDR
	2035 Water Use Projection	**2040 Water Use Projection**	**Water Needed (mgd)**	**Inferred Water Supply***
NW – II	91.19	94.88	5.00	89.88
NW – Oth	304.58	311.90	0.00	311.90
SF – LKB	253.83	257.49	0.01	257.48
SF – UEC	325.38	354.68	3.75	350.93
SF – LEC	1,963.65	2,006.54	49.55	1,956.99
SF – LWC	1,170.36	1,210.68	9.27	1,201.41
SJR – CSEC	416.72	427.87	TBD**	394.52**
SR – West	122.35	N/A	0.00	122.35
SW – N (excluding CFWI)	173.09	181.73	11.55	170.18
SW – TB	450.56	461.85	0.00	461.85
SW – H (excluding CFWI)**	94.96	89.15	0.00	89.15
SW – S	272.99	279.33	0.00	279.33
CFWI	873.94	907.59	95.00	812.59
NFRWSP	667.47	N/A	112.20	555.27

* Estimated as 2040 water use minus water needed. If 2040 water use is not available, 2035 water use is applied.
** Since "water needed" is not reported in DEP (2020a), EDR assumes that the inferred supply remains the same as "Estimated Existing Sources Available to Meet Future Demands" published in the Regional Water Supply Planning 2018 Annual Report (DEP 2019b), that is, 394.52 mgd. This assumption implies that "water needed" is 394.52 minus 427.87, equaling a shortage of 33.35 mgd. Reference: DEP. 2019b. Regional Water Supply Planning 2018 Annual Report. Available online at https://geodata.dep.state.fl.us/app/932ef4223c304dc4a0ff5653e1e3615a (Accessed January, 2021).

To calculate the inferred supply shortage, water demand information reported in DEP (2020a) is compared with the inferred supply. The inferred supply shortage is the difference between the WMD-projected water demand and the inferred water supply reported in Table 4.4.1. For all regions, except SJR-CSEC, NFRWSP, and SR-West, inferred supply shortage is equal to "water needed" values summarized in DEP (2020a). Note that no water availability determinations, groundwater or otherwise, are performed by EDR. Further, the analysis of regional inferred supply shortages is not an indicator of water availability on an individual permit basis.

The demand, supply, and inferred supply data are shown in Tables 4.4.2 and 4.4.3. The inferred supply and potential inferred supply shortage calculations contain four assumptions:

- It is assumed that the estimated demand in the base year was met with the inferred supply and that this base year quantity will continue to be met decades into the future. It does not account for the investments needed to maintain aging infrastructure, relocate wellfields due to saltwater intrusion in coastal areas, or address other impacts on the existing supply.

- It is assumed that the inferred supply in a region does not change over time without investments in alternative water supplies. In the future, EDR plans to refine this assumption. It is recognized that "Water Needed" reported above is based on the specific approaches to estimating the existing supplies used by WMDs, and in some cases, part of the "Water Needed" can still be met by the traditional groundwater sources. For example, based on the feedback from SWFWMD, traditional groundwater resources are anticipated to be the primary sources to meet a majority of the projected additional water demands in

SW – N through 2040.[171] Groundwater can be a less expensive water supply source as compared with the alternative water supplies, and therefore, the expenditure forecast for SW – N presented in this report can exceed the actual expenditure needs. Another issue to be addressed in the future is the potential change in the inferred existing supply due to the saltwater intrusion or other issues that could potentially require additional future investments not accounted in this report.

- Regions reported as having zero "water needed" in DEP (2020a) are assumed by EDR to have an inferred supply equal to their highest projected water use. Realistically, in all such regions, it is highly unlikely that the existing sources[172] are precisely the same as the future demand; however, this assumption is still reasonable given the limited data available.

- Natural system restoration needs are assumed to be accounted for in the "water needed" field in DEP (2020a). Water necessary to restore or protect natural systems should be an important element in the expenditure projections. Water for natural systems is clearly not identified as a water demand in DEP (2020a). Yet, it is unclear to what degree natural system restoration is accounted for in the "water needed" field in DEP (2020a), particularly considering the differences in methodologies used by the WMDs (see Appendix A.6).

Regardless of these assumptions and due to the complex nature of quantifying water supply across the state, EDR relies on the WMDs' water demand and water needed data to infer supply. Approaches used by the WMDs to evaluate existing supplies are discussed in Appendix A.6.

[See table on following page]

[171] SWFWMD also continues to support the development of reclaimed water and conservation projects within the Region.
[172] Existing sources include both traditional and alternative sources already built or proposed to be built during the 20-year planning horizon.

Table 4.4.2 Water Demand and Inferred Supply Based on WMD Data

Demand	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Inferred Supply*
NW – II	69.74					76.88					82.25					87.03					91.19					94.88	89.88
NW – Oth	254.16					273.72					287.12					296.92					304.58					311.90	311.90
SR - West**	100.55					106.53					110.92					116.69					122.35					127.54**	122.35
SJR – CSEC	353.17					383.47					395.62					406.11					416.72					427.87	394.52
SW – N (excluding CFWI)	131.08					142.49					153.55					163.54					173.09					181.73	170.18
SW – TB	385.71					413.34					432.77					436.96					450.56					461.85	461.85
SW – H (excluding CFWI)	94.91					91.52					89.45					96.17					94.96					89.15	89.15
SW – S	234.95					245.02					254.22					265.77					272.99					279.33	279.33
SF – LKB	245.29					249.90					251.83					253.68					253.83					257.49	257.48
SF – UEC	272.95					279.15					288.89					298.46					325.38					354.68	350.93
SF – LEC	1,739.61					1,813.99					1,863.91					1,923.28					1,963.65					2,006.54	1,956.99
SF – LWC	980.33					1,030.31					1,073.57					1,113.64					1,170.36					1,210.68	1,201.41
NFRWSP**	555.29					585.06					612.70					641.36					667.47					696.57**	555.27
CFWI	667.12					735.24					789.49					836.65					873.94					907.59	812.59
Statewide	6084.85					6426.62					6686.29					6936.25					7181.07					7407.80	

*The supply data are inferred by subtracting the region's "water needed" from the highest water demand projected by WMDs for their current planning period, based on DEP (2020a). Green highlighted cells indicate the year of the RWSP/WSA publication for that region that is identified in DEP (2020a). SJR - CSEC is still awaiting initial publication, but demand data are available from DEP (2020a), and EDR assumes that the inferred supply remains the same as "Estimated Existing Sources Available to Meet Future Demands" published in the Regional Water Supply Planning 2018 Annual Report (DEP 2019, available online at https://geodata.dep.state.fl.us/app/932ef4223c304dc4a0ff5653e1e3615a, accessed January 2021), that is, 394.52 mgd. In reality, the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems and avoiding the adverse effects of competition for water supplies is location-specific.

** The 2040 water demand is projected by EDR using the WMDs' data for 2010-2035, as discussed in Appendix A.1.

Table 4.4.3 Inferred Supply Shortage to Be Met through Investments

Planning Regions	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
NWF – II	-					-					-					-					1.31					5.00
NWF – Oth	-					-					-					-					-					-
SR – West	-					-					-					-					-					5.19
SJR – CSEC	-					-					1.10					11.59					22.20					33.35
SW – N (excluding CFWI)	-					-					-					-					2.92					11.55*
SW – TB	-					-					-					-					-					-
SW – H (excluding CFWI)	-					-					-					1.21					-					-
SW – S	-					-					-					-					-					-
SF – LKB	-					-					-					-					-					-
SF – UEC	-					-					-					-					-					3.75
SF – LEC	-					-					-					-					6.66					49.55
SF – LWC	-					-					-					-					-					9.27
NFRWSP	0.02					29.79					57.43					86.09					112.20					141.30
CFWI	-					-					-					24.06					61.35					95.00
Statewide (sum of regions)	**0.02**					**29.79**					**58.53**					**122.95**					**206.63**					**353.97**

* As discussed above, SWFWMD anticipates that these quantities will largely be met with traditional groundwater sources.

Note: These values are calculated by subtracting the inferred supply from Table 4.4.2 from the demand in each year of the same table and only displays a value when the demand is higher than the inferred supply.

4.5 Water Supply and Water Resource Development Projects: Dataset Used in the EDR Expenditure Analysis

For the expenditure analysis, EDR utilizes the information about project capacity and funding available in Appendix C of DEP (2020a), referred to below as "the project appendix." The project appendix is a spreadsheet, with rows describing projects or their phases (referred to as "project items" below), and columns presenting various project characteristics.[173]

The project appendix summarizes the water supply development project options and water resource development project options identified in the current RWSPs. The appendix also includes the projects in design and construction and the projects completed in the past. Specifically, as part of the RWSPs developed under section 373.709, Florida Statutes, the WMDs are required to compile a list of water supply development and water resource development project options, including water conservation. The water supply development component must include project options, such as traditional and alternative water supply projects, which are technically and financially feasible. In the future, when additional supplies are needed to meet higher water demand, these projects may provide a menu of options to choose from for local governments, public and private utilities, regional water supply authorities, multi-jurisdictional water supply entities, self-suppliers, or others. Note that a project not included in the water supply development project option list may also be implemented to meet the future water demand. The water that can be made available from water supply development project options (*i.e.,* the total capacity) must exceed the water supply needs for all existing and future reasonable-beneficial uses within the 20-year planning horizon. In contrast, the water resource development component must include projects that support water supply development for all existing and future reasonable-beneficial uses and the natural systems. In addition, pursuant to section 373.0421, Florida Statutes, the WMDs must also include in each RWSP any water supply development or water resource development project identified in an applicable Minimum Flow and Minimum Water Level (MFL) recovery or prevention strategy (RPS). The RPS must include a phased-in approach for the development of additional water supplies, implementation of conservation strategies, and other actions to achieve recovery to an established minimum flow (for rivers, streams, estuaries, and springs) or minimum water level (for lakes, wetlands, and aquifers), or to prevent the existing flow or water level of such water resources from falling below the established minimum levels. Overall, the DEP project appendix includes the projects identified in the RWSPs and RPSs, the projects implemented and funded by the WMDs or state agencies in the past, and the projects currently being designed or constructed (and funded or co-funded by agencies) in order to meet the RWSP and MFL RPS goals.

The project appendix is the most comprehensive statewide dataset of the Florida water supply and water resource development projects currently available. Nevertheless, EDR recognizes that this dataset has two limitations that could influence the expenditure estimates. First, the project appendix primarily includes projects that are eligible for district or state cost-share funding. Such projects can differ from those carried out solely by local entities. For example, these projects can be larger in scale and have lower costs per mgd of capacity. Second, the project appendix can include projects implemented or planned for multiple benefits, with water supply or MFL RPS

[173] See the complete list of the columns and project characteristics in Appendix A.7.

goals being only a secondary benefit. For example, reclaimed water projects can be constructed to dispose of treated wastewater, rather than offset potable water use. Some projects can also be intended to ensure water supply reliability (*e.g.*, at the time of peak demand), diversify water supply sources, and reduce demands on traditional sources rather than to meet new water demand. In addition, projects can be constructed to replace aging infrastructure, providing limited water conservation benefits. EDR assumes, however, that since the project appendix is part of the DEP's RWSP Annual Status Update, most of the projects are intended for meeting the new water demand or the MFL RPS goals.

The DEP project appendix includes 1,606 project items. For each project item, the "Project Status" column indicates whether the item is canceled, completed, in construction or underway, in design, on hold, or an "RWSP or RPS option only." When canceled project items are removed, 1,545 project items remain for further analysis. EDR analyzed projects with statuses identified as in construction or underway, in design, or on hold as a single aggregate category.

The "Project Total" column in the DEP project appendix provides information about the total project funding (if any) by the state, district, and cooperating entity. Cooperative entity included, for example, a county, city, water utility, farm, homeowner association, or golf club. This information is not always reflective of the project's total implementation cost since it generally does not include information about land purchases[174] or the costs of project components ineligible for funding. This information also excludes funding provided by federal agencies, if any. EDR assumes, however, that the funding from the state, district, and cooperating entity accounts for most of the implementation cost.[175]

Further, for the projects that are listed as RWSP or RPS option only, the "Projected Total Funding (for RWSP/RPS Options Only)" column summarizes information about potential funding requirements (*i.e.*, planning-level cost estimates). This "Projected Total Funding" is an estimate only and is not verified until the project is submitted for cost-share funding to begin design or implementation. Still, this projected funding represents the best available information regarding the future funding needs and, therefore, EDR includes it in the analysis. Below, the combined "Project Total" and "Projected Total Funding (for RWSP/RPS Options Only)" is referred to as the "project total ($)."

EDR indexes "project total ($)" to $2020.[176] EDR also examines whether a project item on the list is a phase of a larger project. For example, the project appendix may list the construction of a water treatment facility and the construction of wells providing water to that facility as separate project items. Aggregating the phased or linked projects reduces the project number from 1,545 to 1,340 projects.[177] Further, 35 projects with no "project total ($)" information are removed from the database, with 1,305 projects remaining.

[174] Although the spreadsheet includes the columns "Land Acquisition Component" and "Total Land Acquisition Funding by District or State," the information in these columns is not provided, except for a handful of project items.
[175] See additional discussion of infrastructure cost and funding in Chapter 6.
[176] See Appendix A.8 for details.
[177] See Appendix A.9 for additional description.

Finally, 230 projects with no information about the project capacity are also excluded from the analysis,[178] leaving 1,075 projects in the database. To evaluate the water or reuse flow made available by the projects (*i.e.*, the project capacity), the columns "Quantity of Water Made Available on Completion (mgd)" and "Reuse Flow Made Available on Project Completion (mgd)" are used.[179] Similar to EDR (2020),[180] it is assumed that from 1.00 mgd of the "Reclaimed water (for potable offset)," only 0.55 mgd contributes to meeting the net demand change in a region. In other words, the capacity of the reclaimed water projects is multiplied by 0.55.[181] This coefficient is intended to reflect the beneficial offset provided by the reclaimed water. As stated in DEP (2015)[182], "[n]ot all reuse types are created equal in terms of benefiting 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."[183]

Based on the project type, the region of implementation, and the MFL RPS information, EDR classifies the projects into four overlapping categories to account for the projects' presumed intent (Table 4.5.1). Projects intended to create additional water supplies to meet the projected increase in demand are assumed to be implemented only in the regions with an inferred water supply shortage. This category excludes water conservation projects, reclaimed water for groundwater recharge or natural system restoration, flood control, and data collection and evaluation.[184]

Another project category is presumed to address whether sufficient water is available for natural systems. EDR assumes that this category includes currently designed, constructed, and held projects for (a) reclaimed water labeled as "for groundwater recharge or natural system restoration," (b) the regions with no inferred supply shortages, and (c) specific MFL RPS. In addition, the category includes RWSP/RPS Options Only projects associated with specific MFL RPS.

The water demand management and conservation category encompasses water conservation projects. Finally, such projects as flood control and data collection are assumed to contribute to

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[178] Note that for some of these projects, information about the storage or distribution capacity was included.

[179] "Quantity of Water Made Available to Date (mgd)" and "Reuse Flow Made Available to Date (mgd)" were also reviewed; however, even for projects identified as "Complete," the values were missing for many projects. As a result, the decision was made to focus on the project capacity "upon completion."

[180] EDR report published in January 2020

[181] EDR reviewed the statewide "Total Flow" and "Total Offset" data for 2000, 2005, 2010, and 2015 from the Annual Reuse Inventory reports available from the DEP (DEP 2019b). On average, 1.00 mgd of reclaimed water was estimated to offset from 0.54 mgd to 0.56 mgd of the water from traditional sources. While the offset depends on the type of reclaimed water use, EDR assumed that from 1.00 mgd of the "Reclaimed water (for potable offset)," 0.55 mgd contributes to meeting the net demand change in a region.

[182] 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 December 1, 2015, at p. 21, available online at: https://floridadep.gov/sites/default/files/SB536%20Final%20Report.pdf. (Accessed September 2020.)

[183] Ideally, the water use efficiency should be analyzed as part of the demand projections. For example, such analysis is expected to show lower efficiency when a residential yard is irrigated with reclaimed rather than potable water. Demand for reclaimed *vs.* potable water should then be projected for each use type (*e.g.*, residential irrigation, cooling for power generation, etc.), accounting for the potential differences in water use efficiency. Individual reclaimed water projects should also be classified into the same use types to accurately project the expenditures needed to offset the increase in potable water use with the reclaimed water projects. Due to the lack of relevant data, however, EDR accounts for reducing the water use efficiency on the water supply side by adjusting the project capacity. This assumption, while necessary, may decrease the accuracy of reclaimed water project funding estimates. Depending on data availability, future editions may differentiate the offset coefficient based on project locations and specifications.

[184] Some of the data collection and evaluation projects are still accounted for as part of the aggregated phased projects, as discussed in Appendix A.10.

water supply or natural system restoration indirectly. They are included in the "other" category (and disregarded from the further analysis).[185]

Table 4.5.1 General Project Categories Defined by EDR

EDR Project Category	Project Description	Number of Projects in DEP Project Appendix*
Additional water supply to meet growing demand	Projects in the regions with positive 2040 inferred supply shortages, given that the projects are not associated with any MFL RPS. Specifically, the following project types are considered: • Reclaimed Water (for potable offset) • Brackish Groundwater • Surface Water • Surface Water Storage • Groundwater Recharge • Aquifer Storage and Recovery (ASR) • Stormwater • Other Project Type • Other Non-Traditional Source • Desalination • Distribution / Transmission Capacity	483
Water demand management and conservation	• PS and CII Conservation • Agricultural Conservation	477
Water for natural systems	• All projects that are not yet completed and that are associated with specific MFL RPS • Reclaimed water projects for groundwater recharge or natural system restoration, if the project status is listed as in design, in construction / underway, or on hold • All project types if the projects are in the regions with no inferred shortage, if the project status is in design, in construction/underway, or on hold	195
Other	• Flood Control Works • Data Collection and Evaluation	5

* The total is greater than the total number of the projects in the dataset since some projects fall into more than one category.

4.6 Expenditure Projections to Meet the Future Demand

To forecast the expenditures needed to increase existing supply and meet the future demand, EDR considered (a) capacity and expenditures for the projects currently in design, in construction / underway, or on hold, and (b) potential additional projects currently in RWSP/RPS Options Only status.

Among the 483 projects categorized by EDR as those intended to create additional water supply (see Table 4.5.1), 49 projects are in design, in construction / underway, or on hold. Upon completion, these projects are expected to reduce the 2040 inferred water supply shortage from 353.97 mgd to 187.63 mgd (see Table 4.6.1). This reduction is significant, and the projects are estimated to completely eliminate the inferred water supply shortage in the SR – West, SJR – CSEC, and SF – UEC. The total expenditures for these projects are $340.25 million $2020 (see

[185] As mentioned above, some of them are included in the umbrella project, as discussed in Appendix A.10.

Table 4.6.1).[186] The remaining water supply shortage of 187.63 mgd should be met by investing in additional water supply projects or water conservation, as discussed in the next sections.

Table 4.6.1 Analysis of the Projects in Construction, in Design, and On Hold, by Region Where Water is Needed

Planning Regions	Potential Inferred Supply Shortage by 2040, mgd (end of planning period)	Water and Beneficial Offset* by the Projects in Design, Construction, and On Hold, mgd	Remaining Potential Inferred Supply Shortage by 2040, mgd	Project Expenditures: "Project Total ($)" for the Projects in Design, Construction, and On Hold (million, $2020)
(1)	(2)	(3)	(4) = (2) – (3)	(5)
NWF – II	5.00	1.38	3.63	$10.50
SR – West	5.19	6.06	**	$3.14
SJR – CSEC	33.35	33.60	**	$40.15
SW – N***	11.55	2.59	8.97	$38.58
SF – UEC	3.75	11.10	**	$8.30
SF – LEC	49.55	8.96	40.59	$52.19
SF – LWC	9.27	3.30	5.97	$41.49
NFRWSP	141.3	18.56	122.74	$59.19
CFWI	95.00	89.26	5.74	$86.70
Statewide (sum of regions)	**353.97**	**174.81**	**187.63**	**$340.25**

* Accounting for 0.55 beneficial offset coefficient for reclaimed water projects.
**If (2)-(3) results in a negative value, no shortage is reported.
*** Excluding CFWI.

To develop scenarios for supplying the remaining potential supply shortage of 187.63 mgd, for each planning region, EDR identified project types included in "RWSP/RPS Options Only."[187] EDR further narrowed down the project types based on the ranking reported in DEP (undated) – only project types ranked as "highly" or "moderately likely" were used by EDR in the expenditure projections.[188] These project types are summarized in Table 4.6.2.[189]

[See table on following page]

[186] Table 4.6.1 lists only those regions where water is needed based DEP (2020a).
[187] The only exception is NW – II, where all projects are considered, since no "RWSP/RPS Options Only" projects are identified.
[188] DEP. Undated. An Assessment of Viable Alternative Water Supply Resources and Critical Funding Needs. Presented by the FDEP pursuant to Executive Order 19-12 and Chapter 2019-115, Laws of Florida.
[189] See Appendix A.10 for additional details.

Table 4.6.2 Project Types Identified for Each Region to Meet the Inferred Water Supply Shortage

	ASR	Brackish Groundwater	Groundwater Recharge	Reclaimed water	Stormwater	Surface Water Storage
NW – II				✓		
NFRWSP			✓	✓		
SW – N*				✓		
CFWI		✓		✓		
SF – LWC	✓	✓		✓		
SF – LEC		✓		✓	✓	✓

* The portion of the region excluding CFWI. For the 2022 Edition of the report, EDR plans to refine the assumption of the future water supply sources for the region. Discussions with SWFWMD staff indicated that the future water demand is expected to be met with groundwater, though the District will continue implementing reclaimed water projects as well.

Reclaimed water is expected to play an essential role in meeting the increase in water demand in all regions. In addition, brackish groundwater is likely to be crucial in south and central Florida, while groundwater recharge can be a vital project type in the NFRWSP. EDR identified more than two project types to meet the future increase in demand in SF – LWC and SF – LEC. In these regions, EDR's expenditure projections only consider the most and least costly project types.

Further, expenditure per-mgd can depend on project capacity, and EDR selected the median capacity for each project type (see Table 4.6.3). For reclaimed water projects, the median project capacity varied among regions to reflect the differences in project sizes identified by EDR in the DEP project appendix.[190]

Table 4.6.3 Project Capacity, mgd of water or beneficial offset

Project Type	Median Project Capacity, mgd of water or beneficial offset
ASR	2.55
Brackish Groundwater	4.00
Groundwater Recharge	3.00
Reclaimed Water (for potable offset):	
NW – II	0.33
NFRWSP	0.27
SW – N*	0.28
CFWI	0.40
SF – LWC	2.75
SF – LEC	1.10
Stormwater	4.50
Surface water storage	3.00

* The portion of the region excluding CFWI.

[190] Appendix A.10 discusses alternative project capacity assumptions.

Project expenditures depend on project capacity, type, and location. EDR developed a multivariate regression model to examine this relationship. The dependent variable in the model is the natural logarithm of "project total ($)" (million dollars). Various combinations of the independent variables were tested, and the final model used in the analysis is described in Appendix A.11. The model includes project capacity (*i.e.*, the natural logarithm of water or beneficial offset for the projects), the region of project implementation, project type, and project status. The model is estimated in SAS using *proc robustreg*, and it explains approximately 51% of the variability in the dependent variable. EDR will continue testing alternative model specifications to improve the model predictive capacity for the 2022 Edition of this report.

The regression model is then used to estimate the project expenditures (per mgd of water or beneficial offset).[191] Note that the estimated expenditures for reclaimed water projects account for the beneficial offset being only 0.55 of the actual project capacity. This assumption makes this project type especially expensive (Table 4.6.4). In contrast, stormwater and groundwater recharge projects are relatively inexpensive, but they are only relevant to select regions.

Table 4.6.4 Estimated Project Expenditures per Unit of Capacity (million $2020 per mgd)

	ASR	Brackish Groundwater	Groundwater Recharge	Reclaimed water	Stormwater	Surface Water Storage
NW – II				$8.19		
NFRWSP			$0.45	$4.33		
SW – N*				$10.80		
CFWI		$2.17		$4.38		
SF – LWC	$1.72	$2.34		$2.52		
SF – LEC		$2.44		$2.37	$0.62	$1.02

Note: Values in this table assume the median project capacity. For reclaimed water projects, the beneficial offset is assumed to be 55 percent of each project's capacity.
* Excluding CFWI.

These estimated per-mgd expenditures are then used to forecast the investments needed to meet the remaining inferred supply shortage in each region summarized in Table 4.6.1. EDR uses the most and least expensive project types in these calculations (see columns 6 and 7 in Table 4.6.5). These expenditures are then combined with the costs of the projects currently in construction, in design, and on-hold. As shown in columns 8 and 9 in Table 4.6.5, the total projected expenditures to meet the inferred supply shortage by 2040 are between $0.571 and $1.133 billion (with $0.852 billion being the average). Note that "less expensive" and "more expensive" scenarios show the same costs for several regions since the inferred shortage is expected to be met with the projects already in construction, in design, or on hold.

[191] Medium capacity is assumed for each project type, see Table 4.6.3.

Table 4.6.5 Expenditures Forecast for the Additional Water Supply

Planning Regions	Inferred Supply Shortage by 2040, mgd	Water and Beneficial Offset* for the Projects in Design, Construction, and On Hold, mgd	"Project Total" for the Projects in Design, Construction, and On Hold (million, $2020)	Remaining inferred shortage By 2040	"Project Total" to Meet Remaining Inferred Shortage (million, $2020)		Total Forecasted Expenditure to meet 2040 Interred Supply Shortage (million $2020)		
					Less expensive	More expensive	Less expensive	More expensive	Average
(1)	(2)	(3)	(4)	(5)	(6)	(7)	**(8)**	**(9)**	**((8) + (9)) / 2**
NWF – II	5	1.38	$10.50	3.63	$29.72	$29.72	**$40.22**	**$40.22**	**$40.22**
SR – West	5.19	6.06	$3.14	-	-	-	**$3.14**	**$3.14**	**$3.14**
SJR – CSEC	33.35	33.60	$40.15	-	-	-	**$40.15**	**$40.15**	**$40.15**
SW – N**	11.55	2.59	$38.58	8.97	$96.84	$96.84	**$135.42**	**$135.42**	**$135.42**
SF – UEC	3.75	11.10	$8.30	-	-	-	**$8.30**	**$8.30**	**$8.30**
SF – LEC	49.55	8.96	$52.19	40.59	$25.22	$94.89	**$77.41**	**$147.08**	**$112.25**
SF – LWC	9.27	3.30	$41.49	5.97	$10.25	$15.06	**$51.74**	**$56.55**	**$54.14**
NFRWSP	141.3	18.56	$59.19	122.74	$54.88	$530.98	**$114.07**	**$590.17**	**$352.12**
CFWI	95	89.26	$86.70	5.74	$14.02	$25.11	**$100.72**	**$111.81**	**$106.26**
Statewide (sum of regions)	**353.97**	**209.85**	**$340.25**	**187.63**	$230.914	$792.598	**$571.15**	**$1,132.84**	**$852.00**

* Accounting for 0.55 beneficial offset coefficient for reclaimed water projects.
** Excluding CFWI.

To calculate the state's funding contributions toward the total expenditures, EDR considers 272 projects from the DEP project appendix that were completed in the past. These projects are selected because the total of their state, district, and cooperating entity(ies) funding is exactly equal to "project total ($)." The state's funding share differed among the planning regions, with the average share being the highest in the NW – II and the lowest in the SW – N (excluding CFWI) as shown in Table 4.6.6. Statewide, the state funding share is nine percent and the district funding share is 26.6 percent, demonstrating that the cooperative entity or entities cover(s) most of the project expenditures.

Table 4.6.6 Share of State's Funding in the "Project Total ($)"

	N	Mean	Median
NW – II	5	0.229	0.307
NFRWSP and SR – West	47	0.130	0.000
SJR – CSEC	48	0.057	0.000
CFWI	51	0.066	0.060
SW – N (excluding CFWI)	5	0.041	0.000
SF – UEC	4	0.106	0.095
SF – LEC	30	0.144	0.091
SF – LWC	18	0.101	0.051

The mean estimated funding contributions of the state's expenditures in each region are used to forecast the total state expenditures needed to address the inferred water supply shortage (Table 4.6.7). By 2040, the total is forecasted to range between $56.14 million and $129.09 million, with an average of $92.61 million. The highest investments by 2040 are projected in the NFRWSP and

SF – LEC. Note that this forecast does not explicitly account for the increased state funding share for the projects in the Rural Economic Development Initiative (REDI) areas.[192]

Table 4.6.7 Estimated State Expenditures (million $2020)

Region	Less expensive	More expensive	Average
NWF – II	$9.202	$9.202	$9.202
SR – West	$0.407	$0.407	$0.407
SJR – CSEC	$2.302	$2.302	$2.302
SW – N (excluding CFWI)	$5.521	$5.521	$5.521
SF – UEC	$0.879	$0.879	$0.879
SF – LEC	$11.166	$21.217	$16.192
SF – LWC	$5.248	$5.735	$5.492
NFRWSP	$14.779	$76.465	$45.622
CFWI	$6.632	$7.362	$6.997
Statewide (sum of regions)	**$56.136**	**$129.091**	**$92.614**

4.7 Expenditure Forecast, Water Conservation, and Drought

The expenditures discussed above focus on the baseline scenario for water use and related inferred shortage calculations. These expenditures do not account for the water use efficiency improvements and water conservation. The overall statewide inferred water supply shortage can be reduced by 68.7 percent if the water use efficiency improvements and conservation are accounted for (see Table 4.7.1). Given this water use scenario, the inferred water supply shortage would continue only in CFWI and NFRWSP.

[See table on following page]

[192] As stated in DEO (2020), "Section 288.0656, Florida Statutes, establishes the Rural Economic Development Initiative (REDI) to better serve Florida's economically distressed rural communities by providing a more focused and coordinated effort among state and regional agencies that provide programs and services for rural areas. An 'economically distressed' county/community is eligible to request a 'Waiver or Reduction of Match' of jobs or wage requirements, eligible company criterion, inducement requirement and grants. Each state agency determines which grant programs will allow for a waiver of match based on their annual budget and federal and state guidelines" (quoted from the webpage available at: https://floridajobs.org/community-planning-and-development/community-partnerships/rural-economic-development-initiative; accessed January 2021.)

Table 4.7.1 The 2040 Inferred Water Supply Shortage Given Two Water Demand Scenarios

Regions	Inferred Water Supply, mgd	Baseline Water Demand (Scenario 1)		Water Demand with Conservation (Scenario 2)		Drought Demand (Scenario 3)	
		2040 Water Demand, mgd	Inferred shortage, mgd	2040 Water Demand, mgd	Inferred shortage, mgd	2040 Water Demand, mgd	Inferred shortage, mgd
NW – II	89.880	94.880	5.000	88.879	-	105.890	16.010
NW – Oth	311.900	311.900	-	308.101	-	345.070	33.170
SR – West	122.350	127.536	5.186	114.148	-	137.147	14.797
NFRWSP	555.27	696.574	141.304	627.214	71.944	753.878	198.608
SJR – CSEC	394.52	427.870	33.350	389.650	-	508.560	114.040
CFWI	812.59	907.590	95.000	851.590	39.000	1011.000	198.410
SW – N*	170.18	181.730	11.550	167.646	-	201.810	31.630
SW – TB	461.85	461.850	-	416.881	-	501.240	39.390
SW – H*	94.96	89.150	-	80.846	-	130.270	35.310
SW – S	279.33	279.330	-	258.114	-	335.320	55.990
SF – LKB	257.48	257.490	0.010	257.490	-	303.360	45.880
SF – UEC	350.93	354.680	3.750	340.580	-	481.600	130.670
SF – LEC	1,956.99	2006.540	49.550	1904.140	-	2329.110	372.120
SF – LWC	1,201.41	1210.680	9.270	1184.380	-	1356.840	155.430
Statewide (sum of the region)			**353.970**		**110.944**		**1,441.455**

* Excluding CFWI.

Despite the inferred shortage decrease, EDR expects limited reductions in the projected expenditures, unless most of the water use reduction is achieved through passive conservation. Specifically, for active conservation, the DEP project appendix includes 94 agricultural water conservation projects and 383 PS and CII conservation projects for which both "project total ($)" and project capacity (mgd) are provided. Median costs for these projects are $5.09 and $4.50 million per mgd, respectively. These expenditures are relatively high and comparable with that for the alternative water supply projects. Therefore, the implementation of water conservation strategies is not expected to reduce projected expenditures. The only strategy to reduce the costs is to rely on inexpensive passive water conservation (such as households purchasing more efficient appliances or new urban developments implementing more stringent construction standards).

Table 4.7.2 Expenditure for Water Conservation Projects, million $2020 per mgd of Project Capacity

Project Type	Number of Observations	Mean	Median
Agricultural Conservation	94	16.456	5.092
PS and CII Conservation	383	21.209	4.495

While the water conservation scenario reduces the potential inferred shortage, the drought scenario can expand the inferred shortage. For example, if a 1-in-10 year drought occurs in 2040, the inferred supply shortage can increase approximately four times, from 353.97 mgd to 1,441.46 mgd (Table 4.7.1). Today, much of the increase in water demand under drought conditions is addressed by available surplus or managed by government-imposed, short-term restrictions in demand.

Changing climate conditions may lead to more frequent, prolonged, or severe droughts, requiring significantly higher expenditures to meet water demand in such conditions.

4.8 Expenditures to Ensure That Sufficient Water Is Available for Natural Systems

Part of section 403.928, Florida Statutes, requires EDR to estimate the expenditures necessary to achieve the legislature's intent that sufficient water be available for the natural systems. While the WMDs may use a variety of tools to protect the natural systems, EDR primarily focuses on projects included in recovery or prevention strategies for the implementation of minimum flows and minimum water levels (MFLs); however, there are a few additional conditions under which projects are assumed to benefit the natural systems.

Projects Associated with MFL Recovery or Prevention Strategies

Sections 373.042 and 373.0421, Florida Statutes, provides requirements for the WMDs with regard to the establishment and implementation of MFLs for water courses, water bodies, and aquifers. The MFLs are intended to define "the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area."[193] These limits are relevant to water supply planning, permitting decisions, and the declaration of water shortages.[194]

The WMDs are required to adopt (or revise) and implement recovery or prevention strategies to achieve recovery to an MFL as soon as practicable or prevent a future violation of an MFL if it is expected to occur within 20 years.[195] When developing the recovery or prevention strategy, the WMDs must include a phased-in approach or timetable to allow for the provision of water supplies for all existing and projected reasonable-beneficial uses.[196] Once the recovery or prevention strategy is adopted by the appropriate WMD, the applicable RWSP must be amended to include any water supply or water resource development projects.[197] For a visual of all currently adopted MFLs and RPSs by type and status, see Figures 4.8.1 and 4.8.2.

In 2016, the Florida Legislature strengthened the implementation of MFLs for Outstanding Florida Springs (OFSs).[198] The WMDs, excluding NWFWMD, were required to adopt MFLs for all OFSs within their jurisdictions by July 1, 2017.[199] A recovery or prevention strategy for an OFS must identify a prioritized list of projects to implement the plan and include the estimated cost and date of completion for each project, the estimated benefit from each project, and the source and amount of financial assistance available by the applicable WMD.[200] Unlike recovery or prevention strategies for other water resources, those for OFSs must be designed to achieve the MFLs no later

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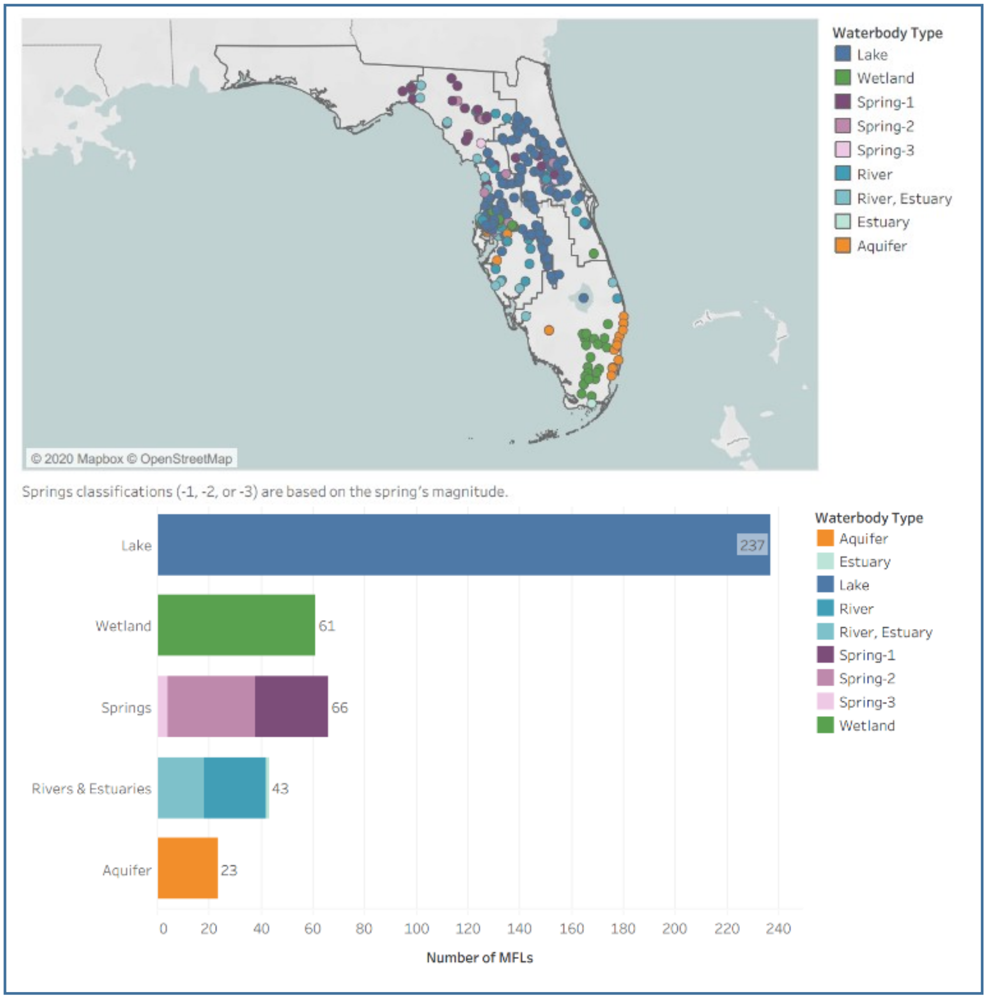
[193] § 373.042, Fla. Stat.
[194] §§ 373.705 and 373.709, Fla. Stat.; Fla. Admin. Code R. 62-40.473(3)-(4);
[195] § 373.0421(2), Fla. Stat.
[196] § 373.0421(2), Fla. Stat.
[197] § 373.0421(2), Fla. Stat.
[198] *See* 2016-1, §§ 5 and 25, Laws of Fla. (amending section 373.042, Florida Statutes, and creating section 373.805, Florida Statutes, to establish additional MFL requirements for Outstanding Florida Springs).
[199] The deadline for NWFWMD is July 1, 2026.
[200] § 373.805(4), Fla. Stat.

than 20 years after adoption of the strategy and must contain a schedule establishing 5-year, 10-year, and 15-year targets to inform future planning and funding decisions.[201]

Figure 4.8.1 Locations of Adopted MFLs by Waterbody Type

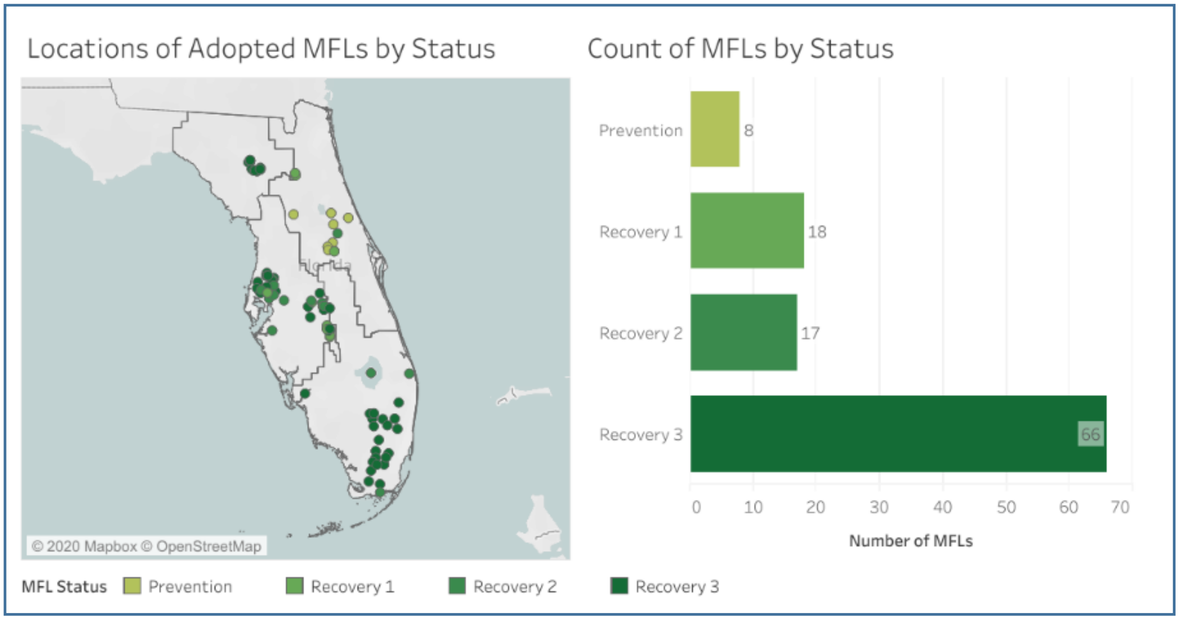


Source: DEP. 2020b. 2019 Statewide Annual Report (STAR Report). Available online at: https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=1696c8bc33e7464b8249998f23f6795a (Accessed January 2021).

[See figure on following page]

[201] § 373.805(4), Fla. Stat.

Figure 4.8.2 Locations of Adopted MFLs With RPSs by Status



Source: DEP. 2020b. 2019 Statewide Annual Report (STAR Report). Available online at: https://fdep.maps.arcgis.com/apps/MapSeries/index.html?appid=1696c8bc33e7464b8249998f23f6795a (Accessed January, 2021).

To forecast expenditures for implementing existing recovery or prevention strategies, EDR analyzed "project total ($)" information for the projects associated with the MFL RPSs listed in the project appendix (see Table 4.8.1). Specifically, 66 projects are listed as supporting MFL RPSs and are identified as currently being implemented or intended for future implementation. The total funding to implement these projects is $448.76 million. For the projects associated with MFL RPSs and implemented in the past, the average percentage of the state funding is 11.1%, and the average percentage of district funding is 39.6% (based on the sample of 48 projects). Therefore, the forecasted state expenditure for the MFL RPS projects is $49.812 million (or 0.111 x $448.760 million).

Note that this estimate may be an underestimation since it is unclear whether the projects in the appendix are sufficient to meet the MFL target for the related natural systems. Further, it does not account for Everglades restoration which is discussed in Chapter 7, as these projects are largely part of the Comprehensive Everglades Restoration Plan (CERP). Conversely, some of the projects considered by EDR as natural system restoration projects may in fact address the needs of the growing water demand in the region, leading to an overlap between the estimated expenditures for the natural system restoration and water supply to help meet the increase in water demand.

While the DEP's Water Resource Implementation Rule states that the WMDs must expeditiously implement all adopted recovery or prevention strategies,[202] there is no generally applicable target date mandated by law to achieve the adopted MFL. Only recovery or prevention strategies for

[202] Fla. Admin. Code R. 62-40.473(7).

Outstanding Florida Springs (OFSs)[203] are required to contain 5-year, 10-year, and 15-year targets, with achievement of the adopted MFL to occur no later than 20 years after adoption of the strategy.[204] Without a required timeframe to achieve MFLs, the timing of the nearly $50 million in state expenditures is a decision for policy makers.

Table 4.8.1 Projects Associated with MFL RPSs

MFL RPS Supported	Project Status	Total Number of Projects	Project Total (million $2020)
Lower Santa Fe and Ichetucknee River Recovery Strategy	Construction/underway, design, or on hold	17	$108.056
	RWSP or RPS Option Only	31	$135.856
	Total	**48**	**$243.912**
Lower Hillsborough River Recovery Strategy	Construction/underway, design, or on hold	2	$11.557
	Total	**2**	**$11.557**
Silver Springs Prevention Strategy	Construction/underway, design, or on hold	6	$21.097
	RWSP or RPS Option Only	2	$44.586
	Total	**8**	**$65.683**
Volusia Recovery and Prevention Strategy	Construction/underway, design, or on hold	4	$19.207
	RWSP or RPS Option Only	4	$108.402
	Total	**8**	**$127.608**
Total Statewide*		***66***	***$448.760***

Note: This Table does not include Everglades Restoration projects since the Comprehensive Everglades Restoration Plan (CERP) is discussed in Chapter 7. The Table also excludes the expenditures reported for projects for which the value of water/reuse flow made available upon completion is zero or missing. In the future, EDR intends to continue discussions with the state and regional agencies to verify if the missing or zero values for the project's capacity implies that the water or reuse flow made available by the project is made available for the natural systems.

Other Projects Potentially Intended for Natural System Protection and Restoration

In addition to the projects linked to the MFL RPS, EDR assumed that the natural system protection and restoration goals can be met with the following projects that are currently in design, construction / underway, or on hold: (a) projects classified as "Reclaimed Water (for groundwater recharge or natural system restoration)", and (b) projects where existing supplies are already sufficient for meeting projected future demands (*i.e.*, projects in the regions with no inferred water supply shortage identified in Table 4.4.3).

[203] An "Outstanding Florida Spring" is defined as "all historic first magnitude springs, including their associated spring runs, as determined by the department using the most recent Florida Geological Survey springs bulletin, and the following additional springs, including their associated spring runs: (a) De Leon Springs; (b) Peacock Springs; (c) Poe Springs; (d) Rock Springs; (e) Wekiwa Springs; and (f) Gemini Springs. § 373.802(4), Fla. Stat.

[204] § 373.805(4), Fla. Stat.

Five "Reclaimed Water (for groundwater recharge or natural system restoration)" projects are currently being implemented in three planning regions, with the total project expenditures of $23.414 million (Table 4.8.2). Based on the completed groundwater recharge or natural system restoration projects, the state funds, on average, account for 30.0% of the project expenditures (with WMDs covering 35.0%). Therefore, for the projects currently in design, construction/underway, and on hold, the state funding can be estimated at $7.024 million (or $23.414 x 0.30).

Table 4.8.2 Expenditures for "Reclaimed Water (for groundwater recharge or natural system restoration)" Projects Currently in Design, in Construction / Underway, or on Hold

Regions	Number of Observations	Project Total, million $2020
CFWI	2	1.551
NFRWSP	1	3.354
SW – TB	2	18.510
Statewide (sum of the regions)	**5**	**23.414**

Next, the projects currently being implemented in the regions that have sufficient existing supply are considered. The total implementation expenditure for these projects is $192.890 million (see Table 4.8.3). Based on past projects, the average share of state funding for such projects is small – just 0.041 (*i.e.*, approximately 4.1%). Therefore, EDR expects that the future state funding for the projects in the regions with no inferred water supply shortage is $7.872 million.

Table 4.8.3 Expenditures for Projects Currently in Design, Construction / Underway, or On Hold in the Regions With No Inferred Water Supply Shortage

RWSP Region Supported	Number of Observations	Project Total, million $2020
NW – I	1	4.329
NW – III	1	4.063
NW – VI	1	0.105
SF – LKB	1	0.720
SW – H (excluding CFWI)	3	2.690
SW – S	21	117.653
SW – TB	30	63.330
Statewide (sum of regions)	**58**	**192.890**

4.9 Total Projected Expenditure

Overall, ensuring that sufficient water is available for natural systems is projected to require an investment of $665.06 million, with $64.71 million (nearly 10 percent) being covered by the state funds (Table 4.9.1). In addition, the expenditure to address the potential 2040 inferred water supply shortage is projected at $852.00 million, with the estimated state share being $92.61 million. Overall, by 2040, $1.52 billion is needed,[205] with the state covering $157.32 million (Table 4.9.2).

[205] Assuming that the MFL RPS projects are implemented by 2040.

In the 2020 Edition, the total for natural systems was reported as $7.80 billion with a state share of $371.14 million. The significant difference does not reflect a change in conditions, but rather is largely attributable to SWFWMD's recent review of projects that benefit MFL RPSs in their updated RWSPs. The review included a reassessment of which projects were still needed.

Table 4.9.1 Projected Expenditures to Ensure that Sufficient Water Is Available for Natural Systems (million $2020)

Expenditure	MFL RPS projects	Reclaimed water for groundwater recharge or natural system restoration	Projects in the regions with no inferred water supply shortage	Total
Total expenditures	$448.760	$23.414	$192.890	**$665.064**
State share	$49.812	$7.024	$7.872	**$64.708**

Table 4.9.2 Total Projected Expenditures by 2040, million $2020

Expenditures	Addressing Inferred Water Supply Shortage*	Providing Water for Natural Systems	Overall Total
Total expenditures	$851.996	$665.064	**$1,517.060**
State share of expenditures	$92.614	$64.708	**$157.321**

* Considering the average between the less and more expensive scenarios.

4.10 EDR's Progress toward the Integration of Water Demand Projections with EDR's Economic and Demographic Forecasts

To facilitate the expenditure forecast, EDR intends to produce an independent statewide water use forecasting model reflecting the officially adopted estimating conference results[206] as well as continually updated EDR outlooks on Florida's demographics and economic conditions. This will enable on-demand fiscal simulations of various economic, demographic, and climate scenarios using the latest data. In this edition, a preliminary water demand forecast is presented. The results are compared to the WMDs' projections to identify significant differences that may prompt additional research prior to submitting EDR's pilot model for peer-review. At this time, the pilot model's results should not be interpreted to be more robust than those presented in Section 4.6.

The following improvements in EDR's pilot model have been implemented relative to the model described in the 2020 Edition:

- *More complete integration of EDR's water use forecasts with economic and demographic indicators developed by EDR*: The pilot water use model is based on EDR & BEBR county population projections, along with EDR's statewide data on construction employment

[206] The Economic Estimating Conferences develop official projections related to the state economy while the Demographic Estimating Conference develops official information concerning the population (§ 216.136, Fla. Stat.). General provisions for the Consensus Estimating Conferences are defined in § 216.134, Fla. Stat. Specifically, the Consensus Estimating Conferences are within the legislative branch. The membership of each consensus estimating conference consists of principals and participants. The principals of each conference shall be the professional staff of the Executive Office of the Governor designated by the Governor, the coordinator of EDR, the professional staff of the Senate designated by the President of the Senate, and the professional staff of the House of Representatives designated by the Speaker of the House of Representatives.

(NAICS 236), accommodation and food service employment (NAICS 72), mining employment (NAICS 21), utilities employment (NAICS 22), manufacturing employment (NAICS 31-33), and the population share for specific age groups.

- *Inclusion of the most recent water withdrawal data shared by the WMDs*: EDR added county-level water withdrawal data collected and shared by the NWFWMD, SRWMD, SWFWMD, and SFWMD.[207] This expanded the dataset of historic water use assembled for the 2020 Edition by EDR from U.S. Geological Survey (USGS) and DEP reports. Since the WMDs have the most current withdrawal data available, EDR is able to incorporate recent water use trends in its pilot model.

- *Inclusion of a more extensive county-level water use history*: EDR now populates the pilot model with the annual 1991 through 2018 history of water withdrawals, as opposed to the quinquennial 2000 through 2015 dataset used for the previous edition of this report. While future water use is likely determined by the most recent water use trends, a 20-year water use forecast cannot be solely based on the most recent data. Long-term changes in water use are modelled more accurately if the dataset includes a long time series.

- *Improved procedure to allocate county water use to appropriate water supply planning regions*: for this edition of the EDR report, EDR apportioned the forecasted county water use based on the county population in various water supply planning regions. This approach improves the regional water use forecasts which underlie the statewide forecast. For comparison, last year for all counties, EDR allocated total county water use to specific water supply planning regions, disregarding the county splits between or among the planning regions.

Other adjustments made by EDR, as compared with the 2020 Edition:

a. *The water withdrawals and reclaimed water use are combined for each county; the beneficial offset coefficients are largely disregarded.* Reclaimed water sources still supply a relatively small share of the total water use in the state. Therefore, the effect of EDR's assumptions regarding the beneficial offset coefficient on the total water demand forecast is small. Still, EDR intends to continue discussions with the WMDs and DEP to better define beneficial use volume based on the total reclaimed water flow reported in DEP's Reuse Inventory Database and Annual Report.[208]

b. *EDR excluded the water price variable from the pilot model.* Historical data for the prices are either deficient or lacking, especially before 2005.

c. *EDR forecasted water use in PS, DSS, L/R, and CII on the aggregate, instead of projecting each water-use category individually*. For most Florida regions, population change is the primary determinant of the total water use. The statistical models developed for the

[207] For SJRWMD, annual water use reports are available online at https://www.sjrwmd.com/documents/water-supply/#water-use-data. These data will be analyzed for the 2022 Edition.
[208] The definitions of the use categories differ between the USGS water withdrawal and DEP reclaimed water use databases, making the water use estimates from the two databases not entirely comparable.

aggregated water use category showed a better predictive power than the statistical models originally developed for individual water use categories. Note that for the counties identified as "outlier" in the model, separate statistical models were developed to examine water use. For example, for the counties dominated by CII water use, employment in construction sectors is a better predictor than the indicators used for the counties dominated by PS water use.

d. *PG water use was forecasted separately from the use in the other sectors*. While in the 2020 Edition, EDR forecasted CII and PG jointly, in this report, aggregate modeling was not possible, given the discrepancy of the PG water use data acquired from the USGS and WMDs. Therefore, EDR first separated the PG forecast from the CII, PS, DSS, and L/R forecast. Second, since the water use did not follow the same pattern among counties, separate models were developed for each county. EDR intends to continue improving its PG forecasting model.

e. *EDR updated the AG water use forecast.* This edition uses the AG water use forecast in the seventh and most recent release of the Florida Statewide Agricultural Irrigation Demand developed by DACS.[209]

EDR's pilot water use model can help explore the effects of weather, demographic, and economic variables on water demand and assist in the EDR expenditure forecast. However, EDR emphasizes that further refinements and peer-review of the model are still needed.

EDR's Pilot Model for Statewide Agricultural Water Use

For the AG water use forecast, EDR relied on the latest release of agricultural water demand projections developed by DACS. The DACS geodatabase, referred to as the Florida Statewide Agricultural Irrigation Demand (FSAID), was developed in response to Section 570.93, Florida Statutes, which requires DACS to establish an agricultural water supply planning program. WMDs must consider the data provided by DACS as indicative of future water demands (Section 373.709, Florida Statutes). Referred to as FSAID-VII, the current FSAID model "…incorporates both agronomic and economic factors that affect irrigation water demand. The model's ability to capture the variation in water use by profitability across crops and within crops over time provides an enhanced estimate of future irrigation demands" (The Balmoral Group 2020, p. 6[210]). In addition to supplemental agricultural irrigation, FSAID also projects freeze protection irrigation, aquaculture, and livestock water use, and it differentiates the demand between average- and drought-year conditions.

The FSAID forecast meets EDR's needs by being annually updated, consistent among the water supply planning regions, and reliant on the most recent economic projections. For each water supply planning region, EDR uses average-year supplemental irrigation, freeze protection

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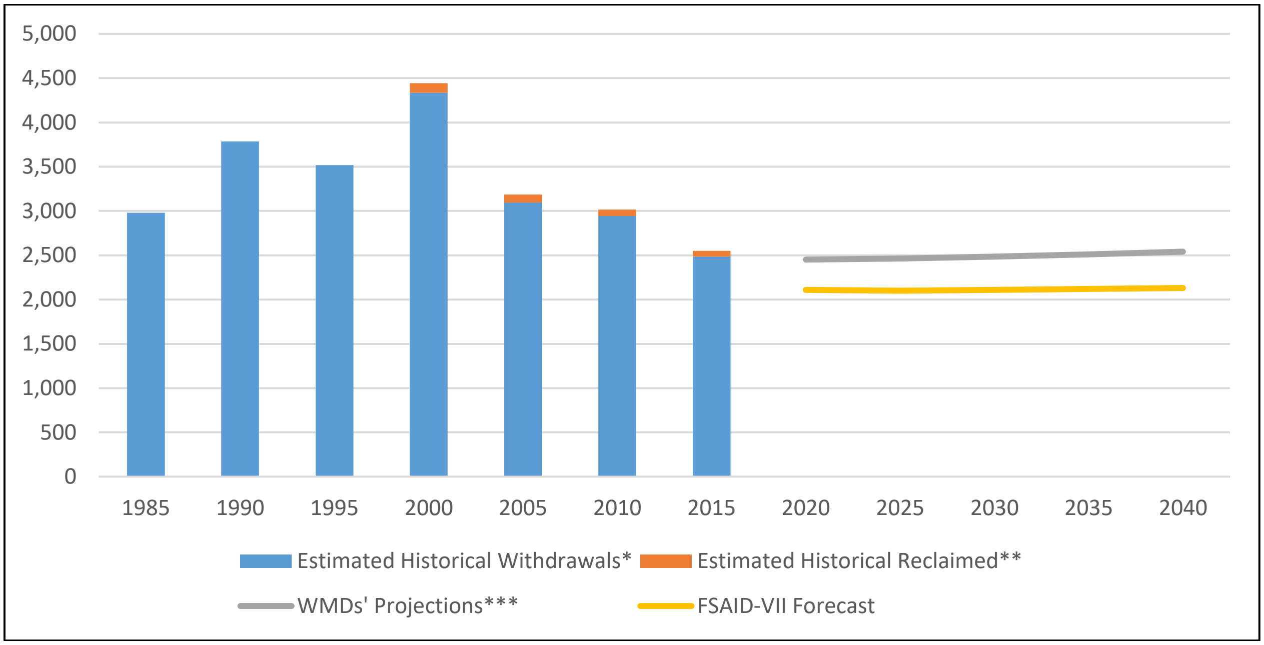
209 DACS. 2020. Agricultural Water Supply Planning. Available online at: https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Water-Supply-Planning (Accessed January 2021.)

210 The Balmoral Group. 2020. Florida Statewide Agricultural Irrigation Demand. Estimated Agricultural Water Demand, 2018 – 2045. Available online at: https://www.fdacs.gov/content/download/92578/file/FSAID-VII-Water-Use-Estimates-Final-Report.pdf (Accessed January 2021.)

irrigation, aquaculture, and livestock water use reported in FSAID-VII for 2020, 2025, 2030, 2035, and 2040. The potential effect of conservation reported in FSAID is not accounted for by EDR, since for many regions, FSAID projections without conservation were already below the projections available from the WMDs (see Fig 4.10.1).[211]

Figure 4.10.1 Statewide Agricultural Water Use: Historical Withdrawals and Future Use Projections (mgd)



* These estimates are derived by EDR from the USGS water withdrawal data for "Livestock (Stock) total self-supplied withdrawals, fresh, in Mgal/d" (in 1985, 1990, and 1995), "Livestock total self-supplied withdrawals, fresh, in Mgal/d" (in 2000, 2005, 2010, and 2015), "Aquaculture total self-supplied withdrawals, fresh, in Mgal/d" (in 2000, 2005, 2010, and 2015), and "Irrigation, Total, total self-supplied withdrawals, fresh, in Mgal/d" (in 1985, 1990, 1995, 2000, 2005, 2010, and 2015). In these titles of the data series, "Mgal/d" refers to the millions gallon of water per day.
** EDR estimates are derived by calculating the county and statewide total reclaimed water use for "Agricultural Irrigation" reported in the "D-Utilization" in DEP's 1996-2018 Reuse Inventory Database and Annual Report.
*** These are aggregated by DEP from the WMDs' projections. Two exceptions are made for the 2040 forecasts for the SR-west and NFRWSP, for which EDR estimated the 2040 data using a trend from the 2015-2035 WMDs' estimates and projections.

EDR's Pilot Model for the PS, DSS, L/R, and CII Water Use

EDR's pilot model is based on historical water use and economic and demographic indicator values, and it forecasts water use for each county. These county forecasts are then allocated to the

[211] Comparison of the water demand forecasts from WMDs and FSAID for various water supply planning regions is presented in Appendix A.12.

water supply planning regions using the population shares[212] for those counties divided among water supply planning regions. However, the model's intended use is statewide expenditure projections, and, therefore, county forecasts are not presented in the main text of this report.

Historical Water Use

County-level ground and surface water withdrawals are available from the USGS for selected years between 1985 and 2015.[213] The USGS water use data is supplemented by the data provided by the WMDs: NWFWMD (2016-2018), SRWMD (2016-2018), SWFWMD (1985-2018), and SFWMD (2014-2018).[214] Further, EDR assumes that some of the reclaimed water flow reported in the DEP's Reuse Inventory Database and Annual Report[215] meets the demand in the categories traditionally classified as PS, DSS, CII, or L/R, and therefore, should be accounted for in the historical water use dataset. The DEP Reuse Inventory Database and Annual Report, however, classifies water use categories differently than WSAs/RWSPs. EDR's approach to integrating the two water use classifications is summarized in Table 4.10.1. Overall, reclaimed water flow is estimated to account for a relatively small proportion of water use. Therefore, while it is essential to verify the reclaimed water use assumptions, these assumptions may have a small effect on the forecast, given that most of the water demand is still met by surface water or groundwater. Estimated historical water use for the PS, DSS, L/R, and CII categories is presented in Figure 4.10.2.

[See table on following page]

[212] Using methodology developed for EDR in BEBR's "An Analysis of Methods to Allocate BEBR's County Population Estimate and Projections to Water Management District Boundaries" (available from EDR upon request), shares are based on Census Block population data from 2010. For blocks that are divided by a supply planning region's boundary, land area shares were used to split the block's population.

[213] USGS publishes statewide summary water withdrawal reports and related county data every five years. However, for selected counties, water withdrawal data are also available for the years between the 5-year summaries. EDR used the data from Microsoft Excel spreadsheets titled "Historical Public Supply Data for 1950-2010" and available from the USGS website titled "Historical Water-Use in Florida" (available online at: https://www.usgs.gov/centers/car-fl-water/science/historical-water-use-florida; accessed January 2021.) These data were supplemented with the USGS report "Water Withdrawals, Uses, and Trends in Florida, 2015" by Richard Marella (available online at: https://pubs.usgs.gov/sir/2019/5147/sir20195147.pdf; accessed January 2021.) Note that for PS water use, the USGS identifies transfers for each county. Whether the transfer is import or export is described for 1985, 1990, 1995, 2000, 2005, 2010, and 2015 in summary reports published by the USGS. The transfers among counties were allocated to import or export following the pattern specified in the reports. It must be pointed out that there are slight differences in the definitions of water-use categories between USGS and WMDs, for example, in the threshold used to separate water suppliers into the PS or DSS categories. Since EDR models water demand in the PS, DSS, L/R, and CII in the aggregate, these differences become irrelevant.

[214] For the counties split between WMDs, the water use from each WMD was summed for each year for which the data was available. If data were available from only one WMD, total county water use was treated as "missing." For counties partially or completely in SJRWMD, historical water withdrawals were based on the USGS data only.
Further, for SRWMD, NWFWMD, and SFWMD, it was assumed that PS water transfers between counties are either accounted for or insignificant in the WMDs' data. For the SWFWMD, PS water transfers are explicitly identified in the district's data.

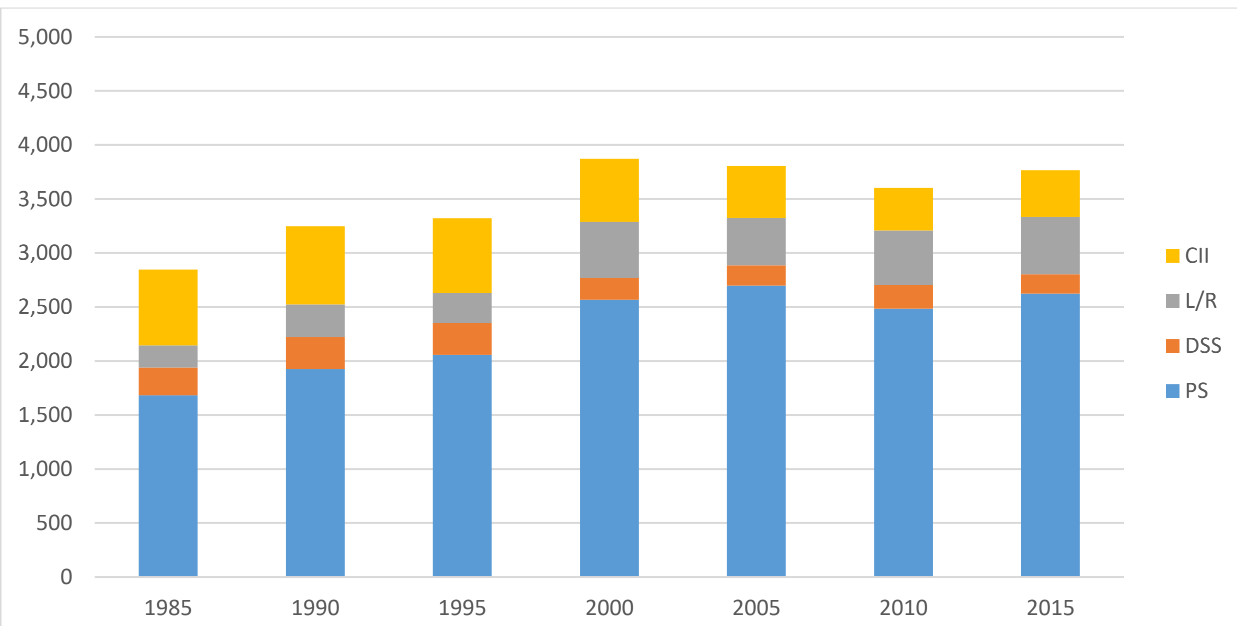
[215] EDR uses "Appendix D – Utilization" data from DEP's 1996-2018 reuse inventory database. The database is public information; however, EDR acknowledges that the database used was initially requested from DEP by a University of Florida research-Extension team to develop an extension publication.

Table 4.10.1 Assumptions Applied to Reuse Inventory Types and Subtypes

Reuse Inventory Type	Assumed Water Use Category	Notes
Residential irrigation	PS	-
Toilet flushing	PS	-
Fire protection	PS	-
Public Access Areas & Landscape Irrigation	PS and L/R	Specifically, EDR allocated to the PS category 60% of reuse water flow from "other public access areas" and "other" reuse subtypes.* In addition, 100% of the "Golf Course Irrigation" reuse subtype was assumed to be used for L/R.
Industrial	PS and CII	Within the Industrial type, only the "At Treatment Plant" subtype was considered. It was assumed to be equally split between the commercial-industrial-institutional self-supplied, public supply, and the water use internal for the treatment plants (*e.g.*, water to spray foam formed as a part of the treatment process). The internal water use was then disregarded from the analysis.

* "Other public access areas" subtype can include parks, athletic fields, schools, decorative water features, and cleaning roads and sidewalks. "Other" reuse subtype can including "decorative fountains, commercial laundries, cleaning of roads and sidewalks, vehicle washing, concrete making, and other permitted uses" (DEP 2019). Some of these activities may be met by either public supply or self-supply; they also may serve as treated wastewater disposal mechanisms. EDR attributed 60% of this reuse flow to the public supply category, rounded average of offset value reported for "Other public access areas" in Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group (2003).
References: (1) DEP. 2020. 2019 Reuse Inventory (available online at: https://floridadep.gov/sites/default/files/2019_Reuse_Inventory_Report.pdf; Accessed January 2021); and (2) Reuse Coordinating Committee and the Water Conservation Initiative Water Reuse Work Group. 2003. Water Reuse for Florida Strategies for Effective Use of Reclaimed Water. Available online at: https://floridadep.gov/sites/default/files/valued_resource_FinalReport_508C.pdf (Accessed January 2021.)

Figure 4.10.2 Statewide Estimated Historical Water Use in PS, DSS, L/R, and CII (mgd)



Note: Based on the USGS and WMDs water withdrawal data, combined with reclaimed water use attributed by EDR to the respected water use categories. See Appendix A.13 for historical water use in each category.

EDR Water Use Model

EDR produces and updates multiple economic and demographic indicators characterizing the state's economy and population trends, and these indicators are used to develop the state's official forecasts. EDR also maintains a comprehensive database of the historical indicator values. Many of these indicators are significant predictors of water use, such as population, economy structure (*e.g.*, characterized by employment in various industries), and the total economic activity (*i.e.*, Florida's gross domestic product). EDR produces these forecasts for a 10-year planning period, and therefore, for this report, these forecasts are expanded using a linear trend to match the 20-year water supply planning horizon.

Most of EDR's economic forecasts are produced for the state as a whole. Water use, however, must be forecasted on the regional level to match the geography used for the existing water supply inferred from the WMDs' data. Therefore, for this report, EDR distributed the total statewide values of various economic indicators to individual counties. For this task, the counties' relative shares were estimated for each economic indicator using county historical and forecasted data from Woods and Poole Economics (2020).[216]

EDR applies regression analysis to develop a model that can reasonably reproduce the Florida counties' historical water use variability. The model includes the following variables:[217]

- *County population:* population growth is a critical determinant of water use;[218]

- *The proportion of the county population employed in accommodation and food services*: tourists and visitors can significantly increase water use, especially in the PS and CII categories that include hotels and motels and other lodging and food service locations. While county historical visitor numbers are not available, employment in accommodation and food service sector can serve as a proxy reflecting fluctuation in visitation;

- *The proportion of the county population employed in mining, manufacturing, and utility sectors*: this value reflects the importance of industrial and mining activities in a county, which can be an important driver of CII water use;

- *Total precipitation in spring months (i.e., March-May)*: the weather is a decisive determinant of water use, particularly in PS and L/R categories. Reduction in precipitation, especially in warm and relatively dry spring months, can increase total water use;[219]

- *Time trend*: this variable is intended to capture the effect of conservation and improving efficiency. For example, while the water use is expected to grow with population, this growth is expected to decelerate over time due to the water use efficiency improvements.

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[216] Woods and Poole Economics. 2020. Data Pamphlets for Any State, Region, or the U.S. Total. Available online at: https://www.woodsandpoole.com/our-databases/counties-metro-areas/data-pamphlets-state-region-us-totals/ (Accessed January 2021.)

[217] Various specifications of the model were examined, and the predictive powers for these specifications were compared using the adjusted R-squared values. Predicted water use was also visually compared with each county's historical water use to ensure the model does not materially misrepresent the history. Forecasted water use was also examined to ensure the model does not result in forecasted exponential growth in water use on the statewide or county levels. The statistical models described in this report are those that were judged as the best using these criteria. See Appendix A.14 for additional details.

[218] EDR also considered county population specifically in incorporated areas. The water use correlation with that population was smaller, however, as compared with the total population in a county.

[219] EDR also examined the potential effect on water use of the total summer precipitation (June-August), and the average temperature in spring and summer months. However, none of these variables had a statistically significant effect on the water use.

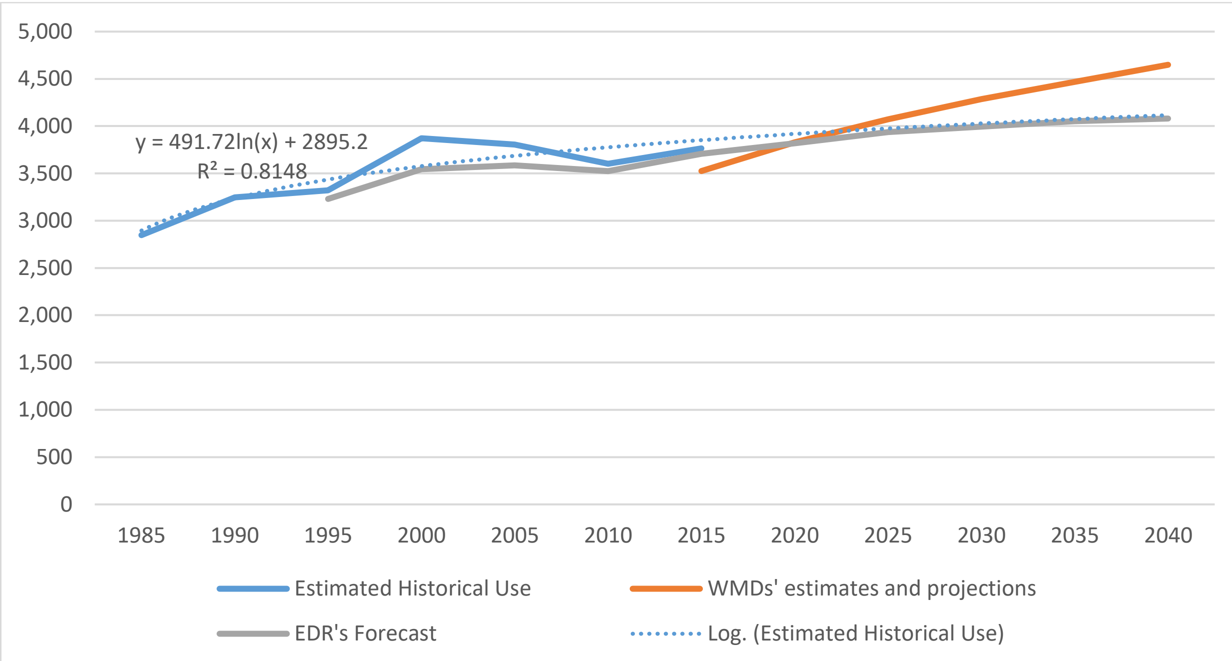
Note that water demand can be related to these variables in a nonlinear fashion. EDR used log-transformation to transform this relationship into the form that can be captured by a linear regression analysis.

The preliminary analysis shows that the water use in nine counties could not be adequately predicted with the model and the variables discussed above. For three of these counties – Duval, Lee, and Palm Beach – population growth was the only predictor of the water use, and therefore, water use in these counties is forecasted using population only. In the other six counties – Glades, Hamilton, Nassau, Polk, Putnam, and Taylor – water use was dominated by the CII category, whereas PS dominated water use in all other Florida counties. While population was still a significant driver of water use, employment in the construction sector was also identified as an important determinant. In addition, water use in these counties was negatively correlated with the population's proportion of those 65 years or older. This age variable likely acted as a proxy variable reflecting the changes in the economy's structure, with an aging population indicating the transition out of an industrial and manufacturing economy. The variables and the models are described in more detail in Appendix A.14.

Statewide historical estimated water use, the WMD estimates and projections, and the EDR forecast are presented in Figure 4.10.3. EDR forecasts a continued increase in the statewide water use; however, the rate of increase is lower than that projected by WMDs. One explanation can be the effect of water conservation included in the EDR forecast but not in the WMDs' demand Scenario 1 ("Baseline").

[See figure on following page]

Figure 4.10.3 Statewide Estimated Historical and Projected Water Use in PS, DSS, L/R, and CII (mgd)



Note: Log. (Estimated Historical Use) is provided for illustration only, and it shows a statewide water use trend observed historically. The statewide water use increased over time and can be approximated with a logarithmic trendline. EDR's forecast generally extends this same logarithmic trendline into the future.

EDR's Pilot Model for PG Water Use

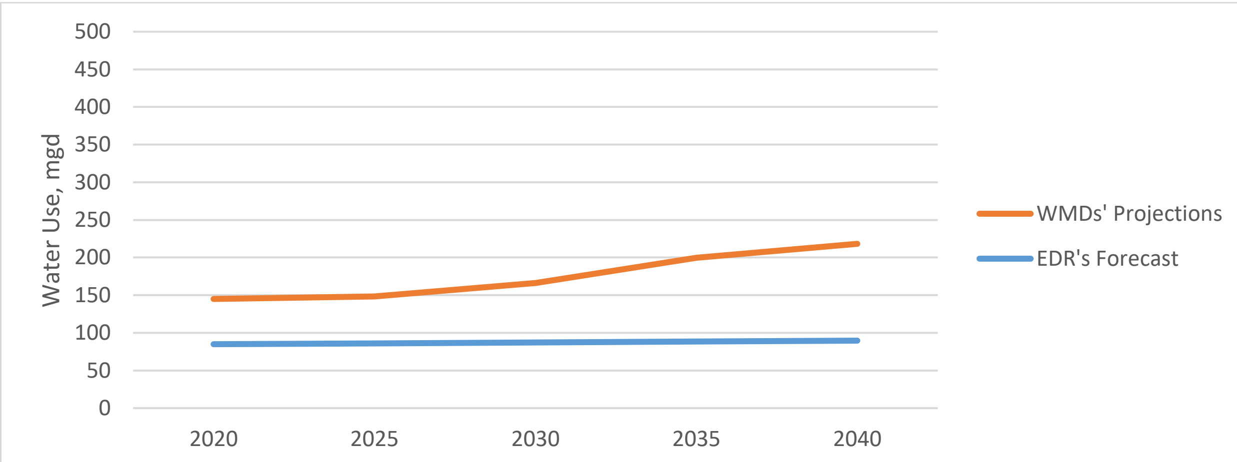
The discrepancy in the PG water use data from the USGS *vs* the WMDs creates a significant barrier for developing EDR's PG water use model. The data provided by the NWFWMD, SRWMD, and SFWMD span two to three recent years only, and therefore, are insufficient for developing a 20-year water use projections for the EDR expenditure model. Therefore, EDR supplements the WMDs' data with information available from the USGS periodic water use reports; however, the data are not entirely compatible. WMDs focus on consumptive use, while the USGS reports water withdrawals that can include both consumptive use and withdrawal returned to the water source. To make the two data sources more compatible, EDR uses only freshwater withdrawals for closed-loop systems from the USGS reports (as opposed to the total freshwater withdrawals also reported by USGS). Still, for a sample of counties for which both the WMDs' and USGS' data were available, the water use reported in the two sources differed significantly, implying that additional data verification and clarification should be implemented.

The analysis of the USGS and WMD data shows zero PG water use in most counties.[220] The exceptions are 26 counties: Alachua, Bay, Citrus, DeSoto, Duval, Escambia, Hardee, Hernando, Jackson, Lake, Lee, Leon, Liberty, Manatee, Martin, Miami-Dade, Orange, Osceola, Palm Beach,

[220] These counties can still report water withdrawals for the PG category; however, these withdrawals are deemed to be irrelevant for the water supply planning process. For example, these counties may report significant volumes of saline water withdrawals. Since these withdrawals have a limited value in any alternative water use, EDR disregards these withdrawals from the analysis.

Pasco, Polk, Putnam, St. Lucie, Suwannee, Volusia, and Wakulla. For these counties, the water use is assumed to stay at the average historical use or is modeled using a regression analysis.[221] A statewide forecast of PG water use is presented in Figure 4.10.4.

Figure 4.10.4 Statewide Projected Water Use in PG (mgd)



Note: Scale is one-tenth that of prior figures to clearly illustrate the difference between the forecasts.

EDR's Pilot Model Water Use Summary

As presented in Figures 4.10.1, 4.10.3, and 4.10.4, the water use forecasts projected with EDR's pilot model and FSAID-VII are below those produced by the WMDs for the baseline scenario (Scenario 1) and the scenario with conservation (Scenario 2), as shown in Figure 4.10.5. Possible explanations for the differences include:

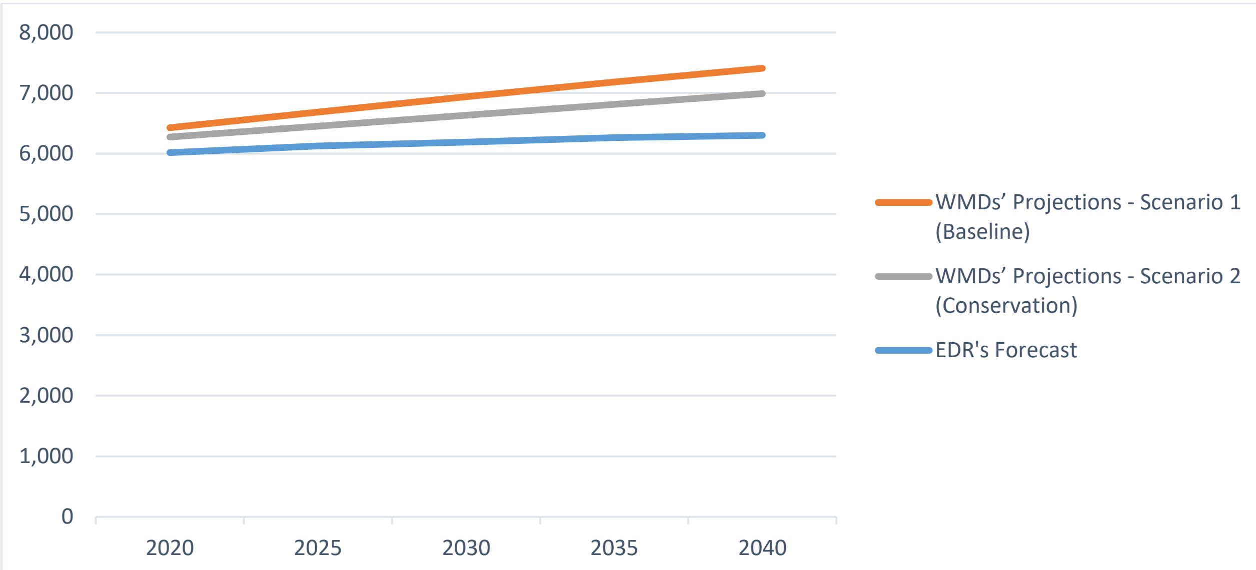
- Historical trends in water use efficiency improvements and water conservation are higher than those considered by the WMDs;
- EDR's forecast is based on updated population projections, which may be lower than those used in the WMDs' projections;
- Historical PG water use data used by EDR to develop the forecasting model are not adequate, and therefore, they do not allow accurate projections of the future water use;
- The AG water use forecast from FSAID-VII incorporated into the EDR statewide forecast is significantly below those developed by the WMDs.

Overall, while the EDR model and forecast presented in this edition is a significant improvement compared to the 2020 Edition, additional work and peer-review of the model is needed before EDR makes the decision to rely solely on this model to forecast expenditures. In the interim, both EDR's

[221] For more details, see Appendix A.16.

model based on the WMD projections and EDR's pilot model will run concurrently to produce expenditures forecasts.

Figure 4.10.5 Statewide Projected Water Use (mgd)



EDR's pilot statewide water use model can be directly applied to forecast water use (see Table 4.10.2).[222] Two issues need to be addressed to improve the forecast:

a. Analysis of both average year and drought water use scenarios (currently, only the average year conditions are considered); and

b. Examination of the determinants for water use efficiency improvements and water conservation (current forecast incorporates historical time trend in the water use efficiency improvements, without considering potential investments needed to maintain or accelerate this trend).

[See table on following page]

[222] See Appendix A.17 for a comparison of the EDR's forecast with the WMDs' estimates and projections.

Table 4.10.2 Total Water Use Forecast Produced by EDR's Pilot Statewide Water Use Model

Region	2020	2025	2030	2035	2040
NW – II	95.45	99.92	103.91	107.72	110.69
NW – Oth	239.54	237.84	237.13	238.03	237.77
SR – West	93.87	97.69	101.88	105.52	109.39
NFRWSP	633.66	643.04	647.18	654.96	659.77
SJR – CSEC	382.09	384.58	383.55	384.34	382.53
SW – N (excluding CFWI)	130.47	136.10	141.41	147.45	152.26
SW – TB	526.66	532.20	531.11	530.33	525.79
SW – H (excluding CFWI)	121.35	120.52	119.52	118.59	117.63
SW – S	315.47	325.00	330.15	336.22	340.58
CFWI	623.35	638.38	652.36	664.38	670.75
SF – LKB	133.45	134.72	135.76	136.73	137.08
SF – UEC	237.80	234.67	229.24	224.75	219.45
SF – LEC	1,781.74	1,806.00	1,815.05	1,825.68	1,828.11
SF – LWC	700.31	734.36	762.43	788.21	809.08
Statewide	***6,015.22***	***6,125.03***	***6,190.67***	***6,262.87***	***6,300.87***

EDR's Pilot Model Water Supply

Existing water supply can be inferred from the WMDs' reports (see Table 4.4.1). This information, however, generally does not reflect reclaimed water supply.[223] Since reclaimed water is an important water supply source, DEP's Reuse Inventory Database and Annual Report is used as a proxy.[224] For this edition, EDR assumes that existing reclaimed water use is precisely equal to the available reclaimed water supply.[225] Therefore, the reclaimed water volume estimated to be available in 2018 for various water use-categories is used as an existing reclaimed water supply.[226] County reclaimed water flow in these categories is grouped into water supply planning regions based on the county population proportions in each water supply region.[227] Existing supply should also account for the capacity of the projects currently in design, construction/underway, or on hold. Table 4.10.3 summarizes the existing supply in all regions based on the assumptions discussed above. In the future, EDR intends to continue its ongoing review of the sources of water supply, including analyzing DEP's Reuse Inventory Database, likely improving the assumptions used in EDR's pilot model.

223 As discussed in Appendix A.6, the WMDs use hydrogeological models of aquifers, along with the CUPs/WUPs permit information, to estimate existing supply. Reclaimed water is generally not reflected in this analysis.
224 DEP. 2020. Reuse Inventory Database and Annual Report. Available online at: https://floridadep.gov/water/domestic-wastewater/content/reuse-inventory-database-and-annual-report (Accessed December 2020.)
225 In the future, additional discussions with WMDs and DEP are needed to identify the existing reclaimed water supply. For example, the DEP's Reuse Inventory Database and Annual Report reports both the capacity and the flow for each reclaimed water facility, with the flow being smaller than the capacity. It is not clear, however, whether the capacity can be interpreted as available supply or whether additional infrastructure investments are needed before the total capacity is available to supply water users. A part of the capacity to be allocated to the natural system restoration goals must also be subtracted from the exiting supply.
226 These included 2018 reclaimed water flow for residential irrigation, toilet flushing, fire protection, public access areas & landscape irrigation (including the following subtypes: "other public access areas," "golf course irrigation," and "other"), and industrial–at a treatment plant. For industrial–at a treatment plant reclaimed water flow, it is assumed that only 2/3 of the flow is available for various uses, and 1/3 of the flow is used internally by the reclaimed water treatment plants.
227 See Appendix A.15 for the county population percentage in each water supply planning region.

Table 4.10.3 Existing Water Supply Estimates–Example for the Pilot Expenditure Estimates (mgd)

Region	Inferred Supply*	Existing Reclaimed Water Flow for Specific Use Categories**	Water and Beneficial Offset by the Projects in Design, Construction, and On Hold	Sum of Inferred Supply and Exiting Reclaimed Water Flow
(1)	(2)	(3)	(4)	(5) = (2) + (3) + (4)
NW – II	89.88	9.47	1.38	100.73
NW – Oth	311.90	6.90	2.33	321.13
SR – West	122.35	0.03	6.06	128.44
NFRWSP	555.27	38.18	18.56	612.01
SJR – CSEC	394.52	55.39	33.60	483.51
SW – N (excluding CFWI)	170.18	9.84	2.59	182.61
SW – TB	461.85	94.67	16.23	572.75
SW – H (excluding CFWI)	89.15	0.03	0.14	89.32
SW – S	279.33	34.36	13.27	326.96
CFWI	812.59	103.50	89.26	1,005.35
SF – LKB	257.48	0.15	-	257.63
SF – UEC	350.93	7.32	11.10	369.35
SF – LEC	1,956.99	70.09	8.96	2,036.04
SF – LWC	1,201.41	71.11	3.30	1,275.82

* See Table 4.4.2.
** Assuming existing reclaimed water supply is equal to 2018 reclaimed water use.

EDR's Pilot Model Future Supply Shortage

EDR's pilot model uses inferred existing supply to estimate potential future supply shortages that should be addressed through new investments. It confirms the conclusion made with the WMDs' water demand projections that additional water supply will need to be developed, although, the pilot model projects a relatively small difference of 99.65 mgd between the forecasted demand and estimated water supply by 2040. In contrast, the results based on the WMDs' 2040 water use projections suggest a larger shortage of 353.97 mgd. The difference is due to the lower water use forecasted by EDR's pilot model, as compared with the WMDs' projections. EDR's pilot model indicates that water supply investments are needed in North Florida (NW – II, and NFRWSP) and some of SWFWMD (the Heartland and Southern regions). The potential 2040 supply shortages using both methodologies can be found in Table 4.10.4.

[See table on following page]

Table 4.10.4 Potential 2040 Supply Shortage Estimates – EDR's Pilot Model and EDR Results based on WMD Data (mgd)

Regions	Using WMD	EDR Pilot
NW – II	5.00	9.96
NW – Oth	-	-
SR – West	5.19	-
NFRWSP	141.30	47.76
SJR – CSEC	33.35	-
SW – N (excluding CFWI)	11.55	-
SW – TB	-	-
SW – H (excluding CFWI)	-	28.31
SW – S	-	13.62
CFWI	95.00	-
SF – LKB	-	-
SF – UEC	3.75	-
SF – LEC	49.55	-
SF – LWC	9.27	-
Statewide	**353.97**	**99.65**

EDR's Pilot Model Expenditure Forecast

In order to develop an expenditure forecast that addresses the supply shortage, certain assumptions regarding the projects must be made. These assumptions include the choice of project types and sizes for each region where water use is projected to exceed existing supplies. Similar to the approach discussed in Appendix A.10, water supply development scenarios can be derived from the past projects and future project options included in the DEP project appendix and a recent DEP assessment[228] of this issue. In that assessment, reclaimed water is ranked as a "high confidence" water source for all of the relevant regions. A similarly high rating is assigned to surface water and brackish groundwater in the SW – S and to groundwater recharge in the NFRWSP.

Implementation Costs per Unit of Project Capacity
The EDR model presented in Appendix A.10 can predict the project costs, given specific project types, sizes, implementation region, and status. Assessment of the unit project costs for the NW – II, and NFRWSP are discussed in the previous sections. Following a similar approach, reclaimed water project costs for SW – H (outside CFWI) can be estimated at $11.42 million per mgd. Projects in the SWFWMD tend to be more expensive, especially compared with those in the CFWI); moreover, the medium size of the reclaimed water projects in the SW – H is small, which increases the cost per unit of the project capacity. In turn, in the SW – S, reclaimed water projects are large (on the median), and their average costs are estimated at $6.37 million per mgd. Brackish groundwater projects can be less expensive (estimated at $3.54 million per mgd, on average). In comparison, surface water projects can cut the project expenditure even further (estimated at $2.20 million per mgd, on average).

[228] DEP. Undated. An Assessment of Viable Alternative Water Supply Resources and Critical Funding Needs. Presented by the FDEP pursuant to Executive Order 19-12 and Chapter 2019-115, Laws of Florida.

Statewide Expenditure Forecast to Ensure Sufficient Water is Available

The unit cost for various project types and regions can be combined with the estimates of the potential future supply expansion needs (from the pilot model) and the cost of projects already in design, construction/underway, and on hold to generate low- and high-cost expenditure scenarios. On the statewide level, the project expenditures estimated using EDR's pilot model (*i.e.*, $767.27 million by 2040) are comparable with those estimated using the WMD's water demand projections ($852.00 million by 2040). Differences appear in the expenditure projections at the regional level, with EDR's pilot model forecasting the bulk of the expenditures occurring in the SW – H (outside CFWI) and NFRWSP, with some expenditures also needed in the SW – S and NW – II. In contrast, the WMDs' demand estimates point to potential supply expansion needs in the NFRWSP, SW – N (excluding CFWI), CFWI, and SF – LEC. While EDR focuses on the statewide expenditure forecast, the pilot model's accuracy regarding specific regional expenditure predictions needs further discussion with the WMDs and DEP. These results are shown in Table 4.10.5 below.

As a placeholder, the expenditure forecast for the natural systems from Section 4.8 is included in Table 4.10.5 below. While EDR's pilot water use model is not expected to affect the general approach to the natural system expenditure estimates (which is based on the sum of the expenditures for the projects identified by the WMDs), several issues still need to be addressed. Most importantly, how do supply estimates relate to the needs of the natural system restoration? EDR's pilot model seems to project water demand exceedance in the regions considered by the WMD as having sufficient water supply. Does this mean that the projects currently in design, construction/underway, or on hold in these regions are intended for natural system restoration? In many regions, MFLs are developed. In the absence of corresponding RPSs, it is not clear if MFLs should be used by EDR to indicate that the existing demand in the region already exceeds (or will likely exceed) the existing supply. Overall, the link between the demand projections, existing supply estimates, and the water needs for the natural systems must be further discussed and clarified.

Table 4.10.5 Statewide Expenditures forecast, Total for 2020-2040, Pilot Model (million $2020)

Planning Regions	Projects in Design, Construction, and On Hold (million, $2020)	Project Meet Remaining Inferred Shortage (million, $2020)		All Projects (million $2020)		
		Less expensive	More expensive	Less expensive	More expensive	Average
(1)	(4)	(6)	(7)	(8)	(9)	((8) + (9)) / 2
NW – II	$10.50	$81.53	$81.53	$92.03	$92.03	$92.03
NFRWSP	$59.19	$21.49	$206.61	$80.68	$265.80	$173.24
SW – H*	$2.69	$323.30	$323.30	$325.99	$325.99	$325.99
SW – S	$117.65	$29.964	$86.76	$147.61	$204.41	$176.01
Statewide (sum of regions)	**$190.03**	**$456.28**	**$698.20**	**$646.31**	**$888.23**	**$767.27**
Natural Systems				$665.06	$665.06	$665.06
Total Expenditure				**$1,311.37**	**$1,553.29**	**$1,432.33**

* excluding CFWI.

4.11 Next Steps and Recommendations

In the future, EDR plans to continue enhancing the water use forecasting model. Yet, even the current pilot model allows for the following insights:

- EDR's pilot model results in a total expenditure forecast that is, on the whole, comparable with the forecast reported in Table 4.9.2 (*i.e.*, the forecast based on the WMDs' demand projections). The key difference is which regions have an inferred future supply shortage because the project costs vary significantly between regions (see Table 4.10.4). While EDR is required to produce a statewide expenditure forecast, differences at the regional level determine the magnitude of the statewide expenditures.

- The EDR model calls for making investments in alternative water supplies sooner than EDR's forecast based on the WMD data. In fact, for the regions with potential future supply shortages, the bulk of the water supply expenditures are needed in 2020s.

- Significant improvements in water use efficiency and conservation are forecasted by EDR's pilot model. While some of these improvements can be costless (*i.e.*, passive conservation), others will require significant investments. In the future, the expenditures needed to maintain or accelerate water use efficiency improvements and water conservation should be further explored.

- A critical area for improvement is a better understanding of "beneficial use volume for the total reclaimed water flow" as used in DEP's reclaimed water use inventory and database. Furthermore, EDR's pilot model forecast is based on the assumption that the existing reclaimed water use is precisely equal the available reclaimed water supply. Additional analysis is needed to verify the assumption and strengthen the evaluation of existing reclaimed water supply.

- Expenditures for natural system protection and restoration should be better integrated into EDR's pilot model in the future. An initial step in this process is a discussion of the projects currently in design, construction/underway, or on hold in the regions with no "Water Needed" identified in DEP (2020a).

- The 2021 Edition includes a limited discussion of drought preparedness expenditures. The discussion of drought impacts on future water demand, existing supplies, and natural systems should be expanded in future editions.

Overall, EDR will continue enhancing the water use and expenditure forecasting model.

5. Estimating Future Expenditures Necessary to Comply with Laws and Regulations Governing Water Quality Protection and Restoration

The Office of Economic and Demographic Research (EDR) is required to forecast expenditures necessary to comply with laws and regulations associated with water quality protection and restoration projects and initiatives. This edition further estimates future expenditures relating to state programmatic costs to implement the total maximum daily loads program and basin management action plans. Future editions will continue to refine the existing analyses as better data becomes available and will begin to analyze relevant compliance costs of local governments and public and private utilities to meet requirements related to water quality protection and restoration. While this chapter largely focuses on the primary water quality improvement initiatives required by the federal Clean Water Act and the Florida Watershed Restoration Act, future editions will incorporate other important state and regional water quality protection and restoration initiatives.

5.1 State and Federal Laws and Regulations Governing Surface Water Quality

Florida has an abundance of surface water resources. The protection of these resources is vitally important. Water pollution not only affects Florida's inland and coastal waters, it can also impact the public health of residents and visitors who use and enjoy Florida's waters. According to the United States Environmental Protection Agency (EPA), nonpoint sources of pollution are reported as the leading cause of surface waterbody impairment nationwide[229] and are the largest contributor of pollutants to surface and groundwater in Florida.[230] Unlike point sources of pollution that are conveyed to waterbodies by discrete means, nonpoint pollution comes from many diffuse sources that are transported to waterbodies through stormwater runoff. Potential sources of nonpoint source pollution include runoff from agricultural and urban landscapes, septic tanks, and atmospheric deposition. The most significant surface water quality issue identified statewide is excessive nutrients (nitrogen and phosphorus) from both point and nonpoint sources. The Florida Department of Environmental Protection (DEP) is responsible for implementing various surface water quality-related directives under federal and state law. Much of this effort is undertaken in coordination with other state agencies, the water management districts (WMDs), local governments, universities, and other public and private stakeholders.

In 1972, Congress passed the Clean Water Act (CWA) with a purpose to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[231] Two national goals were also declared: (1) the elimination of pollutant discharges into navigable waters by 1985; and (2) fishable and swimmable waters by 1983.[232] Although water pollution still remains an issue nationwide, the intent behind these ambitious goals still embody the implementation of the CWA.

[229] U.S. Environmental Protection Agency, Basic Information about Nonpoint Source (NPS) Pollution, Overview, available at: https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution (Accessed December 2020.)
[230] Florida Department of Environmental Protection, Nonpoint Source Program Update, April 2015 at 9, available at: https://floridadep.gov/sites/default/files/NPS-ManagementPlan2015.pdf (Accessed December 2020.)
[231] 33 U.S.C. § 1251(a).
[232] 33 U.S.C. § 1251(a).

While the CWA establishes the federal framework governing water quality protection and restoration, it is structured in a manner that recognizes the primary responsibilities and rights of states to control water pollution.[233] To this end, the CWA imposes various wide-scale requirements on states with regard to water quality management. These initiatives include establishing and periodically reviewing surface water quality standards, assessing the condition of waterbodies, and establishing water quality goals through the adoption of total maximum daily loads (TMDLs) for waterbody segments which do not meet water quality standards, and implementing controls for permitted sources of pollution. This federal and state partnership is further demonstrated by the availability of federal grants to states for the implementation of various water quality programs and initiatives.

In even numbered years, states are required to meet reporting requirements under CWA sections 303(d), 305(b), and 314, which identify impaired waters, provide a description of the water quality of all waters in the state, and provide an assessment of the status and trends of significant publicly owned lakes, respectively.[234] DEP prepares the Integrated Water Quality Assessments for Florida, which are available on its website.[235]

The main regulatory components of the CWA prohibit discharges of pollutants into waters of the United States except in compliance with the provisions of the CWA. This includes the regulation of pollutants discharged from point sources under the National Pollutant Discharge Elimination System (NPDES) permit program[236] and discharges of dredged or fill material.[237] The CWA also regulates the use and disposal of biosolids from wastewater treatment processes.[238] Although most nonpoint sources of pollution are not controlled through regulatory measures, the CWA incentivizes nonpoint source management through federal grants to address nonpoint source pollution.[239]

Recent Legislation

In 2020, the Florida Legislature passed the Clean Waterways Act[240] addressing many environmental issues related to water quality improvement in the state. The act requires the Department of Agriculture and Consumer Services (DACS) to inspect agricultural producers enrolled in best management practices at least once every two years, prioritizing operations in certain Basin Management Action Plan (BMAP) areas. Further, it transfers the Onsite Sewage Program from the Department of Health to DEP and allows DEP to provide grants for certain wastewater treatment projects in BMAP areas. The act additionally addresses water quality improvements related to stormwater, biosolids, and golf courses, including setting new

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[233] 33 U.S.C. § 1251(b).
[234] 33 U.S.C. §§ 1313, 1315, and 1324.
[235] https://floridadep.gov/dear/dear/content/integrated-water-quality-assessment-florida. (Accessed December 2020.)
[236] 33 U.S.C. § 1342
[237] 33 U.S.C. § 1344.
[238] 33 U.S.C. § 1345.
[239] 33 U.S.C. § 1329.
[240] *See* Ch. 2020-150, Laws of Florida, available at: http://laws.flrules.org/2020/150.

expectations for water quality monitoring.[241] A number of the act's provisions are forward looking, the full impact of which will follow future rule development, appropriations, and study results.

Water Quality Assessment and Total Maximum Daily Loads for Impaired Waters

Water quality assessment begins with water quality standards. The Clean Water Act directs states to establish surface water quality standards, or if the state fails to act, requires the EPA to do so.[242] Florida's surface water quality standards are adopted by rule in chapter 62-302 of the Florida Administrative Code, and consist of designated uses,[243] 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).[244] See Table 5.1.1 identifying the seven classes of designated uses in Florida beginning with the classification having the highest degree of protection (*i.e.,* Class I – Potable Water Supplies).

Table 5.1.1 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

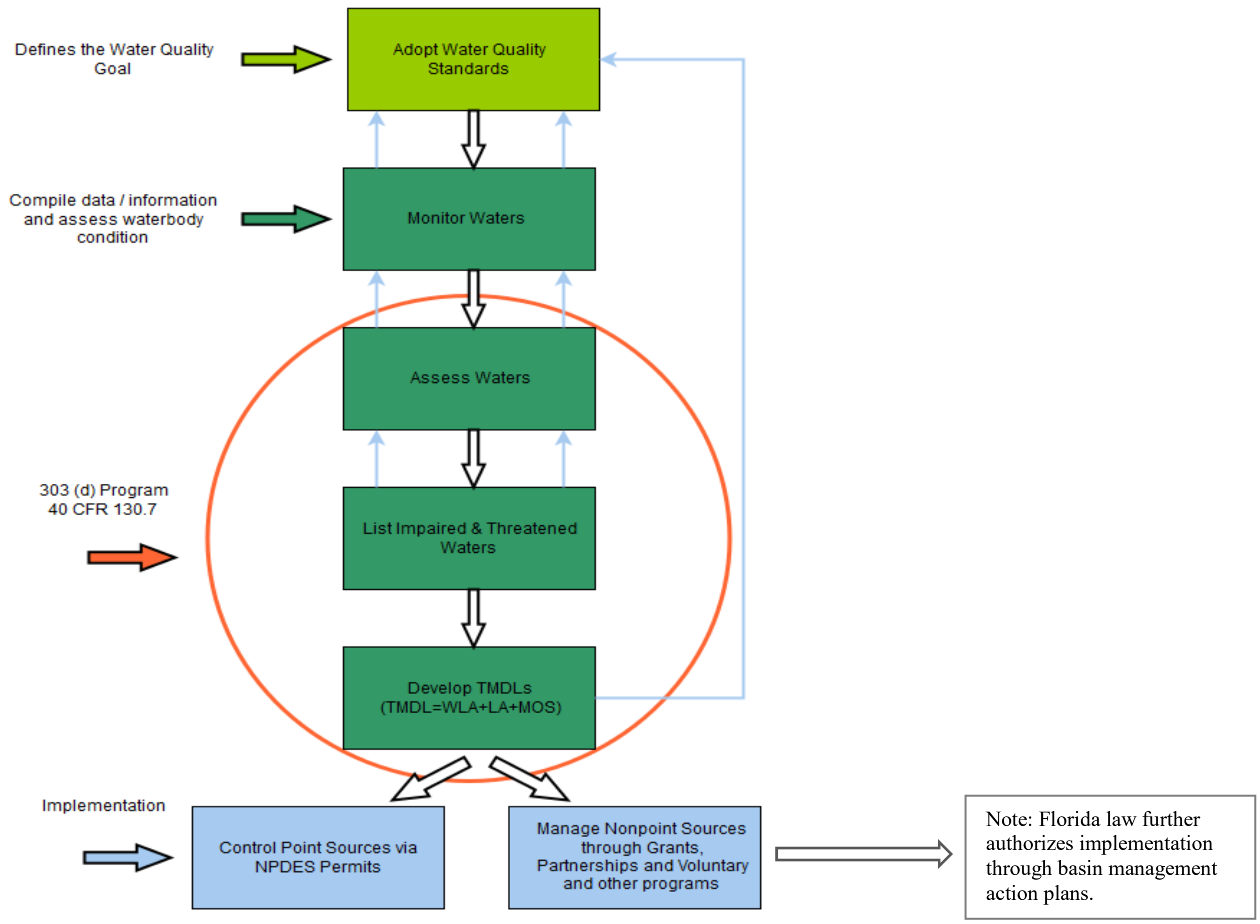
Source: Fla. Admin. Code R. 62-302.400(1).

The cornerstone of water quality restoration under the CWA is the development and implementation of total maximum daily loads for waterbodies or waterbody segments that are not fully meeting their designated uses. In 1999, the Florida Legislature passed the Florida Watershed Restoration Act, section 403.067, Florida Statutes, which established the state's TMDL program to implement the requirements in section 303(d) of the federal Clean Water Act.[245] Under this program, waters identified as impaired are placed on DEP's Verified List of impaired waterbodies for which TMDLs must be developed.[246] The list is adopted by DEP secretarial order and is

[241] For a concise summary of the bill see: https://www.flsenate.gov/PublishedContent/Session/2020/BillSummary/Community_CA0712ca_00712.pdf. (Accessed December 2020.) For a more thorough analysis, see: https://www.myfloridahouse.gov/Sections/Documents/loaddoc.aspx?FileName=h1343z1.ANRS.DOCX&DocumentType=Analysis&BillNumber=1343&Session=2020 . (Accessed December 2020.)
[242] 33 U.S.C. § 1313(a)-(c).
[243] 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).
[244] Fla. Admin. Code R. 62-302.200(42).
[245] 33 U.S.C. § 1313(d).
[246] *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).

submitted to the EPA biennially pursuant to 303(d) of the Clean Water Act.[247] The EPA must approve or disapprove the 303(d) list and may independently add additional waterbodies not identified by the state. Figure 5.1.1 illustrates the general approach for water quality restoration under the CWA.

Figure 5.1.1 Water Quality-Based Approach of the Federal Clean Water Act



Note: WLA refers to wasteload allocation for point sources, LA refers to load allocations for nonpoint sources, and MOS refers to the margin of safety to account for uncertainty.
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 2020.)

The DEP utilizes a statewide watershed management approach for water resource management in Florida. First, DEP has delineated the state into assessment units with unique water body identification numbers (WBIDs) that represent waterbodies at the watersheds or sub-watershed

[247] *See* Fla. Admin. Code R. 62-303.100(1); *see also* Fla. Admin. Code R. 62-303.150(1). The current Statewide Comprehensive Verified List of Impaired Waters is available at: https://floridadep.gov/dear/watershed-assessment-section/content/assessment-lists. (Accessed December 2020.)

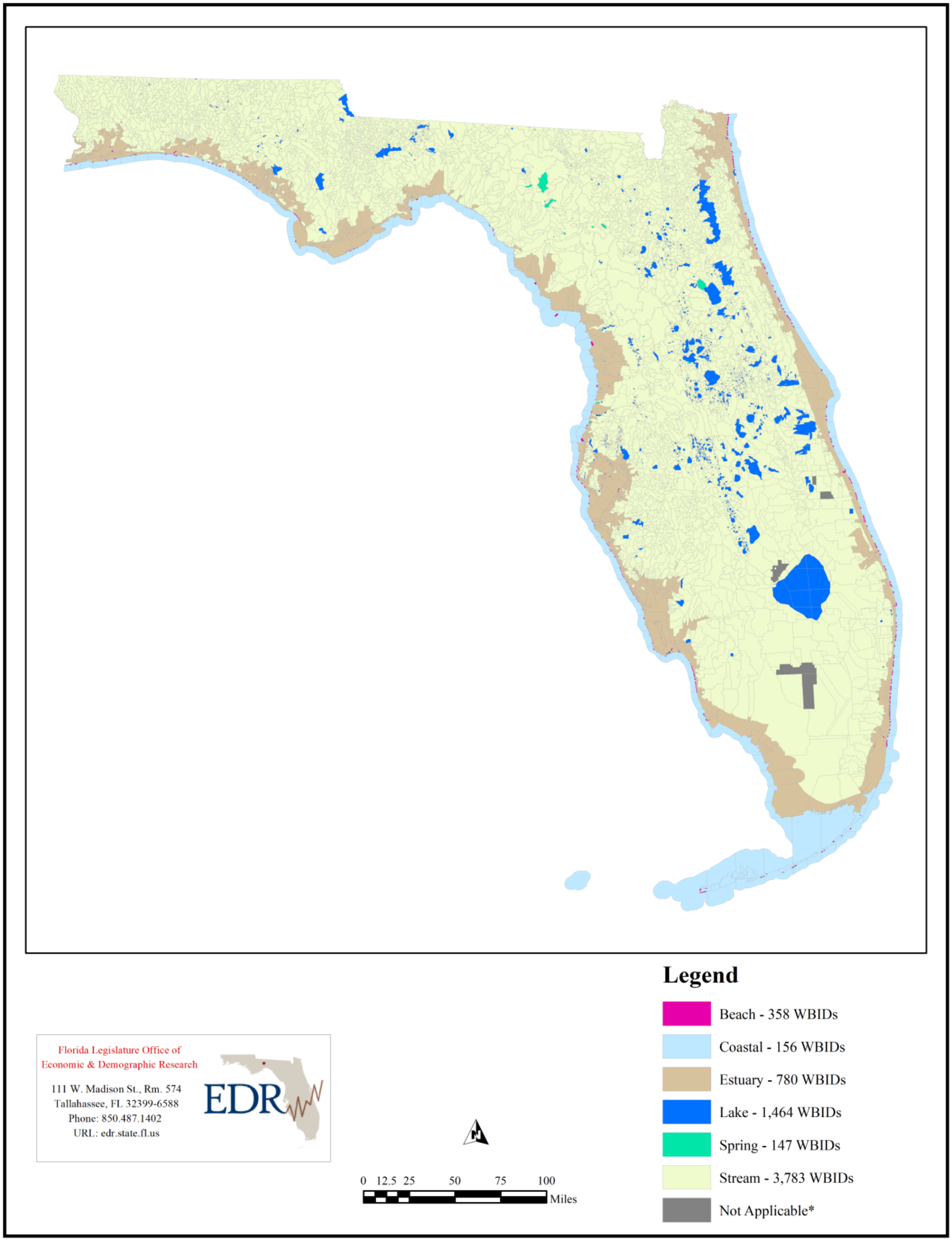
scale.[248] These WBIDs include "drainage basins, lakes, lake drainage areas, springs, rivers and streams, segments of rivers and streams, coastal, bay and estuarine waters in Florida."[249] The WBIDs are used by DEP in implementation of a number of responsibilities including impaired waters assessment and the total maximum daily loads and basin management action plan programs.[250]

Second, as part of the watershed management approach, Florida's 52 basins are divided into five basin groups that continuously move through a five-year, five-phase cycle of restoration activities that begins with the first phase of preliminary basin evaluation.[251] This approach allows DEP to focus its resources on specific basins throughout the state during each phase and ideally ensures that the WBIDs in each basin group will be assessed every five years. Assessed WBIDs are then placed in assessment categories or subcategories from one through five. See Figure 5.1.2 for a map of WBIDs statewide. See Figure 5.1.3 for a map of the five basin groups. See Figure 5.1.4 for an illustration of the rotating watershed management approach. See Table 5.1.2 for the assessment categories.

[See figures and tables on following pages]

[248] Florida Department of Environmental Protection, Basin 411, What is a WBID?, https://floridadep.gov/dear/watershed-assessment-section/content/basin-411-0. (Accessed December 2020.)
[249] *Id.*
[250] *Id.*
[251] *See* Florida Department of Environmental Protection, Final Integrated Water Quality Assessment for Florida: 2016 Sections 303(d), 305(b), and 314 Report and Listing Update, Table 6.2. Phases of the basin management cycle at 168, available at: https://floridadep.gov/sites/default/files/2016-Integrated-Report.pdf. (Accessed December 2020.) *See also* 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 2020.)

Figure 5.1.2 Water Body IDs (WBIDs)



*The six areas shown as not applicable are identified in DEP's GIS data as Hollywood Indian Reservation, Miccosukee Indian Reservation, Big Cypress Indian Reservation, Brighton Indian Reservation, Fellsmere Stick Marsh, and C-52 (Blue Cypress Watershed Management Area).

Figure 5.1.3 Basin Groups

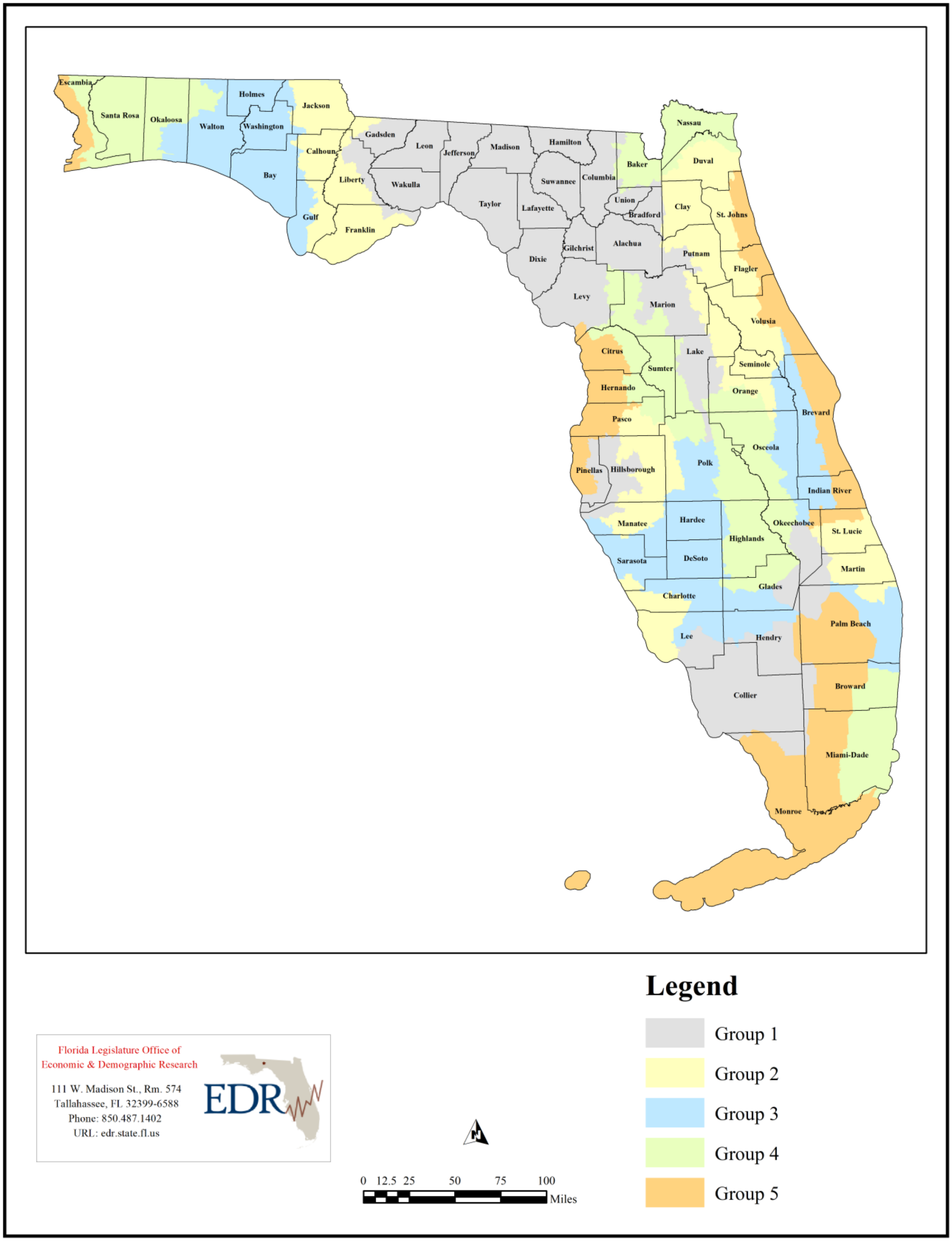
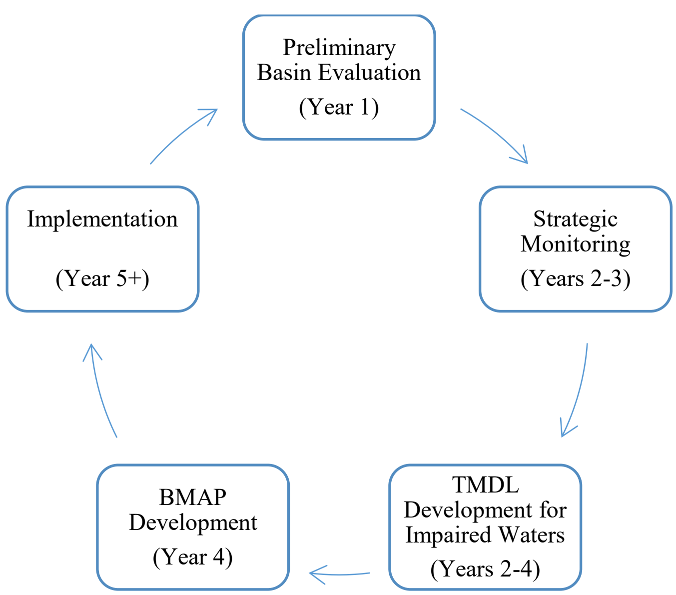


Table 5.1.2 Assessment Categories

Assessment Category	Assessment Category Definitions
1	Attains all designated uses
2	Attains some designated uses and insufficient or no information or data are present to determine if remaining uses are attained
3a	No data and information are present to determine if any designated use is attained
3b	Some data and information are present but not enough to determine if any designated use is attained
3c	Enough data and information are present to determine that one or more designated uses may not be attained according to the Planning List methodology in Chapter 62-303 of the Florida Administrative Code
4a	Impaired for one or more designated uses but does not require TMDL development because a TMDL has already been completed
4b*	Impaired for one or more designated uses but does not require TMDL development because the water will attain water quality standards due to existing or proposed measures
4c	Impaired for one or more criteria or designated uses but does not require TMDL development because impairment is not caused by a pollutant
4d	Waterbody indicates non-attainment of water quality standards, but the Department does not have enough information to determine a causative pollutant; or current data show a potentially adverse trend in nutrients or nutrient response variables; or there are exceedances of stream nutrient thresholds, but the Department does not have enough information to fully assess non-attainment of the stream nutrient standard.
4e**	Waterbody indicates non-attainment of water quality standards and pollution control mechanisms or restoration activities are in progress or planned to address non-attainment of water quality standards, but the Department does not have enough information to fully evaluate whether proposed pollution mechanisms will result in attainment of water quality standards.
5	Water quality standards are not attained and a TMDL is required.

Source: Florida Department of Environmental Protection, Watershed Assessment Section, available at: https://floridadep.gov/dear/watershed-assessment-section. (Accessed December 2020.) *See also* Memorandum from Robert H. Wayland III, Director, Office of Wetlands, Oceans and Watersheds to EPA Regional Directors et al. dated November 19, 2001, 2002 Integrated Water Quality Monitoring and Assessment Report Guidance, available at: https://www.epa.gov/sites/production/files/2015-10/documents/2002_02_13_tmdl_2002wqma.pdf. (Accessed December 2020.)
*Water segments in the 4b assessment category have Reasonable Assurance Plans in place and are not included in the state's 303(d) list.
** Water segments categorized in the 4e assessment category have Alternative Restoration Plans (also referred to as Pollutant Reduction Plans) in place and are included in the state's 303(d) list. Note that Florida's 4e category is comparable to EPA's 5-alternative (or 5-alt) category as they both recognize ongoing restoration activities for otherwise impaired waterbody segments.

Figure 5.1.4 Watershed Management Approach



Assessed water segments that are identified as impaired and placed in assessment category 5 require TMDL development. Establishing TMDLs for impaired waters represents a major first step towards restoring water quality. A TMDL is a water quality restoration goal that 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.[252] Using the TMDL as the maximum value, DEP then assigns individual wasteload allocations for point sources, load allocations for nonpoint sources, and a margin of safety to account for uncertainty in the scientific analysis.[253] Existing point sources may include wastewater treatment facilities, industrial facilities, and municipal separate storm sewer systems (known as MS4s). Existing nonpoint sources may include agricultural runoff and atmospheric deposition. These allocations along with other management and restoration strategies are intended to achieve the pollutant reductions necessary to meet the TMDL.[254]

Expressed mathematically, the TMDL is the summation of the wasteload for existing NPDES wastewater facilities and NPDES stormwater systems, the load allocation for existing nonpoint sources and natural background, and a margin of safety:

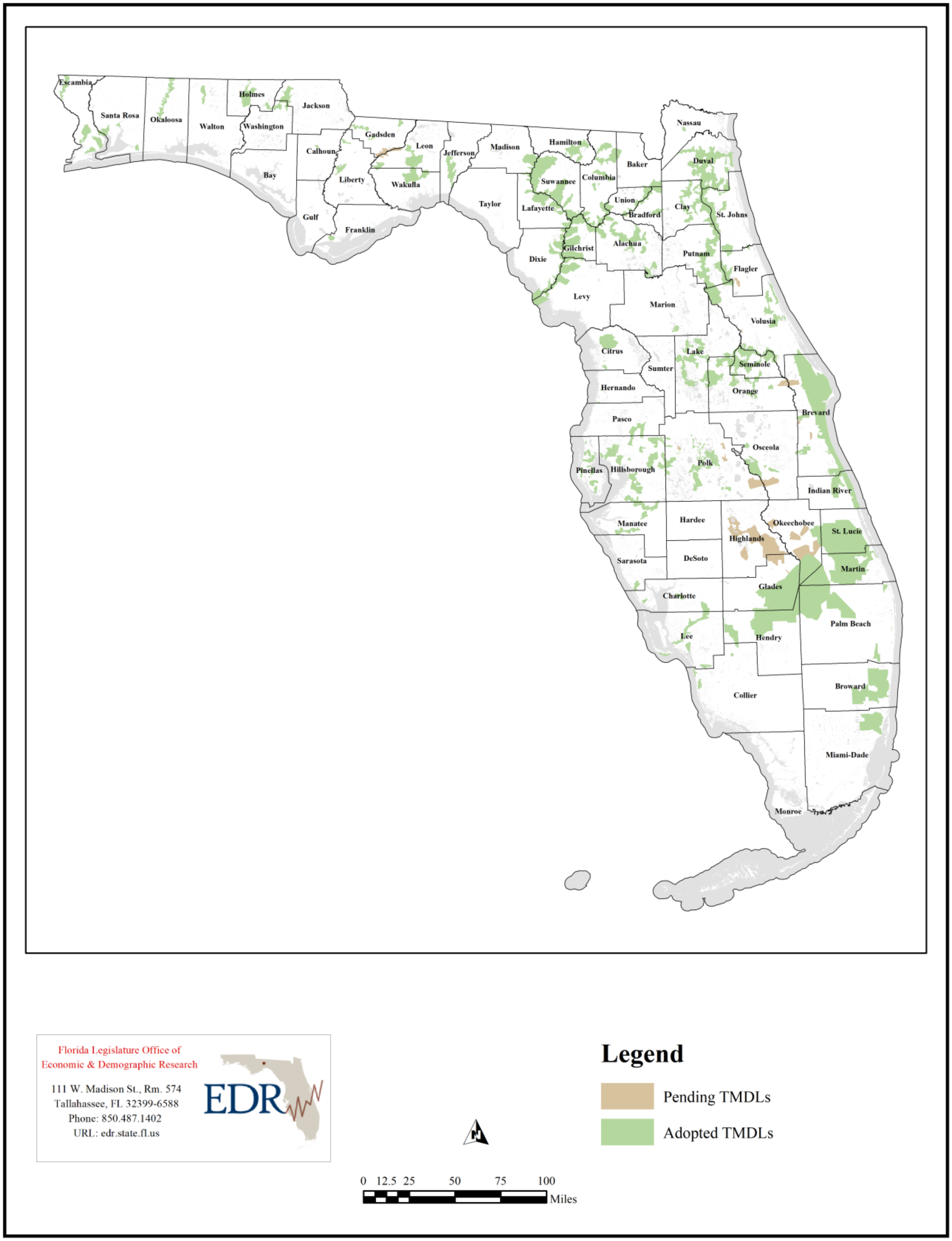
$$\mathbf{TMDL} = \sum \mathbf{WLA}_{\mathbf{NPDES}} + \sum \mathbf{WLA}_{\mathbf{NPDES\ Stormwater}} + \sum \mathbf{LA}_{\mathbf{Nonpoint\ Sources}} + \mathbf{MOS}$$

As of December 31, 2019, DEP has adopted a total of 438 TMDLs for impaired WBIDs (437 site-specific TMDLs and 1 statewide TMDL).[255] Specifically, there are 253 TMDLs for dissolved oxygen (DO), nutrients, and/or un-ionized ammonia; 179 TMDLs for bacteria; and five for other parameters (iron, lead, and turbidity).[256] In addition to these site-specific TMDLs, in 2013, DEP adopted a single statewide TMDL for mercury that affects over 1,100 waterbody segments in fresh and marine waters previously listed for mercury impairment.[257] For a map of TMDL activities in the state, see Figure 5.1.5.

[See figure on following page]

[252] *See* Fla. Admin. Code R. 62-303.200(31).
[253] All TMDLs include either an explicit margin of safety (*i.e.*, a specified amount of loading held in reserve) or implicit margin of safety (*i.e.*, conservative assumptions made and documented during TMDL development).
[254] § 403.067(6), Fla. Stat.
[255] Florida Department of Environmental Protection, 2019 Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Levels, and Recovery or Prevention Strategies, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed September 2020.)
[256] *Id*.
[257] *Id*. Note that mercury impairment is based upon potential risks to human health through consumption of fish with elevated levels of mercury in their tissues and not on an exceedance of the state's water quality criterion for mercury. *See* Final Report, Mercury TMDL for the State of Florida, October 24, 2013, available at: https://floridadep.gov/sites/default/files/Mercury-TMDL.pdf (Accessed September 2020.)

Figure 5.1.5 TMDLs in Florida



Based on DEP's statewide Comprehensive Verified List of impaired waters, which includes the most recent updates published on August 18, 2020, there are approximately 1,724 waterbody-parameter combinations in Florida that are listed as impaired and require a TMDL.[258] Overall, the most frequently identified pollutants causing water impairment relate to excessive nutrients.

In 2015, DEP set forth a priority framework document addressing how Florida's TMDL program will implement the new long term vision that EPA announced for section 303(d) of the Clean Water Act.[259] For the 2015 through 2022 time period, DEP expects to develop site-specific TMDLs for 80 priority waterbodies or waterbody segments.[260] The TMDL priority setting focuses on impaired waters where site-specific TMDLs are the best available option for water quality restoration.[261] Where appropriate, alternatives to the TMDL approach will be implemented.

Forecast of Future Expenditures Necessary to Comply with Laws Governing TMDLs

The DEP's statewide Comprehensive Verified List of impaired waters provides a list of WBIDs over which TMDLs will need to be established.[262] Further, they are prioritized into high, medium, or low priority.[263] While these priorities are not associated with a legally required time to completion, the list indicates that high priority are to be addressed within 5 years, medium within 5 to 10 years, and low within 10 years. As of the August 2020 update, there were 294 WBIDs with high priority for TMDL development, 1,021 with medium priority, and 409 with low priority.[264] The methodology regarding TMDL establishment provided by DEP suggests that for each WBID, impairments for dissolved oxygen, total nitrogen, total phosphorus, chlorophyll-a, macrophytes, biology, algal mats, nitrates-nitrites, total ammonia, and un-ionized ammonia could be combined into a single TMDL and that all other impairments would require individual TMDLs. Applying this methodology and assuming the highest priority among combined impairments, there are expected to be 276 TMDLs with high priority, 706 with medium, and 395 with low priority.

DEP further provided a history of the 447 existing TMDLs, identifying the year they were established and the pollutant parameter.[265] This history can be found in Table 5.1.3.

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[258] 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 September 2020.) Note that a waterbody or waterbody segment not meeting more than one water quality standard would be identified more than once on the State's Verified List as separate waterbody-parameter combinations.

[259] 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 September 2020.)

[260] *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 September 2020.)

[261] Letter from Gregory P. DeAngelo, P.E.., Florida Department of Environmental Protection, to Gracy Danois, Chief, U.S. Environmental Protection Agency (September 1, 2015) at 2, available at: https://floridadep.gov/sites/default/files/PriorityFrameworkDocument.pdf. (Accessed September 2020.)

[262] Available at: https://floridadep.gov/dear/watershed-assessment-section/documents/comprehensive-verified-list. (Accessed September 2020.)

[263] Less than 1 percent of the WBIDs on the verified list are not assigned a priority. EDR categorizes them as low priority.

[264] According to DEP staff, the state's bacteria water quality criteria for fresh waters in Florida Administrative Code Rule 62-302.530 were updated from fecal coliform to E.Coli to be consistent with EPA recommendations. As DEP begins assessing waters under the new E.Coli criteria, waterbody segments currently identified as impaired for fecal coliform and requiring a TMDL may be updated accordingly to reflect E.Coli impairment or delisted for fecal coliform.

[265] As previously mentioned, 438 TMDLs were developed as of December 31, 2019. As shown in Table 5.1.3, 9 additional TMDLs were developed through September 18, 2020 for a total of 447 TMDLs (based on personal communication with DEP staff).

Table 5.1.3 TMDLs Established by Parameter and Year

	CY 2001	CY 2002	CY 2003	CY 2004	CY 2005	CY 2006	CY 2007	CY 2008	CY 2009	CY 2010
DO, Nutrients, Unionized Ammonia	9	-	-	1	1	28	8	53	46	2
Fecal Coliform	-	-	-	6	1	18	5	21	40	31
Iron	-	-	-	-	-	1	-	-	-	-
Lead	-	-	-	-	-	-	-	-	3	-
Mercury in Fish Tissue (statewide)	-	-	-	-	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-	-	-	-	-
Total	**9**	**-**	**-**	**7**	**2**	**47**	**13**	**74**	**89**	**33**
	CY 2011	**CY 2012**	**CY 2013**	**CY 2014**	**CY 2015**	**CY 2016**	**CY 2017**	**CY 2018**	**CY 2019**	**CY 2020****
DO, Nutrients, Unionized Ammonia	-	2	37	10	10	4	13	17	12	9
Fecal Coliform	-	39	1	17	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-	-	-	-
Lead	-	-	-	-	-	-	-	-	-	-
Mercury in Fish Tissue (statewide)	-	-	1*	-	-	-	-	-	-	-
Turbidity	-	-	1	-	-	-	-	-	-	-
Total	**-**	**41**	**40**	**27**	**10**	**4**	**13**	**17**	**12**	**9**

*The one TMDL for Mercury covers 1,131 WBIDs.
**This only reflects January 1 through September 18 of 2020.

Finally, DEP provided internal expenditure data that allowed a breakdown between TMDL development expenditures and other TMDL-related expenditures (*e.g.*, funding for restoration efforts). This was able to be produced with confidence going back to Fiscal Year 2012-13. Between that time and Fiscal Year 2019-20, the state of Florida has expended $24.26 million on TMDL development. Using the consumer price index to adjust each year, this represents $25.93 million in Fiscal Year 2019-20 dollars.[266] Over that same time period, 132 TMDLs were established. Assuming similar costs going forward, this suggests an average cost per TMDL of $196,411.82. Applying this cost to the anticipated TMDLs from the verified list and considering the timing differences between priority groups produces the expenditure forecast shown in Table 5.1.4.

[266] CPI-All Urban Consumers (Current Series) was used. Series Id: CUUR0000AA0; Not Seasonally Adjusted (Series Title: All items - old base in U.S. city average, all urban consumers, not seasonally adjusted; Area: U.S. city average).

Table 5.1.4 Forecast of TMDL Development Expenditures Necessary to Comply with the Law (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Total	$32.47	$32.47	$32.47	$32.47	$32.47	$21.62	$21.62	$21.62	$21.62	$21.62

Underlying this forecast is an assumption of approximately 165 TMDLs established per year for the first five years of the forecast and approximately 110 TMDLs established per year for the last five years of the forecast based on priorities. This may not be currently feasible. DEP staff indicates that under their current staffing and funding they are capable of developing TMDLs for approximately 20 WBIDs per year. At that rate, the state would need to expend approximately $3.93 million annually through Fiscal Year 2088-89 to establish TMDLs over WBIDs on the current verified list. Establishing a TMDL, however, is not the only method through which waterbodies can be removed from the verified list. The Comprehensive Delist List is also maintained by DEP[267] and indicates a wide variety of reasons for a WBID being removed from the Verified List, including becoming part of an alternative restoration approach, identifying analysis flaws, establishing a TMDL, and no longer being impaired.

Basin Management Action Plans

In 2005, the Florida Watershed Restoration Act was amended to authorize DEP to adopt basin management action plans (BMAPs), which are water quality restoration plans that are unique to Florida. The BMAPs provide the state's primary mechanism and blueprint for restoring impaired waters by meeting TMDLs. Addressing surface waters and groundwater-fed springs, they provide an opportunity to manage nonpoint sources of pollution. The plans are intended to integrate all of 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.[268]

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.[269] 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.[270] 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. Except as discussed below, while the implementation of a BMAP is not required to achieve the appropriate TMDLs within a particular time frame, an assessment of the progress toward meeting the milestones is conducted every five years and revisions to BMAPs

[267] Available at: https://floridadep.gov/dear/watershed-assessment-section/documents/comprehensive-delist-list. (Accessed September 2020).

[268] § 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).

[269] § 403.067(7)(a)2., Fla. Stat.

[270] *See* § 403.067(7)(a), Fla. Stat.

are made when deemed necessary or appropriate. For Outstanding Florida Springs BMAPs[271] and BMAPs adopted for Lake Okeechobee, the Caloosahatchee Estuary Basin, and the St. Lucie Estuary Basin under the Northern Everglades and Estuaries Protection Program,[272] 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.[273]

Beginning in 2016, additional requirements for BMAPs were put in place. Each new or revised BMAP must now 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.[274]

In June 2020, DEP submitted its third statewide annual report (STAR Report) to the Governor and Florida Legislature, which, in part, provides the status of each TMDL and BMAP as of December 31, 2019.[275] In the STAR Report, DEP must include the status of BMAP projects identified to achieve a TMDL, and, if applicable, an explanation of possible causes and potential solutions for any unmet 5-year, 10-year, or 15-year milestone, or 20-year target.[276] The report must also include project descriptions, estimated costs, proposed priority project ranking, and funding needs to achieve the TMDLs.[277]

The latest STAR Report provides a progress report on the 30 adopted BMAPs, the majority of which address nutrient impairments. Note that EDR has not included in its analysis any pending BMAPs or revisions to BMAPs that were not included in DEP's STAR Report.[278] For a map of

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[271] *See* Florida Springs and Aquifer Protection Act, §§ 373.801 – 373.813, Fla. Stat.
[272] § 373.4595, Fla. Stat.
[273] *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).
[274] § 403.067(7)(a)4.c., Fla. Stat.
[275] Florida Department of Environmental Protection, 2019 Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies, June 30, 2020, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2020.)
[276] § 403.0675(1), Fla. Stat.
[277] *Id*.
[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 December 2020.)

adopted and pending BMAPs as of December 1, 2020, see Figure 5.1.6. For a list of adopted BMAPs included in the STAR Report see Table 5.1.5.

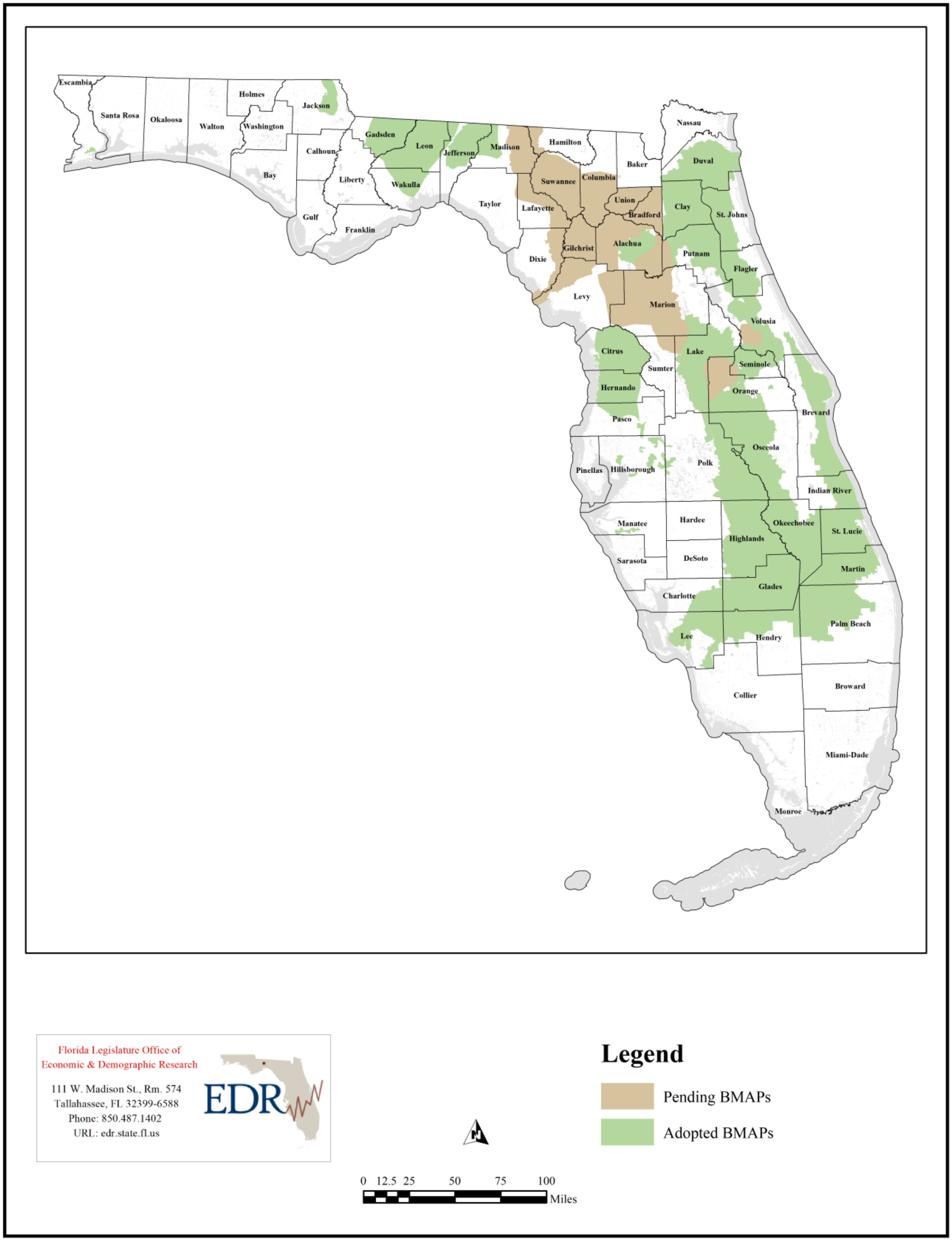
Table 5.1.5 BMAPs Included in Analysis

BMAP Type	BMAP Name	FY* Original Document	FY* Document Updated	Starting FY* for DEP's Milestones
Fecal Indicator Bacteria	Alafia River Basin	2014		N/A**
	Bayou Chico	2012		N/A**
	Hillsborough River Basin	2010		N/A**
	Lower St. Johns River Tributaries I and II	2009 and 2011	2016 (both)	N/A**
	Manatee River Basin	2014		N/A**
Northern Everglades and Estuaries Protection Program	Caloosahatchee Estuary Basin	2013	2020	2013
	St. Lucie River and Estuary	2013	2020	2013
	Lake Okeechobee	2015	2020	2015
Outstanding Florida Springs	Crystal River/Kings Bay	2018		2018
	DeLeon Springs	2018		2018
	Gemini Springs	2018		2018
	Homosassa and Chassahowitzka Springs Groups	2018		2018
	Jackson Blue Spring and Merritts Mill Pond Basin	2016	2018	2018
	Rainbow Springs Basin	2016		2018
	Santa Fe River	2012		2018
	Silver Springs, Silver Springs Group, and Upper Silver River	2016		2018
	Upper Wakulla River and Wakulla Springs	2016	2018	2018
	Wacissa River and Wacissa Spring Group	2018		2018
	Weeki Wachee	2018		2018
	Wekiva River, Rock Springs Run, and Little Wekiva Canal	2016		2018
Surface Water: Nutrients	Everglades West Coast Basin	2013		N/A**
	Indian River Lagoon Basin: Banana River Lagoon	2013		N/A**
	Indian River Lagoon Basin: Central Indian River Lagoon	2013		N/A**
	Indian River Lagoon Basin: North Indian River Lagoon	2013		N/A**
	Lake Jesup	2010	2020	N/A**
	Lakes Harney, Monroe, Middle St. Johns River, and Smith Canal	2013		N/A**
	Lower St. Johns River Mainstem	2009		N/A**
	Orange Creek	2008	2020	N/A**
	Upper Ocklawaha River Basin	2008	2020	N/A**

* The Fiscal Year ends in the listed year. For example, 2014 represents Fiscal Year 2013-14.
** The 5, 10, 15, and 20-year milestones are only applicable to BMAPs for the Northern Everglades and Estuaries Protection Program and Outstanding Florida Springs. For timing of expenditures for the other BMAPs in EDR's analysis below, the fiscal year of the original document is used. In the case of the Lower St Johns River Tributaries I and II, the average of 2010 is used.

[See figure on following page]

Figure 5.1.6 Basin Management Action Plans



While TMDLs are implemented by point sources of pollution through timely changes in NPDES permit conditions (such as new discharge limits), the reduction of nonpoint sources of pollution is achieved through the implementation of best management practices (BMPs). Nonpoint source dischargers included in BMAPs are required to implement BMPs or conduct water quality monitoring approved by DEP or the applicable WMD to demonstrate compliance with pollutant load reductions.[279]

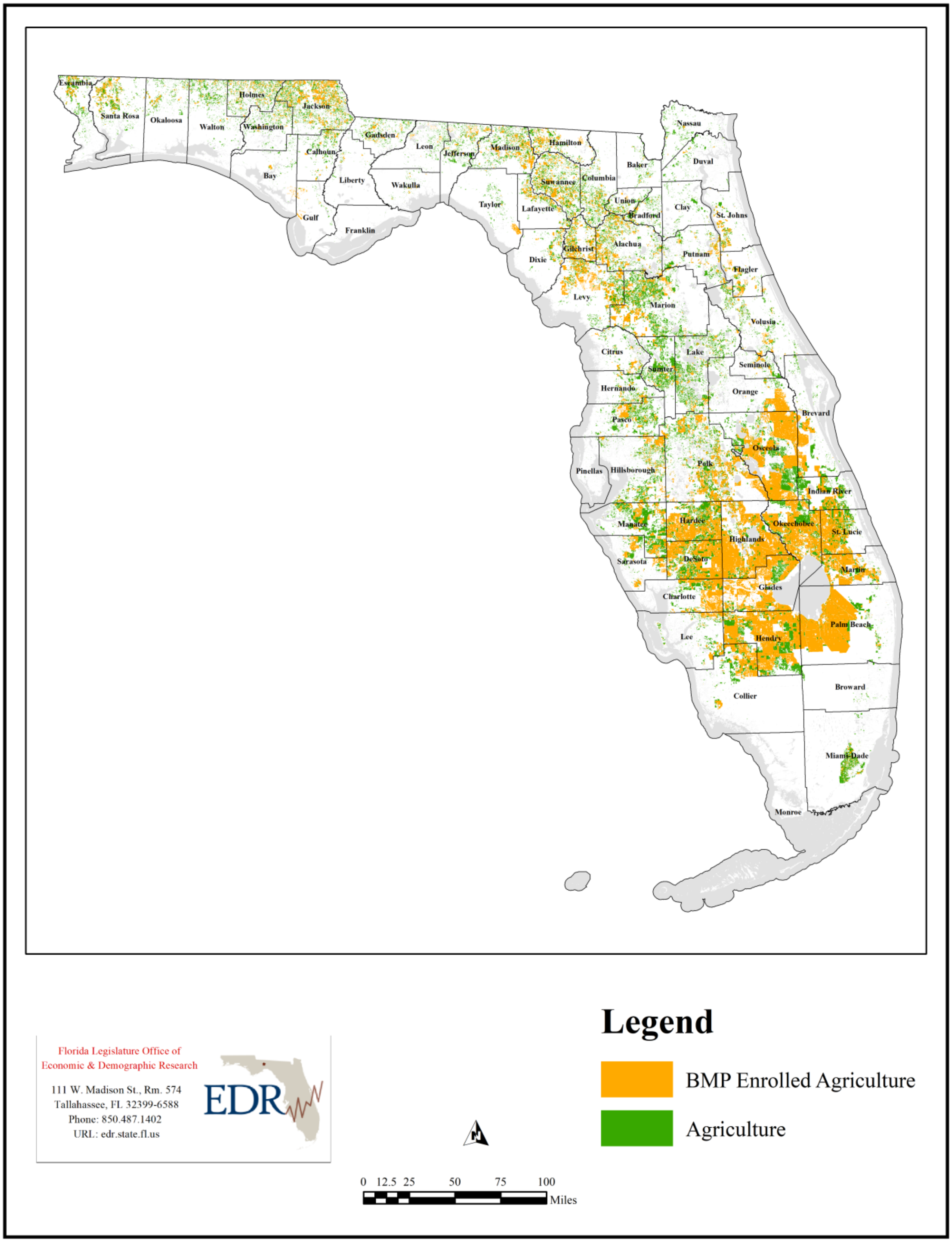
To address nonpoint source pollution from urban and suburban areas (*i.e.,* non-agricultural areas) within BMAPs, responsible stakeholders have identified structural and non-structural BMPs to address stormwater runoff and discharges to receiving waterbodies. Structural BMPs involve constructed systems that are generally intended to reduce the volume of stormwater discharge or reduce concentrations of pollutants. This includes wet or dry detention ponds. Non-structural BMPs focus on preventing, controlling, and treating pollutants at their source before they enter the environment. This includes land conservation, local ordinances (such as fertilizer ordinances), land use planning, watershed planning, and low impact development strategies. According to the BMAP project list provided with the STAR Report, wet detention ponds comprise the most widely identified structural BMP, while education efforts are the most common non-structural practice.[280] Combining structural and non-structural projects, the most common project type is stormwater practices related to fecal indicator bacteria ("FIB-Stormwater").

Agricultural BMPs are intended to be practical, cost-effective measures that agricultural producers can undertake to conserve water and reduce the amount of pollutants that enter water resources.[281] 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.[282] According to the DACS Office of Agricultural Water Policy, approximately 56 percent of the agricultural acreage in Florida, excluding silviculture, is enrolled in the BMP program.[283] Of those, approximately 54 percent of the enrolled acres are within BMAP areas. See Figure 5.1.7 for a map of BMP-enrolled agricultural lands statewide, excluding silviculture and aquaculture. As of December 2020, there were still five pending BMAPs for Outstanding Florida Springs that are not yet final and awaiting the outcome of legal challenges.[284] Once the pending BMAPs shown in Figure 5.1.6 are adopted and final, BMP enrollment statewide is expected to increase further.

[See figure on following page]

[279] *See* § 403.067(7)(g), Fla. Stat.
[280] Available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2020.)
[281] *See* DACS, Agricultural Best Management Practices, What Are Agricultural Best Management Practices?, https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Best-Management-Practices. (Accessed December 2020.)
[282] § 403.067(7)(c), Fla. Stat.
[283] DACS, Status of Implementation of Agricultural Nonpoint Source Best Management Practices, July 1, 2020, available at: https://www.fdacs.gov/Divisions-Offices/Agricultural-Water-Policy. (Accessed December 2020.)
[284] The five pending BMAPs for Outstanding Florida Springs are: (1) Santa Fe River; (2) Silver Springs and Upper Silver River and Rainbow Springs Group and Rainbow River; (3) Suwannee River (Lower Suwannee River, Middle Suwannee River, and Withlacoochee River Sub-basins); (4) Volusia Blue Spring; and (5) Wekiwa and Rock Springs.

Figure 5.1.7 Map of BMP-enrolled Agricultural Lands (Excluding Silviculture & Aquaculture)



Forecast of Future Expenditures Necessary to Implement Adopted BMAPs
The STAR Report contains a full list of completed, underway, and planned projects within each BMAP. Project costs and nutrient load reductions are included when available. For some projects, a cost estimate or load reduction may not be applicable. For the instances where costs were unavailable but applicable, EDR estimates them based on average costs of projects of the same type that included cost information.[285]

For any BMAP with a required total nutrient load reduction for total nitrogen (TN) and/or total phosphorus (TP), the additional reduction necessary to meet that total is calculated as the initial load reduction requirement minus the load reductions from completed, underway, and planned projects. BMAPs identified as Fecal Indicator Bacteria BMAPs and those where TN or TP load reduction requirements are not identified are assumed to be achieved once the existing underway and planned projects are completed. This assumption may lead EDR to underestimate the necessary future expenditures.

The timing of the expenditure forecast is unique to each BMAP. Nutrient reduction achieved through completed projects is compared to the initial load reduction requirement and the duration of time since the BMAP's adoption to estimate the remaining time to completion. For example, if a total nitrogen reduction of 100 pounds per year has been achieved in the 5 years since the BMAP's adoption and 400 pounds per year is the load reduction requirement, EDR assumes the BMAP needs 15 more years. EDR caps this duration at 20 years from the adoption of the BMAP, assumes projects identified as planned will be completed over the lesser of the aforementioned estimated time to completion or five years, and assumes that the funding for costs associated with underway projects has already been spent.[286]

The cost per future project and resulting load reduction is also unique to each BMAP. The relevant existing projects in the STAR Report can reduce TN, TP, or both. For each BMAP, the cost and load reduction for each type are considered and the most cost effective project type is chosen. For BMAPs requiring a nutrient load reduction of both TN and TP, the most cost effective projects are always those that reduce both. In those instances, once enough projects are identified to satisfy one nutrient's load reduction, the most cost effective choice to reduce the other nutrient is then chosen.[287]

The final challenge in forecasting BMAP expenditures was estimating the cost sharing between different funding sources (*i.e.*, local, regional, state, and federal government as well as private stakeholders). The shares are based on project information provided in the STAR Report. Some projects identify a dollar value and a single funding entity (600 projects). For these projects, matching funding amounts to funding sources is straight forward. The remaining projects present a greater challenge. After extensive efforts to make more of the data useable, additional projects,

[285] Project types used are those identified in the project list and consist of 87 different types.
[286] Alternatively, assuming the underway projects have not been funded results in a total expenditure increase of $4,748.24 million, or an increase of 77 percent.
[287] For example, imagine BMAP X needs 30 pounds of TN and 10 pounds of TP reduced per year and the average TN reducing project cost $5 and reduced 1 pound of TN per year, the average TP reducing project cost $10 and reduced 1 pound of TP per year, and the average TN and TP reducing project cost $20 and reduced 3 pounds of TN and 2 pounds of TP per year. Five of the TN and TP reducing projects would be done first, costing $100 and meeting the required TP reduction and 15 of the 30 reductions necessary of TN, and then 15 of the TN reducing projects would be done, costing $75 and meeting the required TN reduction.

including those identifying multiple funding sources and funding amounts, were included in the final dataset for the first time. This nearly doubled the size of the final dataset by adding 566 projects, enabling the identification of funding sources[288] for 1,166 BMAP projects. This expanded dataset was used to calculate the cost shares for the forecast of BMAP expenditures. The total amount of project funding used to allocate shares grew by a factor of three to $4.65 billion, lending greater confidence to the shares used for the analysis in this edition even though they have changed significantly since the 2020 Edition.

The forecast of expenditures necessary to comply with laws governing the BMAP program is provided in Table 5.1.6. This forecast may change significantly as more project data becomes available and more BMAPs are adopted. In compiling the list of projects, DEP is likely more informed regarding projects involving state funds than on those that do not, and as such the state share may be overestimated. Further, it is likely that the cheaper or more cost effective projects would be completed first, meaning that future projects would be more expensive. As such, EDR's methodology based on historical and existing projects may underestimate future project costs.

Table 5.1.6 Forecast of BMAP Expenditures Necessary to Comply with the Law (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Local	$152.64	$152.64	$148.72	$138.47	$138.47	$58.79	$53.08	$49.65	$43.13	$41.04
Regional	$103.56	$103.56	$100.91	$93.95	$93.95	$39.89	$36.01	$33.69	$29.27	$27.84
State	$416.96	$416.96	$406.25	$378.25	$378.25	$160.60	$144.99	$135.64	$117.82	$112.10
Federal	$119.58	$119.58	$116.51	$108.48	$108.48	$46.06	$41.58	$38.90	$33.79	$32.15
Private	$2.62	$2.62	$2.55	$2.38	$2.38	$1.01	$0.91	$0.85	$0.74	$0.70
Total	$795.37	$795.37	$774.94	$721.53	$721.53	$306.34	$276.57	$258.74	$224.76	$213.83

	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	Total
Local	$41.04	$40.75	$37.73	$28.86	$28.86	$8.12	$8.12	$8.12	**$1,178.21**
Regional	$27.84	$27.65	$25.60	$19.58	$19.58	$5.51	$5.51	$5.51	**$799.42**
State	$112.10	$111.33	$103.07	$78.84	$78.84	$22.17	$22.17	$22.17	**$3,218.50**
Federal	$32.15	$31.93	$29.56	$22.61	$22.61	$6.36	$6.36	$6.36	**$923.06**
Private	$0.70	$0.70	$0.65	$0.50	$0.50	$0.14	$0.14	$0.14	**$20.24**
Total	$213.83	$212.36	$196.60	$150.40	$150.40	$42.29	$42.29	$42.29	**$6,139.43**

[288] Funding sources broadly correspond to level of government and the private sector. Municipalities, counties, and publicly-owned utilities located within a single county (*e.g.*, Gainesville Regional Utilities and JEA), as well as revenue sources, such as ad valorem taxes and discretionary sales surtaxes, were all considered local. Regional sources included WMDs. State sources included state agencies, trust funds, and the state revolving loan funds, while federal sources included federal agencies and the military. Private entities included corporations and agricultural producers. The examples listed are not exhaustive and the funding source classifications may be refined in future editions.

Alternative Restoration Plans

The EPA recognizes that under certain circumstances, the TMDL development approach required under the CWA may not be the most efficient and effective strategy to attain water quality standards.[289] In some limited cases, water quality standards may be attained through (1) technology-based effluent limitations for permitted point sources, (2) more stringent effluent limitations required by the local, state, or federal authority, or (3) other pollution requirements such as best management practices.[290] As a result, the EPA created assessment category 4b for CWA reporting purposes,[291] which recognizes that other pollution control mechanisms in lieu of TMDL development may result in the attainment of applicable water quality standards in the near-term. The 4b waters are not included in a state's 303(d) impaired waters list, and therefore, are not prioritized for TMDL development. The EPA also recognizes a 5-alternative category of waters that are included in a state's 303(d) list and prioritized for TMDL development but are being addressed in the near-term through alternative restoration efforts.

In Florida, DEP encourages local stakeholders to develop and implement water quality restoration activities as soon as practicable, which may obviate the need to use limited state resources to develop TMDLs and implement BMAPs.[292] At a minimum, effectively addressing water quality concerns ahead of these regulatory steps may reduce the state and local expenditures necessary restore water quality.[293] In Florida, there are two types of restoration plans that are intended to promote water quality improvements prior to development of a TMDL: 4b reasonable assurance plans (4b plans or RAPs) and 4e water quality restoration plans (4e plans). Both types of alternative approaches are initiated and driven by stakeholder involvement. The main difference between the 4b and 4e plans concerns the level of certainty regarding when applicable water quality standards will be attained, with 4b plans having greater certainty that reasonable progress will be made by the next assessment cycle for that basin.[294] For a full list of the state's assessment categories, see Table 5.1.2. See Figure 5.1.8 for a map of the 4b and 4e plans currently being implemented in Florida.

[See figure on following page]

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[289] *See* Integrated Reporting Guidance under CWA Sections 303(d), 305(b) and 314 for the years 2004, 2008 (providing, in part, guidance on the use of assessment category 4b) available at: https://www.epa.gov/tmdl/integrated-reporting-guidance-under-cwa-sections-303d-305b-and-314. (Accessed December 2020.)

[290] *See* 40 C.F.R § 130.7(b)(1).

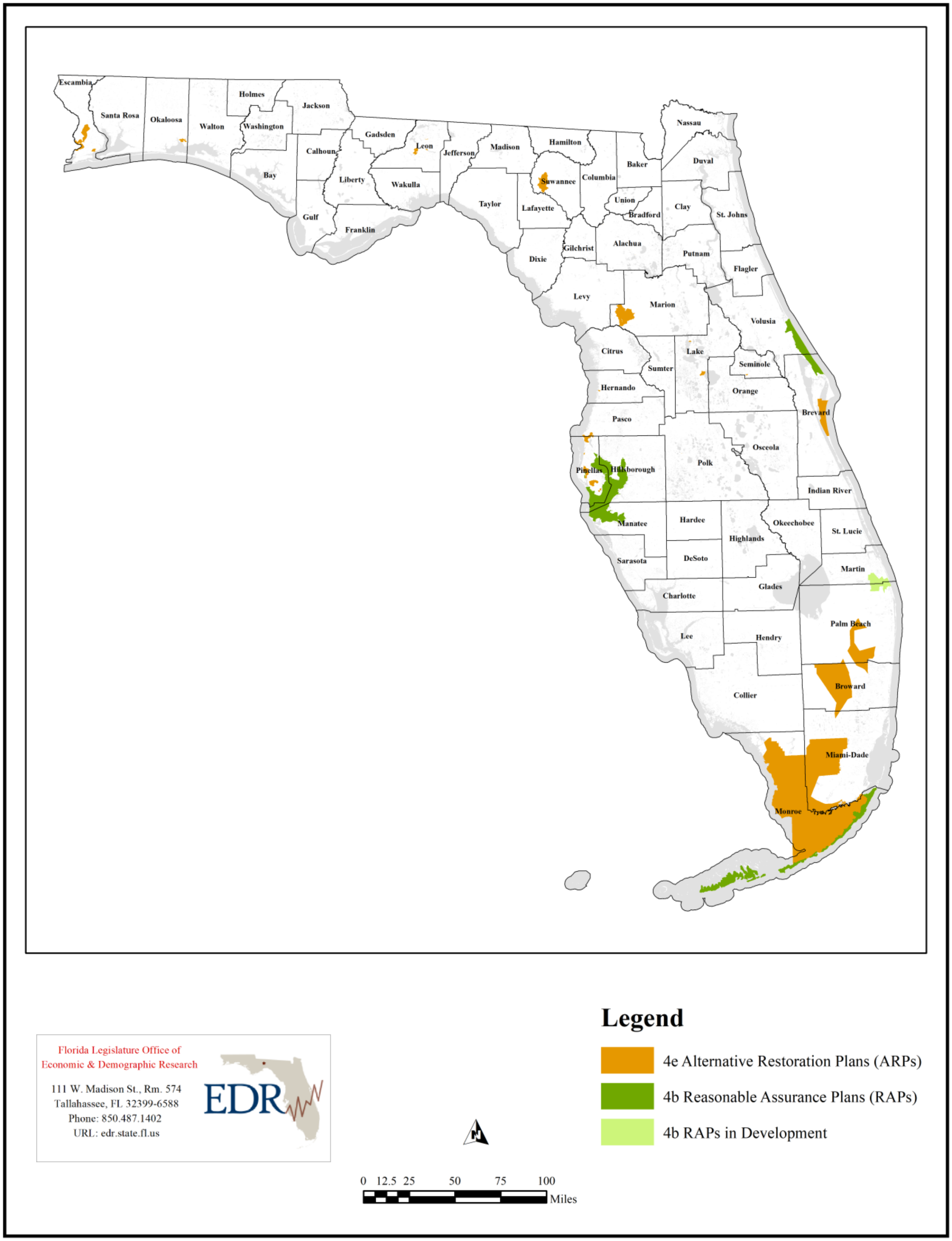
[291] As discussed previously, the state water quality reporting requirements are under sections 303(d), 305(b), and 314 of the CWA. These reports are often referred to as integrated reports since a single report meeting all of the requirements are submitted to EPA.

[292] *See* Florida Department of Environmental Protection, *Guidance on Developing Plans as Alternatives to TMDLs – Assessment Category 4b and 4e Plans*, June 2015, at 1, available at: https://floridadep.gov/sites/default/files/4b4ePlansGuidance.pdf. (Accessed December 2020.)

[293] Florida Department of Environmental Protection, *Category 4e Assessments and Documentation*, https://floridadep.gov/dear/alternative-restoration-plans/content/category-4e-assessments-and-documentation. (Accessed December 2020.)

[294] Florida Department of Environmental Protection, *Category 4e Assessments and Documentation*, https://floridadep.gov/dear/alternative-restoration-plans/content/category-4e-assessments-and-documentation. (Accessed December 2020.)

Figure 5.1.8 Alternative Restoration and Reasonable Assurance Plans



For 4b plans, there is reasonable assurance that, due to pollution control mechanisms, the waterbody is "expected to attain water quality standards in the future and is expected to make reasonable progress towards attainment of water quality standards by the time the next section 303(d) list for the basin is scheduled to be submitted to EPA."[295] The 4b plans are developed by local stakeholders, approved by DEP, and adopted by DEP secretarial order. As of December 2020, there are five 4b plans that are being implemented in Florida.[296] See Table 5.1.7 for project implementation costs identified in 4b plans. According to DEP staff, while not required, DEP may try to track 4b project implementation data in a similar format as basin management action plan projects, which may include cost estimates and timeframes for completion. As this data becomes available, EDR will refine the expenditure analysis to include 4b plans.

Table 5.1.7 Reasonable Assurance Plans (4b Plans)

Reasonable Assurance Plans	Lead Entity	Year of Plan and Updates	Total Identified Expenditures*
Lake Seminole	Pinellas County	2007, 2011, 2015, 2019	$47.78
Florida Keys	DEP	2008, 2011, 2018	$721.99
Shell, Prairie, and Joshua Creeks	Southwest Florida WMD	2004, 2006, 2008, 2010, 2012, 2014	$47.22
Tampa Bay Estuary	Tampa Bay Estuary Program	2002, 2007, 2009, 2012, 2014	$-
Mosquito Lagoon	City of Edgewater, City of New Smyrna Beach, City of Oak Hill, THE Department of Transportation, and Volusia County	2019	$20.92

*These expenditures are in millions of dollars and may be historical or planned.

DEP's 4e category is comparable to EPA assessment category 5-alternative (or 5-alt). This category recognizes that there are recently completed or ongoing water quality restoration activities being implemented to address impairment.[297] The 4e waters are included in the state's 303(d) list and the state's study list (for additional data gathering),[298] but the decision to develop a TMDL is deferred until the next assessment cycle. As explained above, 4e plans involve less certainty of when water quality standards will be attained than the 4b plans.[299] The goal of an approved 4e plan "is to implement appropriate restoration activities and, if necessary, additional study so that by the next assessment cycle either a 4b plan can be approved [by DEP] or the

[295] Fla. Admin. Code R. 62-303.600.
[296] *See* Florida Department of Environmental Protection, *Reasonable Assurance Plans (RAPs): Category 4b Assessments and Documentation*, https://floridadep.gov/dear/alternative-restoration-plans/content/reasonable-assurance-plans-raps-category-4b-assessments. (Accessed December 2020.)
[297] Florida Department of Environmental Protection, *Category 4e Assessments and Documentation*, https://floridadep.gov/dear/alternative-restoration-plans/content/category-4e-assessments-and-documentation. (Accessed December 2020.)
[298] Fla. Admin. Code R. 62-303.390(2)(d).
[299] Fla. Admin. Code R. 62-303.390(2)(d).

waterbody attains water quality standards for the parameter causing impairment."[300] As of December 2020, local stakeholders were implementing restoration projects for 51 waterbody segments as a near-term alternative to TMDL development. Table 5.1.8 shows the current water quality restoration activities under 4e plans. In future editions, EDR will collaborate with DEP staff to determine what project data is available for 4e plans for the purposes of estimating future expenditures.

[See table on following page]

[300] Florida Department of Environmental Protection, *Guidance on Developing Plans as Alternatives to TMDLs – Assessment Category 4b and 4e Plans*, June 2015, at 10, available at: https://floridadep.gov/sites/default/files/4b4ePlansGuidance.pdf. (Accessed December 2020.)

Table 5.1.8 Water Quality Restoration Plans (Category 4e)

Group Name	WBID	Water Segment Name	Waterbody Type	Parameters Assessed Using the Impaired Surface Waters Rule
Choctawhatchee - St. Andrew	722	Rocky Bayou	Estuary	Nutrients (TN)
Everglades	3252B	Water Conservation Area (WCA) 1 (North Sector)	Stream	Dissolved Oxygen, Nutrients (TP)
Everglades	3252D	WCA 1 (West Sector)	Stream	Dissolved Oxygen, Nutrients (TP)
Everglades	3252E	WCA 1 (South Sector)	Stream	Nutrients (TP)
Everglades	3265F	WCA 2A (West Sector)	Stream	Nutrients (TP)
Everglades	3265G	WCA 2A (Central Sector)	Stream	Dissolved Oxygen, Nutrients (TP)
Everglades	3268H	WCA 3A (East Sector)	Stream	Nutrients (TP)
Everglades	3268I	WCA 3A (Central Sector)	Stream	Dissolved Oxygen, Nutrients (TP)
Everglades	3289	Shark Slough (Everglades National Park)	Stream	Dissolved Oxygen
Everglades	3289E	Chevelier Bay	Estuary	Nutrients (TN)
Everglades	3289G	Cannon Bay	Estuary	Nutrients (Chlorophyll-a), Nutrients (TN), Nutrients (TP)
Everglades	3289H	Lostmans Bay (Everglades National Park)	Estuary	Nutrients (TN)
Everglades	3289I	Bays Near Flamingo (Everglades National Park)	Estuary	Nutrients (TN)
Everglades	3289L	Alligator Bay	Estuary	Nutrients (TN)
Everglades	3289M	Dads Bay	Estuary	Nutrients (TN)
Everglades	3289R	Shark Slough A (Everglades National Park)	Estuary	Nutrients (TN), Nutrients (TP)
Everglades	3289X	Everglades Lakes	Estuary	Nutrients (Chlorophyll-a), Nutrients (TN), Nutrients (TP)
Everglades	3303G	Joe Bay (East Segment)	Estuary	Nutrients (TN)
Florida Keys	6002	Manatee Bay	Estuary	Nutrients (TN)
Florida Keys	6003	Barnes Sound	Estuary	Nutrients (Chlorophyll-a)
Florida Keys	6005	Long Sound	Estuary	Nutrients (TN)
Florida Keys	6005A	Little Blackwater Sound	Estuary	Nutrients (TN)
Florida Keys	6005B	Blackwater Sound	Estuary	Nutrients (TN)
Florida Keys	6016	Duck Key	Coastal	Dissolved Oxygen (Percent Saturation)
Florida Keys	8077	Florida Bay (Middle Keys)	Coastal	Nutrients (TN)
Florida Keys	8078	Florida Bay (Upper Keys)	Coastal	Nutrients (TN)
Indian River Lagoon	3057A	Banana River below 520 Causeway	Estuary	pH
Indian River Lagoon	3057B	Banana River above 520 Causeway	Estuary	pH
Middle St. Johns	2997B	Lake Howell	Lake	Biology, Nutrients (Chlorophyll-a)
Ocklawaha	2720A	Alachua Sink	Lake	Dissolved Oxygen
Pensacola	846	Bayou Chico	Estuary	Enterococci
Pensacola	846C	Bayou Chico Drain	Estuary	Enterococci
Perdido	462A	Perdido River (South Marine)	Estuary	Nutrients (Chlorophyll-a)
Perdido	489	Elevenmile Creek	Stream	Escherichia coli
Perdido	797	Perdido Bay (Upper Segment)	Estuary	Nutrients (Chlorophyll-a)
Sarasota Bay - Peace - Myakka	1497A	Crystal Lake	Lake	Nutrients (Chlorophyll-a), Nutrients (TN), Nutrients (TP)
Springs Coast	1382I	Weeki Wachee River	Estuary	Nutrients (TN)
Springs Coast	1440	Anclote River Tidal	Estuary	Enterococci, Nutrients (Chlorophyll-a), Nutrients (TN)
Springs Coast	1440A	Anclote River Bayou Complex (Spring Bayou)	Estuary	Nutrients (Chlorophyll-a), Nutrients (TN)
Springs Coast	1556	Cedar Creek (Tidal)	Estuary	Enterococci
Springs Coast	1618D	Seminole Bypass Canal	Stream	Nutrients (Chlorophyll-a)
Springs Coast	1668A	Joe's Creek	Stream	Nutrients (Macrophytes)
Suwannee	3315Z	Blue Spring (Madison County)	Spring	Nutrients (Algal Mats)
Suwannee	3483	Peacock Slough	Spring	Nutrients (Algal Mats)
Suwannee	3519Z	Ichetucknee Head Spring	Spring	Nutrients (Nitrate-Nitrite)
Suwannee	3528Z	Blue Springs (Lafayette County)	Spring	Nutrients (Algal Mats)
Suwannee	3605S	Devils Ear	Spring	Nutrients (Nitrate-Nitrite)
Suwannee	3653Z	Hornsby Spring	Spring	Nutrients (Nitrate-Nitrite)
Tampa Bay	1731B	Salt Creek	Estuary	Nutrients (Chlorophyll-a)
Withlacoochee	1320	Rainbow River (Blue Run)	Stream	Nutrients (Algal Mats)
Withlacoochee	1320C	Indian Creek Springs Group	Spring	Nutrients (Nitrate-Nitrite)

Source: DEP website at https://floridadep.gov/dear/alternative-restoration-plans/content/category-4e-assessments-and-documentation accessed December 2020.

5.2 Next Steps and Recommendations

Future editions of this report will continue to improve upon the TMDL development and BMAP implementation forecasts. This will include development costs for TMDLs over any water segments added to the Comprehensive Verified List and BMAP implementation costs for any newly adopted BMAPs identified in DEP's STAR Report. In addition, discussion with DEP staff indicates that project lists, similar to those used to develop the cost estimates for BMAP implementation, will be developed for the Alternative Restoration Plans. Once that data is available, EDR will produce a forecast of the expenditures necessary to comply with laws regarding those plans. EDR will also begin working with DEP staff to identify available data on regulatory costs associated with TMDL implementation by local governments and public and private utilities. Lastly, EDR will work toward identifying the water quality monitoring costs to be presented as a separate expenditure forecast or as a component of other applicable programs.[301] This includes water quality monitoring programs such as the state's Status and Trend monitoring networks for surface waters and the groundwater monitoring network.

At this time, EDR has no formal recommendations for legislative consideration regarding water quality protection and restoration.

[301] Note that EDR has identified DEP's watershed monitoring expenditures from Fiscal Years 2010-11 to 2019-20 in Table 3.3.1 of Chapter 3.

6. Infrastructure Investments Necessary to Meet Growing Water Demand and Laws and Regulations Governing Water Quality Protection and Restoration

Part of section 403.928(1)(b), Florida Statutes, requires the Office of Economic and Demographic Research (EDR) to annually assess future governmental and utility expenditures necessary to comply with laws and regulations governing water supply and demand and those governing water quality protection and restoration. Intrinsic to supplying water and water quality protection is the infrastructure that transports and the facilities that treat drinking water, wastewater, and stormwater.

The 2020 Edition introduced some basic concepts for drinking water, wastewater, and stormwater infrastructure. It also provided background on existing needs estimates developed by the U.S. Environmental Protection Agency (EPA) with the cooperation of the Florida Department of Environmental Protection (DEP) and local utilities. In this edition, this chapter contains an updated inflation adjustment for the EPA's needs estimates and updated information for certain federal funding programs. It discusses, in depth, the Local Government Infrastructure Surtax, identifies near-term capital investments planned by some of the state's larger utilities, and, finally, provides a timeline to survey drinking water and wastewater utilities. Survey drafts are included in Appendix C.

6.1 Federal Needs Estimates and Funding

EPA Surveys

The EPA periodically conducts two surveys to estimate needed capital expenditures over a 20-year forecast period.[302] The EPA produces drinking water infrastructure estimates from the Drinking Water Infrastructure Needs Survey and Assessment (DWINSA), most recently conducted in 2015. In it, Florida's existing drinking water infrastructure needs estimate was $21.886 billion (in January 2015 dollars).[303] As shown in Table 6.1.1, Florida's estimated drinking water infrastructure needs are $24.089 billion adjusted for inflation to state fiscal year 2019-20.[304]

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[302] These two surveys are generally referred to as "quadrennial," though neither is consistently conducted at four year intervals. Previous Drinking Water Infrastructure Needs Survey and Assessments were conducted every four years from 1995 to 2015, but the next survey was delayed a year until 2020. The analysis of the survey results is still ongoing. The Clean Watersheds Needs Survey (previously called the Clean Water Needs Survey) was conducted every two years from 1978 to 1992, every four years from 1996 to 2012, and has not been conducted since. In response to an inquiry about the timing of a future Clean Watersheds Needs Survey, the EPA's Clean Watersheds Needs Survey team stated "Due to lack of funding there was no 2016 CWNS. We are just starting to begin an effort for the next CWNS but it looks like it won't be released until 2020 or beyond." EPA, CWNS Team, personal communication (November 5, 2019).

[303] EPA, "Drinking Water Infrastructure Needs Survey and Assessment, Sixth Report to Congress," EPA-816-K-17-002 (March 2018), p. 36, https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf. (Accessed December 2020.)

[304] BLS, CPI-All Urban Consumers, Series ID: CUUR0000AA0. The *Engineering News-Record*'s Construction Cost Index was the index used by the EPA for its 2002 report "The Clean Water and Drinking Water Infrastructure Gap Analysis" to adjust DWINSA and CWNS estimates. A cached version of the Construction Cost Index as of August, 2020, is available at https://webcache.googleusercontent.com/search?q=cache:Pck3_HUJ8RwJ:https://www.enr.com/economics/historical_indices/construction_cost_index_history+&cd=2&hl=en&ct=clnk&gl=us. (Accessed December 2020.)

Table 6.1.1 DWINSA Expenditures Estimates for Florida (in $millions)

	Adjustment Period 1/1/2015 to FY19-20	Consumer Price Index Multiplier	ENR CCI Multiplier*
		1.100651518	1.140309533
Category	**2015 DWINSA**	**FY19-20**	**FY19-20**
Transmission and Distribution	$13,734.00	$15,116.35	$15,661.01
Treatment	$4,702.50	$5,175.81	$5,362.31
Storage	$1,551.60	$1,707.77	$1,769.30
Source	$1,446.20	$1,591.76	$1,649.12
Other	$452.20	$497.71	$515.65
Total	**$21,886.40**	**$24,089.30**	**$24,957.27**

* Calculated using the *Engineering News-Record*'s Construction Cost Index.

The EPA's other regular survey is the Clean Watersheds Needs Survey (CWNS), conducted and published in compliance with the Clean Water Act, section 516(b)(1)(B). It is a survey of Publicly Owned Treatment Works' (POTW) wastewater and stormwater capital investment needs. The 2012 CWNS is the most recent completed assessment. In it, Florida's official documented clean water infrastructure needs totaled $18.423 billion (in January 2012 dollars).[305] Adjusted for inflation, the estimate grew to $20.907 billion (see Table 6.1.2 below).[306] In addition to the total from POTW survey responses, sanitary surveys from DEP and county health departments reported $5.586 billion for decentralized wastewater treatment systems (onsite sewage treatment and disposal systems) in 2012.

Table 6.1.2 CWNS Expenditure Estimates for Florida (in $millions)

	Adjustment Period 1/1/2012 to FY19-20	Consumer Price Index Multiplier	ENR CCI Multiplier*
		1.134846885	1.239229149
Category	**2012 CWNS**	**FY19-20**	**FY19-20**
I. Secondary Wastewater Treatment	$-	$-	$-
II. Advanced Wastewater Treatment	$11,328.06	$12,855.61	$14,038.06
III. Conveyance System Repair	$1,691.62	$1,919.73	$2,096.30
IV. New Conveyance Systems	$2,802.39	$3,180.28	$3,472.80
V. Combined Sewer Overflow Correction	$-	$-	$-
VI. Stormwater Management Program (total)	$499.08	$566.38	$618.47
X. Recycled Water Distribution	$2,101.66	$2,385.06	$2,604.44
Total Official Needs	**$18,422.82**	**$20,907.08**	**$22,830.10**
XII. Decentralized Wastewater Treatment Systems	$5,585.65	$6,338.86	$6,921.90

* Calculated using the *Engineering News-Record*'s Construction Cost Index.

305 EPA, Clean Watersheds Needs Survey 2012, Florida database, https://ofmpub.epa.gov/apex/cwns2012/f?p=134:25:. (Accessed December 2020.)

306 BLS, CPI-All Urban Consumers, Series ID: CUUR0000AA0. *Engineering News-Record*, Construction Cost Index, August 2020.

These two surveys serve very different purposes. The previous edition of this report details the background and goals of the surveys and how the EPA uses the information. Though the next CWNS has not been scheduled, the 2020 DWINSA is underway. While much of the survey instrument is the same or similar to the 2015 version, there are two major new subjects. The first is the workforce supporting drinking water infrastructure. The second new section deals with lead pipes. Utilities are asked to inventory the number of lead pipes in their distribution network and estimate replacement costs.[307]

Selected Federal Grants and Loans

The major avenues of federal funding assistance are the Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund, granted to Florida by the EPA. Data on the EPA's annual allocations is presented in Chapter 3. In addition to the state revolving funds, the EPA also administers a more recent loan program under the Water Infrastructure Finance and Innovation Act (WIFIA). Under this program, the EPA announces the amount of available loan funding and requests letters of interest for eligible projects. Projects are reviewed and some selected. Prospective borrowers are invited to continue the application process. Since 2017, 16 letters of interest were submitted for projects in Florida. Eight of those projects were selected to continue the application process, and five of those projects have closed loans. Table 6.1.3 lists these projects.

Table 6.1.3 WIFIA Closed Loans in Florida

Borrower	Project Name	Close Date	Loan Amount
Miami-Dade County	Ocean Outfall Discharge Reduction and Resiliency	3/22/2019	$99.7 million
Toho Water Authority	Accelerated Gravity Sewer Assessment and Rehabilitation Project	2/12/2020	$40.1 million
Miami-Dade County	Wastewater Treatment Plant (WWTP) Electrical Distribution Building Upgrade	5/28/2020	$326.2 million
City of North Miami Beach	Regional Potable Water Improvements	6/25/2020	$44.2 million
Miami-Dade County	South District Wastewater Treatment Plant Expansion	7/15/2020	235.2 million

Source: WIFIA Closed Loans, EPA, https://www.epa.gov/wifia/wifia-closed-loans (accessed December 2020).

The U.S. Department of Agriculture's (USDA) Rural Utilities Service bypasses the state by providing assistance directly to communities.[308] Table 6.1.4 contains summary information on the Rural Utilities Service's grants and loans to Florida communities for Water and Waste Disposal

[307] More information is available at: https://beta.regulations.gov/docket/EPA-HQ-OW-2020-0017/document. (Accessed December 2020.)
[308] More information on the USDA's Rural Utility Service's Water and Environmental Programs can be found at https://www.rd.usda.gov/programs-services/all-programs/water-environmental-programs. (Accessed December 2020.)

purposes. Note that included in "waste disposal" are loans and grants for both wastewater and solid waste, so the actual funding devoted to drinking water, wastewater, and stormwater utilities may be overstated in some years.

Table 6.1.4 USDA Rural Utilities Service Water and Waste Disposal Grants and Loans to Florida Communities, Dollar Amount (Count)

Federal Fiscal Year	Direct Loans	Guaranteed Loans	Grants	Total Assistance
2009	$22,019,200 (8)		$12,178,980 (8)	$34,198,180 (16)
2010	$48,141,000 (14)	$200,000 (1)	$22,387,440 (14)	$70,728,440 (29)
2011	$21,996,000 (10)		$11,265,550 (12)	$33,261,550 (22)
2012	$20,211,600 (8)		$9,324,170 (9)	$29,535,770 (17)
2013	$4,878,000 (2)		$3,261,230 (3)	$8,139,230 (5)
2014	$9,784,100 (5)		$6,318,670 (12)	$16,102,770 (17)
2015	$3,178,000 (3)		$3,678,830 (7)	$6,856,830 (10)
2016	$19,042,000 (5)		$9,135,320 (6)	$28,177,320 (11)
2017	$1,909,000 (3)		$4,486,525 (6)	$6,395,525 (9)
2018	$22,653,600 (6)		$13,467,020 (7)	$36,120,620 (13)
2019	$17,754,000 (7)		$17,279,180 (12)	$35,033,180 (19)
2020	$8,768,000 (3)	$2,500,000 (1)	$11,969,913 (6)	$23,237,913 (12)
2009 - 2020	**$200,334,500 (74)**	**$2,700,000 (4)**	**$124,752,828 (102)**	**$327,787,328 (178)**

Note: The three funding types listed in the original Progress Report tables were Water and Waste Disposal Direct Loans, Water and Waste Disposal Loan Guarantees, and Water and Waste Disposal Grants. Included in the grants column are two additional specialized grant programs: Special Evaluation Assistance for Rural Communities and Households and Emergency Community Water Assistance Grants.

Sources: USDA, Rural Development, "USDA Rural Development Progress Report 2013," (March 2014), p. 35, https://www.rd.usda.gov/files/reports/RD_2013ProgressReport.pdf. (Accessed December 2020.) USDA, Rural Development, "USDA Rural Development Progress Report 2014," (May 2015), p. 30, https://www.rd.usda.gov/files/RD2014ProgressReport.pdf. (Accessed December 2020.) USDA, Rural Development, "USDA Rural Development Progress Report 2016," (January 2017), p. 26, https://www.rd.usda.gov/files/reports/USDARDProgress2016Report.pdf. (Accessed December 2020.) Kenda Robison, USDA, Rural Development, personal communications (December 9, 2019, December 2, 2020).

6.2 Local Funding Sources

In addition to revenue from base fees and consumption charges billed to customers, publicly-owned drinking water and wastewater utilities may also have additional sources of local funding, including the local government infrastructure surtax (LGIS) or special assessments. Both of these sources require local support and are limited by statute.

Local Government Infrastructure Surtax

Section 212.055(2), Florida Statutes, authorizes a sales surtax of 0.5 or 1 percent, the proceeds of which must be used to "finance, plan, and construct infrastructure; acquire land for public recreation, conservation, or protection of natural resources; or finance the closure of local government-owned solid waste landfills that have been closed or are required to be closed" by DEP.[309] As explained in the 2019 Local Government Financial Information Handbook, the definition of "infrastructure" is more expansive than just drinking water, wastewater, and

[309] http://edr.state.fl.us/Content/local-government/reports/lgfih19.pdf, p. 179.

stormwater infrastructure. Other authorized infrastructure uses include, but are not limited to, emergency vehicles, land-acquisition expenditures for some residential housing projects that include low-income units, and instructional technology used in school district classrooms.[310]

The surtax must be approved by voters in a countywide referendum after either a majority of the county's governing body passes an ordinance or municipalities representing a majority of the county's residents all adopt uniform resolutions calling for the referendum. The surtax rate is subject to limits enumerated in section 212.055, Florida Statutes, which depend on what other surtaxes are levied in the county and the aggregated surtax rate.[311] Within a county, the distribution of the levy's proceeds is calculated by either an interlocal agreement or the Local Government Half-cent Sales Tax formulas enumerated in section 218.62, Florida Statutes. In calendar years 2020 and 2021, 28 counties levied the LGIS. The levies in Glades County and Santa Rosa County, however, are scheduled to expire on December 31, 2021.[312] Of the 28 counties currently levying the LGIS, eight are eligible to increase the rate from 0.5 percent to 1 percent. An additional 11 counties do not levy the LGIS but could, three at 0.5 percent and eight at 1 percent. Table 6.2.1 lists the current LGIS rates and which counties could either begin or increase their LGIS levy.

[See table on following page]

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[310] *Ibid*, 181. "Pursuant to this provision, the term *instructional technology* means an interactive device that assists a teacher in instructing a class or a group of students and includes the necessary hardware and software to operate the interactive device."

[311] A full description of the limits for specific counties and surtaxes is available in EDR's "2021 Local Discretionary Sales Surtax Rates" table.

[312] "2021 Local Discretionary Sales Surtax Rates," Office of Economic and Demographic Research, http://edr.state.fl.us/Content/local-government/data/county-municipal/2021LDSSrates.xls.

Table 6.2.1 Current and Permitted Local Government Infrastructure Surtax

County	Current Local Gov't Infrastructure Surtax Rate	No Increase Permitted	Permitted Increase
Alachua	0.5		0.5
Baker		X	
Bay	0.5		0.5
Bradford		X	
Brevard	0.5		0.5
Broward			1
Calhoun		X	
Charlotte	1	X	
Citrus			1
Clay	1	X	
Collier	1	X	
Columbia		X	
Desoto		X	
Dixie		X	
Duval	0.5		0.5
Escambia	1	X	
Flagler			0.5
Franklin		X	
Gadsden		X	
Gilchrist		X	
Glades	1	X	
Gulf		X	
Hamilton		X	
Hardee		X	
Hendry		X	
Hernando			1
Highlands	1	X	
Hillsborough	0.5	X	
Holmes		X	
Indian River	1	X	
Jackson		X	
Jefferson		X	
Lafayette		X	
Lake	1	X	
Lee			1
Leon	1	X	
Levy		X	
Liberty		X	
Madison		X	
Manatee	0.5		0.5
Marion	1	X	
Martin			1
Miami-Dade			0.5
Monroe	1	X	
Nassau		X	
Okaloosa	0.5		0.5
Okeechobee		X	
Orange			1
Osceola	1	X	
Palm Beach	1	X	
Pasco	1	X	
Pinellas	1	X	
Polk			0.5
Putnam	1	X	
Santa Rosa	0.5		0.5
Sarasota	1	X	
Seminole	1	X	
St. Johns			1
St. Lucie	0.5		0.5
Sumter		X	
Suwannee		X	
Taylor		X	
Union		X	
Volusia			1
Wakulla	1	X	
Walton		X	
Washington		X	
Number of Counties:	28	48	19

Using the estimates adopted by the Revenue Estimating Conference in August 2020, an estimated $1.48 billion will be collected through the current LGIS surtax rates. Table 6.2.2 lists the estimated revenues for each county. The estimates are shown first using the default calculation, dividing the revenues between the Board of County Commissioners (BOCC) and the total of all municipal estimates, and then are shown allocated according to an interlocal agreement between the BOCC, municipal totals, school district, and all other entities. Counties that both do not currently levy and are not permitted to increase their levies are excluded from the table for brevity.

Table 6.2.2 LGIS Estimates for FY2020-21

	Default Distribution		Interlocal Agreement Distribution			
County	BOCC	Municipalities (Total)	BOCC	Municipalities (Total)	School	Other*
Alachua	11,411,204	8,617,365				
Bay	12,507,880	8,406,410				
Brevard	25,643,812	20,332,162				
Broward						
Charlotte	25,019,054	2,867,473				
Citrus						
Clay	20,643,421	1,840,727	17,831,163	2,671,745	1,981,240	
Collier	86,591,767	9,211,397				
Duval	84,700,177	4,060,221	85,991,074	2,769,324		
Escambia	43,543,933	8,252,668				
Flagler						
Glades	633,838	96,283				
Hernando						
Highlands	8,950,597	2,362,483				
Hillsborough	85,997,210	30,350,175	116,347,385			
Indian River	17,416,622	6,613,817				
Lake	27,042,400	17,715,682	14,919,361	14,919,360	14,919,361	
Lee						
Leon	23,491,418	19,832,564	4,332,398	4,332,398		34,659,185
Manatee	23,429,130	5,162,551				
Marion	38,301,051	8,024,054				
Martin						
Miami-Dade						
Monroe	19,381,987	12,674,418				
Okaloosa	13,600,756	6,816,052				
Orange						
Osceola	39,726,863	14,773,374	29,795,147	11,080,030	13,625,059	
Palm Beach	155,745,819	108,330,255	79,222,822	52,815,215	132,038,037	
Pasco	57,843,659	5,150,606	28,347,419	6,299,427	28,347,419	
Pinellas	82,857,739	78,004,058				
Polk						
Putnam	5,585,008	1,258,213				
Santa Rosa	8,016,295	801,453				
Sarasota	54,787,171	23,211,858	36,781,742	21,717,530	19,499,757	
Seminole	49,585,502	31,536,121	45,103,622	15,737,595	20,280,406	
St. Johns						
St. Lucie	8,313,469	8,521,110				
Volusia						
Wakulla	2,355,558	69,177	2,424,735			
Total	**1,033,123,339**	**444,892,728**				

* Other category includes an intergovernmental agency in Leon County, Gulf County's non-BOCC county distribution, and Miami-Dade's Charter County and Regional Transportation System Surtax and County Public Hospital Surtax distributions. A complete list of entities and estimated distributions is available in EDR's Local Discretionary Sales Surtax Revenue Estimates table.

Table 6.2.3 Unrealized FY2020-21 LGIS Estimates

	Default Distribution		Interlocal Agreement Distribution			
County	BOCC	Municipalities (Total)	BOCC	Municipalities (Total)	School	Other*
Alachua	11,411,204	8,617,365				
Bay	12,507,880	8,406,410				
Brevard	25,643,812	20,332,162				
Broward	145,833,991	216,157,611				
Charlotte						
Citrus	16,444,983	1,230,177				
Clay						
Collier						
Duval	84,700,177	4,060,221	85,991,074	2,769,324		
Escambia						
Flagler	2,570,303	3,098,817				
Glades						
Hernando	20,350,872	953,044				
Highlands						
Hillsborough						
Indian River						
Lake						
Lee	93,107,346	57,019,399				
Leon						
Manatee	23,429,130	5,162,551				
Marion						
Martin	28,745,603	5,141,684				
Miami-Dade	154,347,458	108,579,722				N/A
Monroe						
Okaloosa	13,600,756	6,816,052				
Orange	335,374,725	140,621,979				
Osceola						
Palm Beach						
Pasco						
Pinellas						
Polk	31,801,208	14,197,444				
Putnam						
Santa Rosa	8,016,295	801,453				
Sarasota						
Seminole						
St. Johns	35,283,002	3,055,842				
St. Lucie	8,313,469	8,521,110				
Volusia	39,578,654	41,957,498				
Wakulla						
Total	**1,091,060,870**	**654,730,543**				

* Other category includes an intergovernmental agency in Leon County, Gulf County's non-BOCC county distribution, and Miami-Dade's Charter County and Regional Transportation System Surtax and County Public Hospital Surtax distributions. A complete list of entities and estimated distributions is available in EDR's Local Discretionary Sales Surtax Revenue Estimates table.

Table 6.2.3 (on the previous page) contains estimated revenue for the unrealized LGIS levy for the same counties and governmental categories. In comparison to the estimated $1.48 billion in current revenue, the unrealized LGIS revenue estimate totals $1.75 billion.

In the same way that much of the LGIS revenue is used for projects not related to water infrastructure, it should not be assumed that all $1.75 billion of the unrealized collections would be used for water-related projects. The LGIS is, however, an un- or under-utilized revenue source for 19 counties and their municipalities. As a surtax, it impacts everyone buying taxable goods within the county regardless of the buyer's or seller's direct benefit from funded projects.

Another local option is a non-ad valorem assessment, often referred to as special assessments. Unlike local discretionary sales surtaxes, special assessments are assessed against property owners directly benefitting from whatever project the assessment is devoted to. For example, revenue collected from a special assessment for streetlight maintenance cannot be redirected to stormwater management.

6.3 Needs Estimates: Stormwater and Capital Improvement Plans

The two EPA surveys collect data needed by that agency, but the scope of their surveys are limited in significant ways. The ensuing needs estimates, most recently the 2015 DWINSA and the 2012 CWNS, understate Florida's actual infrastructure investment needs. EDR's surveys are still in the planning stage (see Section 6.4). For this edition, though, EDR attempted to create expenditure estimates based on two alternative methodologies. First, the methodology used by the Indiana University Public Policy Institute and the Indiana Finance Administration to estimate 20-year stormwater needs was reproduced for Florida. Second, 5-year capital improvement plans from the state's largest drinking water and wastewater utilities were gathered to aggregate and compare with EPA estimates.

Florida Stormwater Expenditure Estimate

As briefly discussed in the 2020 Edition,[313] the Indiana University Public Policy Institute, working with the Indiana Finance Authority, published a 20-year stormwater expenditure estimate in 2018. The study estimated 2017 through 2036 expenditures totaling $6.36 billion ($2018), divided into $1.83 billion in infrastructure, or investment, needs and a further $4.53 billion in non-capital expenditure needs.[314] By contrast, Indiana's 2012 CWNS stormwater estimate was only $161 million ($2012).[315] It is important to note that unlike the EPA's drinking water survey and estimate, the CWNS estimate only aggregates estimates from survey respondents and does not account for what the Indiana study refers to "programming" needs or any needs from non-respondents.

Indiana's report was based on general estimates of annual stormwater management costs per acre. The study used county-level developed acre totals from the Multi-Resolution Land Characteristics

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[313] *See*: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf at p. 210.
[314] Indiana University Public Policy Institute, "Financial Needs for Stormwater Infrastructure and Programming in Indiana," (August 2018), p. 2, http://ppidb.iu.edu/publication/details/755. (Accessed January 2021.)
[315] EPA, "Clean Watersheds Needs Survey 2012 Report to Congress," (January 2016), p. A-1, https://www.epa.gov/sites/production/files/2015-12/documents/cwns_2012_report_to_congress-508-opt.pdf. (Accessed December 2020.)

Consortium's 2011 National Land Cover Database (NLCD). The Multi-Resolution Land Characteristics Consortium is a "group of federal agencies who coordinate and generate consistent and relevant land cover information at the national scale for a wide variety of environmental, land management, and modeling applications."[316] The consortium releases an updated NLCD every five years. Using satellite imagery, land cover is into divided into sixteen classifications (and four additional Alaska-specific classifications), shown in Table 6.3.1.

Table 6.3.1 NLCD Land Cover Classifications

Land Cover Code	Land Cover Name	Description
11	Open Water	All areas of open water, generally with less than 25% cover or vegetation or soil
12	Perennial Ice/Snow	All areas characterized by a perennial cover of ice and/or snow, generally greater than 25% of total cover.
21	Developed, Open Space	Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
22	Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
23	Developed, Medium Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
24	Developed, High Intensity	Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
31	Barren Land (Rock/Sand/Clay)	Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
41	Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
42	Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
43	Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.
52	Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
71	Grassland / Herbaceous	Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
81	Pasture/Hay	Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
82	Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
90	Woody Wetlands	Areas where forest or shrub land vegetation accounts for greater than 20 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
95	Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

[316] Multi-Resolution Land Characteristics Consortium website, https://www.mrlc.gov/. (Accessed January 2021.)

The three highlighted classifications are those used in the Indiana study's acreage calculations. Non-developed land (and "Developed, Open Space") classifications were assumed to not add any cost to stormwater management activities.

The total low, medium, and high intensity developed acreage was multiplied by an inflation-adjusted cost per acre estimate. The cost estimates were originally published in the American Public Works Association's (APWA's) magazine, the *APWA Reporter*, in February, 2000, following newly promulgated federal stormwater permit rules.[317] The APWA article included five levels of stormwater management programs and an annual cost range per acre for each program level. The lowest level, "incidental," can cost as little as $15 annually for reactive maintenance, while "advanced" programs could cost ten times that. The authors put no upper limit on "exceptional" program costs. Table 6.3.2 contains costs and descriptions of all five levels. In the table, each successive program level includes the program features of all of the levels before it. "Minimum" programs, for example, include reactive incidental maintenance in addition to right-of-way maintenance and erosion control, as well as better regulation and inspection, and more staff than found in "incidental" programs. It is important to note that these are estimates for public (government and utility) expenditures and do not include any private sector costs to comply with state or federal regulations. Estimates also assume historical and continuing regular investment and maintenance.[318]

Table 6.3.2 Typical Costs of Stormwater Management Programs, ($2000)

Program Level	Program Cost per Acre per Year	Typical Program Features
Incidental	$15- $30	Reactive incidental maintenance, and regulation as part of other programs
Minimum	$30- $60	ADD: right-of-way maintenance, better regulation and inspection, more staff, and erosion control
Moderate	$60- $90	ADD: additional maintenance programs and levels of service, better regulation and inspection, some planning, minor capital programs, and general upgrade of capabilities
Advanced	$90- $150	ADD: maintenance (of some sort) of the whole system, master planning, regional treatment, some water quality, data collection, multi-objective planning, strong control of development and other programs, and utility funding
Exceptional	Over $150	ADD: Stormwater quality, advanced flood control, advanced levels of service for maintenance, aesthetics become more important, and public programs

[317] Treadway, E and Reese, A., "Financial strategies for stormwater management," (2000, February), American Public Works Association Reporter. Reprinted as a pdf at https://cues.rutgers.edu/meadowlands-district-stormwater/pdfs/Doc45_Treadway_et_al_2000_Financial_Strategies.pdf. (Accessed January 2021.)
[318] Indiana University Public Policy Institute, "Financial Needs for Stormwater Infrastructure and Programming in Indiana," (August 2018), p. 7.

To adjust for inflation from 2000 to 2017, the Indiana study used the mid-point of Advanced programs ($120) and separated infrastructure needs (*i.e.*, capital investment needs), from what they referred to as "programming" needs. Quoting the article in the *APWA Reporter*, the Indiana study described programming elements as "administration and financial management, operations and maintenance, regulation and enforcement, engineering and planning … water quality, public involvement and education, technology, and other miscellaneous activities."[319] Capital needs were assumed to be 25% of the annual cost, with the remaining 75% of the cost dedicated to programming needs. A specific inflation rate was applied to each type of need. The Engineering News-Record's Construction Cost Index (ENR's CCI) was used to adjust the $30 per acre per year capital cost (to $51.78), while the U.S. Bureau of Labor Statistics' Consumer Price Index for all Urban Consumers (CPI) was used to adjust the $90 estimate for programming elements (to $128.07).

As mentioned previously, the Indiana analysis assumed the same cost for the three developed land classifications and assumed no costs for undeveloped or "Developed, Open Space" land. Using the same methodology (though updating the inflation rate and using more recent land cover data), Florida's annual stormwater needs total $530.46 million. Table 6.3.3 shows these calculations.

Table 6.3.3 Florida's Stormwater Needs (Indiana Methodology)

Adjustment Time Frame	1/2000 to FY2019-20
ENR CCI Multiplier	1.855002719
CPI Multiplier	1.523423125

Florida's Developed Acres*	2,751,943

Year	Infrastructure costs $/acre/year	Programming costs $/acre/year	Total
Unadjusted dollars	$30.00	$90.00	$120.00
FY2019-20 dollars	$55.65	$137.11	$192.76

	Infrastructure costs	Programming costs	Total
Annual Cost	$153,145,851	$377,313,622	$530,459,473
20-Year Cost	$3,062,917,029	$7,546,272,440	$10,609,189,469

* Acreage includes Low, Medium and High Intensity. Developed Open Space is not included.

Florida's reported 20-year capital needs from the 2012 CWNS are shown in table 6.3.4. This can be compared to the $3.06 billion in capital needs using Indiana's methodology shown above.

[319] *Ibid*, p. 2.

Table 6.3.4 Florida's 2012 CWNS Stormwater Needs (in $millions)

	Adjustment Period	**CPI Multiplier**	**ENR CCI Multiplier***
	1/1/2012 to FY19-20	1.134846885	1.239229149
Category	**2012 CWNS**	**FY19-20**	**FY19-20**
VI. Stormwater Management Program (total)	$499.08	$566.38	$618.47

* Calculated using the *Engineering News-Record*'s Construction Cost Index.

If programming expenditures are assumed to be three times as much as capital expenditures, a total needs estimate can be calculated using the CWNS data. As shown in table 6.3.5, the total is calculated by adding the capital needs (using the ENR CCI multiplier) to three times the reported needs (adjusted by the CPI multiplier and multiplying by three). Even with the addition of programming needs, CWNS annual stormwater needs estimates are still only $115.88 million, far less than what is being spent or needed.

Table 6.3.5 Programming and Capital Stormwater Needs based on 2012 CWNS

		Estimated Needs (in $millions)	Percent of Total
Programming Costs			
	CPI Adjustment	$566.38	25%
	CPI Adjustment x 3	$1,699.14	75%
Capital Costs			
	ENR CCI Adjustment	$618.47	25%
All Costs			
	Total	$2,317.61	100%

Clearly, Florida's stormwater management challenges are not at all similar to Indiana's situation. Indiana is a mostly landlocked state, bordered on the northwest by Lake Michigan. It does not have to contend with hurricanes and for much of the year, precipitation (*i.e.*, snow) does not immediately seep into the ground or flow through its storm drains into holding ponds (though the literal and environmental cost of spring snowmelts should not be underestimated). Florida's annual rainfall is typically much higher than Indiana's rainfall. Further, the Indiana methodology excludes undeveloped land cover, thus, when applied to Florida, it does not address related expenditures for the Everglades. Additionally, Florida's extensive coast presents additional flooding challenges.

To begin addressing the inadequacies found in applying the Indiana methodology to Florida, EDR provides a more expansive estimate in Table 6.3.6 to account for Florida's higher rainfall. In this application, the level of stormwater management has been increased from the midpoint to the top of the "advanced" management range. Additionally, land cover deemed to be "Developed, Open Space" has been added at a lower stormwater management level (the midpoint of the "incidental" range). As a result, the adjusted annual cost estimate rises to $759.33 million or a 20-year total of $15.19 billion.

Table 6.3.6 Florida's Stormwater Needs (Indiana Methodology with EDR's Rainfall Adjustment)

Development Level	Developed, Open Space	Developed, Low Intensity	Developed, Medium Intensity	Developed, High Intensity
Management Level	Incidental Average	Advanced High	Advanced High	Advanced High
Infrastructure costs $/acre	$ 10.43	$ 69.56	$ 69.56	$ 69.56
Programming costs $/acre	$ 25.71	$ 171.39	$ 171.39	$ 171.39
Total costs $/acre	$ 36.14	$ 240.95	$ 240.95	$ 240.95

Development Level	Developed, Open Space	Developed, Low Intensity	Developed, Medium Intensity	Developed, High Intensity	Total Developed Acres	20-Year Total
Statewide Acreage	2,663,200.88	1,691,659.60	812,097.36	248,186.03	5,415,143.86	
Infrastructure costs	$ 27,788,877	$ 117,676,243	$ 56,491,605	$ 17,264,466	$ 219,221,192	$ 4,384,423,833
Programming costs	$ 68,464,943	$ 289,925,252	$ 139,181,388	$ 42,535,387	$ 540,106,970	$ 10,802,139,408
Total Costs	$ 96,253,820	$ 407,601,496	$ 195,672,993	$ 59,799,853	$ 759,328,162	$ 15,186,563,241

Even simply using the Indiana methodology as in Table 6.3.3, the 20-year capital estimate of $3,062.92 million eclipses Florida's 2012 CWNS stormwater management adjusted total of $618.47 million as seen in Table 6.1.2. The overall framework from the CWNS, however, should not be disregarded. By replacing the CWNS stormwater estimate from Table 6.1.2 with EDR's expanded stormwater capital cost estimate from Table 6.3.6, an alternative total needs estimate is arrived at in Table 6.3.7.

Table 6.3.7 CWNS Expenditure Estimates with EDR's Expanded Stormwater Capital Cost Estimate

Category	20-Year Estimate*
I. Secondary Wastewater Treatment	$-
II. Advanced Wastewater Treatment	$14,038.06
III. Conveyance System Repair	$2,096.30
IV. New Conveyance Systems	$3,472.80
V. CSO Correction	$-
EDR's Expanded Stormwater Capital Cost Estimate	$4,384.42
X. Recycled Water Distribution	$2,604.44
Total Official Needs with EDR Stormwater	**$26,596.02**
XII. Decentralized Wastewater Treatment Systems	$6,921.90

* Calculated using the *Engineering News-Record*'s Construction Cost Index.

Even these adjusted levels of management understate future needs. Fully accounting for stormwater would call for including programming costs as well as capital costs. Over 20-years, these combined costs total an estimated $15,186.6 million, which averages $759.3 million annually. Even so, the recent expenditures reported by local governments for stormwater are much higher. The Local Government Annual Financial Reports show that $1.32 billion in local fiscal year 2017-18 was reported under expenditure account code 538, "Flood Control/Stormwater Control."[320] The inclusion of flood control, however, may drive some of this difference. EDR plans to investigate this and other issues, including the higher cost of stormwater management near the coast, in future editions.

Capital Improvement Plan Aggregates

As a compliment to the stormwater analysis, an attempt was made to collect the capital improvement plans (CIPs) of drinking water and wastewater utilities. This year, the focus was the largest utilities in the state, under the assumption that they would be most likely to have responded to one or both of the EPA surveys. The CIPs collected cover the 2019-20 to 2023-24 local fiscal years. The current analysis was limited to utilities serving areas with populations equal to or greater than 100,000. As DEP's databases of drinking water facilities is organized by system, and a single utility can encompass multiple systems, the population data in DEP's Basic Facilities Report table was aggregated by the owning entity. For example, there are six Public Water System IDs for JEA facilities in and around Jacksonville, but JEA publishes one capital improvement plan. In addition to the drinking water utilities serving 100,000, municipalities and unincorporated areas with a population of 100,000 or more were researched. Those that had a drinking water and/or wastewater utility and published a CIP with drinking water or wastewater projects for the 2019-20 to 2023-24 local fiscal years were added to the list of "large" utilities. Some CIPs were not found in the governing entity's published documents, resulting in a number of utilities missing from the total. The estimate, therefore, understates the planned expenditures for large utilities. Even so, a comparison with the EPA's estimates shows a significant difference.

As there is no statewide standard for project classification, the plans differ in their organization. Broadly, EDR categorized projects into either drinking water (DW) or wastewater (WW). Reuse is included as part of wastewater, as a clear separation of wastewater treatment from treatment for water meant for reuse could not always be identified. Additionally, some CIPs included a summary table with a combined DW and WW category. In other CIPs, a detailed project list was provided without classifications. In those instances where EDR was unable to map projects into specific categories, the combined DW and WW category was used. Table 6.3.8 displays the totals separated into these three groups.

[See table on following page]

[320] Expenditure Details, Fiscal Year ended 2018, https://apps.fldfs.com/LocalGov/Reports/Default.aspx. Data current as of January 1, 2021.

Table 6.3.8 Five-Year CIP Budgets

	LFY 19-20	LFY 20-21	LFY 21-22	LFY 22-23	LFY 23-24
DW	608,151,649	666,807,836	526,795,039	501,766,624	476,879,220
WW	1,054,558,009	1,379,181,688	1,327,985,717	1,184,330,839	1,119,416,076
DW & WW	1,075,178,397	896,470,135	817,204,659	567,501,818	693,656,160
TOTAL	2,737,888,055	2,942,459,659	2,671,985,415	2,253,599,281	2,289,951,456

The combined DW and WW category was proportionally distributed into the individual DW and WW categories using the ratio produced by the two individual budget categories, as shown in Table 6.3.9.

Table 6.3.9 Five-Year CIP Budgets with Proportional Categories

Proportion Calculation for Combined Plans

	LFY 19-20	LFY 20-21	LFY 21-22	LFY 22-23	LFY 23-24
DW / (DW + WW)	37%	33%	28%	30%	30%
WW / (DW + WW)	63%	67%	72%	70%	70%

Totals with Proportional Categories

	LFY 19-20	LFY 20-21	LFY 21-22	LFY 22-23	LFY 23-24
DW	1,001,408,230	958,976,151	758,897,598	670,649,786	684,102,914
WW	1,736,479,825	1,983,483,508	1,913,087,817	1,582,949,495	1,605,848,542
TOTAL	2,737,888,055	2,942,459,659	2,671,985,415	2,253,599,281	2,289,951,456

The year-over-year growth rates are not consistent or smooth throughout the five year plans, adding some uncertainty to any 20-year projections. Merely multiplying the five-year totals by four produces a drinking water estimate of $16.3 billion and a wastewater estimate of $35.3 billion. Using the annual growth rates between the 2022-23 and 2023-24 local fiscal years, the projected drinking water expenditures are $16.1 billion, with $35.9 billion for wastewater.

The CIPs collected by EDR were produced before the onset of the coronavirus pandemic and its associated economic downturn. In the next edition, EDR will examine how the pandemic has affected these plans. Though some differences will certainly be due to new information, new constraints and urgent priorities may affect drinking water and wastewater expenditures.

6.4 Utility Survey Timeline and Drafts

One of the goals for this edition was to work towards conducting a survey of both public and private utilities regarding assets, asset condition, and O&M expenditures. Drafts of the surveys for drinking water utilities and wastewater utilities are printed in Appendix C. The goal for the first year’s survey is to gather basic information on drinking water and wastewater facilities and systems and to get a firmer idea on planned expenditures for the near future. This is to encourage participation and reduce the onus placed on utilities. The surveys have the same basic structure:

- Contact and location information
- Background and facility questions (source, treatment plants, discharge, customer information)
- Transmission and collection infrastructure questions
- Finances and future plans data

For this first year, the documentation standards will be minimal. As part of the finances and future plans section, EDR will ask that utilities include copies of publicly available planning documents such as capital improvement plans, rate studies, etc.

While the survey drafts included in this edition are presented as numbered lists of questions, the final surveys will most likely be Microsoft Excel workbooks. Excel will allow survey recipients to save partially filled out surveys and is widely enough used that most, if not all, recipients will be able to access it. Additionally, with Excel, formulas will be used to crosscheck answers (*e.g.*, if a utility reports 1,000 total linear feet of pipe with 500 feet of polyvinyl chloride and 5,000 feet of cast iron, a formula and conditional formatting will warn the survey recipient of the error).

A tentative timeline has already been developed for this year’s survey. In January and February, the draft surveys will be revised and formatted in Excel. Additionally, the regulatory divisions of all five water management districts will be contacted to discuss the survey and request utility contact information (as opposed to system contact information). By the end of March, the survey drafts will be sent to industry associations for input and the list of utilities will be finalized. In April, surveys will be sent to utilities with a request to complete and return them by August. The responses will be aggregated and analyzed in the fall and data published in the 2022 edition.

7. The Everglades

The Florida Everglades, famously referred to as 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 reaching 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.[321] 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.[322] The Everglades wetlands also provide natural water storage for the environment during drier seasons, serve as an important water recharge area for South Florida, and play a significant role in the state's effort to combat sea level rise.

This chapter outlines major Everglades restoration plans or programs and identifies historic expenditures related to those initiatives. Further, this edition builds upon the 2020 Edition's methodology for forecasting expenditures necessary to complete the Comprehensive Everglades Restoration Plan. Future editions will improve upon this forecast and provide forecasts of expenditures governing Everglades restoration including the state's water quality restoration initiatives.

7.1 Historical and Legal Context

To restore and protect the greater Everglades ecosystem, the Florida Legislature established the State of Florida's responsibilities in a series of statutes under chapter 373, Florida Statutes. In addition to authorizing the South Florida Water Management District (SFWMD) to serve as the local sponsor or lead entity for the state's restoration efforts, the Legislature directed the roles and responsibilities of both the Florida Department of Environmental Protection (DEP) and SFWMD for plans or programs authorized under Florida law including the Everglades Forever Act[323] and the Northern Everglades and Estuaries Protection Act,[324] as well as the federally authorized Comprehensive Everglades Restoration Plan (CERP).[325]

For a "forward-looking snapshot" of schedules and estimated costs for completing projects that implement CERP and non-CERP Everglades restoration initiatives, see the most recent Integrated

[321] § 373.4592(1)(a), Fla. Stat.
[322] § 373.4592(1), Fla. Stat.
[323] § 373.4592, Fla. Stat.
[324] § 373.4595, Fla. Stat.
[325] *See* §§ 373.470, 373.1502, Fla. Stat.

Delivery Schedule of the U.S. Army Corps of Engineers (Corps).[326] For a summary of all the South Florida Ecosystem restoration activities by state and federal entities for the reporting period of July 1, 2016 through June 30, 2018, see the South Florida Ecosystem Restoration Task 2018 Biennial Report.[327] The major restoration programs that require state or regional funding are discussed below.

Comprehensive Everglades Restoration Plan

Congress authorized the Corps to implement phases of the Central and Southern Florida Project for Flood Control (C&SF Project) under the Flood Control Act of 1948[328] and the Flood Control Act of 1954[329] with subsequent modifications authorized by later acts of Congress. The C&SF Project drained areas of the Everglades in order to provide "flood control; water supply for municipal, industrial, and agricultural uses; prevention of saltwater intrusion; water supply for the Everglades National Park (ENP); and protection of fish and wildlife resources."[330] The C&SF Project established more than 480,000 acres south of Lake Okeechobee as the Everglades Agricultural Area. Portions of the Everglades were diked to create Water Conservation Areas 1, 2, and 3 (WCA 1, WCA 2, and WCA 3). WCA 1 is known as the Arthur R. Marshall Loxahatchee National Wildlife Refuge[331] and WCA 2 and WCA 3 are used for water storage during high rainfall events. The resulting one thousand miles of canals and levees and the 150 water control structures that collectively made up this extensive South Florida flood control plumbing system severely altered the Everglades ecosystem. The unintended adverse effects on the environment prompted Congress to require the Corps to conduct a restudy of the impacts of the C&SF Project and develop a comprehensive plan to modify the C&SF Project in order to restore, preserve, and protect the 18,000 square mile South Florida ecosystem,[332] and to ensure the availability of adequate water supplies for people to use.

In 2000, Congress approved the CERP with the passage of the Water Resources Development Act of 2000 to provide a coordinated plan for restoring the water resources of central and southern Florida, including the Everglades, while restoring other water-related needs such as water supply and flood protection.[333] The CERP is the largest hydrologic restoration initiative ever undertaken in the United States. It represents a comprehensive, long-term partnership between the federal government and the State of Florida (through SFWMD as the local sponsor), which focuses primarily on the restoration of the water quantity, quality, timing, and distribution within the

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[326] U.S. Army Corps of Engineers, Integrated Delivery Schedule, https://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/Integrated-Delivery-Schedule/. (Accessed December 2020.)
[327] South Florida Ecosystem Restoration Task Force: 2018 Biennial Report, available at: https://evergladesrestoration.gov/content/documents/strategic_plan_biennial_report/2018_Biennial_Report.pdf. (Accessed December 2020.)
[328] Pub. L. 80-858, § 201, 62 Stat. 1176 (1948).
[329] Pub. L. 83-780, § 203, 68 Stat. 1248, 1257 (1954).
[330] U.S. Army Corps of Engineers, Jacksonville District, Central and Southern Florida (C&SF) Project Fact Sheet, May 2020, https://www.saj.usace.army.mil/About/Congressional-Fact-Sheets-2020/C-SF-Project-C/. (Accessed December 2020.)
[331] WCA 1 is owned by the SFWMD and operated as a refuge by the U.S. Fish and Wildlife Service through a license agreement. The wildlife was renamed the Arthur R. Marshall Loxahatchee National wildlife Refuge in 1986.
[332] Water Resources Development Act of 1996, Pub. L. 104-303, § 601, 110 Stat. 3767, 3768. Section 528 of the Water Resources Development Act of 1996 also defined the "South Florida ecosystem" as the "area consisting of the lands and waters within the boundary of the South Florida Water Management District, including the Everglades, the Florida Keys, and the contiguous near-shore coastal waters of South Florida."
[333] Public Law 106-541, 114 Stat. 2680, 2681.

Everglades ecosystem. Several projects included in CERP are comprised of multiple components due to their complexity and size.[334] In total, CERP consists of more than 50 projects totaling 68 project components[335] at a cost of $16.4 billion.[336] The federal government is responsible for 50 percent of the overall cost of implementing CERP, although any land acquisition necessary for CERP projects is the responsibility of the State (the amount of which is credited towards the State's share).[337]

While the CERP itself has been approved as a modification to the C&SF Project, the projects identified therein are conditionally approved. Those that cannot be approved under the Corps' programmatic authority require federal authorization of construction before being eligible for federal appropriation.[338] Congress authorized four projects referred to as "Generation 1 Projects" and four projects referred as "Generation 2 Projects" in 2007 and 2014, respectively.[339] In addition, there are previously authorized projects that pre-date CERP, which were assumed to be completed during CERP planning. These projects are referred to as "Foundation Projects" as they were expected to serve as the foundation for CERP implementation.[340]

Considerable progress has been made toward CERP implementation in recent years. The progress has been driven in part by the commitment of long-term state funding for Everglades restoration, a push by the state to expedite the implementation of certain restoration activities, and more consistent federal approval of water resource projects within CERP. In 2016, Congress approved the Central Everglades Planning Project (CEPP), a suite of restoration projects targeting the central Everglades, which is estimated to cost a total of $1.98 billion.[341] The CEPP is designed to send more water south from Lake Okeechobee.[342] In October 2018, the Everglades Agricultural Area (EAA) reservoir was federally authorized as a change to the water storage components of CEPP.[343] This project will provide additional water storage south of Lake Okeechobee and is intended to reduce high-volume discharges from the lake into the St. Lucie and Caloosahatchee estuaries and restore the hydrological connection to the Everglades.[344]

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[334] 2015 Central and Southern Florida Project, Report to Congress, Comprehensive Everglades Restoration Plan, at 3, available at: https://evergladesrestoration.gov/content/cerpreports/cerp_2015_rpt_to_congress.pdf. (Accessed December 2020.)
[335] *Id.*
[336] 2015 Central and Southern Florida Project, Report to Congress, Comprehensive Everglades Restoration Plan, at 39, available at: https://evergladesrestoration.gov/content/cerpreports/cerp_2015_rpt_to_congress.pdf. (Accessed December 2020.)
[337] Pub. L. 106-541, § 601, 114 Stat. 2680, 2684.
[338] *See* Pub. L. 106-541, § 601, 114 Stat. 2680, 2683-2684.
[339] The first set of CERP projects that were authorized (Generation 1 projects) were approved in the Water Resources Development Act of 2007. These are the Indian River Lagoon South, the Picayune Strand Restoration, and the Site 1 Impoundment projects, and the Melaleuca Eradication Facility. The second set of CERP projects that were authorized (Generation 2) were approved in the Water Resources Development Act of 2014. These are the C-111 Spreader Canal, the Biscayne Bay Coastal Wetland Phase 1 projects, the Caloosahatchee River (C-43) West Basin Storage, and the Broward County Water Preserve Areas.
[340] South Florida Ecosystem Restoration Task Force, 2018 Biennial Report, at 5, available at: https://evergladesrestoration.gov/content/documents/strategic_plan_biennial_report/2018_Biennial_Report.pdf. (Accessed December 2020.)
[341] Pub. L. No: 115-270 (2018).
[342] U.S. Army Corp of Engineers, Central Everglades Planning Project Fact Sheet, November 2019, available at https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/4197. (Accessed December 2020.)
[343] America's Water Infrastructure Act of 2018, Pub. L. No: 115-270 (2018). Note that in 2017, prior to federal authorization, section 373.4598, Florida Statutes, was enacted by the Florida Legislature to establish an expedited schedule for the design and construction of the Everglades Agricultural Area (EAA) reservoir project.
[344] *See* 373.4598, Fla. Stat.

For the most recent five year-report on the progress of implementation of CERP, see the 2020 Central and Southern Florida Project Report to Congress.[345]

Everglades Forever Act

In 1992, the federal court approved as a consent decree a settlement agreement among the federal government, the State of Florida, and the SFWMD, which resolved claims brought by the federal government concerning discharges of water with excess phosphorus levels into the Everglades National Park and the Loxahatchee National Wildlife Refuge in violation of water quality standards. The consent decree required the state parties to construct and operate large freshwater treatment wetlands known as Stormwater Treatment Areas (STAs) to reduce total phosphorus concentrations in surface water runoff before the water is discharged into the Everglades Protection Area and to implement a regulatory best management practices (BMP) program in the Everglades Agricultural Area to reduce total phosphorus loads.

In 1994, the Florida Legislature enacted the Everglades Forever Act (EFA) recognizing that water flowing into the Everglades contained excessive levels of phosphorus.[346] The EFA established the state's long-term commitment to restoring and protecting the remaining Everglades ecosystem by improving water quality and water quantity through the implementation of the Everglades Construction Project, source control measures, and a research and monitoring program.[347] The Everglades Construction Project contained 17 projects with six STAs making up the primary components.

In 2003, the Florida Legislature amended the EFA to incorporate SFWMD's Long-Term Plan for Achieving Water Quality Goals (Long-Term Plan) finding that the plan sets forth the best available phosphorus reduction technology through BMPs and STAs.[348] The Long-Term Plan consists of a combination of source controls, STAs, Advanced Treatment Technologies, and regulatory programs that were intended to achieve compliance with the total phosphorous criterion in the Everglades Protection Area by December 31, 2006.[349]

In 2013, the EFA was amended again to include, as a modification to the Long-Term Plan, the State of Florida and U.S. Environmental Protection Agency's consensus plan on new strategies for improving water quality in the Everglades.[350] Known as the Restoration Strategies Regional Water Quality Plan dated April 27, 2012 (Restoration Strategies), this technical plan includes the creation of 6,500 acres of new STAs and 116,000 acre-feet of additional water storage (flow equalization basins or FEBs) to work in conjunction with existing water quality features to achieve compliance with the state's numeric phosphorus criterion for the Everglades Protection Area.[351]

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[345] *See*: https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll11/id/4924. (Accessed January, 2021.)
[346] § 373.4592(1)(d), Fla. Stat.
[347] Ch. 94-115, §§ 1-2, Laws of Fla. (codified as amended in § 373.4595, Fla. Stat.).
[348] § 373.4592(3)(b), Fla. Stat.
[349] Florida Administrative Code Rule 62-302.540 establishes the applicable water quality standards for phosphorus within the Everglades Protection Area
[350] Ch. 2013-59, § 1, Laws of Fla. (amending § 373.4592, Fla. Stat.)
[351] SFWMD, Restoration Strategies Regional Water Quality Plan. 2012. Available at: https://www.sfwmd.gov/sites/default/files/documents/rs_waterquality_plan_042712_final.pdf. (Accessed December 2020.) For additional information, *see also* SFWMD, Restoration Strategies for Clean Water for the Everglades, https://www.sfwmd.gov/our-work/restoration-strategies. (Accessed December 2020).

The cost of implementing the Restoration Strategies is estimated to be $880 million over a 13-year period. According to the SFWMD's Restoration Strategies Program Update, total program expenditures through November 22, 2019 are approximately $337.9 million and all projects are scheduled to be constructed by December 2025.[352] 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 through Fiscal Year 2023-24 to support the implementation of the water quality plan. For more detailed information on the status of these projects, see the SFWMD's 2020 South Florida Environmental Report, Chapter 5A, Restoration Strategies – Design and Construction Status of Water Quality Improvement Projects.[353]

In order to present a forecast of these expenditures in future editions, the Office of Economic and Demographic Research (EDR) will begin working with DEP and SFWMD staff to obtain annual data on program expenditures. This should include identifying regional and state expenditures, as well as information on the completion timeline and updated cost estimates for projects that have yet to be completed.

Northern Everglades and Estuaries Protection Act

In 2007, the Florida Legislature enacted the Northern Everglades and Estuaries Protection Program (NEEPP), which expanded the existing Lake Okeechobee Protection Program, to include protection and restoration of the Caloosahatchee River, St. Lucie River, and Lake Okeechobee watersheds.[354] 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 the northern Everglades watersheds.[355]

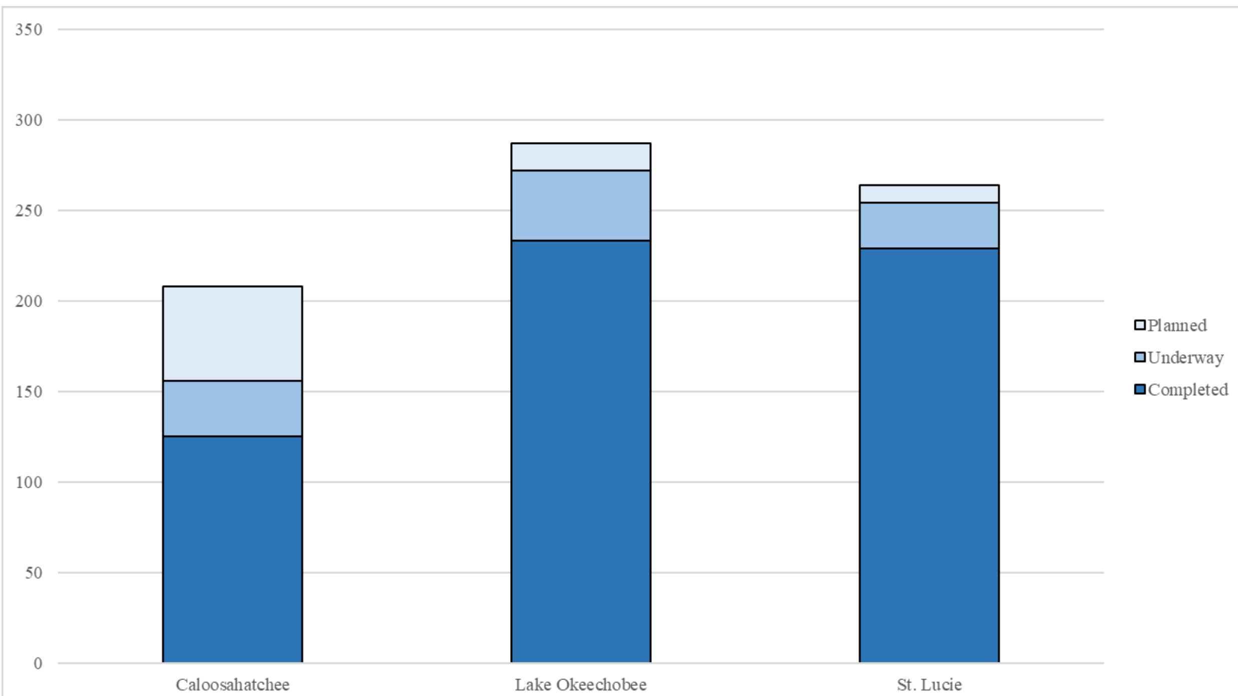
In 2016, the Florida Legislature amended NEEPP to reflect the Basin Management Action Plans (BMAPs) adopted for Lake Okeechobee (2014), the Caloosahatchee Estuary Basin (2012), and the St. Lucie River and Estuary Basin (2013), as the pollution control programs for these watersheds. The amendments strengthened the implementation of these BMAPs and also clarified the roles and responsibilities of SFWMD, DEP, and the Department of Agriculture and Consumer Services in implementing the program.[356]

The NEEPP requires these BMAPs to achieve the adopted total maximum daily loads (TMDLs) within 20 years of BMAP adoption with 5-year, 10-year, and 15-year milestones to measure progress. The DEP is also required to conduct a review of each of these BMAPs every five years and identify further load reductions that may be necessary to achieve compliance with the applicable TMDLs. The first five-year reviews of the Caloosahatchee Estuary Basin BMAP, the St. Lucie River and Estuary Basin BMAP, and the Lake Okeechobee BMAP were completed in December 2017, June 2018, and December 2019, respectively.

[352] South Florida Water Management District, Restoration Strategies Program Update (December 2019), available at: https://www.sfwmd.gov/sites/default/files/documents/RS_Update_2019_12_FINAL.pdf. (Accessed December 2020.) Note that the 2020 monthly updates no longer include total expenditures or a scheduled completion date.
[353] Available at: https://apps.sfwmd.gov/sfwmd/SFER/2020_sfer_final/v1/chapters/v1_ch5a.pdf. (Accessed December 2020.)
[354] Ch. 2007-253, § 3, Laws of Fla. (amending § 373.4595, Fla. Stat.).
[355] § 373.4595, Fla. Stat.
[356] Ch. 2016-1, § 15, Laws of Fla. (amending § 373.4595, Fla. Stat.). For more information on basin management action plans associated with NEEPP, see DEP, Basin Management Action Plans, available at: https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps. (Accessed December 2020.)

According to DEP's 2019 statewide annual report (STAR Report), the completed projects identified in the Caloosahatchee Estuary BMAP are estimated to achieve 77 percent of the reduction needed to meet the total nitrogen (TN) TMDL allocated to the Caloosahatchee Estuary Basin. For the Lake Okeechobee BMAP, the completed projects in the northern sub-watersheds are estimated to achieve 23.5 percent[357] of the reduction needed to meet the total phosphorus (TP) TMDL. For the St. Lucie River and Estuary Basin, the completed projects are estimated to achieve 62 percent of the reduction needed to meet the TN TMDL and 39 percent of the reduction needed to meet the TP TMDL.[358] See Figures 7.1.1 ad 7.1.2 for the status of the BMAP projects for the northern Everglades watersheds and progress towards nutrient reduction goals as of December 31, 2019.

Figure 7.1.1 Status and Count of NEEPP BMAP Projects



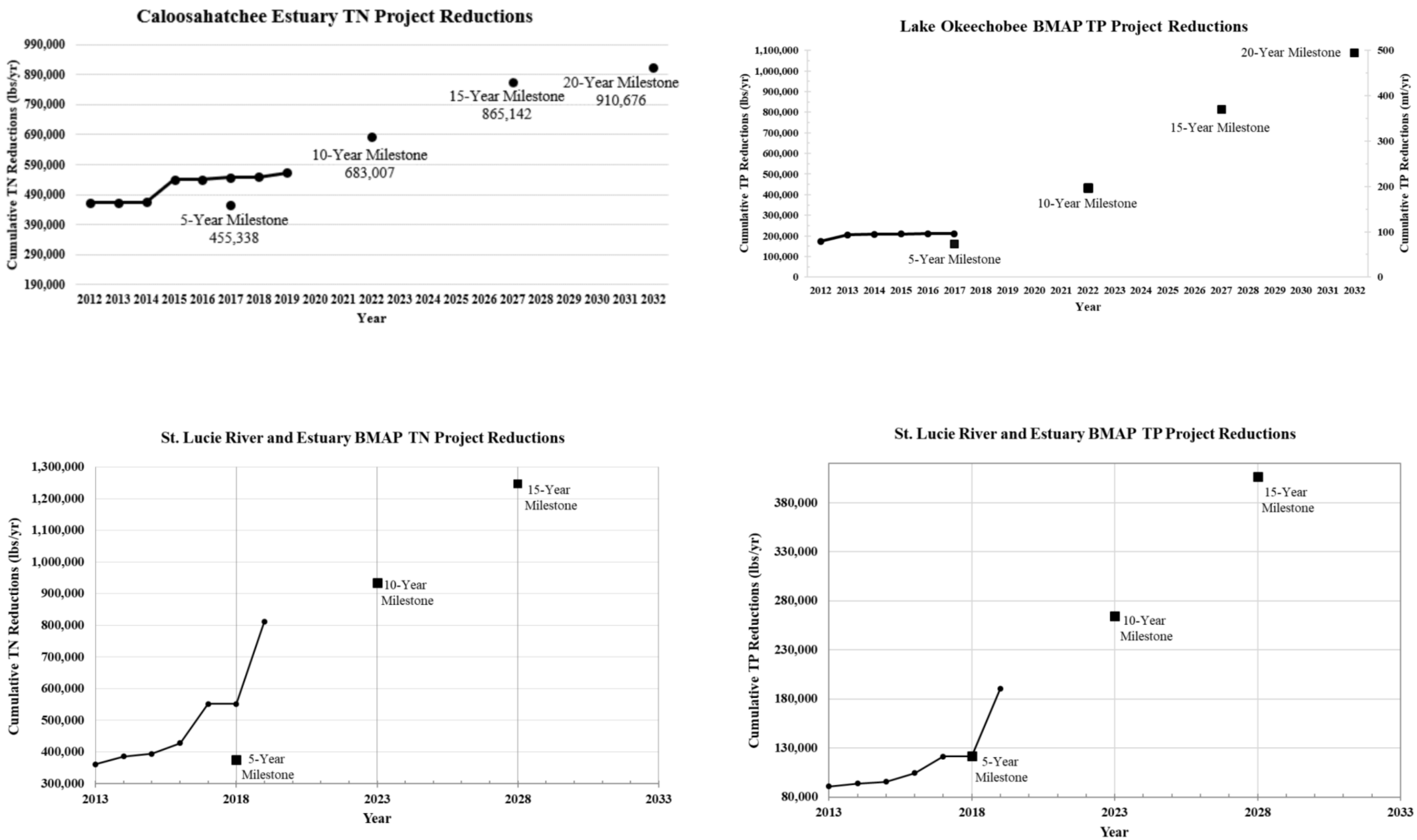
Source: Compiled from the STAR Report's Adopted BMAP Projects data.

[See figure on following page]

[357] This represents a 1.5% improvement from the previous edition of this report available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

[358] These represent a 10% and 4% improvement, respectively, from the previous edition of this report available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

Figure 7.1.2 Progress Toward NEEPP BMAP Nutrient Reduction Goals



Source: Individual BMAP reports for the 3 BMAPs available at: https://floridadep.gov/dear/water-quality-restoration/content/basin-management-action-plans-bmaps.

For more information on the status of implementation of the Caloosahatchee Estuary Basin, St. Lucie River and Estuary Basin, and Lake Okeechobee BMAPs, see DEP's 2019 STAR Report.[359] In future editions of EDR's report, expenditures necessary to complete these particular BMAPs may be isolated from the statewide BMAP implementation analysis presented in Section 5.1, above.

Everglades Restoration Investment Act

In 2000, the Legislature passed the Everglades Restoration Investment Act, section 373.470, Florida Statutes, 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.[360] 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.[361]

7.2 Everglades Expenditures

The primary funding sources for Everglades restoration are the federal government, the state of Florida, and the SFWMD. The share for each of these funding sources for projects varies depending upon the restoration plan or program being implemented. Many of the restoration projects are funded by shares of federal and state funding, with the state funding including SFWMD. As such, distinguishing between state and regional expenditures on Everglades restoration can be challenging. In this section, state and regional expenditures are largely reported together.

Federal Expenditures on Everglades Restoration

Federal funding for Everglades restoration is provided through the Corps and the U.S. Department of the Interior. EDR received data from SFWMD which breaks down historic CERP expenditures by year and government entity. Under CERP, the federal government is required to fund half of the total cost of implementing CERP projects. Over the history of the program, the federal government has spent just under 44 percent of the total expenditures to implement CERP. Table 7.2.1 shows the annual federal expenditures on CERP since Federal Fiscal Year 2000.

[See table on following page]

[359] Florida Department of Environmental Protection, 2018 Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies, June 30, 2020, available at: https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report. (Accessed December 2020.)
[360] Ch. 2000-129, § 5, Laws of Fla.
[361] 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.

Table 7.2.1 Federal Expenditures on CERP (in $millions)

	FFY 99-00	FFY 00-01	FFY 01-02	FFY 02-03	FFY 03-04	FFY 04-05	FFY 05-06	FFY 06-07	FFY 07-08	FFY 08-09	FFY 09-10
Real Estate	$-	$-	$-	$-	$38.08	$-	$-	$-	$-	$41.02	$0.06
Design	$1.32	$10.61	$21.43	$30.69	$40.64	$49.59	$49.17	$57.00	$48.43	$48.46	$51.27
Construction	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-	$10.19
Studies	$-	$0.38	$1.58	$1.24	$1.38	$1.30	$1.83	$0.10	$0.49	$1.08	$0.21
Total	**$1.32**	**$10.99**	**$23.00**	**$31.92**	**$80.11**	**$50.89**	**$51.01**	**$57.10**	**$48.92**	**$90.56**	**$61.73**

	FFY 10-11	FFY 11-12	FFY 12-13	FFY 13-14	FFY 14-15	FFY 15-16	FFY 16-17	FFY 17-18	FFY 18-19	FFY 19-20
Real Estate	$0.03	$0.03	$0.06	$0.01	$0.00	$71.59	$0.00	$0.10	$0.02	$-
Design	$46.60	$37.42	$34.41	$23.34	$19.57	$17.98	$21.82	$21.85	$28.87	$36.10
Construction	$47.15	$67.29	$68.28	$50.36	$43.24	$32.21	$43.83	$52.12	$69.11	$75.32
Studies	$0.29	$0.12	$0.01	$0.01	$-	$-	$0.02	$-	$-	$-
Total	**$94.07**	**$104.86**	**$102.75**	**$73.72**	**$62.81**	**$121.78**	**$65.67**	**$74.07**	**$98.00**	**$111.42**

Note: Historical values in this table may be updated annually as data becomes available. Data in this table supersedes that reported in previous editions.

In addition to CERP expenditures, the SFWMD provided running totals of expenditures for certain non-CERP Everglades restoration activities. Table 7.2.2 shows the cumulative non-CERP total federal expenditures on Everglades Restoration. EDR will work with district staff to determine annual expenditures and progress where applicable.

Table 7.2.2 Non-CERP Federal Expenditures on Everglades Restoration (in $millions)

Modified Water Deliveries to Everglades National Park	$394.80
Critical Projects	$88.88
Kissimmee River Restoration	$388.25
Herbert Hoover Dike	$1,499.52
Central and South Florida Project (Non-CERP)	$823.60
Total	**$3,195.05**

Source: Provided by the SFWMD. Values are cumulative totals as of September 30, 2019.

State and Regional Expenditures on Everglades Restoration

The State of Florida has spent more than $1.2 billion for projects related to Everglades restoration over the most recent ten fiscal years. These expenditures are largely included in the reported state expenditures for water quality restoration projects and initiatives in Chapter 3.[362] Table 7.2.3 shows the annual cash expenditures for various projects or initiatives related to Everglades restoration. The majority of the funding (shown in the "Everglades Restoration" row) is for projects that support CERP and Restoration Strategies.

Table 7.2.3 State Expenditures for Everglades Restoration (in $millions)

	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20
Everglades Restoration	$69.27	$27.54	$26.60	$54.77	$39.12	$82.86	$121.89	$148.38	$257.29	$219.32
Land Acquisition	$-	$-	$-	$-	$-	$0.05	$6.52	$22.61	$14.52	$3.80
Florida Keys Wastewater Treatment	$-	$-	$-	$39.16	$10.72	$26.20	$6.23	$6.01	$10.49	$1.19
Lake Okeechobee Agricultural Projects	$-	$-	$-	$-	$4.72	$6.65	$5.72	$7.53	$6.53	$7.48
Total	**$69.27**	**$27.54**	**$26.60**	**$93.92**	**$54.56**	**$115.77**	**$140.37**	**$184.53**	**$288.83**	**$231.79**

Funding sources for Everglades restoration projects have included General Revenue, trust fund balances, and bond proceeds. Prior law had authorized the issuance of bonds to finance or refinance the cost of Everglades restoration from Fiscal Year 2002-03 through Fiscal Year 2019-20 in an amount not to exceed $100 million per fiscal year except under certain conditions.[363] This authorization is no longer effective. Prior to its expiration, the state had 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 located within the Florida Keys Area of Critical State Concern.[364]

The aggregate principal amount of outstanding bonds is approximately $157 million, with net debt service of approximately $23 million due in Fiscal Year 2020-21. The debt service is expected to generally decline each year through Fiscal Year 2034-35, at which time the Everglades bonds would be retired. Table 7.2.4 shows the estimated debt service that will be due each fiscal year.

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[362] *See* Table 3.3.4.

[363] § 215.619, Fla. Stat. Specifically, § 215.619(1)(a), Fla. Stat, authorized bonds to exceed $100 million per fiscal year if DEP requested additional amounts to achieve cost savings or accelerate the purchase of lands, or the Legislature authorized additional bonds to fund the Florida Keys and Key West Areas of Critical State Concern.

[364] Specific Appropriation 1626A, ch. 2014-51, Laws of Fla. (Fiscal Year 2014-15 General Appropriations Act).

Table 7.2.4 Everglades Restoration Bonds Outstanding Debt Service (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28
Principal	$15.60	$16.39	$17.18	$18.03	$18.94	$13.28	$13.90	$7.88
Interest	$7.09	$6.31	$5.51	$4.65	$3.75	$2.83	$2.22	$1.59
Outstanding Debt Service	$22.68	$22.69	$22.69	$22.68	$22.69	$16.11	$16.12	$9.46

	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	Total
Principal	$8.17	$5.94	$6.15	$6.38	$3.10	$3.20	$3.32	**$157.42**
Interest	$1.30	$0.99	$0.78	$0.55	$0.33	$0.23	$0.12	**$38.26**
Outstanding Debt Service	$9.47	$6.93	$6.93	$6.93	$3.43	$3.43	$3.43	**$195.67**

Note: Values may not sum to totals due to rounding.

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 Land Acquisition Trust Fund for both Florida Forever bonds and Everglades bonds.

Similar to the federal expenditure data above, the SFWMD provided data on annual CERP expenditures by the state and the SFWMD. Over the history of the program, the state/regional governments have contributed just over 56 percent of the total expenditures. Table 7.2.5 details the complete history of state and regional expenditures on CERP.

[See table on following page]

Table 7.2.5 State/SFWMD CERP Expenditures for Everglades Restoration (in $millions)

	LFY 98-99	LFY 99-00	LFY 00-01	LFY 01-02	LFY 02-03	LFY 03-04	LFY 04-05	LFY 05-06	LFY 06-07	LFY 07-08	LFY 08-09
Real Estate	$-	$-	$-	$-	$-	$75.39	$-	$-	$-	$-	$508.99
Design	$0.58	$1.88	$9.62	$17.83	$31.62	$41.67	$64.83	$105.42	$66.29	$59.63	$33.43
Construction	$-	$-	$-	$-	$0.02	$0.82	$2.00	$0.47	$12.81	$0.78	$0.11
Studies	$-	$-	$0.09	$0.94	$1.95	$1.91	$1.37	$1.35	$3.19	$1.42	$0.31
Total	$-	$-	$-	$-	$-	$75.39	$-	$-	$-	$-	$508.99

	LFY 09-10	LFY 10-11	LFY 11-12	LFY 12-13	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18*	LFY 18-19*	LFY 19-20*
Real Estate	$-	$1.64	$1.06	$4.61	$0.55	$0.41	$518.57	$-	$-	$-	$0.03
Design	$22.02	$16.90	$8.37	$10.31	$8.70	$7.61	$9.49	$14.65	$-	$-	$-
Construction	$2.53	$2.51	$1.48	$3.83	$1.65	$32.53	$42.19	$66.82	$-	$-	$-
Studies	$0.07	$0.04	$0.05	$0.04	$0.01	$-	$-	-$0.02	$-	$-	$-
Total	**$24.62**	**$21.09**	**$10.96**	**$18.79**	**$10.92**	**$40.55**	**$570.25**	**$81.45**	**$-**	**$-**	**$0.03**

Note: Historical values in this table may be updated annually as data becomes available. Data in this table supersedes that reported in previous editions.
*Full expenditure values for these years are not included because the Corps is in the process of reviewing the district's final expenditure reports for cost-share purposes.

In addition to CERP expenditures, SFWMD provided EDR with running totals of expenditures for non-CERP Everglades restoration activities. Table 7.2.6 shows the cumulative non-CERP total state and regional expenditures on Everglades restoration. EDR will work with district staff to determine annual expenditures and progress, where applicable.

Table 7.2.6 State/SFWMD Non-CERP Expenditures for Everglades Restoration (in $millions)

Critical Projects	$88.15
Kissimmee River Restoration	$202.20
Herbert Hoover Dike	$100.00
Restoration Strategies & Everglades Construction Project	$2,038.40
Central and South Florida Project (Non-CERP)	$215.60
Total	**$2,644.35**

Source: Provided by the SFWMD. Values are cumulative totals as of September 30, 2020.
Note: Previous editions of this report included Northern Everglades expenditures that are not part of the integrated delivery schedule.

Expenditures Necessary to Comply with Laws and Regulations Governing CERP

When CERP was originally authorized in 2000, it was estimated that it would cost $8.2 billion and take 30 years to complete.[365] This cost was updated in 2015 to be $16.4 billion.[366] Since that time, additional costs associated with the Everglades Agricultural Area Reservoir ($1.3 in billions of $2018) and Lake Okeechobee Watershed Project ($1.4 in billions of $2018) have been added to that total.[367] Adjusting each of these for inflation results in a total implementation cost of $20.67 billion in Fiscal Year 2019-20 dollars. Similarly, summing the CERP expenditure totals from Tables 7.2.1 and 7.2.5 and adjusting them to Fiscal Year 2019-20 dollars results in $3.80 billion spent, leaving $16.88 billion remaining. Over the most recent five years, the inflation adjusted expenditures have averaged $238.06 million, putting CERP on track to require more than an additional 78 years to reach full implementation in the year 2091.

If the original 30 year goal were to be met, total expenditures would need to increase nearly eightfold to a total of $1.88 billion per year. If an alternative goal of 50 years were to be met,[368] expenditures would need to more than double to $581.92 million per year. These costs would be shared approximately 50-50 between the federal government and the state of Florida, including the South Florida Water Management District. If Florida accelerates the pace of its spending to meet a 30- or 50-year goal, it is unlikely that the federal government would accelerate its funding in tandem. However, if the state advances the full cost, it runs the risk that such funds will not be reimbursed.

7.3 Next Steps and Recommendations

Future editions of this report will continue to refine the forecast of expenditures necessary to complete CERP. Additionally, EDR will work with DEP and SFWMD staff to produce a forecast of the expenditures necessary to implement non-CERP Everglades restoration projects required by law. These include the state's water quality initiatives in the Restoration Strategies and the updated BMAPs for the Caloosahatchee River, St. Lucie River, and Lake Okeechobee watersheds.

At this time, EDR has no formal recommendations for legislative consideration regarding Everglades restoration.

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[365] Everglades Restoration: Federal Funding and Implementation Progress. Congressional Research Service. Available at: http://www.nationalaglawcenter.org/wp-content/uploads/assets/crs/R42007.pdf. (Accessed December 2020.)

[366] 2015 Central and Southern Florida Project, Report to Congress, Comprehensive Everglades Restoration Plan, at 39, available at: https://evergladesrestoration.gov/content/cerpreports/cerp_2015_rpt_to_congress.pdf. (Accessed December 2020.)

[367] Progress Toward Restoring the Everglades: The Seventh Biennial Review – 2018. National Academies of Sciences, Engineering, and Medicine. National Academic Press. Available at: https://www.nap.edu/catalog/25198/progress-toward-restoring-the-everglades-the-seventh-biennial-review-2018. (Accessed December 2020.) Note that some portion of these costs may be included in CERP cost estimates. EDR will work with DEP to remove any potential redundancy.

[368] *See* Congressional Research Service, Recent Developments in Everglades Restoration, October 17, 2019 (stating that CERP will take approximately 50 years to implement), available at: https://fas.org/sgp/crs/misc/IF11336.pdf. (Accessed December 2020.)

8. Analyzing the Potential Future Gap Between Water Resource-Related Revenues and Expenditures

This assessment is required by section 403.928(1)(d), Florida Statutes, to identify the gap between the state's projected revenues and the projected and estimated expenditures for water resources.[369] Projected revenues and projected expenditures are the forecast of future water resource related revenues and expenditures, respectively, based upon historical trends and ongoing projects or initiatives. Estimated expenditures are the forecast of future expenditures that are necessary to comply with federal and state laws and regulations governing water supply and demand as well as water quality protection and restoration, while also achieving the Legislature's intent that sufficient water be available for all existing future reasonable-beneficial uses and the natural systems. There are several ways of conducting this analysis; they are described below.

8.1 Evaluating the Gap Considering the Current Trend

In Chapter 3, the projected revenues and projected expenditures necessary to conduct a gap analysis were developed.

Projected Water Supply Funding Gap

Historical and projected revenues dedicated to or historically allocated for water supply can be found in Table 3.2.1in Chapter 3 of this report. These revenue sources consist of federal grants and loan repayments, neither of which have a smooth history. Further, between Fiscal Years 2005-06 and 2008-09, $227.70 million was appropriated from the Documentary Stamp Tax to aid the Water Management Districts with alternative water supply funding. The use of that funding source for this purpose did not continue in the most recent ten fiscal years, but $18.75 million was expended in that time period from previous appropriations. The delay in expenditures creates the appearance of a gap that does not actually exist. Additionally, there was a $22.48 million expenditure in Fiscal Year 2019-20 from General Revenue (GR). Since this revenue source is neither dedicated nor historically allocated to water supply, it complicates the analysis. These historical and projected revenues are shown in Figure 8.1.1.

Water supply expenditures by the state have been inconsistent over the past ten years. This is likely due to the varying size of federal grant awards, the terms and rates of loan repayments, and recent appropriations for alternative water supply. The historical and projected state expenditures on water supply can be found in Table 3.1.1 in Chapter 3 of this report. This type of data is very difficult to forecast with any reliable degree of accuracy. These historical and projected expenditures are also shown in Figure 8.1.1.

[369] State is inclusive of federal revenues appropriated in the General Appropriations Act each year.

Figure 8.1.1 Projected Water Supply Funding Gap (in $millions)

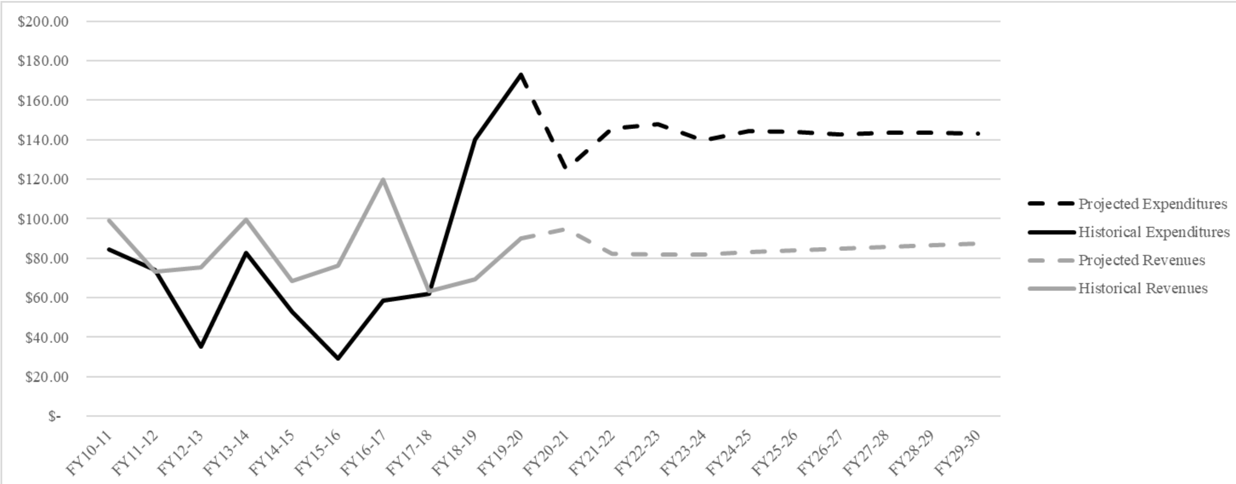

Figure 8.1.1 indicates that a gap in water supply funding may exist and extend into the future. The gap is quantified in Table 8.1.1 below. This gap is largely driven by past expenditures of large appropriations from GR which is not a revenue source dedicated or historically allocated to water supply. The gap – the difference between revenues and expenditures – is also partly exacerbated by ongoing expenditures from appropriations made prior to the history presented. Further, a portion of the gap is comprised of loan authorizations and their repayments and, as such, may be assumed to zero-out over time.

Table 8.1.1 Projected Water Supply Funding Gap (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Projected Expenditures	$124.94	$145.92	$147.89	$139.58	$144.47	$143.98	$142.68	$143.71	$143.46	$143.28
Projected Revenues	$94.85	$82.45	$82.00	$81.89	$83.01	$83.99	$84.67	$85.61	$86.50	$87.35
Gap	**($30.09)**	**($63.47)**	**($65.89)**	**($57.69)**	**($61.46)**	**($59.99)**	**($58.01)**	**($58.10)**	**($56.96)**	**($55.93)**

Projected Water Quality Funding Gap

Historical and projected revenues dedicated or historically allocated to water quality can be found in the "Total Water Quality Revenues" row of Table 3.4.3 in Chapter 3 of this report. These historical and projected revenues are shown in Figure 8.1.2. Additionally, a scenario is included where uncommitted revenue from the Documentary Stamp tax that is allocated to the Land Acquisition Trust Fund (LATF) is used for water quality purposes.

Water quality expenditures by the state have been more stable than supply; 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 10 percent per year, on average. The historical and projected state expenditures on water quality can be found in Table 3.3.7 in Chapter 3 of this report. This type of data is very difficult to forecast with any reliable degree of accuracy and, as such, forecasts will vary between editions of this report based on the latest data. These historical and projected expenditures are shown in Figure 8.1.2.

Figure 8.1.2 Projected Water Quality Funding Gap (in $millions)

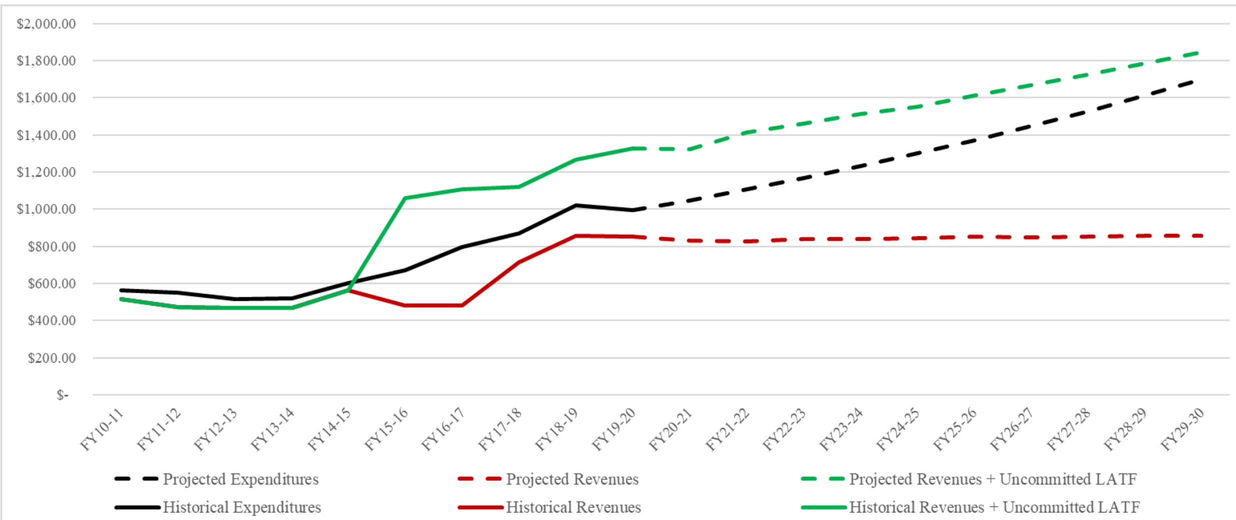

Figure 8.1.2 indicates that a gap has existed in water quality funding for at least ten fiscal years. This gap would have been filled either through revenues generated and saved from previous years or from a source not dedicated or historically allocated to water quality. Because those revenues are technically not "committed" to this purpose, they are not assumed in the future. Going forward, the gap persists and broadens over the ten year forecast period. The gap is quantified in Table 8.1.2 below. The gap is eliminated from the forecast horizon if the uncommitted documentary stamp tax distribution to the LATF is included as a revenue source.

[See table on following page]

Table 8.1.2 Projected Water Quality Funding Gap (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
Projected Expenditures	$1,048.63	$1,106.42	$1,167.40	$1,231.73	$1,299.61	$1,371.24	$1,446.81	$1,526.54	$1,610.67	$1,699.43
Projected Revenues	$832.95	$827.69	$838.57	$838.65	$845.56	$850.44	$848.12	$852.24	$855.65	$858.74
Gap	**($215.68)**	**($278.73)**	**($328.82)**	**($393.08)**	**($454.05)**	**($520.80)**	**($598.69)**	**($674.30)**	**($755.02)**	**($840.69)**
Projected Revenue + Uncommitted LATF	$1,322.23	$1,414.73	$1,462.69	$1,512.42	$1,550.27	$1,611.72	$1,668.95	$1,724.85	$1,785.44	$1,844.59
Gap with Uncommitted LATF	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-

8.2 Evaluating the Gap Considering the Expenditures Necessary to Comply with the Law and Meet the Legislature's Intent

In Chapter 3 the projected revenues dedicated or historically allocated to water supply and water quality and other water resource-related programs were evaluated. Chapter 4 provides a provisional estimate of future water supply expenditures necessary to achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems, while Chapters 5 and 7 provide partial estimates of future water quality protection and restoration expenditures necessary to comply with federal and state laws and regulations governing water quality protection and restoration. This data provides a basis to compare the estimated future expenditures calculated thus far to the total revenue forecasts.

Estimated Water Supply Funding Gap

Table 4.6.7 provides estimates of the state cost of future water supply expenditures based on data available from the Department of Environmental Protection and the Water Management Districts (WMDs). This analysis uses the average column from that table to calculate annual project costs.[370] Previous editions evaluated the time to completion of projects and determined that two years is a reasonable estimate of standard project construction duration.[371] As such, the expenditures necessary to generate water for each given year must occur two years prior to the water generation needs. Incorporating the time needed for construction into the methodology described above produces the annual expenditure forecast for alternative water supply (AWS) seen in Table 8.2.1.

Section 4.8 estimates a necessary state expenditure of $64.71 on the natural systems. Only the Minimum Flow and Minimum Water Levels (MFLs) over Outstanding Florida Springs have a 20-year deadline required by law. The Office of Economic and Demographic Research (EDR) applied

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[370] The average cost per gallon per year was calculated by dividing the average expenditure forecast by the water to be generated to meet future demand. This result was then applied to the annualized inferred supply shortage forecast to determine expenditures per year.
[371] See Section 4.9 of the 2020 Edition, available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

this same 20-year deadline to the year that each MFL's Recovery and Prevention Strategy was first published, producing an annual expenditure forecast. Further, for the other projects from Section 4.8 identified as benefiting natural systems, a five-year deadline is assumed. This natural systems expenditure forecast can also be seen in Table 8.2.1.

Table 8.2.1 Estimated Future Water Supply Expenditures (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30
AWS	$1.78	$1.78	$1.86	$2.00	$2.00	$2.38	$2.69	$2.69	$2.38	$2.38
Natural Systems	$8.24	$8.24	$8.24	$8.24	$8.24	$5.26	$4.05	$2.03	$2.03	$2.03
Total	**$10.03**	**$10.03**	**$10.10**	**$10.24**	**$10.24**	**$7.64**	**$6.74**	**$4.72**	**$4.41**	**$4.41**

	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	FY 38-39	FY 39-40
AWS	$2.38	$3.74	$7.00	$7.60	$7.60	$7.60	$8.31	$13.25	$N/A*	$N/A*
Natural Systems	$2.03	$2.03	$2.03	$2.03	$N/A*	$N/A*	$N/A*	$N/A*	$N/A*	$N/A*
Total	**$4.41**	**$5.76**	**$9.03**	**$9.62**	**$7.60**	**$7.60**	**$8.31**	**$13.25**	$N/A*	$N/A*

*FY38-39 through FY39-40 AWS expenditures and FY34-35 through FY39-40 MFL Recovery expenditures are not expected to be zero. Statewide demand forecasts are not currently available beyond 2040 and the two-year construction period prevents AWS estimates for FY38-39 and FY39-40.

The revenue available for water supply must be evaluated prior to identifying a gap between expenditures and revenues. All of the water supply revenue identified in Section 3.2 is tied to the drinking water revolving loan fund. It is extremely unlikely that any of this revenue will be available for AWS or MFL recovery, leaving no usable revenue source.[372]

Figure 8.2.1 depicts the gap between the zero state revenues and the estimated state water supply expenditures necessary to achieve the Legislature's intent that sufficient water be available for all existing and future reasonable-beneficial uses and the natural systems. The annual estimates are shown in Table 8.2.2. Note that EDR's pilot model results suggest a slightly lower expenditure forecast, and therefore a smaller gap, than shown below.[373]

[See figure on following page]

[372] For a description of the drinking water revolving loan fund, see Section 3.2.
[373] For more information on EDR's pilot model and its results, see Section 4.10.

Figure 8.2.1 AWS and MFL Recovery State Funding Gap (in $millions)

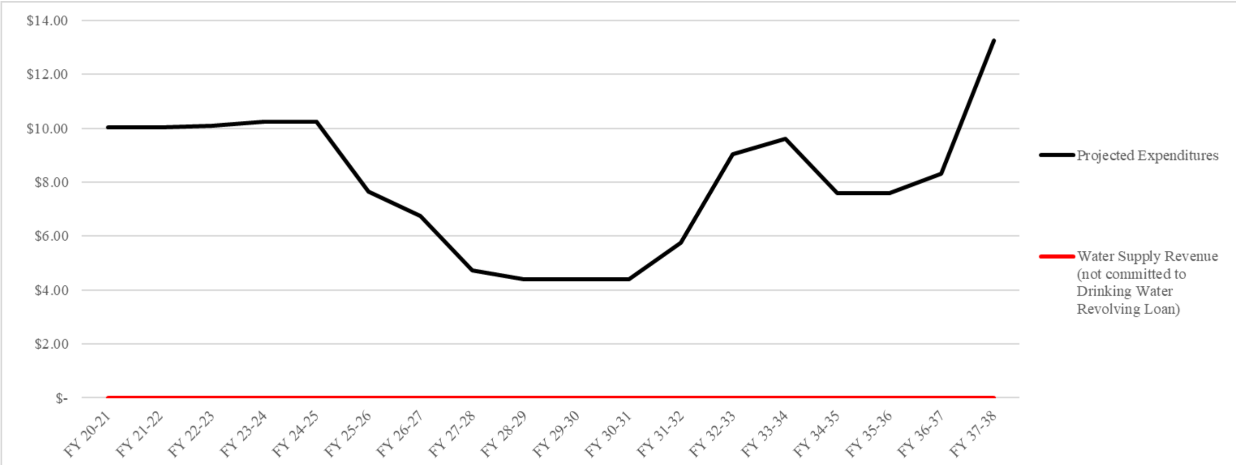


Table 8.2.2 Projected Water Supply Funding Gap, based on AWS and MFL Recovery Estimates (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29
Projected Expenditures	$10.03	$10.03	$10.10	$10.24	$10.24	$7.64	$6.74	$4.72	$4.41
Projected Revenues	$-	$-	$-	$-	$-	$-	$-	$-	$-
Gap	**($10.03)**	**($10.03)**	**($10.10)**	**($10.24)**	**($10.24)**	**($7.64)**	**($6.74)**	**($4.72)**	**($4.41)**

	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38
Projected Expenditures	$4.41	$4.41	$5.76	$9.03	$9.62	$7.60	$7.60	$8.31	$13.25
Projected Revenues	$-	$-	$-	$-	$-	$-	$-	$-	$-
Gap	**($4.41)**	**($4.41)**	**($5.76)**	**($9.03)**	**($9.62)**	**($7.60)**	**($7.60)**	**($8.31)**	**($13.25)**

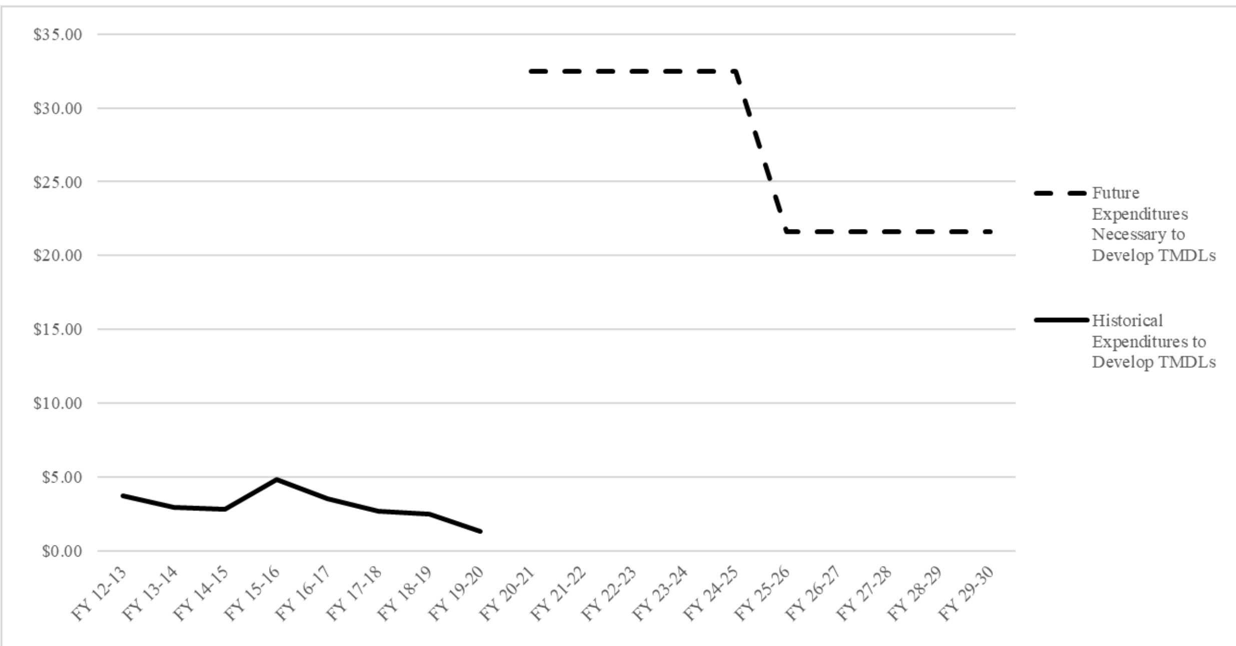
Estimated Water Quality Funding Gap

Existing water quality expenditures address a broad range of projects, programs, and initiatives. See Section 3.3 for a categorization of historical expenditures. Some of these expenditures are needed to comply with laws and regulations, such as the Total Maximum Daily Load (TMDL) program, while some may occur with consistency but are not part of a broader structure, such as annual water projects. This makes it possible for the projected revenue to exceed the expenditure estimates for legally required water quality protection and restoration activities, but create a funding gap after including the consistent expenditures that are made without a specific legal requirement to do so.

In this 2021 Edition, EDR has identified the monitoring of water bodies and development of TMDLs, the implementation of Basin Management Action Plan (BMAP) projects, Alternative Restoration Plans, Surface Water Improvement and Management (SWIM) program, and the Comprehensive Everglades Restoration Plan (CERP) and non-CERP Everglades restoration as federal and state laws and regulations governing water quality protection and restoration that require future expenditures. Estimates of TMDL development, BMAP implementation, and CERP expenditures are developed in Chapters 5 and 7.

Compared to the others, TMDL development expenditures appear small. It is worth noting, however, that the future expenditures necessary to develop TMDLs over the currently identified waterbodies is much higher than the historic rate. This is shown in Figure 8.2.2.

Figure 8.2.2 TMDL Development History and Forecast (in $millions)



In order to consider a single CERP expenditure forecast, two additional assumptions are required regarding the duration of the time to completion and the cost share between federal and state/regional governments. Chapter 7 provides three time-to-completion estimates consisting of the current trend concluding in 2091, the 50-year time horizon concluding in 2049, and the 30-year time horizon concluding in 2029. The original 30-year time horizon is selected and a fifty-fifty cost share is assumed. Table 8.2.3 identifies the current state expenditure forecast for TMDL development, BMAP implementation, and CERP.

Table 8.2.3 State Expenditure Forecast for TMDL Development, BMAP Implementation, and CERP (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29
TMDL Dev.*	$32.47	$32.47	$32.47	$32.47	$32.47	$21.62	$21.62	$21.62	$21.62
BMAP Imp.**	$416.96	$416.96	$406.25	$378.25	$378.25	$160.60	$144.99	$135.64	$117.82
CERP	$937.54	$937.54	$937.54	$937.54	$937.54	$937.54	$937.54	$937.54	$937.54
Total	**$1,386.96**	**$1,386.96**	**$1,376.26**	**$1,348.26**	**$1,348.26**	**$1,119.76**	**$1,104.15**	**$1,094.80**	**$1,076.99**

	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38
TMDL Dev.*	$21.62	$-	$-	$-	$-	$-	$-	$-	$-
BMAP Imp.**	$112.10	$112.10	$111.33	$103.07	$78.84	$78.84	$22.17	$22.17	$22.17
CERP	$-	$-	$-	$-	$-	$-	$-	$-	$-
Total	**$133.72**	**$112.10**	**$111.33**	**$103.07**	**$78.84**	**$78.84**	**$22.17**	**$22.17**	**$22.17**

*While the TMDL development forecast considers all waterbodies on the comprehensive verified list, additional water bodies may be identified as impaired in the future and require TMDL development.
**The existing BMAP implementation forecast ends in FY37-38, however, there are at least 3 known additional BMAPs that will be accounted for in future editions. Further, as discussed in Section 5.2, the BMAP implementation estimate is likely understated.

Combining just the forecasts for TMDL development, BMAP implementation, and CERP implementation produces a revised expenditure total that exceeds projected revenues in every year. Even dedicating the currently uncommitted LATF dollars produces a gap in the first year of the forecast, but it eliminates the gap in all remaining years. This gap is shown in Table 8.2.4. The degree to which the timeframes and cost shares underlying the expenditure forecasts for the development of TMDLs and implementation of BMAPs and CERP are legally required is still being assessed. Figure 8.2.3 provides a snapshot of the projected revenues and the thus far estimated expenditures over the next ten fiscal years.

There are two caveats to this analysis. First, the statutorily uncommitted LATF dollars are currently being spent on other qualified purposes of the LATF. Redeploying them to TMDLs, BMAPs, and CERP would require the other purposes to be defunded or shifted to another revenue source. Second, the expenditure forecast shown in Figure 8.2.3 addresses only a stylized subset of water quality expenditures since it does not include other historical water quality initiatives required by law or in practice, as identified in Chapter 5.

[See figure on following page]

Figure 8.2.3 Total Projected Water Quality Revenue Compared with Estimated Expenditures Necessary to Develop TMDLs, Implement BMAPs, and Implement CERP (in $millions)

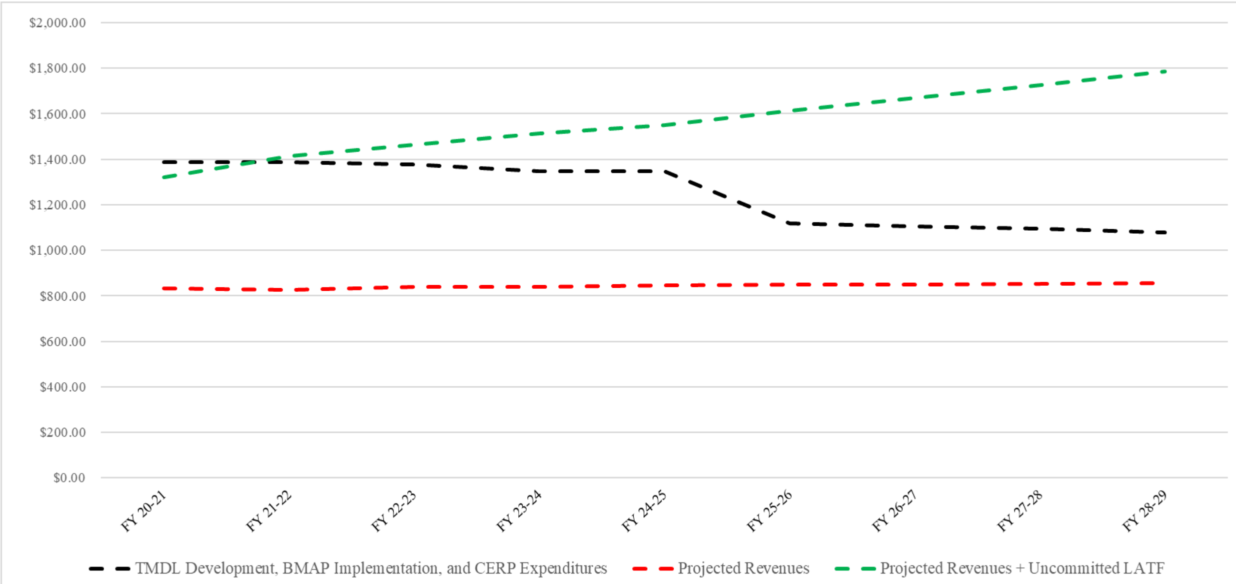


Table 8.2.4 Projected Water Quality Funding Gap (in $millions)

	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29
TMDL/BMAP /CERP Exp.	$1,386.96	$1,386.96	$1,376.26	$1,348.26	$1,348.26	$1,119.76	$1,104.15	$1,094.80	$1,076.99
Projected Revenues	$832.95	$827.69	$838.57	$838.65	$845.56	$850.44	$848.12	$852.24	$855.65
Gap	**($554.01)**	**($559.27)**	**($537.68)**	**($509.61)**	**($502.70)**	**($269.32)**	**($256.04)**	**($242.56)**	**($221.34)**
Projected Revenue + Uncommitted LATF	$1,322.23	$1,414.73	$1,462.69	$1,512.42	$1,550.27	$1,611.72	$1,668.95	$1,724.85	$1,785.44
Gap with Uncommitted LATF	**($64.73)**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**

Future editions aim to include updated forecasts form TMDL development, BMAP implementation, and CERP as well as estimated forecasts for Alternative Restoration Plans, the SWIM program, and non-CERP Everglades restoration. While a gap may not exist between total revenues and the subset of identified expenditures, it is not unreasonable to expect a gap to be revealed in future editions once all estimated expenditures are incorporated.

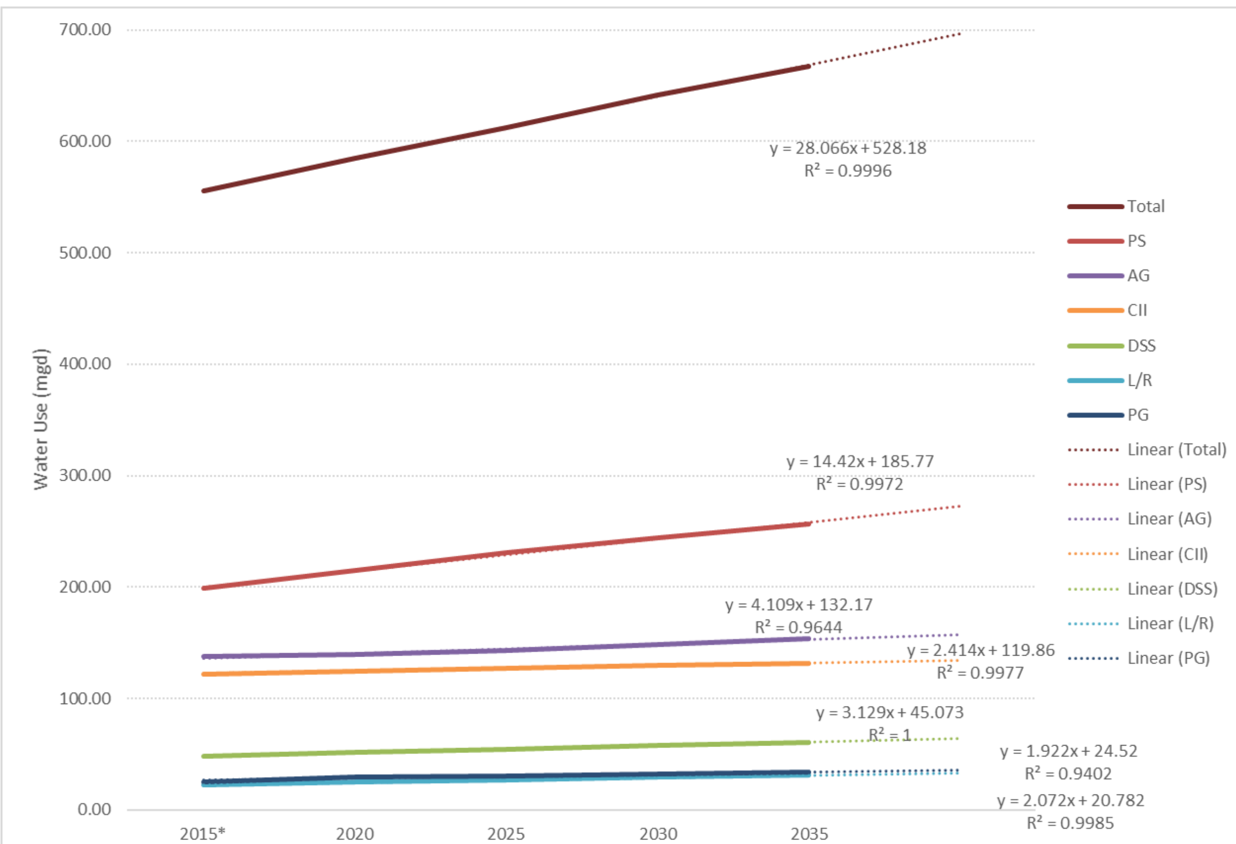
Appendix A: Additional Resources Regarding Water Supply and Demand Modelling and Expenditures Forecasts

The following are the appendices related to Chapter 4.

A.1 Water Demand in SR-West and NFRWSP

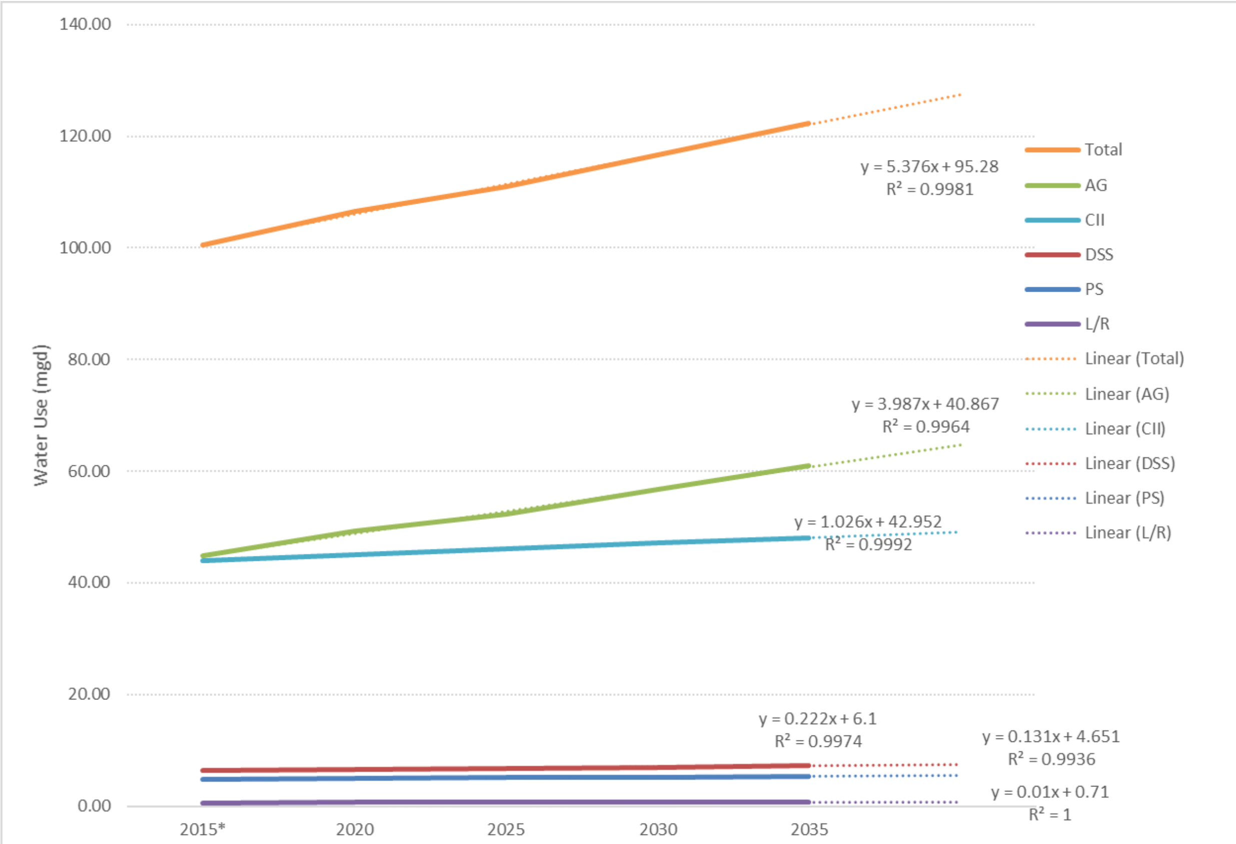
To create a single statewide 20-year planning horizon, the 2040 water use for the NFRWSP and SR-West is projected with a linear trend. Figures A.1.1 and A.1.2 show that linear trends sufficiently explain the water use estimates and projections for each use category in the two regions (with the R-squared measure of fit for the simple linear regression being 0.94 or higher). Still, this simple forecasting approach does not account for the myriad factors WMDs must incorporate into their predictions. Therefore, it should not be used as an official water use forecast for these two regions.

Figure A.1.1 NFRWSP Water Use Projections



Note: For 2015, the WMDs report estimates, rather than projections. The following abbreviations are used on this graph: PS – public supply, DSS – domestic self-supply, AG – agriculture, L/R – landscape / recreation, CII – commercial/industrial/institutional, and PG – power generation.

Figure A.1.2 SR-West Water Use Projections



Note: For 2015, the WMDs report estimates, rather than projections. The following abbreviations are used on this graph: PS – public supply, DSS – domestic self-supply, AG – agriculture, L/R – landscape / recreation, and CII – commercial/industrial/institutional. Also, for power generation (PG), the estimated and projected water use is 0 mgd. This category is not shown on the graph.

Table A.1.1 NFRWSP Water Use Projections

Use Category*	Data from DEP (2020a)					EDR projection with linear trend
	2015	2020	2025	2030	2035	2040
Public Supply (PS)	198.96	215.09	230.48	244.05	256.58	272.29
Domestic Self-Supply (DSS)	48.21	51.33	54.43	57.62	60.71	63.85
Agriculture (AG)	137.73	139.41	142.95	148.80	153.58	156.82
Landscape / Recreational (L/R)	22.73	24.97	27.14	29.15	31.00	33.21
Commercial/Industrial/Institutional (CII)	122.13	124.70	127.32	129.66	131.72	134.35
Power Generation (PG)	25.53	29.56	30.38	32.08	33.88	36.05
Total	**555.29**	**585.06**	**612.70**	**641.36**	**667.47**	**696.57**

* The titles of the use categories are consistent with the other parts of this edition. These titles are slightly different from those used by SRWMD and SJRWMD.

Table A.1.2 SR-West Water Use Projections

Use Category*	DEP (2020a)					EDR projection with linear trend
	2015	**2020**	**2025**	**2030**	**2035**	**2040**
Public Supply (PS)	4.77	4.91	5.07	5.18	5.29	5.44
Domestic Self-Supply (DSS)	6.31	6.54	6.79	7.00	7.19	7.43
Agriculture (AG)	44.81	49.30	52.31	56.65	61.07	64.79
Landscape / Recreational (L/R)	0.72	0.73	0.74	0.75	0.76	0.77
Commercial/Industrial/Institutional (CII)	43.94	45.05	46.01	47.11	48.04	49.11
Power Generation (PG)	0.00	0.00	0.00	0.00	0.00	0.00
Total	**100.55**	**106.53**	**110.92**	**116.69**	**122.35**	**127.54**

A.2 Methods Used by WMDs to Project Water Use

Section 403.928, Florida Statutes, requires EDR to include a compilation of projected water supply and demand data developed by each water management district (WMD) and to note any significant differences among the methods used by the WMDs to calculate the data.

The DEP and WMDs collaborate to ensure statewide consistency in the approaches used in long-term water supply planning. A vital example of this collaboration is the statewide Format and Guidelines for Regional Water Supply Planning (DEP et al. 2019[374]). The Guidelines define the water use categories, describe various water use estimation and projection methods, and discuss the indicators presented on the statewide level in the DEP's 2018 Annual RWSP Summary. Furthermore, the SJRWMD, SFWMD, SWFWMD, DEP, and other agencies and stakeholders collaboratively develop the regional water supply plan for the CFWI, emphasizing the coherence in planning methods among the three participating WMDs. Another example of collaboration between the WMDs is the NFRWSP planning, with consistent estimation and planning approaches applied by the SRWMD and SJRWMD. Despite these efforts to increase the planning approaches' coherence, differences in the specific methodologies used by WMDs remain. These differences are driven by the historical practices in each WMD, including the availability of relevant data and stakeholder collaboration processes established in each planning region. Similarities and differences in the approaches used by the WMDs are discussed in the subsections below.

Public Supply (PS)

As discussed in DEP et al. (2019, p. 25), "Districts should use their best professional judgment to utilize the best available method and data to develop demand projections. Actual methodologies used are documented in each RWSP."

For the PS category, the WMDs estimate water use for the suppliers' service area with an allocation above 0.1 mgd.[375] The estimated base year water use is typically equivalent to a utility's reported pumpage. For future demand projections, the WMDs rely on the "unit water demand" approach

[374] DEP, NWFWMD, SFWMD, SWFWMD, SJRWMD, and SRWMD. 2019. Format and Guidelines for Regional Water Supply Planning. 42pp.
[375] The NWFWMD includes selected small public supply systems, as discussed below.

where a "unit water demand coefficient" is multiplied by the number of users.[376] For public supply, "the number of users" is the number of people served by the water utilities, and the "unit water demand coefficient" is the per capita use:[377]

Figure A.2.1 Total Water Use in PS Service Area Equation

While this general approach is similar among all the WMDs, the specifics vary as follows:

- The WMDs use different definitions of the population served by water suppliers: the SWFWMD (excluding CFWI portion) and NWFWMD explicitly account for non-permanent populations. The other WMDs focus on the permanent population only.

- All of the WMDs utilize the BEBR county population projections in developing the PS forecasts; however, since the WMDs develop WSAs/RWSPs at different times, the population estimates utilized by WMDs also vary. The publication years for the population estimates utilized by the WMDs range from 2014 to 2018 (with the base population year being 2013 through 2017).

- The methods used to allocate the BEBR county population projections to the future utility service areas vary among the WMDs, with some districts utilizing simple percent-share methods. In contrast, others rely on complex parcel-level models of future development.

- Although each WMD does it differently, most of them account for treatment losses in PS water use projections. An exception is SWFWMD, which excludes the treatment losses from their per capita water use calculations.[378]

- All of the WMDs estimate per-capita water use based on the average for the past year(s). However, the number of years considered ranges from one to five years.

[376] For a description of various long-term water demand forecasting methods, see Rinaudo (2015).
[377] Note that in the SFWMD, this approach is modified. SFWMD is the only district that relies on net per capita water use, rather than the gross per capita. The net per capita use excludes the water losses in the treatment process. As a result, in the SFWMD, the total water use in PS is estimated as a product of three terms: net per capita water use, the number of people, and a ratio to account for the treatment losses.
[378] As discussed in SWFWMD (2014, p. 4), "water withdrawn for public supply goes through treatment procedures that cause water losses" (p. 7). For example, for the desalination system, water treatment losses "may range from 15 to 50 percent" (SWFWMD 2020, p. 15).
References:
SWFWMD. 2014. Southwest Florida Water Management District 2012 Estimated Water Use Report.
SWFWMD. 2020. Southwest Florida Water Management District 2018 Estimated Water Use Report.

- In line with DEP et al. (2019), the WMDs include the public suppliers that allocate 0.1 mgd or more in the PS category. There are, however, important variations with two districts including certain systems with smaller allocations (see Table A.2.1).

Below, each component of the PS estimation formula is discussed in detail, including public suppliers included in the category, per capita use rate calculations, population served analysis and utilities' population forecasting methods.

PS: Public Suppliers Included in the Category

The WMDs are generally consistent in considering the systems with at least 0.1 mgd of permitted quantity or average pumpage in PS. One key difference is that the SWFWMD includes all public suppliers (even those smaller than 0.1 mgd), as well as domestic self-supply and residential irrigation wells, in the PS category. This SWFWMD aggregate category is broken down in DEP (2020a) to be more consistent with the other WMDs. Additionally, the NWFWMD includes some small public suppliers in the PS category. Specific definitions used by the WMDs are presented in Table A.2.1 below.

Table A.2.1 Definitions of the Public Supply Category

*Region**	*Definition*
NWFWMD	Utility systems that have 0.1 mgd and above annual average daily rate. Systems below the 0.1 mgd threshold are included if included in regulatory audits, if water use may meet the threshold during the future planning horizon, or if multiple small systems within a county collectively meet the 0.1 mgd threshold.
SRWMD and NFRWSP	All large municipal, public, and private systems supply potable water to the public from a central water supply system for human consumption and other uses and have average annual permitted quantities of 0.1 mgd or more.
SWFWMD (excluding CFWI)	DSS, water supply permittees supplying residential homes, and residential irrigation wells are included. Specifically, DSS is defined as residential dwellings systems provided water from a dedicated, on-site well and are not connected to a central utility. Water supply permittees with permitted water use for residential single-family, multi-family, and mobile homes are also included in the PS category. Finally, residential irrigation wells are on-site wells that serve the outdoor needs of individual residential dwellings connected to a central water utility system for their indoor needs.
SFWMD (excluding CFWI)	The category includes potable water supplied by water treatment plants with projected average pumpage of 0.1 million gallons per day (mgd) or greater.
CFWI	The category includes water provided by any municipality, county, regional water supply authority, special district, public or privately-owned water utility, or multijurisdictional water supply authority for human consumption and other purposes with average annual permitted quantities 0.1 mgd or greater.

* For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.

Calculation of Per Capita Water Use

Four key differences are identified among the WMDs' approaches to calculating the per capita use. The first difference concerns the calculation method. Specifically, all but one of the WMDs utilize gross per capita use rates in their PS demand projections. The gross per capita rate (in gallons per capita per day, gpcd) is calculated as the utility's gross water use divided by the population served. Gross utility water use is equal to water withdrawals minus export plus import. The exception is the SFWMD, where the per capita use rate is based on net (finished) water volume and corresponding service area populations. Net (finished) water is the volume delivered to end-users after accounting for treatment losses. Once the net (finished) demand is forecasted for each PS service area, the SFWMD projects the gross water withdrawals by multiplying the net (finished) demand by the related raw-to-finished ratios.

The second difference among the WMDs also relates to the consideration of treatment losses. The SWFWMD excludes treatment losses from the utility's gross water use when calculating the per capita rate, while all the other WMDs include the treatment losses. Third, the definitions of the population in utility service areas differ among the WMDs. The NWFWMD and SWFWMD account for the non-permanent population, while the other WMDs only focus on the permanent population. Finally, WMDs use a different number of data years to calculate the per capita use. While most of the WMDs utilize the five-year average gross per capita use rate, the SF – UEC utilized a four-year average, and the NWFWMD applied a one-year rate. Both plan to apply a five-year average rate in the future (see Table A.2.2).

Table A.2.2 Periods Used by WMDs to Calculate the Per Capita Use Rates for PS

Region*	**Period of Estimation**	
	Number of years	Time period
NW – II**	1	2015
NW – Oth**	1	2015
SR – West	5	2010-2014
SWFWMD	5	2011-2015
SF – LKB	5	2013-2017
SF – UEC**	4	2010-2013
SF – LEC	5	2012-2016
SF – LWC	5	2010-2014
NFRWSP	5	2010-2014
CFWI	5	2011-2015

* For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.
** The WMD is planning to use 5-year average in the future.

Definition of the Population Served by Public Suppliers

As mentioned above, the "population served" definition is critical for estimating the per capita water use rate. While the SFWMD, SJRWMD, and SRWMD focus on the permanent population only, the NWFWMD and SWFWMD explicitly account for the permanent and non-permanent populations. Explicit modeling of the non-permanent population can allow the WMDs to analyze the effect of significant tourism and seasonal population fluctuations and have more accurate per capita rates at the utility, county, and regional levels. For example, such a model would capture the changes in tourism in coastal areas due to prolonged harmful algal bloom events.

In the future, it will be essential to identify the areas where the non-permanent population can have a significant impact on the water use projections. For example, for the SWFWMD, the permanent population is projected to be 6.672 million people in 2040, while the total functional population is estimated at 7.400 million people (*i.e.*, the non-permanent population accounts for approximately

11% of the entire functional population). The share of the non-permanent population in the NWFWMD districtwide is lower than that in the SWFWMD. Overall, the relative difference can be significant for specific utilities, urban areas, counties, and water supply planning regions. For a summary of non-permanent population treatment, see Table A.2.3.

Table A.2.3 Treatment of Non-Permanent Population in RWSPs and WSAs, by WMD

WMD	Non-Permanent Population
NWFWMD	The *seasonal population* is accounted for by adjusting the permanent county population (from BEBR medium estimates) with seasonal rates. In 2014, a study commissioned by the NWFWMD produced seasonal population rates for each public supply utility, the DSS use category in each county, and countywide averages. The seasonal population rates are then estimated as one-half of the seasonal population ratio to the permanent population (to account for the length of stay of seasonal residents in the area). Seasonal population rates were sometimes refined following a review of public supply utility outreach results. The resulting seasonal rates adjust the BEBR medium county 2015 population estimates and 2020-2040 future population projections.
SWFWMD (except CFWI)	Seasonal, tourist, and commuter populations are estimated, and in combination with the permanent population, they comprise the "functional population," which is then used to calculate the per-capita water use. The seasonal population is calculated from the average emergency room admission rate for 2009-2011 (third quarter compared with the first quarter of the year) for the ages 45-74 years old cohort, given the average likelihood of being admitted to the emergency room of 2.23%. These estimates of the seasonal population are then adjusted to represent a typical amount of time spent by seasonal residents in Florida (from 44% to 57% of the year, depending on beach destination). Next, the tourist population, based on the 1997-2016 county-level lodging room data from the Florida Department of Business and Professional Regulation, is combined with the county-level unit occupancy and party size data, with short-term unit rentals also taken into account. The tourism population projections are based on the average of two methods: (1) extrapolating linear trend and (2) county employment projections from Woods and Poole Economics. Finally, to estimate commuters' ratio to permanent population, the 2006-2010, American Community Survey data are used. Adjustments are made for the hours and days per week spent by commuters in the area (note that only a positive commuter population was included in the analysis). The commuter and tourist population estimates were adjusted to account for their water use, as compared with the full-time residents, assuming 132 gal/day for residential water use, but only 69.3 gal/day for indoor use.
Other WMDs	The non-permanent population is not explicitly considered in the per capita use estimates.

Estimation of the Permanent Population for Utility Service Areas

Section 373.709, Florida Statutes, contains guidance for the population projections to be used in the RWSPs. The WMDs are required to consider the medium population projections data produced by BEBR. Any adjustment of or deviation from the BEBR projections must be fully described, and the original BEBR data must be presented along with the adjusted data.

As summarized in Table A.2.4, all of the WMDs rely on the BEBR's medium county population estimates and projections. Due to the stacked schedule for the WSA/RWSP updates, the annual BEBR projections represent snapshots of the state's demographics taken during different economic circumstances and times. They do not add up to the current statewide population projections. For example, the BEBR projections published in 2014 and used for the SF – UEC may differ from later BEBR projections and the most recent forecast adopted by the Florida Demographic Estimating Conference. Annual updates and changes in the state population projections can be significant. For example, in 2017, a notable increase in the statewide population was incorporated due to the influx of Puerto Ricans migrating to the state after Hurricane Maria.[379]

Table A.2.4 BEBR Population Projections Used in WSAs/RWSPs

Region[i]	Publication Year	Base Year for the Population Projections	Reference
NWFWMD (all regions)[ii]	2016	2015	BEBR, 2016. *Projections of Florida Population by County, 2020-2045, with Estimates for 2015.* UF/BEBR, Florida Population Studies. Volume 49, Bulletin 174, January 2016.
SR – West[iii]	2015	2014	Rayer S. and Y. Wang. 2015. *Projections of Florida Population by County, 2015–2040, with Estimates for 2014.* UF/BEBR, Florida Population Studies. Volume 48, Bulletin 171.
SWFWMD (except CFWI)[iv]	2017	2016	Rayer, S. and Y. Wang. 2017. *Projections of Florida Population by County, 2020-2040, with Estimates for 2016*. UF/BEBR, Florida Population Studies, Volume 50, Bulletin 177.
SF – LKB	2018	2017	Rayer, S. and Y. Wang. 2018. *Projections of Florida Population by County, 2020-2045, with Estimates for 2017*. UF/BEBR, Florida Population Studies Bulletin 180.
SF – UEC	2014	2013	BEBR. 2014. *Projections of Florida Population by County, 2015-2040, with Estimates for 2013*. UF/BEBR, Florida Population Studies, Volume 47, Bulletin 168.
SF – LEC	2017	2016	Rayer, S. and Y. Wang. 2017. *Projections of Florida Population by County, 2020-2040, with Estimates for 2016*. UF/BEBR, Florida Population Studies, Volume 50, Bulletin 177.
SF – LWC	2015	2014	Rayer S. and Y. Wang. 2015. *Projections of Florida Population by County, 2015–2040, with Estimates for 2014.* UF/BEBR, Florida Population Studies. Volume 48, Bulletin 171.
NFRWSP	2015	2014	Rayer S. and Y. Wang. 2015. *Projections of Florida Population by County, 2015–2040, with Estimates for 2014.* UF/BEBR, Florida Population Studies. Volume 48, Bulletin 171.
CFWI	2017	2016	BEBR. 2017. Central Florida Water Initiative Small Area Estimates and Projections. Prepared for the Central Florida Water Initiative, under contract to Southwest Florida Water Management District. Agreement 17UN0000448. UF/BEBR, Gainesville, FL.

[i] For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.
[ii] As noted in 2018 WSA, incorporated by reference.
[iii] The Water Supply Assessment references the following publication: "Smith, S.K. 2015. *Projections of Florida Population by County, 2015 – 2040. Volume 48, Bulletin 171.* BEBR, University of Florida. Gainesville, FL." However, Volume 48, Bulletin 171, is co-authored by Rayer S. and Y. Wang, as referenced in the table above.
[iv] Incomplete reference in the RWSP's draft (available for public review in April).

Population in the Counties Split Between WMDs

Six counties are split between WMD jurisdictions that follow different schedules for WSAs/RWSPs updates.[380] Given the stacked schedule of WSAs/RWSPs development, the sum of the populations used by the different WMDs may not equal the officially published county total.

[379] EDR. 2017. Demographic Estimating Conference Executive Summary. December 5, 2017. Available online at: http://edr.state.fl.us/Content/conferences/population/archives/171205demographic.pdf (Accessed January 2021.)
[380] These are Jefferson (NWFWMD and SRWMD), Levy (SRWMD and SWFWMD), Lake (SWFWMD and SJRWMD, also in CFWI), Highlands (SWFWMD and SFWMD), Charlotte (SWFWMD and SFWMD), and Okeechobee (SFWMD and SJRWMD). Note that Orange, Osceola, and Polk counties are also split between two WMDs; however, the counties are part of the CFWI, where the WMDs collaborate on RWSP development. The counties split between the SJRWMD and SRWMD are also modeled collaboratively by the WMDs, and they are not included in the listing of the "split" counties.

Only the NWFWMD's WSA discusses the topic of population projections for such a split county. The WSA document states that the Jefferson County population estimates in the NWFWMD were coordinated and compared with the SRWMD estimated share of Jefferson County. The combined total of both WMDs population estimates and projections is within about two percent of the BEBR's Jefferson County estimates and forecasts. The discussion of the population in split counties was not found for the other WSAs/RWSPs.

Methods for Allocating BEBR County Population to PS Service Areas

Based on DEP et al. (2019, p. 4), the base year is "the year that acts as the starting point for water demand projections and is based on the best available data of reported and estimated water use. Water use in the base year is not a projection, but rather actual or estimated use. This is typically between one and five years prior to the first year of the planning period." To relate BEBR's county population estimates to the population in the utility service areas in the base year, the WMDs generally use data provided by water utilities, county-level estimates and, in the case of the SFWMD, Traffic Analysis Zone (TAZs) data. Utilities with permitted quantities of 0.1 mgd are required to report population and submit service area information.[381] These data can be supplemented with the Basic Facility Report information submitted to the DEP, district Customer Use Survey reports, comparison of PS service area maps and census block population, and other data. The domestic self-supply portion is then estimated as a difference between the total county population and population served by water utilities.

The methods used to project the population for each utility service area differ among the WMDs, in part, due to the varying availability of data. The SRWMD and SJRWMD apply a percent-share method that assumes that the county population's split among utility service areas remains the same in all years of the planning horizon. The SWFWMD relies on a model to project the development parcel-by-parcel. Most regions in the SFWMD utilize projections developed by the local planning councils. All the methods are summarized in Table A.2.5.

[See table on following page]

[381] Based on the description in the SWFWMD's RWSP.

Table A.2.5 Population Projection Methods

Region	Method
NWFWMD	**BEBR's low, medium, and high population projections for incorporated areas** are used if a PS service area has a significant correlation with a BEBR-identified incorporated area. If a service area is in an unincorporated area of a county, aerial photography and land use review, the municipal population shares of total county populations, historical trends, and data submitted by local entities are analyzed. All of the above are considered to select one set of best-fit growth rates (low to high) for each PS utility for 2020-2040. BEBR medium projections are the default selection unless the analyses and utility-provided data support an alternative growth rate. If a negative growth rate appears to be most statistically appropriate, a no-growth (0.0%) scenario is used. BEBR county estimates and medium projections, seasonally adjusted, control the total county population projections.
SRWMD and NFRWSP	The **percent-share method** is utilized. First, a percentage of the 2010 county population for each public supply and small public supply system is calculated. These respective percentages are assumed to remain constant in the future, and they are used to allocate the BEBR's projected population to utility service areas. The WMDs cross-verified the estimates against a "build-out" (i.e., maximum) population for each public supply system using current land use and zoning information. Also, 1% per year conversion of domestic-self-supply to public supply systems is added to viable public supply systems in selected counties based on discussions with stakeholders. Note that the SJRWMD is developing a Population Distribution Model, which will distribute the population to the parcel level using growth drivers and growth inhibitors.
SWFWMD (except CFWI)	The **Growth Drivers Model** is used to forecast the population increase parcel by parcel. The Model uses logistic regression to predict a parcel's likelihood of being developed based on various parcel characteristics, such as proximity to roads and existing developments. The Model predictions are supplemented by the analysis of historical development trends and the consideration of physical constraints (e.g., wetlands). The projections are controlled by (a) the current population (low bound) and (b) a county-wide buildout model developed by GIS Associates (the maximum population growth at the parcel level). The buildout model utilizes future land use data from the counties' comprehensive plans and medium density data from recent 20-year development in incorporated places.
SF – LKB	The **county growth rates from BEBR's medium projections** are applied to each PWS service area and DSS area.
SF – UEC	A **general linear trend based on BEBR projections** is used. Maps of service areas for the base year and 2040 were developed using data from water supply facilities' work plans, growth plans, and other information. Five-year incremental projections for each PS utility were based on a general linear interpolation of the population change from the 2010 census, 2013 estimates to 2040 projections (BEBR 2014), keeping each county controlled to the medium BEBR projections.
SF – LEC and SF – LWC	**Projections published by county planning departments or metropolitan planning organizations** are utilized. These projections allocate BEBR medium county projections to hundreds of traffic analysis zones (TAZs). Local planning departments consider local Comprehensive Plans, transportation infrastructure, remaining developable land, employment opportunities, and local development objectives to establish population growth rates for different areas. In the SF – LEC, the SFWMD added to these projections the forecast for group quarter population (such as correctional facilities, nursing homes, college dorms, military barracks, group homes, missions, and shelters). Group quarter populations were assumed to grow at the countywide population growth rate. After distributing the projected TAZ populations to all PWS service areas and DSS areas in the SF – LEC, the 2040 county population totals were less than the BEBR's totals. These discrepancies resulted from inconsistency in the publication date and the source data used for the TAZ projections developed by local planning departments. Adjustments to the PWS service area and the DSS population totals were made proportional to their unadjusted 2040 share of the total county population.
CFWI	This region relies on **BEBR's Geospatial Small-Area Population and Forecasting Model**. BEBR estimated parcel-level historical (2010-2016) permanent residential population, future permanent residential population, and a build-out scenario as a part of this Model. The WMDs then aggregated the parcel level population to each PS service area.

Domestic Self-Supply (DSS) Water Use

DSS category includes: (a) small public supply systems (*i.e.*, those smaller than 0.1 mgd in the permitted capacity or pumpage), and (b) residential dwellings systems that are provided water from a dedicated, on-site well and are not connected to a central utility[382] (SWFWMD 2020). Note that the SWFWMD combines PS, DSS, and residential irrigation wells into one category, which is then split between PS and DSS by the DEP for the statewide summary developed for each use category.

For small public supply systems, the forecasting methods follow those discussed above for large systems included in PS. For residential dwellings not connected to a central utility, a "unit water demand" method is also used, with the per capita water use multiplied by the estimated population:

Figure A.2.2 Total DSS Water use in a County Equation

In all the WMDs, the domestic self-supplied population is determined as the difference between the BEBR medium county population and the county population served by the public supply.[383] This approach is used for the base year estimate and the 5-year interval projections in the WMDs' planning horizons.

The per capita water use is assumed to be equal to the county median or average public supply per-capita usage rates (adjusted to account for PS uses not relevant to DSS, as described below). If county-specific information is unavailable, then the estimates from other areas are applied. For example, districtwide average public supply per-capita usage rates can be used. Another example is the SRWMD which utilizes the county averages estimated by the SJRWMD (for counties split between the WMDs) or SJRWMD districtwide averages. The NWFWMD relies on the USGS' estimates for the DSS rates. The period used to calculate the per capita differs among the regions, corresponding to the differences observed in the PS category.

Note that the PS per capita rate includes all types of uses served by the public supply, including household use, commercial use, and others. Many of the uses are not relevant to DSS, and therefore, the *residential* per-capita rate is estimated for the PS sector and then it is applied to DSS. Residential per-capita, also referred to as *household water use rate*, is generally based on the

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[382] This definition is based on that in SWFWMD (2020).
Reference:
SWFWMD. 2020. 2020 Regional Water Supply Plan: Northern Planning Region. Public Review Draft. April, 2020.
[383] Note that in the NWFWMD, all population estimates (total county, public supply, and DSS) are seasonally adjusted.

residential water use allocation from relevant consumptive use permits (CUPs) or water use permits (WUPs).[384]

In the SFWMD, many of the PS utilities rely on brackish groundwater sources characterized by significant losses in the treatment process. Therefore, the SFWMD excludes the treatment losses from calculating per capita use to be applied for DSS. Similarly, the SWFWMD also excludes treatment losses (see Table A.2.6).

Table A.2.6 PS Per Capita Rate Calculations Used in DSS Projections

Region*	Per capita rate	Exclude CII use from PS per capita?	Comments
NW – II NW – Oth	2010 districtwide average domestic per capita use rates from USGS**	Yes	-
SR – West	5-year county-wide average domestic water use, based on data from PS	Yes	-
SWFWMD (excluding CFWI)	5-year countywide residential per capita estimated by SWFWMD from utilities' data	Yes	Exclude treatment losses
SF – LKB	5-year countywide median (with some places mentioning average) use rates for PS populations	No	Finished water use only (*i.e.,* exclude treatment losses)
SF – UEC	4-year countywide PS weighted average (statewide average from USGS)	No	Finished water use only (*i.e.*, exclude treatment losses)
SF – LEC	5-year median PS use rate	No	Finished water use only (*i.e.*, exclude treatment losses)
SF – LWC	5-year median usage rates from each county's PWS population (2010 statewide average from USGS is used for Charlotte County)	No	Finished water use only (*i.e.*, exclude treatment losses)
NFRWSP	5-year county-wide average from PS and SPSS	Yes	-
CFWI	5-year county-wide average from PS and SPSS	Yes	-

* For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.
** During preparation of the 2018 WSA, available data was insufficient to generate residential per capita rate(s). Therefore, the NWFWMD relied on the USGS for DSS rates.

The SWFWMD also estimates residential irrigation well water use in the DSS category. The estimated number of wells less than 5 inches in diameter is estimated from the SWFWMD well construction GIS map layer and cross-verified with utility billing data. This number was multiplied by 332 gallons per day to estimate the baseline water use. The projected number of residential irrigation wells then follows the applicable county population growth rate.

384 *Consumptive use permits*: Unless otherwise exempt, all water withdrawals in Florida are regulated through a system of consumptive use/water use permits (CUPs/WUPs) granted by the WMDs. According to section 373.223, Florida Statutes, each permit applicant must establish that the proposed use of water is reasonable-beneficial, consistent with the public interest, and will not interfere with any existing legal uses. In addition, withdrawals may not be harmful to the water resources in the area. The information available for individual CUP/WUP holders differs among the WMDs. For example, the information regarding residential water use allocation is included in CUPs issued to public water suppliers in the SJRWMD, but not in the SRWMD. In some RWSPs/WSAs, the domestic self-supplied per-capita use is estimated from the per-capita use of large public supply utilities only (*i.e.*, utilities with average annual permitted quantities greater than 0.1 mgd). In other regions, the analysis also includes smaller public supply utilities.

The other WMDs either include residential irrigation well water use as part of recreational-landscape irrigation (NWFWMD) or do not account for this use (SFWMD, SJRWMD, and SRWMD). While it is important to improve the estimation methods for residential well water use, this use is relatively small on a districtwide or statewide level. For example, in the SWFWMD (including the CFWI portion), the total residential irrigation well withdrawals are estimated at 31.22 mgd in 2015, which is 6.22% of the aggregate water use in PS (*i.e.*, 501.53 mgd); however, there are sub-regions where more significant volumes of water are withdrawn from residential irrigation wells that should be taken into consideration.

Landscape/Recreational (L/R) Water Use

The Landscape/Recreational (L/R) category includes such users as self-supplied golf courses, parks (including water parks), and commercial center irrigation (DEP et al. 2019). The WMDs are generally consistent in their approaches to estimating and projecting water use in this category. However, some differences among the WMDs are also observed. Specifically, NWFWMD is the only WMD that includes residential irrigation wells in this category.[385] In some regions, golf course irrigation accounts for a large proportion of the L/R water use, necessitating separate modeling. For golf courses that use reclaimed water, data limitations preclude the NWFWMD from projecting the quantity of reclaimed water used.[386] Finally, like the PS and DSS use calculations, for L/R, the WMDs rely on the BEBR-medium population projections published in different years and not equal to the most current officially adopted population estimates and projections. Below, the methods used by the WMDs are discussed in more detail.

Base Year Total Water Use

The WMDs use available data to estimate the total base year water use, as summarized in Table A.2.7. Note that some L/R users are not required to report their water use because they withdraw small amounts of water. In addition, some of the WMDs separately estimate the irrigation for golf courses, while others focus on the category's total water use.

[See table on following page]

[385] Note that the SWFWMD accounts for this in DSS, while the other WMDs do not account for this use at all.

[386] These courses are, however, still considered in the analysis.

Table A.2.7 Base Year Water Use Methods

Region	***Estimation Methods***
NWFWMD	Base year water use is estimated from *reported and audited pumpage. Additional calculations* are used for individual WUP (IWUP) holders with no water use reporting requirements, and the wells with a general WUP (GWUP). Historical data for IWUPs (with reporting requirements) are used to determine that water use averaged a 60% share. This share of actual water use to the permitted use is applied to permitted allocation for IWUPs without reporting requirements. Overall, water use is estimated in aggregate at the county level.
SRWMD and NFRWSP	A historic average gallon per capita per day rate for each county is estimated using the Districts' recreational-landscape irrigation data and BEBR's county population for 2010-2014.
SWFWMD (except CFWI)	Historical metered and estimated water use is considered. The average for 2011-2015 is calculated and used as the baseline.
SFWMD (except CFWI)	The acreage is estimated using the SFWMD's Water Use Regulatory Database. Most permits in the database contain information that allows for the disaggregation of landscape and golf course acres. For those that do not, golf course data from the University of Florida GeoPlan Center provided estimates of all active golf courses (at least in the LEC Planning Area). The water use is calculated using the AFSIRS model.
CFWI	The county-specific L/R average gallon per capita per day (gpcd) was calculated from the L/R average water use for 2011-2015, obtained from the ECFTX calibration dataset and the BEBR estimates of county population for 2011-2015 (BEBR, 2017).

Water Use Projections

The methods used to project future water use are summarized in Table A.2.8. In the areas where golf course irrigation is extensive, this use is modeled separately. It is assumed to remain steady or grow at a slow rate (either as suggested by the industry and local planning councils or as estimated using a golf course irrigation model). All non-golf demand is assumed to grow at the rate of increase for the BEBR-medium population. Note that the WMDs rely on the BEBR-medium population projections published in different years (see discussion in the PS description).

Table A.2.8 Methods Used to Project L/R Water Use

Method	**NWFWMD**	**SRWMD and NFRWSP**	**CFWI**	**SWFWMD (excluding CFWI)**		**SF – LKB**		**SF – UEC**		**SF – LEC**		**SF – LWC**	
				non-golf	**golf**	**non-golf**	**golf**	**non-golf**	**golf**	**non-golf**	**golf**	**non-golf**	**golf**
Water use is calculated as a product of the base year water use and BEBR Medium population growth rates.	X	X	X	X		X		X		X		X	
Water use is assumed to remain steady.					X		X				X		
Water use is based on a demand model for an 18-hole golf course, combined with the previous year's pumpage rate estimates.					X*								
Water use is assumed to grow at a slow rate as suggested by the industry and local planning estimates.									X				X

* In the SW – TB region only.

Residential Irrigation Wells
Only NWFWMD accounts for residential irrigation wells in the L/R category. In part, this is due to the location and quantity of residential irrigation wells in areas of resource concern. SWFWMD accounts for this in the PS category, while the other WMDs do not account for this use at all.

In NWFWMD, nearly all wells covered by the general WUPs with well construction permits are small (primarily 2 inches to 4 inches, but up to 6 inches diameter), and they are intended for residential outdoor irrigation. Non-residential general WUP wells include a small number of wells used for golf courses, aesthetics, or water-based recreation purposes. The analysis supporting the North Florida-Southeast Georgia (NFSEG) groundwater model produced a districtwide, weighted average, outdoor water use for residential parcels of 76 gallons per day (gpd). The gpd was multiplied by the number of wells as follows:

Estimated Water Use (ADR) = No. of Wells x 76 gpd

This analysis is done for the base year only. The base year use is projected to grow by the same trend factor as the other uses described below.

Reclaimed Water Use for Golf Course Irrigation
Supplying reclaimed water for golf course irrigation blurs the category's definition (which was initially identified as "self-supply"). In the NWFWMD, the L/R water demand that is met with reclaimed water in the base year is limited, only marginally reducing the total water use in the category. In the SFWMD, the substitution of groundwater by reclaimed water is explicitly modeled. Specifically, in the SF-LEC, data from DEP's 2016 Reuse Inventory report are compared to permitted areas to determine the portion of reclaimed water used under the L/R category. The anticipated share of future L/R use met with reclaimed water is calculated from the historical relationship of expanding reclaimed water supply and population growth.[387]

Commercial/Industrial/Institutional (CII) Water Use

The category comprises all reporting commercial, industrial, and institutional (CII) self-supplied permittees (including mining and dewatering uses). Only consumptive uses are included (*i.e.*, recycled surface water and non-consumptive uses excluded). The base year water use is estimated from the CUPs/WUPs information (such as reported pumpage). To forecast the future water use, three separate water use projection methods are used by the WMDs. The first method is to request the projections from the permittees directly. In the NWFWMD, over 40% of CII permittees responded to an outreach survey request sent by the NWFWMD about the future demand projections. These responses were incorporated into the WSA and RWSP unless the projections exceeded the permitted allocation or other anomalies in the provided responses were observed. Historical water use, water use trends, and share of water use to the permitted allocations were also reviewed and considered to determine total future demands in the category.

The second method is used by the SWFWMD (excluding the portion in the CFWI). The district determined that the water use is generally correlated with the county one-year cross-regional

[387] As stated in the SF – LEC RWSP, the L/R use met with reclaimed water could be much larger if ocean outfall targets from the Ocean Outfall Law are met by 2025. See § 403.086(10), Fla. Stat.

product (GRP) growth rate from Woods and Poole (2017). The only exception is Mosaic water use, for which the company provided growth projections for its processing facilities and mining operations.

The SFWMD, SJRWMD, and SRWMD employ the third method, and it is also applied for the CFWI RWSP. CII water use is assumed to follow population trends. For example, in the CFWI, NFRWSP, and SRWMD, the county-specific five-year average gallon per capita per day is based on the USGS data or the calibration dataset from the East-Central Florida Transient (ECFTX) groundwater model. This per capita rate is then multiplied by the BEBR-medium population projection growth rate. Similar to the categories discussed above, the BEBR projections published in different years were used in different regions.

Power Generation (PG) Water Use

In all the WMDs, this category includes water used for power generation facilities not supplied by the PS (primarily, thermoelectric power). For thermoelectric power generation, net water use for thermoelectric power generation may include on-site potable uses, as well as water loss due to evaporation, blowdown, drift, and leakages. Note that fresh surface water or brackish water is used for recirculation and cooling, and since this water is then returned to its source, it is not, for planning purposes, considered a consumptive use.

Water use projection methods differed among the WMDs. The water use in the sector is small, however, and therefore, the difference in the methods does not significantly alter the overall statewide water demand projections. In NWFWMD and SFWMD, water use projections were established in consultation with permittees. The projections were requested directly from the permittees in NWFWMD, and nearly all of them responded. The responses were supplemented with data from electric utility ten-year site plans (submitted to the Florida Public Service Commission) and historical water use. In SFWMD, the water use forecast is established in consultation with the power generation facilities owners and managers (such as Florida Power and Light).

In turn, in SRWMD and NFRWSP, the forecasts are based on the ten-year site plans and the BEBR population projections. For each PG facility, its 10-year site plan was reviewed to identify any planned expansions. Water use beyond the 10-year site plan horizon was projected using the BEBR medium population growth rates and the average daily gallon per megawatt use estimated for 2010-2014.

Finally, in the SWFWMD[388] and CFWI, water use forecasts are based on 10-year site plans and electricity demand projections. First, historical water use and the 10-year site plan for each PG facility were reviewed. Next, a 5-year average for water use per megawatt was calculated (in some cases, only the last year data were used). This value is then applied to the projected megawatt production reported in the 10-year site plan for each PG facility. This forecast is extended beyond the ten years by considering the 20-year (2008-2027) average customer growth rate and then

[388] In the RWSP for the SW – TB, it is discussed that water use forecasts are based on the GRP growth rate. However, discussions with SWFWMD staff indicated that all the RWSPs rely on a consistent methodology. Therefore, EDR does not identify the potential difference in the method for the SW – TB region.

forecasting the customers through 2040. The number of customers was multiplied by the megawatt use per customer and the water use per megawatt to project future water use.

Water Demand for Agriculture (AG)

For agriculture, section 570.93, Florida Statutes, enacted in 2013, directs DACS to establish an agricultural water supply planning program that includes "the development of data indicative of future agricultural water supply demands," based on at least a 20-year planning period. Section 373.709(2)(a), Florida Statutes, requires the WMDs to "consider the data indicative of future water supply demands provided by the Department of Agriculture and Consumer Services." Any adjustments or deviations from the projections published by DACS "must be fully described, and the original data must be presented along with the adjusted data." DACS's Florida Statewide Agricultural Irrigation Demand (FSAID) geodatabase provides the agricultural acreage and water use projections for each WMD and planning region. This information is updated annually.[389]

For forecast purposes, the agricultural self-supplied use is generally split by the WMDs into agricultural irrigation and other water applications (*e.g.*, livestock watering, frost-freeze protection, and aquaculture). While all the WMDs utilize acreage or water use information from the FSAID, the FSAID versions and information type differ among the WMDs, as summarized in Table A.2.9.

[See table on following page]

[389] The Balmoral Group. 2019. Florida Statewide Agricultural Irrigation Demand: Estimated Agricultural Water Demand, 2017 – 2040. Produced for the Florida Department of Agriculture and Consumer Services. The Balmoral Group, 35pp. Available online at: https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Water-Supply-Planning . (Accessed December 2020.)

Table A.2.9 FSAID Version and Information Type Used in WMDs' WSAs/RWSPs

Region*	FSAID			Data used by WMDs to supplement FSAID
	Version	Year of Release**	Information Used in WSA/RWSP	
NWFWMD	IV	2017	Total AG water use forecast	None
SR – West	IV	2017	Total AG water use forecast	Agricultural water use in 2010 (*i.e.*, base year) is based on FSAID-II
NFRWSP	II	2015	Total AG water use forecast	None
CFWI	IV	2017	Total AG water use forecast	North Ranch Sector Plan information in Osceola County
SWFWMD	V	2018	AG acreage; Projected trends in non-irrigation AG water use	Per-acre irrigation rate was calculated by SWFWMD (often on the permit-by-permit basis to account for crop rotations and other factors). FSAID's aquaculture and livestock base year water use was adjusted using metered water use data for individual permits.
SF – LKB	V	2018	AG acreage (adjusted with local data); Water demand projections for livestock and aquaculture production	AFSIRS irrigation rate per acre for individual crops was used to forecast irrigation water demand.
SF – UEC	II	2015	FSAID is used as a reference only. Acreage and demand projections already completed prior to FSAID	Agricultural acreage projections by crop type were prepared by SFWMD using the land use maps (developed by the WMD in 2013), historical data, marketing information, etc. These projections run to 2040 in 5-year increments. AFSIRS model was utilized to estimate per-acre irrigation rates.
SF – LEC	IV	2017	AG acreage (adjusted with local data); Water demand projections for livestock and aquaculture production	AFSIRS irrigation rate per acre for individual crops was used to forecast irrigation water demand.
SF – LWC	III	2016	AG acreage (adjusted with local data); Water demand projections for livestock and aquaculture production	AFSIRS irrigation rate per acre for individual crops was used to forecast irrigation water demand.

* For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.
** The water use data used in the development/calibration of FSAID can be one or two years older than the FSAID release date.

A.3 Differences in 2019 and 2020 WMDs' Water Demand Projections

Projected statewide water demand is lower than that discussed in the DEP and EDR reports last year (DEP 2020a, EDR 2020[390]). Specifically, for 2035, statewide WMDs' water demand projections were at 7,549.69 mgd last year compared with 7,181.07 mgd reported this year (DEP 2020a). Despite a modestly higher population projection for 2035, the overall water use projections declined. Major causes for this reduction include:

- *A downward trend in per capita water use has been observed in recent years*. The latest demand projections for water supply planning regions with updated RWSPs rely on more recent average per capita water use estimates, leading to the demand projections' downward revisions.

- *The revised 2015 water use estimates indicated reduced water demand*. The year 2015 is the base year for many RWSPs. The reduction in the base year demand estimates leads to a decrease in the demand for the following years, thus reducing the statewide water demand in DEP (2020a) compared with DEP (2019b).

[390] EDR. 2020. Annual Assessment of Florida Water Resources and Conservation Lands – 2020 Edition available at: http://edr.state.fl.us/Content/natural-resources/LandandWaterAnnualAssessment_2020Edition.pdf.

- *Agricultural water use estimates and projections were updated for the water supply planning regions where the RWSPs were updated in 2020*. Specifically, in the SWFWMD, agricultural water use projections are significantly lower than those developed previously.

- *Projected demand for the landscape/recreational irrigation is lower in DEP (2020a) than in DEP (2019)*. The difference is especially relevant for the SWFWMD, where golf course irrigation demand has been updated and is now assumed to be flat, reducing the total L/R projections.

- *Technological changes have led to reductions in water use in energy production*. This trend is observed on the national level, and it likely applies on the state level as well.[391]

When changes in methodology are accompanied by updated data, the impact on the projection is difficult to quantify, even when the change is a forecasting improvement. For CFWI's recent RWSP update, the projection methods were made uniform across the three participating WMDs. In turn, SWFWMD improved its methodology used to allocate county populations to utility service areas. Finally, the SFWMD changed the water use projection methods for the CII, AG, and L/R categories. In the past, SFWMD developed the agricultural acreage projections internally, while for the updated RSWPs, the SFWMD used FSAID acreage projections.

A.4 Conservation Potential

Definitions

Water conservation is defined as "the efficient use of water. Water conservation does not include water supply source switching, which, though valuable in reducing the use of traditional water supplies, does not improve the efficiency of use" (DEP 2019, p. 5). The conservation projection is "the projected conservation savings of all water users or a subset of water users that could be achieved during the planning horizon. Districts develop this projection using the best available information and methodologies … Districts may present these quantities as a range, with the low end of the range being likely to be achieved and the high end of the range being the conservation potential or some portion of it" (DEP 2019, p. 7).

Note that the WMDs emphasize that potential conservation should not be directly removed from water demand estimates. The actual savings are based on endorsement and implementation of conservation measures by public supply utilities and other users and are highly contingent on specific user participation rates. Nevertheless, for this analysis, EDR subtracted the conservation projections from the demand projections to evaluate the potential impact of the water use efficiency improvements and to recognize the conservation improvements evident in the historical data. EDR acknowledges that conservation investments, potentially substantial in magnitude, are likely needed for these efficiency improvements to be realized.

[391] For example, see the presentation by Melissa Harris, USGS. Thermoelectric Water Use. USGS WUDR Open Forum May 27, 2020. Available online at: https://water.usgs.gov/wausp/wudr/wu-forum-files/Harris-USGS-Thermoelectric-Water-Use-20200527.mp4 (Accessed January 2021.)

2020-2040 Water Use Forecast with Conservation

DEP (2020a) summarizes the WMDs' conservation projections for the WMDs' current planning period. Since the planning period differs among the WMDs, no consistent statewide conservation projection is available for 2020-2040. The conservation potential is also presented as the total for the planning period, with no specific dates for the use reduction.

To derive a statewide 2020-2040 water use forecast that accounts for the conservation potential, EDR first considered the regions planning for 2020-2040. For these regions, the alternative 2040 water use forecast was estimated as the difference between the 2040 water use and conservation projections. For 2020, 2025, 2030, and 2035, the regional water use forecast with conservation was estimated by interpolating the 2015 water demand (*i.e.*, the base year use) and the 2040 forecast with conservation (Table A.4.1).

Table A.4.1 Water Use Forecast with Conservation (Regions with 2020-2040 Planning Horizons)

Region	Data from DEP (2020a)			EDR Calculations (mgd)				
	Base Year Water Use (mgd)	Projected 2040 Water Use	Conservation Projection*	2020	2025	2030	2035	2040
NW – II	69.74	94.88	6.00	73.56	77.39	81.22	85.05	88.88
NW – Oth	254.16	311.90	3.80	264.95	275.74	286.52	297.31	308.10
SJR – CSEC	353.17	427.87	38.22	360.47	367.76	375.06	382.35	389.65
SW – N**	131.08	181.73	14.08	138.39	145.71	153.02	160.33	167.65
SW – TB	385.71	461.85	44.97	391.95	398.18	404.41	410.65	416.88
SW – H**	94.91	89.15	8.30	92.10	89.28	86.47	83.66	80.85
SW – S	234.95	279.33	21.22	239.58	244.21	248.85	253.48	258.11
SF – LKB	245.29	257.49	0.00	247.73	250.17	252.61	255.05	257.49
SF – UEC	272.95	354.68	14.10	286.48	300.00	313.53	327.05	340.58
SF – LEC	1,739.61	2,006.54	102.40	1772.52	1805.42	1838.33	1871.23	1904.14
SF – LWC	980.33	1,210.68	26.30	1021.14	1061.95	1102.76	1143.57	1184.38
CFWI	667.12	907.59	56.00	704.01	740.91	777.80	814.70	851.59

* The total of "Conservation Projection" and "Additional Conservation Projection" in DEP (2020a). ** Portion of the region outside the CFWI.

Next, for the two regions that use the 2015-2035 planning period (*i.e.*, SR – West and NFRWSP), EDR derived the alternative 2035 water use by subtracting the conservation projections from the 2035 water use reported in DEP (2020a). For 2015, 2020, 2025, and 2030, the regional water use was then estimated by interpolating between the base year's water use (*i.e.*, 2010) and the alternative 2035 forecast. Finally, the 2040 water use was extrapolated from the 2010-2035 estimated use with conservation (Table A.4.2).

Table A.4.2 Water Use Forecast with Conservation (Regions with 2015-2035 Planning Horizons)

Region	Data from DEP (2020a)			EDR Calculations (mgd)					
	Base Year Water Use (mgd)	Projected 2040 Water Use	Conservation Projection*	2015	2020	2025	2030	2035	2040
SR – West	97.96	122.35	10.90	100.66	103.36	106.05	108.75	111.45	114.15
NFRWSP	550.75	667.47	53.00	563.49	576.24	588.98	601.73	614.47	627.21

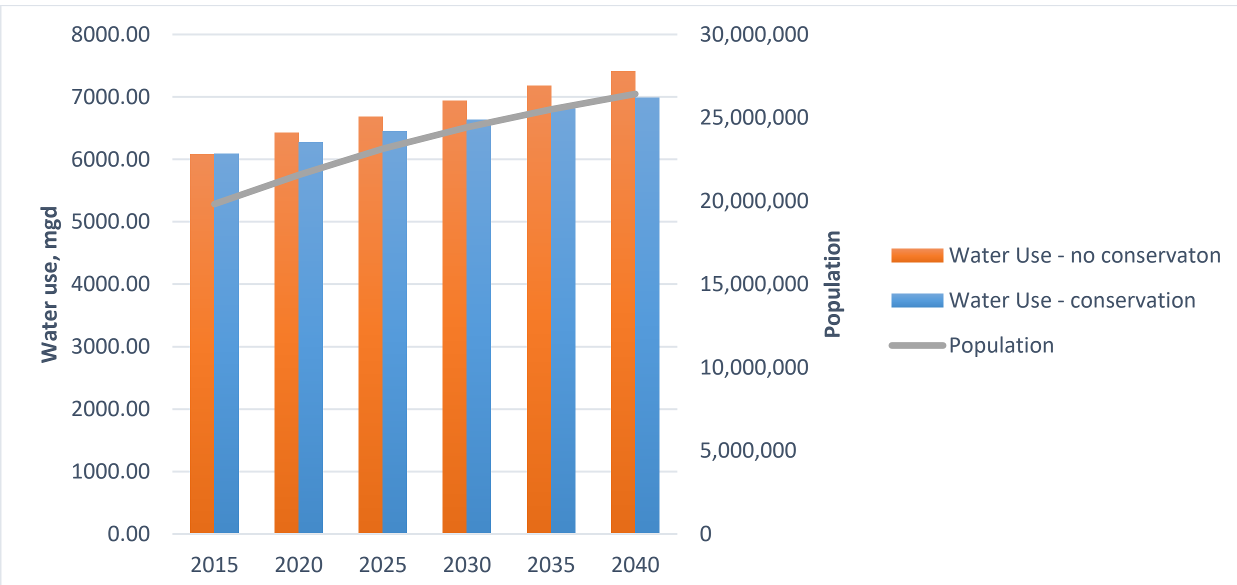
* The total of "Conservation Projection" and "Additional Conservation Projection" in DEP (2019)

The statewide water demand forecasts for the two scenarios – with and without accounting for the conservation potential – are shown in Table A.4.3 and Figure A.4.1. By 2040, conservation can potentially reduce statewide water use by 418.14 mgd. This volume is higher than the total conservation potential reported in DEP (2020a) since EDR estimated additional water conservation that may be available in the SR – West and NFRWSP in 2035-2040 (as described above).

Table A.4.3 Comparison of the Statewide Water Use Forecasts

Scenario	2020	2025	2030	2035	2040	2020-2040 difference	
						mgd	%
With conservation	6272.46	6451.76	6631.06	6810.36	6989.66	717.20	11.43%
No conservation	6426.62	6686.29	6936.25	7181.07	7407.80	981.18	15.27%

Figure A.4.1 Statewide Water Demand Projections With and Without Conservation



A.5 Drought-Year Water Use Estimates

This appendix summarizes EDR's calculations of water use given a scenario of recurring droughts. The calculations are based on the WMDs' projections of drought demand for the last year of the WMDs' water supply planning horizon. For most of the WMD's water supply planning regions, this appendix follows a similar format. First, a table with each WMD's projections is presented. The projections are used to calculate the percent increase in water use during a drought year, focusing on the planning horizon's last year. In the second table, this percentage and each WMD's water use estimates and projections for the baseline scenario are utilized to calculate the drought water use for the 5-year periods. At the end of the appendix, EDR summarizes the WMDs' methods to account for drought in their water use projections.

NWFWMD

Table A.5.1 Projections of 2040 Water Use

Region	Baseline Scenario (Average Rainfall): Water Use (mgd)*	Drought Scenario	
		Water Use (mgd)	% (compared with the baseline scenario)
NWF-II	94.88	105.89	111.61%
NWF-Oth	311.90	345.07	110.63%
Total	406.78	450.96	110.86%

* Source: DEP (2020a).

Table A.5.2 Water Use Estimates and Projections for 2020-2040, Baseline and Drought Scenarios (mgd)

Region	Baseline Scenario (Data from DEP 2020a)					Drought Scenario (Using % increase from Table A.5.1)				
	2020	2025	2030	2035	2040	2020	2025	2030	2035	2040
NWF-II	76.88	82.25	87.03	91.19	94.88	85.80	91.80	97.12	101.77	105.89
NWF-Oth	273.72	287.12	296.92	304.58	311.90	302.83	317.65	328.49	336.97	345.07
Total	350.60	369.37	383.94	395.77	406.78	388.63	409.45	425.62	438.74	450.96

SRWMD: SR – West Water Supply Planning Region

Table A.5.3 Projections of 2035 Water Use

Region	Baseline Scenario (Average Rainfall): Water Use (mgd)*	Drought Scenario	
		Water Use (mgd)	% (compared with the baseline scenario)
SR — West	122.35	131.57	111.61%

* Source: DEP (2020a).

Table A.5.4 Water Use Estimates and Projections for 2020-2040, Baseline and Drought Scenarios (mgd)

Region	Average Demand (Data from DEP 2020a)					Demand during Drought (Using % increase from Table A.5.3)				
	2020	2025	2030	2035	2040*	2020	2025	2030	2035	2040
SR – West	106.53	110.92	116.69	122.35	127.54	114.78	119.51	125.73	131.83	137.42

* Calculated by EDR based on a linear trend of 2015-2035 data provided by the SRWMD.

SRWMD and SJRWMD: NFRWSP Planning Region

Table A.5.5 Projections of 2035 Water Use

Region	Baseline Scenario (Average Rainfall): Water Use (mgd)*	Drought Scenario	
		Water Use (mgd)	Water Use (mgd)
NFRWSP	667.47	722.38	108.23%

* Source: DEP (2020a).

Table A.5.6 Water Use Estimates and Projections for 2020-2040, Baseline and Drought Scenarios (mgd)

Use Category	Average Demand (Data from DEP 2020a)					Demand during Drought (Using % increase from Table A.5.5)				
	2020	2025	2030	2035	2040	2020	2025	2030	2035	2040
Total for NFRWSP	585.06	612.70	641.36	667.47	696.57*	633.19	663.10	694.12	722.38	*753.88*

* Calculated by EDR based on a linear trend of 2015-2035 data summarized in DEP (2020a).

SWFWMD: All Planning Regions

The SWFWMD provides drought demand estimates for each of the 5-year intervals in its planning horizon. However, some of the SWFWMD's regions are partially in the CFWI. Therefore, EDR calculated water use for the portions of the regions outside the CFWI. These calculations are described in the tables below.

Table A.5.7 Drought Water Use Estimates and Projections: SWFWMD Regions not in CFWI

Region	2015	2020	2025	2030	2035	2040
SW – TB	422.08	450.52	470.79	475.59	489.7	501.24
SW – S	286.62	297.54	307.69	320.17	328.19	335.32

Source: SWFWMD's RWSPs.

Table A.5.8 SWFWMD's Projections of 2040 Drought Water Use for the Regions Partially in CFWI

Region	Drought Water Use: Total for the region (mgd)*	Drought Water Use: Portion of the Region outside CFWI	
		Volume (Mgd)**	% of the total demand in the region
SW – N	202.54	201.81	99.64
SW – H	418.72	130.27	31.11

* Source: SWFWMD's RWSPs.
** Source: DEP (2020a).

Table A.5.9 EDR Calculations of Drought Water Use in SWFWMD's regions partially in CFWI

Region	2015	2020	2025	2030	2035	2040	Notes
SW – N	145.85	158.6	170.94	181.89	192.74	202.54	Source: SWFWMD's RWSPs
SW – N (excluding CFWI)	145.32	158.03	170.32	181.23	192.05	201.81	Drought use estimated or projected for SW – N by SWFWMD multiplied by 0.9964 (see Table A.5.8)
SW – H	383.14	397.05	400.99	417.09	420.04	418.72	Source: SWFWMD's RWSPs
SW – H (excluding CFWI)	119.20	123.53	124.75	129.76	130.68	130.27	Drought use estimated or projected for SW – H by SWFWMD multiplied by 0.3111 (see Table A.5.8)

Table A.5.10 Drought Water Use Projections: All SWFWMD Regions outside CFWI

Region	2015	2020	2025	2030	2035	2040
SW – N (excluding CFWI)*	145.32	158.03	170.32	181.23	192.05	201.81
SW – TB**	422.08	450.52	470.79	475.59	489.7	501.24
SW – H (excluding CFWI) *	119.20	123.53	124.75	129.76	130.68	130.27
SW – S**	286.62	297.54	307.69	320.17	328.19	335.32

* Source: SWFWMD's RWSPs
** See Table A.5.9.

SFWMD: All Planning Regions

SFWMD provides drought demand estimates for each 5-year interval in its planning horizon, as summarized in Table A.5.11 below.

Table A.5.11 SFWMD Projections of Drought Water Use

From RWSPs	2015	2020	2025	2030	2035	2040
SF – LKB	290.05	294.98	297.01	299.35	299.24	303.36
SF – UEC	383.89	389.88	402.21	414.45	445.91	481.59
SF – LEC	2,048.23	2,128.28	2,176.09	2,239.18	2,282.87	2,329.11
SF – LWC	1,108.81	1,163.39	1,209.49	1,252.45	1,312.74	1,356.84

Source: SFWMD's RWSPs.

SJRWM, SWFWMD, and SFWMD: CFWI Planning Region

Table A.5.12 Projections of 2040 Water Use

Region	Baseline Scenario (Average Rainfall): Water Use (mgd)*	Drought Scenario	
		Water Use (mgd)	% (compared with the baseline scenario)
CFWI	907.59	1,011.00	111.39%

* Source: DEP (2020a).

Table A.5.13 Water Use Estimates and Projections for 2020-2040, Baseline and Drought Scenarios (mgd)

Region	Average Demand (Data from DEP 2020a)					Demand during Drought (Using % increase from Table A.5.12)				
	2020	2025	2030	2035	2040	2020	2025	2030	2035	2040
CFWI	735.24	789.49	836.65	873.94	907.59	819.01	879.44	931.98	973.52	1,011.00

SJRWMD: SJR – CSEC Planning Region

Table A.5.14 Projections of 2040 Water Use

Region	Baseline Scenario (Average Rainfall): Water Use (mgd)*	Drought Scenario	
		Water Use (mgd)	% (compared with the baseline scenario)
SJR – CSEC	427.87	508.56	118.86%

** Source: DEP (2020a).

Table A.5.15 Water Use Estimates and Projections for 2020-2040, Baseline and Drought Scenarios (mgd)

Region	Baseline Scenario (Data from DEP 2020a)					Drought Scenario (Using % increase from Table A.5.14)				
	2020	2025	2030	2035	2040	2020	2025	2030	2035	2040
SJR – CSEC	383.47	395.62	406.11	416.72	427.87	455.79	470.23	482.70	495.31	508.56

Statewide Water Use Projections for a Scenario of Recurring Droughts

Table A.5.16 summarizes water use estimates and projections for the scenario of recurring droughts. EDR calculates these estimates using the WMDs' data reported in their WSAs/RWSPs. Calculation details are presented in the series of tables above.

Table A.5.16 Projected Statewide Water Use for a Scenario of Recurring Droughts (mgd)

Region	2020	2025	2030	2035	2040
NWFWMD	388.63	409.45	425.62	438.74	450.96
SR – West	114.56	119.28	125.48	131.57	137.15
NFRWSP	633.19	663.10	694.12	722.38	753.88
SJR – CSEC	455.79	470.23	482.70	495.31	508.56
SWFWMD (excluding CFWI)	1029.62	1073.56	1106.76	1140.62	1168.64
SFWMD (excluding CFWI)	3976.53	4084.8	4205.43	4340.76	4470.91
CFWI	819.01	879.44	931.98	973.52	1,011.00
Statewide Water Use – Drought Scenario	***7,417.32***	***7,699.86***	***7,972.09***	***8,242.89***	***8,501.10***
For comparison:					
Statewide Water Use – Baseline Scenario (average rainfall)	*6,426.62*	*6,686.29*	*6,936.25*	*7,181.07*	*7,407.80*
Drought Demand as % from Average Year Demand	*115.42%*	*115.16%*	*114.93%*	*114.79%*	*114.76%*

Methods Used by WMDs to Develop the Drought Water Use Projections

NWFWMD. Annual average streamflow and precipitation data were analyzed for over 30 years, with 2011 selected as a dry year compared to the average year of 2015. An increase in PS water usage during 2011 generated the drought event multiplier of 1.07, or a 7% increase over an average year. The same factors were also presumed to affect DSS. Therefore, the drought year projections for PS and DSS both use a 1.07 multiplier.

The FSAID IV generated dry year estimates by crop. The dry to average year ratio in northwest Florida ranges from a low of 1.17 for greenhouse/nursery crops to a high of 1.72 for hay. These estimates generated agricultural drought demand by the NWFWMD's planning regions. The AFSIRS simulations in the FSAID IV were accepted for the L/R category, with the estimated dry to average year multiplier for sod or perennial grass being 1.34. Finally, the water use in the CII and PG sectors is assumed to remain unchanged during droughts.[392]

SRWMD and SJRWMD.[393] Water demand in PS and DSS is assumed to increase by 6% given a 1-in-10 year drought, based on the recommendations of the 1-in-10-Year Drought Subcommittee of the Water Planning Coordination Group (WDPS 1998[394]). For AG drought demand, the FSAID II forecast was utilized. For the L/R category, a 1-in-10-year drought factor was developed for each county, using the highest year water use from 2006-2014 and the percent increase from the average 2006-2014 L/R water use. For example, if water use in 2007 was 5 percent higher than the 2006-2014 average, 5 percent was applied to the average 2035 water demand to project a 2035 1-in-10 year water demand. Finally, the 1-in-10-Year Drought Subcommittee of the Water Planning Coordination Group, as stated in their final report, determined that drought events do not significantly impact water use in the CII and PG self-supply categories.

SWFWMD (excluding CFWI). Water demand in PS and DSS was assumed to increase by 6% during a 1-in-10 drought year (WDPS 1998). For the L/R category, the 1-in-10-year drought water use factor was assumed to be 1.3 for golf course irrigation, and 1.26 for non-golf uses. Based on Water Planning Coordination Group (1998), drought events are not expected to impact the CII and PG self-supply use. Finally, for the AG irrigation drought-year demand, crop-specific scaling factors from the FSAID V forecast were derived and then applied for individual WUPs, accounting for the relevant surface water and groundwater split. Aquaculture and livestock water uses were assumed not to be affected by drought.

SFWMD (excluding CFWI). Drought water use for PS and DSS categories was calculated using drought demand factors for each county. For example, a 1.03 multiplier was utilized for Monroe County, and the coefficient of 1.10 was applied for Palm Beach and Broward Counties. In turn, for the AG and L/R categories, crop- and basin-specific irrigation rates from the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) were the basis for drought use forecast. AFSIRS is a water budget model for calculating irrigation demands that estimate demand based on basin-specific data. Finally, drought demand for CII and PG was assumed to be equal to that for the average year.

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[392] To clarify, the FSAID IV data was accepted and used in the 2018 WSA. Except for the sod/perennial grass 1.34 multiplier for the L/R category, the NWFWMD did not exercise any tools, applications, or calculations.

[393] For the SJR – CSEC, the information is not available. RWSP is expected to be available for public comments and review in Spring, 2021.

[394] WDPS. 1998. Final Report: 1-in-10-Year Drought Requirement in Florida's Water Supply Planning Process. SJRWMD, Palatka, FL.

CFWI. Water demand in PS and DSS was assumed to increase by 6% during a 1-in-10 drought year (WDPS 1998). For AG, the FSAID IV drought demand projections were utilized. For L/R, each county was characterized by a drought factor, using the highest year water use from 2011-2015 and the average use from the same period. Finally, drought demand for CII and PG was assumed to be equal to that for the average year.

The methods used by various WMDs are summarized in Table A.5.17 below.

Table A.5.17 Statewide Drought Demand Projection Method

Region	PS and DSS	AG	L/R	CII and PG
NWFWMD	1.07 multiplier	FSAID IV	Sod or perennial grass multiplier of 1.34 (from FSAID IV)	Water use is assumed to remain unchanged during the drought year
SRWMD and SJRWMD	1.06 multiplier	FSAID II	Drought factor was developed for each county, using the highest year water use from 2006-2014 and the percent increase from the average 2006-2014 L/R water use	
SWFWMD (except CFWI)	1.06 multiplier	FSAID V and WUP information	Drought water use factor was assumed to be 1.3 for golf course irrigation, and 1.26 for non-golf uses	
SFWMD (except CFWI)	County-specific drought demand multipliers	AFSIRS	AFSIRS	
CFWI	1.06 multiplier	FSAID IV	Drought factor was developed for each county, using the highest year water use from 2011-2015 and the percent increase from the average 2011-2015 L/R water use	

A.6 Methods Used by WMDs to Evaluate Existing Supplies

Different estimation methods are used to quantify "Estimated Existing Sources Available to Meet Future Demands," which makes it difficult to compare the values reported for the various supply planning regions. The following estimation methods to quantify "Estimated Existing Sources Available to Meet Future Demands" are utilized:[395]

- ***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.[396] 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 currently reported withdrawals of those permittees at the time of RWSP development.[397]

[395] For the SJR – CSEC region, the data are not available. The RWSP is expected to be available for public review in the spring of 2021.
[396] Potential water supplies from the surficial aquifer, seawater desalination, and reclaimed water are accounted for among the alternative water supply options.
[397] For each permittee, the SWFWMD evaluates the level of water use as either a five-year average of reported withdrawals or a single year estimate.

•***Permitted but unused water and unused DEP permitted treatment capacity (SFWMD)***: For the SFWMD planning regions, the public supply category is projected to grow, while the other water use categories, such as agricultural self-supply, are expected to remain relatively stable or to decline. Therefore, the assessment of the existing water supply focuses only on the sources available for public supply. To estimate "Existing Sources Available to Meet Future Demand," with the exception of the Upper Kissimmee Basin Planning Area which is included in the 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[398] and the permitted allocation or existing treatment capacity.[399]

•***Currently permitted water for public supply (NWFWMD)***: The NWFWMD uses the currently permitted volumes of water for public supply to estimate demand that can be met. This districtwide data is used in the DEP's annual metrics submission.

•***Hydrogeological computer models of planning-level groundwater withdrawal scenarios (CFWI and NFRWSP)***: Hydrogeologic computer models are used to examine groundwater withdrawal scenarios corresponding to the projected demands on the planning-region level for public supply (PS), domestic self-supply (DSS), commercial-industrial-institutional-mining self-supply (CII), recreational landscape irrigation self-supply (L/R), agricultural self-supply (AG), and power generation self-supply (PG) categories. The models are used to determine the estimated maximum withdrawal levels after which further increases in withdrawals may be constrained by at least one natural system (*e.g.*, a violation of a minimum flow or minimum water level).[400] For the CFWI, their model[401] indicated that, on a water supply planning level, alternative sources or conservation would be needed to meet all "Net Demand Change." For the NFRWSP, several groundwater withdrawal scenarios were assessed using a hydrogeological model.[402] For all the scenarios considered, water withdrawals were constrained by at least one natural system. Therefore, "Estimated Existing Sources Available to Meet Future Demands" for the NFRWSP were listed as "Not Quantified." It is possible that water projects must be completed in the NFRWSP area to meet the base year water demand in addition to the "Net Demand Change."

A.7 Data Used in the EDR Project Expenditure Analysis

The project options identified in the current RWSPs, projects being implemented, and projects funded in the past, are summarized in Appendix C of DEP (2020a). The project appendix is a

[398] Utilities apply various methodologies to forecast future demand based on the number of people per connection, the number of connections, and other characteristics of their service areas. The SFWMD has its own methodology to project demand (based on BEBR population projections, five-year average per capita use, etc.). As a part of the RWSP development process, the SFWMD and utilities discuss and agree to the amount of water needed for the region.

[399] Note that the utilities are planning and reporting based on their peak capacity. The projects identified by the public supply companies also focus on projected peak capacity since utilities need to meet peak future demand. Unless utility-specific coefficients are estimated, the average capacity is approximately 80 percent of the peak capacity.

[400] While water may be available on a permit-by-permit basis, the hydrogeological modeling provides a planning-level estimate of how much water the WMDs must identify through conservation or AWS project options.

[401] The East Central Florida Transient Groundwater Flow Model.

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

spreadsheet, with rows describing "project items" and columns summarizing various project characteristics (see Table A.7.1).

Table A.7.1 Project Characteristics Reported in DEP's Project Appendix

Category*	Project Characteristics**
Project identification	• DEP Unique IDs; • District Project Numbers
Linkages among the project items	• Phased or Linked Project
General description of the project items	• Project Name; • Project Type; • Project Description; • Project Status; • Cooperating Entity; • Comments.
Geographical Region	• Water Management District; • RWSP Region Supported.
Timing	• Year First Added to RWSP/RPS; • RWSP or RPS Year Project Last Identified; • Initial fiscal year funded; • Most recent fiscal year funded; • Construction Beginning Date; • Construction Completion Date.
Capacity	• Quantity of Water Made Available upon Completion (MGD); • Reuse Flow Made Available upon Project Completion (MGD).
Total cost and funding information	• Projected Total Funding (for RWSP/RPS Options Only); • Total Construction Costs; • Project Total;
Funding sources	• Total State Funding; • Total District Funding; • Cooperating Entity Match.
Minimum Flow and Minimum Water Levels (MFLs)	• Primary MFL Supported; • MFL RPS Supported, if applicable.

* The categories are defined by EDR.
** Additional characteristics reported in the DEP appendix list included: Latitude and Longitude; Land Acquisition Component; Waterbody Benefited; Ancillary MFL Supported; Quantity of Water Made Available to date (MGD); Reuse Flow Made Available to date (MGD); Storage Capacity Created (MG); Distribution / Transmission Capacity Created (MGD); Construction Completion Year; Historic District Expenditures; WRDWP Current FY Funding; WRDWP Current FY+1 Funding; WRDWP Current FY+2 Funding; WRDWP Current FY+3 Funding; WRDWP Current FY+4 Funding; Budget ReferenceWRD or WSD (optional); Fiscal Year Included in 5-Year WRDWP, If Applicable; WPSP Funding; Springs Funding; Other State funding; Total Land Acquisition Funding by District or State. These characteristics are not used in the EDR analysis since they are not relevant or the information is missing for a large number of projects.

A.8 Effect of Inflation on "Project Total ($)" Estimates

The effect of inflation on the cost and funding needs is an important element of the analysis, given that the earliest completion date of a project item listed in the project appendix is 2005. To account for inflation and convert all "project total ($)" estimates to 2020 dollars, the consumer price index[403] was used. First, for each project item, EDR estimated the fiscal year (FY) for "project total ($)," as summarized in Table A.8.1. Approximately half of all "project total ($)" estimates were assumed to be developed in the last five years (see Table A.8.2).

Table A.8.1 Year when "Project Total ($)" Estimates were Developed

Project Status	State Fiscal Year Assumed by EDR*
RWSP or RPS Option Only	The year preceding the year of RWSP in which the project was last identified;
Complete	The year reported as the construction completion year, or the following year, depending on the construction completion month (Jan.-Jun. *vs.* Jul.-Dec.);
Construction/Underway, Design, or On hold	Year reported as the construction beginning year, or the following year, depending on the construction beginning month (Jan.-Jun. *vs.* Jul.-Dec.); - if the construction beginning date is not reported (or if it is reported as a future year), then the initial fiscal year funded or the year preceding "RWSP or RPS Year Project Last Identified" is used.

* Exceptions are the projects for which the relevant information was missing. In such cases, the decision was made depending on various project characteristics.

Table A.8.2 Year and Inflation Multipliers for "Project Total ($)"

State FY Assumed by EDR for "Project Total ($)" Estimates	CPI used to index "Project Total ($)" to $2020	Projects Items in the DEP (2020a)*	
		Number	**Percent**
2005	1.34	1	0.06
2006	1.29	5	0.32
2007	1.26	95	6.15
2008	1.22	88	5.70
2009	1.20	105	6.80
2010	1.19	107	6.93
2011	1.16	39	2.52
2012	1.13	63	4.08
2013	1.11	51	3.30
2014	1.09	138	8.93
2015	1.09	90	5.83
2016	1.08	167	10.81
2017	1.06	144	9.32
2018	1.04	131	8.48
2019	1.02	184	11.91
2020	1.00	137	8.87
Total	**-**	**1,545**	**100.00**

* After removal of the project items listed as canceled

[403] Consistent with the other chapters of this EDR report: CPI-All Urban Consumers (Current Series) is used. Series Id: CUUR0000AA0; Not Seasonally Adjusted (Series Title: All items - old base in U.S. city average, all urban consumers, not seasonally adjusted; Area: U.S. city average).

A.9 Analysis of Phased or Linked Projects

EDR used two variables in the DEP database to identify the groups of projects that can be phases of a single project: "DEP Unique ID" and "Phased or Linked Project." If "DEP Unique ID" values were indexed by A, B, etc., or if the projects had identical "DEP Unique ID",[404] the projects were selected for further consideration. In turn, the "Phased or Linked Project" variable indicated a specific district project number with which the project under consideration is linked (if any). With a few exceptions, the "DEP Unique ID" and "Phased or Linked Project" variables contained the same information about the projects' linkages.

EDR analyzed every group of linked projects, focusing on the project name and description, water and reuse flow made available, "project total ($)," construction costs, and comments included in the DEP project appendix. Each group's components were either left as standalone projects or were combined into a single umbrella project. If the groups were combined into umbrella projects, "project total ($)," construction costs, and water or reuse flow made available were aggregated. The information about the funding split among the state, WMDs, and cooperating partner(s) was disregarded to avoid possible double-counting of the funding.[405] If the project phases were of various statuses, the aggregated project's status was decided on a case-by-case basis. For a few groups, some projects were combined, while other projects were treated separately or disregarded. Below, the analysis of the project groups is discussed for each WMD.

NWFWMD. Only two projects were identified as linked — NWWS00013A and NWWS00044A. The "Phased or Linked Project" variable was equal to the "Yes" value for both. These two projects were treated as standalone since no specific information was provided about the linkages.

SRWMD. EDR made the following decisions for the phased or linked projects from SRWMD:

- *Aggregate the projects*: only one group of linked projects was aggregated – GRU Groundwater Recharge Wetlands projects (SRWS00129A – SRWS00129B). The total water or reuse flow made available, construction costs, and "project total ($)" were aggregated between the phases. The aggregated project is assumed to be in "design" status (Table A.9.1).

Table A.9.1 Summary Information for the Aggregated Project Group in SRWMD

DEP Unique IDs	EDR's Internal Index Variable	Project Status	Number of projects aggregated	Quantity of Water Made Available today (mgd)	Quantity of Water Available upon completion (mgd)	Reuse Flow Made Available today (mgd)	Reuse Flow Available upon completion (mgd)	Construction costs	Project Total, $	Project Total after accounting for inflation, $2020
SRWS00129A - SRWS00129B	92100SWRS	Design	2	0	1.5	0	1.5	0	12,000,000	12,000,000

[404] The identical IDs were corrected in the later versions of the DEP project appendix.

[405] For several completed projects in the database, total funding from all sources is not equal to the project total. Moreover, some of the project groups included projects of different statuses. Therefore, to avoid possible misinterpretation of the funding information, this data were disregarded for the aggregated projects.

- *Treat projects as standalone*: projects from twelve groups were treated as standalone.[406] In addition, three projects identified as "phased or linked" but included one phase only were also treated as standalone.[407]

- *Convert a group into a standalone project by removing potentially duplicative phases*: project #SRWS00144A (district project #277, linked to district project #303) was assumed to be a component of the project SRWS00140A (district project #303). Both projects were listed as being in design. Project #SRWS00144A was removed from the database to avoid possible double counting of the water or reuse flow made available.

SJRWMD. No projects were linked through the DEP Unique IDs. However, another variable – "phased or linked projects" – showed three groups of projects. They were treated as follows:

- *Aggregate projects into one umbrella project*: For the Ocala LFA, projects with DEP Unique IDs #SJ00329A and SJWS00278A were combined. In the project appendix, SJ00329A was listed as linked to SJWS00278A (*i.e.*, District project # 33953). One of the projects involved constructing three LFA wells, while the other project described the installation of pumps, motors, and controllers for wells. EDR assumed that the water made available, funding, and costs could be summed for these two projects (see Table A.9.2). While one project was in design, EDR focused on the other project's status and assumed the combined project to be in construction /underway (see Table A.9.2).

Table A.9.2 Aggregated Project Group in SJRWMD

DEP Unique ID	EDR's Internal Index Variable	Project Status	Number of projects aggregated	Quantity of Water Made Available today (mgd)	Quantity of Water Available upon completion (mgd)	Construction costs, $	Project Total, $	Project Total after accounting for inflation, $2020
SJ00329A and SJWS00278A	87200SWJS	Construction /Underway	2	0	9.28	2,891,250	2,891,250	2,891,250

- *Assume the projects are standalone*: although two stormwater harvesting projects by Clay County Utility Authority were identified as linked, they were treated as standalone.

[406] These groups and projects were: (1) SRWS00031A—SRWS00031E, (2) SRWS00032A—SRWS00032E, (3) SRWS00003A—SRWS00003B, (4) SRWS00014A—SRWS00014B, (5) SRWS00107A—SRWS00107B, (6) SRWS00108A—SRWS00108B, (7) SRWS00018A—SRWS00018C, (8) SRWS00038A—SRWS00038B, (9) SRWS00138A—SRWS00138B, (10) SRWS00144A and SRWS00140A (or district projects #277 and 303), (11) SRWS00020A - SRWS00020C, and (12) SRWS00047A - SRWS00047C. For group (6) (projects SRWS00108A—SRWS00108B, or District projects # 228 and 182), based on the feedback from SRWMD, #228 implemented a portion of 182. However, the costs and WMA estimates were developed independently for these two projects. EDR considered these projects independently from each other. Similarly, group 10 (SRWS00144A and SRWS00140A, or district projects #277 and 303) likely included an umbrella project (SRWS00140A) and a phase (SRWS00144A), but they were treated as standalone for the EDR cost analysis. Also, groups (11) and (12) were considered for aggregation. These were: (a) Ichetucknee Springs Quality & Quantity Enhancement project group (SRWS00020A - SRWS00020C), and (b) University Oaks Water System Improvement (SRWS00047A - SRWS00047C). Since the linked projects were of different status, it was decided not to aggregate them..

[407] These were projects with DEP Unique IDs equal to SRWS00104A (or district project #161), SRWS00143A (district project #39), and SRWS00083A (district project #79).

Specifically, in the database, project #SJ00314A was linked with #SJWS00228A ("Phased or Linked Project" = "NFWSP - 06" or "NFWSP-06"). One of the projects was in "design" status, while the other was listed as "RWSP or RPS Option Only," which complicated the projects' aggregation.

- *Remove projects*: Two linked reclaimed water projects by Altamonte Springs were identified: SJWS00308A and SJ00337A (with the latter also identified as the district #33852). The project description says that SJWS00308A is an expansion of SJ00337A. Based on the descriptions, the 3.5 MGD of Reuse Flow Made Available upon Project Completion (MGD) for SJWS00308A was included in the 12.5 MGD for SJ00337A. The construction cost and "project total ($)" for SJWS00308A were also assumed to be included in SJ00337A. Therefore, SJWS00308A was removed from further analysis.

SWFWMD. Twelve groups, including 63 projects, were identified. These projects were treated by EDR as follows:

- *Assume that the projects are standalone*: nine of the twelve groups were assumed to include standalone projects.[408]

- *Aggregate linked projects into one umbrella project:* three project groups were assumed to represent aggregate projects jointly "producing" water or reuse flow. These were two surface water projects by the Peace River Manasota Regional Water Supply Authority (SWWS00020A and SWWS00020B), two brackish groundwater projects associated with the Punta Gorda RO facility (SWWS00151A and SWWS00151B); and seven projects related to Lake Hancock restoration (SWWS00002A — SWWS00002G). A summary of the aggregated projects is presented in the table A.9.3 below.

[See table on following page]

408 These nine groups were the following: (1) Brooksville South Reuse projects (SWWS00004A—SWWS00004B); (2) Pasco County's Starkey Ranch reclaimed water projects (SWWS00104A—SWWS00104C); (3) Charlotte County's regional reclaimed water projects (SWWS00024A—SWWS00024C); (4) Hillsborough River restoration projects (12 projects, including SWWS00015A, SWWS00035A - SWWS00035D, and SW00035E—SW00035K); (5) nine projects related to Low Floridan Aquifer development in central Florida (SWWS00136A— SWWS00136J); (6) facility expansion and surface water projects by Peace River (SWWS00277A—SWWS00277B); (7) five distribution / transmission capacity projects by PRMRWSA (SWWS00049A—SWWS00049E); (8) sixteen agricultural projects funded through Facilitating Agricultural Resource Management Systems (FARMS) Program (SWWS00349A—SWWS00349P), and (9) Clearwater Groundwater Replenishment Phase 3 (the group includes just one project with DEP Unique ID = SWWS00130A or district project #N665).

Table A.9.3 Aggregated Project Groups in SWFWMD

DEP Unique ID	EDR's Internal Index Variable	Project Status	Number of projects aggregated	Quantity of Water Made Available today (mgd)	Quantity of Water Available upon completion (mgd)	Storage (mg)	Construction costs	Project Total, $	Project Total after accounting for inflation, $
SWWS00020A - SWWS00020B	02000SWWS	Complete	2	14.7	14.7	6000	142,113,927	167,192,876	198,431,461
SWWS00151A - SWWS00151B	15100SWWS	Construction /Underway	2	0	4	2	36,150,000	42,400,000	42,660,529
SWWS00002A - SWWS00002G	20000SWWS	Complete	7	8.06	18.85	1938	33,238,697	167,720,793	184,895,251

SFWMD. SFWMD identified many projects as phased or linked — 81 groups, including 573 projects. These projects were considered by EDR as follows:

- Delete projects from the groups to convert the remaining phases into standalone projects: This approach was used for two groups:
    - Sawgrass Water Reclamation Facility in the City of Sunrise (SFWS00265A—SFWS00265B): SFWS00265B was omitted to avoid possible double-counting. This RWSP option project was initially added to the DEP Master list before project SFWS00265A received funding in Fiscal Year 2016-17. Costs and water made available should be counted using the 265A project.
    - Lee County's ASR (SFWS00292A—SFWS00292B): SFWS00292B was omitted to avoid possible double-counting. This RWSP option project included all phases of the project (*i.e.*, SFWS00292A and other phases), and it was added to the DEP Master list before SFWS00292A (LWC-2000) receiving funding.
- *Remove the project groups for which water or reuse flow made available cannot be identified:* For seven groups, "RWSP or RPS Option Only" projects included "project total ($)" information, but not water or reuse flow. These projects were: a Cape Coral RO project (SFWS00040B), Westport WWTF expansion (SFWS00121C), Collier County Reclaimed Water ASR (SFWS00012E), Three Oaks Reclaimed Water project (SFWS00116C), South Martin WWTP Expansion (SFWS00038E), Dixie wellfield (SFWS00077B), and Hialeah Florida Aquifer RO WTP (SFWS00188B). The other projects in the corresponding groups were listed as completed, with the completion years from 2006 to 2014. Discussion with SFWMD staff revealed that water or reuse flow made available from the completed projects in the groups included the share for the "RWSP or RPS Option Only" phase. For example, the groups' completed projects could have been approved when the region's population was booming, and accounting for the total project capacity was necessary at that time. When the population projections were reduced, some of the projects' phases were converted to "RWSP or RPS Options Only" status. Water made available still counted toward the completed project phases.

Similarly, for the Tropical Farm projects by Martin County Utilities (SFWS00370A[409]), the phase listed as being in "construction / underway" did not include any water or reuse flow. Comments for the project indicated that the water made available is likely included in the other phase, which is listed as being "RWSP or RPS Option Only."

EDR removed these six groups of projects from the cost analysis. The proper accounting of the water made available and related costs were impossible without collecting additional project-specific data.

- *Treated projects as standalone*: projects from several groups were considered standalone. Specifically, the following four groups were identified through DEP Unique IDs: Lee County Utilities' Green Meadows (SFWS00117A—SFWS00117B[410]) and Corkscrew projects (SFWS00118A—SFWS00118B[411]), North Lee County projects (SFWS00208A—SFWS00208B[412]), Bonita Spring's Reverse Osmosis Treatment projects (SFWS00351A—SFWS00351B), and Orange County Utilities' LFA and Tohopekaliga Water Authority's Cypress Lake Wellfield projects (SFWS00288A- SFWS00288B). In addition, three projects included self-references in the column "Phased or linked project," with no other linked projects identified in the database: Central District wastewater treatment plant project in Miami-Dade (SFWS00112A or district # LEC-62), 6 mgd reverse osmosis water treatment plant in the Town of Davie (SFWS00207A or LEC-99), and recycling of membrane concentrate for the reclaimed water project in Boca Raton (SFWS00242A or LEC-120).[413] All these projects were treated as standalone for the EDR project cost analysis.

- *Aggregate linked projects into one umbrella project*: This approach was used for most SFWMD groups of phased or linked projects. The "comments" field in the DEP project database identified one project with the aggregate water or reuse flow in each group as the one (and the other projects reported zero water or reuse flow). For 69 groups, the aggregation was a straightforward summation of the "project total ($)" information for the project phases. For eight groups, the following modifications of the aggregation rules were made:

    - *Groups combined into two, instead of one umbrella project*: For three groups, one project had a status different from that for the other projects in the group (with separate water or reuse flow and "project total ($)" also identified). EDR separated these projects from related umbrella projects. Specifically, the brackish groundwater project group by Fort Pierce Utilities Authority was combined into two groups: completed wellfield and RO capacity expansion (aggregating SFWS00016A—SFWS00016C) and "RWSP or RPS Option Only" WTP expansion (SFWS00016D). Similarly, Biscayne coastal wetlands rehydration by Miami-Dade Water and Sewer Authority ("RWSP or RPS Option Only" project SFWS00079C) was separated from the completed brackish

[409] Two projects included the same DEP Unique ID in the original project spreadsheet shared with EDR. This duplication was corrected in the later versions of the spreadsheet.
[410] SFWS00117B (RWSP option) is a future expansion of SFWS00117B (LWC-39).
[411] SFWS00118B (RWSP option) is a future expansion of SFWS00118B (LWC-40).
[412] SFWS00208B (RWSP option) was submitted for Fiscal Year 2020-21 funding and was sent for DEP consideration. It is the expansion of the previously funded SFWS00208A (LWC-78) project.
[413] LEC-120, 62, and 99 were likely linked to old RWSP options removed from the list based on the updated 2018 LEC WSP. The 2013 LEC RWSP options were included and previously linked to the funded projects. Later, the 2013 LEC RWSP options were removed and updated with the 2018 LEC RWSP options.

groundwater projects by Seacoast Utility Authority (aggregate SFWS00079A and SFWS00079B). Finally, the phase of McCarty Ranch Reservoir and Water Treatment Area that is in construction (SFWS00356A[414]) was separated from the other three phases listed as "RWSP or RPS Option Only."

- *Aggregating some but not all data:* For one group, EDR aggregated the project costs but not reuse flow. The group included two projects with the same DEP Unique ID = SFWS00313A—South County Reclaimed Phase I in Palm Beach County (district project # RWSPLEC-35) and Broward-Palm Beach Reclaimed Water Main Interconnect (district project number LEC-300 (AWS-SFDEP-16)). It was assumed that the reuse flow for Broward-Palm Beach Reclaimed Water Main Interconnect included the total reuse flow for both projects (*i.e.*, 16 MGD). It was further concluded that the two projects' costs were reported independently and should be combined.

A.10 Project Scenarios to Meet Future Demand Increase

To develop future project scenarios, EDR examines the volume of water or beneficial offset for the projects listed as "RWSP/RPS Options Only" in the DEP project appendix.[415] EDR focuses on the regions with inferred water supply shortages. "RWSP/RPS Options Only" projects in each region are examined, and their types are summarized in Table A.10.1.

For the future project expenditure projections, EDR further narrowed the list of project types for each region. To accomplish this, "means to meet future demand" identified in DEP (undated) were considered.[416] DEP (undated) classified potential alternative sources to meet future water demand based on the likelihood the source will be utilized.[417] This likelihood (aka "confidence rating") reflected expectations for the source meeting all or a portion of the region's future needs. This likelihood was reported as "high" (likely to be used regionally and locally), "moderate" (may be used regionally and likely to be used locally), and low (unlikely to be used regionally, but may be used locally). (see Table A.10.1).

To summarize, EDR selected only the project types that have "high" or "moderate" likelihood (based on DEP, undated), and which were also present among "RWSP/RPS Options Only" in the DEP project appendix. These project types are summarized in Table A.10.2.

Projects were further examined to determine the median project capacity. For each type, the differences in project capacity among regions and statuses were analyzed using the two-way ANOVA test and nonparametric tests implemented in SAS *proc npar1way*. Generally, there were no statistically significant differences among the project mean and median capacities among the statuses. Only for the reclaimed water type was the number of projects large enough to detect the differences in the project sizes among regions (Table A.10.3).

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[414] Two projects were labeled with the same DEP Unique ID in the original spreadsheet shared with EDR. This duplication of the IDs was later corrected.
[415] The only exception is NW – II, where all projects are considered, since no "RWSP/RPS Options Only" projects are identified.
[416] DEP. Undated. An Assessment of Viable Alternative Water Supply Resources and Critical Funding Needs. Presented by the FDEP pursuant to Executive Order 19-12 and Chapter 2019-115, Laws of Florida.
[417] DEP (undated) also states the quantity each source is estimated to produce; these estimates are not used in the EDR analysis.

Table A.10.1 Project Types Identified in "RWSP/RPS Options Only" in DEP Project Appendix and in "Means to Meet Future Demands" in DEP (undated)

Regions	ASR	Brackish Groundwater	Groundwater Recharge	Other Non-Traditional Sources	Other Project Type	Reclaimed water	Seawater Desalination	Stormwater	Surface Water	Surface Water Storage
NW – II										
NFRWSP										
SW – N*										
CFWI										
SF – LWC										
SF – LEC										

* excluding CFWI

Legend:

Confidence rating from DEP (undated):

high (likely to be used locally and regionally)

medium (likely to be used locally; may be used regionally)

low (may be used locally, unlikely to be used regionally)

EDR rating:

project type is present in "RWSP/RPS Options Only" (exception for NW – II applies)

Table A.10.2 Project Types Selected for EDR Expenditure Scenarios

	ASR	Brackish Groundwater	Groundwater Recharge	Other Non-Traditional Sources	Other Project Type	Reclaimed water	Seawater Desalination	Stormwater	Surface Water	Surface Water Storage
NW – II										
NFRWSP										
SW – N										
CFWI										
SF –LWC										
SF – LEC										

* excluding CFWI

Table A.10.3 Project Capacity, mgd of Water or Beneficial Offset

Project Type	Median Project Capacity, mgd of water or beneficial offset	Project Sample Examined
ASR	2.55	8 projects from SF – LWC, various project statuses; no statistically significant difference among project statuses, based on the tests in SAS *proc npar1way*
Brackish Groundwater	4.00	52 projects from SF – LEC, SF – LWC, and CFWI; ANOVA showing no statistically significant difference among regions or statuses
Groundwater Recharge	3.00	17 projects from NFRWSP; no statistically significant difference among project statuses, based on the tests in SAS *proc npar1way*
Reclaimed Water (for potable offset):*		Project capacity is different among the regions, based on the tests implemented in SAS *proc npar1way*
NW – II	0.33	5 projects, different statuses
NFRWSP	0.27	58 projects, different statuses
SW – N**	0.28	12 projects, different statuses
CFWI	0.40	66 projects, different statuses
SF – LWC	2.75	17 projects, different statuses
SF – LEC	1.10	27 projects, different statuses
Stormwater	4.50	5 projects from CFWI, SF – LWC, and SF – LEC; no statistically significant difference among project statuses, based on the tests in SAS *proc npar1way*
Surface water storage	3.00	5 projects from SF – LEC; no statistically significant difference among project statuses, based on the tests in SAS *proc npar1way*

* In addition to the regions relevant to the expenditure projection, Section 4.10 discusses projects in SW – H (outside CFWI) and SW – S regions identified as relevant by EDR's pilot water use model. Reclaimed water projects sizes assumed for these regions are 0.12 mgd and 0.57 mgd, respectively.
** excluding CFWI

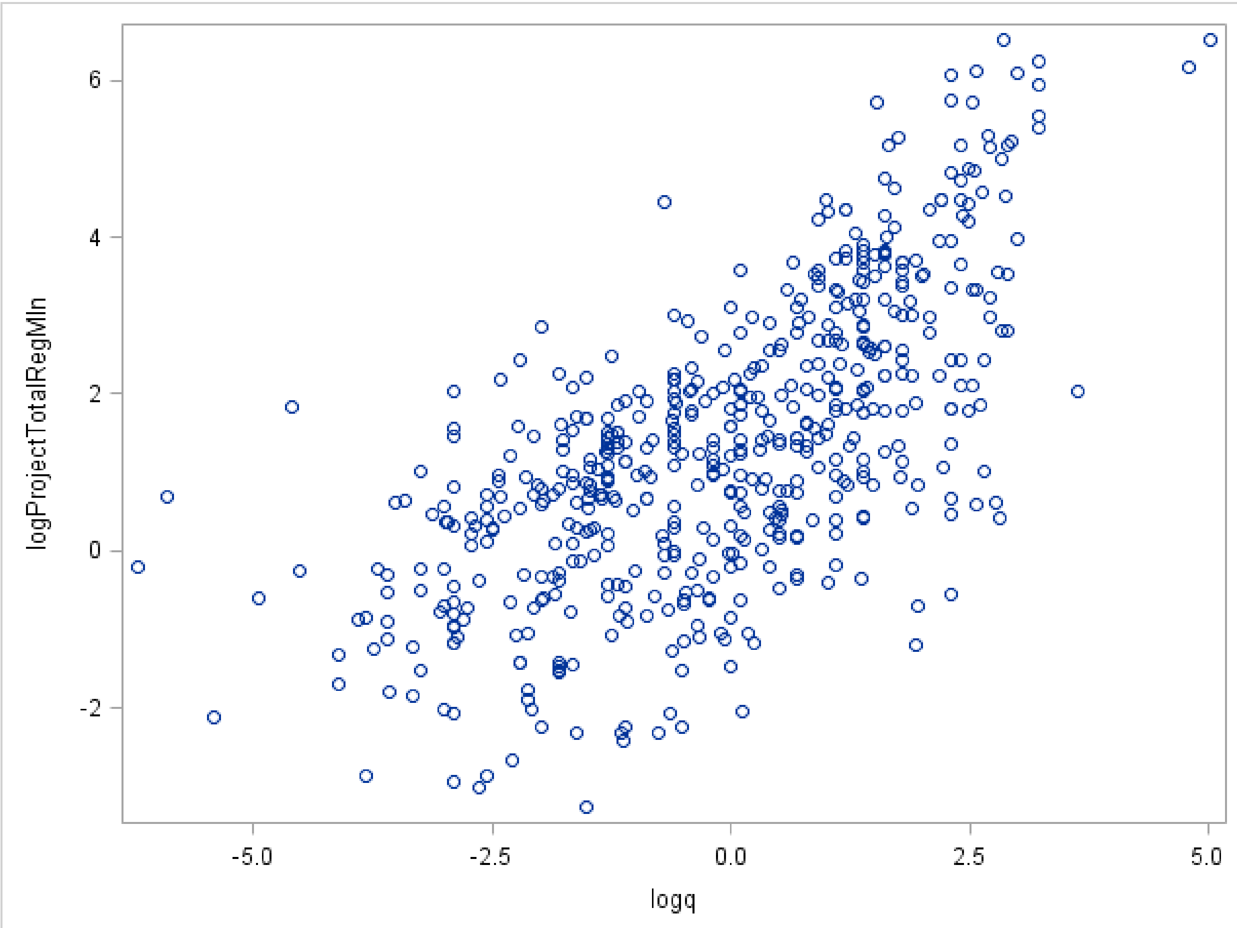
A.11 Regression Analysis of Project Expenditures

Regression analysis was used to explore the relationship between project expenditures and project types, capacities, the regions of implementation, and project status. To develop a regression model, 577 projects from the project appendix were selected. These were projects identified as "Additional water supply" and "Water for natural systems" projects (see Table 4.5.1).[418] The natural logarithm of "project total ($)" was strongly correlated with the natural logarithm of the project capacity. As shown in the scatter plot in Figure A.11.1, the relationship between these two variables is linear. Since log-transformation is applied to both variables, it is the percent change in project capacity, linearly related to the percent change in the "project total ($)."

[See figure on following page]

[418] Note project type "Reclaimed Water (for groundwater recharge or natural system restoration)" was excluded.

Figure A.11.1 Scatter Plot, Natural Logarithms of "Project total ($)" and Project Capacity (mgd)



DEP project appendix provides information about project capacity, type, status, and the region of implementation. The regression model includes all these characteristics. The model specification was selected based on R-squared, Akaike information criterion for robust regression (AICR), and Bayesian information criterion for robust regression (BICR) values (Table A.11.1). It explained approximately 51% of the variability in the dependent variable. EDR will continue testing alternative model specifications to improve the predictive model capacity for this report's 2022 Edition.

[See table on following page]

Table A.11.1 Regression Analysis Results (dependent variable is the natural logarithm of “project total”, in million $2020)

Variable notation	Variable description	Degrees of Freedom	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	Intercept	1	1.618	0.425	0.785	2.452	14.490	0.000
logq	Log of project capacity	1	0.675	0.036	0.604	0.746	342.860	<.0001
Project status:								
tbProject_Status	Construction, Design, or on hold	1	-0.613	0.186	-0.977	-0.248	10.850	0.001
tbProject_Status	Complete	1	-0.963	0.140	-1.238	-0.688	47.090	<.0001
tbProject_Status	RWSP or RPS Option Only	Baseline, captured in the intercept						
Project type:								
PrTypeReg	Aquifer Storage and Recovery	1	0.113	0.480	-0.828	1.054	0.060	0.813
PrTypeReg	Brackish Groundwater	1	0.568	0.408	-0.231	1.367	1.940	0.163
PrTypeReg	Groundwater Recharge	1	-0.964	0.471	-1.887	-0.041	4.190	0.041
PrTypeReg	Other	1	0.264	0.464	-0.645	1.173	0.320	0.569
PrTypeReg	Reclaimed Water (for potable offset)	1	0.523	0.403	-0.268	1.313	1.680	0.195
PrTypeReg	Stormwater	1	-0.359	0.511	-1.361	0.642	0.490	0.482
PrTypeReg	Surface Water	1	0.436	0.428	-0.402	1.274	1.040	0.308
PrTypeReg	Surface Water Storage	Baseline, captured in the intercept						
Project region:								
tbRWSP_Region	NFRWSP	1	-0.139	0.190	-0.512	0.234	0.530	0.465
tbRWSP_Region	NWFWMD	1	0.564	0.358	-0.137	1.265	2.490	0.115
tbRWSP_Region	SF – LEC	1	-0.283	0.209	-0.694	0.127	1.830	0.176
tbRWSP_Region	SF – LKB	1	-1.079	0.597	-2.249	0.091	3.270	0.071
tbRWSP_Region	SF – LWC	1	0.076	0.226	-0.367	0.519	0.110	0.737
tbRWSP_Region	SF – UEC	1	0.120	0.297	-0.463	0.702	0.160	0.687
tbRWSP_Region	SJR – CSEC	1	0.213	0.203	-0.185	0.610	1.100	0.294
tbRWSP_Region	SW – H (excluding CFWI)	1	0.568	0.643	-0.691	1.828	0.780	0.377
tbRWSP_Region	SW – N (excluding CFWI)	1	0.787	0.348	0.105	1.470	5.110	0.024
tbRWSP_Region	SW – S	1	0.492	0.232	0.036	0.947	4.470	0.035
tbRWSP_Region	SW – TB	1	0.546	0.204	0.146	0.946	7.150	0.008
tbRWSP_Region	CFWI	Baseline, captured in the intercept						
Goodness-of-Fit								
R-squared	0.506							
AICR	620.229							
BICR	718.727							
Deviance	718.603							

Note: Estimated using *proc robustreg* in SAS

As expected, the model shows that expenditures increase with the project capacity. Note that since natural logarithm transformations are used for both expenditure and capacity, the model coefficient reflects the percent change in the expenditure for a one percent change in capacity. The model results also show that the “RWSP or RPS Option Only” projects are more expensive than those completed in the past and those currently in construction, in design, or on hold (other things being equal). Groundwater recharge projects are identified as statistically less expensive (with the surface water storage category being the reference category). Finally, the SW – N (excluding CFWI), SW – S, and SW – TB regions tend to be more costly (when compared with projects in the CFWI).

This regression model is used to estimate the expenditures for various project types, capacities, and regions. Estimated project expenditures for the “Complete” project status are presented in

Table A.11.2. Note that if the model results for "RWSP or RPS Option Only" status are used, the estimated project expenditure becomes significantly higher. The expenditure can be lowered for all project types and regions if larger projects are constructed. The only exception is for SF – LEC, where the surface water storage projects are the same for median and large capacity projects.

Table A.11.2 Estimated Project Expenditures, Using Regression Model Coefficient for "Complete" Projects Status

Project Type	Region	Project Capacity, mgd of water or beneficial offset		Expenditure Assuming Median Project Capacity		Expenditure Assuming "Small" Project Capacity		Expenditure Assuming "Large" Project Capacity	
		Median	**Small and large project capacities***	**million $2020**	**million $2020 per mgd**	**million $2020**	**million $2020 per mgd**	**million $2020**	**million $2020 per mgd**
ASR	SF – LWC	2.55	0.77 – 8.00	4.378	**1.717**	**1.951**	**2.534**	9.471	**1.184**
Brackish Groundwater	CFWI	4	2.50 – 6.00	8.667	**2.167**	**6.311**	**2.524**	11.395	**1.899**
Brackish Groundwater	SF – LWC	4	2.50 – 6.00	9.351	**2.338**	**6.809**	**2.724**	12.295	**2.049**
Brackish Groundwater	SF – LEC	4	2.50 – 6.00	9.768	**2.442**	**7.113**	**2.845**	12.842	**2.140**
Groundwater Recharge	NFRWSP	3	1.50 – 4.00	1.341	**0.447**	**0.840**	**0.560**	1.629	**0.407**
Reclaimed Water (for potable offset)	NW – II	0.33	0.33 – 0.39	2.701	**8.186**	**2.701**	**8.186**	3.024	**7.753**
	NFRWSP	0.27	0.07 – 0.63	1.168	**4.326**	**0.470**	**6.710**	2.069	**3.284**
	SW – N**	0.28	0.25 – 0.68	3.023	**10.796**	**2.800**	**11.201**	5.501	**8.090**
	CFWI	0.4	0.15 – 1.65	1.750	**4.375**	**0.903**	**6.018**	4.554	**2.760**
	SF – LWC	2.75	1.81 – 4.62	6.936	**2.522**	**5.230**	**2.890**	9.844	**2.131**
	SF – LEC	1.1	0.50 – 3.58	2.609	**2.372**	**1.533**	**3.065**	5.787	**1.616**
Stormwater	SF – LEC	4.5	1.00 – 10.00	2.796	**0.621**	**1.013**	**1.013**	4.792	**0.479**
Surface water storage	SF – LEC	3	1.00 – 3.00	3.046	**1.015**	**1.451**	**1.451**	3.046	**1.015**

* The project capacity varied significantly in the dataset, and to identify a "typical" range of the project sizes, the capacities defining the first, second, and third quantiles were considered for each project type. These capacities were then labeled as "small," "median," and "large" project capacities, respectively. The quantiles were defined using proc univariate in SAS 9.4.
** excluding CFWI

Overall, groundwater recharge projects in the NFRWSP and stormwater projects in the SF – LEC stand out as relatively inexpensive for the median project capacity.[419] In contrast, reclaimed water projects (especially in the NW – II and SW – N) are expensive (per mgd of the beneficial offset). Reclaimed water projects also tend to be small (except those implemented in the SF – LEC and SF – LWC), which increase project expenditures per mgd of beneficial offset. Furthermore, the beneficial offset is assumed to be 0.55 of the actual project capacity, increasing the per-unit expenditures for reclaimed water projects.

As mentioned above, projects of all types implemented in the SW – N (excluding CFWI), SW – TB, and SW – S tended to be more expensive relative to the reference category (*i.e.*, the projects in the CFWI). EDR is researching why this is so. It is possible that this increase in expenditures is related to the high costs associated with retrofitting the existing infrastructure in highly urbanized environments (*e.g.*, the SW – TB). At the other extreme, high costs may reflect rural conditions where access to labor and supplies is lower, increasing the costs of project construction (*e.g.*, the SW – N excluding CFWI).

[419] Note that groundwater recharge projects' costs may be underestimated since the DEP project appendix does not account for the land purchase expenditures.

A.12 Agricultural Water Use Projections by Water Supply Planning Regions

Table A.12.1 Agricultural Water Use Projections

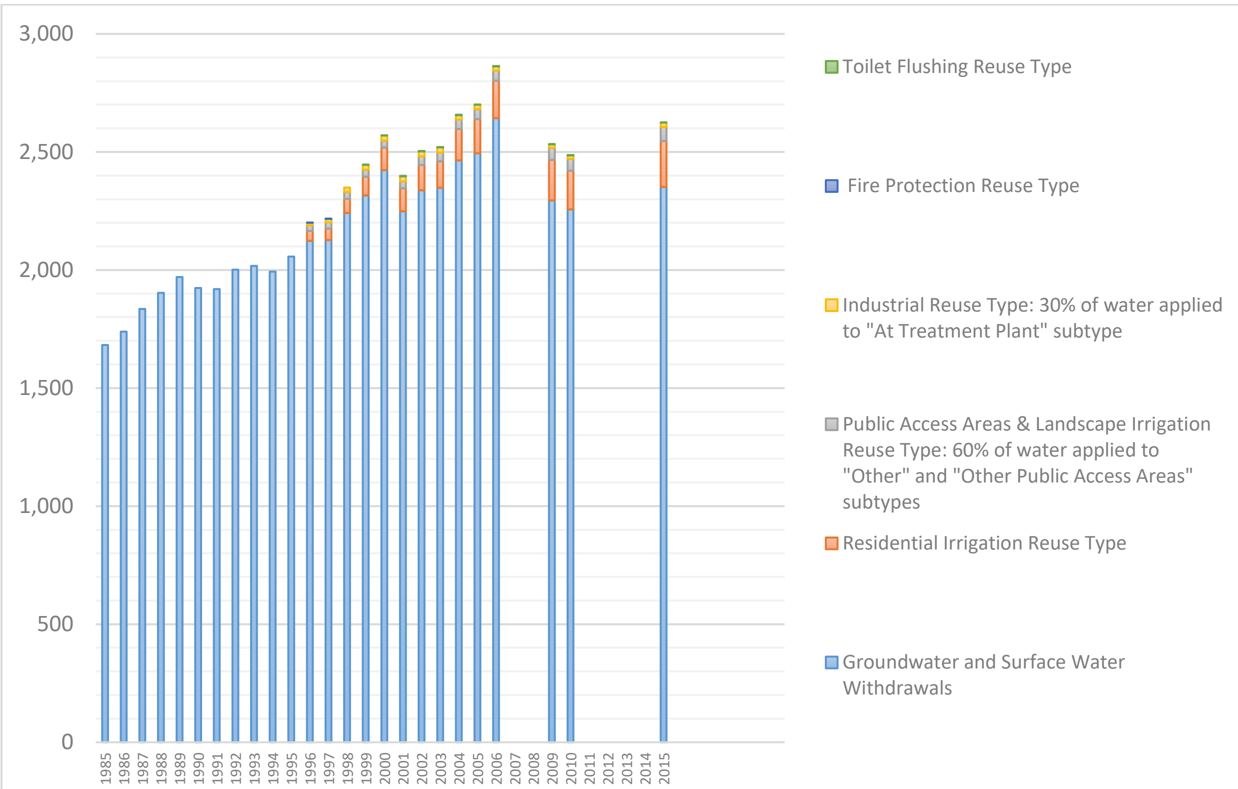
	2020	2025	2030	2035	2040
FSAID-7 Projection					
NW – I	2.7	3.17	3.62	4.03	4.46
NW – II	2.94	3.48	4.04	4.5	5.18
NW – III	0.9	0.9	0.9	0.9	0.91
NW – IV	35.61	36.5	37.36	38.56	39.69
NW – V	0.31	0.31	0.31	0.32	0.32
NW – VI	5.98	6.05	6.08	6.14	6.2
NW – VII	1.59	1.6	1.61	1.63	1.65
SR – West	56.48	61.40	65.89	70.07	74.49
NFRWSP	155.05	161.44	166.62	172.36	178.20
SJR – CSEC	110.55	109.93	108.82	108.32	107.57
SW – N (excluding CFWI)	25.45	27.95	30.21	33.13	35.79
SW – TB	55.21	53.86	53.01	51.45	49.67
SW – H (excluding CFWI)	102.61	101.65	101.00	100.27	99.61
SW – S	169.66	171.80	174.13	176.91	179.35
CFWI	141.27	138.52	137.08	136.97	136.43
SF – LKB	121.34	122.43	123.41	124.32	124.73
SF – UEC	122.09	116.62	111.04	105.85	100.79
SF – LEC	659.34	638.86	636.74	634.17	631.45
SF – LWC	340.82	343.85	346.17	350.88	354.05
Statewide	*2,109.90*	*2,100.32*	*2,108.02*	*2,120.75*	*2,130.53*
Water Management Districts' Projections					
NW – I	3.78	4.31	4.96	5.57	6.16
NW – II	3.00	3.24	3.52	3.77	3.97
NW – III	0.90	0.91	0.93	0.95	0.97
NW – IV	30.64	32.91	34.51	36.54	38.45
NW – V	0.25	0.25	0.25	0.25	0.25
NW – VI	5.39	5.56	5.71	5.88	6.03
NW – VII	1.39	1.39	1.48	1.55	1.67
SR – West	49.30	52.31	56.65	61.07	64.79*
NFRWSP	139.41	142.95	148.80	153.58	156.82*
SJR – CSEC	119.12	119.46	120.71	121.60	122.91
SW – N (excluding CFWI)	19.58	21.14	22.87	24.64	26.43
SW – TB	46.12	44.18	42.35	40.45	38.16
SW – H (excluding CFWI)	71.53	68.99	66.26	65.20	62.18
SW – S	105.58	106.48	107.52	108.55	109.65
CFWI	157.19	157.89	159.66	161.72	163.49
SF – LKB	241.31	243.01	244.66	244.63	248.14
SF – UEC	168.67	170.86	173.31	178.57	186.65
SF – LEC	653.25	643.51	637.51	631.06	625.27
SF – LWC	634.93	644.66	653.01	665.92	678.83
Statewide	*2,451.33*	*2,464.00*	*2,484.66*	*2,511.50*	*2,540.82*
Difference between WMDs' and FSAID projections**					
NW – I	1.08	1.14	1.34	1.54	1.7
NW – II	0.06	-0.24	-0.52	-0.73	-1.21
NW – III	0.00	0.01	0.03	0.05	0.06
NW – IV	-4.97	-3.59	-2.85	-2.02	-1.24
NW – V	-0.06	-0.06	-0.06	-0.07	-0.07
NW – VI	-0.59	-0.49	-0.37	-0.26	-0.17
NW – VII	-0.2	-0.21	-0.13	-0.08	0.02
SR – West	-7.18	-9.09	-9.24	-9.00	-9.70
NFRWSP	-15.64	-18.49	-17.82	-18.78	-21.38
SJR – CSEC	8.57	9.53	11.89	13.28	15.34
SW – N (excluding CFWI)	-5.87	-6.81	-7.34	-8.49	-9.36
SW – TB	-9.09	-9.68	-10.66	-11.00	-11.51
SW – H (excluding CFWI)	-31.08	-32.66	-34.74	-35.07	-37.43
SW – S	-64.08	-65.32	-66.61	-68.36	-69.70
CFWI	15.92	19.37	22.58	24.75	27.06
SF – LKB	119.97	120.58	121.25	120.31	123.41
SF – UEC	46.58	54.24	62.27	72.72	85.86
SF – LEC	-6.09	4.65	0.77	-3.11	-6.18
SF – LWC	294.11	300.81	306.84	315.04	324.78
Statewide	***341.43***	***363.68***	***376.64***	***390.75***	***403.33***

* This value was projected by EDR using a trend from the WMDs' 2015-2035 estimates and projections.
** Font colors are used to indicate positive and negative differences between the WMDs' and the FSAID's projections.

A.13 Historical Water Use in PS, DSS, L/R, and CII

This appendix presents graphs summarizing background information for historical water use. As shown in Figure A.13.1, most of the estimated water use is supplied by groundwater and surface water withdrawals in PS. In contrast, reclaimed water from various reuse categories accounted for 10% or less of the total estimated water use. Peak PS water use occurred in 2006. After a drop in water use in 2009 and 2010, a small water use increase was observed in 2015.

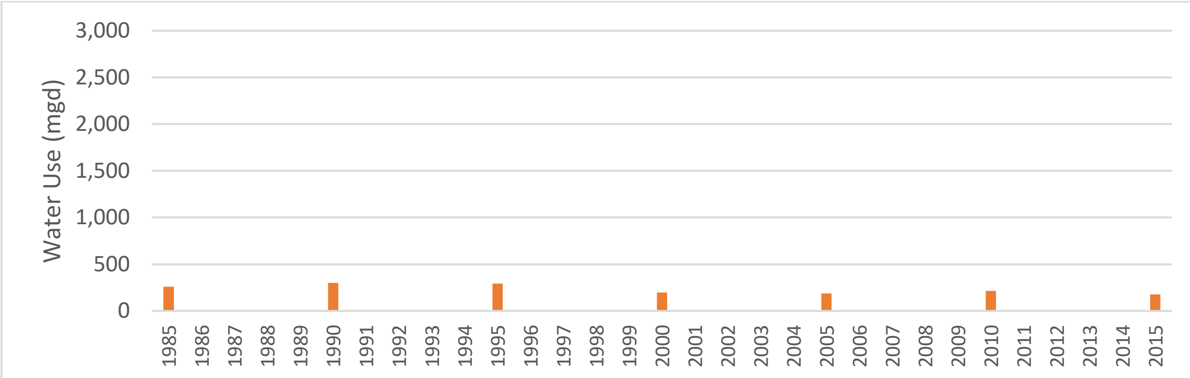
Figure A.13.1 PS: Statewide Historical Water Use Estimated from Water Withdrawal and Reuse Inventory Data (mgd)



Note that for selected years, water use was available for a few counties only. These years are treated as "missing data" on this graph. However, available county water use information is used in the EDR water use forecasting model. In other words, this graph should not be interpreted as a comprehensive summary of PS county water use data.

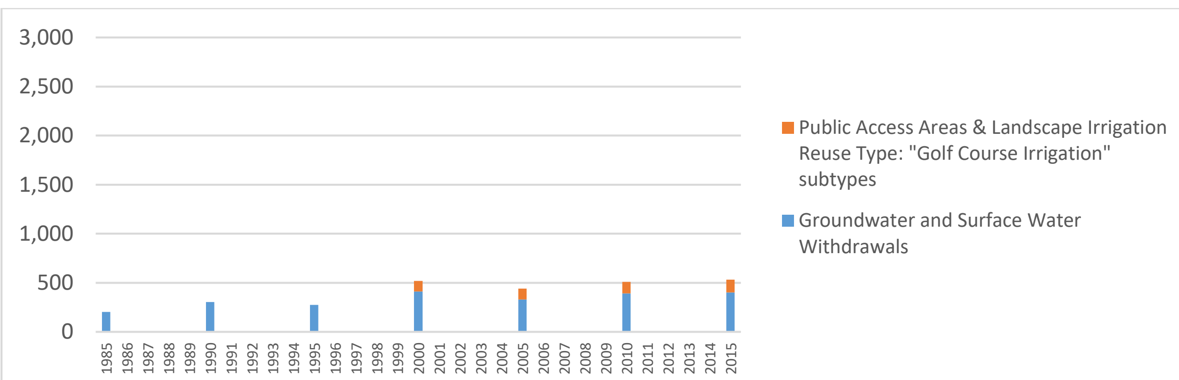
In turn, for DSS, water use is supplied by groundwater, and the statewide water use has been relatively small, as compared with PS (see Figure A.13.2). Statewide DSS has been relatively stable over the last 20 years. Since approximately 2000, L/R statewide water use has exceeded that in DSS, and it continues growing. Approximately one-third of L/R statewide water use is supplied by reclaimed water (see Figure A.13.3). Finally, the CII category is the only category that shows a continuous decline that began in the 1990s (see Figure A.13.4). In 2015, statewide water use in this category was below that in L/R. Less than 5% of the total use is supplied by reclaimed water.

Figure A.13.2 DSS Statewide Historical Water Use (mgd)



Note: DSS water use is supplied solely by groundwater. Note that for selected years, water use was available for a few counties only. These years are treated as "missing data" on this graph. However, available county water use information is used in the EDR water use forecasting model. In other words, this graph should not be interpreted as a comprehensive summary of PS county water use data.

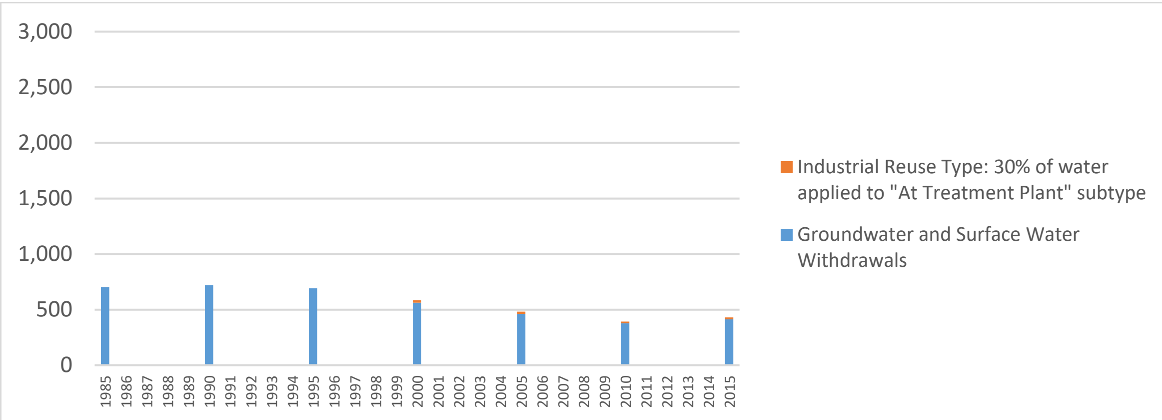
Figure A.13.3 L/R: Statewide Historical Water Use Estimated from Water Withdrawal and Reuse Inventory Data (mgd)



Note that for selected years, water use was available for a few counties only. These years are treated as "missing data" on this graph. However, available county water use information is used in the EDR water use forecasting model. In other words, this graph should not be interpreted as a comprehensive summary of PS county water use data.

[See figure on following page]

Figure A.13.4 CII: Statewide Historical Water Use Estimated from Water Withdrawal and Reuse Inventory Data (mgd)



Note that for selected years, water use was available for a few counties only. These years are treated as "missing data" on this graphs. However, available county water use information is used in the EDR water use forecasting model. In other words, this graph should not be interpreted as a comprehensive summary of PS county water use data.

A.14 PS, DSS, L/R, and CII Water Use: Data and Model Estimation

Data

The data used to develop the combined PS, DSS, L/R, and CII forecast are summarized in the graphics below. First, historical water use data are presented in Figure A.14.1. Broward, Hillsborough, Miami-Dade, Orange, and Palm-Beach stand out as counties with exceptionally high use. Also, while in most counties, water use is stable or growing, in a few counties, the use decreases (*e.g.*, Polk and Putnam). It is also observed that for Gulf, Hamilton, and Sumter counties, water use follows different trends before and after 2000. This observation was verified by separately examining the trends in each use category for these counties (*i.e.*, independently examining PS, DSS, L/R, and CII). Therefore, for the regression analysis, EDR disregards the water use data before 2001 for Gulf and Hamilton Counties, and before 2004 for Sumter County.

[See figure on following page]

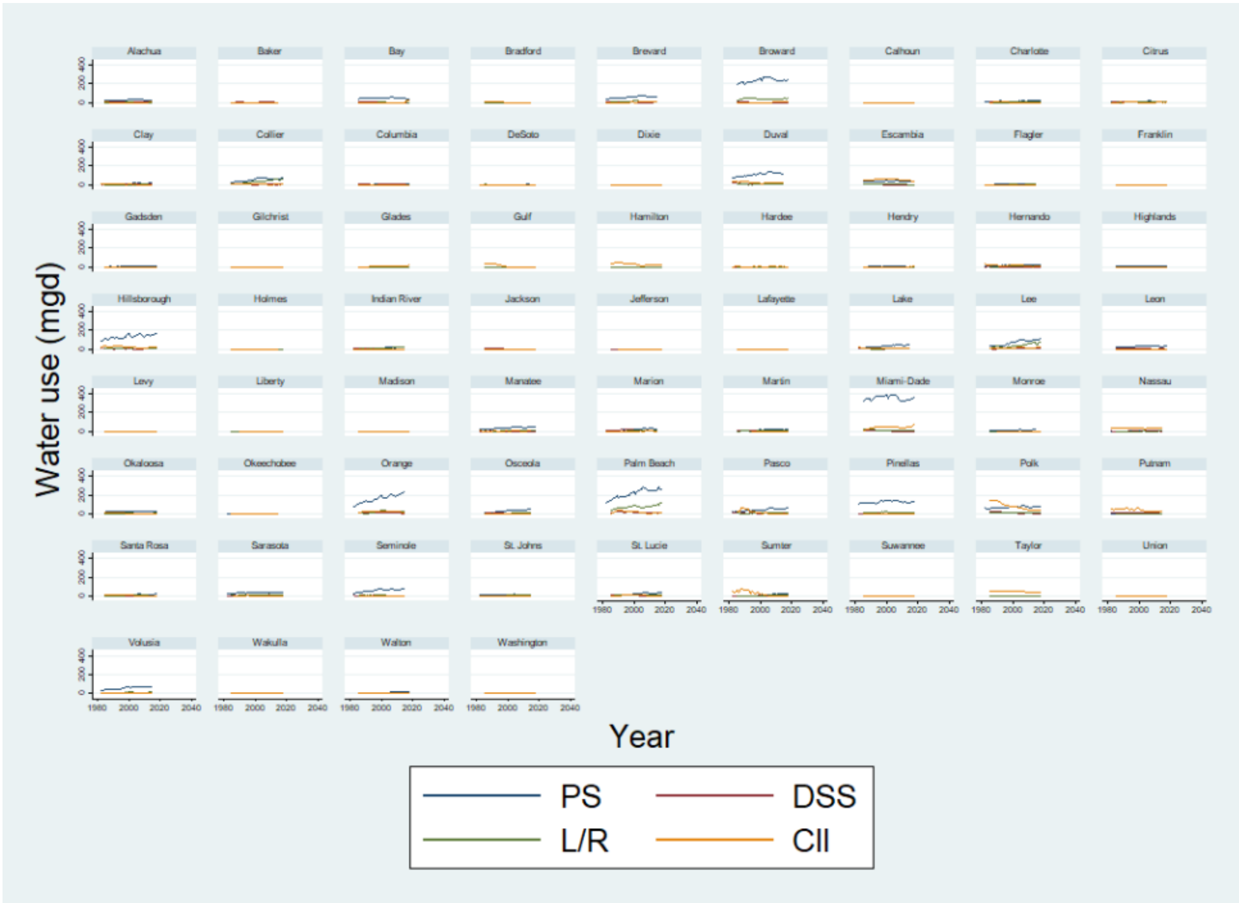
Figure A.14.1 Total Estimated PS, DSS, L/R, and CII Water Use, by County (mgd)

Note that on this graph, missing water use values are estimated using interpolation. In the EDR model, no interpolation is used. Therefore, water use data was missing for various years in various counties between 1980 and 2019.

While in most counties, PS is the primary water use sector, the water use in Glades, Hamilton, Nassau, Polk, Putnam, and Taylor is dominated by CII (Figure A.14.2), requiring a different forecasting model. A different model was also developed for Collier, Lee, and Palm Beach Counties, where the total water use mirrored population growth especially closely.

[See figure on following page]

Figure A.14.2 Estimated PS, DSS, L/R, and CII Water Use, by County (mgd)



Note that on this graph, missing water use values are estimated using interpolation. In the EDR model, no interpolation is used. Therefore, water use data was missing for various years in various counties between 1980 and 2019.

The next series of graphs displays the historical and forecasted values of the economic and demographic variables used in the EDR water use models. These values are developed from (a) an EDR database of historical and forecasted statewide economic and county demographic data, and (b) county-level history and projections available from Woods and Poole Economics (2020). In other words, EDR state-level economic values are "distributed" to the individual counties based on the proportion values estimated by EDR from Woods and Poole Economics (2020).

Figure A.14.3 shows county population, both historical data and the forecast (EDR 2020). Similar to the water use shown in the previous Figure, the population in Broward, Hillsborough, Miami-Dade, Orange, and Palm-Beach counties stands out as exceptionally high compared with the other counties. The population in these and other counties is projected to continue growing.

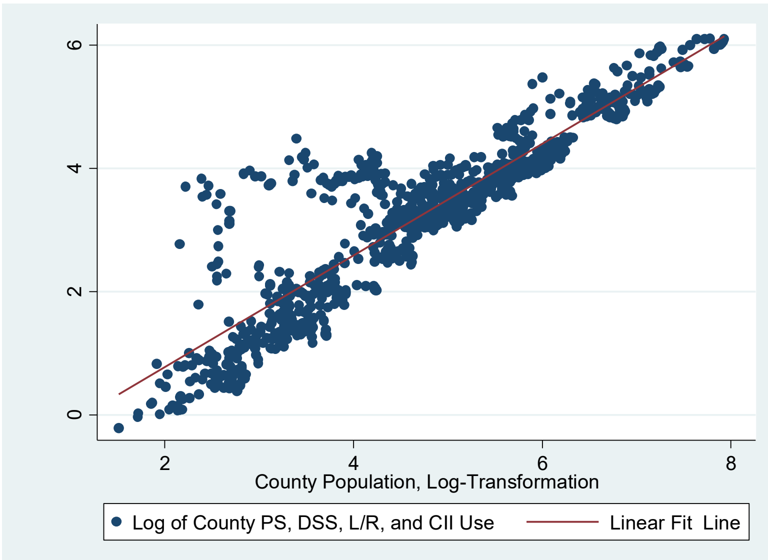
[See figure on following page]

Figure A.14.3 Population, by County (million people)

The total county water use in PS, DSS, L/R, and CII categories was correlated with the county population. Specifically, the relation between (a) the natural logarithm of the water use and (b) the natural logarithm of the population is close to linear. See Figure A.14.4 for illustration.

[See figure on following page]

Figure A.14.4 Scatter Plot for Total PS, DSS, L/R, and CII Water Use (mgd) and Total County Population (thousand people), Log-Transformations



Next, Florida employment in accommodation and food services (NAICS 72) demonstrates the relative share of tourism-related activities in the county economy. Statewide data for 1991 – 2030 are obtained from EDR's database of Florida's economic and demographic indicators. EDR's state forecast is extended to 2031 – 2040, assuming a linear trend. Historical and forecasted county Accommodation & Food Services Employment (TT051) levels are examined (Woods and Poole Economics 2020) and used as a model to allocate EDR's state employment figures to the individual counties. In other words, each county's employment as a share of the state's total employment is calculated. These proportions from Woods and Poole Economics (2020) are then applied to the EDR statewide forecast to estimate county employment. To assess the share of the tourism-related activities in the county economy, EDR calculated the ratio of accommodation and food services employment to the county population. The final result is displayed in Figure A.14.5. In most counties, the proportion of the population employed in accommodation and food services is less than 0.1 (*i.e.*, 10% of the population). The exception is Monroe County, where the share fluctuates between 0.1 and 0.2. The proportion is also relatively high in Bay, Orange, and Walton Counties (which may reflect the importance of tourism associated with Destin-Panama City and Orlando).

[See figure on following page]

Figure A.14.5 Estimated Ratio of Accommodation and Food Services Employment in the Total County Population

The proportion of the population employed in mining, manufacturing, and utility sectors is also calculated. The state employment in the following industries was identified in the EDR state dataset for 1991 through 2030: mining (NAICS 21), utilities (NAICS 22), and manufacturing (NAICS 31-33). Next, EDR's state forecasts for the industries were extended to 2031 – 2040 using a linear trend. To allocate the state forecast to individual counties, historical and forecasted values for mining (TT035), utilities (TT036), and manufacturing (TT038) were examined (Woods and Poole Economics 2020). Each county's employment as a share of the state's total employment is calculated for every year, aggregating the three sectors. These proportions are then applied to the EDR statewide forecasts to derive counties' employment from EDR's state employment values. This derivation process ensures that the sum of the county employment is equal to the official state forecast. The proportion of the population employed in mining, manufacturing, and utility sectors is very low for all counties–less than 0.03 (or 3% of the population), see Figure A.14.6. The proportion of employment in these industries is relatively high in Alachua County. Historically, the proportion was also relatively high in Citrus, Gulf, and Hardee Counties, but it dropped significantly over time.

Figure A.14.6 Estimated Ratio of Mining, Utilities, and Manufacturing Employment in the Total County Population

As shown on Figures A.14.7 and A.14.8, county water use is positively correlated with the proportion of the county population employed in accommodation and food services, as well as with the proportion employed in mining, manufacturing, and utilities. The correlation is smaller than that with the county population, and the dispersion of the water use observations around the linear fit line is large. The potential effect on the water use is likely small for the proportion of population employed in mining, manufacturing, and utilities (see the slope of the linear fit line on Figure A.14.8).

[See figure on following page]

Figure A.14.7 Scatter Plot for Total County PS, DSS, L/R, and CII Water Use (mgd) and the Proportion of County Population Employed in Accommodation and Food Services, Log-Transformations

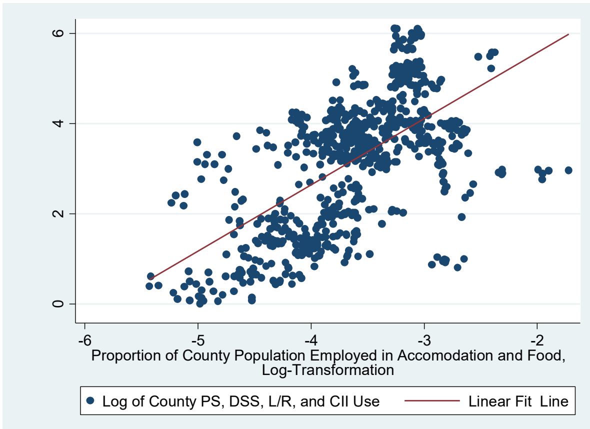
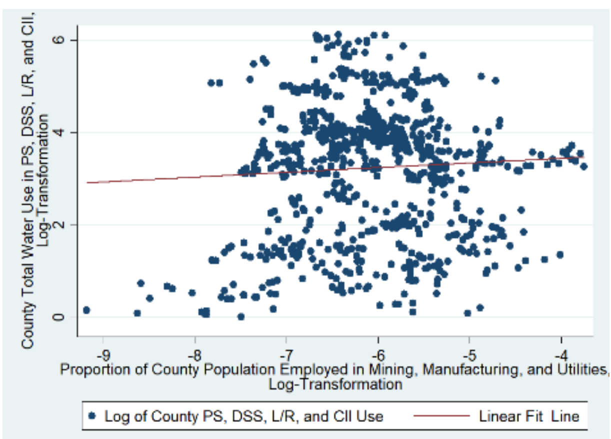


Figure A.14.8 Scatter Plot for Total County PS, DSS, L/R, and CII Water Use (mgd) and the Proportion of County Population Employed in Mining, Manufacturing, and Utilities, Log-Transformations



In addition to demographic and economic variables, weather and climate variability can also impact water use. EDR obtained total precipitation and average temperature for March-May and June-August periods for each county from NOAA (2020[420]). Among the weather variables, total spring precipitation was included in the final water use model. For the water use forecast, 2000-2020 average precipitation is assumed for each county (see Figure A.14.9). Water use shows a (weak) negative correlation with March-May county precipitation (Figure A.14.10).

[420] NOAA. County Time Series. Available online at: https://www.ncdc.noaa.gov/cag/county/time-series . (Accessed September 2020.)

Figure A.14.9 Total Precipitation from March Through May (inches)

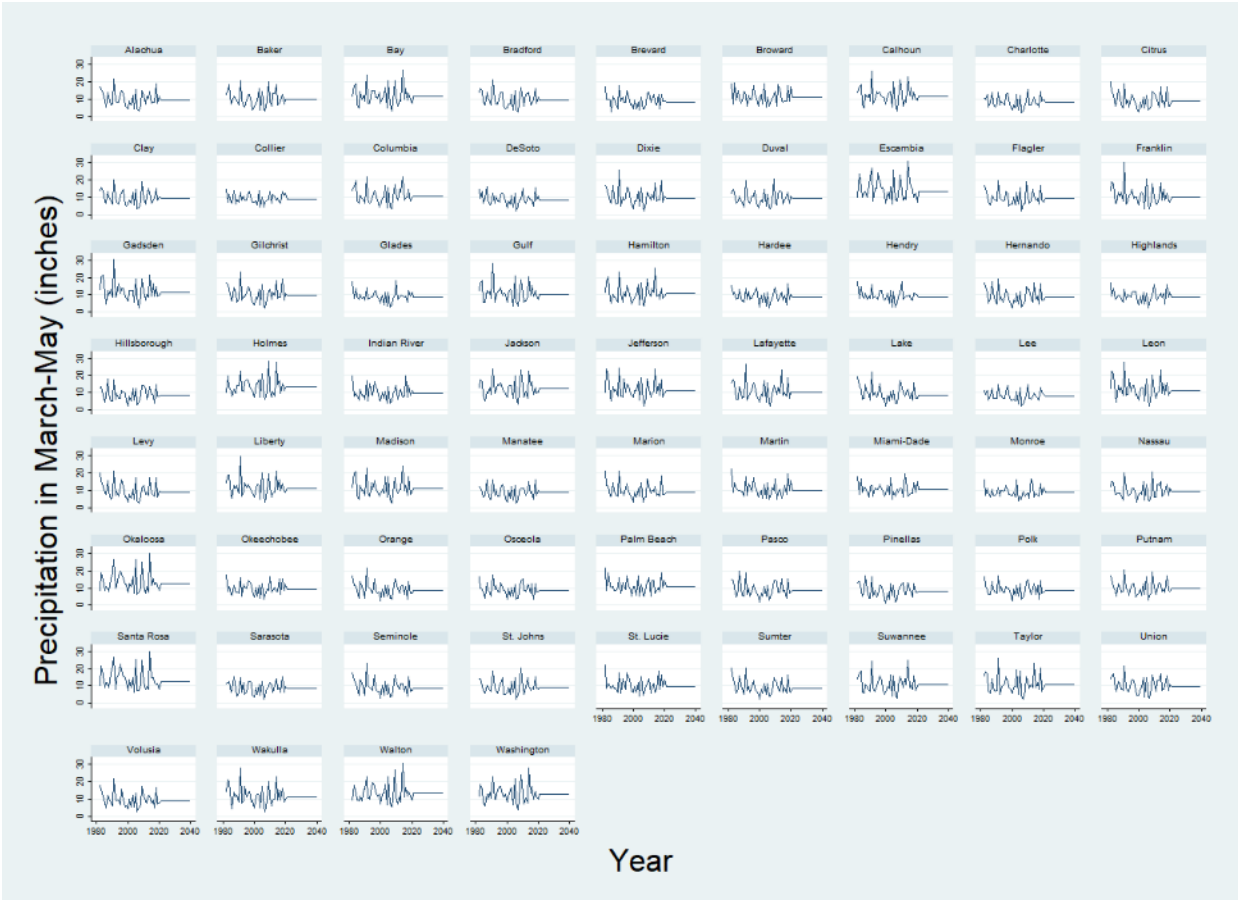
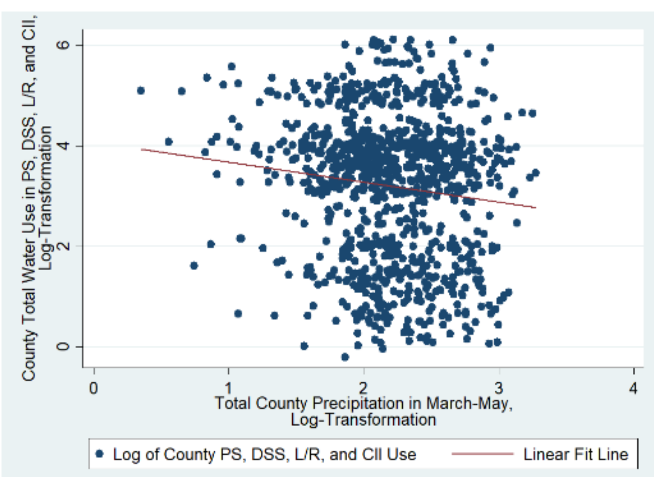


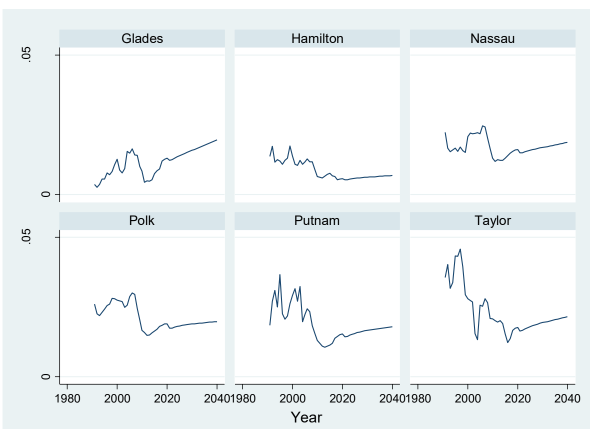
Figure A.14.10 Scatter Plot for Total County PS, DSS, L/R, and CII Water Use (mgd) and the County Precipitation from March Through May (inches), Log-Transformations



County population, precipitation, time trend, and employment proportions in accommodation and food services, as well as in mining, manufacturing, and utilities, can explain water use variation among most of the counties over time. However, for three counties – Duval, Lee, and Palm Beach – population seems to be the only driver of water demand. Therefore, a separate model was developed to examine water use in these three counties.

Furthermore, in six counties, the water use was dominated by the CII category – Glades, Hamilton, Nassau, Polk, Putnam, and Taylor counties (see Figure A.14.2 above). After examining various model specifications, water use in these counties was modeled as a function of the total county population, the proportion of employment in the construction sector, and the population's proportion 65 years old and older. Like the variables above, county-level values were derived from (a) EDR statewide estimates and (b) county proportions estimated from Woods and Poole Economics (2020).[421] As shown in Figure A.14.11, the employment in construction is below 5% of the population in all counties. This proportion varies significantly over time, shrinking significantly in 2008 through 2010 (*i.e.*, the Great Recession) and it is expected to slowly grow in the future. Water use in the six counties was positively correlated with the county population and the population proportion employment in construction (Figure A.14.12).

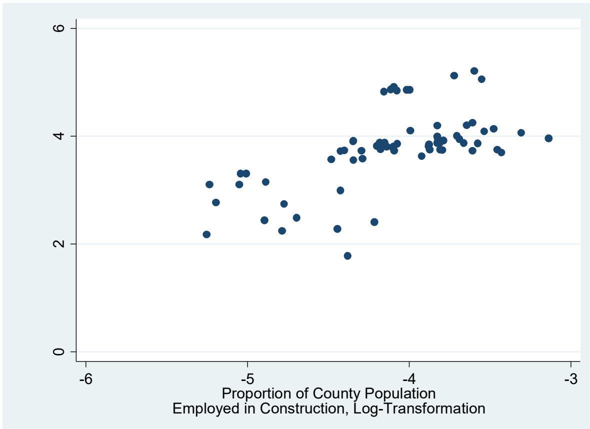
Figure A.14.11 Glades, Hamilton, Nassau, Polk, Putnam, and Taylor: Estimated Ratio of Construction Employment in the Total County Population



[See figure on following page]

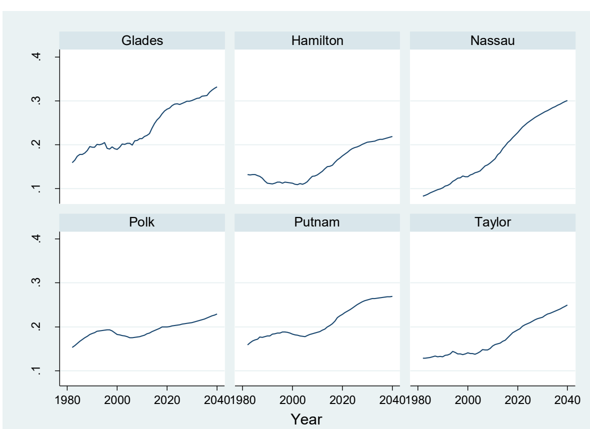
[421] For construction employment, Florida employment in construction of buildings (NAICS 236), heavy & civil engineering construction (NAICS 237), and specialty trade constructors (NAICS 238) were summed. EDR data span the 1991-2030 period, and 2031-2040 statewide values were projected using a linear trend. The total state employment in these three industries was then distributed to individual counties using Woods & Poole Economics (2020) county data for construction employment (TT037). The proportion of employment in each county was estimated by dividing the employment by the total county population.

Figure A.14.12 Glades, Hamilton, Nassau, Polk, Putnam, and Taylor: Scatter Plot for Total County PS, DSS, L/R, and CII Water Use (mgd) and the Proportion of County Population Employed in Construction, Log-Transformations



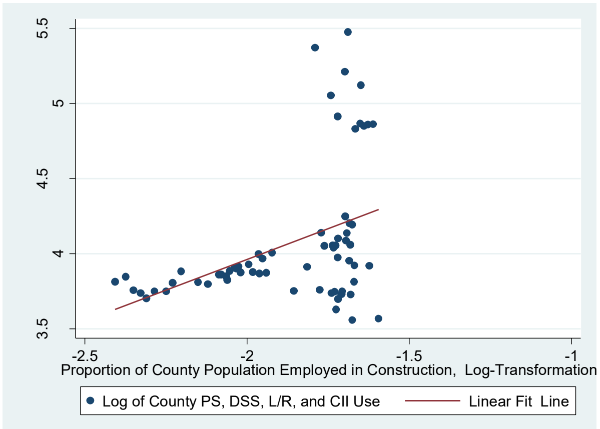
A similar approach was used to estimate the proportion of the county population 65 years old or older.[422] Among the 6 counties, the 65+ age group was projected to be especially high in Glades and Nassau Counties – reaching or exceeding 30% of the county population by 2040. In the other four counties, the age group share in the total population was also projected to grow (Figure A.14.13). Water use is correlated with the population's proportion 65 years old or older (see the scatter plot in Figure A.14.14).

Figure A.14.13 Glades, Hamilton, Nassau, Polk, Putnam, and Taylor: Estimated Share of Population Aged 65+ of the Total County Population



[422] It was based on EDR statewide data (extended to 2031-2040 using a linear trend) and county proportions estimated from TT029 in Woods and Poole Economics (2020).

Figure A.14.14 Glades, Hamilton, Nassau, Polk, Putnam, and Taylor: Scatter Plot for Total County PS, DSS, L/R, and CII Water Use (mgd) and the Share of County Population Aged 65+, Log-Transformations



Water Use Model Development

Regression analysis was used to estimate coefficients for the following three models:

1. The main model that characterizes aggregate county water use in the PS, DSS, L/R, and CII categories and represents 58 out of 67 Florida counties. This model includes such variables as county population, the proportion of employment in accommodation and food services, proportion of employment in mining, manufacturing, and utilities, spring precipitation, and time trend;

2. Model for three counties where water use can be explained by the population change only (Lee, Collier, and Palm Beach Counties);

3. Model for the counties dominated by CII water use. This model included such variables as construction employment, county population, and proportion of population older than 64 years old.

For all three models, coefficients were estimated using the *regress* procedure in STATA 13.1.[423] The procedure executed a linear regression analysis. Option "*vce(cluster county_FIPS)*" was added to account for correlation in observations from the same county when estimating the standard error.[424]

The estimation procedure and results for the main model (Model 1) are presented in Figure A.14.15. The model coefficients show the expected signs and are statistically significant (at 95% or higher confidence level). The model adequately represents the variability of the dependent variable – county water use (R-squared = 0.97).

[423] StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.

[424] This option relaxes the usual OLS linear regression analysis requirement specifying that all the observations should be independent. See more in STATA. Undated. vce options — Variance estimators. Available online at: https://www.stata.com/manuals13/xtvce_options.pdf (Accessed January 2021.)

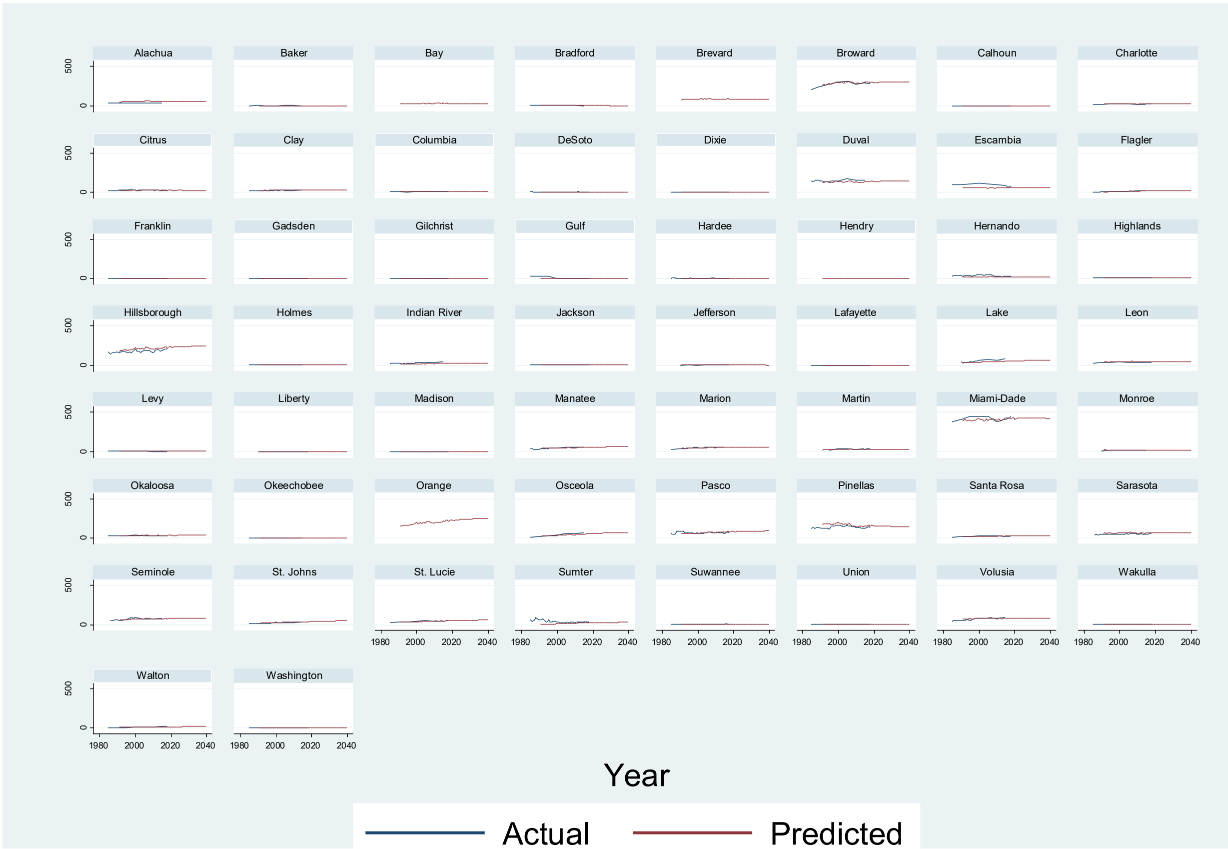
Figure A.14.15 Estimation Results – Main Model for PS, DSS, L/R, and CII Water Use

```
. generate lnPS_DSS_REC_CIIMnew =lnPS_DSS_REC_CIIM
(2979 missing values generated)

.
. replace lnPS_DSS_REC_CIIMnew=. if (county_FIPS == 12045 & Year <2001 ) | (county_FIPS == 12119 & Year < 2004 )
(22 real changes made, 22 to missing)

.
. regress  lnPS_DSS_REC_CIIMnew lnAdjPop000 lnpropAcFoodEmpl Year lnassumeCIIempl lnSpringTotPrec if  county_FIPS !=12043 &   county_FIPS !
> =12123 & county_FIPS !=12107 & county_FIPS !=12089  & county_FIPS !=12105 & county_FIPS !=12099 & county_FIPS !=12071 & county_FIPS !=120
> 21 & county_FIPS !=12047, vce(cluster county_FIPS)

Linear regression                                      Number of obs =     672
                                                       F(  5,    57) =  948.86
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.9679
                                                       Root MSE      =  .26061

                               (Std. Err. adjusted for 58 clusters in county_FIPS)
------------------------------------------------------------------------------------
                 |               Robust
lnPS_DSS_REC_C~w |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------+------------------------------------------------------------------
     lnAdjPop000 |    .863571   .0317367    27.21   0.000     .8000192    .9271227
lnpropAcFoodEmpl |   .1739068   .0506663     3.43   0.001     .0724492    .2753643
            Year |  -.0070855   .0024379    -2.91   0.005    -.0119674   -.0022037
 lnassumeCIIempl |   .1048757   .0294186     3.56   0.001      .045966    .1637855
 lnSpringTotPrec |  -.0615952   .0299184    -2.06   0.044    -.1215057   -.0016846
           _cons |      14.05   4.745349     2.96   0.004     4.547603     23.5524
------------------------------------------------------------------------------------
```

Actual and forecasted water use values for the counties included in Model 1 are shown in Figure A.14.16. Note that based on the model, future water use is projected to grow very slowly (if at all).

[See figure on following page]

Figure A.14.16 Actual and Forecasted Water Use in PS, DSS, L/R, and CII Categories: Main Model Results



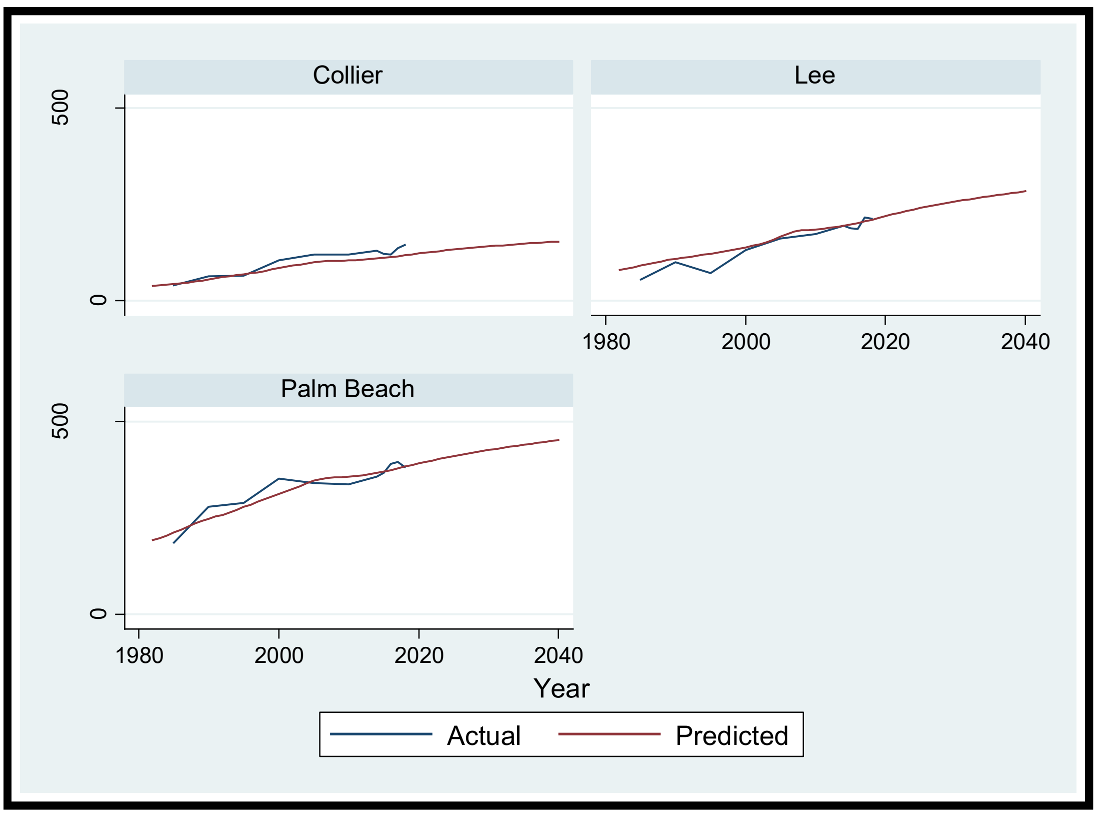
Model 2 was used to forecast the water use in three counties: Collier, Lee, and Palm Beach Counties. In these counties, water use variation can be almost entirely explained by population changes, with the model's R-squared being 0.93 (Figure 14.17). Figure 14.18 displays actual and projected water use levels for these three counties.

[See figure on following page]

Figure A.14.17 Estimation Results –Model 2 for PS, DSS, L/R, and CII Water Use (Lee, Collier, and Palm Beach Counties)

```
. regress  lnPS_DSS_REC_CIIM lnAdjPop000 if  county_FIPS ==12099 | county_FIPS ==12071 | county_FIPS ==12021, vce(cluster co
> unty_FIPS)

Linear regression                                      Number of obs =      33
                                                       F(  1,      2) =  149.99
                                                       Prob > F      =  0.0066
                                                       R-squared     =  0.9316
                                                       Root MSE      =  .16603

                                  (Std. Err. adjusted for 3 clusters in county_FIPS)
------------------------------------------------------------------------------
             |               Robust
lnPS_DSS_R~M |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 lnAdjPop000 |   .8659749   .0707093    12.25   0.007      .5617375    1.170212
       _cons |   -.343238   .5132708    -0.67   0.573     -2.551664    1.865188
------------------------------------------------------------------------------
```

Figure A.14.18 Actual and Forecasted Water Use in PS, DSS, L/R, and CII Categories: Model 2 (Lee, Collier, and Palm Beach Counties)

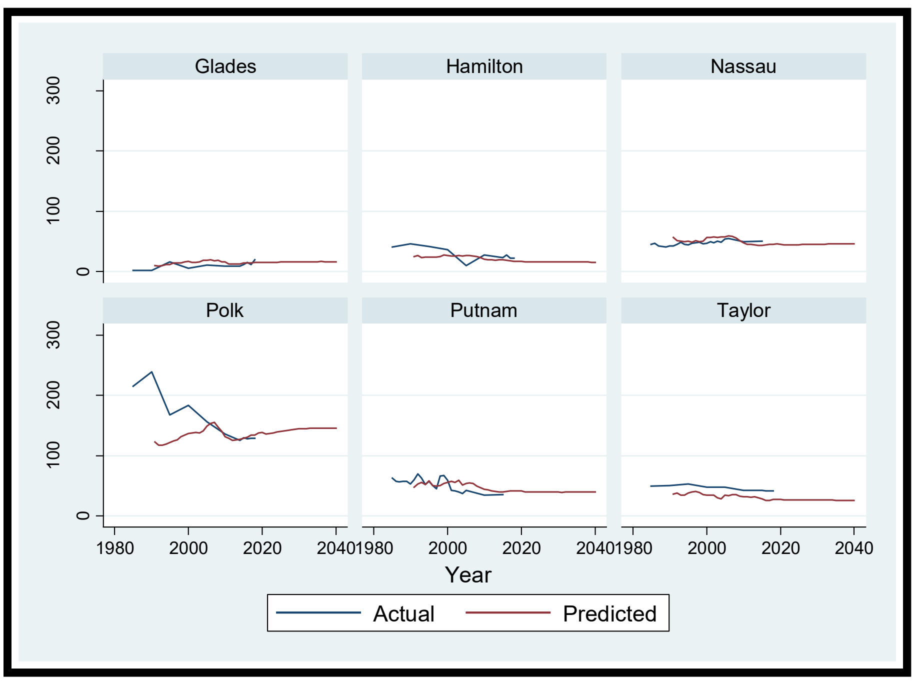


Finally, Model 3 was developed to examine water use in six counties dominated by CII water use: Glades, Hamilton, Nassau, Polk, Putnam, and Taylor. EDR considered various combinations of variables for the model. The model that performed the best is displayed in Figure A.14.19. While the R-squared is high, EDR plans to continue improving the model for the 2022 Edition of this report. Specifically, the counties included in Model 3 may be too different from each other, and a separate model may be needed for each county. Actual and predicted water uses for the counties are presented in Figure A.14.20.

Figure A.14.19 Estimation Results – Model 3 for PS, DSS, L/R, and CII Water Use (Glades, Hamilton, Nassau, Polk, Putnam, and Taylor Counties)

```
. regress  lnPS_DSS_REC_CIIM  lnAdjPop000 lnpropCONSTRemploy lnprop65 if county_FIPS ==12043 | county_FIPS ==12047 | county_FIPS ==12105 | county_FIPS ==
> 12107 | county_FIPS ==12123 |  county_FIPS ==12089 , vce(cluster county_FIPS)

Linear regression                               Number of obs =       69
                                                F(  3,      5) =    38.61
                                                Prob > F      =   0.0007
                                                R-squared     =   0.8191
                                                Root MSE      =   .31177

                                 (Std. Err. adjusted for 6 clusters in county_FIPS)
------------------------------------------------------------------------------------
                   |               Robust
 lnPS_DSS_REC_CIIM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------------+----------------------------------------------------------------
       lnAdjPop000 |   .4709921   .0663833     7.10   0.001      .3003483    .6416359
lnpropCONSTRemploy |   .3013461   .1257321     2.40   0.062     -.0218586    .6245508
          lnprop65 |  -.5632486     .25508    -2.21   0.078     -1.218953    .0924554
             _cons |    2.13046   .9947596     2.14   0.085     -.4266513    4.687571
------------------------------------------------------------------------------------
```

Figure A.14.20 Actual and Forecasted Water Use in PS, DSS, L/R, and CII Categories: Model 3 (Glades, Hamilton, Nassau, Polk, Putnam, and Taylor Counties)



County water use forecasts generated by the three models were combined to estimate water use for specific water supply planning regions.

Table A.14.1 PSS, DSS, L/R, and CII Water Use Projections and Forecasts

	2020	2025	2030	2035	2040
EDR Forecast					
NW – I	58.81	56.97	56.43	56.28	55.82
NW – II	92.51	96.44	99.87	103.22	105.51
NW – III	31.81	31.55	31.43	31.48	31.27
NW – IV	17.61	16.96	16.30	15.86	15.36
NW – V	5.11	4.90	4.76	4.67	4.53
NW – VI	6.86	6.54	6.22	5.99	5.75
NW – VII	53.25	53.39	53.11	53.17	52.81
SR – West	37.39	36.29	35.99	35.45	34.90
NFRWSP	453.14	456.13	455.09	457.13	456.10
SJR – CSEC	267.55	270.66	270.74	272.03	270.97
SW – N (excluding CFWI)	98.77	100.79	102.73	104.75	105.81
SW – TB	471.17	478.11	477.91	478.71	475.97
SW – H (excluding CFWI)	18.73	18.87	18.52	18.32	18.02
SW – S	139.81	147.18	149.98	153.26	155.16
CFWI	475.11	492.79	508.11	520.14	526.96
SF – LKB	12.11	12.29	12.35	12.41	12.35
SF – UEC	108.21	110.55	110.70	111.40	111.16
SF – LEC	1,113.30	1,158.04	1,169.21	1,182.41	1,187.56
SF – LWC	359.13	390.15	415.90	436.97	454.67
Statewide	*3,820.39*	*3,938.61*	*3,995.36*	*4,053.64*	*4,080.68*
Water Management Districts' Projections					
NW – I	77.68	82.17	83.50	84.24	84.83
NW – II	73.87	79.01	83.50	87.42	90.91
NW – III	55.92	58.00	59.91	61.71	63.55
NW – IV	16.81	17.30	17.65	17.87	18.09
NW – V	5.16	5.22	5.30	5.35	5.38
NW – VI	6.40	6.62	6.83	7.03	7.15
NW – VII	44.25	46.14	48.18	49.92	51.61
SR – West	57.23	58.61	60.04	61.28	62.75*
NFRWSP	416.09	439.37	460.48	480.01	503.70*
SJR – CSEC	252.21	263.90	272.98	282.53	292.34
SW – N (excluding CFWI)	121.11	130.56	138.71	146.37	153.09
SW – TB	366.88	388.24	394.25	409.74	423.31
SW – H (excluding CFWI)	19.99	20.46	29.91	29.76	26.97
SW – S	135.75	143.82	154.08	160.04	165.04
CFWI	567.05	620.54	665.86	701.03	732.83
SF – LKB	8.59	8.82	9.02	9.20	9.35
SF – UEC	89.28	95.83	101.95	107.61	112.83
SF – LEC	1,120.99	1,180.65	1,233.02	1,279.84	1,328.52
SF – LWC	394.98	428.51	460.23	489.04	516.45
Statewide	*3,830.25*	*4,073.79*	*4,285.39*	*4,469.98*	*4,648.70*
Difference between WMDs' and EDR projections					
NW – I	18.87	25.2	27.07	27.96	29.01
NW – II	-18.64	-17.43	-16.37	-15.8	-14.6
NW – III	24.11	26.45	28.48	30.23	32.28
NW – IV	-0.8	0.34	1.35	2.01	2.73
NW – V	0.05	0.32	0.54	0.68	0.85
NW – VI	-0.46	0.08	0.61	1.04	1.4
NW – VII	-9	-7.25	-4.93	-3.25	-1.2
SR – West	19.84	22.32	24.05	25.83	27.85
NFRWSP	-37.05	-16.76	5.39	22.88	47.6
SJR – CSEC	-15.34	-6.76	2.24	10.5	21.37
SW – N (excluding CFWI)	22.34	29.77	35.98	41.62	47.28
SW – TB	-104.29	-89.87	-83.66	-68.97	-52.66
SW – H (excluding CFWI)	1.26	1.59	11.39	11.44	8.95
SW – S	-4.06	-3.36	4.1	6.78	9.88
CFWI	91.94	127.75	157.75	180.89	205.87
SF – LKB	-3.52	-3.47	-3.33	-3.21	-3
SF – UEC	-18.93	-14.72	-8.75	-3.79	1.67
SF – LEC	7.69	22.61	63.81	97.43	140.96
SF – LWC	35.85	38.36	44.33	52.07	61.78
Statewide	***9.86***	***135.18***	***290.03***	***416.34***	***568.02***

* This value was projected by EDR using a trend from the WMDs' 2015-2035 estimates and projections.

** Font colors are used to indicate positive and negative differences between the WMDs' and EDR's projections.

A.15 Population and Water Use for the Counties Divided Between Water Supply Planning Regions

A special procedure was applied to the counties split among two or more supply planning regions. First, the county population distribution was assessed using census block information. The proportion of the population in each supply planning region was estimated. EDR further assumed that the population distribution would remain unchanged in the planning horizon. For example, suppose in 2019, 90% of a county's population resided in water supply planning region A, and 10% resided in Region B. It is assumed that the population distribution among the regions will remain at 90% and 10% for the planning horizon, regardless of population growth. The specific percentage assumed for each region and each county is presented in Table A.15.1.

[See table on following page]

Table A.15.1 Percent of County Population in Various Water Supply Planning Regions

	NWF REG I	NWF REG II	NWF REG III	NWF REG IV	NWF REG V	NWF REG VI	NWF REG VII	SR EX-NFRWSP	SJR CSEC	SW – H*	SW – N*	SW – S	SW – TB	SF LEC	SF LKB	SF LWC	SF UEC	CFWI	NFRWSP
Alachua	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Baker	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Bay	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Bradford	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Brevard	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Broward	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Calhoun	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Charlotte	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.15%	0.00%	0.00%	0.00%	0.85%	0.00%	0.00%	0.00%
Citrus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Clay	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Collier	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	99.99%	0.00%	0.00%	0.00%
Columbia	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
DeSoto	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dixie	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Duval	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Escambia	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Flagler	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Franklin	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gadsden	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Gilchrist	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Glades	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	32.08%	67.92%	0.00%	0.00%	0.00%
Gulf	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hamilton	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Hardee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hendry	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10.44%	0.00%	89.56%	0.00%	0.00%	0.00%
Hernando	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Highlands	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	91.31%	0.00%	0.00%	0.00%	0.00%	8.69%	0.00%	0.00%	0.00%	0.00%
Hillsborough	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Holmes	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Indian River	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Jackson	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Jefferson	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	67.64%	32.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lafayette	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Lake	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	64.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	35.12%	0.00%
Lee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Leon	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Levy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	42.96%	0.00%	0.00%	57.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Liberty	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Madison	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Manatee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Marion	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	68.59%	0.00%	31.41%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Martin	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
Miami-Dade	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Monroe	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.99%	0.00%	0.01%	0.00%	0.00%	0.00%
Nassau	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Okaloosa	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Okeechobee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.59%	0.00%	0.00%	0.00%	0.00%	0.00%	91.95%	0.00%	5.46%	0.00%	0.00%
Orange	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Osceola	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Palm Beach	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pasco	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Pinellas	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Polk	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Putnam	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Santa Rosa	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sarasota	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Seminole	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
St. Johns	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
St. Lucie	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%
Sumter	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Suwannee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Taylor	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Union	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Volusia	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Wakulla	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Walton	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Washington	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

*excluding CFWI

A.16 PG Water Use: Data and Model Estimation

For Power Generation water use, historical data from the USGS and WMDs showed that for most of the counties, PG water use was zero. It was assumed that the withdrawal would remain at zero into the future. For several counties, no specific patterns in historical water use were identified, and therefore, future water use is assumed to be equal to average historical use (see Table A.16.1).

Table A.16.1 Assumptions about PG Water Use

County FIPS	County Name	Estimated Water Use Value (mgd)	Notes
12001	Alachua	2.34	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12003	Baker	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12005	Bay	4.60	Average; WMD data for 2016-2018
12007	Bradford	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12009	Brevard	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12011	Broward	0.00	Average; WMD data for 2014-2018
12013	Calhoun	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12015	Charlotte	0.00	Average; WMD data for 2014-2018
12017	Citrus	Varies	Based on regression analysis, see description below
12019	Clay	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12021	Collier	0.00	Average; WMD data for 2014-2018
12023	Columbia	0.00	Average; WMD data for 2016-2018
12027	DeSoto	Varies	Based on regression analysis, see description below
12029	Dixie	0.00	Average; WMD data for 2016-2018
12031	Duval	5.19	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12033	Escambia	9.71	Average; WMD data for 2016-2018
12035	Flagler	0.00	Average; WMD data for 2016-2018
12037	Franklin	0.00	Average; WMD data for 2016-2018
12039	Gadsden	0.00	Average; WMD data for 2016-2018
12041	Gilchrist	0.00	Average; WMD data for 2016-2018
12043	Glades	0.00	Average; WMD data for 2014-2018
12045	Gulf	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12047	Hamilton	0.00	Average; WMD data for 2016-2018
12049	Hardee	Varies	Based on regression analysis, see description below
12051	Hendry	0.00	Average; WMD data for 2014-2018
12053	Hernando	Varies	Based on regression analysis, see description below
12055	Highlands	0.00	Average; WMD data for 2014-2018
12057	Hillsborough	0.00	Average; WMD data for 2002-2018
12059	Holmes	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12061	Indian River	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12063	Jackson	1.41	Average; WMD data for 2016-2018
12065	Jefferson	0.00	Average; WMD data for 2016-2018
12067	Lafayette	0.00	Average; WMD data for 2016-2018
12069	Lake	0.24	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12071	Lee	0.36	Average; WMD data for 2014-2018
12073	Leon	2.50	Average; WMD data for 2016-2018
12075	Levy	0.00	Average; WMD data for 2016-2018
12077	Liberty	0.48	Average; WMD data for 2016-2018
12079	Madison	0.00	Average; WMD data for 2016-2018
12081	Manatee	4.58	Average; WMD data for 2006-2018
12083	Marion	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12085	Martin	7.50	Average; WMD data for 2014-2018
12086	Miami-Dade	7.92	Average; WMD data for 2014-2018
12087	Monroe	0.00	Average; WMD data for 2014-2018
12089	Nassau	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12091	Okaloosa	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12093	Okeechobee	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12095	Orange	0.59	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12097	Osceola	Varies	Based on regression analysis, see description below
12099	Palm Beach	1.18	Average; WMD data for 2014-2018
12101	Pasco	Varies	Based on regression analysis, see description below
12103	Pinellas	0.00	Average; WMD data for 1991-2018
12105	Polk	6.16	Average; WMD data for 2014-2018
12107	Putnam	17.79	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12109	St Johns	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12111	St Lucie	1.35	Average; WMD data for 2014-2018
12113	Santa Rosa	0.14	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12115	Sarasota	0.00	Average; WMD data for 2002-2018
12117	Seminole	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12119	Sumter	0.00	Average; WMD data for 1991-2018
12121	Suwannee	0.04	Average; WMD data for 2016-2018
12123	Taylor	0.00	Average; WMD data for 2016-2018
12125	Union	0.00	Average; WMD data for 2016-2018
12127	Volusia	3.99	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12129	Wakulla	0.29	Average; WMD data for 2016-2018
12131	Walton	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)
12133	Washington	0.00	Average water use in 2000, 2005, 2010, and 2015 (freshwater withdrawals for closed loop systems, USGS)

For the following six counties, regression analysis was applied to forecast PG water use: Citrus, DeSoto, Hardee, Hernando, Osceola, and Pasco. The figures below illustrate the model specifications and the forecasts produced for each county. Regression models include such variables as county population, employment in manufacturing, mining, and utility industries; and time trend.

Figure A.16.1 Citrus County: PG Water Use Regression Model

```
. regress lnPGnum_WMDCorrect  AdjPop000   if county_FIPS == 12017&Year >=1995

      Source |       SS           df       MS      Number of obs   =        24
-------------+----------------------------------   F(1, 22)        =     25.59
       Model |  5.54913646         1  5.54913646   Prob > F        =    0.0000
    Residual |  4.76975973        22  .216807261   R-squared       =    0.5378
-------------+----------------------------------   Adj R-squared   =    0.5168
       Total |  10.3188962        23  .448647661   Root MSE        =    .46563

------------------------------------------------------------------------------
lnPGnum_WM~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   AdjPop000 |   .0378208   .0074758     5.06   0.000      .022317    .0533245
       _cons |  -4.745844   .9831484    -4.83   0.000    -6.784769   -2.706919
------------------------------------------------------------------------------
```

Figure A.16.2 Citrus County: Actual and Forecasted PG Water Use

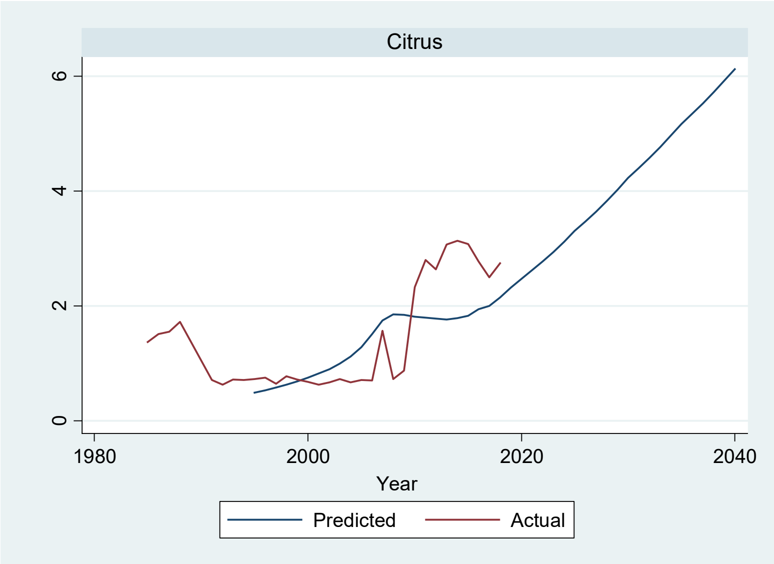
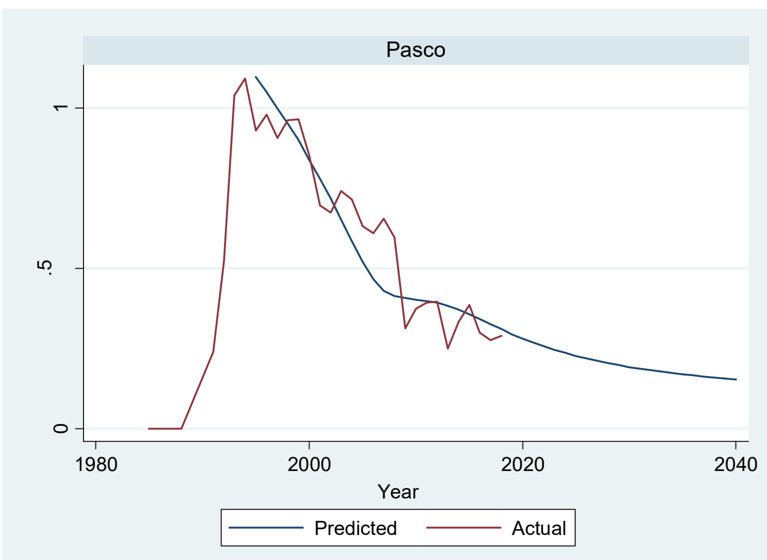


Figure A.16.3 Pasco County: PG Water Use Regression Model

```
. regress lnPGnum_WMDCorrect  lnAdjPop000   if county_FIPS == 12101 & Year >=1995

      Source |       SS       df       MS              Number of obs =      24
-------------+------------------------------           F(  1,    22) =  103.14
       Model |  4.04776825     1  4.04776825           Prob > F      =  0.0000
    Residual |  .86343173    22  .039246897           R-squared     =  0.8242
-------------+------------------------------           Adj R-squared =  0.8162
       Total |  4.91119998    23  .213530434           Root MSE      =  .19811

------------------------------------------------------------------------------
lnPGnum_WM~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 lnAdjPop000 |  -2.463202   .2425465   -10.16   0.000    -2.966213   -1.960192
       _cons |   14.21544   1.461377     9.73   0.000     11.18473    17.24615
------------------------------------------------------------------------------
```

Figure A.16.4 Pasco County: Actual and Forecasted PG Water Use

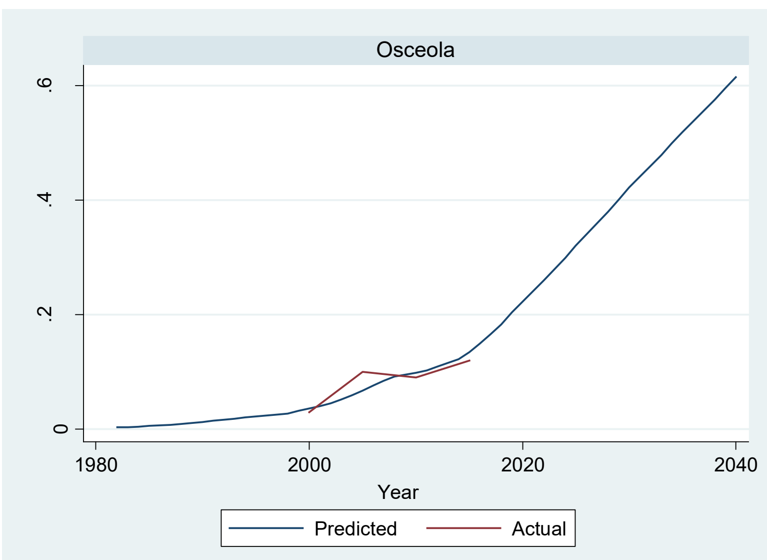


[See figure on following page]

Figure A.16.5 Osceola County: PG Water Use Regression Model

```
. regress lnTEPG_CL_F_total1 lnAdjPop000   if county_FIPS == 12097

      Source |       SS       df       MS              Number of obs =       4
-------------+------------------------------           F(  1,      2) =    9.07
       Model |  .963769746     1  .963769746           Prob > F      =  0.0949
    Residual |  .212583877     2  .106291939           R-squared     =  0.8193
-------------+------------------------------           Adj R-squared =  0.7289
       Total |  1.17635362     3  .392117874           Root MSE      =  .32602

------------------------------------------------------------------------------
lnTEPG_CL_~1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 lnAdjPop000 |   2.266913   .7528325     3.01   0.095    -.9722639     5.50609
       _cons |  -14.99583   4.125027    -3.64   0.068    -32.74439    2.752732
------------------------------------------------------------------------------
```

Figure A.16.6 Osceola County: Actual and Forecasted PG Water Use

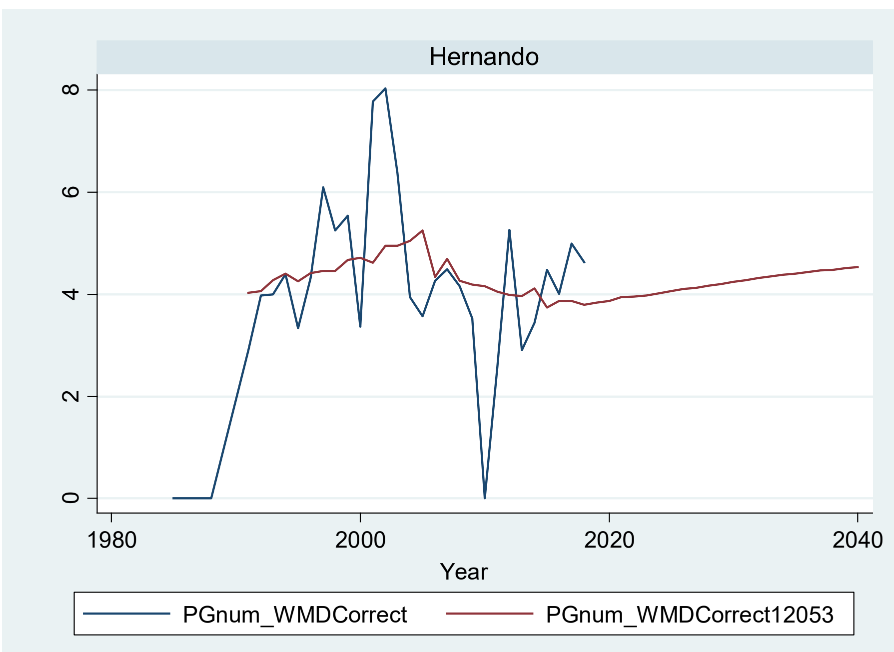


[See figure on following page]

Figure A.16.7 Hernando County: PG Water Use Regression Model

```
. * 12053Hernando

. regress lnPGnum_WMDCorrectPerCap  lnassumeCIIempl if county_FIPS == 12053& Year >= 1990

      Source |       SS           df       MS      Number of obs   =        27
-------------+----------------------------------   F(1, 25)        =     19.46
       Model |  1.4007187         1  1.4007187     Prob > F        =    0.0002
    Residual |  1.79930229       25  .071972092    R-squared       =    0.4377
-------------+----------------------------------   Adj R-squared   =    0.4152
       Total |  3.20002099       26  .12307773     Root MSE        =    .26828

------------------------------------------------------------------------------
lnPGnum_WMDCo~p |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
lnassumeCIIempl |    .488791   .1107975     4.41   0.000     .2605994    .7169827
          _cons |  -2.865352   .1560713   -18.36   0.000    -3.186786   -2.543917
------------------------------------------------------------------------------
```

Figure A.16.8 Hernando County: Actual and Forecasted PG Water Use

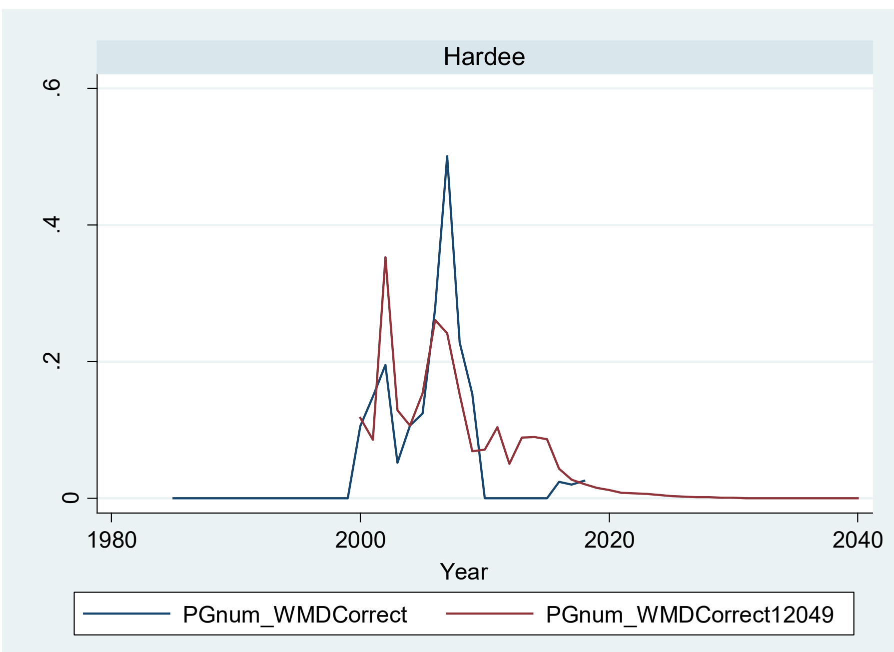


[See figure on following page]

Figure A.16.9 Hardee County: PG Water Use Regression Model

```
. ** Hardee 12049

. regress lnPGnum_WMDCorrect  Year  assumeCIIempl   if county_FIPS == 12049& Year >= 2000

      Source |       SS       df       MS              Number of obs =      13
-------------+------------------------------           F(  2,     10) =   12.82
       Model |  8.6524181     2  4.32620905           Prob > F      =  0.0017
    Residual | 3.37333441    10  .337333441           R-squared     =  0.7195
-------------+------------------------------           Adj R-squared =  0.6634
       Total | 12.0257525    12  1.00214604           Root MSE      =   .5808

------------------------------------------------------------------------------
lnPGnum_WMD~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        Year |  -.3268659   .0727705    -4.49   0.001    -.4890086   -.1647231
assumeCIIempl |  -46.69853   14.26878    -3.27   0.008    -78.49136   -14.90571
       _cons |   663.7562   148.8812     4.46   0.001     332.0282    995.4842
------------------------------------------------------------------------------
```

Figure A.16.10 Hardee County: Actual and Forecasted PG Water Use

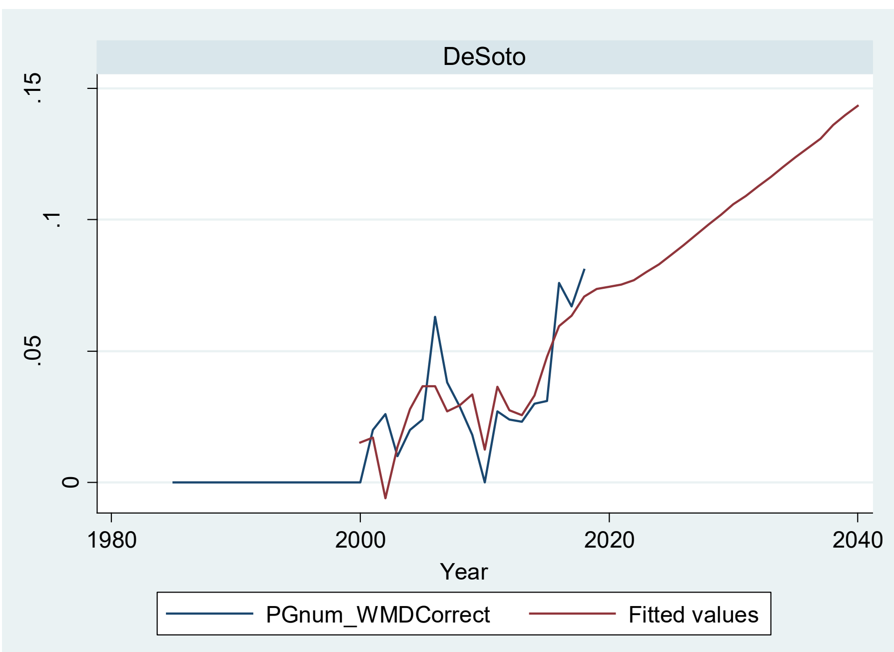


[See table on following page]

Figure A.16.11 DeSoto County: PG Water Use Regression Model

```
. regress PGnum_WMDCorrect  GDP assumeCIIempl  if county_FIPS == 12027 & Year >= 2000

      Source |       SS           df       MS      Number of obs   =        19
-------------+----------------------------------   F(2, 16)        =     14.52
       Model |  .006356785         2  .003178392   Prob > F        =    0.0003
    Residual |  .003502162        16  .000218885   R-squared       =    0.6448
-------------+----------------------------------   Adj R-squared   =    0.6004
       Total |  .009858947        18  .000547719   Root MSE        =    .01479

------------------------------------------------------------------------------
PGnum_WMDCo~t |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+----------------------------------------------------------------
          GDP |   .0000492   .0000265     1.86   0.082    -6.91e-06    .0001054
assumeCIIempl |   1.829313   .4555424     4.02   0.001     .8636057    2.795019
        _cons |  -.0594688   .0197692    -3.01   0.008    -.1013775     -.01756
------------------------------------------------------------------------------
```

Figure A.16.12 DeSoto County: Actual and Forecasted PG Water Use



[See table on following page]

Table A.16.2 PG: WMDs' Water Use Projections and EDR Forecasts

	2020	2025	2030	2035	2040
EDR Forecast					
NW – I	9.71	9.71	9.71	9.71	9.71
NW – II	0.00	0.00	0.00	0.00	0.00
NW – III	4.60	4.60	4.60	4.60	4.60
NW – IV	1.90	1.90	1.90	1.90	1.90
NW – V	0.00	0.00	0.00	0.00	0.00
NW – VI	0.00	0.00	0.00	0.00	0.00
NW – VII	2.79	2.79	2.79	2.79	2.79
SR – West	0.00	0.00	0.00	0.00	0.00
NFRWSP	25.47	25.47	25.47	25.47	25.47
SJR – CSEC	3.99	3.99	3.99	3.99	3.99
SW – N (excluding CFWI)	6.25	7.36	8.47	9.57	10.66
SW – TB	0.28	0.23	0.19	0.17	0.15
SW – H (excluding CFWI)	0.01	0.00	0.00	0.00	0.00
SW – S	6.00	6.02	6.04	6.05	6.07
CFWI	6.97	7.07	7.17	7.27	7.36
SF – LKB	0.00	0.00	0.00	0.00	0.00
SF – UEC	7.50	7.50	7.50	7.50	7.50
SF – LEC	9.10	9.10	9.10	9.10	9.10
SF – LWC	0.36	0.36	0.36	0.36	0.36
Statewide	*84.93*	*86.1*	*87.29*	*88.48*	*89.66*
Water Management Districts' Projections					
NW – I	12.09	12.09	12.09	12.09	12.09
NW – II	0.00	0.00	0.00	0.00	0.00
NW – III	5.82	6.99	8.39	8.39	8.42
NW – IV	2.32	2.32	2.32	2.32	2.32
NW – V	0.00	0.00	0.00	0.00	0.00
NW – VI	0.00	0.00	0.00	0.00	0.00
NW – VII	4.93	4.93	4.93	4.93	4.93
SR – West	0.00	0.00	0.00	0.00	0.00
NFRWSP	29.56	30.38	32.08	33.88	36.05
SJR – CSEC	12.14	12.26	12.42	12.59	12.62
SW – N (excluding CFWI)	1.80	1.85	1.96	2.08	2.21
SW – TB	0.34	0.35	0.36	0.37	0.38
SW – H (excluding CFWI)	0.00	0.00	0.00	0.00	0.00
SW – S	3.69	3.92	4.17	4.40	4.64
CFWI	11.00	11.06	11.13	11.19	11.27
SF – LKB	0.00	0.00	0.00	0.00	0.00
SF – UEC	21.20	22.20	23.20	39.20	55.20
SF – LEC	39.75	39.75	52.75	52.75	52.75
SF – LWC	0.40	0.40	0.40	15.40	15.40
Statewide	*145.04*	*148.50*	*166.20*	*199.59*	*218.28*
Difference between WMDs' and EDR projections					
NW – I	2.38	2.38	2.38	2.38	2.38
NW – II	0.00	0.00	0.00	0.00	0.00
NW – III	1.22	2.39	3.79	3.79	3.82
NW – IV	0.42	0.42	0.42	0.42	0.42
NW – V	0.00	0.00	0.00	0.00	0.00
NW – VI	0.00	0.00	0.00	0.00	0.00
NW – VII	2.14	2.14	2.14	2.14	2.14
SR – West	0.00	0.00	0.00	0.00	0.00
NFRWSP	4.09	4.91	6.61	8.41	10.58
SJR – CSEC	8.15	8.27	8.43	8.60	8.63
SW – N (excluding CFWI)	-4.45	-5.51	-6.51	-7.49	-8.45
SW – TB	0.06	0.12	0.17	0.20	0.23
SW – H (excluding CFWI)	-0.01	0.00	0.00	0.00	0.00
SW – S	-2.31	-2.10	-1.87	-1.65	-1.43
CFWI	4.03	3.99	3.96	3.92	3.91
SF – LKB	0.00	0.00	0.00	0.00	0.00
SF – UEC	13.70	14.70	15.70	31.70	47.70
SF – LEC	30.65	30.65	43.65	43.65	43.65
SF – LWC	0.04	0.04	0.04	15.04	15.04
Statewide	***60.11***	***62.40***	***78.91***	***111.11***	***128.62***

* This value was projected by EDR using a trend from the WMDs' 2015-2035 estimates and projections.

** Font colors are used to indicate positive and negative differences between the WMDs' and EDR's projections.

A.17 Comparison of EDR and WMD Statewide Water Use Projections

Table A.17.1 Total Water Use Projections and Forecasts

	2020	2025	2030	2035	2040
EDR Forecast					
NW – II	95.45	99.92	103.91	107.72	110.69
NW – Oth	239.54	237.84	237.13	238.03	237.77
SR – West	93.87	97.69	101.88	105.52	109.39
NFRWSP	633.66	643.04	647.18	654.96	659.77
SJR – CSEC	382.09	384.58	383.55	384.34	382.53
SW – N (excluding CFWI)	130.47	136.10	141.41	147.45	152.26
SW – TB	526.66	532.20	531.11	530.33	525.79
SW – H (excluding CFWI)	121.35	120.52	119.52	118.59	117.63
SW – S	315.47	325.00	330.15	336.22	340.58
CFWI	623.35	638.38	652.36	664.38	670.75
SF – LKB	133.45	134.72	135.76	136.73	137.08
SF – UEC	237.80	234.67	229.24	224.75	219.45
SF – LEC	1,781.74	1,806.00	1,815.05	1,825.68	1,828.11
SF – LWC	700.31	734.36	762.43	788.21	809.08
Statewide	***6,015.22***	***6,125.03***	***6,190.67***	***6,262.87***	***6,300.87***
Water Management Districts' Projections					
NW – I	93.55	98.57	100.55	101.9	103.08
NW – II	76.87	82.25	87.02	91.19	94.88
NW – III	62.64	65.9	69.23	71.05	72.94
NW – IV	49.77	52.53	54.48	56.73	58.86
NW – V	5.41	5.47	5.55	5.6	5.63
NW – VI	11.79	12.18	12.54	12.91	13.18
NW – VII	50.57	52.46	54.59	56.4	58.21
SR – West	106.53	110.92	116.69	122.35	127.54
NFRWSP	585.06	612.7	641.36	667.47	696.57
SJR – CSEC	383.47	395.62	406.11	416.72	427.87
SW – N (excluding CFWI)	142.49	153.55	163.54	173.09	181.73
SW – TB	413.34	432.77	436.96	450.56	461.85
SW – H (excluding CFWI)	91.52	89.45	96.17	94.96	89.15
SW – S	245.02	254.22	265.77	272.99	279.33
CFWI	735.24	789.49	836.65	873.94	907.59
SF – LKB	249.9	251.83	253.68	253.83	257.49
SF – UEC	279.15	288.89	298.46	325.38	354.68
SF – LEC	1,813.99	1,863.91	1,923.28	1,963.65	2,006.54
SF – LWC	1,030.31	1,073.57	1,113.64	1,170.36	1,210.68
Statewide	***6,426.62***	***6,686.29***	***6,936.25***	***7,181.07***	***7,407.80***
Difference between WMDs' and EDR projections					
NW – I	22.33	28.72	30.79	31.88	33.09
NW – II	-18.58	-17.67	-16.89	-16.53	-15.81
NW – III	25.33	28.85	32.30	34.07	36.16
NW – IV	-5.35	-2.83	-1.08	0.41	1.91
NW – V	-0.01	0.26	0.48	0.61	0.78
NW – VI	-1.05	-0.41	0.24	0.78	1.23
NW – VII	-7.06	-5.32	-2.92	-1.19	0.96
SR – West	12.66	13.23	14.81	16.83	18.15
NFRWSP	-48.60	-30.34	-5.82	12.51	36.80
SJR – CSEC	1.38	11.04	22.56	32.38	45.34
SW – N (excluding CFWI)	12.02	17.45	22.13	25.64	29.47
SW – TB	-113.32	-99.43	-94.15	-79.77	-63.94
SW – H (excluding CFWI)	-29.83	-31.07	-23.35	-23.63	-28.48
SW – S	-70.45	-70.78	-64.38	-63.23	-61.25
CFWI	111.89	151.11	184.29	209.56	236.84
SF – LKB	116.45	117.11	117.92	117.10	120.41
SF – UEC	41.35	54.22	69.22	100.63	135.23
SF – LEC	32.25	57.91	108.23	137.97	178.43
SF – LWC	330.00	339.21	351.21	382.15	401.60
Statewide	***411.40***	***561.26***	***745.58***	***918.20***	***1,106.93***

** Font colors are used to indicate positive and negative differences between the WMDs' and EDR's projections.

Appendix B: Miscellaneous Tables

Table B.1 Natural Resource Survey Response Rate and Shares Used for Non-Responding Governments

Account	Gov. Type	Responded	Surveyed	Share Responded	Land Management	Land Acquisition	Water Supply	Water Quality
343.700	County	11	20	55.00%	2.34%	1.80%	0.00%	24.42%
	Municipality	13	50	26.00%	0.88%	0.00%	0.00%	30.36%
	Local SD	2	4	50.00%	0.00%	0.00%	0.00%	4.44%
	Regional SD	2	3	66.67%	0.00%	0.00%	0.00%	0.00%
537	County	29	65	44.62%	7.75%	10.77%	2.24%	20.96%
	Municipality	13	41	31.71%	5.43%	0.00%	3.56%	31.06%
	Local SD	10	29	34.48%	0.48%	26.29%	8.28%	35.45%
	Regional SD	1	3	33.33%	33.10%*	0.00%*	1.83%*	37.29%*
572	County	29	65	44.62%	6.69%	0.00%	0.00%	0.82%
	Municipality	98	320	30.63%	1.29%	0.47%	1.20%	5.07%
	Local SD	86	142	60.56%	0.00%	0.00%	0.00%	0.00%
	Regional SD	0	1	0.00%	0.00%**	0.00%**	0.00%**	0.00%**

Note: All governmental entities with revenues or expenditures in excess of $10,000 reported in the listed accounts were surveyed. Overall response rates were as follows: Counties 30/66 (45.45%), Municipalities 99/327 (30.28%), Local Special Districts 98/174 (56.32%), and Regional Special Districts 3/7 (42.86%).
*Shares from the 2019 Edition were used for Account 537 regional special districts. The single respondent indicated 100% land management, similar to their response from previous years. Previous year shares from other districts indicate this was not representative.
**With no response from the regional special district, the shares from the local special districts was used.

Table B.2 Remaining Financial Account Data Not Allocated to Water Resources or Conservation Lands (in $millions)

Revenue Account 343.700	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
County	$6.60	$7.29	$7.75	$8.18	$10.99
Municipality	$50.90	$57.68	$52.14	$56.14	$45.27
Local SD	$8.48	$1.00	$0.76	$1.04	$1.16
Regional SD	$0.87	$0.16	$0.13	$0.17	$0.18
Expenditure Accounts 537 + 572	**LFY 13-14**	**LFY 14-15**	**LFY 15-16**	**LFY 16-17**	**LFY 17-18**
County	$851.59	$864.38	$922.71	$923.35	$1,103.89
Municipality	$1,013.29	$1,091.71	$1,250.64	$1,267.69	$1,333.45
Local SD	$98.86	$105.97	$115.42	$144.85	$161.45
Regional SD	$2.66	$2.85	$3.43	$3.78	$2.87

Table B.3 Survey Results for Account 343.700 Revenues Historically Allocated to Conservation Land Acquisition and Management (in $millions)

Conservation Land Acquisition	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
County	$0.34	$0.52	$0.84	$0.68	$0.28
Municipality	$-	$-	$-	$-	$-
Local SD	$-	$-	$-	$-	$-
Regional SD	$-	$-	$-	$-	$-

Conservation Land Management	LFY 13-14	LFY 14-15	LFY 15-16	LFY 16-17	LFY 17-18
County	$0.18	$0.27	$0.41	$0.54	$0.36
Municipality	$0.28	$0.26	$0.25	$0.26	$0.58
Local SD	$0.07	$0.01	$0.01	$0.01	$-
Regional SD	$-	$-	$-	$-	$-

Figure B.1 Northwest Florida Potential Conservation Land Acquisition

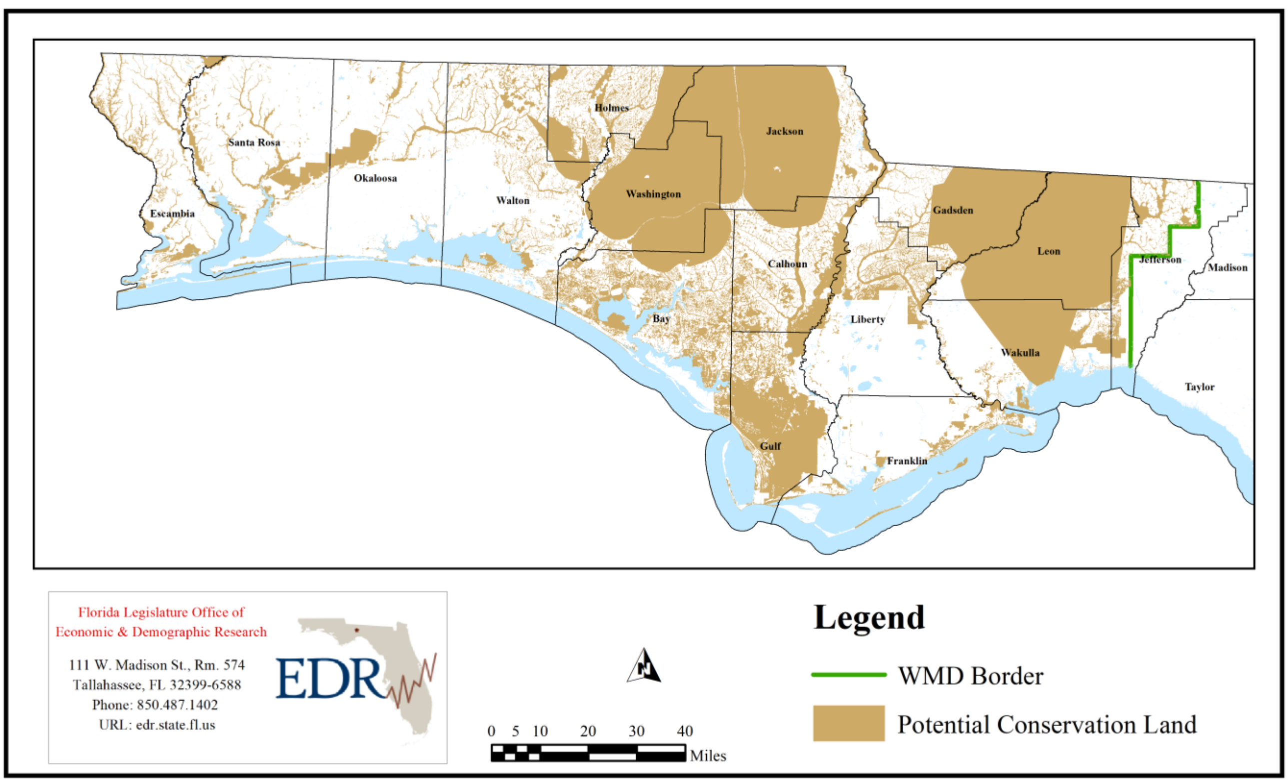


Table B.4 Corrected Table 2.3.1 from the 2020 Edition

County	Potential Tax Collection from all Conservation Land		Actual Tax Collection on Conservation Land		Impact on Tax Collection from Conservation Land		Implied Share of Tax Base Lost	
	County Tax	School Tax	County Tax	School Tax	County Tax	School Tax	County Base	School Base
Alachua	$8.50	$5.38	$0.22	$0.15	$8.27	$5.23	4.99%	4.40%
Baker	$1.18	$0.83	$0.02	$0.01	$1.17	$0.81	14.31%	12.62%
Bay	$13.46	$14.87	$0.02	$0.03	$13.44	$14.84	14.56%	13.65%
Bradford	$0.10	$0.07	$0.00	$0.00	$0.10	$0.06	1.36%	1.20%
Brevard	$9.78	$9.14	$0.14	$0.14	$9.64	$9.00	3.80%	3.39%
Broward	$21.49	$19.86	$0.13	$0.17	$21.36	$19.69	1.51%	1.39%
Calhoun	$0.09	$0.06	$0.00	$0.00	$0.09	$0.06	3.11%	2.75%
Charlotte	$2.44	$1.60	$0.02	$0.01	$2.43	$1.59	1.53%	1.38%
Citrus	$5.92	$4.21	$0.11	$0.09	$5.81	$4.12	7.79%	6.98%
Clay	$2.60	$2.27	$0.03	$0.03	$2.57	$2.24	2.93%	2.61%
Collier	$20.98	$21.13	$7.13	$8.46	$13.84	$12.67	2.92%	2.52%
Columbia	$1.66	$1.10	$0.03	$0.02	$1.62	$1.08	6.82%	6.06%
DeSoto	$2.64	$1.45	$0.03	$0.02	$2.61	$1.44	16.13%	14.52%
Dixie	$2.57	$1.19	$0.09	$0.04	$2.48	$1.14	28.94%	27.78%
Duval	$16.51	$8.91	$0.19	$0.11	$16.33	$8.80	2.25%	2.04%
Escambia	$24.01	$19.36	$0.12	$0.10	$23.89	$19.26	16.38%	14.91%
Flagler	$0.75	$0.51	$0.06	$0.04	$0.69	$0.47	0.85%	0.75%
Franklin	$2.93	$2.60	$0.12	$0.11	$2.82	$2.49	18.75%	17.34%
Gadsden	$0.17	$0.12	$0.00	$0.00	$0.17	$0.12	1.64%	1.44%
Gilchrist	$0.36	$0.20	$0.01	$0.01	$0.35	$0.19	5.76%	5.04%
Glades	$4.70	$2.23	$0.09	$0.04	$4.61	$2.19	39.70%	37.76%
Gulf	$2.99	$2.47	$0.03	$0.03	$2.96	$2.45	19.88%	18.68%
Hamilton	$0.58	$0.35	$0.01	$0.01	$0.57	$0.34	11.89%	10.93%
Hardee	$0.30	$0.19	$0.05	$0.03	$0.25	$0.16	2.85%	2.59%
Hendry	$8.03	$3.93	$0.09	$0.04	$7.94	$3.89	29.34%	27.64%
Hernando	$3.94	$2.42	$0.03	$0.02	$3.91	$2.40	4.64%	3.99%
Highlands	$1.60	$1.11	$0.15	$0.10	$1.46	$1.01	3.55%	3.20%
Hillsborough	$17.60	$10.45	$0.11	$0.07	$17.49	$10.38	1.78%	1.62%
Holmes	$0.23	$0.15	$0.00	$0.00	$0.23	$0.15	6.04%	5.15%
Indian River	$3.35	$2.85	$0.06	$0.06	$3.29	$2.80	2.33%	2.17%
Jackson	$0.88	$0.67	$0.01	$0.01	$0.88	$0.66	8.38%	7.67%
Jefferson	$0.71	$0.54	$0.01	$0.01	$0.70	$0.53	15.48%	13.75%
Lafayette	$0.62	$0.37	$0.00	$0.00	$0.61	$0.37	22.36%	20.52%
Lake	$3.37	$3.08	$0.10	$0.10	$3.27	$2.98	2.05%	1.81%
Lee	$4.27	$3.56	$0.07	$0.07	$4.20	$3.50	0.72%	0.65%
Leon	$2.77	$1.93	$0.03	$0.02	$2.75	$1.91	1.87%	1.73%
Levy	$3.63	$2.35	$0.11	$0.07	$3.53	$2.28	18.96%	17.10%
Liberty	$3.67	$2.38	$0.01	$0.01	$3.67	$2.38	70.90%	68.39%
Madison	$0.25	$0.14	$0.01	$0.00	$0.24	$0.14	4.18%	3.79%
Manatee	$1.18	$1.08	$0.03	$0.03	$1.15	$1.05	0.41%	0.38%
Marion	$7.53	$6.56	$0.10	$0.09	$7.43	$6.46	5.01%	4.49%
Martin	$7.81	$5.14	$0.26	$0.18	$7.55	$4.96	3.63%	3.38%
Miami-Dade	$27.73	$24.50	$0.61	$0.59	$27.12	$23.92	1.14%	1.03%
Monroe	$11.58	$9.19	$0.98	$0.97	$10.60	$8.22	8.31%	7.55%
Nassau	$2.01	$1.31	$0.01	$0.01	$2.00	$1.30	2.40%	2.21%
Okaloosa	$5.92	$7.12	$0.35	$0.42	$5.58	$6.70	5.77%	5.36%
Okeechobee	$2.77	$1.95	$0.11	$0.08	$2.65	$1.87	15.99%	14.55%
Orange	$5.01	$4.89	$0.05	$0.05	$4.96	$4.85	0.51%	0.47%
Osceola	$9.30	$6.97	$0.08	$0.06	$9.22	$6.91	3.98%	3.66%
Palm Beach	$21.78	$18.32	$0.21	$0.19	$21.56	$18.13	1.32%	1.24%
Pasco	$2.82	$1.75	$0.21	$0.13	$2.61	$1.62	0.97%	0.87%
Pinellas	$4.22	$3.03	$0.03	$0.02	$4.19	$3.00	0.57%	0.52%
Polk	$2.15	$1.61	$0.50	$0.39	$1.65	$1.22	0.65%	0.57%
Putnam	$2.46	$1.34	$0.05	$0.03	$2.42	$1.31	7.37%	6.61%
Santa Rosa	$6.81	$6.29	$0.09	$0.09	$6.72	$6.20	9.62%	8.63%
Sarasota	$4.57	$5.95	$0.03	$0.04	$4.54	$5.91	1.39%	1.31%
Seminole	$1.25	$1.07	$0.13	$0.11	$1.12	$0.96	0.47%	0.43%
St. Johns	$20.70	$16.32	$1.04	$0.85	$19.66	$15.47	8.50%	7.88%
St. Lucie	$5.28	$2.55	$0.18	$0.09	$5.10	$2.46	2.14%	1.85%
Sumter	$6.39	$4.96	$0.03	$0.03	$6.36	$4.93	7.07%	6.37%
Suwannee	$0.40	$0.26	$0.03	$0.02	$0.36	$0.24	2.88%	2.57%
Taylor	$0.53	$0.39	$0.01	$0.00	$0.52	$0.39	7.07%	6.45%
Union	$0.07	$0.04	$0.00	$0.00	$0.07	$0.04	3.05%	2.63%
Volusia	$6.65	$4.34	$0.34	$0.24	$6.31	$4.10	1.99%	1.76%
Wakulla	$3.72	$2.90	$0.01	$0.01	$3.71	$2.89	29.56%	26.43%
Walton	$9.32	$9.71	$0.04	$0.05	$9.27	$9.65	8.72%	8.25%
Washington	$0.48	$0.33	$0.01	$0.01	$0.47	$0.32	7.64%	6.79%
Statewide	$382.06	$305.88	$14.94	$15.04	$367.12	$290.85	2.42%	2.15%

Appendix C: Additional Resources Regarding Necessary Infrastructure Investments

The following are the appendices related to Chapter 6.

C.1 Wastewater Utility Survey Draft

Contact & Location Information

Please provide your contact and location information, then proceed to the survey on the next worksheet.

- Utility Name:
- Contact Name:
- Contact Position/Title:
- Email Address:
- Phone Number:
- Please list any Facility IDs assigned to wastewater treatment facilities owned or operated by your utility:
- Indicate which Water Management District(s) boundaries your service area is located in.
  - NWFWMD
  - SRWMD
  - SJRWMD
  - SWFWMD
  - SFWMD
- What type of entity owns your utility?
  - Municipality
  - County
  - Regional Water Authority
  - Independent Special District
  - Investor Owned
  - Private Non-Profit
  - Other
    - If other, please describe your ownership type:

This survey has three sections: Background & Facility Information, Collection Infrastructure, and Finances & Future Plans. While we ask that you complete the entire survey, we understand that investor-owned utilities may not be as comfortable sharing detailed financial information.

Background & Facility Information

1. Does your utility both collect and treat wastewater? (If your collection system is connected to another utility's system where it is treated, please answer No and continue to question 6.)
    - Yes
    - No

    1.1. If your collected wastewater is treated by a different utility, what is the name of that Utility?
2. Does your utility treat wastewater collected by another utility?
    - Yes
    - No

    2.1. If yes, what is the name of that utility?
3. What is your utility's total permitted treatment capacity? (MGD)

    3.1. How many domestic wastewater treatment facilities does your utility own that are currently in operation?

    3.2. How many domestic wastewater treatment facilities owned by your utility are currently under construction (and not in operation)?

    3.3. Notes:

    3.4. Please fill out the table below for your domestic WWTFs.

Facility ID	Permitted MGD	Average MGD Treated (over 2020 calendar year)	Year of Construction	Estimated Year of Future Major Updates (if available)	Estimated Year of Decommission (if available)	Is the WWTF part of a reclaimed water system? (Yes/No)	Discharge Methods	Notes

4. Does your utility plan to build any new treatment plants in the next 20 years?
    - Yes
    - No

    4.1. If yes, please briefly describe (e.g., MGD treatment capacity, level of planned treatment, reuse, etc.):
5. Does your utility plan to cease using any current discharge methods or begin using any new discharge methods within the next 20 years for any of your treatment plants?

    5.1. Cease:

    5.2. Begin:

6. Does your utility use an asset management system to inventory utility assets and track their conditions?
   - Yes
   - No

   6.1. If so, is there a digital geographic information system integrated into your asset management system? That is, do you use a GIS program to map your assets?
   - Yes
   - No
7. Does your utility have a reclaimed water distribution system?
   - Yes
   - No
   - No, but we have a treatment facility connected to another utility's reuse distribution system.

   7.1. If no, do you plan to build one in the next 20 years?
   - Yes
   - No
   - No, but we plan on connecting a treatment facility to another utility's reuse distribution system.
8. Please answer the following questions about your customer base.

   8.1. What is the population served by your utility?

   8.2. If you separate your customer population by permanent and non-permanent populations, what are the respective totals?

Type	Population
Permanent	
Non-Permanent	

9. What is the total number of connections to your collection system?

   9.1. If you separate your connections by category (e.g., size, residential vs. commercial, etc.), please list the categories and connection counts below.

Category	Number of Connections

Collection Infrastructure

10. Within your service area, are newly constructed properties required to connect to your collection system?
    - Yes
    - No
    - Notes:
11. How many lift stations are part of your collection system?
    11.1. What is the average age of your utility's lift stations?
    11.2. How many new lift stations are expected to be installed in the next 20 years?
    11.3. How many of your existing lift stations do you expect to replace in the next 20 years?
12. What are the total linear feet of sewer mains in your collection system?
    12.1. How are the linear feet of sewer mains in your collection system allocated between the following categories?

Category	Linear Feet
Gravity	
Force	
Total	0

Remainder:	0

    12.2. Please list the linear feet of pipe by material and whether the pipe is a gravity main or a force main:

Material	Linear Feet - Gravity Main	Linear Feet - Force Main
Ductile Iron (including cement lined)		
Cast Iron (including cement lined)		
Asbestos Cement		
Vitrified Clay or Clay Tiles		
Pre-stressed Concrete		
Reinforced Concrete		
Steel		
Polyvinyl Chloride		
Polyethylene		
High Density Polyethylene		
Polypropylene		
Fiberglass Reinforced Epoxy Pipe		
Unknown		
Please list any other known types and lengths:		
Remaining length of pipe not assigned to material	0	0

12.3. What is the preferred replacement material for existing pipes?

Current Material	Replacement Material - Gravity	Replacement Material - Force
Ductile Iron (including cement lined)		
Cast Iron (including cement lined)		
Asbestos Cement		
Vitrified Clay or Clay Tiles		
Pre-stressed Concrete		
Reinforced Concrete		
Steel		
Polyvinyl Chloride		
Polyethylene		
High Density Polyethylene		
Polypropylene		
Fiberglass Reinforced Epoxy Pipe		
Unknown		
Other materials listed in table above:		

12.4. Notes about replacement materials (*e.g.*, pipes above or below certain size will all be replaced with a specific material, etc.):

13. Please fill out the table below. While aggregated linear feet totals by decade is preferable, if that is not possible please estimate the proportion of your collection pipes by decade. Lengths of pipe that have been relined should be considered as dating from the year it was relined.

Time Period	Linear Feet of Pipe	Proportion
Pre-1960		
1960-1969		
1970-1979		
1980-1989		
1990-1999		
2000-2009		
2010-2019		
2020 or After		
Total	0	100.00%
Remaining pipe not yet included:	0	100.00%

13.1. Did you calculate or estimate this table?

- o Calculate
- o Estimate

14. How many linear feet of pipe were replaced over the last three calendar years?

Year	Linear Feet
2018	
2019	
2020	

15. How many linear feet of pipe were relined over the last three calendar years?

Year	Linear Feet
2018	
2019	
2020	

16. How many linear feet of pipe were inspected over the last three calendar years (including sections that were replaced or relined)?

Year	Linear Feet
2018	
2019	
2020	

17. How many manholes does your system have?
18. How many sanitary sewer overflows did your system experience in the following years? If available, please aggregate volumes.

Year	Number of Sanitary Sewer Overflows	Estimated Gallons Spilled
2015		
2016		
2017		
2018		
2019		
2020		

18.1. If the data is available, please include only sanitary sewer overflows that were caused by hurricanes or tropical storms in the table below.

SSOs Caused by Hurricanes or Tropical Storms		
Year	Number of Sanitary Sewer Overflows	Estimated Gallons Spilled
2015		
2016		
2017		
2018		
2019		
2020		

Finances & Future Plans

Please fill out the following information relating to your finances and system plans.
While any financial information from investor-owned utilities is helpful to EDR, we understand if you prefer not to answer.
If your utility provides both drinking water and wastewater, please exclude the portion of your budgets and plans devoted to drinking water service in your answers.

19. Please choose which dates below align with your utility's fiscal year. If other, please type your fiscal year start and end dates in the Notes/Other box below.
    - October 1 - September 30 (Local Fiscal Year)
    - July 1 - June 30 (State Fiscal Year)
    - January 1 - December 31 (Calendar Year)
    - Other:
    - Notes:
20. Please list your annual revenue collected through customer billing for the following years:

Year	Customer Billing Revenue
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

20.1. If you had any alternate sources of revenue in those years (e.g., county or municipal transfer from general fund, etc.), please list those total revenues

Year	Non-Customer Billing Revenue
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

21. Please list your total annual expenditures for the following years:

Year	Expenditures
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

22. Please list your capital improvement expenditures for the following years:

Year	Capital Imp. Expenditures
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

23. Has your utility received any grants from the federal government, state, a WMD, or another entity? Chose all that apply.

Federal
State of Florida
WMD
Other public entity
Private entity

23.1. Please briefly describe any grants received since 2010 (e.g., year, amount, granting entity, purpose):

24. How many loans from the Clean Water State Revolving Fund (CWSRF) has your utility received?

24.1. Please provide the following information on any open CWSRF loans.

#	Total Original Amount	Amount Remaining	Final Year Due
1			
2			
3			
4			

24.2. If your utility has not applied for or received any CWSRF loans but has pursued alternative financing, or if your utility now chooses to avoid CWSRF funding, is there a reason why?

25. For publicly owned utilities, please choose any fiscal years in the list below during which utility revenue was transferred from the enterprise fund to a general operating fund. The Uniform Accounting System Chart of Accounts records this type of transfer under revenue code 382.000, "Contributions from Enterprise Operations."

2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
2019-2020

26. What is the last year of your current planning horizon (*i.e.*, the outer limit of your high-level strategic planning)?
27. Please attach copies of the following documents, if they are publicly available:
    27.1. Capital Improvement Plan/Capital Improvement Program (typically 5-6 year plans)
    27.2. Description of current pricing rate structure
    27.3. Strategic plan
    27.4. Rate Study (if undertaken within the last five years)

C.2 Drinking Water Survey Draft

Contact & Location Information

Please provide your contact and location information, then proceed to the survey on the next worksheet.

- Utility Name:
- Contact Name:
- Contact Position/Title:
- Email Address:
- Phone Number:
- Please list any PWS IDs for systems owned or operated by your utility:
- Indicate which Water Management District(s) boundaries your service area is located in.
    - NWFWMD
    - SRWMD
    - SJRWMD
    - SWFWMD
    - SFWMD
- What type of entity owns your utility?
    - Municipality
    - County
    - Regional Water Authority
    - Independent Special District
    - Investor Owned
    - Private Non-Profit
    - Other
        - If other, please describe your ownership type:

This survey has three sections: Background & Source Information, Distribution Infrastructure, and Finances & Future Plans. While we ask that you complete the entire survey, we understand that investor-owned utilities may not be as comfortable sharing detailed financial information.

Background & Source Information

Please fill out the following information relating to your water source(s), treatment system(s), storage, and customers.

1. Do you buy your water from a wholesaler or produce your own?
    - Buy from wholesaler
    - Produce own
    - Mixture of both
2. If you purchase your water, what is the name of the utility or public water system you buy from?

3. What is your water source type?
    3.1. Produced by your utility:
        - Ground
        - Surface
        - Ground water under direct influence (GWUDI)
        - Other/Notes:
    3.2. Bought from another producer:
        - Ground
        - Surface
        - GWUDI
        - Other/Notes:
4. Does your utility use an asset management system to inventory utility assets and track their conditions?
    - Yes
    - No
    4.1. If so, is there a geographic information system (GIS) integrated into your asset management system?
        - Yes
        - No
    4.2. Notes:
5. What is your utility's water production capacity (in mgd)? (If your utility purchases all of your water from a wholesaler, skip to question 9.)
6. Please fill in the following information about any wells that are currently in use.
    6.1. How many wells are currently in use?
    6.2. Please list the aquifer(s) they draw from:
    6.3. What is the average age of your wells?
    6.4. How many wells do you plan to drill in the next 20 years?
7. Please fill in the following information about your utility's water treatment plants.
    7.1. How many water treatment plants does your utility use?
    7.2. What is the average age of your water treatment plants?
    7.3. How many new treatment plants do you plan to build in the next 20 years?
    7.4. How many existing treatment plants are expected to need rehabilitation or expansion in the next 20 years?
    7.5. Notes:
8. During treatment, do you desalinate your water?
    - Yes
    - No
    8.1. If so, what is the source of the saline or brackish water?

9. Please answer the following questions about your water storage system(s).
    9.1. What is the combined capacity of your water storage tanks?
    9.2. Ground Storage:
        9.2.1. How many ground storage tanks does your utility use?
        9.2.2. What is the average age of your ground storage tanks?
        9.2.3. Do you plan to install any new ground storage tanks in the next 20 years? If so, please provide any specifics you can or describe your general ground storage tank needs.
    9.3. Elevated Storage:
        9.3.1. How many elevated storage tanks does your utility use?
        9.3.2. What is the average age of your elevated storage tanks?
        9.3.3. Do you plan to install any new elevated storage tanks in the next 20 years? If so, please provide any specifics you can or describe your general elevated storage tank needs.
10. Please answer the following questions about your customer base.
    10.1. What is the population directly served by your utility? (Please exclude customers who receive your wholesale water.)
    10.2. If you separate your customer population by permanent and non-permanent populations, what are the respective totals? (Please exclude customers who receive your wholesale water.)

Type	Population
Permanent	
Non-Permanent	

11. How many water meters are connected to your distribution system for each of the following sizes?

Water Meters	**Number of Connections**
5/8"	
3/4"	
1"	
1.5"	
2"	
3"	
4"	
6"	
8"	
10"	

Other (please list size and count):

Distribution Infrastructure

Please fill out the following information relating to your distribution infrastructure.

12. Do you regularly conduct water audits or otherwise track water loss?
    - Yes
    - No
    - If yes, please briefly describe how you track water loss below (e.g., annual water audit using AWWA M36 methodology).
13. How many, if any, booster pump stations does your utility own?
    - 13.1. What is the average age of your utility's booster pump stations?
    - 13.2. How many new booster pump stations are expected to be installed in the next 20 years?
    - 13.3. How many of your existing pump stations do you expect to replace in the next 20 years?
14. What is the total linear feet of potable water distribution pipe owned by your utility?
    - 14.1. Please list the linear feet of pipe by material:

Material	Linear Feet
Ductile Iron	
Cast Iron	
Cast Iron (Cement Lined)	
Steel	
Asbestos Cement	
Plastic (PVC, CPVC, HDPE, PE, etc.)	
Unknown	

Please list any other known types and lengths:

Remaining length of pipe not assigned to material	0

14.2. What is the preferred replacement material for existing pipes?

Current Material	Replacement Material
Ductile Iron	
Cast Iron	
Cast Iron (Cement Lined)	
Steel	
Asbestos Cement	
Plastic (PVC, CPVC, HDPE, PE, etc.)	
Unknown	

Other materials listed in table above:

14.3. Notes about replacement materials (e.g., pipes above or below certain size will all be replaced with a specific material, etc.):

15. Please fill out the table below. While aggregated linear feet totals by decade is preferable, if that is not possible please estimate the proportion of your distribution pipes by decade. Lengths of pipe that have been relined should be considered as dating from the year it was relined.

Time Period	Linear Feet of Pipe	Proportion
Pre-1960		
1960-1969		
1970-1979		
1980-1989		
1990-1999		
2000-2009		
2010-2019		
2020 or After		
Total	0	0.00%
Remaining pipe not yet included:	0	100.00%

15.1. Did you calculate or estimate this table?
- Calculate
- Estimate

16. How many linear feet of pipe were replaced over the last three calendar years?

Year	Linear Feet
2018	
2019	
2020	

17. How many linear feet of pipe were relined over the last three calendar years?

Year	Linear Feet
2018	
2019	
2020	

18. How many linear feet of pipe were inspected over the last three calendar years (including sections that were replaced or relined)?

Year	Linear Feet
2018	
2019	
2020	

19. How many backflow prevention devices does your distribution system have?
20. How many fire hydrants are connected to your system?
21. How many boil water notices were issued during the last three calendar years? Additionally, how many of those boil water notices were issued either during a hurricane or tropical storm or were caused by a hurricane or tropical storm?

Year	All Notices	Hurricane / Tropical Storm Related
2018		
2019		
2020		

Finances & Future Plans

Please fill out the following information relating to your finances and system plans.
While any financial information from investor-owned utilities is helpful to EDR, we understand if you prefer not to answer.
If your utility provides both drinking water and wastewater, please exclude the portion of your budgets and plans devoted to wastewater service in your answers.

22. Please choose which dates below align with your utility's fiscal year. If other, please type your fiscal year start and end dates in the Notes/Other box below.
    - October 1 - September 30 (Local Fiscal Year)
    - July 1 - June 30 (State Fiscal Year)
    - January 1 - December 31 (Calendar Year)
    - Other:
    - Notes:
23. Please list your annual revenue collected through customer billing for the following years:

Year	Customer Billing Revenue
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

23.1. If you had any alternate sources of revenue in those years (e.g., county or municipal transfer from general fund, etc.), please list those total revenues.

Year	Non-Customer Billing Revenue
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

24. Please list your total annual expenditures for the following years:

Year	Expenditures
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

25. Please list your capital improvement expenditures for the following years:

Year	**Capital Imp. Expenditures**
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	

26. Has your utility received any grants from the federal government, state, a WMD, or another entity since 2010? Chose all that apply.

Federal
State of Florida
WMD
Other public entity
Private entity

26.1. Please briefly describe any grants received since 2010 (e.g., year, amount, granting entity, purpose):

27. How many loans from the Drinking Water State Revolving Fund (DWSRF) has your utility received?

27.1. Please provide the following information on any open DWSRF loans.

#	Total Original Amount	Amount Remaining	Final Year Due
1			
2			
3			
4			

27.2. If your utility has not applied for or received any DWSRF loans but has pursued alternative financing, or if your utility now chooses to avoid DWSRF funding, is there a reason why??

28. For publicly owned utilities, please choose any fiscal years in the list below during which utility revenue was transferred from the enterprise fund to a general operating fund. The Uniform Accounting System Chart of Accounts records this type of transfer under revenue code 382.000, "Contributions from Enterprise Operations."

2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
2019-2020

29. What is the last year of your current planning horizon (*i.e.*, the outer limit of your high-level strategic planning)?
30. Please attach copies of the following documents, if they are publicly available:
    30.1. Capital Improvement Plan/Capital Improvement Program (typically 5-6 year plans)
    30.2. Description of current rates
    30.3. Strategic plan
    30.4. Rate Study (if undertaken within the last five years)

Appendix D: Acronyms

Table D.1 List of All Acronyms Used in this Report

Acronym/Label	Meaning
AFR	Annual Financial Report
AG	Agriculture (Agricultural Self-Supply)
AICR	Akaike Information Criterion for Robust Regression
APWA	American Public Works Association
ASR	Aquifer Storage and Recovery
AWS	Alternative Water Supply
BEBR	University of Florida's Bureau of Economic and Business Research
BICR	Bayesian Information Criterion for Robust Regression
BMAP	Basin Management Action Plan
BMP	Best Management Practices
BOCC	Board of County Commissioners
BOT	Board of Trustees of the Internal Improvement Trust Fund (DEP)
C&SF Project	Central and Southern Florida Project for Flood Control
CAMA	Coastal and Aquatic Managed Areas (DEP)
CARL	Conservation and Recreation Lands
CCI	Construction Cost Index (developed by the Engineering News-Record)
CEPP	Central Everglades Planning Project
CERP	Comprehensive Everglades Restoration Plan
CFWI	Central Florida Water Initiative (region includes parts of SFWMD, SJRWMD, & SWFWMD)
CII	Commercial/Industrial/Institutional (Self-Supply)
CIP	Capital Improvement Plan
CPI	Consumer Price Index
CSEC	Central Springs and East Coast Region (SJRWMD)
CSO	Combined Sewer Overflow
CTV	County Taxable Value
CUP	Consumptive Use Permit
CWA	Clean Water Act
CWNS	Clean Watersheds Needs Survey
CWSRF	Clean Water State Revolving Fund
CY	Calendar Year (January 1 through December 31)
DACS	Florida Department of Agriculture and Consumer Services
DACSI&A	Florida Forest Service Inholdings and Additions
DEAR	Division of Environmental Assessment and Restoration (DEP)
DEP	Florida Department of Environmental Protection
DFS	Florida Department of Financial Services
DO	Dissolved Oxygen
DOR	Florida Department of Revenue
DOS	Florida Department of State

Acronym/Label	Meaning
DRP	Division of Recreation and Parks Optimum Boundaries (DEP)
DSS	Domestic Self-Supply
DW	Drinking Water
DWINSA	Drinking Water Infrastructure Needs Survey and Assessment
DWRA	Division of Water Restoration Assistance (DEP)
DWSRF	Drinking Water State Revolving Fund
EAA	Everglades Agricultural Area
ECFTX	East-Central Florida Transient (groundwater model)
EDR	Office of Economic and Demographic Research
EEL	Environmentally Endangered Lands
EFA	Everglades Forever Act
ENP	Everglades National Park
ENR CCI	Engineering News-Record Construction Cost Index
EPA	U.S. Environmental Protection Agency
FEB	Flow Equalization Basin
FFPL	Florida Forever Priority List
FFS	Florida Forest Service (DACS)
FFY	Federal Fiscal Year (October 1 through September 30)
FIB	Fecal Indicator Bacteria
FIPS Code	Federal Information Processing Standard Code
FLP	Forest Legacy Program
FNAI	Florida Natural Areas Inventory
FRDAP	Florida Recreation Development Assistance Program
FSAID	Florida Statewide Agricultural Irrigation Demand (version referred to by Roman numeral)
FWC	Florida Fish and Wildlife Conservation Commission
FWCI&A	FWC's Inholdings and Additions
FY	State Fiscal Year (July 1 through June 30)
GIS	Geographic Information System
GR	General Revenue
GRU	Gainesville Regional Utilities
GWUP	Group Water Use Permit
IWUP	Individual Water Use Permit
JV	Just Value
L/R	Landscape/Recreational (Self-Supply)
LA	Load Allocations (for Nonpoint Sources)
LATF	Land Acquisition Trust Fund
LEC	Lower East Coast Region (SFWMD)
LFA	Lower Floridan Aquifer
LFY	Local Fiscal Year (October 1 through September 30)
LGIS	Local Government Infrastructure Surtax
LKB	Lower Kissimmee Basin Region (SFWMD)
LMUAC	Land Management Uniform Accounting Council
LWC	Lower West Coast Region (SFWMD)

Acronym/Label	Meaning
MFL	Minimum Flows and Minimum Water Levels
MGD	Millions of Gallons per Day
MOS	Margin of Safety
NAICS	North American Industry Classification System
NEEPP	Northern Everglades and Estuaries Protection Program
NFRWSP	North Florida Regional Water Supply Partnership (includes parts of SJRWMD & SRWMD)
NLCD	National Land Cover Database
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NW – II	Region II (NWFWMD)
NW – Oth	Regions I, III, IV, V, VI, & VII (NWFWMD)
NWFWMD	Northwest Florida Water Management District
OFS	Outstanding Florida Springs
OLS	Ordinary Least Squares
PG	Power Generation (Self-Supply)
POTW	Publicly Owned Treatment Works
PS	Public Supply
PSC	Florida Public Service Commission
PWS	Public Water System
RAP	Reasonable Assurance Plan
REDI	Rural Economic Development Initiative
RFLPP	Rural and Family Lands Protection Program
RO	Reverse Osmosis
RPS	Recovery and Prevention Strategies
RWSP	Regional Water Supply Plan
SD	School District
SF – LEC	Lower East Coast Region (SFWMD)
SF – LKB	Lower Kissimmee Basin Region (SFWMD)
SF – LWC	Lower West Coast Region (SFWMD)
SF – UEC	Upper East Coast Region (SFWMD)
SFWMD	South Florida Water Management District
SJR – CSEC	Central Springs and East Coast Region (SJRWMD)
SJRWMD	St. Johns River Water Management District
SOLARIS	Florida State Owned Lands and Records Information System
SRWMD	Suwannee River Water Management District
STA	Stormwater Treatment Area
STAR Report	Statewide Annual Report (published by DEP)
STV	School District Taxable Value
SW – H	Heartland Region (SWFWMD, partially in CFWI)
SW – N	Northern Region (SWFWMD, partially in CFWI)
SW – S	Southern Region (SWFWMD)
SW – TB	Tampa Bay Region (SWFWMD)
SWFWMD	Southwest Florida Water Management District

Acronym/Label	Meaning
SWIM	Surface Water Improvement and Management
TAZ	Traffic Analysis Zone
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
UEC	Upper East Coast Region (SFWMD)
UF	University of Florida
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WBID	Water Body Identification Number
WCA	Water Conservation Area
WDPS	Water Planning Coordination Group
WIFIA	Water Infrastructure Finance and Innovation Act
WLA	Wasteload Allocation (for Point Sources)
WMD	Water Management District
WPSPTF	Water Protection and Sustainability Program Trust Fund
WRDWP	Water Resource Development Work Program
WSA	Water Supply Assessment
WTP	Water Treatment Plant
WUP	Water Use Permit
WW	Wastewater
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant