Central Florida Water Initiative

First Edition

Conservation Implementation Strategy

A strategy to advance and enhance water conservation throughout the CFWI.

Cooperatively developed by the CFWI Conservation Team
Approved by the Steering Committee on October 15, 2019

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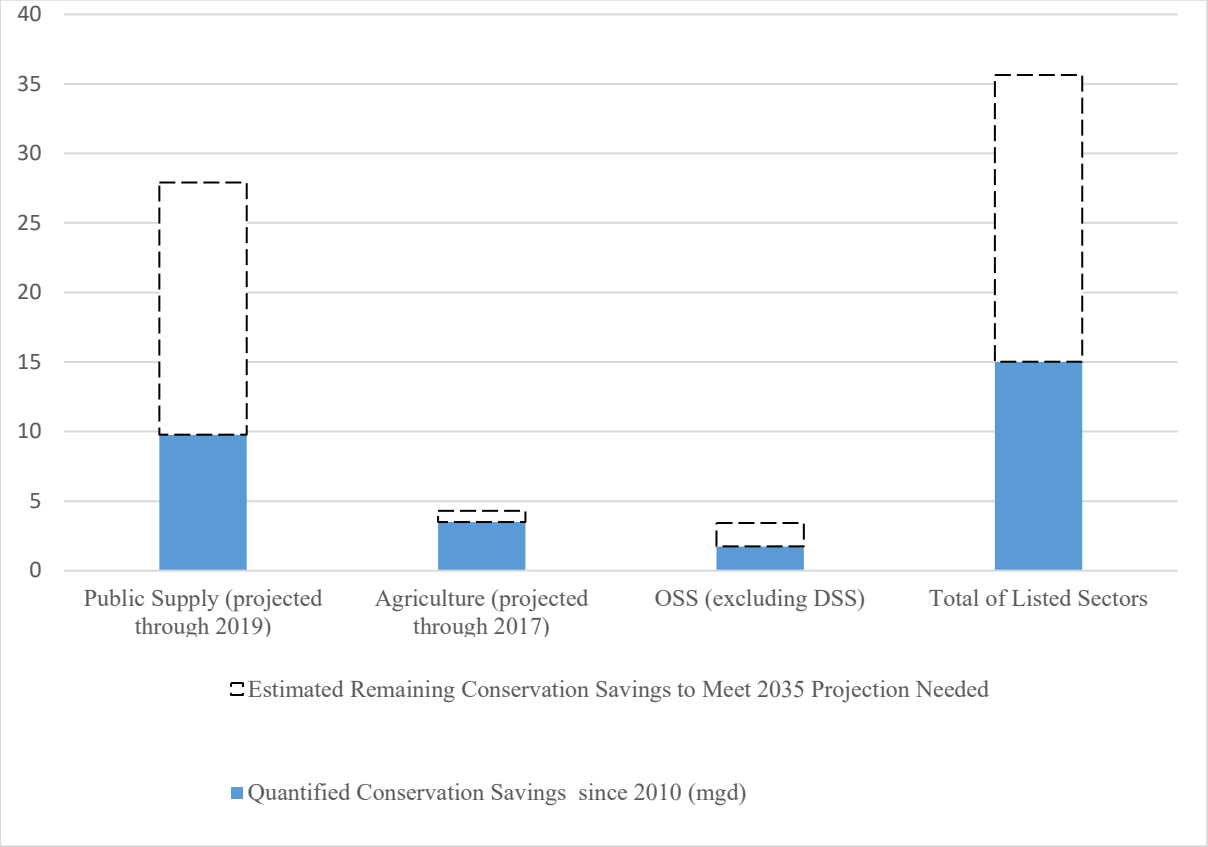
I. Executive Summary

This implementation strategy has been created to assist in achieving the water conservation savings identified in the Central Florida Water Initiative (CFWI) Regional Water Supply Plan (RWSP)[1]. The goals of this document are to: (1) identify quantifiable conservation savings between 2010 to date; (2) analyze the trend of quantifiable conservation savings through the planning horizon of 2035; and (3) identify and quantify conservation best management practices (BMPs) and programs that can be used to meet the Steering Committee's goal of exceeding the 2035 conservation projection.

This document recognizes that quantification of conservation BMPs and programs remains difficult and some BMPs remain unquantified and are not included in the following analysis. The numbers presented herein for water saved through water conservation constitutes only a portion of the actual water conservation savings for each sector. Different methodologies for quantifying *some* of water users' conservation efforts were used for each sector and even for different BMPs within a single sector. Total quantified savings by sector is presented in Figure 1, below, along with the remaining conservation needed by 2035 to meet the 2035 projected conservation savings.[2] This strategy does not include quantification of conservation for either domestic self-supply or power generation, but each will be looked at in the future.

Figure 1. Total Quantified Conservation Savings by Sector (in mgd)



[1] *See* Volume II, 2035 Water Resources Protection and Water Supply Strategies (Solutions Strategies)
[2] Quantification of BMPs for all sectors began in 2010.

The following chart represents the goals and deliverables for the future work on the Conservation Team in expanding this Implementation Strategy and developing the conservation chapter for the 2020 CFWI RWSP and beyond.

Table 1. Future Deliverables

Goal Topic	Deliverable
Golf course survey	Develop a survey to document conservation efforts being made by Golf Courses
Agriculture White Paper	Review and contribute to a white paper on agricultural BMPs for ultimate review and approval by the Steering Committee
Conservation Outreach and Communication	Designate a Conservation Messaging Liaison to work with the Communications and Outreach Team to develop a white paper about how to message water conservation for various audiences to maximize behavior change.
	Identify funding sources, conservation messaging, and target audiences as well as other outreach opportunities, such as trainings, workshops, etc.
Guideposts	Identify guideposts that can be included in the conservation chapter of the 2020 RWSP
Passive Conservation	Estimate passive conservation savings for the 2020 RWSP.
Project Options	Continue to work with stakeholders to develop designated projects for the 2020 RWSP.
Geographic Target Areas	Further define "geographic target areas," and generate maps to depict the areas
BMP Improvement/Expanded Effort	Develop/finalize savings estimates for new BMPs including: irrigation restriction enforcement, rain sensors, customer portal/AMI, and irrigation system audits. Identify additional BMPs with goal to increase rate of implementation.
Cost-Share Participation Review	Future iterations of this implementation strategy shall undertake a review of cost-share applications in each district, evaluate which eligible users are utilizing cost-share programs for conservation and identify how additional eligible applicants can be encouraged to apply for cost-share funding to implement larger conservation efforts.
Data Source Improvement	Improve data collection and analysis.

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II. Introduction

A. Background

Information about the CFWI, the 2015 RWSP, and the Steering Committee may be found online at http://www.cfwi.com. Upon approval of the 2015 CFWI RWSP, the CFWI Steering Committee directed the Conservation Team to identify ways to achieve water conservation savings greater than 37 mgd over the next 20 years. The Conservation Team endeavors to track progress toward meeting the water conservation projections, as well as future projected savings identified in future RWSPs.

Water conservation by all water use categories must continue to be a priority to meet the region's future water demands. Planning evaluations estimated 37 mgd ("2035 projected conservation savings") could be saved with conservation efforts. *See* Table 2. Additional savings is possible through higher participation rates than those modeled and the implementation of other conservation measures than the ones considered in the initial evaluation.

Table 2. 2035 Projected Conservation Savings by Water Use Category

Water Use Category	Projected Solutions Strategies 2035 Conservation (mgd)	Approximate Percentage of Total
Public Supply (PS)	27.91	76%
Agriculture (AG)	4.30	12%
Landscape/Recreational/Aesthetic (LRA)	2.02	5%
Domestic Self-Supply (DSS)	1.19	3%
Commercial/Industrial/Institutional (CII)	1.15	3%
Power Generation (PG)	0.27	1%
Total	**36.84**	

For all use categories other than Agriculture, the 2035 projected conservation savings above was developed through the review of ten BMPs.[3] Eight BMPs were evaluated using the Conserv Florida Water Clearinghouse EZ Guide tool to estimate water conservation potential for public supply. During the development of the 2015 CFWI RWSP, Solutions Strategies Volume IIA, the SJRWMD Florida Automated Water Conservation Estimating Tool (FAWCET) was used to add two additional BMPs which identified additional water conservation which could be feasible.

For agricultural conservation savings, the Conservation Team concluded that historical data from the SWFWMD Facilitating Agricultural Resource Management Systems (FARMS) Program and other existing cost-share BMP programs, as well as what is known about agriculture within the CFWI Planning Area, should be used to estimate potential water savings. This approach considered several factors in the development of a conservation estimate including participation rate, water savings, BMPs, and project costs. The participation rate in agricultural BMPs is critical to achieving desired outcomes and are used in the development of the Solutions Planning Phase conservation estimates. While the savings and groundwater offset from existing agricultural programmatic BMP implementation can range from 1 to 100 percent on a single farm, an average

[3] The term BMP refers to any measure, practice, program, device replacement, or action which results in an improvement of water use efficiency. A list of additional BMPs is included in CFWI Solutions Strategies Volume IIA, Appendix A.

20 percent savings estimate was used for all BMPs. Using a 20 percent savings rate that applied to the 2035 demand (20% of 214.8 mgd or 43 mgd) and applying a participation rate of 10 to 15 percent, the projected agricultural conservation savings ranges from 4.3 mgd to 6.4 mgd.

B. Strategies

This Implementation Strategy includes information on conservation best management practices (BMPs) and four paths to implement water conservation savings, which were approved by the Steering Committee at its July 18, 2017 meeting. These four strategies include Guideposts, Designated Projections, Funding Opportunities, and Regional Education and Outreach.

1. Guidepost

Guideposts are intended to assist in the development of conservation plans by class of user. The conservation team is committed to developing guideposts that will ensure that all users, in the aggregate, will achieve the CFWI Estimated Conservation savings of 37+ mgd. Guideposts are not goals and are not intended to be applied to an individual consumptive use permit. Rather, they demonstrate the percent reduction that a class of users, in the aggregate, would need to reach to achieve the CFWI Estimated Conservation Savings Goal of 37+ mgd. Guideposts have not been developed for this First Edition of the Implementation Strategy but will be worked on during the development of the 2020 RWSP and next iteration of this strategy.

2. Designated Projects

As summarized in the Executive Summary, progress has been made in achieving the CFWI conservation goal of 37+ mgd. The Conservation Team intends to develop a list of conservation project options that could be selected by a permittee for implementation or inclusion in their water conservation plan similar to the list of other water supply development projects that are typically found in a regional water supply plan. Consistent with water supply development project options, the projects identified in this strategy may not necessarily be selected for development by the water supplier/user. The development of these designated projects is underway, with illustration of projects in Public Supply and Other Self-Supply. The Conservation Team identified three types of projects that can be included on this iterative list and each type is intended to be included for each use sector in time:

A. **Generic Projects**: It is acknowledged that a project is more likely to come to fruition if it has a specifically identified implementing entity. Therefore, the Conservation Team would prefer to identify entity specific projects. However, generic projects, that is, projects that do not have a designated implementing entity, are meant to provide a basic template for a user to potentially adopt at some point in the future.

B. **Regional Projects**: Regional entities and cooperating partners can provide value in administering project implementation. This is especially true for smaller water users that lack the necessary man power to implement a conservation program on their own. A regional project could also cover larger areas and provide economies of scale.

C. **Specific-Entity Projects**: Specific-entity projects are project options that identify a specific water user to implement the listed project.

3. Funding Opportunities

Funding opportunities vary based on funding sources and amounts, different eligibility and match requirements, and timing. This strategy intends to streamline the information available to make it more assessible and understandable to all use types. Specific funding opportunities are included by use type for Public Supply and Agriculture.

A key part of ensuring water users take advantage of funding opportunities is providing education about what funding opportunities are available and helping a water user find a cost-share opportunity that works for them. Common to all sectors, knowledge about funding opportunities was identified as a barrier to taking advantage of cost-share programs. The Conservation Team considered the development of a webpage for funding information, but stakeholders believed personal contact would be more helpful in order to provide accurate and up-to-date information. Therefore, the Conservation Team agrees that the CFWI website's contact page should include contacts for cost-share information at each water management district or the Florida Department of Agricultural and Consumer Services (FDACS), as appropriate.

Since 2010, Districts have provided over $4.7 million in cost-share funds for public supply conservation projects within the CFWI, with more than $9.5 million being spent in project implementation through these programs. This has resulted in 2.25 mgd in water conservation savings. A detailed list of the projects and their implementing entity may be found in Appendix 3. Additionally, Districts have provided over $3.6 million in agricultural cost-share projects, totaling more than $6.0 million being spent in project implementation through these programs from 2010-2017.

In the future, funding opportunities could be targeted at locations where resource impacts have been observed or are anticipated to occur during the planning period. Focusing efforts and resources towards these target areas can be useful in maximizing conservation benefits to the CFWI area.

4. Regional Education and Outreach

Consistent conservation messaging throughout the CFWI Planning Area would result in maximum impact. A key component to this is designating a conservation messaging liaison from the Conservation Team to work with the Communications and Outreach Team. The liaison would be responsible for: identifying targets/deliverables that need to be coordinated; coordinating the development of calendar; developing a scope of work for future communication strategies.

In addition, the Conservation Team believes there is value in developing and implementing a comprehensive public education and outreach program, which may include support for County Extension Services, school education programs, traditional and social media, training, workshops, and exhibits. This could represent a designated project across all use sectors throughout the CFWI.

To initiate this effort, the Conservation Team will explore funding options, potential strategies and target audiences, and the best means to coordinate with the Communications and Outreach Team.

For communication to the public, a 3-month campaign with media saturation (from newsletters to billboards to radio, newspaper, and television ads) across all use classes is estimated to cost $500,000 - $1,000,000. Additional funding would be needed to pursue pre- and post- outreach survey. Less intensive outreach efforts, however, are underway by the Communications and Outreach Team, including newsletter publications and social media posts as well as existing district conservation outreach, such as the *Skip a Week* program.

The Conservation Team has initiated a white paper on the issue of key principles to guide local and regional education and outreach programs. The team intends to further explore the above options, including the potential for outreach, such as support for extension services and training programs, as well as a communications and media outreach.

C. Regulatory measures

Each district includes conservation requirements as part of each consumptive use permit. In addition, during the 2016 legislative session, section 373.0465 was amended to require the Department to adopt rules that must include, among other things, an "annual conservation goal" for users within the CFWI. The Department initiated rulemaking in accordance with that law on December 30, 2016 and several workshops have followed. Though still under development, the final rule may increase conservation through goal-setting of BMPs or other programs.

III. Public Supply

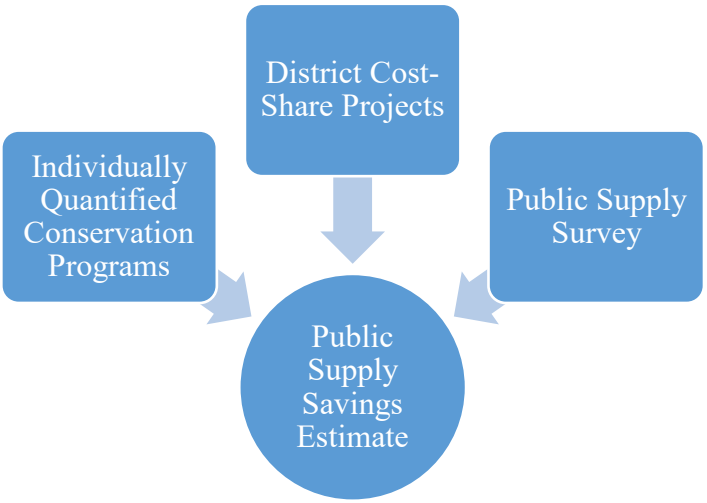
The Public Supply (Utilities) category is now, and is projected to continue to be, the largest use category in the CFWI Planning Area, accounting for more than 70 percent of the total projected demand increase.[4] The 2015 RWSP projected 27.91 mgd of water conservation for public supply. The Steering Committee further established a goal of going beyond the projection. This strategy explores the status of reaching and going beyond that projection and provides tools utilities can use to ensure that the conservation projection is met and exceeded.

A. Where Are We Now

As of 2010, public supply serves an estimated population of 2.6 million people in the CFWI (96 percent of total CFWI population), provided by 85 private and public utilities ("utilities") with a permitted capacity of 0.1 mgd or more. There is limited data available to identify and enumerate specific conservation BMPs being implemented within the planning region and the quantity of water saved from their implementation. The Conservation Team identified certain programmatic BMPs and used figures from District cost share programs to assist in quantifying conservation savings. Additionally, the Conservation Team conducted a survey of public suppliers to capture information about conservation BMP implementations. Lastly, the Conservation Team identified individual conservation measures for which savings estimates were quantifiable. See Figure 2.

[4] Public supply demand is projected to increase by approximately 50 percent from 435 mgd in 2010 to 654 mgd in 2035.

Figure 2. Methods Used for Calculating Public Supply Conservation Savings Estimate



Data compiled from these three sources has value in estimating water savings resulting from current conservation efforts and provides insight into the BMPs that utilities have used and are targeting in their future conservation efforts. The Public Supply Subteam (PS Subteam) estimated the amount of water savings produced by the conservation BMPs implemented from 2010 through 2015 (limited data was available through 2017) and using that same rate of savings projected the amount of conservation savings that may be realized by 2019. Review of these data sources and the analytical methods performed as part of this effort revealed some areas that need improvements. Additional investigation and research on actual water savings from current and new BMPs and enhancement of data collection methodologies will only improve analyses in the future. Specific ideas for improvements are described in the Next Steps section.

The BMPs quantified by these three methods have produced savings (or projected savings) of 8.10-9.77 mgd for 2010 through 2019 as laid out in Table 3, below. Public Supply savings from 2010-2019 represent an average of 32 percent of the conservation savings projected for the 2035 planning horizon. By 2035, an additional 18.14 mgd in conservation water savings is needed to meet the 2035 conservation projection for public supply as laid out in Figure 3, below. It should be noted that additional conservation savings are being achieved by utilities based on other conservation programs that have not yet been quantified such as education programs, inclining block rates, behavioral programs, customer audits, utility leak detection and audits, landscape restrictions/ordinances, irrigation enforcement, etc.

Table 3. Public Supply Estimated Savings Summary for Quantifiable BMPs

Data Source	Estimated Savings for 2010-2014 (mgd)	Estimated Savings for 2015-2019 (mgd)	TOTAL Estimated Savings for 2010-2019 (mgd)
Individually Quantified Conservation[1]	1.15	1.65	2.80
District Cost-Share Projects[2]	0.26	1.65	1.91
Public Supply Survey BMPs[3]	1.65 (reported) 2.47 (extrapolated)	1.74 (reported) 2.60 (extrapolated)	3.39 (reported) 5.07 (extrapolated)
Totals[4]	**3.06** (reported) **3.88** (extrapolated)	**5.03** (reported) **5.89** (extrapolated)	**8.10** (reported) **9.77** (extrapolated)

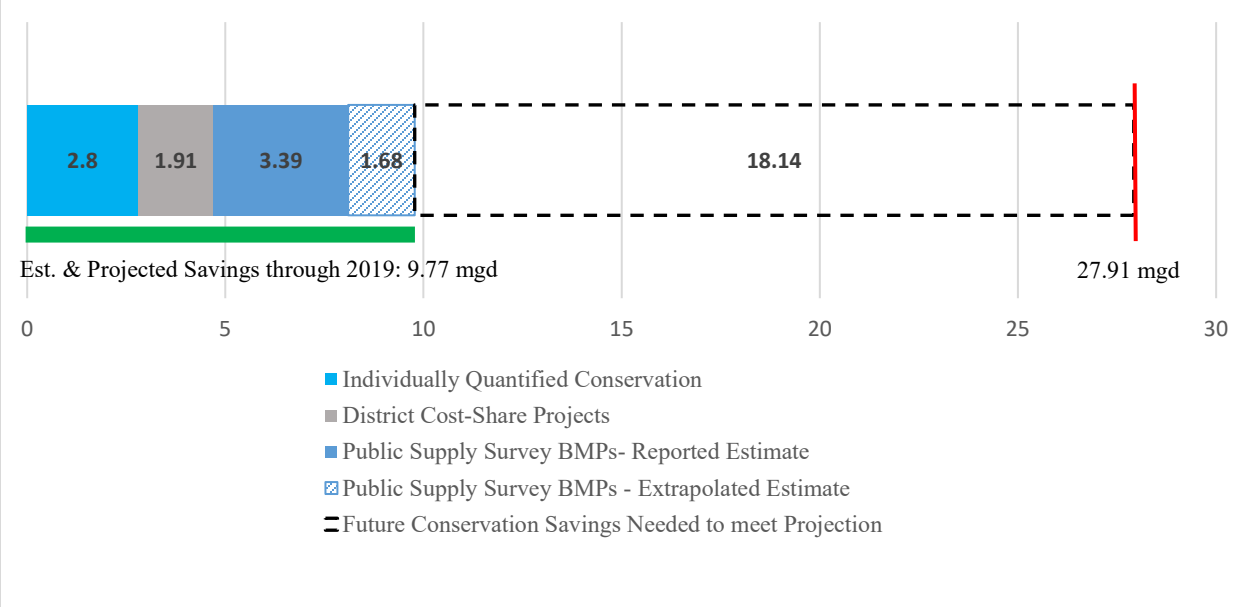
[1] Individually Quantified Conservation include Florida Water Star, Extension Agent/Florida Friendly Program, Florida Green Building Coalition homes, and irrigation restriction enforcement savings.

[2] The savings estimates shown do not include all cost-share projects in the CFWI. Some of the projects funded through District cost-share programs were deleted since their BMPs were included in the Survey BMP savings estimates.

[3] The reported estimate represents the BMP savings for the 12 utilities who completed BMP information for Part 3 of the survey. These 12 utilities represent 67 percent of the CFWI 2035 PS demand projection. The extrapolated estimate assumes that the remaining 73 utilities that did not respond to the survey CFWI utilities have similar BMP savings as the 12 respondents.

[4] All tables and figures in this document are rounded two decimal places, which may lead to small variances in totals.

Figure 3. Estimated and Projection Conservation Savings 2010-2019 by Method and Conservation Remaining in mgd[1]



[1] The reported estimate represents the BMP savings for the 12 utilities who completed BMP information for Part 3 of the survey. These 12 utilities represent 67 percent of the CFWI 2035 PS demand projection. The extrapolated estimate assumes that the remaining 73 utilities that did not respond to the survey CFWI utilities have similar BMP savings as the 12 respondents and is represented by the change between the reported and the extrapolated estimates (1.68 mgd).

1. Individually Quantified Conservation Programs

Quantification of four public supply programmatic conservation savings were produced using data development by or with the University of Florida. These programmatic efforts were

described in the 2015 CFWI RWSP, Solutions Strategies Volume IIA and the methodologies for their inclusion is detailed in the New Quantified BMPs section of this report.

Florida Water Star (FWS) Rebates or Requirement: Applies both indoor and outdoor water efficiency standards and design principles to single and multi-family homes, commercial buildings, and master-planned communities.

The Extension Agent/Florida Friendly Program: The Florida-Friendly Landscaping Program™ (FFL) is implemented by the University of Florida/Institute of Food & Agricultural Science and promotes low maintenance plants and environmentally sustainable landscaping and irrigation practices through its nine principles.

Florida Green Building Coalition (FGBC) Homes: The FGBC's certification program applies holistic efficiency standards to single and multi-family homes and commercial buildings. Water Conservation is one of the areas of sustainable operations criteria and includes a menu of indoor and outdoor water conservation options.

Enforcement/Citation Programs: Programs enforcing the Water Management District's rules and local government ordinances regarding residential irrigation restrictions can prevent wasteful use of potable water. Reports were provided that estimate the amount of water conserved by Tohopekaliga Water Authority (Toho) and Orange County Utilities (OCU) through their enforcement and citation program limiting irrigation to two days per week. Continued review of available reports, along with a more robust quantification effort of enforcement programs as a BMP, will be undertaken in the near future. More information on Toho's and OCU's programs can be found in section III.E.4.

Table 4, below, reflects the estimated conservation savings believed to have been achieved since 2010 for these individually quantified conservation efforts, and is broken out further in Appendix 2.

Table 4. Individually Quantified Conservation Estimated Implementations and Savings

Individually Quantified Conservation	2010-2014 Number of Implementations	2015-2019 Number of Implementations	2010-2014 Savings (mgd)	2015-2019 Savings (mgd)
Florida Water Star Rebates or Requirement[1]	435	4756	0.06	0.61
Extension Agent/Florida Friendly Program[2]	N/A	N/A	N/A	0.08
FGBC Homes[3]	711	1,805	0.02	0.05
Quantified Enforcement Savings	26,126	23,701	1.07	0.91
Total Savings	**-**	**-**	**1.15**	**1.65**

[1] 2010-2014 414 homes in Osceola County, 20 in Orange County, and 1 in Seminole County; 2015 - 345 homes; 2016 - 1411 homes; From 2017 - 2019 assume 1000 homes a year for 3000 more homes

[2] *Savings estimates are 5.2 Mgal/yr for Orange, 1.4 Mgal for Polk, and 0.5 Mgal for Seminole for 2016. (0.02 mgd in 2016); From 2017 to 2019 assumes the same rate of implementation per year or an additional 0.06 mgd savings.*
[3] *the 1,805 homes for 2015-2019 was calculated by adding the 1,083 from 2015-2017 and an estimated 722 homes for 2018-2019. Indoor savings is estimated at 26 gallons per day per home. Assumes 361 new FGBC homes for each year for 2018 and 2019.*
[4] *Quantified Enforcement Savings relies on extrapolation of previous years data for years 2016-2019*

2. Cost-share

The water savings estimates for projects using District cost-share funding were included in the 2010 – 2019 savings estimate. See Appendix 3 for a detailed list of all District Cost-Share projects. If there was an overlap with the funded cost-share program BMPs and the PS Conservation Survey BMPs (further explained below), the survey information was used, except for Polk County, Lakeland and PRWC irrigation projects. Those exceptions included multiple BMPs with a combined estimated savings that was higher than the savings estimates being applied to the survey BMPs. Table 5, below, reflects the summary of the water savings that were identified by the utilities participating in the District cost share programs. Two numbers are provided for each district to provide clarity between all water management district cost-share projects and the more limited list of cost-share projects that specifically excludes those that were included with the survey results.

Table 5. District Cost-Share Project Summary: Estimated Savings 2010-2019 for CFWI

	SFWMD[2]	SWFWMD	SJRWMD[2]	All District Total
2010-2019 Total	0.51	0.76	0.98	**2.25**
2010-2019 Total Excluding Projects included with Survey Results[1]	0.46	0.71	0.74	**1.91**
2010-2019 Estimated Savings Associated with District Cost-Share Programs Excluding Projects included with Survey Results				**1.91**

[1] *In order to avoid double-counting water savings, as explained in the narrative, water savings associated with district cost-share projects that was also reported in the survey results was excluded.*
[2] *Cost-share project water savings from the SJRWMD and SFWMD are based upon expected savings calculated by the participant in the funding application form.*

3. PS Conservation Survey

As previously stated, a PS survey was developed and distributed to determine which conservation programs CFWI utilities have been historically engaged in and which programs will continue into the future. The survey was conducted between May 20 and November 22, 2016, using an online questionnaire. Hard copies of the survey were provided if requested. Eighty-two utilities with a capacity of 0.1 mgd or more were invited to participate in the survey. Twenty-five utilities responded to the survey, though responses varied in degrees of completeness ranging from no useable data to substantial usable data. Three survey questions provided beneficial information for identifying BMP implementation and estimated savings and are summarized in Table 6.[5]

[5] Two additional parts of the survey related to awareness of grant funding opportunities and use of alternative water supplies, not discussed in this section.

Table 6. Summary of PS Conservation Survey

Summary of Survey Question	Summary of Survey Response
A general profile and demographics about the participating utility.	Responses to this question provided information about the total customer accounts represented by the participating utilities. In total, more than 750,000 accounts were represented. The majority of those utilities had a conservation awareness program of some kind.
A compendium of the utility's water conservation efforts including educational programs, regulatory measures, financial incentives or efficiency equipment.	More than 20 different type programs were identified and are being implemented by various utilities.
Characterization of the water efficiency details and analytics about the utilities' program activities.	Responses to this question provided information on the ten 2015 RWSP Quantified BMPs. In addition, 5 other BMPs were included in the survey since the Subteam was aware of utilities that currently had rebates for these BMPs as well. The survey asked for the program start and end year, the number of devices distributed since program inception, and the number of devices projected to be distributed annually. The 12 utilities responding to this question represent 67 percent of the CFWI PS demand. The utilities who participated in the survey but did not respond to this question either do not have BMP rebate or give-away programs, or do have BMP rebate programs, but have not tracked them. The remaining utilities who did not respond to this question represent 33 percent of the 2035 CFWI PS demand.

A summary of the survey responses is found in Appendix 1 and the results of the survey are presented in Appendix 1A. Based on the survey responses, there are a number of BMPs currently being implemented by the utilities, but there is no quantified savings information for some of the programs associated with these BMPs at this time. These unquantified BMPs include enforcement of irrigation restrictions, cisterns, behavioral programs, inclining block rates, utility leak detection, numerous education programs, AMR/AMI programs, etc.

Based on the survey responses, the PS Subteam developed a range of estimates for conservation savings achieved (or projected) from 2010 to 2019 for the quantifiable BMPs. A summary of those quantifiable BMPs is provided in Table 7.

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Table 7. Survey Response Summary: Estimated Implementations and Savings

BMP	Savings Per Device (gpd)[1]	No. of Implementations (2010-2014)	No. of Implementations (2015-2019)	Estimated Savings (gpd) (2010-2014)[4]	Estimated Savings (gpd) (2015-2019)
CII Facility Water Use Assessment/Audit	591.7	10	15	5,917	8,876
High-Efficiency Showerhead Replacement	16.4	44,389	50,055	728,422	821,401
High-Efficiency Toilet Replacement (including Low Flow Toilet)	20.0	9,025	8,650	180,154	172,668
High-Efficiency Faucet Aerator Replacement	6.9	58,521	56,050	406,702	389,530
High-Efficiency Pre-Rinse Spray Valve Replacement	651.5	113	0	73,616	0
High-Efficiency Urinal Replacement	78.8	2	5	158	394
Irrigation System Audits	12.1	10,300	9,810	125,124	119,172
Soil Moisture Sensors	52.8	100	0	5,277	0
Advanced ET Irrigation Controllers	91.4	237	150	21,659	13,708
Waterwise Florida Landscaping	219.9	42	170	9,237	37,386
Water Efficient Clothes washers	11.0[2]	2,025	1,121	22,275	12,331
Water Efficient Dishwashers	0.8[2]	108	100	86	80
Rain sensors	20[3]	3,757	8,415	75,140	168,300
Total for 12 respondents (67%) of 2035 PS Demand				1,653,767	1,743,847
Estimated Total for All CFWI				2,468,309	2,602,756

[1] Savings per device for the 10 2015 RWSP BMPs are as used in the RWSP SS v.II.
[2] Savings per device for water efficient clothes washers and dishwashers was derived from the FAWCET model.
[3] Savings per device for rain sensors is provisional only. See Quantified BMP section for more discussion. The savings included in this chart and projected forward are based on the assumption that rain sensors are replaced upon failure.
[4] Number of implementations from 2015 to 2019 are estimated based on the projected annual number of BMP implementations that responding utilities indicated they would continue.

The number of BMPs implemented from 2010 – 2014 was determined by analyzing the BMP data provided by the responding utilities. BMPs implemented prior to 2010 were not counted. If a utility BMP program spanned a timeframe longer than 2010 – 2014, the number of BMPs implemented since program inception was assumed to follow a linear trend from the start of the program through 2015. The number of devices per year was then multiplied by five to represent an estimated number of devices for the five-year period (2010 – 2014).

A total of 14 BMPs were analyzed for the survey to come up with a conservation savings for each time period for those utilities that participated in the survey[6]. BMP savings methods used the following data:

- The unit savings include each of the ten 2015 Quantified BMPs.[7] The water savings per BMP were applied to the estimated number of devices to obtain a savings estimate.
- Saving rates for three additional BMPs, water efficient clothes washers, water efficient dishwashers, and rain sensors were developed by the PS Subteam.

The estimated savings for the 12 utilities responding to Part 3 of the survey represent the low, or reported, end of the savings range (2010-2019 estimated at 3.40 mgd). Because only 12 utilities (representing 67 percent of the CFWI 2035 PS demand) responded to Part 3 of the survey, the amount which the non-responding utilities might have saved was also estimated by extrapolating the conservation savings associated with 67 percent of the CFWI demand to 100 percent of the CFWI demand. The estimated savings extrapolated for all CFWI utilities, assuming they have similar BMP savings as the 12 utilities that reported, represent the high, or extrapolated, end of the range (2010-2019 estimated at 5.07 mgd).

B. Analysis of Quantification Effort

The conservation savings estimates summarized in this document are drawn from multiple sources and a variety of studies. This data collection represents a subset of conservation savings realized by utilities during this time period. Some conservation savings, including, but not limited to, education, conservation rate structures, and CFWI-wide irrigation enforcement programs, have not yet been quantified and are not included here, but can achieve significant savings in the aggregate.

Based on best available information, and recognizing that this is the first time an effort has been made to quantify savings due to conservation regionally in the CFWI, Table 8 shows the average realized and projected savings for the PS sector from 2010 to 2019.

Table 8. Reported and Extrapolated Savings Average 2010-2019.

	2010 to 2014	2015 to 2019	Average of the two time periods
Reported Savings	3.06 mgd	5.03 mgd	4.05 mgd
Extrapolated Savings	3.88 mgd	5.89 mgd	4.89 mgd

[1]As previously descibed, the reported estimate includes estimated savings from the 12 utilities who responded to Part 3 of the survey while the extrapolated estimate is an extrapolation for all CFWI utilities.

[2] Cummulative savings for individual BMPs assumes replacement of BMP with a BMP of similar efficiency at the end of the BMPs service life.

[6] In addition, data and savings estimates were developed for four additional BMPs, the Florida Water Star Program, the Florida Green Building Coalition Program, the Extension Agency's Florida Friendly Program, and Irrigation Restriction Enforcement Savings as described in section III.A.1. of this strategy.

[7] See 2015 Final CFWI RWSP, Solutions Strategies, Volume IIA, Appendix A.

The 2035 projected savings assume that the average savings of these two time-periods, as shown above, was carried forward in a linear fashion for each subsequent 5-year time period through 2035 (2020-2024, 2025-2029, and 2030-2034). Documented savings rates across these two-time periods appear to have increased but suggest the 2035 savings goal would not be met if the savings follow a linear trend**.** However, conservation savings do not necessarily follow a linear trend, as evidenced by the documented savings from 2015 to 2019 which surpassed those from 2010 to 2014. Expanding and improving the implementation, quantification, and tracking of BMPs, as laid out in the Next Steps section, would be beneficial for a more accurate savings estimate and ensuring the sector is surpassing the savings projection.

C. Per Capita Water Use Trends

For public supply, both gross and residential per capita water use were presented in the 2015 CFWI RWSP, Solutions Strategies, Volume II from 1995 to 2012 showing a significant decrease. This strategy has been updated to include gross and residential per capita figures through 2015. See Figure 4. However, it should be noted that the methodologies accounting for population has changed and per capita figures from 2011 through 2015 cannot be directly compared to numbers in 2010 and prior. It should be further understood that population served by domestic self-supply located within a service area may now be included in the determination of per capita.

Annual gross per capita still shows a downward trend. Gross water use dropped from 182 gallons per capita per day (gpcd) in 1995 to 157 gpcd in 2010, a 14 percent reduction, and from 143 to 140 between 2011 and 2015 using the updated methodology, a 2 percent reduction. These reductions in per capita water use are attributable to several BMPs including the installation of higher efficiency fixtures and appliances; year-round watering restrictions and enforcement of landscape irrigation ordinances; inclining block rates; irrigation system improved efficiencies; urban mobile irrigation labs; customer water audits (indoor and outdoor); year-round public education campaigns and customer outreach; customer incentives and rebates; and other conservation BMPs. The increased use of reclaimed water that offsets potable use plays an important role in reducing per capita trends. Climate, the economy and installation of private irrigation wells and other factors are also generally expected to have contributed to this decrease.

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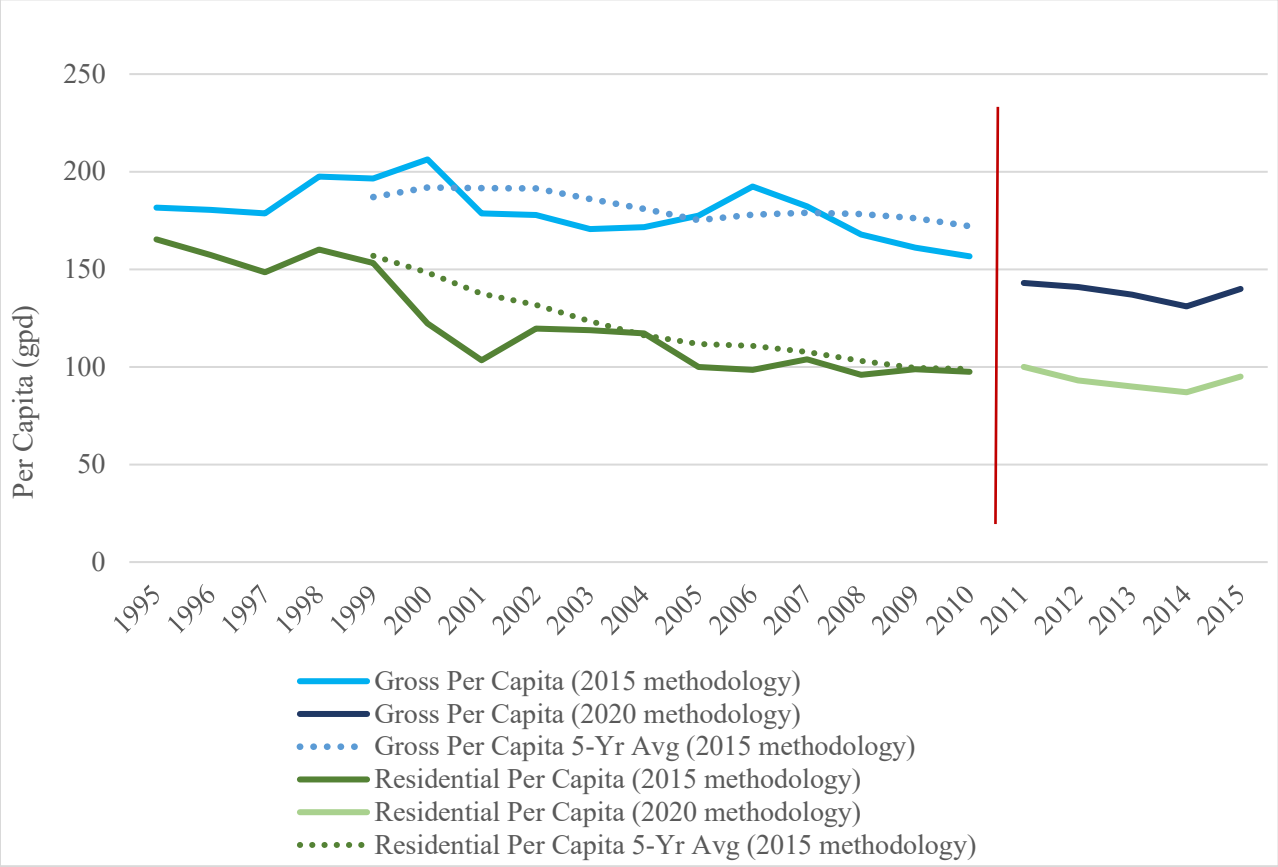
Figure 4. Average Gross and Residential Per Capita within the CFWI, 1995 – 2015 *

* Note there is a change in methodology in 2011 as represented by the red vertical line.



D. Barriers and challenges

The results of the survey included barriers the utilities experience with program implementation and challenges of taking advantage of the resources available from the water management districts. Future iterations of this implementation strategy may undertake a review of cost-share applications in each district, evaluate which users are using conservation cost-share programs and identify how to encourage an increased number of applicants to apply for those cost-share programs. Through the survey, utilities identified the financial component associated with program development as the number one barrier to conservation implementation.

Another critical challenge is customer awareness about the value of water. A major suggestion discussed by the public supply sub-team was the need to have a substantial customer awareness campaign. More information about outreach and communication is provided in the Regional Education and Outreach section of this strategy.

E. Public Supply BMPs

1. The value of quantifying BMPs

The Conservation Team has dedicated a significant amount of time and effort to quantifying BMPs, both those included in the 2015 RWSP and other BMPs not previously quantified. Quantifying BMP water savings can help evaluate and identify effective conservation practices and, by increasing chances of success, reduce the need to develop more expensive alternative water supplies. A new resource in quantifying BMPs is an effort known as H2OSAV.

H2OSAV is an archive of multi-year, utility territory datasets that merges account-level water meter data, conservation program data and property appraiser data. H2OSAV uses statistical tools to evaluate data and identify water consumption patterns and the effectiveness of individual water conservation BMPs or programs. It targets utilities in the CFWI regional planning area in an effort to address these evaluation issues. The beta version of H2OSAV is being developed by the Program for Resource Efficient Communities (PREC) at the University of Florida in partnership with Tohopekaliga Water Authority (Toho); City of Apopka (Apopka); Orlando Utilities Commission (OUC); and Orange County Utilities (OCU). In combination, these utilities cover 37 percent of the CFWI region and in 2015 accounted for 45 percent of its water demand. Some of these utilities have already invested in utility-specific BMP research using the H2OSAV program.

2. Passive Conservation

Passive savings refer to water savings that occur as a result of users implementing conservation BMPs in the absence of incentives. These are typically the result of education, property renovations, or codes and ordinances that mandate the installation of high-efficiency items in new construction and renovations as well as use of other equipment not covered by such mandates. Passive savings will occur *in addition to* the potential 27.91 mgd of water savings through active conservation BMPs and programs.

To identify the total amount of conservation savings the region may experience through the planning horizon, in addition to active program savings, it is important to quantify the amount of passive savings that may occur. The Conservation Team will evaluate the use of analytical tools (e.g. the Alliance for Water Efficiency's Water Conservation Tracking Tool) to identify passive conservation savings for the 2020 CFWI RWSP.

3. Quantified BMPs

Quantification of BMPs in this report is intended to provide a basis to track conservation savings at the planning level. Table 9, below, represents the estimated water savings numbers associated with each BMP quantified to date.

Table 9. Conservation Water Savings by Quantified BMP

Conservation BMP	Savings per device or program (gpd)	2015 RWSP – Projected potential implementations (2010-2035)	2015 RWSP – Projected potential savings (2010-2035) (mgd)	Total number of Implementations (2010-2019)	Total Savings (2010-2019) (mgd)	Percent of Total Savings (2010-2019)
Original 10 BMPs[1]						
Advanced ET Irrigation	91.4	2,845	0.26	387	0.04	0.43%
Irrigation System Audits	12.1	99,605	1.21	22,043	0.47	5.81%
Soil Moisture Sensors	52.8	28,617	1.51	100	0.01	0.06%
Waterwise Florida	219.9	3,956	0.87	212	0.05	0.58%
High-Efficiency Toilets (included low flow toilets)	20	373,215	7.46	17,875	0.36	4.38%
High-Efficiency Faucet	6.9	1,057,602	7.30	114,571	0.80	9.77%
High-Efficiency Showerheads	16.4	527,728	8.65	110,887	1.71	20.95%
CII Facility Water Audit	591.7	169	0.10	25	0.15	1.84%
High-Efficiency Urinals	78.8	3,808	0.30	7	0.00	0.01%
Pre Rinse Spray Valves	651.5	307	0.20	113	0.07	0.86%
SUBTOTAL					**3.64**	**44.70%**
New BMPs from Survey						
Water Efficient Clothes washer	11	0	0	3,146	0.03	0.42%
Water Efficient Dishwasher	0.8	0	0	208	0.00	0.00%
Cisterns[2]		0	0	2	0.00	0.00%
Rain Barrels[2]		0	0	1,427	0.00	0.00%
Rain Sensors	20	0	0	12,172	0.24	2.98%
SUBTOTAL			0		**0.28**	**3.41%**
Individually Quantified Conservation Savings						
Florida Water Star	128	0	0	5,691	0.66	8.12%
FBCB Homes	25.6	0	0	2,516	0.07	0.86%
FFL	Programmatic	0	0	Programmatic	0.08	0.98%
Quantified Enforcement Savings[3]	38.9	--	--		1.97	24.17%
SUBTOTAL					**2.78**	**34.13%**
WMD Cost Share BMPs						
AMR / AMI / AMA	Savings identified from cost share program	0	0	46,577	0.71	8.65%
Other indoor		0	0	3,135	0.18	2.20%
Other outdoor		0	0	1,015	0.23	2.83%
Other indoor + outdoor		0	0	1,500	0.31	3.84%
Line Flushing Reduction		0	0	1	0.02	0.24%
SUBTOTAL					**1.45**	**17.77%**
TOTAL			**27.91**		**8.15**	**100.00%**

[1] Total number of implementations of original 10 BMPs includes survey results and any cost share project using those BMPs.
[2] The use of rain barrels and cisterns represent source substitution, but are included here as efforts that can result in reduced reliance on groundwater.
[3] Implementation rates and savings for 2016-2035 were extrapolated from recorded implementations and measured savings for customers irrigating with potable water in years 2010-2015. These projections assume that trends of implementation and savings from 2010-2015 will continue through the 2035 projection period.

Table 9 shows an important shift in our understanding of the types of BMPs that are being implemented in the region. The 2015 RWSP used 10 BMPs to estimate savings potential in the

region. What the above illustrates is that while 50 - 60 percent of savings occurring in the region are attributable to those original 10 BMPs,[8] another 40-45 percent of total savings is occurring from other BMPs or programs. By documenting and understanding this shift and the BMPs being implemented, future savings estimates can be refined to more accurately predict conservation potential.

The top four BMPs where the utilities are currently focusing their conservation efforts include:

- Plumbing fixture retrofits (showerhead, faucet, and toilets), representing 36 percent[9] of the savings
- Irrigation restriction enforcement, representing 24 percent of savings
- AMR / AMI / AMA, representing 9 percent of the savings
- Irrigation BMPs (audits, rain sensors, ET and SMS devices), representing 10 percent of the savings[9]

The Conservation Team has identified some of these BMPs that need further research (e.g., service lives, savings rates, costs, and cost-effectiveness) as well as additional BMPs that are being reviewed and evaluated for inclusion in future plan updates. This work is discussed in the Next Steps section.

4. Quantified Conservation Savings Methodologies

In addition to using the water savings per device figures for the ten 2015 RWSP quantified conservations programs and devices that were published in the RWSP, the following conservation savings were quantified for the purposes of this report and the methodologies for each is set forth below. The Conservation Team acknowledges that many of the studies listed below may include a limited sample size and more research would be needed to support the savings per implementation.

- **The Florida Water Star Program or comparable (estimated at 128 gpd savings per implementation):** Savings from the Florida Water Star certified homes were determined from the recent Tohopekaliga Water Authority and UF study on the effectiveness of the program. Billing data was used to determine savings of FWS homes compared to similar non-FWS homes. Average savings per household times the number of certified homes was calculated and included. Six utilities who responded to the survey have some type of Florida Water Star rebate or requirement.

- **The Extension Agent/Florida Friendly Program (savings per implementation varies by program):** The FFL program has estimated the quantity of water savings from all FFL program based on agent follow up and questionnaires on behavior change. Estimated savings were shared by Dr. Michael Dukes, UF/IFAS, based on this methodology.

[8] "Other Indoor," "other outdoor," and "other indoor + outdoor" are frequently comprised of some combination of the original 10 BMPs.
[9] Florida Water Star programmatic savings, which include both indoor and outdoor conservation measures, additionally represents an estimated 9 pecent of the total estimated conservation savings.

- **Florida Green Building Coalition (FGBC) Homes (estimated at 25.6 gpd savings per implementation):** Several outdoor options are similar to some landscape codes within CFWI and outdoor options are consistently implemented so only indoor options were considered. Typically, indoor conservation includes the installation of high efficiency toilets, low flow showers and faucets. Savings were calculated by multiplying typical savings from these devises by each CFWI county average occupancy rates for single family homes. The total savings was calculated by adding each counties savings for FGBC homes.

- **Enforcement/Citation Programs**: As part the H2OSAV initiative, The University of Florida's Program for Resource Efficient Communities (UF-PREC) conducted statistical analyses of potable water savings related to Irrigation Restriction Enforcement water conservation programs in the Toho and OCU service areas. Reports summarizing the results of these studies were recently provided to the Conservation Team. The Team is still reviewing these reports and UF-PREC intends to submit the methodology and findings of these studies for publication in a peer-reviewed academic journal. The initial results of these analyses were used to quantify savings from Toho's and OCU's enforcement programs from 2010 to 2019 for inclusion in this Implementation Strategy. A brief description of the enforcement programs is provided below.

  The Toho Water Citation Program issues citations based on the rules set forth by SFWMD for the number of day per week allowed for irrigation. When customers are found violating the irrigation ordinance (initially targeted by drive-by surveillance and now using AMI data) they are contacted by mail. In conjunction with the violation notice, customers are also offered assistance with resetting their irrigation timer. Approximately 30 to 40% of the customers elect to receive a site visit from Toho's staff in which the irrigation system is evaluated, timers are adjusted, and rain sensors supplied if needed.

The OCU Enforcement Program, Water Watch, began in 2001 as an educational effort to inform its customers about watering guidelines. In 2011, the Water Division started issuing citation letters based on staff patrols that identify customers who are not irrigating according to the mandatory water restrictions established by Water Management Districts. The first citation letter is a warning with subsequent citations having a $25 fine for repeat violations.

- **Rain Sensors (estimated at 20 gpd savings per implementation):** There are limited data/resources available on quantification of this BMP. UF IFAS has reported an estimate of approximately 35 gpd per device (or 3% savings) and a report from Citrus County, FL estimates 20 gpd per device. The PS team decided 20 gpd per device was an appropriate estimate until a more thorough analysis can be performed, and/or more data becomes available. It should also be noted that the life expectance of this BMP has been reported to be as little as 2 years; therefore, frequent replacement is necessary to maintain the estimated savings rate.

5. Next Steps

. From what is known about current conservation savings, an increased rate of conservation may be needed to achieve the goal of going beyond the projection of 27.91 mgd. The Conservation

Team has identified ways to improve the methodologies and expand upon the quantification of BMPs, which will be incorporated into the 2040 RWSP update and better track and quantify conservation efforts in the region. There may still be a need for additional savings, so a plan to develop a path forward for increased investment would be beneficial. The recently initiated project solicitation process will provide an avenue for the Team to work with stakeholders in the region to develop designated projects to assist in meeting the savings goal. Further use of conservation tools, such as H2OSAV and AWE, will provide more accurate estimates of the effectiveness of existing conservation efforts and will assist in identifying areas where conservation efforts should be expanded.

Due to the limited data availability for some conservation practices being implemented by public suppliers, the Conservation Team and the Public Supply Subteam should research additional information on the following conservation practices and improve the data sources and methodologies used to quantify savings. This effort will assist the team in evaluating future conservation potential and developing strategies to achieve greater water savings. The following conservation practices and data collection opportunities have been identified:

a. Conservation Practices Requiring Additional Evaluation

- **Irrigation System Audit:** Reevaluate conservations savings associated with an irrigation system audit. As per the EZ Guide, the savings per audit is 12.1 gpd, which some members of the Conservation Team believe may be low.
- **Rain sensors:** A preliminary savings number was used for this document, but further refinement would be beneficial.
- **CII Facility Water Audits**: A CII facility water audit focuses on water demands and water saving improvements for industry-specific water uses (water use not associated with domestic indoor fixtures or landscape irrigation). The CII facility water audit BMP has the second highest savings rate per implementation (591.7 gpd for every audit per EZ Guide output used in the 2015 RWSP) of any of the BMPs considered as part of this quantification effort. A more in-depth review on the kind of CII facility water audits being performed in the region compared to the EZ Guide definition will yield insightful information on estimating true savings for this BMP.
- **Data Analytics:** A significant amount of the quantified savings to date (0.70 mgd or 8.70% - Table 9) was attributed to AMI/AMR/AMA technologies based on the *projected* savings from cost share applications. Additional research is needed to better characterize this measure. AMR and AMI are used to collect customer use data and transmit that information to the utility. Only AMA, or more accurately "data analytics", is used to allow utilities and their customers to understand their water use practices and target more effective conservation BMPs. More research is required to estimate the *actual* savings achieved resulting from these data management efforts and identify those specific conservation measures being implemented by both the utility and the utility customer. As a starting point, a list of the utilities within the CFWI currently using data analytics could be developed to identify the varying ways the technology is being used for conservation targeting and which specific associated measures are being employed by utility customers. It is important to better understand the relationship between the data analytics and the conservation measures themselves (behavior changes and increased participation

in existing utility sponsored programs) and agree upon methodologies to prevent the double-counting of savings.

- **Enforcement/Citation Programs**: Multiple utilities within the CFWI planning region implement Enforcement/Citation Programs to address violations of irrigation restriction ordinances. Fifteen utilities responded to the survey that they had some form of irrigation enforcement program in terms of education, fines, or service suspensions. Unfortunately, most of the utilities did not have quantified water savings estimates for their program, with the exception of reports from Tohopekaliga Water Authority (Toho) and Orange County Utilities (OCU) used for inclusion in this Implementation Strategy only. As discussed above, initial results from Toho's and OCU's programs show promising savings potential that can be achieved through these kinds of programs.~~,~~ The Team looks forward to further review of the UF-PREC report and other methods. Broader application of results from these reports for other purposes, such as application of savings to other "unquantified" enforcement programs or for permitting purposes, has not been determined at this time.

  As mentioned above, multiple utilities have indicated that they have some form of enforcement program. Several of these utilities are working with the H2OSAV initiative or conducting individual analyses to quantify savings from their enforcement programs. The team will work to develop a robust repository of quantified savings from these kinds of programs. A compilation and comparison of the water savings results and program components of these enforcement efforts by CFWI utilities, and other non-CFWI utilities, would be useful for evaluating the effectiveness of these programmatic efforts. A list of utilities implementing an Enforcement/Citation Program that summarize the various components and savings (if available) of those programs would be useful for future analyses.
- **Advanced Irrigation Technology:** Develop ideas for promoting the use of advanced irrigation technology to improve landscape irrigation scheduling efficiency. As a starting point, develop a list of CFWI utilities that have programs using advanced irrigation technology and quantify the number and type of units already in-use.

b. Data Collection Improvements

As discussed earlier, the PS sub-team relied on two existing data sources and developed a third source as the basis for quantifying water conservation savings in the CFWI planning region. Limitations on the reliability of the data sources and on some of the data itself identified the need for improvements in the data collection and analysis processes. Moving forward, consistent and continual measurement of savings from conservation practices and programs will be essential to the accuracy of future water supply estimates.

- **Public Supply Programmatic BMPs** - Three of the individually quantified conservation savings were quantified using data developed by or with the University of Florida. Continued coordination with University staff on these programs will be needed to build the data set.
- **District Cost-Share Program Database** – The districts maintain a database of conservation projects that receive funding through their individual cost share programs.

The dataset contains detailed information on proposed and completed projects and anticipated savings. Review of this information identified areas that need additional investigation. More follow-up on actual water savings realized once the project is completed would be beneficial. As mentioned previously, specific research on the effectiveness of AMI and AMA technologies is required.

- **Public Supply Survey** - The PS sub-team employed an anonymous survey to identify utilities' conservation activities beyond the district funded cost share programs. The survey was successful in capturing conservation efforts being performed by some of the utilities. However, the lack of response from the majority of the utilities (only 12 of 85 responded with enough detail to estimate savings) highlights the need for more outreach and engagement to those utilities not participating. If a survey is going to be the mechanism to capture conservation efforts in the future, refinements are needed on the structure of the survey (e.g. solicitation process, transparency issues, clarity of questions, defining BMPs, QA/QC, etc.) to gain more participation and ensure that data is being properly classified. One-on-one contact between Districts and individual public suppliers can also provide potential increases in participation.

6. BMP Geographic Target Areas

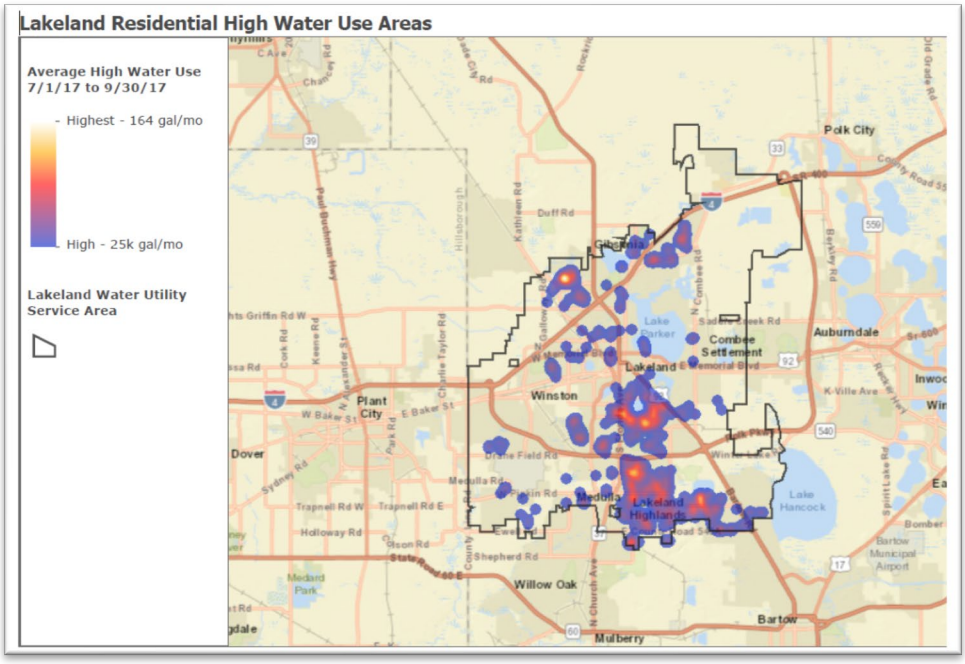
The conservation team is currently discussing options for targeting these BMPs at specific communities or service areas. Factors that should be considered when implementing these BMPs are outlined below by classification. Utilities may identify these areas using their service area information. However, the Conservation Team will investigate identifying these areas CFWI-wide as well in future iterations of this strategy.

- **Outdoor Residential or Commercial Irrigation**. Outdoor residential and commercial irrigation represent a significant amount of potable water use in the CFWI. Factors that can help a utility decide where to focus their BMP efforts, from rebates to education and beyond include:

    - Water customers with high volumetric water uses;
    - Water customers with high irrigation water use if separately metered;
    - Water customers not following the District or local irrigation criteria;
    - Customers using potable rather than reclaimed water when reclaimed water is available;
    - Size of residential lot; and
    - Irrigable square footage.

    For illustration, the City of Lakeland has identified an outdoor irrigation target area using average high-water use during the July – September time periods. From the below map, the City of Lakeland can identify where the highest irrigation savings potential exists when targeting outdoor irrigation BMPs and programs.

Figure 5. Lakeland Geographic Target Area Illustration



- **Indoor Plumbing**. Retrofitting older homes and businesses can result in significant cumulative savings. Factors that can help a utility decide where to focus these BMP efforts, from rebates to education and beyond include:

    - Water customer having separate domestic and irrigation meters and high use on domestic meter;
    - Age of home or business is pre-1994;
    - Size of home or business; and
    - Type of business.

    For example, see domestic self-supply geographic target areas section of this strategy.

- **Commercial or Institutional Use.** Commercial or institutional users connected to the utility's water system present a different type of customer, whose needs and incentives are different than a residential user. Factors that can help a utility decide where to focus commercial BMP efforts, from rebates to education and beyond include:

    - Type or class of business;
    - Age and size of structure;
    - Businesses not using reclaimed water when it is available;
    - Businesses not recycling water when the type of business allows (example-car washing);
    - Businesses not taking advantage of chilled water for AC cooling when available by utility; and
    - Irrigable square footage

F. Regional Education and Outreach

Fostering an informed and engaged public requires public suppliers, water management districts, and other conservation partners to implement a robust education and outreach program. The success of a public supplier's conservation program partially relies on its education of its customer and the resulting behavioral changes that reduce individual water use. Therefore, education programs are key to informing the community about the latest water efficiency and water conservation options. The conservation team suggests implementing the action items presented in the introduction relating to a regional education and outreach effort.

G. Funding

A significant barrier to participation on conservation programs is funding opportunities. The CFWI RWSP Solutions Strategy document estimated that $122 million would be needed to achieve the 2035 projected conservation savings. Increased state and district funds would assist in meeting or exceeding the projected 2035 conservation savings, further leveraging utility investment. The utility survey also revealed that utilities would like to see changes made to the funding programs to allow for greater flexibility. An overview of the Districts' cost-share programs is provided in Table 11 below.

Table 11. District Conservation Cost-Share Program Overview

District	SJRWMD	SWFWMD	SFWMD
Program inception	2009	1991	2003
Total funding for conservation projects since program inception	$3,243,335	$20,950,000	$6,125,514
Number of conservation projects since program inception	26	170	207
Project Types	• Indoor plumbing retrofits • Landscape and irrigation retrofits • Advanced irrigation installations • Automated meter reading technology • Irrigation restriction enforcement	• Indoor plumbing retrofits • Landscape and irrigation modification • Advanced irrigation controller installations • Industrial/Commercial/ Institutional efficiency improvements • Potable water line looping to reduce flushing • Advanced Metering Analytics • Florida Water Star rebates	• Indoor plumbing retrofits • Landscape and irrigation retrofits • Advanced irrigation controller installations • Rain sensors • Automatic line flushing devices • Pre-rinse spray valves • Rain harvesting and cistern installation • Water conservation software technology

Cost share amounts	Most successful projects receive 33% cost-share but water conservation receives 50% with REDI communities receiving 100%.	Projects selected for funding receive 50% cost-share with REDI communities receiving 75%.	Projects are eligible to receive up to 50% cost-share and REDI communities are eligible to receive up to 75%.
2017-18 funding	For the most recent year of approved funding (2017/18), the entire program had a budget of $23.6 million.	For the most recent year of approved funding (FY2018), the entire program had a budget of $59.8 million, of which approximately $0.5 million was for conservation projects.	For 2016 - 2018, the entire program had a budget of $9.0 million with approximately $1 million going towards water conservation projects
Application Due Date	April (Districtwide); October (REDI)	October	Varies
Governing Board selection	June (Districtwide); December (REDI)	June	Varies
Funds made available		October , one full year after application is due	
More information	http://www.sjrwmd.com/funding/	http://www.swfwmd.state.fl.us /business/coopfunding/	https://www.sfwmd.gov/doing-business-with-us/coop-funding

H. Designated Projects

The continuing implementation of projects identified in the District's cost-share program and the PS Survey is critical to meeting and exceeding the 2035 projected conservation savings. Specifically identifying projects can assist in planning and projecting future savings. The following projects have been identified to date.

Table 12. Public Supply Designated Projects

Project Type	Title	Entity	Description	Implementation Schedule	Number of Implementations	Total Project Cost	Water Saved (gpd)
Generic	Toilet Rebate Program	N/A	$100 HE toilet rebate for single family homes	October 2020 – October 2021	500	$100,000 ($50,000 in rebate funds + additional programmatic costs)	10,000 (500 implementations @ 20 gpd per device)
Generic	Soil Moisture Sensor Installs (with option to add ET controllers)	N/A	Direct install soil moisture sensors for high water users	October 2019 – October 2021	1,000	$450,000	52,800 (1,000 implementations @ 52.8 gpd per device)

IV. North Ranch Sector Plan

Osceola County and Deseret Ranch completed a sector plan for a portion of Deseret's property effective October of 2015. With an area of 133,000 acres and a planning horizon of 2080, the North Ranch Sector Plan (NRSP) is a long-term master plan developed pursuant to Section 163.3245,

F.S. While not included in the 2015 RWSP, the NRSP will be included in the 2020 RWSP and is included here to initially identify the intended conservation measures included in the Detailed Specific Area Plan/Conceptual Master Plan for future public supply efforts.

All construction in the North Ranch Planning Area will be new and will incorporate many water saving devices and strategies. Development will strive to achieve a lower demand for water than was estimated in the 2014 Draft Water Supply Plan for Osceola County and a lower demand than is set out in Osceola County's Potable Water Element level of service standard. Assuming that reclaimed water or stormwater can be used for most non-potable needs, the amount of fresh potable water needed will be reduced. As an aspirational goal, it is assumed that the North Ranch Planning Area can achieve a residential potable water use per capita of between 46 and 60 gallons per day. Because the NRSP does not anticipate a significant increase in public water supply demands until after the conservation implementation strategy's planning horizon of 2035, the public water supply conservation strategies and projected savings set forth in the conservation implementation strategy do not incorporate the conservation strategies and projected savings within the NRSP. Future water conservation planning efforts beyond this conservation implementation strategy will consider the conservation efforts enumerated within the NRSP.

V. Agriculture

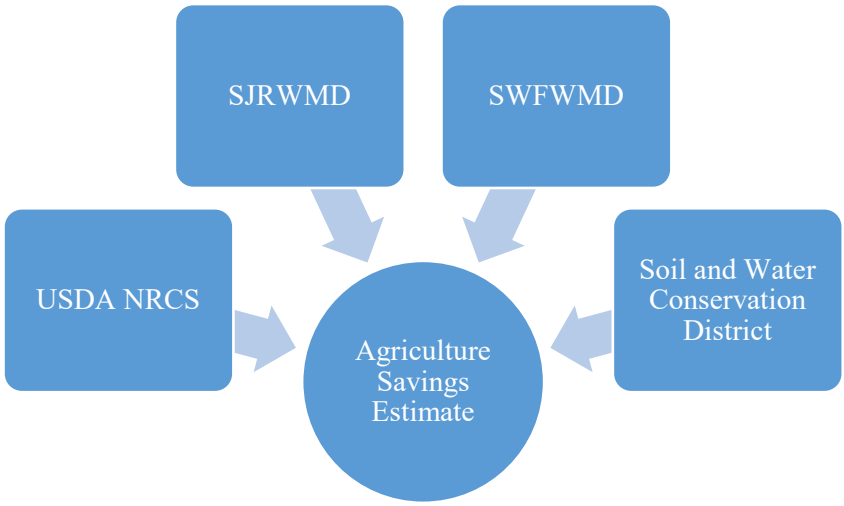
Agriculture represents the second largest water use in the region, with a projected acreage of 165,000 in 2035 pursuant to the 2015 plan. Agricultural demand is projected to increase by approximately 16 percent from 185 mgd in 2010 to 215 mgd in 2035. The 2015 RWSP identified a minimum of 4.30 mgd of water conservation savings for the agricultural sector over the planning horizon. The Steering Committee further established a goal of going beyond the projection. This strategy explores the status of reaching that potential and provides tools agriculture can use to ensure that the conservation projection is met and exceeded.

A. Where Are We Now?

To identify the estimated amount of conservation completed since 2010 and to project the amount of conservation to be completed by 2035 implementing planned conservation activities for agriculture, four data sources were used - Water Management Districts, the Florida Department of Agriculture and Consumer Services (FDACS), the U.S. Department of Agriculture Natural Resources Conservation Service (USDA/NRCS), and the Soil and Water Conservation Districts. See Figure 6.

The savings outlined in this strategy represent the quantifiable conservation savings from cost-share programs, but does not embody all possible conservation savings within the agriculture sector. Conservation savings achieved by agricultural producers independent of cost share programs were unable to be quantified within this strategy due to a lack of data availability.

Figure 6. Methods Used for Calculating Agricultural Conservation Savings Estimate



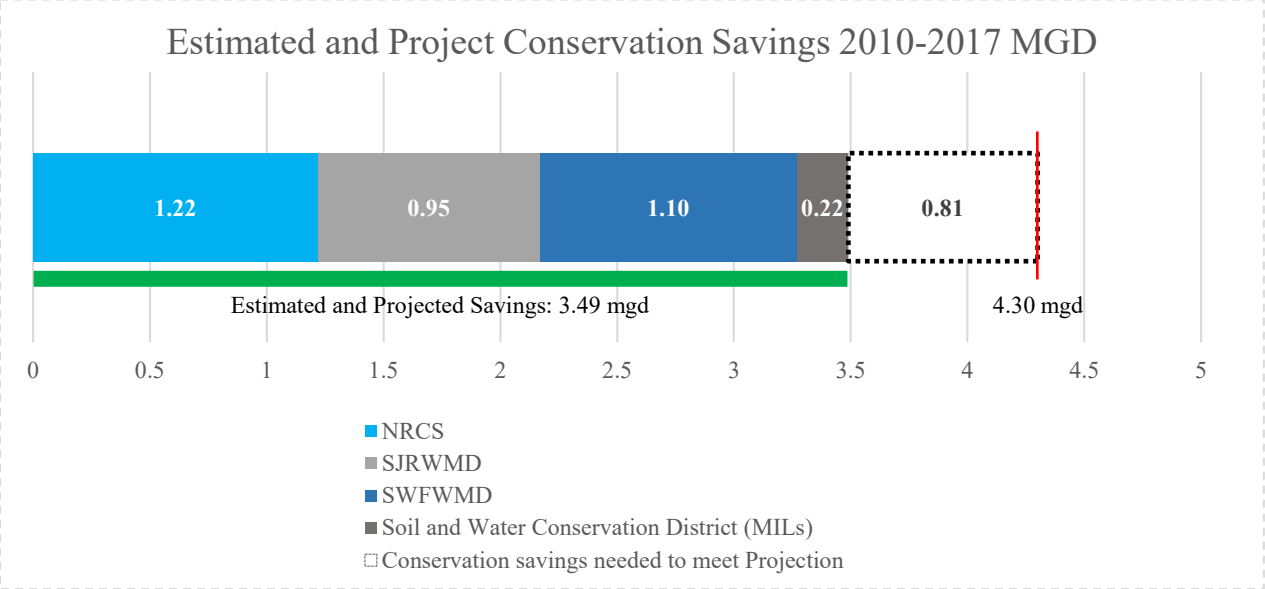
These conservation practices quantified by these four data sources have produced savings (or projected savings) of 3.49 mgd for 2010 through 2017 as laid out in Table 13, below. By 2035, an additional 0.81 mgd in conservation water savings is needed to meet the 2035 conservation projection for agriculture as depicted in Figure 7, below. Overall, 80.2 percent of the 2035 conservation projection of 4.3 mgd for agriculture has been achieved in 2010 – 2017. Assuming the implementation of these conservation practices continue at a similar rate as in the previous time period, the goals of agricultural conservation should be exceeded by 2035. The programs implemented by specific agencies are described in detail in the following sections.

Table 13. Estimated Agricultural Water Conservation Achieved, 2010-2017

Agencies Administering Water Conservation Programs	Region within CFWI	Agricultural Water Conservation Achieved (mgd)		
		2010-2014	2015-2017	Total for 2010-2017
NRCS	Orange and Lake Counties	N/A	0.79	0.79[1]
NRCS and FDACS partnership	Osceola County	0.43	N/A	0.43[2]
SJRWMD[3]	SJRWMD jurisdiction	0.03	0.92	0.95
SWFWMD	SWFWMD jurisdiction	0.98	0.12	1.10
Soil and Water Conservation District Mobile Irrigation Labs (MILs)	Lake and Orange Counties	0.20[4]	0.02[4]	0.22[4]
TOTAL				**3.49**

[1] This estimate includes cooling pads retrofit only; Data for the irrigation retrofit projects implemented with NRCS support are not available.
[2] These estimates include installations of water control structures only. Estimates for other projects implemented by FDACS and NRCS are not available.
[3] projects implemented with SJRWMD funding, along with one project implemented with farmer's funding without funding support by the agency
[4] Verified estimates provided by the mobile irrigation lab program.

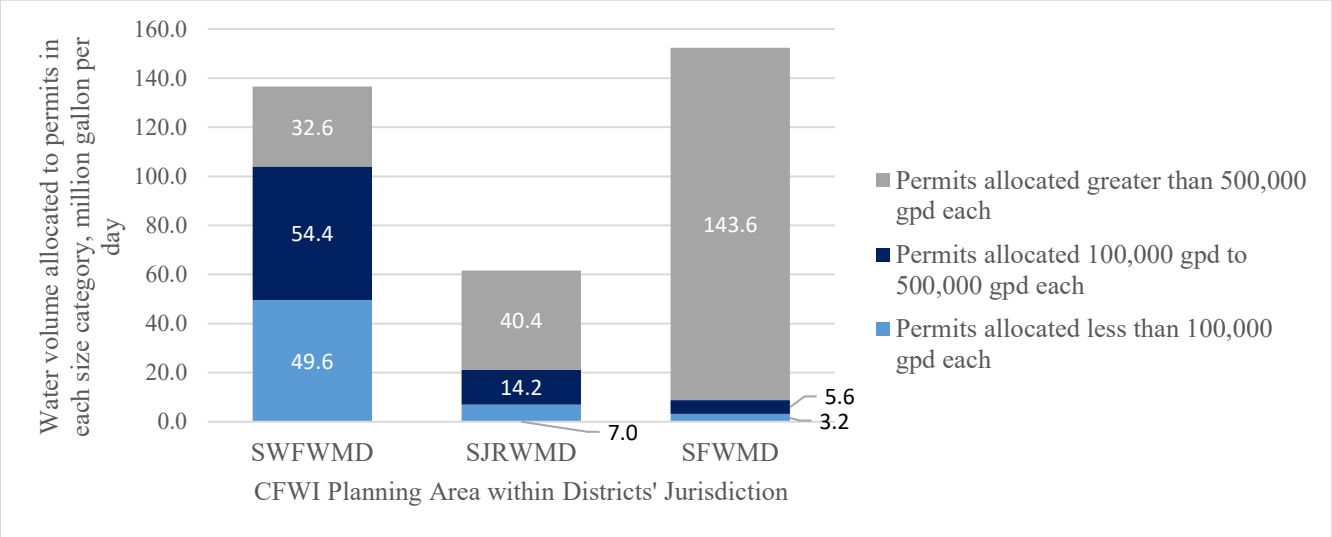
Figure 7. Estimated and Projected Conservation Savings 2010-2017 by Data Source and Conservation Remaining in MGD



1. Number of Agricultural Permittees by Size

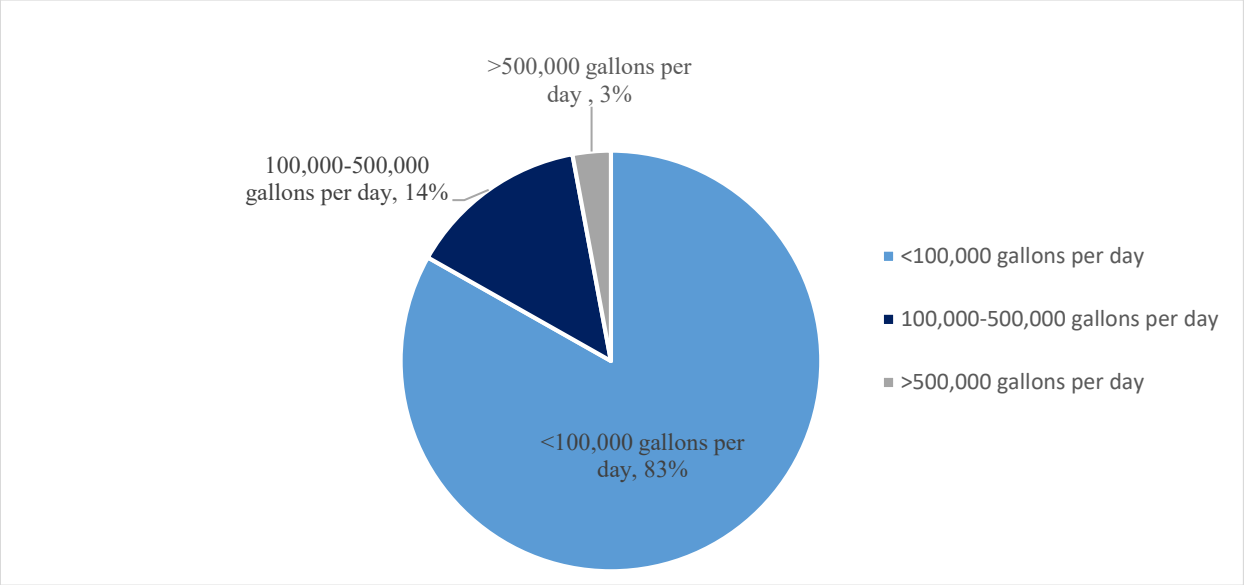
As of July 2016, there were approximately 2,385 agricultural water use permits. Of those permits, 1,984 are small-size agricultural operations that withdraw less than 100,000 gallons per day (gpd). Figure 8 shows the distribution of agricultural permits by allocation size within the CFWI.

Figure 8. Total Volume of Water Allocated to Different Categories of Consumptive Use Permits (CUPs), by Water Management Districts



Source: SJRWMD, July 2016

Figure 9. Distribution of Agricultural Consumptive Water Use Permits by Size



Source: estimated and shared by SJRWMD, based on ECFTX geospatial database (February 7, 2017)

2. Programmatic Savings 2010 – 2017 Results and Methodology

The 2015 CFWI RWSP addressed agricultural water conservation on a programmatic basis based on historical data from SWFWMD's FARMS program . The agricultural sub-team sought to further refine the estimate with actual participation rates of agricultural producers. Using cost-share programs, the agricultural sub-team assessed the best management practices that have been implemented in the CFWI planning area between 2010 and 2017 by reviewing the data for those cost-sharing programs implemented by federal, state, regional, and local government agencies. Since the data was readily available, the analysis generally captures water conservation savings by producers who participated in the various programs for which the data was available. This additionally includes Mobile Irrigation Lab (MIL) data, which may have been funded by cost-share or funded fully by the producer. It is important to note that there may be additional water conservation savings that may have been implemented by agricultural producers that did not participate in the cost-share programs.

a. Federal USDA/NRCS Cost-Share Program

Several programs offered by the USDA/NRCS compensate agricultural producers and landowners that voluntarily implement practices that protect soil, water, air, wildlife habitats, and related natural resources. The programs include the Environmental Quality Incentive Program (EQIP), the Agricultural Conservation Easement Program, and the Conservation Stewardship Program.[10] EQIP is the most relevant federal program for CFWI agricultural water conservation effort that provides a voluntary conservation program for farmers and ranchers.[11] Financial and technical assistance is offered for eligible participants to install or implement structural and

[10] See UF/IFAS extension publication by Mylavarapu et al. 2014
[11] EQIP, created in 1999, was reauthorized in the Farm Security and Rural Investment Act of 2002.

management practices that address impaired water quality and conservation of water resources on eligible agricultural land. A summary of information collected for NRCS agricultural cost-share programs within the CFWI is provided in Table 12 below.

Table 12. Programmatic Savings based on NRCS Cost-Share Funding in the CFWI

Practice Name	Period	Estimated Conservation Savings	Acres	Estimated Total Cost	Cost per Acre
Irrigation System, Microirrigation	2010-2017	Not quantified	102.6 acres[1, 2]	$288,586.10	$2,812.73
Cooling pads retrofit	2010-2017	0.79 mgd[2]			
Water Structure Project, Osceola County[3]	2013	0.43 mgd	Unknown	Unknown	Unknown

[1] *Total water conservation savings unknown and not included in total quantified conservation savings.*

[2] *Data provided by USDA/NRCS*

[3] *Coordinated and co-funded with FDACS, quantity from personal communication from NRCS*

b. St. Johns River Water Management District's Jurisdiction

Since the inception of the SJRWMD Agricultural Cost-Share Program, producers have engaged in a variety of strategies through this partnership effort to increase irrigation efficiency within the SJRWMD portion of the CFWI planning area. The estimated conservation and estimated producer funding along with actual SJRWMD funding is reported in Table 13. If the farmer had an MIL report done prior to the project, this was considered to be the beginning efficiency. Otherwise, a Farm Irrigation Rating Index (FIRI)[12] factor was applied to the existing system. The new system was assigned an efficiency rating based on published literature. The reviewers looked at actual water use and calculated the difference between the two systems which was then applied to the actual water use over the previous five-year period.

Table 13. Programmatic Savings based on SJRWMD District-Wide Agricultural Cost-Share Program in the CFWI

AG Type	Annual Average Daily Permitted (mgd)	Estimated Demand Reduction (mgd)	Project Type	Total Project Cost	SJRWMD Cost	Project Acres	Year of Approval
Row Crop[1]	0.15	0.03	Irrigation Conversion	$150,000 (estimate)	$0 (farmer funded)	99	2011
Green-house	0.02	0.017	Rainwater capture	$350,000	$300,000	15	2015
Citrus / Small Fruits	0.03	0.011	Irrigation Conversion	$176,434	$158,791	19	2015
Sod	0.15	0.081	Irrigation Conversion	$161,571	$64,740	75	2015

[12] FIRI is an NRCS tool that provides a uniform and objective evaluation method for planning irrigation water conservation.

Nursery	1.42	0.29	Irrigation Conversion	$422,703	$300,000	694	2016
Sod	0.22	0.18	Irrigation Conversion	$383,105	$287,329	75	2016
Row Crop	2.19	0.17	Irrigation Conversion & Control Structures	212,613	159,460	1131	2017
Green-house	0.13	0.01	Irrigation Retrofit	100,135	75,101	7.24	2017
Sod	0.57	0.17	Irrigation Conversion	259,032	194,274	70	2017
Overall Total	**4.88**	**0.95**		**$2,215,595**	**$1,539,695**	**2,185**	

[1] *Includes one self-funded project*

c. Southwest Florida Water Management District's Jurisdiction

In 2003, SWFWMD started the FARMS program to assist with implementation of BMPs related to reducing groundwater demands from the Upper Floridan aquifer in agricultural areas. The FARMS program has, historically funded three types of projects:

- Irrigation water conservation through precision irrigation (including pump automation and decision support with soil moisture sensor or weather station);
- Irrigation system conversion to increase irrigation efficiency; and
- Alternative water supply (including expansion of existing water features, excavated ponds, and reclaimed water supply) to replace the demand of Upper Floridan groundwater quantities with a different source of water.

Since 2010, within the CFWI, the SWFWMD has funded 19 projects (Table 14). These projects result in nearly 1.1 mgd of water conservation or Upper Floridan groundwater offsets. Because the goal of FARMS is to reduce Upper Floridan groundwater use, AWS projects, such as tailwater reservoirs or other surficial water sources, are a component of the groundwater savings reported.

Table 14. Programmatic Savings based on SWFWMD FARMS Program in the CFWI

AG Type	Annual Average Daily Permitted (mgd)	Estimated Demand Reduction (mgd)	Project Type	Total Project Cost	SWFWMD Cost	Project Acres	Year of Approval
Blueberry	0.04	0.02	Alternative Water Supply	$277,670	$63,762	20	2010
Citrus	0.35	0.01	Precision Irrigation	$9,087	$ 4,370	448	2010
Blueberry	0.03	0.01	Irrigation Conversion	$77,967	$23,000	20	2011
Blueberry	0.57	0.04	Irrigation Conversion	$161,571	$64,740	20	2011
Citrus	0.05	0.01	Irrigation Conversion	$43,808	$21,904	20	2011
Citrus	0.04	0.03	Alternative Water Supply	$25,128	$18,846	41	2011
Citrus	0.20	0.06	Irrigation Conversion	$304,320	$116,548	192	2011
Blueberry	0.04	0.029	Alternative Water Supply	$138,836	$90,174	20	2012
Blueberry	0.03	0.02	Alternative Water Supply	$96,120	$ 44,962	13	2012
Blueberry	0.02	0.01	Alternative Water Supply	$46,190	$34,611	8	2012

AG Type	Annual Average Daily Permitted (mgd)	Estimated Demand Reduction (mgd)	Project Type	Total Project Cost	SWFWMD Cost	Project Acres	Year of Approval
Blueberry	0.18	0.11	Alternative Water Supply	$376,460	$266,980	80	2012
Blueberry	0.04	0.01	Irrigation Conversion	$90,151	$32,500	24	2012
Nursery	0.46	0.09	Alternative Water Supply	$490,247	$200,000	84	2012
Citrus	0.04	0.01	Alternative Water Supply	$17,460	$8,730	36	2013
Blueberry	0.91	0.52	Alternative Water Supply	$1,007,922	$670,105	414	2014
Blueberry	0.20	0.01	Alternative Water Supply	$35,488	$17,744	12	2015
Citrus	0.55	0.02	Precision Irrigation	$109,600	$54,800	483	2016
Citrus	0.28	0.02	Precision Irrigation	$87,155	$43,578	280	2017
Blueberry	0.14	0.07	Alternative Water Supply	$420,786	$262,651	53	2017
Overall Total	**4.15**	**1.10**		**$3,815,965**	**$2,040,005**	**2,268**	

d. County Soil and Water Conservation District

MILs can be effectively used to ensure that an irrigation system is operating optimally. The duration of these savings may vary. Savings from all MILs is not quantified. However, verified MIL results are available from FDACS, with the estimated water conservation, as indicated by follow up evaluations, of 0.22 mgd for Orange and Lake Counties combined.[13]

3. BMP Analysis

To assist in evaluating additional programmatic savings within the agricultural sector, a draft repository of BMPs was developed by the agriculture conservation sub-team with input from agencies and stakeholders, and used data from the existing agricultural cost-share programs. Specifically, the group focused on the cost-share programs implemented by SJRWMD and SWFWMD. For SWFWMD, the cost-benefit analysis model employed to evaluate FARMS program applications was used. The model is updated periodically to reflect most current costs of BMP implementation and reference interest rates used to amortize the costs to the annual basis. The version used in this report is for 2016 FARMS cycle. For SJRWMD, cost-share program funding applications for 2015 and 2016 were examined.
Historically, agricultural producers were eligible for SFWMD's district-wide cost-share program, which was funded through 2016. Because all use categories competed for the same funding program, however, there were no applications from agricultural producers for SFWMD funding during the 2010-2017 period evaluated in this strategy.

To make the analysis comparable between the two WMDs, the projects considered by the SJRWMD were grouped into the same categories as the categories defined by the SWFWMD's FARMS (i.e., precision irrigation, irrigation conversion, and alternative water supply). The crops were also classified using the categories employed by SWFWMD (row crops, sod/pasture,

[13] Data from Camilo Gaitan, FDACS, representing water savings calculated as a result of follow up evaluations within the CFWI.

perennial crops, and container nurseries). For the cases when the project types and crop categories coincided for SWFWMD and SJRWMD, the cost per gallon of water saved was used from the SWFWMD. If there were no analogue to the project / crop category proposed for SJRWMD in SWFWMD FARMS model, then the SJRWMD project's cost per gallon was examined. If there were at least three projects of the same category / crop type in the SJRWMD list of 2015-2016 applications, then the medium value of the project's cost per gallon was recorded. If less than three projects were in the list, then the project was recorded into the list of practices for which additional cost and benefit information should be collected. The information for practices supported by NRCS cost-share program was also recorded into the list of practices for which additional information (particularly, the water use reduction) should be collected.

The practices were sorted by the cost per gallon value then discussed and categorized by the members of the agricultural conservation sub-committee with respect to their applicability to the region (based on such criteria as soil types, area geology, types of crops produced, etc.). Applicability of practices to crops and soils in each Districts' jurisdiction based on agricultural use in 2017 were categorized as V = Very Relevant, S = Somewhat Relevant, and N = Not Relevant.[14] The main factors for the adjectives applied to the BMPs were the applicability of the BMP to the dominant crop and feasibility of the BMP to agricultural users in the CFWI to the crop and irrigation practices in the District. For example, BMPs impacting center pivot irrigation systems is not relevant in SWFWMD because there are not a significant number of center pivot irrigation systems in SWFWMD. Water Conservation BMPs varied in their costs (per thousand gallon) and applicability to CFWI areas in WMDs' jurisdictions.

However, to fully use the information and estimate water conservation potential for agricultural areas in the CFWI planning area, important steps should include assessment of (1) baseline level of adoption of different practices for various agricultural crops grown in the CFWI planning area (using information about cost-shared practices as well as practices implemented at producers' expense); and (2) potential limitations on the practice adoption (such as physiographic soil types). This information will allow identification of acreage that is available for implementation of conservation practices identified in the matrix, and related potential water conservation. Next, a cost-minimization model could be used to prioritize the practices and agricultural areas to achieve additional water conservation at the lowest costs.

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[14] Note that the ranking is preliminary, and additional analysis of the practices' applicability should be conducted (e.g., by wider discussion with agricultural producers and/or extension agents in the region).

Table 15. Draft BMP Repository - Matrix of Conservation Practices and AWS for which Cost and Benefit Information Is Available and Potential for Implementation in CFWI

Category	Project type	Crops	Cost-effective-ness ($/kgal)[2]	Cost per unit[2]	Units	Information source	Potential to Implement in CFWI	
							SJR WMD	SWFWMD
Precision irrigation	Irrigation System Automation (Controlled by Soil Moisture Sensor)	Any	$0.44 - $0.91	$23,078	$/System	SWFWMD	**S**	**V**
Precision irrigation	Irrigation system automation (controlled by weather station)	Any	$0.47 - $0.97	$24,647	$/System	SWFWMD	**S**	**V**
Precision irrigation	Soil Moisture Sensor	Any	$0.04 - $0.09	$1,947	$/System	SWFWMD	**V**	**V**
Precision irrigation	Weather Station	Any	$0.08 - $0.17	$3,515	$/System	SWFWMD	**V**	**V**
Irrigation Conversion	Center Pivot to sub-surface drip	Row Crop/Sod	$3.34	$2,657	$/Acre	SWFWMD	**N**	**N**
Irrigation Conversion	Overhead to drip	Perennial Crops	$0.79	$2,133	$/Acre	SWFWMD	**V**	**V**
Irrigation Conversion	Overhead to micro irrigation	Container Nurseries	$0.54	$3,288	$/Acre	SWFWMD	**V**	**V**
Irrigation Conversion	Overhead to micro spray	Perennial Crops	$1.25	$3,032	$/Acre	SWFWMD	**S**	**V**
Irrigation Conversion	Retrofit of sprinkler systems	Env. Horticulture	$0.98[1]	$1,838.3[1]	$/Acre	SJRWMD	**V**	**N**
Irrigation Conversion	Seepage to Center pivot	Row crop / sod	$1.49	$1,750	$/Acre	SWFWMD	**N**	**V**
Irrigation Conversion	Seepage to drip	Row Crops	$0.88	$2,133	$/Acre	SWFWMD	**S**	**N**
Irrigation Conversion	Seepage to subsurface drip	Sod/ Pasture	$2.26	$2,657	$/Acre	SWFWMD	**N**	**S**
Irrigation Conversion	Seepage to tile drain	Row crops	$0.66	$4,441.70	$/Acre	SJRWMD	**S**	**N**
Alternative Water Supply	Excavated pond	Sod/ Pasture	$0.80 - $1.05	$485,267 - $575,280	$/System	SWFWMD	**S**	**V**
Alternative Water Supply	Existing feature expansion	Any	$0.91 - $1.61	$392,460	$/System	SWFWMD	**S**	**S**
Alternative Water Supply	Reclaimed water supply	Any	$0.15 - $0.39	$47,245	$/System	SWFWMD	**S**	**S**
Alternative Water Supply	Tailwater recovery with irrigation retrofit	Sod	$0.39	$3,700.50	$/acre	SJRWMD	**S**	**V**

[1] Data should be used with caution, since the estimate is based on a variety of practices, with a large range of costs and benefits.
[2] Note that the cost includes installation cost only (annualized based on the estimate life span of the project); maintenance costs or changes in producers' yields and profits were not accounted for. Furthermore, variability in the cost among the sites and farm sizes is not accounted for. For the practices for which a range of cost is available (i.e., practices funded by SJRWMD), median estimate is used.
[3] Potential to implement was dependent on the applicability of the BMP to the dominant crop and irrigation practice

As mentioned earlier, there are additional practices that are expected to provide water conservation benefits; however, Florida-specific reliable estimates of cost-benefit ratio estimates were not found. These practices are summarized in Table 16, and are identified as needing more research.

Table 16. Additional conservation and AWS practices for which additional cost and benefit information should be collected

Category	Project type	Land use	Information source	Relevance to CFWI planning area
Alternative Water Supply	Tailwater recovery for microjets irrigation	Perennial	SJRWMD	**S**
Alternative Water Supply	Tailwater recovery with decision support	Perennial	SJRWMD	**S**
Alternative Water Supply	Tailwater recovery with hydroponics	Perennial	SJRWMD	**V**
Alternative Water Supply	Tailwater recovery	Mixed	SJRWMD	**S**
Alternative Water Supply	Rainwater harvesting	Hydroponics	SJRWMD	**V**
Alternative Water Supply	Reservoir to store groundwater and reclaimed water	Mixed	SJRWMD	**S**
Alternative Water Supply	Horizontal well	Mixed	SJRWMD	**N**
Alternative Water Supply	Irrigation Reservoir: Embankment Dam with On-Site Borrow	Variety	NRCS	**V**
Alternative Water Supply	Irrigation Reservoir: Embankment Reservoir = 30 Acre-Feet	Variety	NRCS	**V**
Alternative Water Supply	Irrigation Reservoir: Steel Tank	Variety	NRCS	**S**
Alternative Water Supply	Irrigation Reservoir: Plastic Tank	Variety	NRCS	**S**
Alternative Water Supply	Irrigation Reservoir: Fiberglass Tank	Variety	NRCS	**S**
Alternative Water Supply	Irrigation Reservoir: Excavated Pit	Variety	NRCS	**V**
Alternative Water Supply	Irrigation water management	Variety	NRCS	**V**
Alternative Water Supply	Irrigation land leveling	Variety	NRCS	**V**
Source Elimination	Well decommissioning (shallow well)	Variety	NRCS	**V**
Source Elimination	Well decommissioning (drilled well)	Variety	NRCS	**V**
Source Elimination	Well decommissioning (small drilled well)	Variety	NRCS	**V**
Source Elimination	Artesian well cappinig	Variety	NRCS	**S**
Source Elimination	Abandon well plugging (decommissioning)	Variety	NRCS	**V**
Irrigation Conversion	Seepage to linear overhead	Field crops	SJRWMD	**S**
Irrigation Conversion	Seepage to center pivot	Vegetables, other crops	SJRWMD	**S**
Irrigation Conversion	Traveling gun to center pivot	Variety of crops	SJRWMD	**S**
Irrigation Conversion	Overhead to microspray	Perennial	SJRWMD	**V**
Irrigation Conversion	Overhead to drip	Perennial	SJRWMD	**S**
Irrigation Conversion	Drip to hydroponics	Env. horticulture	SJRWMD	**S**
Other	Drainage Water Management	Variety	NRCS	**V**
Other	Structure for Water Control: Flashboard Riser, Metal	Variety	NRCS	**V**
Other	Structure for Water Control: Commercial Inline Flashboard Riser	Variety	NRCS	**V**
Other	Structure for Water Control: Culvert	Variety	NRCS	**V**
Other	Structure for Water Control: Pipe Drop Structure	Variety	NRCS	**V**
Other	Structure for Water Control: Slide Gate	Variety	NRCS	**V**
Other	Structure for Water Control: Flap Gate	Variety	NRCS	**V**

While the draft matrix of water conservation BMPs provides information about practices and their costs, it does not allow estimating the additional water conservation outcomes that can be achieved with the implementation of these practices in the CFWI planning area (since the complete information about the current adoption rate of the practices for various crops and in different areas is not available). The sections below are intended to shed light on the extent of these practices implementation and resulting water conservation outcomes in SWFWMD's and SJRWMD's jurisdictions given the existing Districts' cost-share programs. A similar assessment of the water conservation potential for SFWMD may be conducted in the future. In addition to WMD's programs, NRCS programs can also lead to increase in the acreage of water conservation BMPs, as discussed below.

4. Water Conservation Potential by Water Management District

Information relating to water conservation potential was largely derived from the SJRWMD and SWFWMD cost-share program's capacity and likely participant rates for those programs. Conversely, SFWMD, which does not have an agricultural-specific cost-share program (agricultural producers are eligible to apply for district-wide cost-share), water conservation potential savings was based on a review of permits. Below is a quick summary of the criteria used to identify potential savings.

a. SJRWMD

Most growers within SJRWMD are currently using the most efficient irrigation system available for their crop type, so conservation is primarily expected to come from implementation of decision support systems such as weather stations, soil moisture sensors and automated pump stations. An analysis of current CUP holders with allocations greater than 100,000 gpd (89 percent of permitted allocation) was conducted. Of these, 36 percent of the permits have not reported any water use in the past two years or more due to grove decline for the effects of greening. An additional 13 percent were not considered as part of this evaluation as they are already using a lower quality water source. Of the remaining permits, 27 farms, primarily within blueberry, citrus and nursery operations, were considered as meeting the criteria for possible irrigation efficiency improvement projects. These operations could be expected to conserve an additional 0.465 mgd during the planning period through implementation of precision technology. Table 17 shows a sample of the types of projects that would result in the water savings.

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Table 17. Potential for Water Conservation Projects that can be implemented in the SJRWMD portion of CFWI planning area

Crop	# Farms[15]	Type of Project	Reduction potential (mgd)[1]	Anticipated Project Cost[1]
Blueberry	3	Decision support and automation	0.028	$98,588
Citrus	11	Decision support and automation	0.233	$553,872
Citrus	5	Decision support and automation plus irrigation retrofit	0.142	$361,736
Nursery	7	Decision support and automation	0.029	$147,882
Row crop	1	Irrigation conversion from seepage to overhead	0.033	$212,613
Totals	**27**		**0.465**	**$1,374,691**

[1] *Estimates for conservation potential and cost were derived per project from the SWFWMD Model Farms Economic Study based on years of data collected from the FARMS program.*

b. SWFWMD

Agricultural water conservation within the SWFWMD cost share program is typically accomplished through three BMPs categories:

- Use of AWS
- Precision Irrigation
- Irrigation conversion

Additional savings through this BMPs given the constraints of the FARMS cost share program are discussed below.

i. Alternative Water Supply

AWS can include tailwater recovery ponds, reclaimed water sources, and other surficial aquifer sources. The CFWI planning area has some unique physiographic areas that limit the effectiveness and practicality of AWS as a means to reduce Upper Floridan groundwater use. Within Polk county there are four sand ridges: the Lake Wales, the Lake Henry, the Lakeland and the Winter Haven. Within these ridge areas, the sandy soil is very permeable and the surficial aquifer is deeper than the typical reservoir excavation depth. Lining a reservoir is typically not cost effective for an agricultural producer. Out of more than 1,900 water use permits issued by SWFWMD in the CFWI planning area, more than 60 percent of those permits fall within a ridge physiographic province or are not located near a reclaimed water line and therefore are not practical for an AWS type project. In addition to the physiographic limitation, there is a cost effectiveness limitation to alternative water supply projects. Not only do the agricultural BMPs need to be technically feasible, they need to be cost effective. District funding does not preclude BMP implementation by the grower on their own, but the incentive encourages the implementation, and allows better tracking of the effectiveness of the BMP. Small farms with small allocations, in particular, may not achieve as high of cost-effectiveness as larger farms and therefore may not qualify for District funding.

[15] Number of farms likely to participate in cost-share programs in the next 20 years.

ii. Precision Irrigation

Precision irrigation BMPs generally include pump auto starts and auto stops as well as soil moisture sensors and / or weather stations to determine when to turn pumps on and off. The costs for pump start and stop automation are similar for each pumping station, whether that station serves 10 acres or 40 acres. Based on project experience and research done to support the FARMS program, water conservation benefits are generally limited to about 5 to 7 percent of permitted quantities. Based on a typical pump automation project cost, and because of the limitation in potential for groundwater conservation, FARMS funding for automation projects is generally limited to permits with allocations greater than 100,000 gpd due to project cost-effectiveness.

Using these parameters and the permitted quantities, the following table details the potential for conservation through precision automation and potential costs within the SWFWMD portion of the CFWI planning area and the potential savings at various participation rates (Table 18). Note that the range in funding needed is dependent on the mix of projects. AWS projects cost much more than conservation projects.

Table 18. Potential for Programmatic Savings in SWFWMD portion of the CFWI Planning Area

	Precision Irrigation Conservation	AWS in Valleys and Uplands	100% Participation	15% Participation[1]
Number of Permits Above Cost Benefit Threshold using at least 10% of permitted quantity	175	17	192	28.8
Potential Reduction in GW Use (mgd)	3.22	2.05	5.27	0.79
Potential Funding Needed	$1,750,000	$ 4,800,000	$6,550,000	$982,500

[1] *15% Participation is based on the RWSP's modeled participation rate and is not based on a review of actual water use permits.*

iii. Irrigation Conversions

The other main BMP used to conserve groundwater for agricultural irrigation is the conversion of an irrigation system from one of a lower efficiency to one of high efficiency. Table 19 shows the types of irrigation systems permitted within the SWFWMD section of CFWI planning area, and the total quantities associated with each type.

Table 19. Potential for Conservation through Irrigation Conversion in the SWFWMD portion of the CFWI

Irrigation System	Percent permits within CFWI	Approximate Average Irrigation Efficiency	Associated Permitted Quantity (mgd)	Potential Savings for conversion to 80% Efficient (mgd)	Potential with 15% Participation Rate by Permittee
Micro spray	79.21%	80%	103.39	0	0
Sprinkler over plant or / Travelling Gun	12.53%	65%	10.78	1.62	0.24
Drip irrigation (with and without plastic)	6.64%	85%	10.68	0	0
Seepage	1.35%	50%	2.27	0.68	0.10
Center Pivot	0.27%	75%	1.95	0.09	0.01
Totals	**100%**		**129.07**	**2.39**	**0.35**

This analysis shows that 86 percent of irrigation systems used in the SWFWMD's portion of CFWI planning area are at least 80 percent efficient.[16] This limits the SWFWMD's ability to make significant gains in conservation through irrigation efficiency improvements or irrigation conversions.

Using the average cost per project for previously funded irrigation conversions and a 10 percent decrease in water demand, the permitted quantity would need to be at least 230,000 gpd to get sufficient savings to justify the cost of a typical project. This average cost may not reflect actual costs depending on the size of the irrigated acreage. It is anticipated that approximately 100 permits would meet the cost benefit criteria. Of the 100 permits that have sufficient quantities to justify the cost of an irrigation conversion, the majority are citrus permits of which the majority are groves that use low volume spray type irrigation systems. Within the current guidelines for the SWFWMD funding programs, irrigation conversion within the CFWI planning area will likely not provide significant savings towards the agricultural conservation goal.

c. SFWMD

To develop the agricultural conservation estimates for the SFWMD, agricultural irrigation permits within the SFWMD's boundaries were reviewed to identify the irrigated acreage, crop type, irrigation type, and 1-in-10 allocation. A 1-in-10 allocation is the volume of water required to meet crop demands because of rainfall deficit during a drought with a recurrence probability of one year in ten. The permits were first reviewed to identify only those not using the most efficient irrigation type (80 percent efficiency – low volume). Permits for less than 100,000 gallons per day, permits for systems at 75 percent efficiency (that likely would not make any improvement) and permits with crop types incompatible to low volume irrigation were all discounted. This evaluation

[16] This does not necessarily mean the systems have been operated and maintained to maximize efficiency, but the basic systems permitted are the more efficient systems available.

resulted in a list of six permittees who could conserve water by converting to an irrigation system at 80 percent efficiency (i.e., low volume or micro-sprinkler).

The Modified Blaney-Criddle formula, used in water use permitting, was used to calculate the 1-in-10 demand as permitted and a new 1-in-10 demand with the irrigation efficiency value for the most efficient irrigation method practical for that crop type (e.g., converting container nursery from sprinkler to micro-drip). The difference between the existing and revised demand calculation is the potential savings volume.

This evaluation resulted in an estimated total savings potential of 3.9 mgd, which represents a 63 percent savings on the identified permits. However, several assumptions were made in the estimation process that should be considered, including the following:

- Water use at 1-in-10 drought event level rather than average use
- Permitted acreage is fully planted with the crop type permitted
- The irrigation method present at permit issuance has not changed
- The efficiency improvements will be made to the maximum extent possible and not to a method with an efficiency between the current method and the optimal method
- All permittees will make the efficiency improvements
- Assumes crops and acreage stayed the same as originally permitted

Because all the above assumptions are unlikely to occur, and to be consistent with the participation rate used in the other water management districts for the agricultural sector, it is assumed that the savings for crop irrigation will be approximately 15 percent of the estimate. This results in a calculated water savings potential of 0.59 mgd. Additional savings could occur if other types of efficiency improvements are made such as the introduction of computerized weather-based irrigation controllers or improvements to on-site water management practices.

Table 20. Potential for Conservation through Irrigation Conversion in the SFWMD portion of the CFWI Planning Area

Irrigation system	Permitted Irrigation Efficiency Factor	Associated Permitted Quantity (mgd)	Potential Saving for conversion to 80% efficient (mgd)
Container	0.28	0.15	0.10
Flood/Seepage/Furrow	0.50	10.03	3.76
Traveling Gun	0.71	0.39	0.04
Total potential with 100% participation rate			3.90
Savings with 15% participation rate			0.59

i. USDA/NRCS

Two NRCS practices were identified for application in the CFWI planning area: “The Irrigation System, Microirrigation” and “Irrigation Water Management” (IWM).

- "The Irrigation System, Microirrigation" was the typical NRCS practice adopted in the CWFI planning area. While microirrigation is a more efficient irrigation system than many other irrigation systems, how the system is managed effects the amount of overall efficiency achieved.

- "Irrigation Water Management" (IWM) includes the process of determining and controlling the volume, frequency and application rate of irrigation water specific to the crop requirements. An IWM plan includes the method for determining the timing and amount of each irrigation event using at least one of the following methods: Evapo-transpiration of the crop, soil moisture monitoring, or scientific plant monitoring (e.g. leaf water potential or leaf/canopy temperature measurements).

NRCS relies on their State Resource Assessment to evaluate the work load for the coming years. This assessment is intended to account for past participation trend, and the cost-share programs implemented by other agencies. Based on this assessment, the acreage anticipated to require NRCS service in the future can be evaluated (Table 21). It should be noted that the 3,000 acres to be potentially serviced by the NRCS are also included within the District's permitted acreage discussed above. Therefore, this situation should be recognized to avoid double counting of potential conservation savings.

Table 21. Estimated Future NRCS Participation for Water Conservation Practices within the CWFI Planning Area

	Potential Area to be Serviced by NRCS (Acres)	Assuming 15% Participation[1] (Acres)
Number of Potential Acres	3,000[2]	450

[1] 15% Participation is based on the RWSP's modeled participation rate and is not based on a review of actual water use permits.
[2] Potential Acres based upon USDA - NRCS State Resource Assessment

B. Next Steps

There are several priority areas that have been identified to reduce agricultural demands by at least 4.3 MGD by the year 2035.

1. Funding

The agricultural water conservation sub-team suggests investigating the potential for achieving additional water conservation savings on small scale agricultural water users, further examining efforts to assist small agricultural water users, and the feasibility of creating a dedicated cost-share program for small-scale agricultural operations within the CFWI planning area.

2. Research

In an effort to understand potential water savings and the cost associated with them throughout the agricultural area of the CFWI, the differences in BMP groundwater use reduction effectiveness for CUP holders of different size categories (< 100,000 gpd, 100,000 – 500,000 gpd, and > 500,000 gpd) should be examined.

3. Mobile Irrigation Labs (MIL) evaluations

MILs are employed to determine current irrigation conditions and whether water use efficiency can be increased. MILs can also measure how effective producers are at improving efficiency for definitive points in time (with baseline and follow up evaluations performed for water conservation projects). Follow-up evaluations are important to determine if the recommendations have been implemented and more importantly to ensure that the system is continuing to operate at the efficiency for which it is designed. The agricultural water conservation sub-team suggests that consideration be given for additional funding in the CFWI area for MIL evaluations (including follow-up evaluations).

4. Additional Farm demonstrations

Demonstration programs and the ability to interact with leading farmers who have implemented successful water saving efforts can act as a beneficial education opportunity for producers. The agricultural water conservation sub-team recommends that effective strategies be developed to reach agricultural land owners and operators with technical information and financial incentives.

5. BMP cost effectiveness matrix tool for producers and agencies to evaluate water conservation strategies for the CFWI planning area

A variety of water conservation strategies are available to producers (and additional practices are being developed). A menu of practices applicable to different crops and soil characteristics could aid the choices of producers and agencies. For each practice, ranges of water conservation potential and the costs of the practices could be provided. Gathering this information would assist with the development of a statewide repository for agricultural conservation data, publications, and goal-based planning tools to optimize future conservation programs and promote consistency.

6. Assessment and Prioritization of BMP Practices

As previously described, an assessment of (1) baseline level of adoption of different practices for various agricultural crops grown in the CFWI planning area (using information about cost-shared practices as well as practices implemented at producers' expense); and (2) potential physical limitations on the practice adoption (such as physiography and soil types) would be beneficial. Additionally, a cost-minimization model can be used to prioritize the practices and agricultural areas to achieve additional water conservation at the lowest costs. A savings per acre for different BMPs would also provide information to help producers select cost-effective BMPs.

B. Barriers and Challenges

To implement a comprehensive conservation strategy, there is a need for future collaborative work to address the following challenges:

1. Data availability in SFWMD is less than in other districts due to limited historic participation in their cost-share funding programs.

2. Within the SJRWMD portion of the CFWI planning area, almost half of the CUPs greater than 500,000 gpd are for citrus which has been adversely affected by greening. Many growers are waiting for a solution to the problem and may be unwilling to invest in efficiency upgrades with an uncertain future for their commodity.
3. The geology in some parts of the CFWI planning area may provide opportunities or challenges to tailwater recovery or surface water impoundment projects.
4. Within the SWFWMD portion of the CFWI planning area the main barriers include:
    - A large majority of permits would not generate the groundwater conservation needed to justify District funding.
    - The limited number of projects (permits) that could be upgraded to a more efficient irrigation system.

5. Although most funding allocated to cost share programs in Florida is spent within the fiscal year, there are still sectors that may not participate in USDA/NRCS financial and technical assistance programs because of the following barriers:
    - Lack of awareness about the program. Though USDA/NRCS does promote itself and its programs, there are numerous agricultural operations/operators that are not aware of the cost-share opportunities for the implementation of conservation practices.
    - There may be a resistance to participate, or work with, a federal agency (i.e., averse to government assistance, distrust of government agencies).
    - There are programmatic restrictions (most notably the Adjusted Gross Income (AGI) restriction of less than $900,000 for participation in EQIP). However, this AGI requirement would only restrict larger operations (note that federally recognized Native American Indian Tribes are exempt from the AGI payment restrictions).

6. A lack of financial resources can impede the ability of agricultural producers to implement water conservation practices, especially when those practices require significant up-front costs. BMP implementation must be compatible with a producer's business viability and not create an economic disadvantage.

7. Throughout the CFWI planning area, there is a need to explore the water conservation potential, options and strategies for small-size agricultural operations holding CUPs for withdrawal of <100,000 gallons per day. Such operations account for most of the permit holders in CFWI planning area. These operations also account for 17% of the CFWI water allocation overall, 11% of water demand in the SJRWMD portion of CFWI planning area (7.0 mgd), 36% of water demand in the SWFWMD portion of CFWI planning area (49.6 mgd), and 2% in the SFWMD portion of the CFWI planning area (3.2 mgd). Small-size agricultural operations often face higher per-acre implementation costs for water conservation projects (due to the effect of scale that increases per acre or per gallon implementation costs for smaller structural projects). Small-size agricultural operations also face additional barriers on financing and borrowing. Additional information or an experimental program is needed to determine the potential for water savings and associated costs for small-sized agriculture.

C. Regional Education and Outreach

The necessity of effective educational and outreach programs for achieving long-term water use reductions has already been described in this document. In the agricultural sector, it is important for producers to know about the development of new advanced technologies, best management practices, and cost share programs. Additionally, farm demonstration programs are important for the implementation of water conserving technologies. These programs allow producers to interact with leading farmers who have implemented successful water saving efforts. Effective strategies should be developed to reach the agricultural land owners and operators with technical information and financial incentives. The number of land owners and operators in the CFWI planning area is so large that traditional strategies and programs may not be effective.

D. Funding Opportunities

Technical and financial assistance for implementation of agricultural water conservation practices and projects is provided by the following agencies: United States Department of Agriculture Natural Resources Conservation Service (USDA/NRCS), FDACS, Water Management Districts, and counties' Soil and Water Conservation Districts.

AGENCY/Program	Types of Projects Eligible for Funding	Website
NRCS EQIP	• Cooling Pad System Retrofits; • Irrigation System, Micro-irrigation (conversion from a less efficient system); • Irrigation Water Management; • Drainage Water Management; • Irrigation Land Leveling; • Structure for Water Control; • Irrigation Reservoir; • Water Harvesting Catchment; • Water Well Decommissioning; and • Well Plugging	www.nrcs.usda.gov/wps/poral/nrcs/site/fl/home
Mobile Irrigation Labs	• Site-specific irrigation expertise in analyzing irrigation systems and educating property owners on how to improve water conservation	http://www.freshfromflorida.com/Business-Services/Water/Mobile-Irrigation-Labs
FDACS BMP Cost Share	• Soil moisture sensor technology • Advanced irrigation controllers • Center-pivot retrofits • Variable rate irrigation • Treatment systems	http://www.freshfromflorida.com/Business-Services/Water/Agricultural-Best-Management-Practices

South Florida Water Management District	• Conservation
	  ○ Irrigation system retrofits
	  ○ Soil moisture and climate sensor telemetry
	  ○ Subirrigation drain tiles
	  ○ Rainwater harvesting/cisterns
	  ○ Other water conservation measures that increase irrigation efficiency
	• Alternative Water Supply
	  ○ Tailwater recovery systems
		https://www.sfwmd.gov/doing-business-with-us/coop-funding

AGENCY/Program	Types of Projects Eligible for Funding	Website
	○ Aboveground impoundment (Surface/ Stormwater or Stormwater/ Irrigation runoff) ○ Used of reclaimed water and other alternative water sources	
Southwest Florida Water Management District's FARMS Cost-Share Program	• Irrigation retrofit, • Soil moisture and weather station climate sensor telemetry, • Tailwater recovery/surface water pond irrigation pump stations and filtration, • Water control structures, • Electronic controls including remote irrigation zone and start/stop controls, and • Cold and frost/freeze protection BMPs (in the Dover/Plant City Water Use Caution Area).	https://www.swfwmd.state.fl.us/agriculture/farms/
St. Johns River Water Management District	• Irrigation system retrofits, • Soil moisture and climate sensor telemetry, • Rainwater harvesting, • Subirrigation drain tile, • Tailwater recovery and reuse, • Other water conservation and pollution runoff reduction practices	https://www.sjrwmd.com/localgovernments/funding/#agriculture
Florida's Soil and Water Conservation Districts	• conduct research, • teach best management practices for soil and water conservation, and • develop comprehensive plans for soil erosion control and flood prevention.	https://www.sjrwmd.com/localgovernments/funding/#agriculture
UF/IFAS	• conduct research, and • teach best management practices for soil and water conservation	http://ifas.ufl.edu/

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VI. Other Self-Supply

The Other Self-Supplied (OSS) sector combines Domestic Self-Supply (DSS), Landscape/Recreational/Aesthetic (LRA), Commercial/Industrial/ Institutional (CII), and Power Generation (PG) water use categories. The OSS sector derives water from private wells or other sources (i.e., water not supplied by a utility) to meet household uses (DSS) or permitted demands.

Collectively, the OSS water use category represents approximately 20 percent of the water use in the CFWI Planning Area and represents a disparate group of water users. Water use in this sector is expected to increase by approximately 42 percent from 151.82 mgd in 2010 to 214.86 mgd in 2035. The 2015 CFWI RWSP projected 4.63 mgd of water conservation savings for this sector. The Steering Committee further established a goal of going behind the projection. This strategy lays out a methodology to investigate optimal conservation BMPs that are based on the water demand described in specific permits in each water use category.

Estimates of the water conservation potential for DSS, CII, LRA, and PG categories in the 2015 CFWI RWSP were based on results derived from various segments of the Conserve Florida Water Clearinghouse EZ Guide outputs for Public Supply. The EZ Guide methodology for water conservation potential for OSS users assumed that savings within this sector was directly proportional to similar customers or other uses supplied by public supply systems. The CII and PG estimates focused on the domestic indoor measures associated with CII facilities. The LRA estimates were derived from publicly supplied outdoor water use BMPs (soil moisture sensors and irrigation audits). The water conservation potential for DSS was assumed to be directly proportional to that of the residential use of public supply for both indoor and outdoor BMPs. The public supply per capita conservation potential of 5.57 gallons per person per day was applied to the projected DSS population to determine the DSS water conservation estimate. The OSS conservation potential from the 2015 CFWI RWSP is shown in Table 22.

Table 22. 2015 CFWI RWSP OSS Sector Estimated Conservation Potential based on EZ Guide Outputs

Water Use Category	2035 Demand (mgd)	Percent Conservation	Projected 2035 Conservation (mgd)
DSS	24.42	4.9%	1.19
CII	95.85	1.2%	1.15
LRA	72.18	2.8%	2.02
PG	22.41	1.2%	0.27
Subtotal	190.44		3.44
Grand Total	**214.86**		**4.63**

Table 23 below reflects the BMPs that the EZ Guide used to determine the conservation potential for the OSS sector. As mentioned above, these BMPs focused on the domestic indoor (i.e. plumbing retro-fits) and some outdoor BMPs.

Table 23. 2015 CFWI RWSP OSS Estimated Savings by BMP

Use Type	BMP	Savings (mgd)
CII	CII Audit	0.005
	Pre-rinse Spray Valve	0.01
Outdoor	Irrigation System Audit	0.95
	Soil Moisture Sensor	1.19
Indoor	HE Toilet	0.78
	HE Faucet	0.77
	HE Showerhead	0.90
	HE Urinal	0.02
Grand Total		**4.63**

A. Where Are We Now

1. Evaluation of Applicability of 2015 RWSP BMPs to OSS Uses

The CFWI Water Conservation Team reviewed the methodology previously employed to estimate the OSS savings. The efficiency gains made by conservation measures within the CII, LRA and PG categories, can only apply to the amount of water and type of use prescribed by these permits. As stated above, the initial savings estimate for the OSS sector was based on savings within the PS sector using PS appropriate BMPs. Personal sanitary use, for example, is a significant component of PS consumptive use and will be impacted by plumbing retrofit BMPs. However, an analysis of most OSS permits, revealed that only 1.3 mgd or 0.7 percent of the total OSS allocation was for personal sanitary use. Since the amount of personal sanitary use is less significant in the OSS sector, plumbing retrofits will not achieve substantial water conservation. Similarly, landscape irrigation is a small component of water use in CII and PG type uses.

Since the EZ Guide methodology focused on BMPs associated with PS type uses, it did not account for potential savings in commercial, industrial, or power generation process water. Nor did it account for conservation BMPs specific to large LRA type uses. It is challenging to evaluate the conservation potential of the many varied commercial and industrial uses because the processes are so unique and optimal conservation BMPs would change for each process. The consumptive use permitting process and business economics drive commercial, industrial, and power generation facilities to minimize their process water; however, additional efficiency gains may still be available. The implementation strategy for the OSS water use category is to re-focus the evaluation of the conservation potential from PS-type BMPs to more optimal BMPs based the water demand described in specific permits in each water use category

2. Understanding OSS Water Users

To identify the water conservation potential within this diverse user group, it is helpful to understand how water is used within the four categories making up the OSS sector.

Table 24. OSS Water Users Description

Domestic Self-Supply (DSS)	Commercial/ Industrial/ Institutional (CII)	Landscape/ Recreation/ Aesthetic (LRA)	Power Generation
Each permit in this category represents either of the following: (1) small utilities that have permitted or annual average water use thresholds below 0.1 mgd, and (2) domestic self-supply (individual private homes or businesses not supplied water from a public water supply utility). The water conservation potential within this category will be discussed in section VII of this document.	Each permit in this category represents an individual facility responsible for the production of goods or provision of service. This use also includes water use associated with mining and long-term dewatering operations. The permit allocation may provide water for an entire facility's operation or for a specific end use.	Permits in this category are for golf courses or other types of landscape irrigation and outdoor water use. The types of features in these allocations include golf course irrigation (greens, fairways, additional landscaping), commercial landscapes, sports and recreational fields, parks, cemeteries, and common areas managed by homeowner associations.	Each permit in this category represents water use associated with power plant and power generation facilities. The water conservation potential within this category will be discussed in future iterations of the Implementation Strategy.

As of February 8, 2017, there were 899 OSS permits, not including power generation permits, with a total allocation of 187 mgd within the CFWI region. Within the 899 OSS permits, two SWFWMD permits made up 40% (75.29 mgd) of the total OSS demand. These two water users were reviewed separately. When these permits are removed from the dataset, the resulting distribution of permitted use by District can be seen in Figures 10-11 below.

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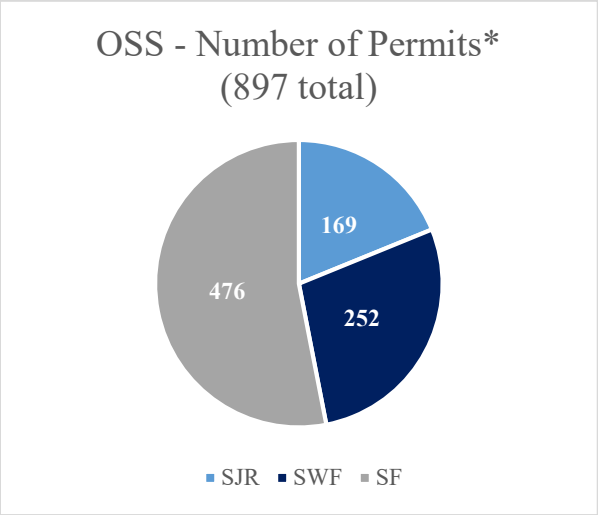
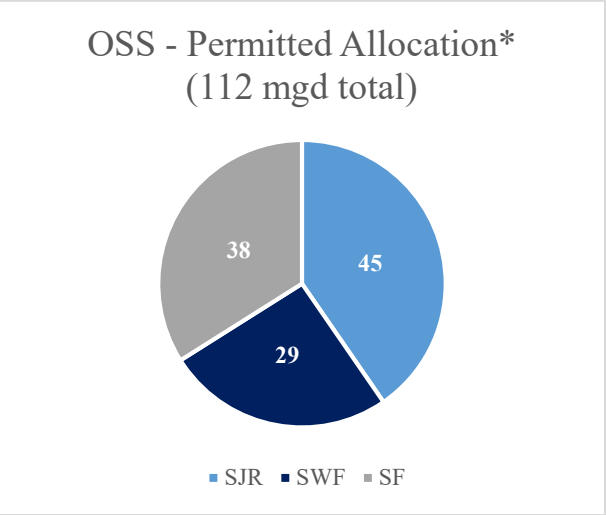
Figures 10-11. OSS Permits



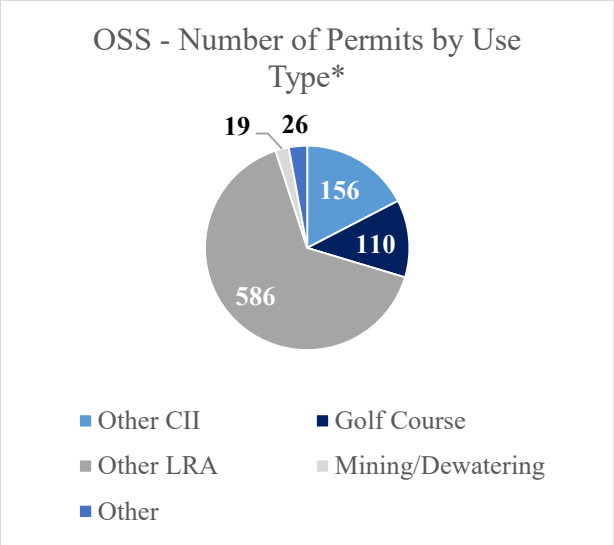


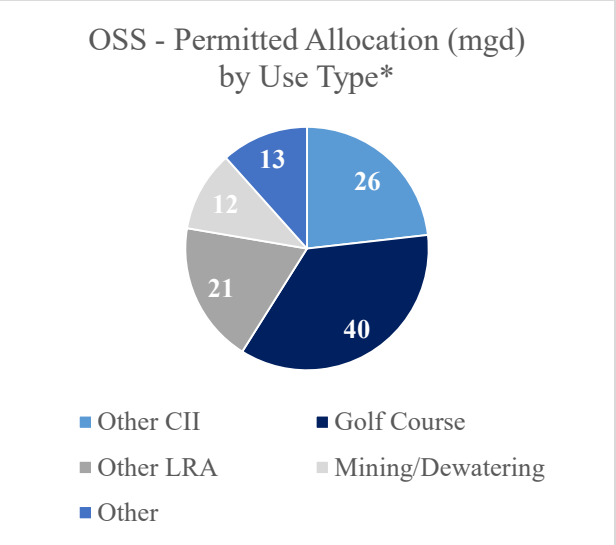
**Two SWFWMD permits removed from dataset*

While SFWMD has the greatest number of OSS permits, the permitted allocations are more equally distributed among the Disricts with SJRWMD having 40 percent, SFWMD having 34 percent and SWFWMD having 26 percent of the permitted allocation.

The diversity of water use types within the OSS sector can be seen in the charts below. Figures 12-13 show the breakout of primary use categories – CII (with Mining and Dewatering broken out), LRA (with Golf Course GC broken out), and Other (e.g., environmental remediation, geothermal loops, etc.) - by the number of permits and the permitted allocation in each category. PG is not included in the assessment below.

Figures 12-13. OSS Permits by Use Type





**Two SWFWMD permits removed from dataset*

Table 25. OSS Allocations by Primary Use Category[1]

Primary Use Category	Number of permits	Allocation (mgd)	Portion of total OSS Allocation
CII	156	26	23%
Golf Course	110	40	36%
LRA	586	21	19%
Mining/Dewatering	19	12	11%
Other	26	13	12%
TOTAL	**897**	**112**	**100%**

[1]*Two SWFWMD permits removed from dataset*

2. Evaluation of OSS BMP Implementation in CFWI

Given the distribution of OSS permits among the three Districts, coupled with the diversity of water use types within this water use category, the team reviewed the types of permits that make up the highest permitted use within each District. Determining where water conservation potential exists and identifying optimal BMPs for the larger OSS projects is anticipated to yield the highest savings. Review of OSS permitted use within each District showed that the golf course (GC) type use was the primary water use category within SJRWMD and SFWMD. However, in SWFWMD, CII permits were the dominant use category. Given this distribution of permitted use within the three districts, the team further focused its efforts in two areas, review of the golf course industry in the entire CFWI area and a review of the larger industrial users within SWFWMD.

a. Investigate Golf Course Permitted Water Use in CFWI

Golf courses are highly visible users of water in the recreation category, with more than 114 courses with water use permits currently operating in the CFWI planning region (Table 26).

Table 26. Permitted Golf Courses

Water Management District	Number of permits	Allocation (mgd)
SFWMD	41	19.7
SJRWMD	37	15.3
SWFWMD	32	5.38
TOTAL	**110**	**40.4**

Among industry professionals, it is generally accepted that responsible irrigation management is a major factor in producing healthy turf and safe, acceptable playing conditions. Although many golf courses already strive to use water efficiently, further efficiency gains could be realized through careful evaluation of irrigation zone schedule run time, sprinkler head design, nozzle selection, head spacing, pipe size, and pressure management. Other conservation practices to be considered include upgrades to the latest weather-based or soil moisture based irrigation controller technology, application of soil amendments that maximize water holding capacity of soil, and implementation of Florida-Friendly Landscaping™ Program principles.

In spring and summer 2010, SFWMD formed a collaborative partnership with the Florida Golf Course Superintendents Association (FGCSA) to survey golf courses within the SFWMD

(southern and parts of central Florida). The purpose of the survey was to better understand the types of irrigation scheduling technologies used by these golf courses and determine the prevalence of newer, more efficient irrigation technologies (called "advanced" irrigation) among area golf courses. The survey results suggest a growing trend (in 2010) toward the use of on-site advanced irrigation technology, and soil moisture sensors in particular. Nearly 60 percent of respondents reported that they were in the process of implementing upgrades to their systems or were planning them within the next three years. Continuing innovation and declining costs have likely fueled even wider adoption of the latest advanced irrigation technologies in the past eight years to support golf course operational staff in making irrigation practices more efficient. Survey responses also indicated that area superintendents inspect their irrigation technology frequently to make sure it is properly connected and operating as intended.

To determine the current status of golf course irrigation practices in the CFWI region, a similar survey will be conducted. The Conservation Team will seek to partner with FGCSA and other industry experts to develop the survey questionnaire, encourage participation and assist with data compilation and analysis.

b. Investigate Large CII Permitted Use in SWFWMD

A permit by permit review (17 permits + 2 Mosaic permits for a total of 19) was conducted for major CII users within the SWFWMD. Available conservation plans that were submitted as permit requirements were reviewed and applicable information was recorded. Specifically, quantifiable conservation measures that have occurred or are scheduled to occur between 2010 -2019 were noted. Unfortunately, while most permits did contain a conservation plan, very few conservation plans list specific actions or projects that had occurred or were scheduled to occur. Of those few that listed specifics, still fewer listed quantifiable water savings (two out of 18 permits reviewed). Those instances where quantifiable conservation measures took place with the set time frame are captured in the summary below in section 4 and 5.

In addition, a review of The Mosaic Fertilizer, LLC's Integrated Water Use Permit (IWUP) (WUP#11400) was performed. Mosaic has been able to document substantial water conservation efforts that have occurred during the last several years. The IWUP has a yearly reporting requirement for a conservation plan update, and this annual report proved to be an extremely valuable resource when compiling ongoing and historical conservation activities. In addition, Mosaic staff provided clarification/ additional project detail where applicable. It is important to note that many projects included in Mosaic's original annual conservation report are source substitution type projects meaning they help conserve groundwater but don't lead to an increase in efficiency of water use. Efforts were made by District staff, followed by review from Mosaic staff, to separate the projects and make this distinction to more accurately depict the conservation occurring.

3. Conservation Savings 2010 – 2014 Results and Methodology

As described above, an estimate of active conservation for the OSS sector was derived by evaluating existing conservation plans permit by permit. There are likely additional conservation activities occurring in this user group, however these activities are difficult to capture as they are

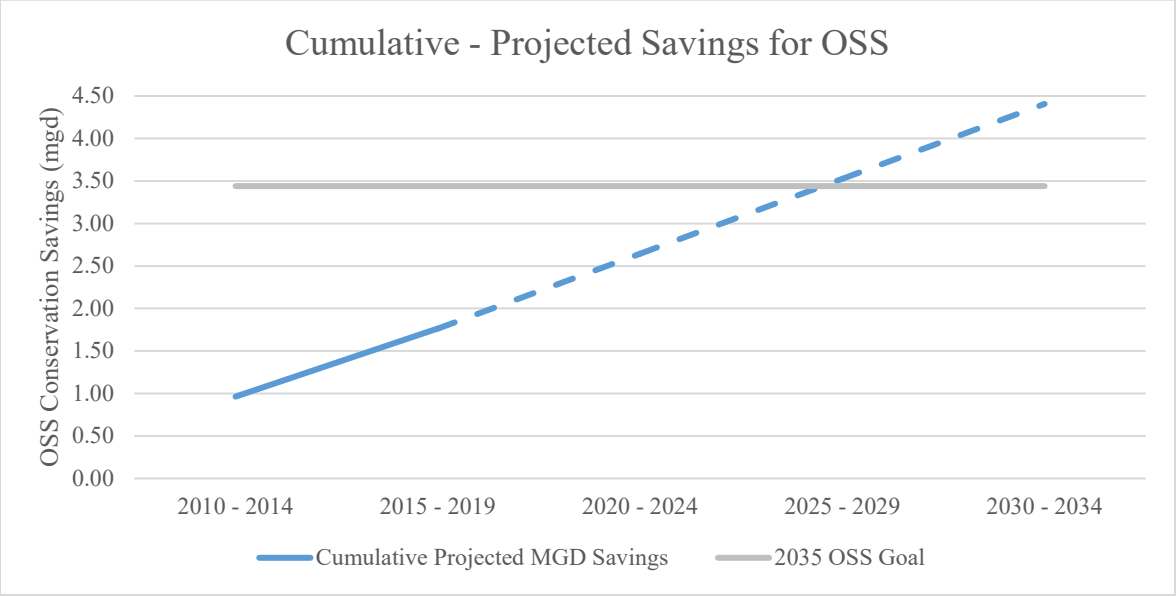
not well documented. The bulk of savings shown in this section are attributable to the Mosaic permit. As an example, projects captured here range from installation of dole valves (pressure regulation of industrial spray heads), to upgrade of cooling tower components allowing for higher cycles of concentration. A list of projects can be found in Appendix 4. For the 2010 – 2014-time period an estimated 0.963 mgd was conserved.

4. Expected Conservation Savings 2015 – 2019 Results and Methodology

This section includes some projects that are currently underway. A list of projects can be found in Appendix 4. For the 2015 – 2019-time period an estimated 0.799 mgd was/is estimated to be conserved.

Figure 14 below depicts a cumulative trend analysis of where conservation efforts are projected to go in future. This was done by averaging the 2010-2014 savings estimate and the 2015-2019 savings estimate together and assuming that rate of conservation (0.881 mgd) continues to occur through the planning horizon. Based on the trend, the savings projection of 3.44 mgd will be exceeded before 2035. This is without capturing savings estimates from the LRA, or PG categories.

Figure 14. OSS Projected Savings (excluding Domestic Self-Supply)



B. Barriers and Challenges

The challenge to implementing conservation BMPs in the OSS sector is twofold; identifying the most appropriate BMPs and funding to implement them once identified. Identifying BMPs is challenging because of the diverse categories that comprise the sector. CII is comprised of a variety of use types, each with specific water needs, and would also require water use audits to identify ways to increase water efficiency in operations. The LRA category is comprised of golf courses and large landscaped areas (parks, HOAs, etc.). While the BMPs for the LRA category are more widely known, many of these permittees have already implemented water saving measures. A formal survey or comprehensive permit review would be required to identify who could be targeted

for BMP implementation. The entirety of the OSS sector is hampered by the fact that even if BMPs were identified a funding source to offset those costs may not be available, or if available, the savings may be too small to qualify the project for funding.

The current focus of the team has been within the golf course industry, since this industry has the largest permitted uses within two of the three Districts. There are barriers and challenges to implementing conservation for these users that are specific to this industry. The quality of a golf course is often defined by the quality of the landscape, and maintaining the quality is very difficult and frequently water intensive. The nature of the game results in heavy wear and tear on the turf grass. Irrigation must occur during limited evening and early morning hours; irrigation schedules are determined more by available watering times than the water absorption rate of soils. The irregular shape of courses makes irrigation uniformity very difficult. All these issues can lead to increased water use, especially in soils and climates that are not conducive to large expanses of turf. Unlike other irrigation landscape areas that include shrubs and trees, turf grass has little capacity to store water and withstand periods of drought. Most golf course managers are familiar with their irrigation permits and are hesitant to take actions that might permanently affect their permitted allocation.

Increasing industry awareness of regional water resource issues is essential to change behavior in this water use category. The efforts of the conservation team to work with the Florida Golf Course Superintendents Association (FGCSA) will be critical to the success of any quantifiable reduction in water use. Building trust in advanced irrigation controllers and technology and seeking other available opportunities to conserve must be embraced by golf course staff. A belief that the permitted allocation for a golf course is a maximum allowable amount rather than an annual goal for water use is a noted challenge in promoting conservation with the industry.

There are 114 golf courses within CFWI and working with each course even with the cooperation of the FGCSA will take time and will need to be repeated as staff changes demand repetition of the conservation message. Challenges to implementing successful conservation in the golf course industry can be overcome with the cooperation of industry professionals, increased reliance on SWAT and continued region-wide outreach and education on the need for efficiency and, if necessary, additional regulations and mandates for higher water use efficiency.

C. OSS BMPs

Commercial and institutional operations are each unique. Even though the processes are generally the same in a specific type of industry, the configuration of that specific plant or company make implementation of a specific BMP not applicable to all facilities. Economic, structural and local water chemistry considerations also need to be taken into account in determining BMP implementation. According to "The Commercial and Institutional End Uses of Water" (Dziegielewski et al, 2000), facility-level water audits have potential savings in the 15 to 50 percent range, with 15 to 35 percent being typical. Audit results can be used to identify which BMPs should be undertaken to reduce water use in a given process. Similarly, an audit of a golf course irrigation system can be used to identify BMPs that can be implemented to save water in this industry.

a. GC/LRA BMPs

Golf course BMP's are well documented in the industry and encouraged through regulatory and voluntary certification efforts. A water audit, conducted by a trained professional, is frequently required by the water use permit to determine the proper equipment needed (spray heads, water pressure regulators, controller, etc.) and a schedule based on the evapotranspiration rate of the vegetation. Advanced irrigation technology including weather and soil moisture based irrigation controllers can automatically adjust irrigation schedules to local conditions, but must be installed and set up properly to achieve any water savings. Irrigation equipment only provides the tools for water efficiency; the tools must be used properly.

Since 2012 the FDEP, University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) and Florida Golf Course Superintendents Association (FGCSA) have offered a voluntary BMP certification for all golf course superintendents. According to FGCSA, 28 percent of Florida golf course superintendents have passed the exam. While this certification focuses primarily on water quality, there is some mention of water conservation and several BMP's benefit both water quality and water conservation. The Irrigation Association (IA) Certified Irrigation Designer certification includes BMP's for golf course irrigation system design and operation. The IA Certified Golf Irrigation Auditor offers individuals involved in the industry expertise to audit golf courses. In summary, the toolbox for golf course BMP's is available to this water use category and all effort should be made to assist the industry to embrace water efficiency through BMP implementation.

b. CII BMPs

Indoor water use includes water used by sanitary plumbing fixtures and appliances in residential and non-residential settings. Other indoor water uses include process water use and water used by heating, ventilation and air conditioning (HVAC) cooling towers. Process water use refers to water used by commercial businesses and industrial manufacturers for purposes other than domestic uses or for air conditioning. Process water can be used to cool equipment, convey (float) objects within a plant, rinse, clean or sterilize items, lubricate objects or surfaces, or can be part of the end product. Cooling tower water use is the single largest point of consumption for many large commercial and institutional buildings. Increasing the efficiency of this equipment is one of the most cost-effective conservation BMPs. Water efficiency for these (other) indoor uses can be increased through the use of high-efficiency hardware, increased water use monitoring, cultural behavioral changes, and the capture and reuse of on-site generated water. Outdoor water use efficiency improvements can be gained primarily by implementing landscaping and irrigation BMPs. A detailed list of CII BMPs can be found in the Solution Strategies Appendix.

c. Mining BMPs

Conservation (efficiency of use) potential is thought to be somewhat limited in most mining operations. Equipment maintenance and leak repair are the two primary sources of

conservation. However, using sources of water other than ground water is very common. As an example, the overwhelming majority of total water demands at Mosaic's mining facilities are met through the use of reclaimed water, captured rainwater, and recycle/reuse of water within the mine water re-circulation system. Mine re-circulation water is used: within the beneficiation and float plant(s) for physical separation and washing; to transport materials via slurry between active mining areas and the receiving beneficiation plant; and as booster pump seal water where feasible.

D. Regional Education and Outreach

Efforts are well underway to work with the golf course industry on improving water conservation. The FGCSA is working with FDEP and UF/IFAS to update and make mandatory the certification for golf course superintendents. Golf Courses are being made aware that projects related to water conservation may be eligible for water management district cost-share funding. The current regulatory requirement for irrigation audits provides the golf course staff with the information needed to make upgrades and improvements for efficiency. The LRA and CII sectors may be captured in any regional conservation outreach that is done. Targeting of specific industries or use types for outreach and education may also be employed.

E. Funding Opportunities

The Water Management Districts have offered funding for water conservation projects over the past two decades but no self-supplied users, individually or collectively, in the region have taken advantage of it. Many users in this category are likely not aware of the District's funding programs. Others, due to their small size, may not be able to meet the funding criteria (minimum project costs or water savings volumes). In order to take advantage of District offered funding programs smaller users would likely need to combine their proposed activities with similar users and identify a sponsor who could apply for funding on their behalf (e.g. a county could sponsor a landscape irrigation audit program for self-supplied users). Most conservation BMPs for self-supplied users would need to be self-funded after doing a cost benefit analyses that takes factors such as return on investment periods into account. Staff from the water management districts are actively engaging with potential self-supply entities to submit applications for conservation cost-share funding.

F. Designated Projects

Given the diversity of this sector, a comprehensive project solicitation could not be performed. In the future, additional projects from all use categories will be pursued. The annual conservation reports submitted by Mosaic Fertilizer, LLC list several project options that could be implemented at some point in the future. Two additional permits mentioned future potential reductions in water use. These projects are listed in Table 27 below. These projects could help meet the regional goal of 37+ mgd and could be eligible for state/water management District cost-share funding.

Table 27. OSS Designated Projects.

Title	Entity	Location	Description	Implementation Schedule	Number of Implementations	Total Project Cost	Water Saved (gpd)
Extend RO Water to 5/6 Demin Unit	Mosaic Fertilizer	Bartow facility - Polk county	Install piping system off of the existing RO water supply to #4 Demin to supply 5/6 Demin Unit. Off-sets well water usage to portable RO trailer. Existing excess RO water sent out of the facility as dilution water prior to NPDES outfall. Install tank to collect RO water for 5/6 Demin.				505,769
Vacuum Pump Seal Water Recycle	Mosaic Fertilizer	Bartow facility - Polk county	Implement a Cooling Tower to recycle seal water back to the vacuum pumps (assuming 40-50% FW Saving)				345,825
Mill Fresh Water Sprays	Mosaic Fertilizer	New Wales facility - Polk county	Reduce the usage of fresh water sprays on the mills				108,070
AFI cleaning solution to DP	Mosaic Fertilizer	New Wales facility - Polk county	Collect scrub water in AFI and use in Dry Products as make up to scrubbers				79,252
Belt Filter Vacuum Pump OTW Return	Mosaic Fertilizer	New Wales facility - Polk county	Return Vacuum Pump water to the 123 Cooling Tower				28,819
Reduction of dilution water	U.S. Agri-chemicals Corporation	Fort Meade Chem - Polk County	nearly all GW is used for dilution of surface water discharge for compliance with NPDES permit. Use is in 5mgd range, and is projected to come down to 4 MGD in 2020 and 3mgd in 2022. Reduction will be achieved by reduction in rain catchment area and potentially an increase in water levels in perimeter drain.	2020	1		1,000,000
Automate pump controls	Caribbean Distillers	Aubundale - Polk County	Replace pump packing material with thermostatically controlled Mechanical seals, also have a solenoid valve that will automatically turn off the seal water when pump is not running				10,000
Total							**2,077,735**

G. Next Steps

As has been discussed, the OSS water use category encompasses a broad range of use types each requiring its own set of conservation BMPs to achieve maximum conservation. The Team has focused its efforts during the development of this implementation strategy in investigating the heterogeneity within this user group and prioritizing the implementation strategy to target those industries with the highest potential for savings for initial efforts. The Conservation Team will continue to coordinate with the golf course industry as it assesses the current status of BMP implementation and the remaining potential for additional conservation on golf courses located in the CFWI region. The next phase of the OSS Implementation Strategy will be to investigate other permitted users within the OSS sector such as non-GC LRA's and other ICI permits. Additionally, the Team will evaluate the water conservation potential and optimal BMPs within the PG water use category. Finally, the team will monitor, and support implementation of projects listed in the designated project section. The Team will seek to coordinate with industry experts as these investigations progress. District staff will continue efforts to engage OSS in cost-share funding projects.

VII. Domestic Self-Supply

Domestic Self-Supply (DSS) is a category within the OSS water use category that serves 4 percent of the CFWI population. Water use within this category is expected to increase by approximately 20 percent from 20.36 mgd in 2010 to 24.42 mgd in 2035. The 2015 CFWI RWSP identified 1.19 mgd of water conservation potential for this water use category. As mentioned earlier, DSS consists of two subcategories: (1) small utilities that have permitted or annual average water use thresholds below 0.1 mgd, and (2) domestic self-supply (individual private homes or businesses that are not supplied water from a public water supply utility).

Using EZ Guide results, the water conservation potential for DSS was assumed to be directly proportional to that of the residential use of public supply for indoor and outdoor BMPs (plumbing fixture retrofits, irrigation system audits and soil moisture sensor). The public supply per capita conservation potential of 5.57 gallons per person per day was applied to the projected DSS population to determine the DSS water conservation estimate of 1.19 mgd. While the actual PS BMPs are applicable for achieving reductions in DSS water use, the savings estimate calculated using EZ Guide presumes a certain participation rate in a "active" water conservation program. Described in more detail below, actual water conservation within the DSS sector occurs as the result of self-initiated efforts (i.e. passive water conservation savings) and not as the result of participation in an active conservation campaign as these residents are rarely targeted by such programs.

A. Where we are now?

1. Difficulty Quantifying Water Savings

Quantifying savings due to conservation practices by the DSS population is challenging for several reasons. The 2015 CFWI RWSP projected that the DSS population within the CFWI region would

average an estimated 165,500 people from 2010 to 2015. The DSS population typically obtains its water supply for residential purposes (indoor for personal sanitary purposes and outdoor for irrigation, pool filling, etc.) from private wells that are normally not metered and never reported. Estimating the actual number of self-supplied residences and their location is difficult as well. To convert the projected population to number of homes you must know the persons per home; an estimated value which changes from area to area. Utilities do not track where DSS homes are located within their service area boundaries and at the time of this writing an inventory of unmetered customers was not available. Another method is to locate private wells which are being used as a DSS water source. The installation of these wells is regulated at the local government level, either by the health department or county permitting departments. Most of these records are incomplete and would not include older DSS wells that were installed before the permitting rules were promulgated and those locations where the wells are unpermitted (i.e. unauthorized).

2. Quantifying Passive Water Conservation Savings 2010 to 2019

Other than the cost of the well permit and subsequent installation and operation, there is minimal costs to operate the well and not a direct method to quantify water use. Geographically, self-supplied homes are located in areas unserved by a public or private utility with many homes being located in rural areas. Since these homes are not supplied by a utility, conservation programs developed and tracked by a specific utility in the area do not target this user group. That is not to say that self-implementation of the BMPs is not occurring in the DSS user group. Many homeowners have likely replaced older fixtures within the home as their useful service lives are passed or the properties are sold and updated. There is no practical way to estimate how many new fixtures may have been purchased and installed within the 2010 to 2015 timeframe.

While these factors make it challenging to quantify savings due to conservation activities and to effectively engage with the DSS population, there are conservation programs that impact water use in the home irrespective of being a utility customer or not. All DSS residents are under the jurisdiction of federal, state, District, and local (city or county) regulations relating to irrigation design and water use. These regulations provide a possible framework for water conservation initiatives that reduce water use in DSS residences.

Both the 1994 national efficiency standards for water-using fixtures (resulting from the 1992 Federal Energy Policy Act) and state-wide Florida Building Codes require indoor plumbing fixtures on new residential construction meet certain standards:

- Toilets: 1.6 gallons per flush
- Showerheads: 2.5 gallons per minute
- Faucets: 2.2 gallons per minute

Construction standards for these fixtures are enforced by the building department of each local government. It can be assumed that all DSS residences built since 1994 have fixtures that meet these minimum standards.

Over the last ten years the Environmental Protection Agency (EPA) WaterSense program, which is a voluntary public-private sponsorship program, has encouraged the use of water-efficient

toilets, showerheads, faucets and other plumbing products. Through the cooperation with manufacturers and the plumbing supply outlets, more than 21,000 product models bearing the WaterSense label are providing an alternative to code designated fixtures. These fixtures use on average 20 percent less water per fixture type than what is referenced above. The water savings is significant as replacement of fixtures in older homes and construction of new homes in the last ten years may include these higher performing fixtures.

Additionally, since 2011, the EPA ENERGY STAR program has included water efficiency in their specifications for the ENERGY STAR labelled appliances. The average ENERGY STAR clothes washer uses 13 gallons per load compared with 23 gallons for standard machines and up to 40 gallons for older clothes washers. Dishwashers with the ENERGY STAR label use on average 4 gallons per load or less. It is likely therefore, that as DSS residents replace older appliances they will install ENERGY STAR models since several energy utilities offer rebates for ENERGY STAR brands. A DSS home with WaterSense appliances and ENERGY STAR appliances uses on average 30% less water than those without.

Since 2008 many local governments have adopted codes and ordinances governing landscape and irrigation system design elements intended to reduce outdoor water use. These codes are implemented by either the building department, environmental department or in some cases, the planning department. Codes are either voluntary or mandatory and are enforced to varying degrees depending on staffing and budget constraints of the local governments. Codes differ in their level of detail requiring varying levels of efficiency and design BMPs.

All five counties and many local governments within CFWI have opted to adopt District irrigation restrictions thereby restricting frequency and duration of irrigation. As with local codes, the irrigation restrictions are enforced to varying degrees depending on staff time and budget constraints.

The table below details outdoor codes and restrictions, adopted at the County-level, that likely impact DSS water use. Currently there are no Counties offering rebate programs to DSS residents.

Table 28. DSS Water Conservation Opportunities

County Government	Irrigation Restrictions Enforcement	Irrigation Design Code and date of implementation
Lake	Complaint driven	2016 Voluntary participation
Orange	Complaint driven	2008 Requires efficient design
Osceola	Complaint driven	2014 Requires efficient design
Polk	Complaint driven	None
Seminole	Complaint driven	None

B. Geographic Target Areas

Retrofitting older homes can result in significant cumulative savings. The conservation team is currently investigating the indoor retrofit potential for DSS homes in the CFWI planning area. “Age of home” was the factor used to target homes that would be good candidates for a plumbing fixture retro-fit program. Homes built before 1994, the year federal indoor plumbing standards were implemented, are the best candidate homes for this type of retrofit program as they were

constructed using high water use fixtures (e.g. toilets - 3.5 to 7.0 gallons per flush, showerheads – 2.8 to 8.0 gpm and faucets 2.8 to 7.0 gpm). However, based on a typical life-expectancy for plumbing fixtures, owners of homes older than 1980 will have started to replace these fixtures as they wear out. A query was conducted on the CFWI DSS geo-database which contains age-of-home and location information on approximately two-thirds of the DSS homes located in the CFWI planning region built before 2016 - 43,736 of 66,000 DSS homes were queried. The query showed that there are 12,928 homes older than 1980 and 12,961 homes were built between 1980 and 1994. Zip codes were then used to target geographic areas within CFWI that have more than 300 homes built before 1994. See graphical representation of the results below on Figure 15 and in Table 29.

Figure 15. Indoor Retrofit Potential

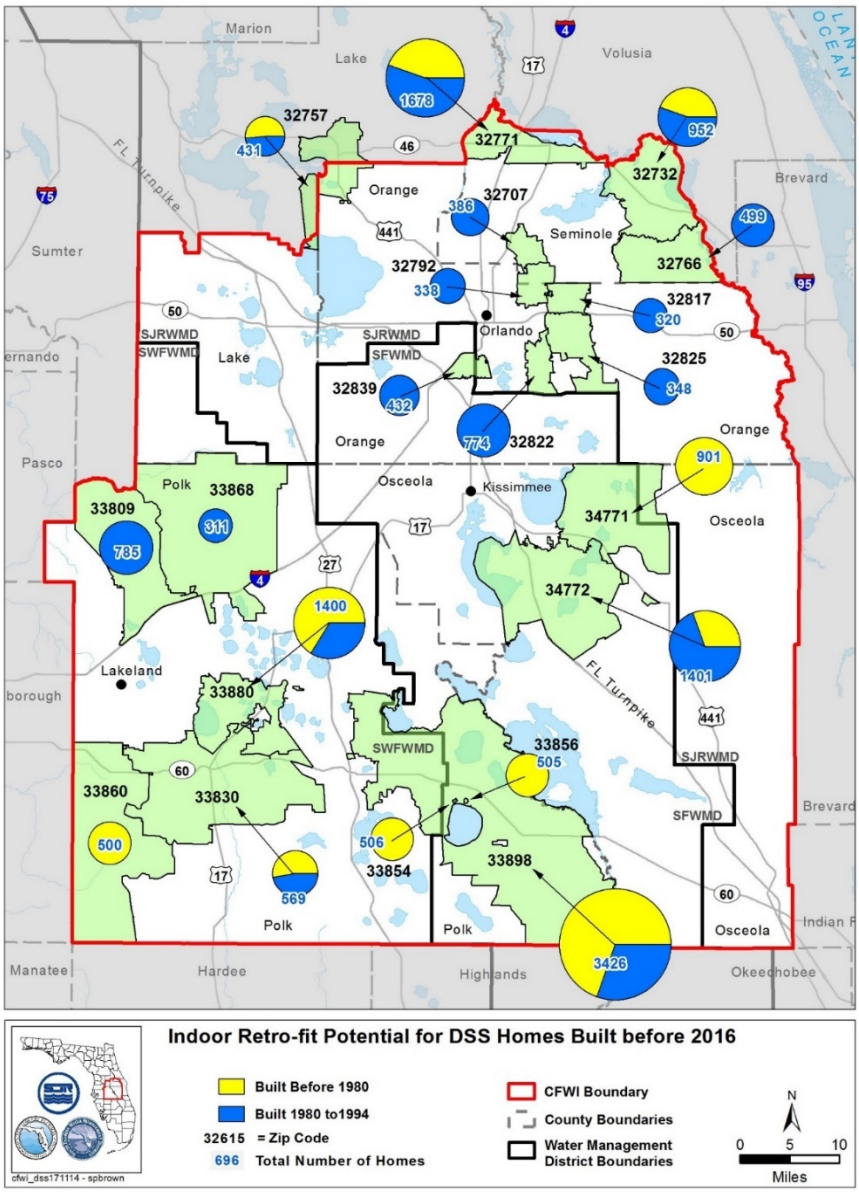


Table 29. Geographical Locations for Retro-fit Potential

		Number of DSS Homes		
County	**Zip code**	**Built Before 1980**	**Built Between 1980 and 1994**	**Total Built pre-1980 through 1994**
Lake	32757	222	209	431
Orange	32822	0	774	774
Orange	32839	0	432	432
Orange	32825	0	348	348
Orange	32792	0	338	338
Orange	32817	0	307	307
Osceola	34771	901	0	901
Osceola	34772	427	974	1401
Polk	33898	2386	1040	3426
Polk	33809	0	785	785
Polk	33880	926	474	1400
Polk	33856	506	0	506
Polk	33854	505	0	505
Polk	33860	500	0	500
Polk	33830	300	269	569
Polk	33868	0	311	311
Seminole	32771	750	928	1678
Seminole	32707	0	385	385
Seminole	32732	423	529	952
Seminole	32766	0	499	499

Results of this query and mapping exercise identify geographic areas where DSS homes, that would not be covered by a utility sponsored program, could be targeted by a County or District for plumbing fixture retro-fit programs. See the project section for more detail.

C. Barriers and Challenges

Barriers to implementation of conservation strategies outlined for public water supply customers can be reiterated and magnified for DSS residents. While BMPs for DSS are the same as for PS, a consistent outreach to these DSS users does not exist (like it might through informational billing in the PS category). Since they are not part of utility supplied water they are not usually targeted by utility programs for funding. The absence of an entity such as a utility to fund and promote implementation of conservation strategies is a significant barrier to successful demand reduction. DSS residents have little or no financial incentive to implement change as they do not pay for their water other than the cost of running and maintaining the pumps and for water treatment. DSS residents are likely to be less aware of the need for conservation as they do not receive common messaging that utility customers receive. They may also believe that water supply issues do not impact them as they fail to understand the regional connection of groundwater resources. In some cases, the reluctance to conserve water stems from the viewpoint that they installed their well, own

that water and saving water is not necessary. They also likely do not know how much water they are using (since it isn't metered) in comparison to other users and wouldn't be identified as a high-water user for conservation messaging (or rebates if available).

Overcoming these barriers should start with outreach and education so that DSS customers understand how their behavior affects the regional water resource. Next would be to offer solutions that are affordable and achievable. Reaching this audience with clear consistent messaging could be achieved with a collaborative effort by local, regional and state government. Once there has been a successful effort to educate, a clear path to behavior change needs to be identified that allows for financial incentives to off-set the reluctance of DSS residents who do not pay for their water supply. Outdoor water use reduction can be enhanced with increased enforcement of irrigation restrictions by local governments, assurance that the statutory requirements for rainfall shut-off devices is being met and active inspection of implementation of irrigation design codes during construction of new homes. Indoor water use reduction can be enhanced through DSS-targeted indoor retrofit programs. These strategies to increase conservation in this sector will have a fiscal impact on local government and regional agencies so appropriate budgeting and possible funding will be needed if efforts are to succeed.

As with public supply customers, challenges to implementing successful regional conservation efforts can be overcome with the application of several time-tested approaches including: comprehensive, region-wide outreach and education campaigns; funding to assist with implementation; and, if necessary, additional regulations and mandates for higher water use efficiency.

D. Designated Projects

At this time, no specific entities, or regional entities have provided potential designated projects. As an example, several generic projects are provided below. These conceptual projects were generated by evaluating the above geographic target area map and assigning one generic project within each county. The zip codes that had the largest number of pre-1995 homes were selected, and a 23% participation rate was used to develop the estimated number of toilet rebates that could be implemented. The cost and savings estimates were extrapolated from Table 5 of the CFWI solutions document.

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Table 30. Generic DSS Designated Projects

Title	Entity	Location	Description	Implement-ation Schedule	Number of Implement-ations	Total Project Cost	Water Saved (gpd)
DSS toilet rebates	Generic	Polk County	$100 HE toilet rebates available to DSS residential homes located in zip code 33898 (3426 * 23% participation = 788 implementations)	2020	788	$118,200	15,760
DSS toilet rebates	Generic	Osceola County	$100 HE toilet rebates available to DSS residential homes located in zip code 34772 (1401 * 23% participation = 322 implementations)	2020	322	$48,300	6,440
DSS toilet rebates	Generic	Orange County	$100 HE toilet rebates available to DSS residential homes located in zip code 32822 (774 * 23% participation = 178 implementations)	2020	178	$26,700	3,560

E. Next Steps

As described, water use within this category is expected to increase by approximately 20 percent and actual water conservation within the DSS sector occurs as the result of self-initiated efforts (i.e. passive water conservation) and not as the result of participation in an active conservation campaign as these residents are rarely targeted by such programs. This report shares the potential of retrofitting older homes in this sector, thereby resulting in significant cumulative savings. Several next steps, broad in focus, will pave the way for increasing conservation across the sector. As mentioned, DSS residents are required to abide by irrigation restrictions and any landscape codes that exist in their jurisdiction. A detailed review of current enforcement of restrictions and landscape code content and enforcement will create a better picture of expected water use by DSS residents. Furthering this step, the team could work with CFWI local governments to compare and improve landscape codes to offer consistency and implementation assistance.

In working with local governments, the team could explore opportunities for DSS rebates using the Districts cost-share programs. Both indoor and outdoor rebates could be offered to DSS residents through a local government environmental or planning department. Communicating with this sector has proven difficult as mentioned in this report. Development of a communications plan specific to this sector would be essential to allow residents to avail of rebates and learn about water conservation ordinances and codes. Clearly, there are several effective next steps that will bring conservation to prominence for the DSS sector, but they will require collaboration by this team, local governments and DSS residents if gains are to be made.

VIII. Conclusion

This implementation strategy has presented an estimate of the conservation savings achieved since 2010 for the PS, AG, and CII sectors along with a discussion about the challenges of estimating conservation savings for the LRA, DSS and PG sectors. With the completion of this first edition of the implementation strategy, the Conservation Team turns it focus to updating the 2020 CFWI RWSP. Portions of this strategy will be used to develop the 2040 conservation projection for that update.