

Facilitating Agricultural Resource Management Systems (FARMS) Program

Fiscal Year 2015–16 Biennial Report



Southwest Florida
Water Management District

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Southwest Florida Water Management District

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(FARMS) Program**

Fiscal Years 2015-16 Biennial Report

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October 2017



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EXECUTIVE SUMMARY

The Facilitating Agricultural Resource Management Systems (FARMS) Program is an agricultural best management practice (BMP) cost-share reimbursement program. The program is a public/private partnership developed by the Southwest Florida Water Management District (District) and the Florida Department of Agriculture and Consumer Services (FDACS) in 2003. The purpose of the FARMS initiative is to provide an incentive to the agricultural community within the District to implement agricultural BMPs that will provide resource benefits. These benefits include:

- Reduction of groundwater withdrawals from the Upper Floridian aquifer;
- Improvement of ground and/or surface water quality impacted by withdrawals of groundwater; and
- Improved natural-system functions within wetlands and watersheds.

The FARMS Program operates under Rule 40D-26 of the Florida Administrative Code (F.A.C.) (the FARMS Rule) to fund projects that provide these benefits while assisting in the implementation of the District's Regional Water Supply Plan. This plan identifies strategic initiatives and regional priorities to meet the District's water management goals. These goals are based on improving and/or maintaining the water resource conditions of several regions within the District. FARMS accomplishes this by placing an emphasis on the:

- Shell, Prairie, and Joshua Creek watersheds (SPJC);
- Upper Myakka River Watershed (UMRW) and Flatford Swamp;
- Southern Water Use Caution Area (SWUCA);
- Central Florida Water Initiative (CFWI);
- Dover/Plant City Water Use Caution Area (DPCWUCA);
- First magnitude springs within the Northern District.

Therefore, the five (5) primary goals for the FARMS Program through fiscal year (FY) 2016 are to:

1. Improve surface water quality in the SPJC watersheds;
2. Improve natural systems in UMRW and restore hydro-periods to Flatford Swamp;
3. Reduce groundwater use by 40 million gallons per day (mgd) in the SWUCA;
4. Reduce groundwater use for Frost/Freeze Protection (FFP) within the DPCWUCA by 20 percent (per freeze event);
5. Reduce Upper Floridan aquifer groundwater use and nutrient loading impacts in the Northern District (Springs Coast).

FARMS projects implement FDACS-approved BMPs that offset groundwater use with surface water and/or increase the overall efficiency of irrigation water use. Properly implemented BMPs protect and conserve water resources and may increase crop production.

The FARMS Program may reimburse a grower up to 50 percent of the total project costs. Some projects may qualify for up to 75 percent reimbursement of total project costs based on the water resource benefits and the project location. As FARMS is a cost-share program, cooperators must match at least 25 percent of the total project costs. The FARMS Rule lists the stipulations a project must meet to qualify for either cost-share reimbursement rate.

The FARMS Rule provides for reimbursement rates capped at 50 percent of the total project cost if a project:

- Reduces withdrawals from the Upper Floridan aquifer by less than 50 percent; **or**
- Reduces withdrawals from any combination of ground, surface or reclaimed water sources; **or**
- Improves ground or surface water quality impacted by groundwater withdrawals; **or**
- Improves natural system functions within the UMRW.

The FARMS Rule provides for reimbursement rates capped at 75 percent of the total project cost if a project:

- Reduces withdrawals from the Upper Floridan aquifer by 50 percent or more; **or**
- Reduces withdrawals by 15 percent or more from any combination of ground, surface or reclaimed water sources of which a minimum of five percent of the total withdrawal reduction is from the Upper

Floridan aquifer and it improves either the ground or surface water quality impacted by ground water withdrawals or the natural system functions within the UMRW; **or**

- Reduces FFP withdrawals authorized by a District Water Use Permit (WUP) from the Upper Floridan aquifer within the boundary in the DPCWUCA; **or**
- Reduces Upper Floridan aquifer withdrawals in the Most Impacted Area, for projects initiated before September 2018.

The FARMS Program had 22 new projects and 1 amendment Board approved for FY 2015 and FY 2016. The projected offset from these new projects is 1.76 mgd. The District will contribute \$5.8 million, 64 percent of the \$9 million in total project costs. Each project's performance will be monitored, as previous years' projects have been tracked, to determine project effectiveness.

According to the District's Water Management Information System (WMIS), as of September 30, 2016, there were 5,648 permitted agricultural entities in the District with a combined permitted annual average daily groundwater quantity of 787,994,928 gallons per day (gpd). From the inception of the FARMS Program in FY 2003 through FY 2016, the total projected groundwater offset for the 182 Board approved FARMS projects is 27 mgd at an overall average cost-benefit of \$2.23 per thousand gallons offset. Total expenditures for these projects is \$63.1 million, with \$26.6 million (42 percent) coming from the District's FARMS Program, \$27.9 million (44 percent) from participating agricultural producers/growers, and \$8.5 million (14 percent) coming from other sources (State appropriations and FDACS funds).

FARMS PROGRAM PRIORITY AREAS

Program History

The FARMS Program currently operates throughout the entire District, with program emphasis occurring within five priority areas: SPJC, UMRW, SWUCA, DPCWUCA, and the Northern District (Springs Coast). When established in 2003, the FARMS Program focused on two priority areas: 1) the Shell, Prairie and Joshua Creek watersheds, and 2) the Upper Myakka River Watershed. Given that the FARMS Program was originally implemented to serve these watersheds, it is not surprising that FARMS projects are predominantly located in Charlotte, DeSoto, and Manatee Counties. The FARMS Program was expanded to include the entire Southern Water Use Caution Area in 2004. In 2011, the Dover/Plant City Water Use Caution Area (DPCWUCA) was added as a FARMS Program priority to focus on reducing groundwater withdrawals due to frost/freeze conditions and associated impacts. With the recent inclusion of the Springs Coast region, the program now covers the entire District. Figure 1 provides a breakdown of the project totals per priority area through FY 2016. Figure 2 shows the location of priority areas and all FARMS projects through FY 2016.

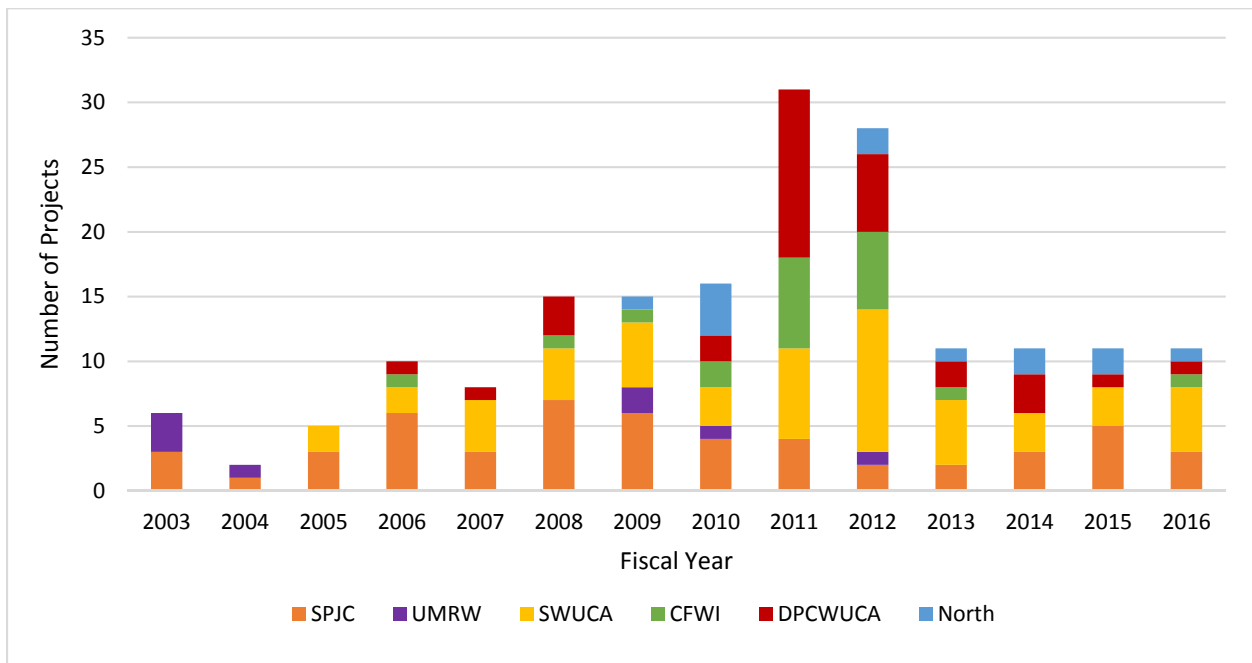


Figure 1. FARMS Program project totals by priority area per fiscal year.

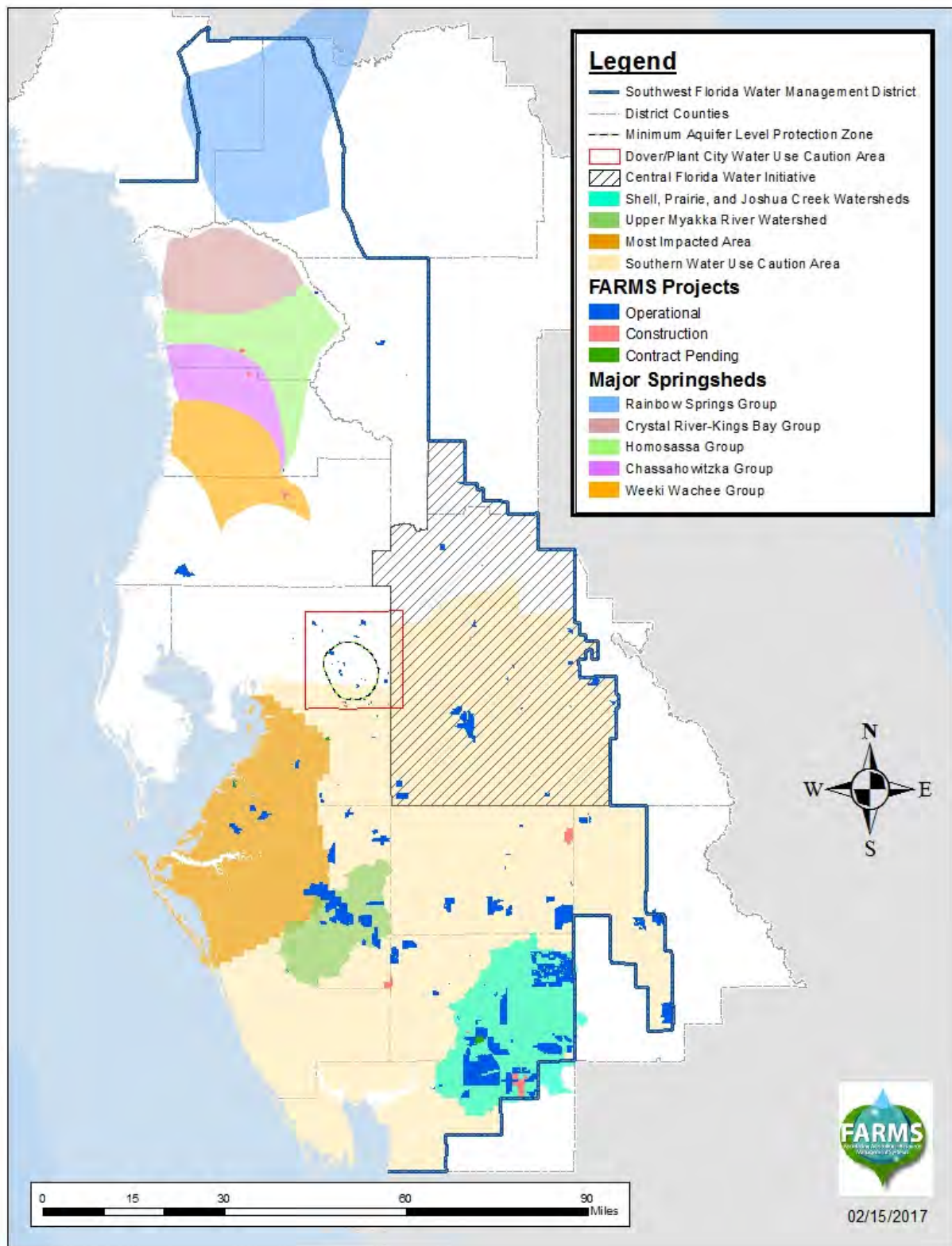


Figure 2. Location Map of Priority Areas and FARMs Projects through Fiscal Year 2016.

Program Priority Areas, Goals, and Achievements

Shell, Prairie, and Joshua Creek watersheds (SPJC)

In 2002, the City of Punta Gorda's public supply reservoir, which is fed by the Shell and Prairie Creek watersheds, exceeded secondary drinking water standards for chloride, dissolved solids, and specific conductivity. Mineralized groundwater used to irrigate agricultural operations draining into these two watersheds, as well as in the Joshua Creek watershed, contributes to the water quality issues. To address this issue, the District created a stakeholder group to develop a plan of action. Part of this plan was the creation of the FARMS Program to assist growers within the watershed with converting their irrigation sources from mineralized groundwater to surface water. To date, 52 projects have been approved with 49 operational projects having offset 8.2 mgd of highly mineralized groundwater. Prairie Creek was removed from the list of impaired waterbodies by the Department of Environmental Protection, indicating the success of the program.

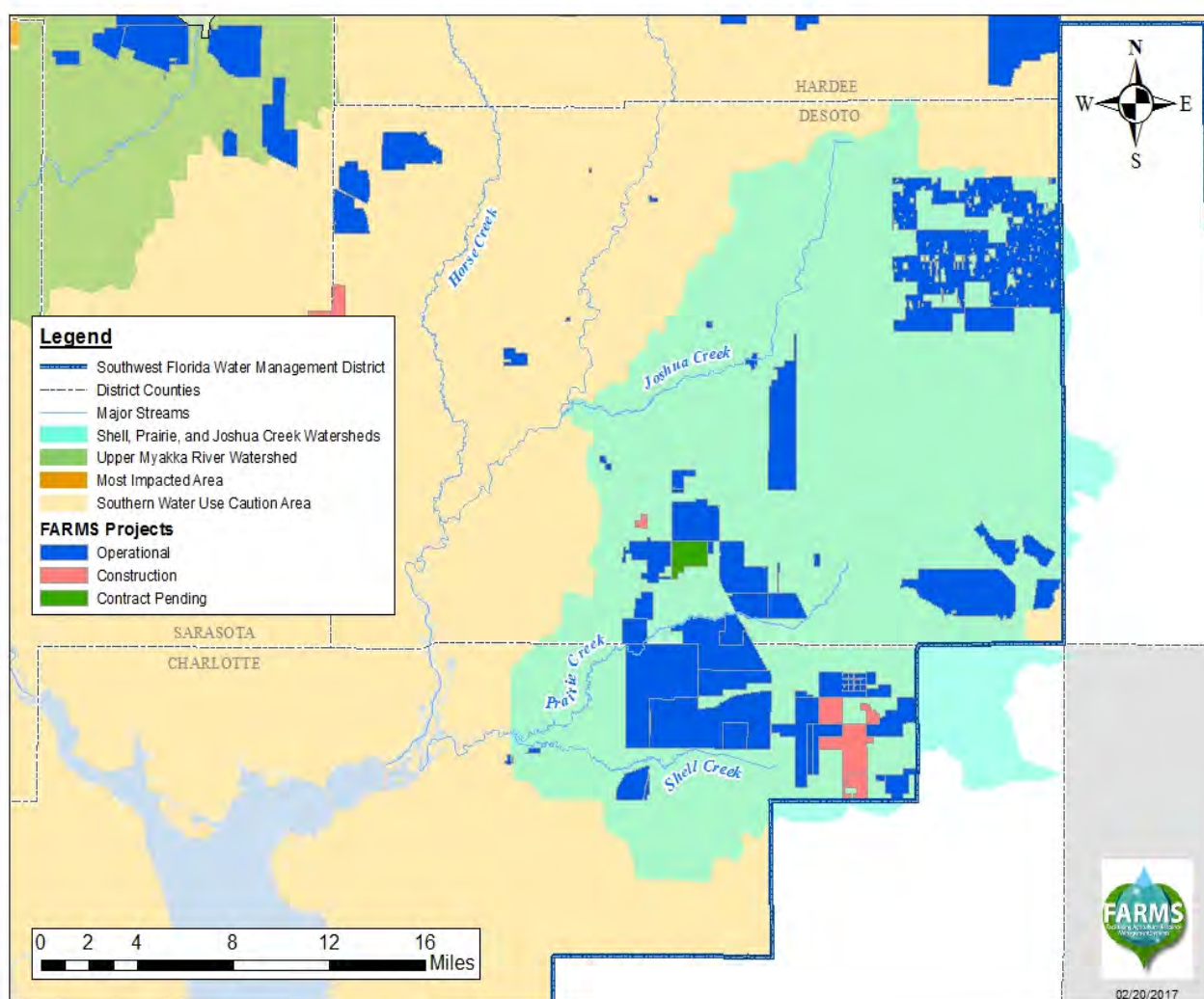


Figure 3. FARMS projects within the Shell, Prairie, and Joshua Creek watersheds.

Upper Myakka River Watershed (UMRW)

The Upper Myakka River Watershed and Flatford Swamp have also been affected by agricultural runoff. The use of groundwater for irrigation and the subsequent runoff to the watershed increased the flow of the river and extended the hydroperiod of the swamp, negatively impacting the habitats of the natural flora and fauna. The FARMS Program has helped to reduce groundwater use in this watershed primarily through the implementation of tailwater recovery. To date, 8 projects have been approved and are operational, offsetting 3.0 mgd.

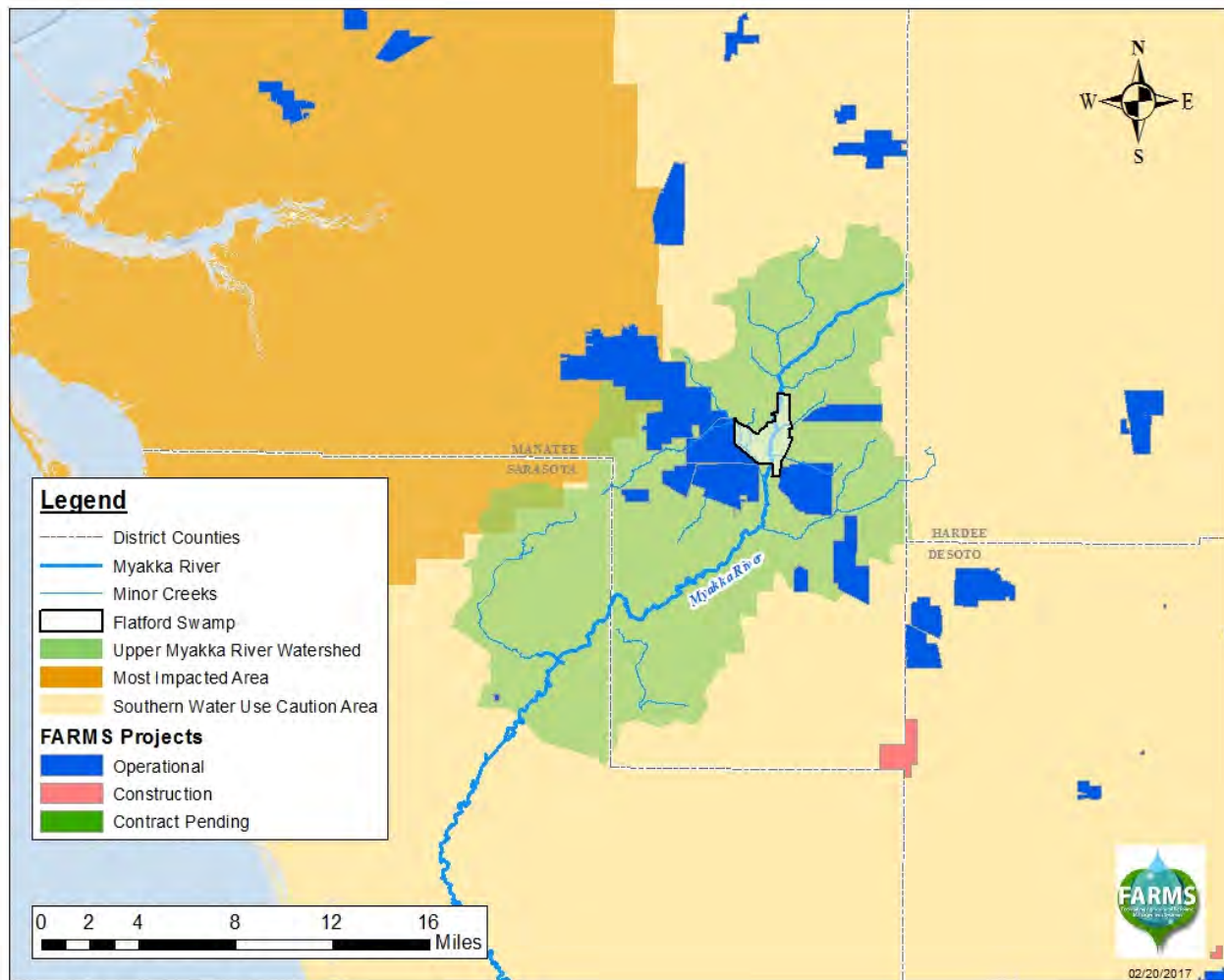


Figure 4. FARMS projects within the Upper Myakka River Watershed.

Southern Water Use Caution Area and Most Impacted Area (SWUCA and MIA)

The District completed the Southern Water Use Caution Area (SWUCA) Recovery Strategy in 2007. The strategy addresses: 1) the restoration of minimum levels in lakes of the Ridge area, 2) the restoration of minimum flows to the upper Peace River, 3) reducing the rate of saltwater intrusion in Hillsborough, Manatee, and Sarasota counties, and 4) ensuring there are sufficient supplies of water available for all existing and projected reasonable -beneficial uses. To assist in this recovery strategy, the FARMS Program was expanded to cover the entire SWUCA in 2004 and was tasked with reducing groundwater use by 40 mgd by the year 2025. The SWUCA includes projects within the SPJC, UMRW, MIA, and the southern limits of the DPCWUCA. To date, 136 projects have been approved with 125 operational projects having offset 19.5 mgd.

The Most Impacted Area (MIA) is an area of about 700 square miles located along the southern Hillsborough, Manatee and northwestern Sarasota counties specifically affected by groundwater withdrawals within the SWUCA. The FARMS Rule was updated to increase the cost-share rate in the MIA to 75% for projects initiated before September 2018 in an effort to increase participation in the program. To date, 12 projects have been approved with 9 operational projects having offset 2.5 mgd.

Although not incorporated within the SWUCA Recovery Strategy, the Central Florida Water Initiative (CFWI) is a collaboration between the St. Johns River Water Management District, South Florida Water Management District, Southwest Florida Water Management District, other agencies, and stakeholders focused on future water supply demands and ensuring water supplies are available to meet those demands. The CFWI planning area includes all of Orange, Osceola, Seminole, and Polk counties, as well as the south west corner of Lake County. Conservation in agriculture has been identified as a part of the solution to the area's future water supply issues. A conservation goal of 4.3 mgd was set for agriculture throughout the entire CFWI planning area by 2035. To date, 23 projects have been approved and are operational, with projects having offset 0.9 mgd.

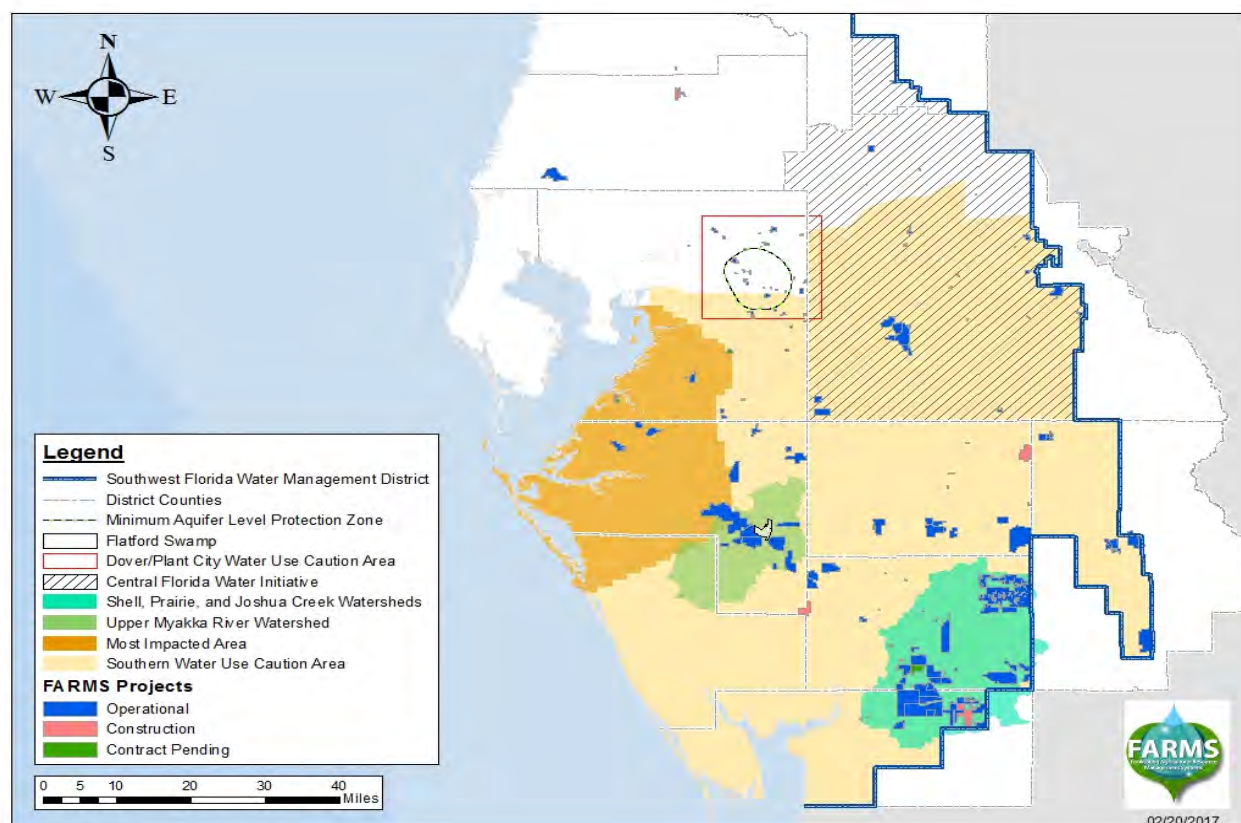


Figure 5. FARMS projects within the SWUCA, MIA, and CFWI.

Dover/Plant City Water Use Caution Area (DPCWUCA)

The DPCWUCA was established in 2011 as a result of an extended freeze event in 2010 that resulted in numerous dry well complaints and sinkholes due to agricultural related groundwater pumping for frost-freeze protection. The FARMS goal is to reduce groundwater used for frost-freeze protection by 20% by the year 2020. To date, 22 FFP projects have been approved and 21 are operational. These projects are projected to offset 41 million gallons per freeze event.

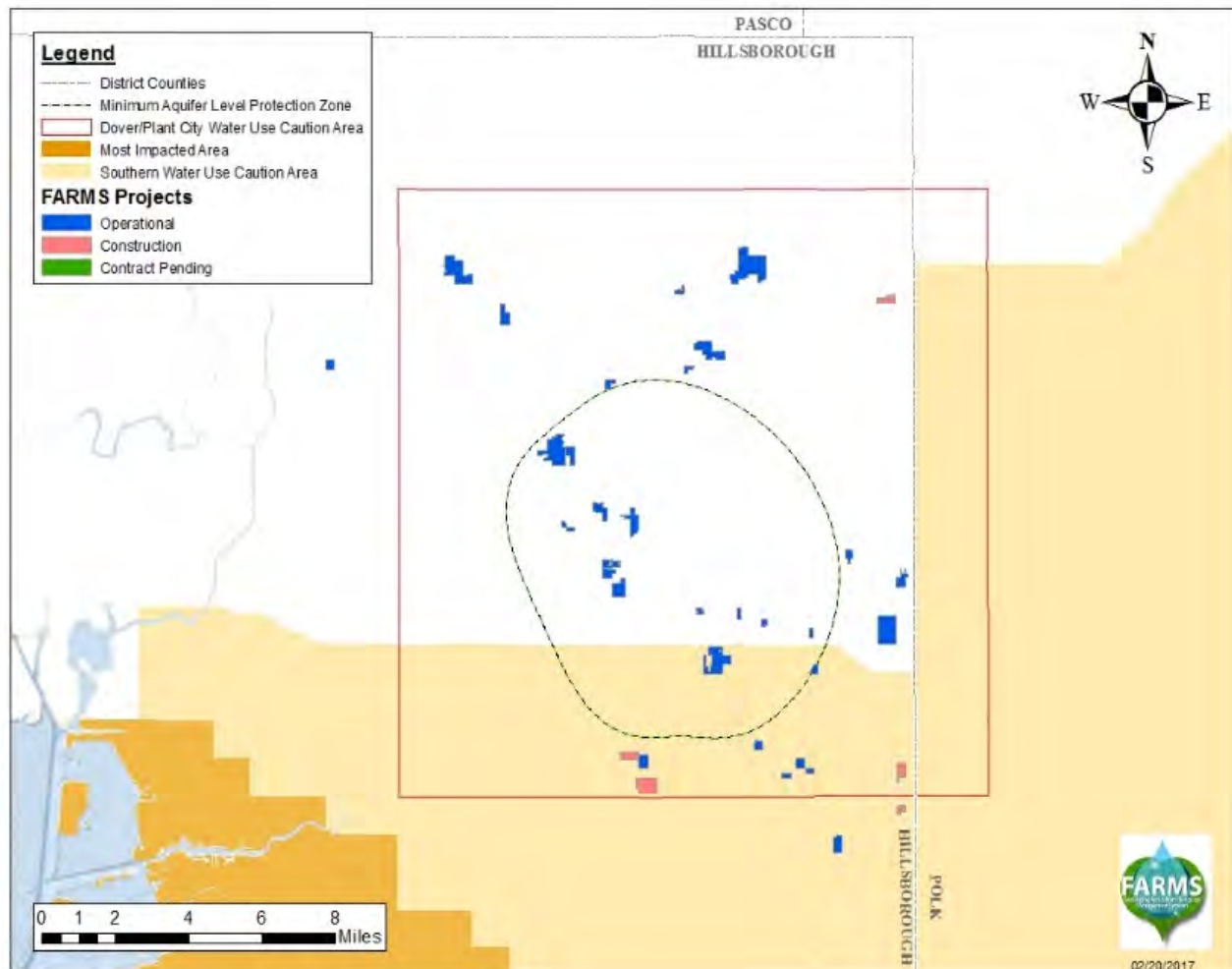


Figure 6. FARMS projects within the DPCWUCA.

Northern District (Springs Coast)

The northern portion of the District contains five 1st magnitude springs. Adverse impacts to these springs from nutrient leaching is a major concern in the region. The FARMS goal in this region is to reduce the use of Upper Floridan aquifer groundwater and reduce nutrient loading to springs. To date, 16 projects have been approved with an offset of 0.5 mgd. In FY 2016, the Board approved the first FARMS project specific to nutrient reduction. The BMPs implemented at a dairy farm in Citrus County will reduce nitrogen loading to Homosassa Springs by an estimated 1,400 pounds per year.

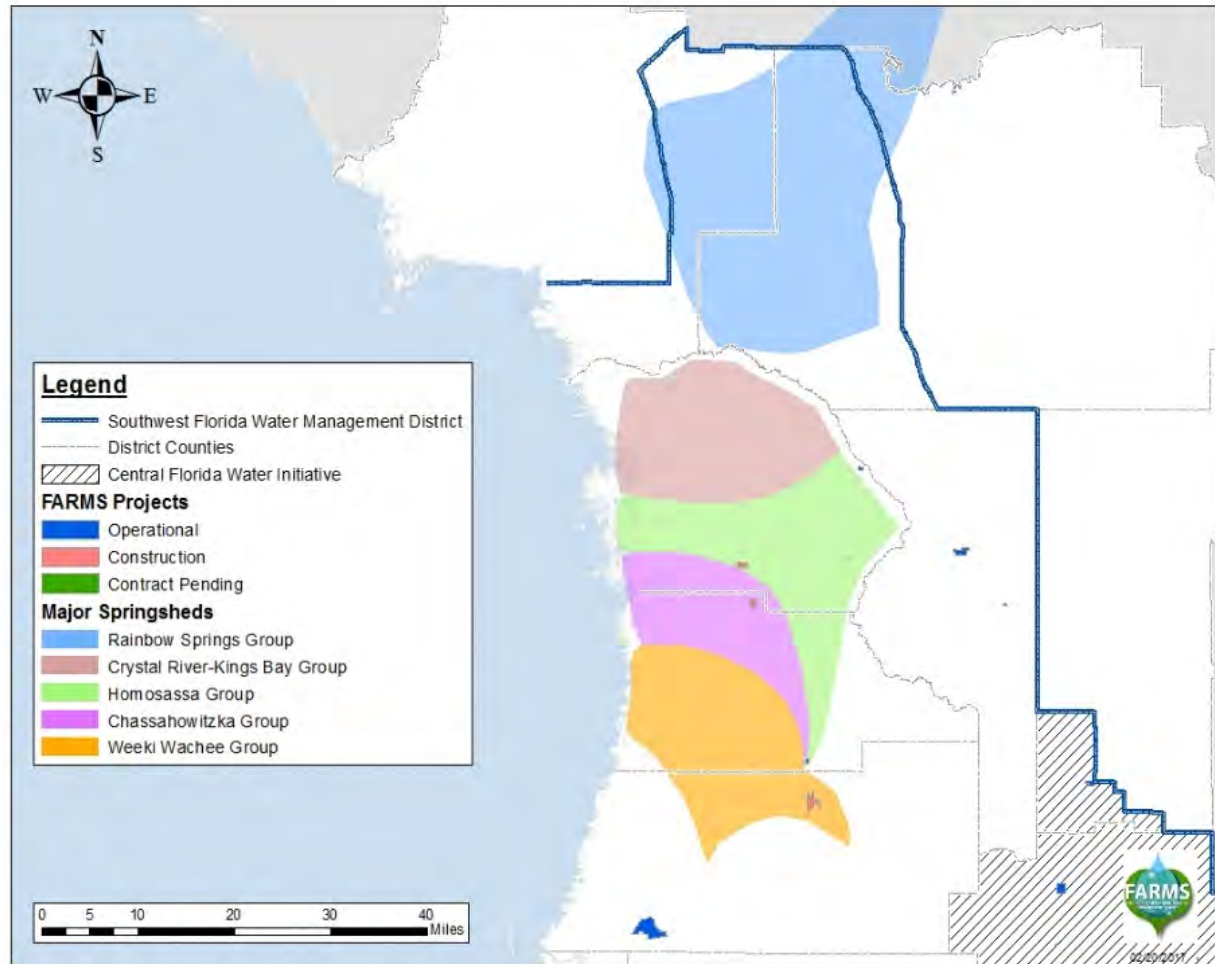


Figure 7. FARMS projects within the Northern District (Springs Coast).

BEST MANAGEMENT PRACTICES ELIGIBLE FOR COST-SHARE THROUGH THE FARMS PROGRAM

Alternative Water Supply (AWS) – Tailwater Recovery and Surface Water Reservoirs

Description

The development of surface water and tailwater recovery reservoirs are effective BMPs implemented by FARMS to achieve both water quality improvements and groundwater conservation (Figure 8). These reservoirs are typically excavated below ground level at the low end of a farm to collect excess irrigation water and storm water run-off. The use of these reservoirs for irrigation is effective in reducing—or "offsetting"—the amount of groundwater that is withdrawn from the Upper Floridan aquifer for irrigation and frost/freeze protection (FFP). They also improve water quality of the downstream watershed by reducing irrigation runoff of mineralized groundwater applied to crops.

In addition to tail-water recovery reservoirs, reclaimed water can be a viable alternative to groundwater as an irrigation source. Groundwater offsets of 50% or greater can be expected from the use of reclaimed water. Reclaimed water is an affordable and effective alternative water source.

Components Eligible for Cost-Share

To incentivize implementation of alternative water supplies as a source of irrigation water, the FARMS Program and the producer share the total project costs of the components and materials used in the construction of pump stations that withdraw water from the reservoir and feed it into the irrigation system. This includes, but may not be limited to: surface water pumps; power units for the pump; materials for the foundation and protective structure; filtration systems, fuel tanks, and flow meters; culverts and control structures that enhance tailwater recovery; intake/mainline piping and any other necessary appurtenances to connect the surface water pump station to the existing irrigation system. Although excavation of the reservoir itself is not considered a FARMS eligible cost, it can be included in the total project cost and be applied towards the grower's required contribution.

Projected Costs and Benefits

With typical offsets between 25 and 50 percent, alternative water supply projects tend to be the most effective water quantity BMP because they have the greatest potential reduction in use of permitted groundwater quantities. Although excavation and management costs can drive up total project costs, the higher potential for groundwater savings from AWS projects result in greater affordability. Affordability for FARMS projects are determined by their cost-benefit ratio. Measured by the daily cost per thousand gallons of groundwater offset, the cost-benefit ratio is affected by a combination of total project costs, projected offset (determined by reservoir size), and permitted quantities (determined by irrigated acreage and crop type). Additional benefits include irrigating with water that has a lower pH (more acidic) and efficiency provided from tailwater recovery and storm water capture.

Examples of Actual Costs and Benefits

FARMS has implemented more AWS projects to date than any other eligible BMP. Most operational AWS FARMS projects have achieved an actual offset that is equal to or better than 75% of the projected offset. Figure 8 displays the typical layout of an AWS project. Project H713 involved the construction of a 5.5-acre reservoir to capture and re-use irrigation tailwater on a 595-acre citrus operation. The projected groundwater offset is 164,000 gpd. From the time construction was completed in July 2015 to present, the reservoir has offset 167,300 gpd. There were 17 AWS projects approved from FY 2015 through FY 2016, with a total contracted reimbursement of \$5,172,897.

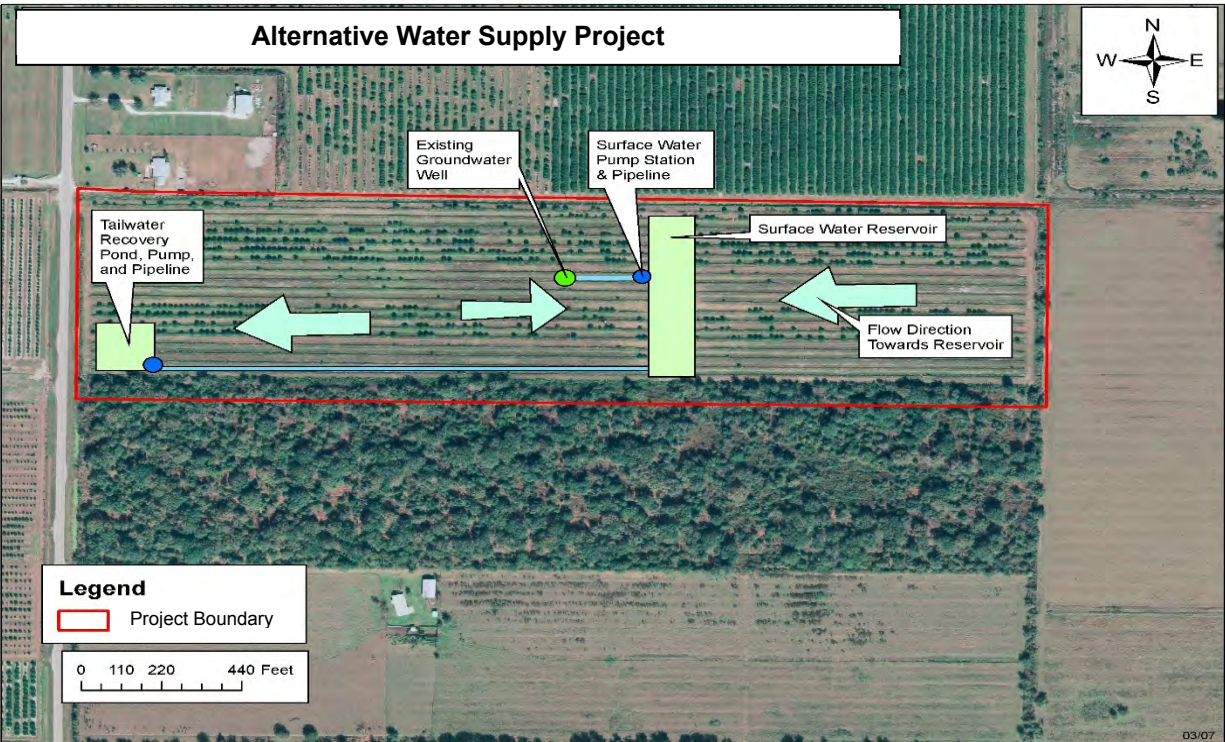


Figure 8. Example of a tailwater recovery pond (top-left) and surface water irrigation pump station (top-right). Typical layout of a tailwater recovery reservoir AWS project (bottom).

Conservation Via Precision Irrigation Systems

Description

Conservation projects that involve the use of instrumentation and/or automated control systems to improve irrigation scheduling and management have been implemented through the FARMS Program and proven to be effective BMPs. Soil moisture and salinity probes, which measure and monitor discrete sub-surface moisture and fertilizer levels, and on-site weather stations, which gather location specific atmospheric data such as temperature and wind speed, are two examples of instrumentation used to improve irrigation efficiency (Figure 9). Improved efficiencies can be achieved by using the data collected from such instrumentation to develop irrigation management strategies. Closed-loop automation and data-driven interactive management are two types of management strategies. In a closed-loop automation system, the scheduling of irrigation events is determined by control systems that use the data, provided by soil moisture sensors and/or weather stations, to determine soil water status and calculate irrigation requirements. This type of system automatically turns pumps and valves on and off as necessary to apply the calculated irrigation depths. In data-driven interactive management, the producer determines the scheduling of

irrigation events based on information displayed through a user-interface (usually computer software or a phone app) that uses the data from soil moisture sensors and/or weather stations to provide details about plant stress, soil moisture status, and recommended irrigation depths. These two types of systems are nearly identical in the terms of the data used, but they differ in the terms of producer involvement. These practices of irrigation management can result in fuel and labor savings to the grower in addition to the conservation of water resources.

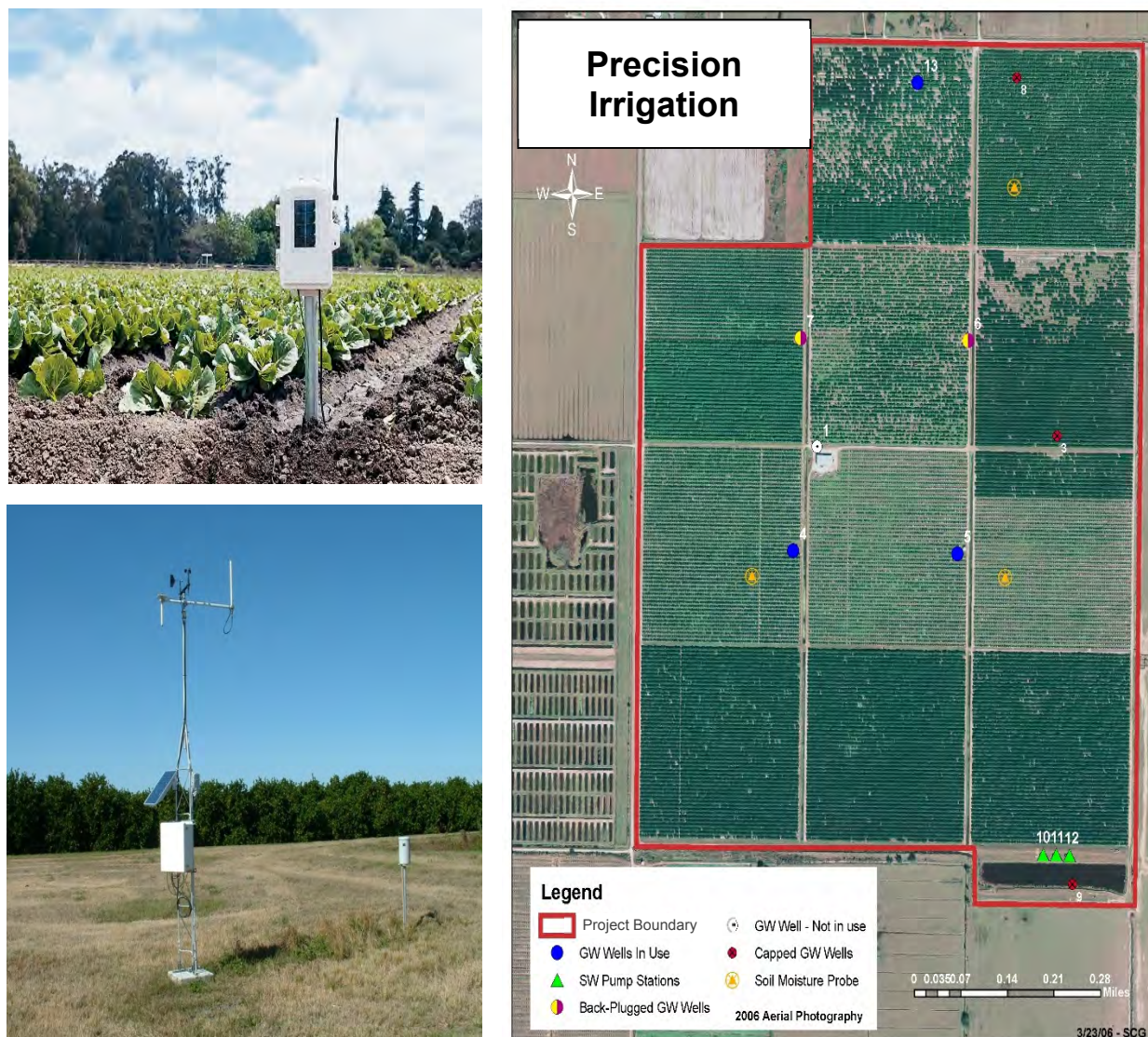


Figure 9. Soil moisture probe installed in a row crop (*top-left*) and a farm-sited weather station (*bottom-left*). Typical layout of a precision irrigation project (*right*).

Components Eligible for Cost-Share

To incentivize implementation of precision irrigation systems that improve irrigation scheduling and management, the FARMS Program and the producer share the total project costs of the components and materials associated with the installation of instrumentation and/or automated control systems. This includes, but may not be limited to weather stations, soil moisture and salinity probes, rain and humidity sensors, auto-starts and shut-offs for pumps, hydraulic valves, flow meters, user interface hardware and software, automatic control systems hardware and software, and any necessary appurtenances to connect automated pump stations to the existing irrigation system.

Projected Costs and Benefits

Precision irrigation systems are the most affordable BMP eligible for cost-share by FARMS in terms of both total project costs and cost-benefit ratios. Reducing the use of permitted quantities between 3% and 8%, these systems are often combined with other BMPs to provide maximum efficiency and sometimes produce projected offsets of greater than 50%. The average reduction in water use for closed-loop automation is slightly higher than data-driven interactive management, but the costs are significantly higher. This is reflected in the cost-benefit ratios as well. The payoff for the higher costs is in the simplification of agricultural operations that lead to an increase in efficiency, saving both time and money. Implementation of precision irrigation systems are consequently very desirable for both producers and the District.

Examples of Actual Costs and Benefits

Figure 9 displays the typical layout of a precision irrigation project. FARMS Project H726 is an example of a closed-loop automation system. Eight irrigation pump stations on a 1,240-acre citrus operation were fully automated by installing remotely operated start/stops, a rain sensor, and two soil moisture probes in the fields. The projected groundwater offset is 26,000 gpd. FARMS Project H714 is the final phase of a four-phase project and is an example of a data-driven interactive management system. In total, 82 pump stations (60 groundwater, 22 surface water) on a 23,526-acre citrus operation were automated and equipped with weather stations, with 32 remote soil moisture probes installed in the fields. The total projected groundwater offset is 1,355,600 gpd. There were six precision irrigation projects approved from FY 2015 through FY 2016, with a total contracted reimbursement of \$1,033,220.

Frost-Freeze Protection (FFP) Non-Irrigation Alternatives

Description

When temperatures drop below freezing, farmers protect their crops with groundwater by running their irrigation systems for the length of a freeze event. This has been a common practice for agricultural commodities such as strawberries, blueberries, citrus, nurseries, and aquaculture. In regions that are predominately comprised of these commodities, such as the Dover/Plant City area, the simultaneous pumping of large amounts of groundwater in such a short period during freeze events puts a tremendous strain on the aquifer. Regional reduction in groundwater level within the aquifer leads to impacts on residential wells. Four primary groundwater conservation BMPs that function as FFP alternatives are eligible for cost-share: surface water reservoirs, row covers, wind machines, and chemical crop protectants (polymers).

Components Eligible for Cost-Share

To incentivize implementation of FFP alternatives, the FARMS Program and the producer share the total project costs of the associated components and materials. This includes, but may not be limited to, all hardware necessary for the operation of a surface water reservoir (see AWS section above), row cover material, wind machines, and chemical crop protectants, and hardware items necessary for the use of row covers, operation of wind machines, or application of polymer coating.

Projected Costs and Benefits

In the Dover/Plant City Water Use Caution Area (DPCWUCA), projects that reduce groundwater use for FFP may qualify for up to 75% reimbursement of total project costs. Pumping less groundwater reduces the impact to the aquifer, increasing sustainability. Growers utilizing alternatives to FFP will be held less accountable in case their neighbors' wells need to be drilled deeper after a freeze event. There are also economic benefits of reducing water use for crop protection. UF/IFAS research, such as Santos *et al.* (2011) and Santos and Stanley (2014), has shown that non-irrigation alternatives to FFP improves crop yields.

Examples of Actual Costs and Benefits

The most popular FFP protection project is AWS because of the dual benefit from bed preparation and cold protection. The use of FFP BMPs are dependent on weather conditions year to year. FARMS Project H622 is a strawberry farm with two fields totaling 40 acres that installed protective ground cloth as an alternative to groundwater for cold protection. Figure 10 displays the typical layout of a similar project. The projected groundwater frost/freeze offset was 3,369,600 gpd. At the completion of the five-year contract term in 2015, it had achieved a frost/freeze offset of 982,500 gpd. FARMS Project H618 is a 20-acre blueberry farm that installed two wind machines as an alternative to groundwater for cold protection (Figure 11). The projected groundwater frost/freeze offset was 1,153,725 gpd. At the completion of the five-year contract term in 2016, it had achieved a frost/freeze offset of 759,508 gpd. There was one FFP project approved from FY 2015 through FY 2016, with a total contracted reimbursement of \$82,500.

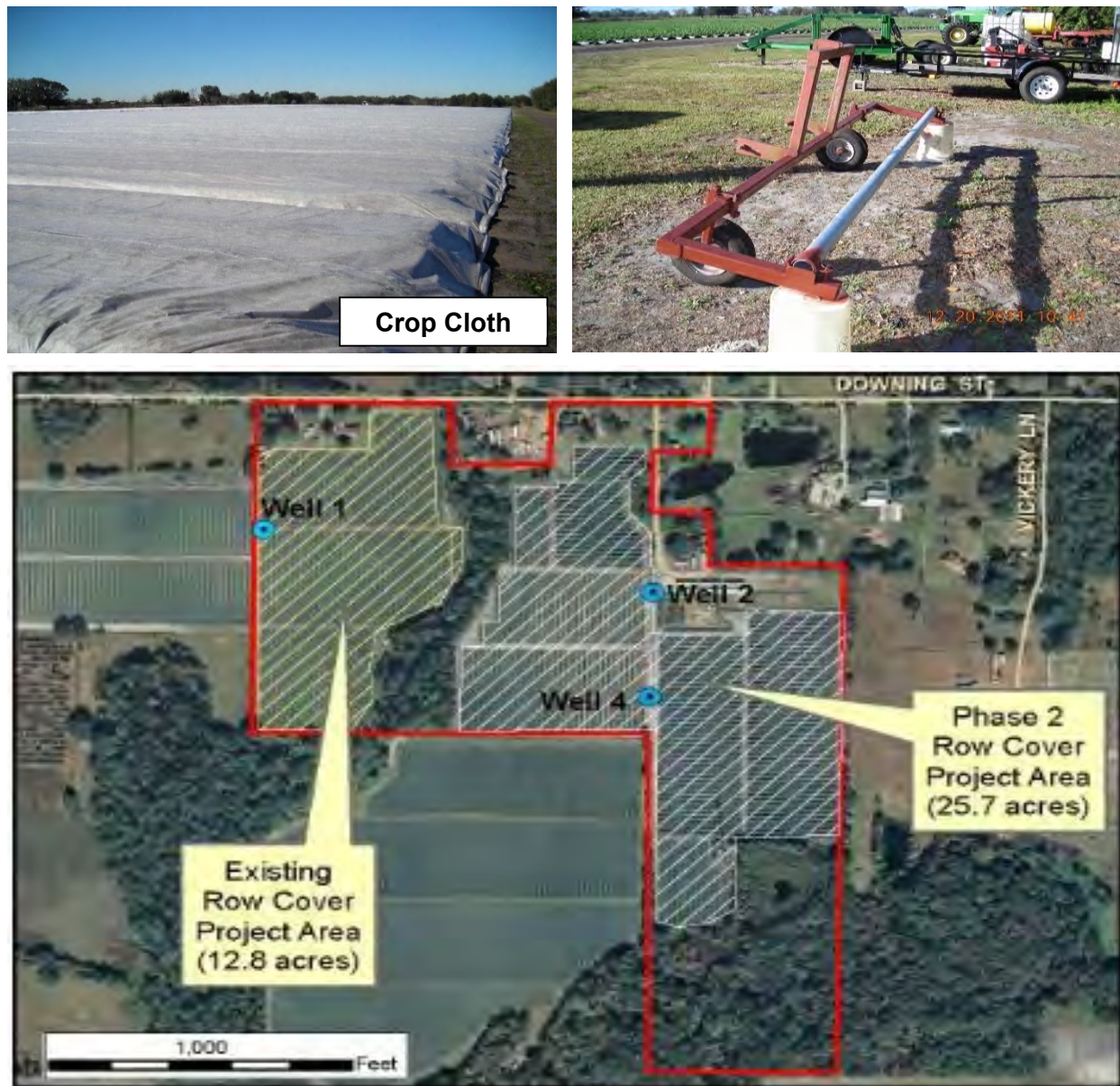


Figure 10. Deployed crop cloth (row cover) on a strawberry field (*top-left*) and a roller typically used to deploy crop cloth during a frost/freeze event (*top-right*). Typical layout of a crop cloth FFP project (*bottom*).

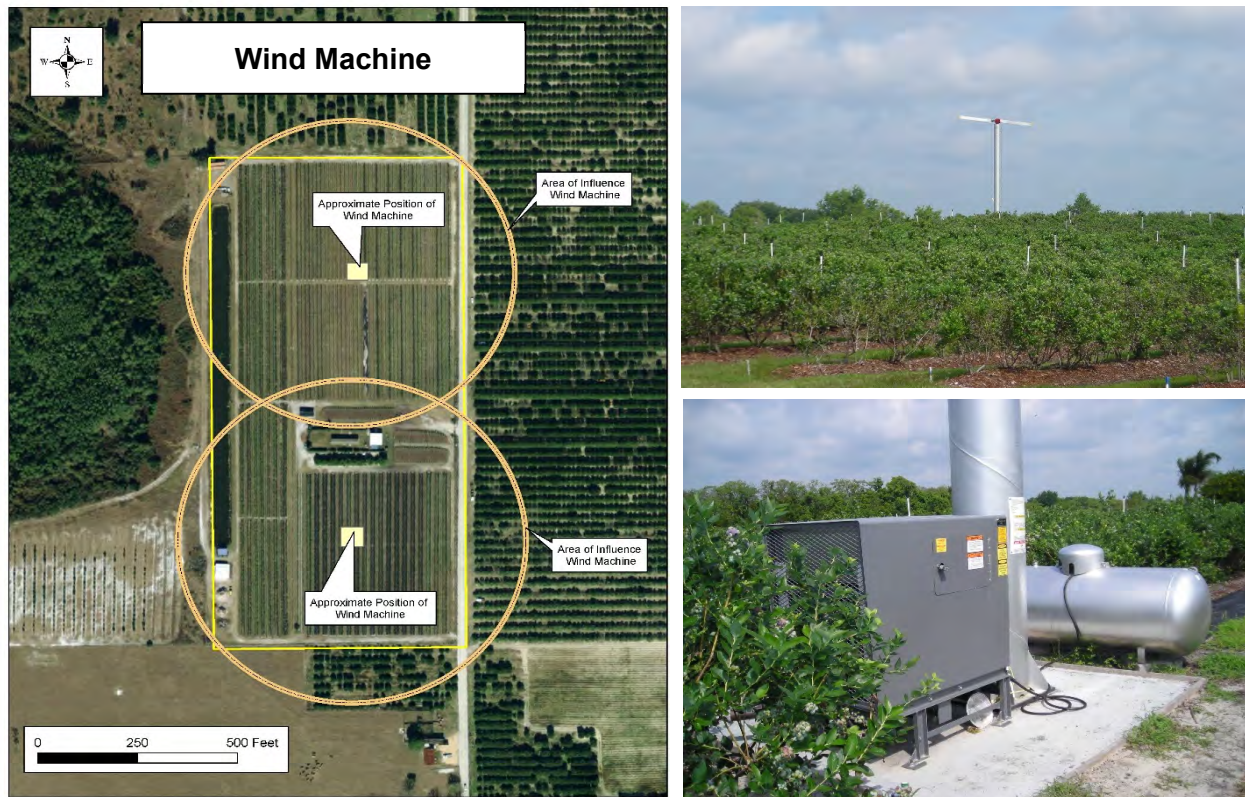


Figure 11. Typical layout of a wind machine FFP project (left). Wind machine installed in a blueberry field (top-right) and typical wind machine power unit setup (bottom-right).

Nitrogen and Nutrient Management

Description

The input of excess nutrients, such as nitrogen, into natural systems disrupts the balance in an ecosystem. The unintended consequences of this can ultimately lead to impacts to natural systems. Since fertilizer application to crops and animal waste produced from livestock in agricultural systems are known sources of excess nutrients, growers must manage their nutrient inputs and outputs to ensure that they do not disrupt surrounding natural systems. The low capacity of sandy soils to hold water and nutrients, combined with frequent high-intensity rains, make Florida's agricultural systems especially vulnerable to nitrogen losses. The most prevalent form of these losses is nitrogen leaching to groundwater. This is of special concern to the five first-magnitude springs located in the northern District. While traditionally FARMS focuses on water conservation BMPs, the District has recognized the importance of nutrient management within the Springs Coast. Nutrient management projects, although not covered under the FARMS Rule, may be funded as pilot projects in Levy, Marion, Citrus, Sumter, Hernando, and Pasco Counties. The FARMS Program funded its first nutrient management pilot study in 2015.

Nitrogen Reduction and Retention BMPs

Nitrogen management BMPs can be grouped into two categories: reduction and retention. BMPs that reduce nitrogen inputs typically improve a producer's profitability while having a positive environmental effect. BMPs that retain nutrients that are already in the system do not provide the same economic returns, but do have significant environmental effects. Some examples of nitrogen application reduction BMPs include variable rate application (sensor based or map based), nitrogen simulation software, fertigation, and equipment guidance systems. Some examples of nitrogen retention BMPs include vegetative filter strips, denitrification walls, treatment wetlands, tailwater recovery ponds, manure storage buildings, and lined wastewater ponds.

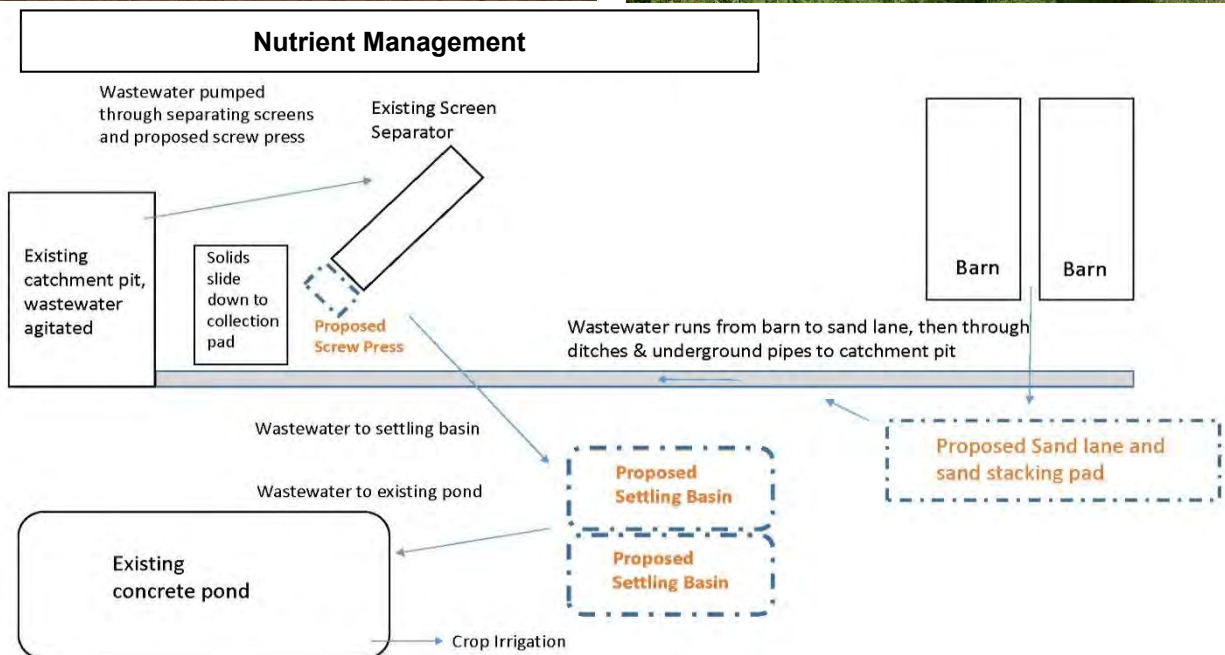


Figure 12. Nutrient management BMPs installed for FARMS Project H736 (clockwise from top-left: sand lane w/settling basins in the background; screw press and screen separator; pressure washer for screw press; new settling basin. Approximate layout of nutrient management BMPs existing before and proposed/installed by FARMS Project H736 (bottom).

Projected Costs and Benefits

Similar to the cost-benefit measurement of dollars per thousand gallons offset for water conservation BMPs, the cost-benefit of nitrogen reduction and retention BMPs can be described as dollars per pound of Nitrogen removed. Nitrogen reduction BMPs typically have a lower cost per pound (\$1 to \$156) than nitrogen retention BMPs (\$2 to \$191). It is more cost effective to reduce the nitrogen inputs than it is to remove nitrogen once it has entered a system. Nitrogen reduction BMPs involve adding components and technology to reduce the nitrogen inputs to the system while nitrogen retention BMPs often require construction and may reduce production area to implement.

Example of Actual Costs and Benefits

FARMS Project H736 (Figure 12) serves as a demonstration pilot project of nutrient management BMP implementation on a dairy farm. FARMS provided cost-share reimbursement for implementation of three BMPs—a sand lane, a screw press, and a settling basin—to further balance the dairy's nutrient inputs and outputs, ultimately reducing the potential for nitrogen enriched water to leach into groundwater via field irrigation and the composting process. The sand lane removes sand from the waste stream, which results in a higher-quality compost product for improved cow bedding while also allowing for nitrogen release by aeration along the flow way. The screw press removes additional wastewater by compressing fibrous solids collected by a screen separator, resulting in a drier material and reducing nitrogen leaching during the composting process. The settling basin allows finer organic sediments to settle out and be periodically collected and distributed to off-site agricultural operations for use as an alternative to inorganic fertilizers. The projected reduction in nutrient impacts from nitrogen leaching into the groundwater is 1,414 pounds of nitrogen removed per acre. There was one nutrient management pilot project approved from FY 2015 through FY 2016, with a total contracted reimbursement of \$247,596.

Additional Cost-Share Programs and Services

Mini-FARMS Program

The Mini-FARMS Program is a partnership between the Florida Department of Agriculture and Consumer Services (FDACS) and the Southwest Florida Water Management District (District). Mini-FARMS is a cost share program that assists agricultural operations of 100 irrigated acres or less in conserving water and protecting water quality within the District's 16 counties. The program promotes agricultural water quality and water quantity best management practices (BMPs), and provides overall water resource benefits. The program provides an incentive for enrollment in the FDACS-adopted agricultural BMPs program, through a Notice of Intent (NOI). Under the Mini-FARMS Program guidelines, the District will reimburse growers 75 percent of their project costs up to \$5,000 per project. There were 23 Mini-FARMS projects approved in FY 2015 and FY 2016, with a total reimbursement of \$72,708. From the program's inception through FY 2016, 154 Mini-FARMS projects have been approved with a total reimbursement of \$578,523.

Well Back-Plugging Program

The Back-Plugging Initiative provides funding assistance for property owners to locate, "back-plug," and improve the water quality in wells that exhibit elevated levels of chloride, total dissolved solids (TDS), and/or specific conductance. Back-plugging works by plugging the lower portion of deep wells with cement to isolate the geological formation that transmits the poorer quality groundwater from the remaining portion of the well. Back-plugged wells show a dramatic improvement in water quality, but often at a cost of lower pumping yields due to the isolation of lower producing zones. Four irrigation wells were back-plugged in FY 2015 and FY 2016. From the initiation of the District's Well Back-Plugging Program in 2002 through FY 2016, a total of 79 wells have been back-plugged. For additional information about this program, please refer to the *Back-Plugging Report*, which is produced every two years by FARMS staff.

Flow Meter Calibration Verification Program

Water Use Permits (WUPs) with metering conditions require that the accuracy of flow meters on applicable withdrawals are verified within five percent every five years. To assist in meeting this permit requirement, the FARMS Program will cover the costs of flow meter accuracy testing for eligible FARMS participants. FARMS staff coordinate with landowners and vendors to schedule testing. The results are then provided to the landowner for submittal to the District's WUP Compliance staff. If the results indicate that the meter needs to be calibrated and/or repaired, the landowner is responsible for the costs. This service reduces the probability of over-pumping issues caused by inaccurate meter readings, and ensures accurate recording of actual water use and tracking of FARMS project offsets.

Mobile Irrigation Lab

A Mobile Irrigation Lab (MIL) is a form of technical assistance that evaluates irrigation systems and provides recommendations to the user for making improvements to the physical system and/or proper operation and management of the system. Technicians working with the MIL are trained to evaluate a wide variety of irrigation systems and are knowledgeable in the principles of soil-plant-water relationships and irrigation scheduling techniques. MILs are a voluntary service that are offered at no cost to agriculturalists within the District. The FARMS Program encourages all program participants to receive a MIL evaluation or demonstrate another form of irrigation efficiency before applying for cost-share funding.

The District manages and funds three MILs for agricultural operations. The longest running MIL at the District is operated by the USDA's Natural Resources Conservation Service (NRCS) staff out of Hardee County and it services each of the District's 16 counties. The other two are operated by private contractors and funded on a year to year basis. The Center Pivot MIL (CPMIL) focuses exclusively on center pivot, long arm, and traveling gun irrigation systems. The Privately Outsourced MIL (PrOMIL) is primarily used to investigate causes of over pumpage and help develop solutions to avoid compliance situations.

University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) Research

UF/IFAS is a federal-state-county partnership that provides research and development for Florida's agricultural, human, and natural resources, as well as related food industries. The District contributes funding annually towards IFAS research that is beneficial to the agricultural community and the public. District IFAS projects focus on water use conservation practices or research focused on understanding the proper irrigation requirements of crops. From FY 2005, through the end of FY 2016, a total of 49 IFAS research projects had received funding totaling \$8.56 million. At the end of FY 2016, there were 14 active IFAS research projects receiving \$843,170 in District funding. Additional information about IFAS research can be found on their website at <http://research.ifas.ufl.edu/>.

Florida Automated Weather Network (FAWN)

Created in 1997 with a legislative appropriation for UF/IFAS, FAWN consists of 44 weather stations statewide that collect and distribute real-time weather and climatic data specifically geared towards agricultural users to increase irrigation efficiency and reduce water use. FARMS provides \$100,000 annually to UF/IFAS to support weather station operation, maintenance, and service enhancements, as well as outreach and education within the District. As of the end of FY 2016, there were 13 FAWN stations in operation within the District. Additional information about FAWN can be found on their website at <http://fawn.ifas.ufl.edu/>.

FARMS PROGRAM SUMMARY AND BOARD APPROVED PROJECTS

Program Summary

Through FY 2016, there are 182 Board approved FARMS projects projected to offset 27 mgd of groundwater withdrawals. The actual groundwater offset of the 164 operational FARMS projects is currently 21 mgd.

Most of the crop types typically grown in the District are represented by FARMS projects, with citrus groves being the largest single category in the number of project sites. Tomatoes, blueberries, strawberries and other row crop vegetables are also grown on a significant number of project sites.

Continued funding support for the FARMS Program is a key element to its future success. The FARMS Program's annual budget is based upon ad valorem taxes levied by the District. Funds received are approved and appropriated on an annual basis, with no guarantee of availability beyond each fiscal year.

Through FY 2016, the total FARMS expenditures for the 182 Board approved FARMS projects is \$63.1 million, with \$26.6 million (42 percent) coming from the District's FARMS budget, \$27.9 million (44 percent) from participating agricultural producers/growers, and \$8.5 million (14 percent) coming from other sources such as state appropriations and FDACS. The average cost benefit of these projects is \$2.23 per thousand gallons offset. Table 1 below provides a complete summary of the funding distribution for FARMS projects through FY 2016. It should be noted that two large projects were funded by the District's Surface Water Exchange Program, a precursor to the FARMS Program being approved in FY 2003, and are now tracked in the FARMS Program database.

Table 1. FARMS Program Funds Expended through FY2016

Funding Year	District	State Appropriations	FDACS	Producer/Grower	Total
FY2000*	\$244,487	\$0	\$0	\$352,743	\$597,230
FY2003*	\$1,569,300	\$0	\$0	\$2,567,747	\$4,137,047
FY2003	\$0	\$146,544	\$559,927	\$373,699	\$1,080,170
FY2004	\$73,239	\$184,436	\$400,000	\$488,043	\$1,145,718
FY2005	\$58,296	\$512,946	\$0	\$399,283	\$970,525
FY2006	\$669,550	\$823,729	\$43,414	\$925,216	\$2,461,909
FY2007	\$632,207	\$865,371	\$0	\$1,079,598	\$2,577,176
FY2008	\$1,181,599	\$1,225,532	\$0	\$1,745,500	\$4,152,631
FY2009	\$981,154	\$1,074,130	\$0	\$2,203,848	\$4,259,132
FY2010	\$550,139	\$588,731	\$0	\$1,162,431	\$2,301,301
FY2011	\$4,290,677	\$655,529	\$0	\$3,941,051	\$8,887,257
FY2012	\$5,970,377	\$351,074	\$0	\$4,386,610	\$10,708,061
FY2013	\$2,387,397	\$374,378	\$176,785	\$2,852,816	\$5,791,376
FY2014	\$2,831,466	\$505,708	\$0	\$1,854,691	\$5,191,865
FY2015	\$2,294,114	\$16,335	\$0	\$1,811,900	\$4,122,349
FY2016	\$2,900,852	\$0	\$0	\$1,818,230	\$4,719,082
TOTAL	\$26,634,854	\$7,324,443	\$1,180,126	\$27,963,406	\$63,102,829

*These two rows represent Surface Water Exchange Projects funded prior to the creation of the FARMS Program. Both projects are managed by FARMS staff and tracked with FARMS projects.

Board Approved FARMS Projects for FY 2015 and FY 2016

During FY 2015 and FY 2016, (October 1, 2014 through September 30, 2016) a total of 22 new FARMS projects and 1 amendment (including phase additions to projects approved in previous years) were Board approved and are now in various stages of development (Figure 13). The budgeted total expenditures (District and producer costs) for these projects is \$9 million with a projected total reimbursement of \$5.8 million. With a projected groundwater offset of 1.76 mgd, the average cost-benefit of these projects is \$2.93 per thousand gallons offset. Table 2 lists each project approved during FY 2015 and FY 2016, including the current status, approved reimbursement amount, and projected groundwater offset.

Table 2. Board Approved FARMS Projects in FY 2015 and FY 2016

FARMS Project No. & Name	Project Type	Project Status (Jan. 2017)	Priority Area	District Share Reimbursement	Total Project Cost	Cost-Share Percentage	Projected GW Offset (GPD)
*H698-Duggal Farm Amendment	AWS-AAD	Operational	SWUCA	\$41,628	\$83,979	50%	40,000
H713-Premier Citrus, LLC - Sun Pure Groves	AWS-AAD	Operational	SWUCA	\$796,350	\$1,062,000	73%	164,000
H714-Orange-Co, LP JWCD Pump Automation	Electronics	Operational	SPJC	\$196,200	\$287,000	68%	69,500
H716-Stardust Ranch, LLC	AWS-AAD	Construction	North	\$111,000	\$194,200	57%	61,000
**H717-Mathis Land Group, LLC - Colson Road	AWS-AAD + FFP	Operational	DPCWUCA	\$82,500	\$110,000	75%	9,600
H720-Premier Citrus - County Line Grove	AWS-AAD	Operational	SPJC	\$439,900	\$660,000	67%	140,000
H721-Premier Citrus - Bay Grove	AWS-AAD	Operational	SPJC	\$355,600	\$497,000	72%	78,000
H722-Varner Groves	AWS-AAD	Operational	SPJC	\$161,600	\$452,600	36%	108,000
H723-Windmill Farms - Phase 2	AWS-AAD	Operational	SWUCA	\$205,400	\$410,800	50%	43,000
H725-Dean Evans Phase 2	AWS-AAD	Operational	North	\$18,000	\$36,000	50%	6,000
H726-Alico - Crossing Grove	Electronics	Operational	SPJC	\$84,600	\$130,000	65%	26,000
H727-Wayne Moss - Halls Branch Farm	AWS-AAD	Operational	SWUCA	\$200,100	\$400,200	50%	82,000
H728-4F LLC Gator Farm	AWS-AAD	Construction	SWUCA	\$150,000	\$200,000	75%	40,000
H729-Alico - Polk County	Electronics	Operational	SWUCA	\$54,800	\$109,600	50%	19,800
H730-Tamiami Citrus - 64 Grove	AWS-AAD Electronics	Construction	SWUCA	\$655,000	\$1,310,000	50%	180,000
H733-Madmac Property Holdings, LLC	Electronics	Construction	DPCWUCA	\$10,556	\$21,112	50%	10,675
H735-BH Griffin - C&S Grove - Phase 2	AWS-AAD	Construction	SPJC	\$617,390	\$823,186	75%	350,000
H736-M & B Products, Inc.	Nutrient Reduction	Operational	North	\$247,596	\$330,128	75%	N/A
H737-FLM, Inc.- Blossom Grove Phase 4	AWS-AAD	Construction	SWUCA	\$426,282	\$707,132	60%	125,000
H738-M&V, LLC	AWS-AAD	Construction	SPJC	\$545,200	\$726,933	75%	98,825
H739-Chapman Family Partnership - Phase 2	AWS-AAD	Operational	SPJC	\$113,250	\$151,000	75%	40,000
H740-Ocean Breeze Properties, LLC	Electronics + Irrigation Conversion	Operational	SWUCA	\$32,064	\$42,752	75%	10,233
H742-Hinton Family LLC	AWS-AAD	Construction	SWUCA	\$252,897	\$337,196	75%	57,700
TOTALS				\$5,797,913	\$9,082,818	63%	1,759,333

*For amendments, the reimbursement is the contract portion funded during the specified fiscal year.

**Offset quantities for DPCWUCA Frost/Freeze Protection projects include AAD and FFP annualized equivalents.

Program Focus for FY 2017 and FY 2018

FARMS staff intend to continue building on relationships developed within the agricultural community to promote the program and accomplish its goals within each priority area. An increased focus will continue to be placed on funding projects within the MIA and first magnitude springsheds in the Northern District. Expansion of the Mini-FARMS Program by increasing the cap from \$5,000 to \$8,000 per project in FY 2018 will assist in maximizing the conservation potential of agricultural operations within the CFWI.

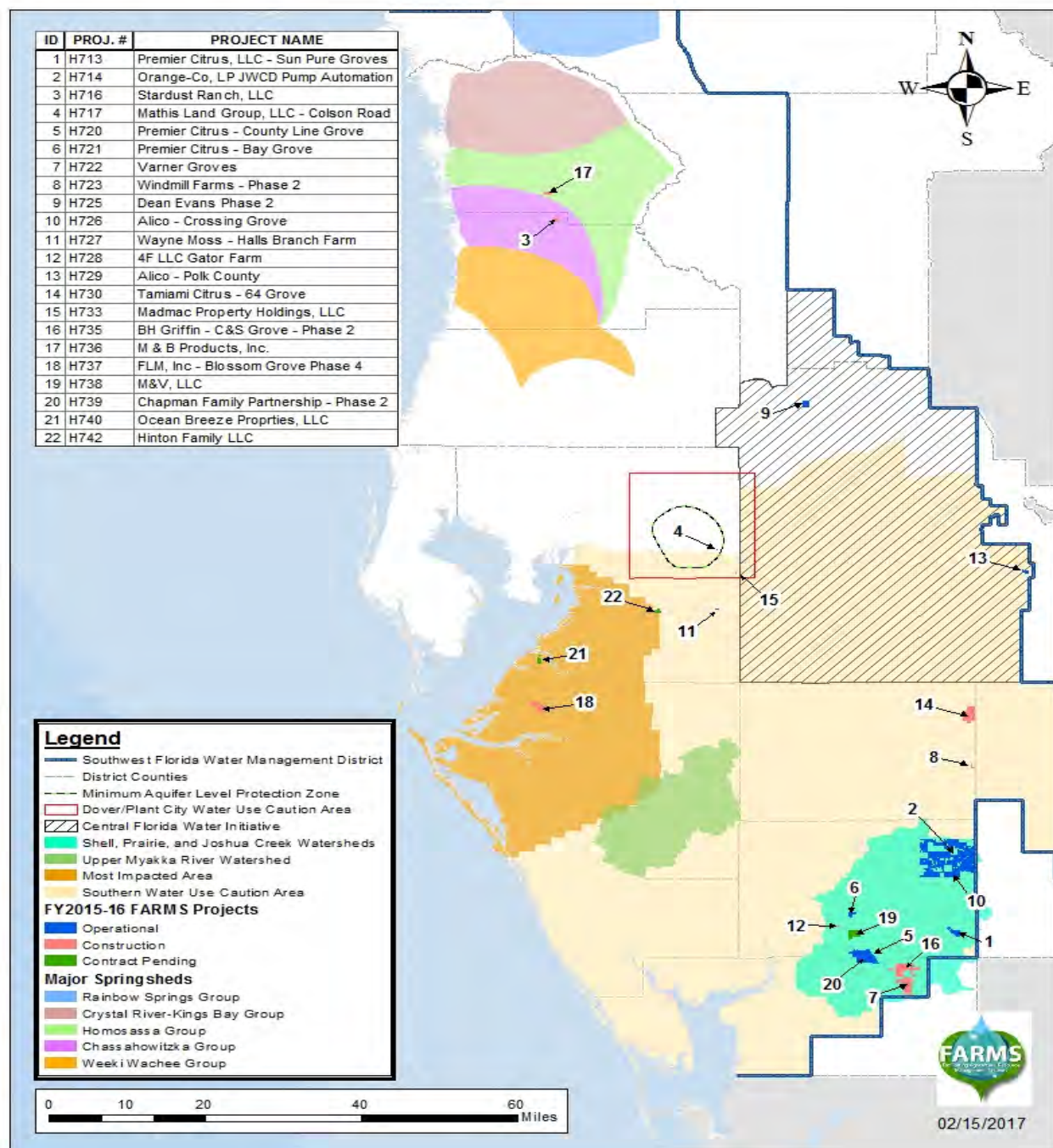


Figure 13. Board approved FARMS projects for FY 2015 and FY 2016

*Duggal Amendment is not included in this map.

ADDITIONAL RESOURCES

Websites:

www.watermatters.org/agriculture/farms/

www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy

research.ifas.ufl.edu

fawn.ifas.ufl.edu

www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/newsroom/features/?cid=stelprdb1193811

Literature:

Balmoral Group, *Florida Statewide Agricultural Irrigation Demand (FSAID) 2016 Water Use Estimates - DRAFT*, April 2016.

Balmoral Group, *Model FARMS Economic Study- Final Report*, March 2016.

Florida Department of Agriculture and Consumer Services, *Water Quality/Quantity Best Management Practices for Florida: Citrus (2012); Cow/Calf (2008), Dairy (2015), and Equine (2011) Operations; Nurseries (April 2014); Sod (2008); Specialty Food and Nut Crops (2011); and Vegetable and Agronomic Crops (2015).*

Florida Department of Agriculture and Consumer Services, *Office of Agricultural Water Policy 2012-15 Strategic Plan*, March 2012.

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Southwest Florida Water Management District, *Back-Plugging Program Bi-Annual Status Report*, November 2015.

Southwest Florida Water Management District, *Regional Water Supply Plan*, November 2015.

Southwest Florida Water Management District, *Southern Water Use Caution Area Recovery Strategy*, March 2006.

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Southwest Florida Water Management District, *2015-19 Strategic Plan*, Updated October 2016.

United States Department of Agriculture, Natural Resources Conservation Services, and Florida Department of Agriculture and Consumer Services, *Mobile Irrigation Lab Handbook*, January 2015.

