FARMS
Facilitating Agricultural Resource Management Systems

Sustaining Agriculture and Water Resources










Facilitating Agricultural Resource Management Systems (FARMS) Program

Fiscal Year 2017-18 Biennial Report

Southwest Florida
Water Management District

Southwest Florida Water Management District

Facilitating **A**gricultural **R**esource **M**anagement **S**ystems (FARMS) Program

Fiscal Years 2017-18 Biennial Report

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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) 2018 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.**

The FARMS Program had 27 new projects and 2 amendments approved for FY 2017 and FY 2018. The projected offset from these projects is 2.2 mgd. The District will contribute $6,356,707, 63 percent of the $10,066,757 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 March 11, 2019, there were 5,427 permitted agricultural entities in the District with a combined permitted annual average daily groundwater quantity of 760,011,836 gallons per day (gpd).

From the inception of the FARMS Program in FY 2003 through FY 2018, the total projected groundwater offset for the 203 Board approved FARMS projects is 28.5 mgd at an overall average cost-benefit of $2.33 per thousand gallons offset. Total expenditures for these projects are $72.2 million, with $31.6 million (44 percent) coming from the District's FARMS Program, $32.1 million (44 percent) from participating agricultural producers/growers, and $8.5 million (12 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 2018. Figure 2 shows the location of priority areas and all FARMS projects through FY 2018.

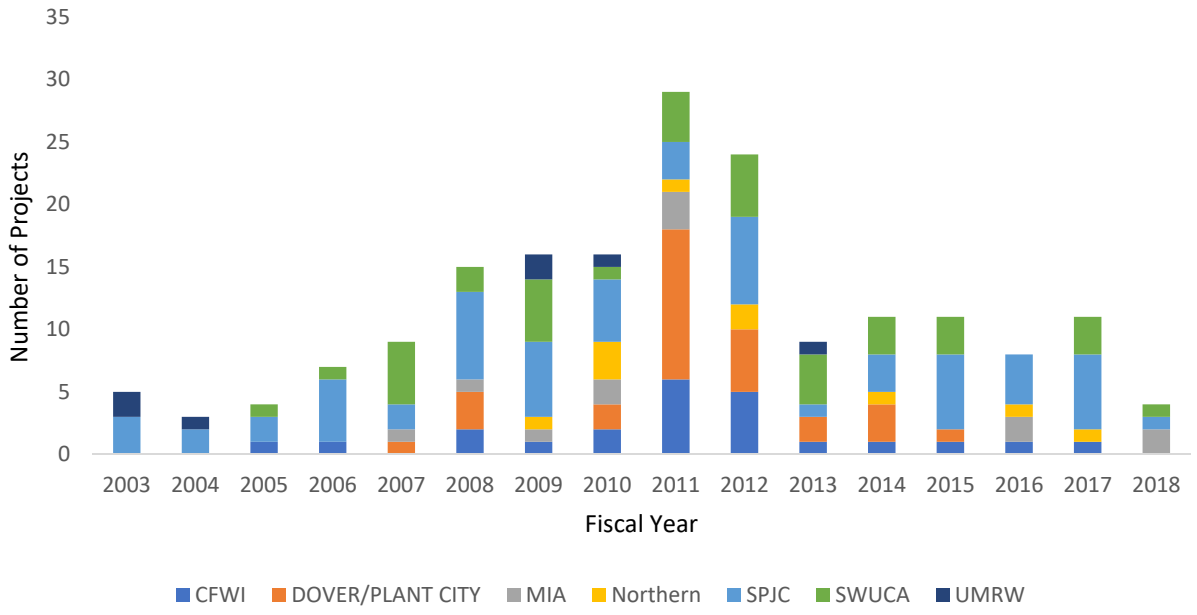


Figure 1. FARMS Program project totals by priority area per Fiscal Year.

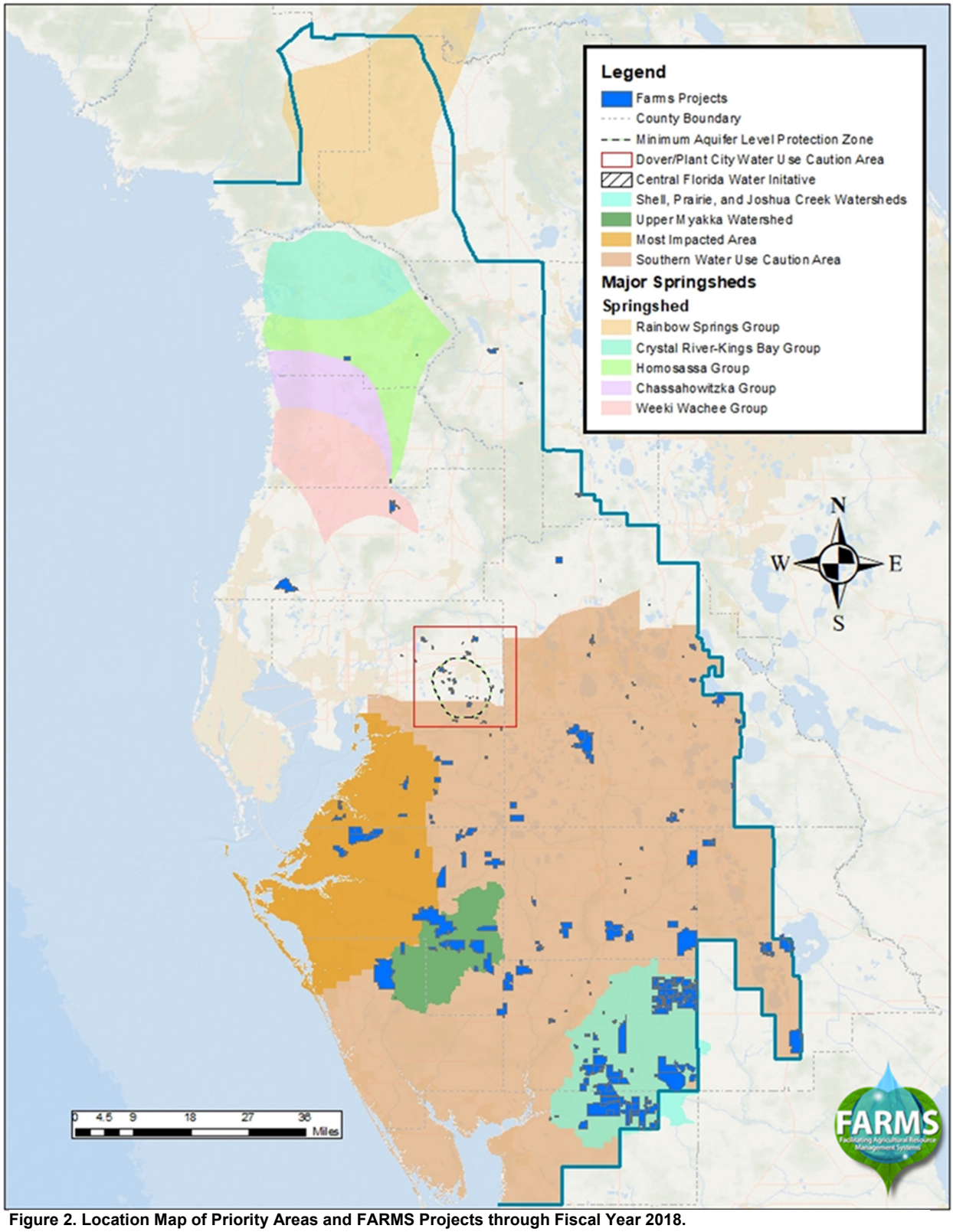


Figure 2. Location Map of Priority Areas and FARMS Projects through Fiscal Year 2018.

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, 70 projects have been approved and 65 are operational having an offset 9.6 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.

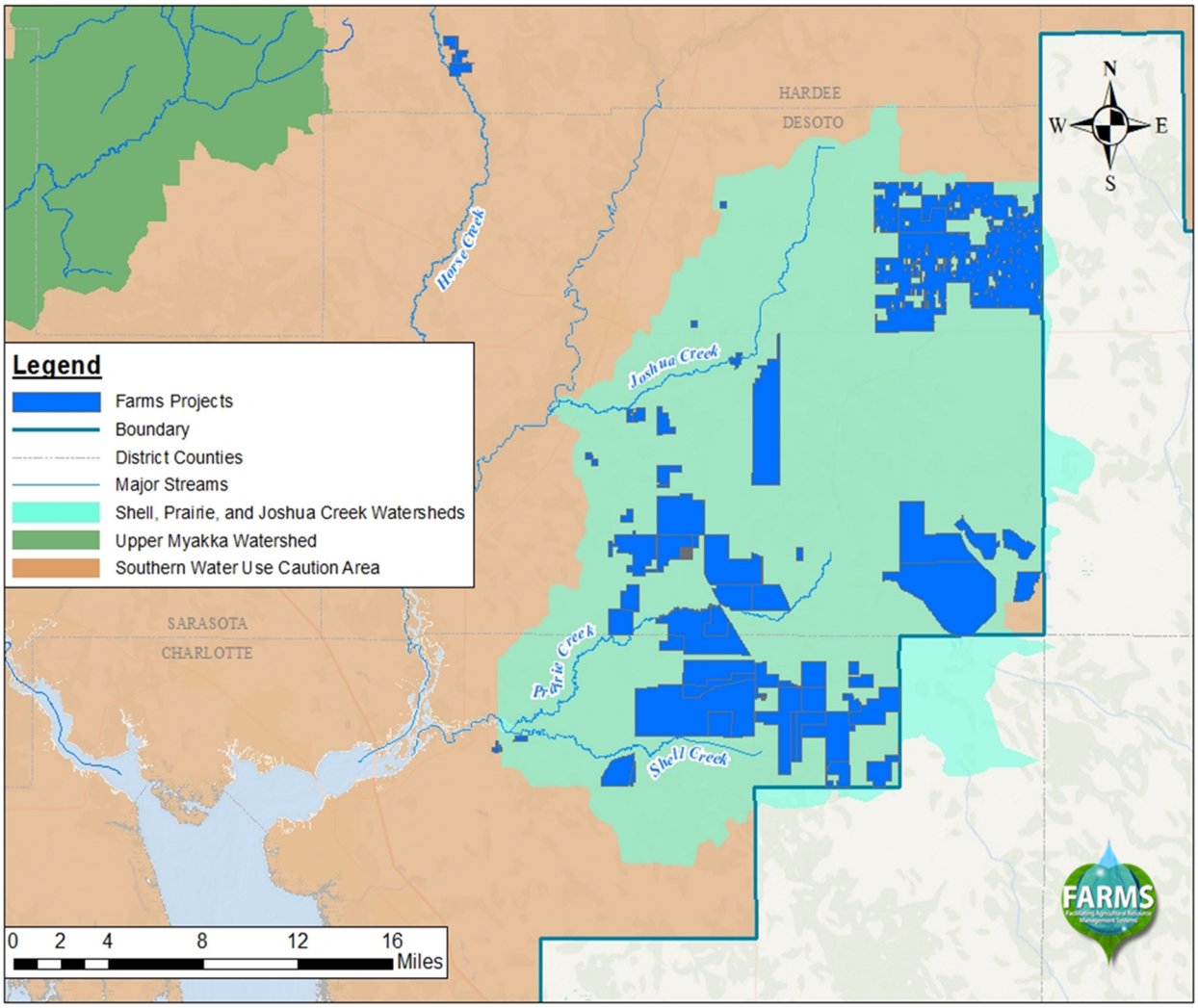


Figure 3. FARMS projects within the Shell, Prairie and Joshua Creek watersheds through Fiscal Year 2018.

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 2.9 mgd.

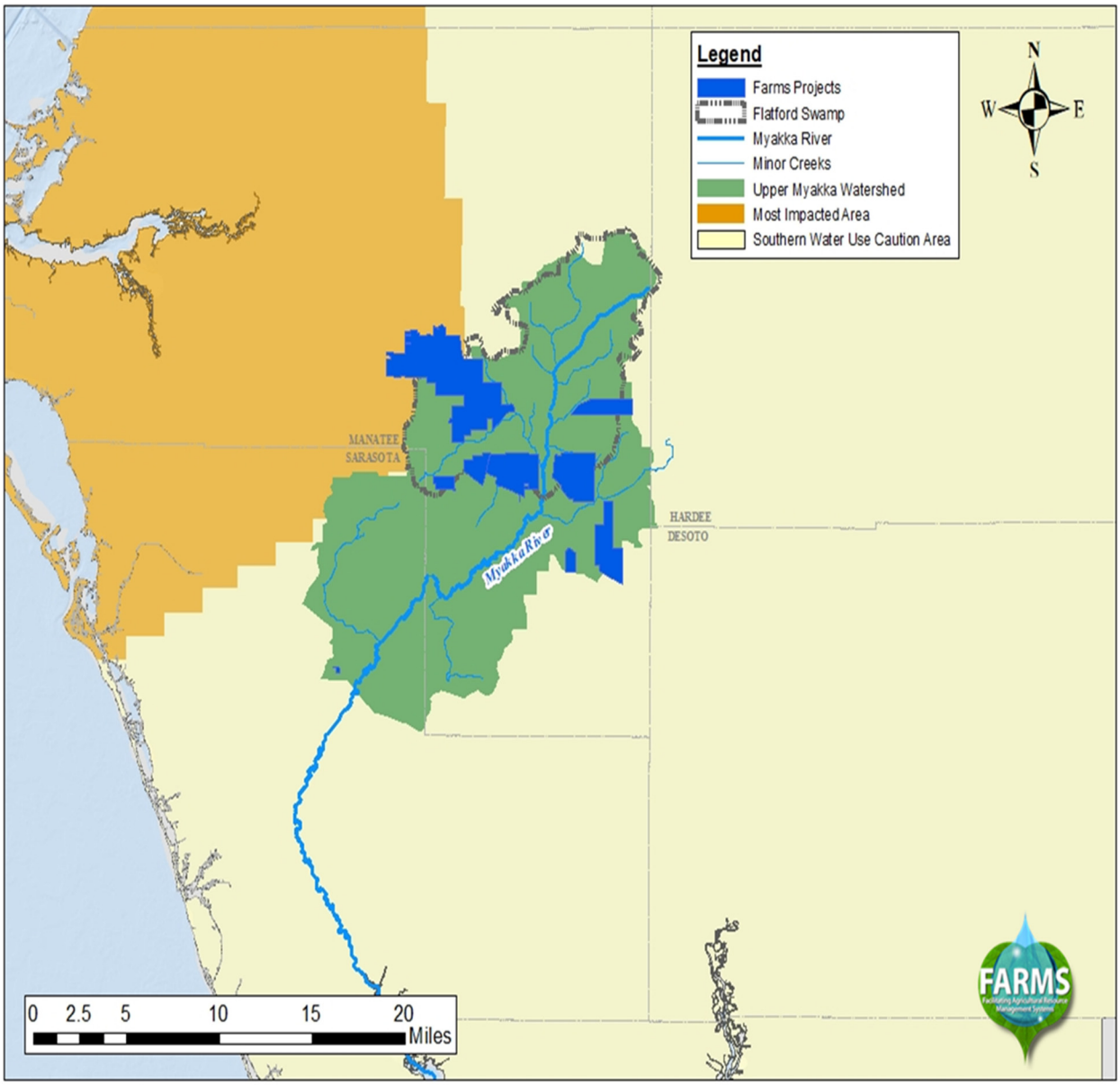


Figure 4. FARMS projects within the Upper Myakka River Watershed through Fiscal Year 2018.

Southern Water Use Caution Area, Central Florida Water Initiative and Most Impacted Area (SWUCA, CFWI 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, 160 projects have been approved and 152 are operational having an offset 20.2 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, 18 projects have been approved and 17 are operational having offset 2.6 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, 25 projects have been approved and 24 are operational, with projects having offset 1.0 mgd.

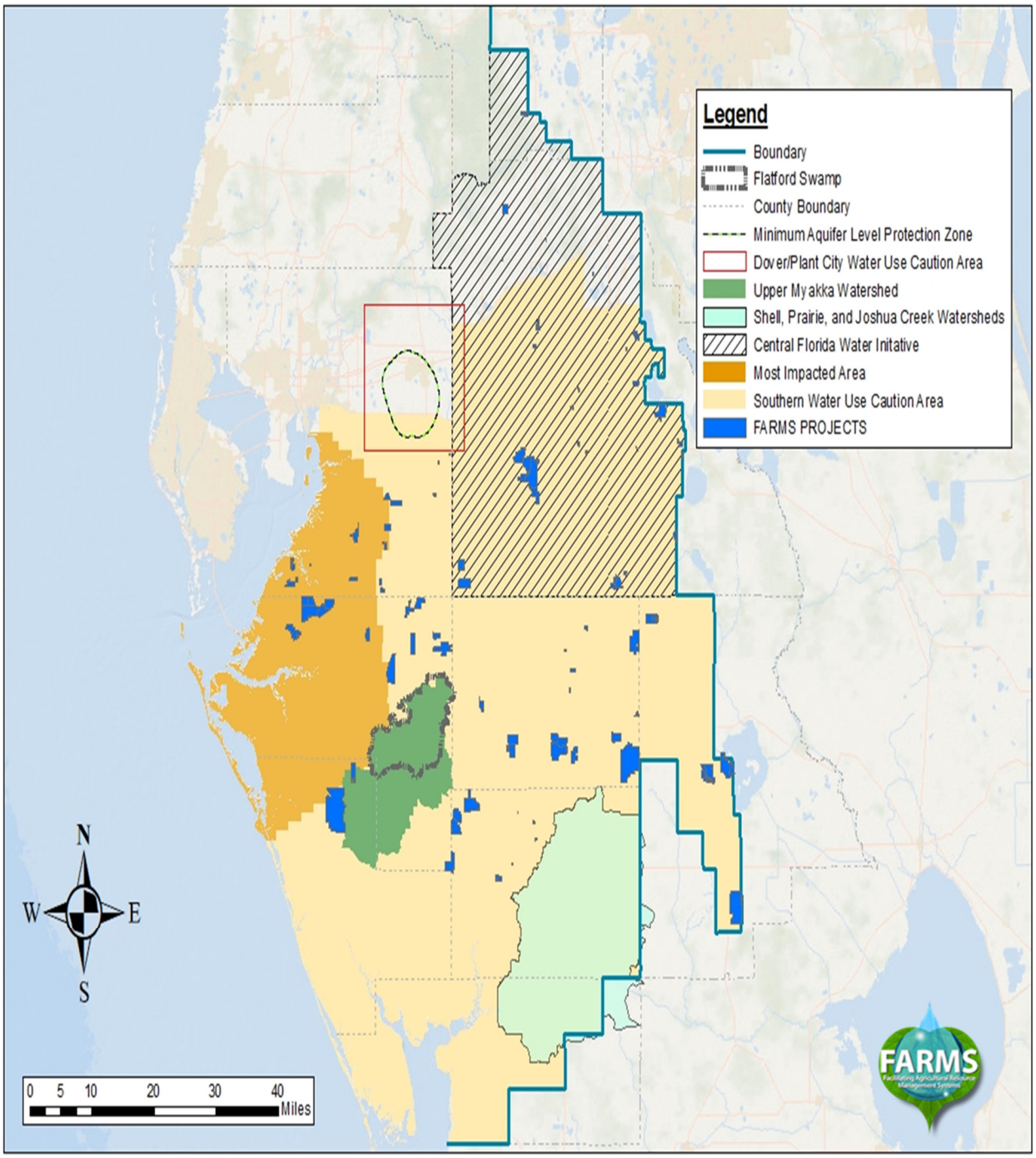
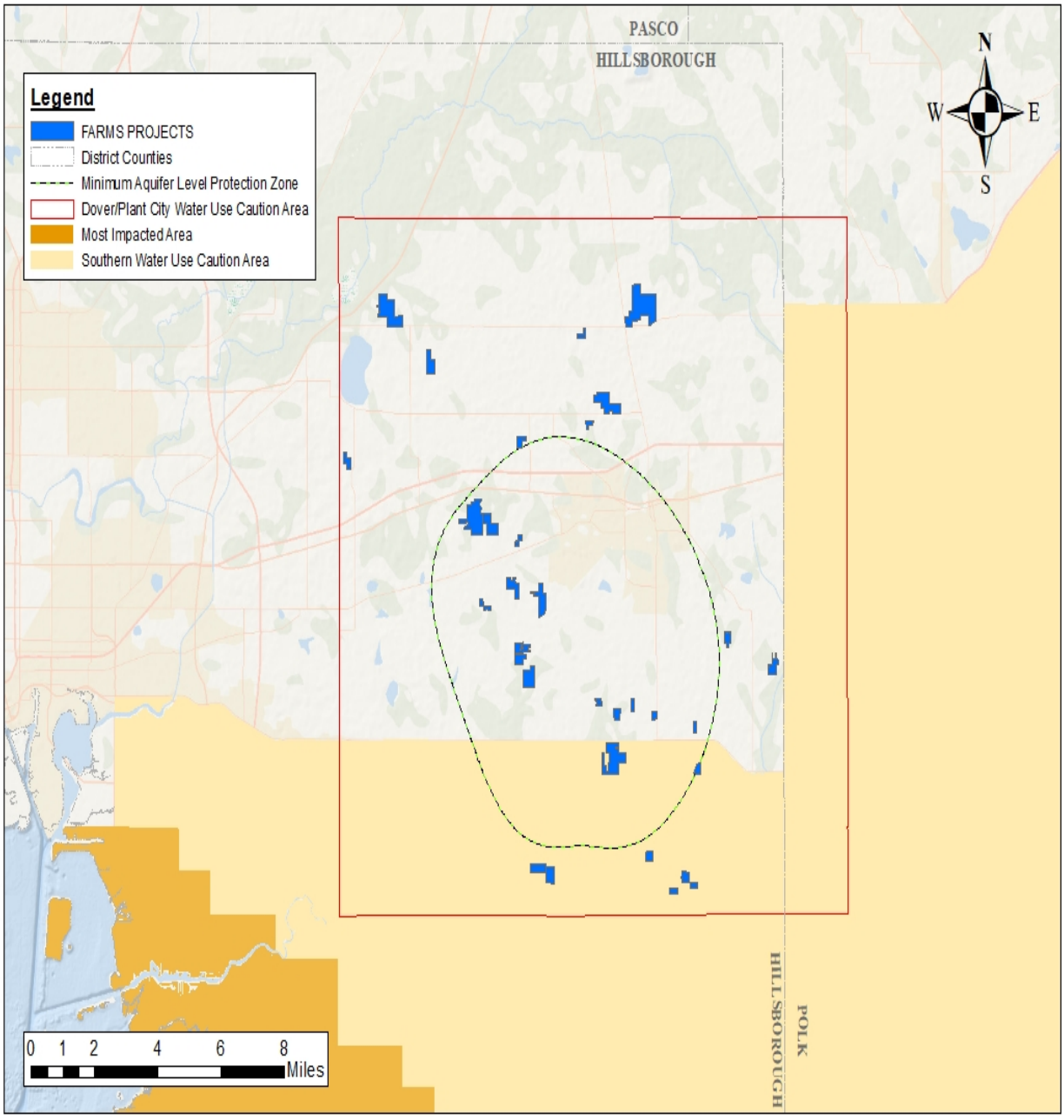


Figure 5. FARMS projects within the SWUCA, MIA, and CFWI through Fiscal Year 2018.

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%. Since December 2010 there have been 41 nights where the air temperature or wet bulb temperature has fallen below 34 degrees, FARMS uses the Dover FAWN station data to benchmark a cold protection event. To date, 31 FFP projects have been approved and 30 are operational. These projects are projected to offset 38.5 million gallons per cold protection event. FARMS analysis estimates that these projects have actually saved 39.6 mgd per event.



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, 11 projects have been approved with an offset of 0.28 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.

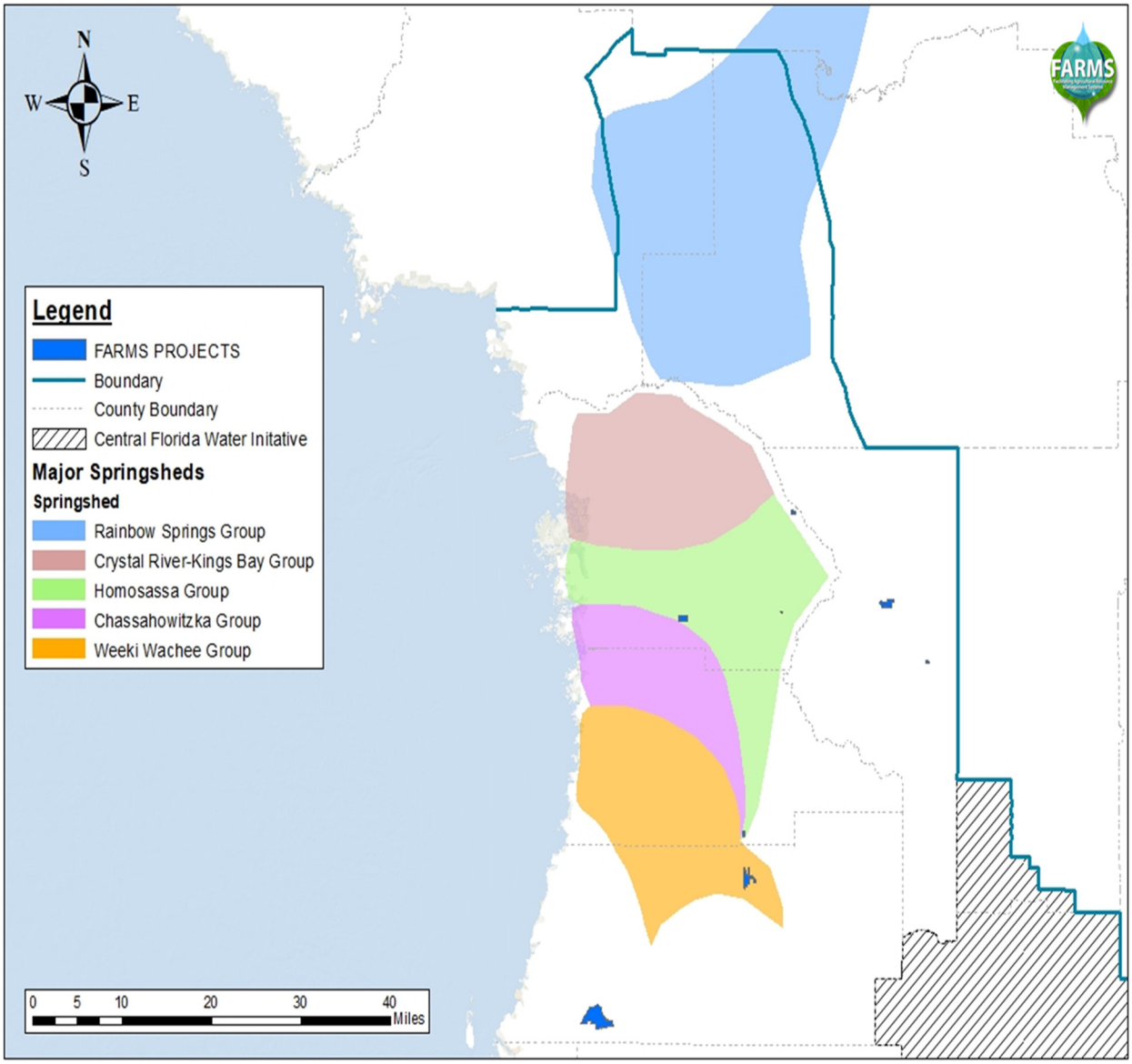


Figure 7. FARMS projects within the Northern District (Springs Coast) through Fiscal Year 2018.

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 compared to normal groundwater 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 a typical layout of an AWS project. Project H764 involved the construction of a four acre reservoir to capture and re-use irrigation tailwater on a 158-acre turf grass sod and citrus operation. The projected groundwater offset is an estimated 142,000 gpd. There were 19 AWS projects approved from FY 2017 through FY 2018, with a total contracted reimbursement of $5,689,498.

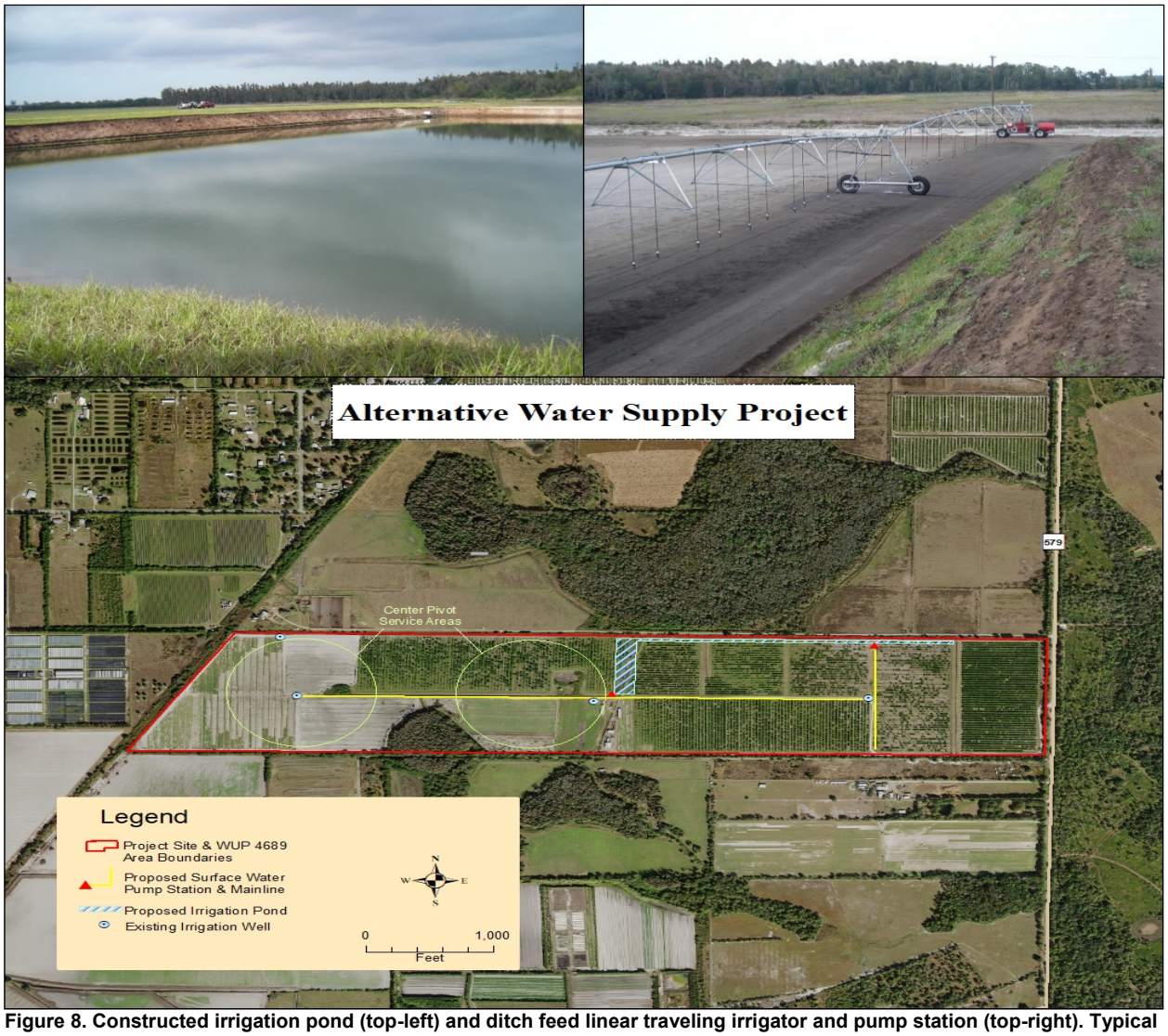


Figure 8. Constructed irrigation pond (top-left) and ditch feed linear traveling irrigator and pump station (top-right). Typical layout of a tailwater recovery reservoir AWS project (bottom).

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. 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.

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 often included in AWS projects to absorb the rising costs involved with automating irrigation systems. 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

FARMS Project H753 is an example of a precision irrigation project (Figure 9). This project consisted of three citrus groves properties totaling 2,229 acres and 18 irrigation pump stations that were equipped with auto-stop controls for automatic or remotely activated shutdown. The groundwater offset is estimated to be 43,000 gpd.

There were 9 precision irrigation projects approved from FY 2017 through FY 2018, with a total contracted reimbursement of $414,698.

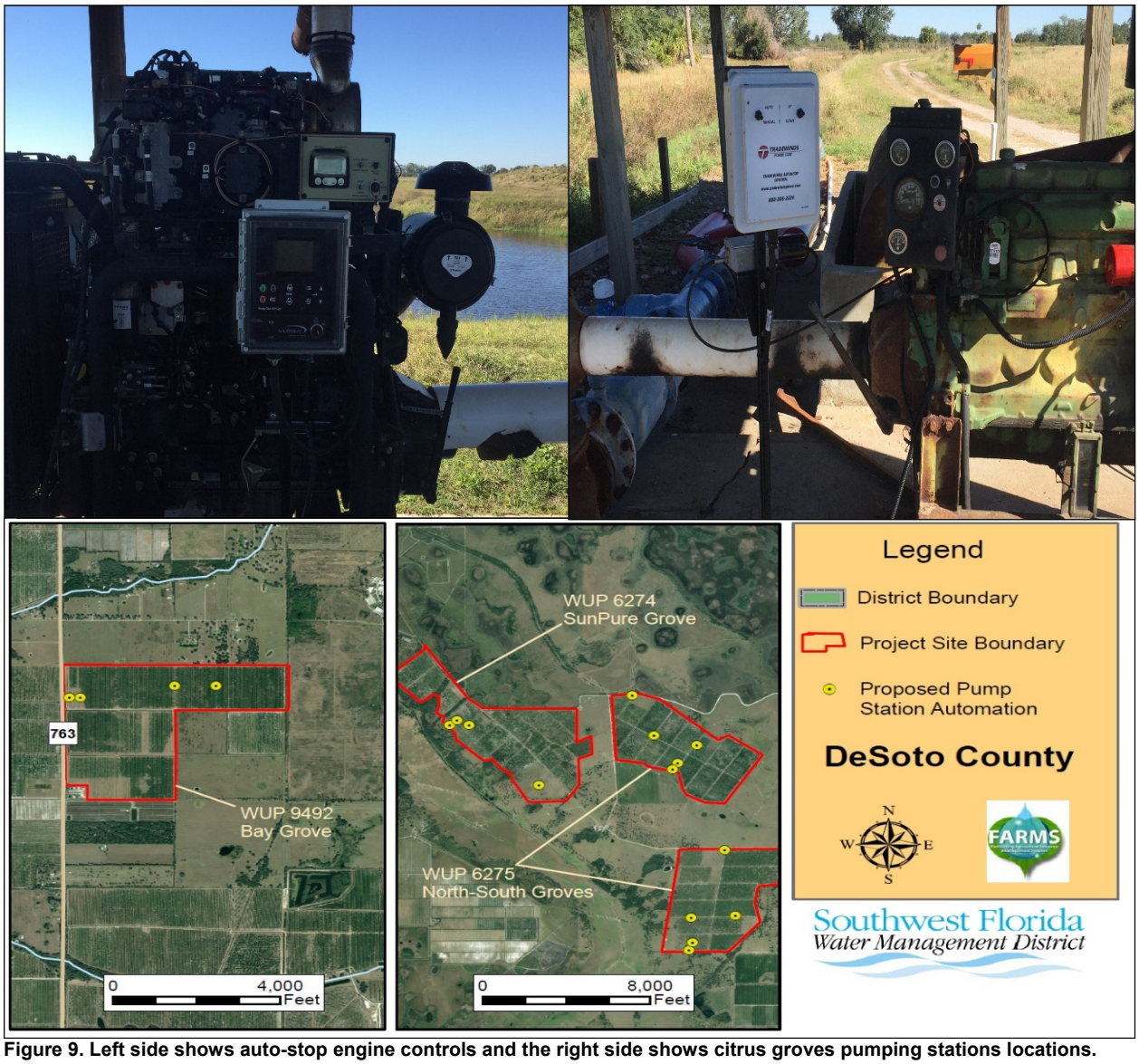


Figure 9. Left side shows auto-stop engine controls and the right side shows citrus groves pumping stations locations.

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. Three primary groundwater conservation BMPs that function as FFP alternatives are eligible for cost-share: surface water reservoirs, row covers and wind machines.

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 Alternative Water Supply (AWS) – Tailwater Recovery and Surface Water Reservoirs, row cover material, and wind machines, and hardware items necessary for the use of row covers or operation of wind machines.

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) 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. During the 2017 and 2018 fiscal years the duration of cold events, as measured at the Dover FAWN station was 11 hours over 2 nights and 53 hours over five nights, respectively.

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. Combining the 2017 cold events, there was the potential for the grower to use 2.15 million gallons of groundwater. The grower used only 0.08 million gallons – saving 96% of the cold protection quantities they would have used without the crop cloth. For the 2018 cold season there was the potential for the grower to use 10.3 million gallons. Their actual use was 1.25 million gallons saving 88% of cold protection quantities they would have used without crop cloth.

FARMS Project H618 is a 20-acre blueberry farm that installed two wind machines as an alternative to groundwater for cold protection (Figure 11). Combining the 2017 cold events, there was the potential for the grower to use 1.12 million gallons. The grower used only 0.13 gallons –

saving 87.6% of the cold protection quantities they would have used without the wind machines. For the 2018 cold season there was the potential for the grower to use 5.4 million gallons. Their actual use was 4.7 million gallons saving only 13% of cold protection quantities they would have used. The reasons for the differences dependent on the types of cold events each evening. A wind machine is most effective during a still night with a temperature inversion. It's not nearly as effective on a windy night.

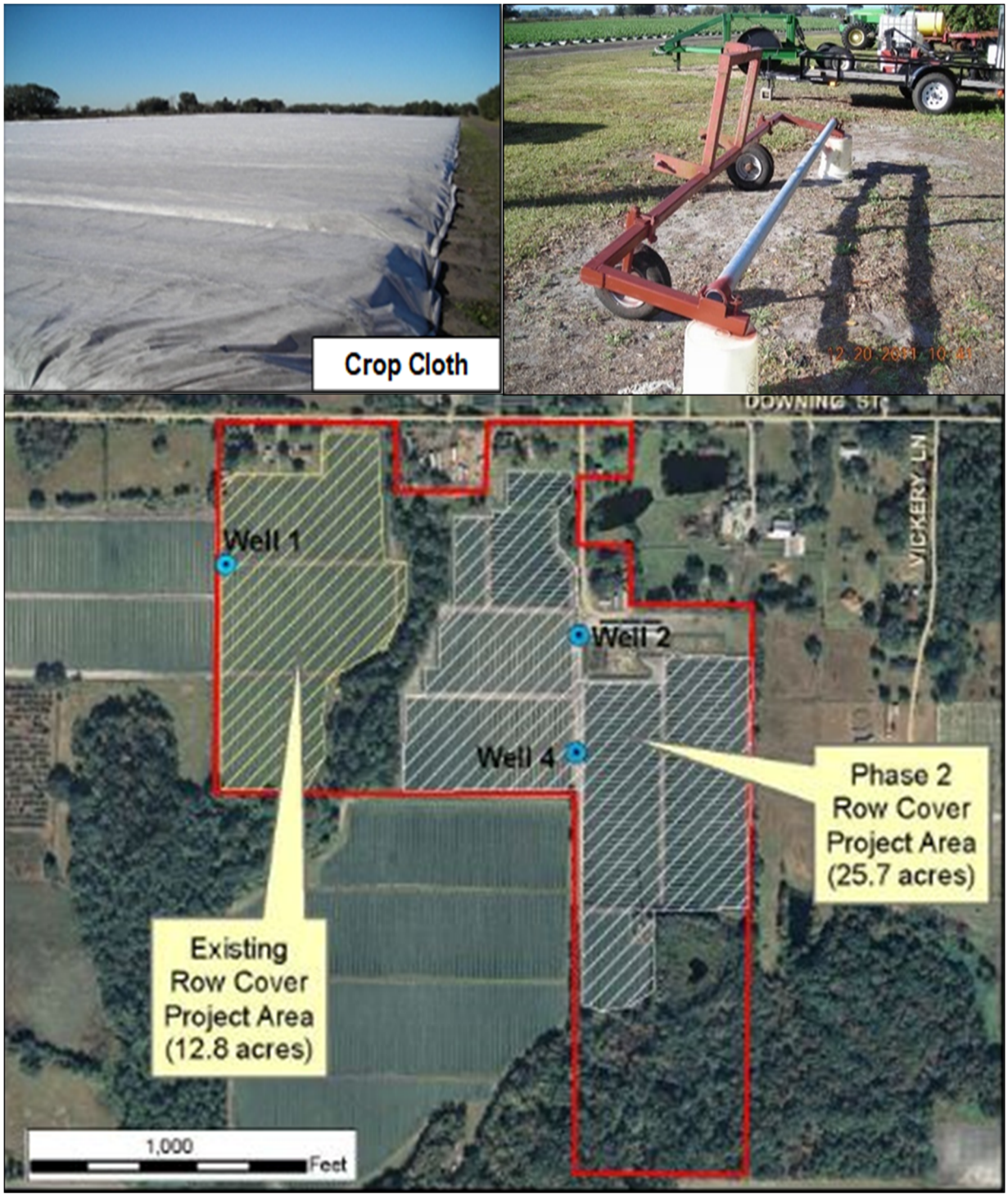


Figure 10. Deployed crop cloth (row cover) on a strawberry field (*top-left*) and a roller typically used to deploy crop cloth during a frost/freeze event (*top-right*). Typical layout of a crop cloth FFP project (*bottom*).

There were three projects approved during FY 2017 and FY 2018 with FFP components. All three used an AWS to provide cold protection water. Only one was within the Dover Plant City WUCA. The three projects had a total contracted reimbursement of $616,546.

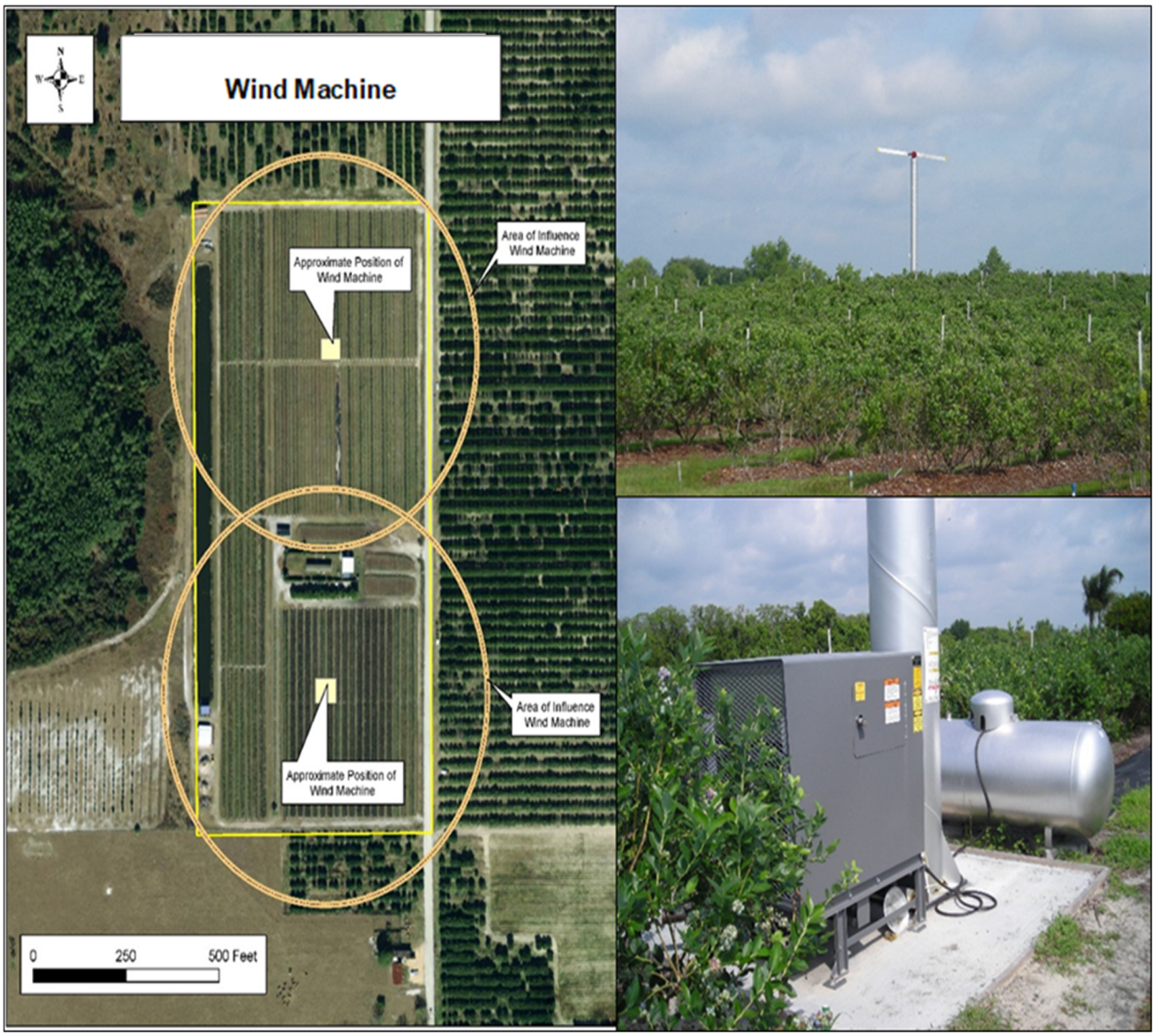


Figure 11. Typical layout of a wind machine FFP project (left). Wind machine installed in a blueberry field (top-right) and typical wind machine power unit setup (bottom-right).

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 focused 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 project in 2015. Project H751 was approved in March 2017. It is a pilot program funded by FARMS in conjunction with FDACS. The program is located in Marion County and involves the construction of manure storage facilities on commercial equine operations for the processing of manure composting. Proper manure storage and composting reduces the potential for nitrogen to leach into the underlying aquifer.

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.

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 new project approved from FY 2017 through FY 2018. This project is jointly funded with the District and FDACS ($100,000 each) to implement nutrient reduction BMPs within the Rainbow River springshed in Marion County. The project is estimated to reduce nutrient loading by up to 3,500 lbs/year.

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).

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 $8,000 per project. There were 41 Mini-FARMS projects approved in FY 2017 and FY 2018, with a total reimbursement of $179,571. From the program's inception through FY 2018, 159 Mini-FARMS projects have been approved with a total reimbursement of $616,237.

Well Back-Plugging Program

The Back-Plugging Initiative provides funding assistance for property owners to investigate, "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. Five irrigation wells were back-plugged in FY 2017 and FY 2018. From the initiation of the District's Well Back-Plugging Program in 2002 through FY 2018, a total of 85 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

The District provides annual funding to the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS) primarily for research projects involving water use conservation through agricultural best management practices and public supply conservation. From FY2005 through FY2018, the District has provided a total of $9.46 million in funding toward 50 IFAS research projects. In FY2017 and FY2018, the District provided $1.08 million in funding toward 10 research projects. 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. 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 42 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 2018, there were 12 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 2018, there are 203 Board approved FARMS projects projected to offset 28.5 mgd of groundwater withdrawals. The actual groundwater offset of the 193 operational FARMS projects is currently 21.5 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 2018, the total FARMS expenditures for the 203 Board approved FARMS projects is $72.2 million, with $31.6 million (44 percent) coming from the District's FARMS budget, $32.1 million (44 percent) from participating agricultural producers/growers, and $8.5 million (12 percent) coming from other sources such as state appropriations and FDACS. The average cost benefit of these projects is $2.33 per thousand gallons offset. Table 1 below provides a complete summary of the funding distribution for FARMS projects through FY 2018. 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 FY2018.

Funding Year	District	State Appropriations	FDACS	Cooperator/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	$820,729	$43,414	$928,216	$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	$1,159,431	$2,298,301
FY2011	$4,166,093	$655,529	$0	$4,065,635	$8,887,257
FY2012	$5,714,072	$351,074	$0	$4,402,349	$10,467,495
FY2013	$2,387,397	$374,378	$176,785	$2,852,816	$5,791,376
FY2014	$2,778,085	$505,708	$0	$1,909,113	$5,192,906
FY2015	$2,294,114	$16,335	$0	$1,811,900	$4,122,349
FY2016	$2,744,004	$0	$0	$1,821,480	$4,565,484
FY2017	$2,905,662	$0	$0	$1,783,205	$4,688,867
FY2018	$2,628,009	$0	$0	$2,147,207	$4,775,216
TOTAL	$31,577,407	$7,321,443	$1,180,126	$32,091,813	$72,170,789

*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 2017 and FY 2018

During FY 2017 and FY 2018, (October 1, 2016 through September 30, 2018) a total of 27 new FARMS projects and 2 amendments (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 $10,066,757 with a projected total reimbursement of $6,356,707. With a projected groundwater offset of 2.2 mgd, the average cost-benefit of these projects is $2.73 per thousand gallons offset. Table2 lists each project approved during FY 2017 and FY 2018, including the current status, approved reimbursement amount, and projected groundwater offset.

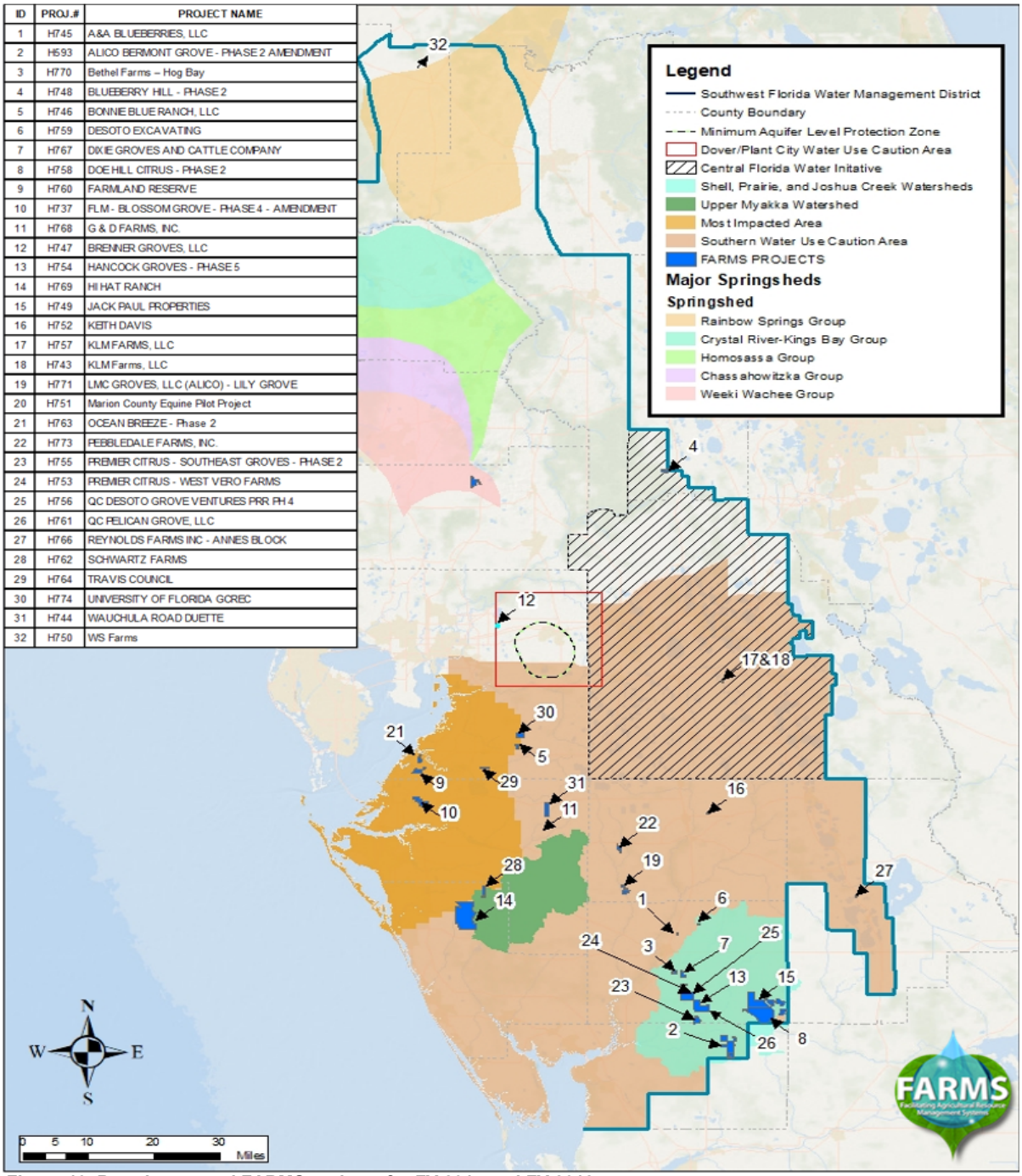
Table 2. Board Approved FARMS Projects in FY 2017 and FY 2018.

FARMS Project No. & Name	Project Type	Project Status (May. 2019)	Priority Area	District Share Reimbursement	Total Project Cost	Cost-Share Percentage	Projected GW Offset (GPD)
H745-A&A BLUEBERRIES, LLC	Electronics	Operational	SWUCA	$34,754	$69,508	50%	20,430
H748-BLUEBERRY HILL - PHASE 2	AWS - AAD+FFP	Operational	CFWI	$262,651	$420,786	62%	50,000
H755-PREMIER CITRUS - SOUTHEAST GROVES - PHASE 2	Electronics	Operational	SPJC	$8,400	$11,200	75%	12,000
H753-PREMIER CITRUS - WEST VERO FARMS	Electronics	Operational	SPJC	$34,500	$46,000	75%	43,000
H756-QC DESOTO GROVE VENTURES PRR PH 4	AWS - AAD	Operational	SPJC	$436,448	$581,930	75%	100,000
H754-HANCOCK GROVES - PHASE 5	Electronics	Construction	SPJC	$21,450	$28,600	75%	35,000
H760-FARMLAND RESERVE	AWS - AAD	Construction	MIA	$196,300	$266,300	74%	55,000
H758-DOE HILL CITRUS - PHASE 2	AWS - AAD	Construction	SPJC	$262,000	$552,000	47%	85,000
H749-JACK PAUL PROPERTIES	AWS - AAD	Operational	SPJC	$701,700	$939,300	75%	144,000
H752-KEITH DAVIS	AWS - AAD+FFP	Operational	SWUCA	$95,400	$212,939	45%	24,700
H593-ALICO BERMONT GROVE - PHASE 2 AMENDMENT	AWS - AAD	Operational	SPJC	$232,170	$309,560	75%	208,000
H746-BONNIE BLUE RANCH, LLC	AWS - AAD	Construction	MIA	$297,610	$477,210	62%	50,000
H762-SCHWARTZ FARMS	Electronics	Construction	MIA	$76,376	$101,385	75%	65,500
H744-WAUCHULA ROAD DUETTE	Electronics	Operational	SWUCA	$49,823	$99,646	50%	60,000
H747-BRENNER GROVES, LLC	AWS - AAD+FFP	Construction	DOVER/PLANT CITY	$258,495	$386,462	67%	13,000
H759-DESOTO EXCAVATING	AWS - AAD	Operational	SPJC	$200,000	$270,000	74%	36,000
H774-UNIVERSITY OF FLORIDA GCREC	Electronics	Contract Pending	MIA	$65,794	$87,725	75%	23,000
H773-PEBBLEDALE FARMS, INC.	AWS - AAD	Contract Pending	SWUCA	$553,799	$1,192,954	46%	183,000
H737-FLM - BLOSSOM GROVE - PHASE 4 - AMENDMENT	AWS - AAD	Operational	MIA	$177,237	$225,237	65%	197,500
H757-KLM FARMS, LLC	AWS - AAD	Construction	CFWI	$221,938	$295,917	75%	43,330
H761-QC PELICAN GROVE, LLC	AWS - AAD	Construction	SPJC	$560,000	$902,000	62%	160,000
H767-DIXIE GROVES AND CATTLE COMPANY	AWS - AAD	Operational	SPJC	$254,000	$467,000	54%	120,000
H766-REYNOLDS FARMS INC - ANNES BLOCK	AWS - AAD	Operational	SWUCA	$99,749	$133,379	75%	32,690
H771-734 LMC GROVES, LLC (ALICO) - LILY GROVE	Electronics	Contract Pending	SWUCA	$74,184	$104,389	71%	26,900
H764-TRAVIS COUNCIL	AWS - AAD	Operational	MIA	$576,600	$924,500	62%	142,000
H769-HI HAT RANCH	AWS - AAD	Construction	MIA	$111,739	$148,985	75%	110,000
H763-OCEAN BREEZE - PHASE 2	Irrig. Conversion	Construction	MIA	$79030	$105,372	75%	15,000
H768-G & D FARMS, INC.	Electronics	Cancelled	SWUCA	$49,417	$98,834	50%	44,500
H743 – KLM FARMS, LLC	Conservation	Cancelled	CFWI	$43,578	$87,156	50%	22,472
H750 – WS FARMS	Other	Cancelled	Springs Coast	$29,948	$39,931	50%	12,645
H751 MARION COUNTY EQUINE PILOT PROJECT	Nutrient Reduction	Construction	Springs Coast	$100,000	$200,000	50%	N/A
H770 BETHEL FARMS – HOG BAY	AWS-AAD	Operational	SPJC	$191,662	$280,552	68%	60,100
TOTALS				**$6,356,707**	**$10,066,757**		**2,195,767**

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

Program Focus for FY 2019 and FY 2020

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 SWUCA, CFWI 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.



ID	PROJ.#	PROJECT NAME
1	H745	A&A BLUEBERRIES, LLC
2	H593	ALICO BERMONT GROVE - PHASE 2 AMENDMENT
3	H770	Bethel Farms – Hog Bay
4	H748	BLUEBERRY HILL - PHASE 2
5	H746	BONNIE BLUE RANCH, LLC
6	H759	DESOTO EXCAVATING
7	H767	DIXIE GROVES AND CATTLE COMPANY
8	H758	DOE HILL CITRUS - PHASE 2
9	H760	FARMLAND RESERVE
10	H737	FLM - BLOSSOM GROVE - PHASE 4 - AMENDMENT
11	H768	G & D FARMS, INC.
12	H747	BRENNER GROVES, LLC
13	H754	HANCOCK GROVES - PHASE 5
14	H769	HI HAT RANCH
15	H749	JACK PAUL PROPERTIES
16	H752	KEITH DAVIS
17	H757	KLM FARMS, LLC
18	H743	KLM Farms, LLC
19	H771	LMC GROVES, LLC (ALICO) - LILY GROVE
20	H751	Marion County Equine Pilot Project
21	H763	OCEAN BREEZE - Phase 2
22	H773	PEBBLEDALE FARMS, INC.
23	H755	PREMIER CITRUS - SOUTHEAST GROVES - PHASE 2
24	H753	PREMIER CITRUS - WEST VERO FARMS
25	H756	QC DESOTO GROVE VENTURES PRR PH 4
26	H761	QC PELICAN GROVE, LLC
27	H766	REYNOLDS FARMS INC - ANNES BLOCK
28	H762	SCHWARTZ FARMS
29	H764	TRAVIS COUNCIL
30	H774	UNIVERSITY OF FLORIDA GCREC
31	H744	WAUCHULA ROAD DUETTE
32	H750	WS Farms

Figure 13. Board approved FARMS projects for FY 2017 and FY 2018.

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

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

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Santos BM, Moore DN, Salame-Donoso TP, Stanley CD, Whidden AJ. 2011. *Evaluation of Freeze Protection Methods for Strawberry Production in Florida.* Proc. Fla. State Hort. Soc. 124: 188-190.

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

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