

## 2019 Annual Report Executive Summary

**Award Number** 2017-68007-26319

**Project Title**

Agricultural Water Security through Sustainable Use of the Floridan Aquifer:  
An Integrated Assessment of Economic and Environmental Impacts

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Award Number 2017-68007-26319



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## FACETS Year 2 Report (July 2018-June 2019) Executive Summary

### **Project Goals and Objectives:**

The goal of the USDA-NIFA Floridan Aquifer Collaborative Engagement for Sustainability (FACETS) project is to promote economic sustainability of agriculture and silviculture in North Florida and South Georgia while protecting water quantity, quality, and habitat in the Upper Floridan Aquifer (UFA) and the springs and rivers it feeds. Specific objectives to achieve these goals include:

1. Integrated Modeling Platform Development - Build a comprehensive modeling platform within a Participatory Modeling Process (PMP) to predict farm/forest-scale and regional-scale impacts of alternative land use and production practices on the water quantity, water quality, and economy of North Florida and South Georgia.
2. Stakeholder Engagement and Social Science Research - Integrate stakeholders' experience with scientific data and models to explore economic-environmental tradeoffs among current and potential future climate, land use, technology, Best Management Practice (BMP) adoption and policy scenarios to understand changes needed to achieve agricultural water security and environmental protection.
3. BMP Research and Extension Demonstrations, Tools and Training - Conduct BMP field research. Develop and deliver innovative Extension BMP demonstrations, digital decision toolkits and training programs for diverse stakeholders to bring about preferred changes in production systems and incentive programs.

For more information about project goals and objectives, [click here](#).

For more information on Year 1 project activities, [click here](#).

### **Summary of Year 2 Project Activities:**

In Year 2 of the project (July 2018 to June 2019), the team advanced project research, modeling, stakeholder engagement, and outreach activities to meet project objectives. One peer-reviewed article was published, and 24 presentations on the project and preliminary results were given to local, state, national and international communities of interest, including:

- Members of Congress and their staff during the Agricultural Research Congressional Exhibition (Washington DC, May 2019);
- NIFA Director Scott Angle and US Representative Ted Yoho during a meeting at the University of Florida (Gainesville FL, April 2019); and
- Researchers and NIFA staff during the USDA NIFA PD meeting (Delaware, October 2018).

The project is proceeding on schedule to date. The first two years of the project have primarily focused on implementation of experimental field trials of different crop management systems, irrigation and nitrogen application Mobile App development, farm/forest-scale biophysical and economic model development, stakeholder engagement through meetings and interviews with the Participatory Modeling Process (PMP) stakeholder group, and preliminary communications and social learning research. Details regarding project activities by objective are included below.

#### Integrated Modeling Platform Development

In Year 2 of the project, biophysical models (SWAT) for Florida and Georgia at the farm/forest scale were calibrated and validated using experimental data from Year 1 field trial research. The calibrated models were used to analyze tradeoffs between water quality, water quantity, and agricultural yields across a range of stakeholder-informed management systems for priority crops in FL and GA. The economic modeling team developed farm-scale enterprise budgets and used biophysical model yield results to estimate and compare net returns across management systems. Initial model results for a subset of cropping systems were presented to stakeholders at a PMP meeting, and stakeholder feedback was incorporated. Additional

field experiment results will be incorporated, and biophysical and economic farm/forest-scale model results will be finalized for all crops, forest, and management systems in Year 3.

In addition to farm/forest-scale biophysical and economic modeling, regional-scale biophysical model development began in Year 2, including compilation and integration of climate, land use, groundwater, streamflow, and nitrate concentration data. Preliminary land use change models for the FL-GA study area were developed and are in the process of being revised based on feedback from the project team.

Producer willingness-to-accept (WTA) and public willingness-to-pay (WTP) surveys are needed to produce BMP supply and demand curves that decision makers can use to develop BMP incentive programs. The framework for the stakeholder preference and valuation research for the WTA surveys was developed in Year 2. Facilitated discussions, focus groups, and pre-tests of WTA survey instruments were conducted for foresters, row crop farmers, and hay producers. The WTA survey will be finalized and implemented in Year 3 of the project.

#### Stakeholder Engagement and Social Science Research

In Year 2 of the project, two webinars and one in-person workshop (Workshop 3) were conducted with the PMP stakeholder group to co-develop and co-interpret farm/forest-scale models and results. Input from the PMP was also incorporated into the WTA survey, social learning research, and communications research in Year 2. Specifically, interviews and surveys were conducted with PMP participants to track and analyze perceptions of the model development process as part of social learning research. Mental model analysis of key stakeholder groups in the PMP were conducted, which will inform development of communication strategies and materials of the project. Preliminary data collection was initiated to identify regional water issue concepts needed for public understanding of water issues, and preliminary research was conducted to understand media framing of regional water issues.

#### BMP Research and Extension Demonstrations, Tools and Training

Field trial research (with experimental plot design) was continued in Year 2 to evaluate nutrient loss, water savings, and yield for a variety of irrigation and fertilization practices for priority crops in FL and GA. The SmartIrrigation Corn Mobile App developed in Year 1 of the project was used to schedule irrigation treatments in both the FL and GA field experiments in Year 2. The nitrogen application scheduling component of the Mobile App was developed in Year 2 and is being evaluated for application in the field.

Three extension agent In-Service Trainings that focused on irrigation scheduling and the use of soil moisture sensors were conducted in Year 2.

Additional opportunities for training and professional development in Year 2 included mentorship of undergraduate students (2), graduate students (15), and post-doctoral associates (2).

#### **Summary of Year 2 Project Accomplishments:**

- 24 project presentations to local, state, national and international communities of interest
- 1 peer-reviewed journal article
- Preliminary farm/forest-scale biophysical model results for a subset of cropping systems
- Enterprise-level financial models for row crops, hay, forestry, and grazing
- Draft producer Willingness-to-Accept surveys for crops and hay, grazing, and forestry
- Preliminary land-use change models
- 2 webinars and 1 in-person workshop with PMP stakeholders
- PMP Workshop 3 Report
- Analysis of PMP stakeholder perceptions of model development process
- Mental models of water issues held by regional stakeholders
- Testing of Irrigation scheduling Mobile App (SmartIrrigation Corn App)
- 3 Extension agent In-Service Trainings
- Mentorship of 2 undergraduate students, 15 graduate students, and 2 post-doctoral associates